VIET NAM RUBBER GROUP
JOINT STOCK COMPANY

TECHNICAL PROCESS OF RUBBER TREE 2020

In 2020

MEMBERS OF THE COMPILATION TEAM OF TECHNICAL PROCESS 2020

I. DIRECTED BY: Mr. Tran Ngoc Thuan - Secretary of the Party Committee - Chairman of the BOD of VRG

II. STEERING COMMITTEE FOR AMENDMENT AND SUPPLEMENT OF THE TECHNICAL PROCESS OF RUBBER TREE:

1. Mr. Tran Ngoc Thuan	Chairman of the Board of Directors	- Head of the Department
2. Mr. Huynh Van Bao	Member of the BOD, General Director	- Deputy Head of Department
3. Mr. Ha Van Khuong	Member of the BOD, Head of Technical Management Department	- Member
4. Mr. Pham Van Thanh	Member of the BOD, Head of Planning and Investment Department	- Member
5. Mr. Tran Duc Thuan	Member of the BOD, Head of Organization and Personnel Department	- Member
6. Mr. Nguyen Tien Duc	Deputy General Director of the Group	- Member
7. Mr. Tran Cong Kha	Deputy General Director of the Group	- Member
8. Mr. Truong Minh Trung	Deputy General Director of the Group	- Member
9. Mr. Le Thanh Tu	Deputy General Director of the Group	- Member
10. Mr. Le Thanh Hung	Deputy General Director of the Group	- Member
11. Mr. Tran Thanh Phung	Deputy General Director of the Group	- Member
12. Mr. Le Van Duc	Deputy Director of Department of Crop Production, Ministry of Agriculture and Rural Development	- Member

III. IMPLEMENTATION TEAM FOR AMENDMENT AND SUPPLEMENT OF THE TECHNICAL PROCESS OF RUBBER TREE:

1. Mr. Le Thanh Tu	Deputy General Director of the Group	- Team Leader
2. Mr. Phan Thanh Dung	Director of Rubber Research Institute of Vietnam	- Permanent Deputy Team Leader
3. Mr. Ha Van Khuong	Member of the BOD, Head of Technical Management Department	- Deputy Team Leader
4. Mr. Pham Van Hoi Em	Chief Accountant, Head of Finance and Accounting Department	- Member
5. Mr. Do Huu Phuoc	Head of Immature Department - Industrial Zones	- Member
6. Mr. Nguyen Van Thai	Deputy Head of Technical Management Department	- Member
7. Mr. Pham Hai Duong	Deputy Head of Technical Management Department	- Member
8. Mr. Nguyen Van Hang	Deputy Head of the Planning and Investment Department	- Member
9. Mr. Ho Trong Minh Thao	Deputy Head of Labor and Salry Department	- Member
10. Mr. Nguyen Ngoc Khiem	Specialist of Technical Management Department	- Member
11. Mr. Tran Duc Tieu	Specialist of Technical Management Department	- Member
12. Mr. Hoang Bao Luan	Specialist of Technical Management Department	- Member
13. Ms. Le Vo Thanh Binh	Specialist of Technical Management Department	- Member
14. Mr. Do KimThanh	Former Deputy Director of Rubber Research Institute of Vietnam	- Member
15. Mr. Nguyen Anh Nghia	Deputy Director of Rubber Research Institute of Vietnam	- Member
16. Mr. Tong Viet Thinh	Head of Soil and Agrochemical Research Department, Rubber Research Institute of Vietnam	- Member
17. Mr. Tran Thanh	Head of Genetics and Breeding Research Department, Rubber Research Institute of Vietnam	- Member
18. Mr. Tran Anh Pha	Head of Plant Protection Research Department, Rubber Research Institute of Vietnam	- Member
19. Mr. Nguyen Nang	Head of Exploitation Physiology Research Department Department, Rubber Research Institute of Vietnam	- Member
20. Mr. Phan Dinh Thao	Deputy Head of Planning Department, Rubber Research Institute of Vietnam	- Member, Secretary

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FOREWORD

Rubber tree *(Hevea brasiliensis Muell. Arg)* is a forest tree originating from the Amazon River basin (South America) and was successfully introduced to Vietnam in 1897. Over the course of more than 120 years of formation and development, by the end of 2019, the total rubber plantation area in Vietnam had reached approximately 966,800 hectares, stretching from the traditional Southeast region to the Central Highlands down to the Central Coast and extending to the Northern mountainous region as well as developed in the two neighboring countries Laos and Cambodia.

The rubber industry in Vietnam, in which the Vietnam Rubber Group plays an important role, has been contributing to the country in many fields including agriculture, forestry, environment, economy, and social security. Today, Vietnam has become one of the world's leading countries in terms of productivity, area and export of natural rubber.

Rubber is a long-term industrial tree, with its main products being latex and timber, thus requiring a Technical Process to enhance the efficiency of planting and commercializing this tree. In the past, the Technical Process was developed and applied by the General Directorate of Rubber, the Rubber Group, and later by Vietnam Rubber Group in the years 1990, 1997, 2004 and 2012, which has effectively improved productivity, quality and plantation area for the domestic rubber industry. Currently, with advancements in various fields and the expansion of rubber plantations, beyond traditional regions, the Technical Process of Rubber Tree needs to be updated, supplemented and adjusted to suit actual conditions.

The Ministry of Agriculture and Rural Development has recognized rubber as a multi-purpose tree that contributes to reforestation and greening barren lands. In addition, with the commitment and implementation of the Vietnam Rubber Group toward sustainable rubber development, based on the harmony of corporate benefits and responsibilities to society and the environment, this process also emphasizes several issues related to environmental, social, and forest development factors, which are new additions beyond the technical provisions outlined in previously issued technical processes.

The Compilation Board is primarily composed of Research Departments, experts and specialized staff of the Rubber Research Institute of Vietnam, along with specialized departments from the Vietnam Rubber Group, led by the Technical Management Department, based on the results of the most effective research achievements both domestically and internationally, as well as the continued production experience accumulated over time. Additionally, this process also receives enthusiastic contributions from professional technical managers with a plot of practical experience from Universities, Institutes, NGOs and rubber plantation units within the Group.

However, despite the best efforts of all members and the collective, some mistakes are unavoidable. We look forward to continuing to receive comments and new requests to update, improve and adapt this process to technical and management solutions for the next edition.

COMPILATION BOARD

Part I

GENERAL PROVISIONS

SECTION I. SCOPE OF APPLICATION OF THE PROCESS

Article 1. Scope of application

The Technical Process of Rubber Tree (hereinafter referred to as the "Process") is issued by the Vietnam Rubber Group (hereinafter referred to as the "Group"). It is strictly prohibited for any individuals or organizations outside of the Group to copy this document in any form without written permission from the Group.

This Process is applied uniformly and consistently across all rubber planting member units managed by the Group, and the units in which the Group holds a controlling capital.

Article 2. Implementation provisions

- All individuals and organizations within the member units involved in planting, caring for, harvesting rubber latex and timber under the Group's management must strictly comply with the provisions outlined in the process. Any actions involving techniques, fertilizer use, materials, or chemicals not mentioned in this process must be approved in writing by the Group.

- The leaders of the member units are directly responsible to the Board of Directors and the Board of General Directors of the Group for organizing and implementing this process. The member units are responsible for reporting the implementation results or proposing amendments to the Group periodically or upon request.

- The Group is responsible for: (i) training, inspecting, evaluating, and supervising the implementation of the process at the units; (ii) issuing appropriate technical-economic norms to facilitate timely implementation by the units. When necessary, the Group may establish independent inspection, verification, and evaluation teams.

Article 3. Basis for developing the process

- Decision No. 750/QD-TTg dated June 3, 2009 by the Prime Minister on the approval of the rubber development planning until 2015 and vision to 2020.

- Decision No. 2930/QD/BNN-KHCN dated October 10, 2006 by the Ministry of Agriculture and Rural Development on promulgating industry standards (10 TCN 763:2006; Rubber - Technical Process for new planting, care and exploitation of tree plantations).

- Circular No. 58/2009/TT-BNNPTNT dated September 9, 2009 by the Ministry of Agriculture and Rural Development guiding rubber planting on forest land.

- Technical Process of Rubber Tree 2012 issued by the Vietnam Rubber Group in 2012 and additional Technical Processes 2014 and 2017; the Technical Process for developing rubber in storm-affected areas in the Central Coastal Region

- Decision No. 419/QD-TTg dated April 5, 2017 by the Prime Minister on the approval of the National Program on greenhouse gas emission reduction through limiting deforestation and degradation; conserving, enhancing carbon stocks and sustainably managing forest resources by 2030.

- Decision No. 1288/QD-TTg dated October 1, 2018 by the Prime Minister on the approval of the Sustainable Forest Management and Forest Certification Project.

- Law on Crop Production No. 31/2018/QH14 passed by the National Assembly of the Socialist Republic of Vietnam on November 19, 2018.

- Circular No. 28/2018/BNNPTNT dated November 16, 2018 on sustainable forest management of the Ministry of Agriculture and Rural Development.

- Handbook and Guidelines for implementing sustainable forest management, Vietnam Forestry Administration, Industry and Trade Publishing House, 2019.

- Handbook on sustainable forest management for plantation forests, WWF-Vietnam and Vietnam Forestry Administration, 2018.

- Decision No. 2855/QD-BNN-KHCN dated September 17, 2008 by the Ministry of Agriculture and Rural Development deciding to announce that the rubber tree is classified as a multi-purpose tree.

Article 4. Technical and economic objectives

- To meet the rubber development needs of the Group in the new context, following the direction of sustainable development and improving rubber production efficiency.

- To improve the effectiveness of land use for rubber planting.

Article 5. Scope of regulation

Any amendments or changes to the provisions mentioned in process shall be decided in writing by the Board of Directors of the Group.

Article 6. Reward and penalty regime

- Individuals and organizations that achieve outstanding performance in implementing the process will be rewarded by the Group according to the current regime;

- For individuals and organizations that violate the provisions in the process, disciplinary measures will be taken depending on the extent of the damage, in accordance with the Group's regulations and State law.

SECTION II. RESPONSIBILITIES FOR THE MANAGEMENT OF THE RUBBER PLANTATION PROJECTS TOWARD SUSTAINABILITY

Article 7. General provisions

- Rubber plantations are the property of the investor and shareholders; managers must be responsible for effective management, use, protection and exploitation of this property;

- Reporting system: Subordinates are responsible for reporting to their immediate superiors on production activities and the implementation of technical process on a regular basis (daily, monthly, quarterly, and annually).

Article 8. Sustainable development

- The Vietnam Rubber Group advocates sustainable business development with three main objectives: Economic Development - Environmental Protection - Social and Community Responsibility.

- Research and apply scientific and technological advancements (S&T) to improve the productivity and quality of rubber plantations and labor productivity; while enhancing land use efficiency and protecting rubber planting soil and the environment.

Article 9. Main harvested products of rubber trees and production cycle

The main harvested products of rubber trees are latex, timber, and rubberwood fuel; in order to ensure production and business efficiency in line with the Group's objectives, direction, and development strategy, as well as market demands and specific conditions of each project, the Board of Directors of the Group will determine the duration of the production cycle.

Article 10. Improvement of land use efficiency and soil improvement

- Develop rubber in combination with planting, protecting and restoring forests;

- Intercrop short-term plants in rubber plantations during the initial construction phase;

- Focus on soil rotation to restore degraded land before replanting rubber in the next cycle;

Article 11. Application of scientific and technological advancements to improve production and business efficiency

- Improve the quality and productivity of gardens using advanced varieties that can adapt to climate change;

- Optimize the average density from 500-800 trees/ha, depending on land conditions and intercropping models;

- Encourage the application of leaf and soil nutrient diagnostic techniques to optimize fertilizer use and increase organic matter in rubber plantations during the business phase;

- Do not use prohibited chemicals and limit the use of highly toxic substances that are harmful to humans, animals, beneficial insects, or have negative environmental impacts;

- Only plant rubber on suitable land, in compliance with legal regulations and the commitments of the Group;

- Apply geographic information systems (GIS) to improve economic efficiency and management;

Article 12. Responsibilities of the Project Investor (Director of the Group, and the Company)

- Be responsible to the Group for achieving the quality targets of the gardens;

- Direct, organize, assign, inspect, handle, and reward the implementation of the process;

- Implement regulations on organizing technical inspections of latex harvesting issued by the Group;

- Report implementation results periodically or on request to the Group;

- Take responsibility and comply with disciplinary measures from the Group for failing to complete tasks;

Article 13. Responsibilities of the Plantation Director

- Be responsible to the Company for managing new plantations, re-plantations and immature plantations, implementing the latex harvesting plan, and the technical condition of the mature

rubber plantations;

- Direct the proper implementation of technical process for the care of new plantations, re-plantations and immature plantations, commercial plantation and organizing latex harvesting;

- Organize periodic technical inspections following the process guidelines;

- Take responsibility and comply with the company's disciplinary measures for failing to complete tasks;

Article 14. Responsibilities of team leaders and group leaders in taking care of immature plantations

- Manage the implementation of new plantation care, replanting and immature stages according to the process guidelines;

- Assign, arrange, and manage workers directly. Inspect the implementation of care tasks;

- Report and make recommendations to the Plantation Director on implementation results regularly;

- Take responsibility and comply with the plantation's disciplinary measures for failing to complete tasks;

Article 15. Responsibilities of team leaders and group leaders in latex harvesting

- Manage the implementation of the latex production plan, manage workers, and technical aspects of teams and groups, and be responsible for the technical condition and product quality managed by teams and groups;

- Arrange and assign substitute tapping workers when regular tapping workers are unexpectedly absent. Check and keep track of the equipment for the garden to ensure timely replacements when needed.

- Daily inspect the technical aspects of the tapped trees in the team and group; correct any technical violations promptly.

- Accurately manage the number of tapped trees in each section, check and detect trees that have not been tapped to remind workers to taper all the trees; diseased trees to notify technical staff to take timely measures to prevent and control the disease;

- Manage the daily latex yield and quality (measure, weigh latex for workers, and remind workers to collect all latex).

- Manage the teams and groups' afternoon shifts, inspect and urge latex collection and care tasks in the afternoon.

- Report and make recommendations to the Plantation Director on implementation results regularly.

- Take responsibility and comply with the plantation's disciplinary measures for failing to complete tasks or violating the process.

Article 16. Responsibilities of latex tapping workers

- Latex tapping workers are responsible for caring for, managing, and harvesting from their assigned trees in accordance with technical process. If they discover any diseased trees, broken

trees, or trees with tapping panel dryness, they must immediately report to the team leader for corrective action.

- Do not arbitrarily abandon their trees or miss collecting latex.

- In case of illness or personal leave, they must inform the team leader in advance so that a substitute can be arranged.

- Regularly maintain cleanliness of tapped trees and tools, repair tapping cuts, and apply vaseline to excessively deep tapping cuts. Restock missing materials, apply preventive treatment to the tapping cuts during the rainy season. For controlled upward tapping plantations, ensure that any flowing latex on the tapping panel is fully removed.

- Before the tapping rest season, all contaminated latex and latex from the ground must be collected, and the tree area should be cleaned. Collect and clean all tapping tools such as frames, gutters, and cups, then store them safely. Sweep and gather leaves and create firebreaks to prevent fires in the plantation.

- Before resuming tapping, inspect the trees, adjust the tapping cuts, and ensure all necessary materials are available for the tapping area.

- It is prohibited to purchase and use any external chemicals (pesticides and latex stimulants) for the plantation without permission.

- Workers are not allowed to bring family members or unauthorized individuals into the plantation to perform tasks without the approval of the Plantation manager.

Article 17. Professional qualifications

- Rubber tapping workers must complete a vocational training course and possess a certificate of competency.

- For controlled upward tapping, workers must be trained in upward tapping techniques for at least one week.

Article 18. Fire prevention for plantations and care for burnt trees

- Before the annual dry season, implement fire prevention measures for the plantation. Create firebreaks about 50 - 100 m apart;

- During the rubber tree leaf-shedding season, organize the sweeping or blowing of leaves and gather them in rows or multi-purpose pits. It is forbidden to burn or collect leaves and transport them outside the plot.

- During the dry season, units must have fire prevention measures in place to protect the plantation. Place fire prohibition signs on main roads and inter-lot roads;

- Organize a firefighting team equipped with proper tools and assign workers to be on standby for firefighting duties.

In the event of a fire, use a 5% lime solution to paint over the affected bark.

Article 19. Plantation protection

- It is forbidden to allow livestock to roam freely in the rubber plantation.

- Any illegal activities such as latex theft, trading of latex, tree cutting, or damaging

equipment in the rubber plantation are strictly prohibited.

- Rubber trees marked for liquidation (due to disease, natural disasters, etc.) must be inventoried and marked before cutting to avoid confusion with other trees.

Part II

TECHNICAL PROCESS

Chapter I
LAND PREPARATION FOR RUBBER PLANTING

Article 20. General provisions on area planning for plantation establishment

- The planning area for the construction of rubber plantations must ensure the standards for rubber growing land; no conversion of natural forest land to rubber growing land; land not located in the area of natural heritage conservation areas, national forests, community forest land, relics, temples; land not subject to environmental conservation and other prohibited areas according to the provisions of law;

- In this process, sloping land is land with an average slope of 10^{o} or more.

Article 21. Climatic zones for rubber planting

- Rubber grows optimally in conditions where rainfall >1,800 mm/year, dry season <5 months, the total evaporation during the dry season<500 mm, number of foggy days <20 days/year, average air temperature >25oC, maximum temperature 30 - 32^{o}C, minimum temperature >20^{o}C;

- Climate areas are not suitable for rubber planting when there is one of the following limitations: rainfall <1,200 mm/year, dry season >7 months, or number of foggy days >80 days/year; for areas that are often heavily affected by storms, only plant new rubber trees >50 km from the coast; do not plant new rubber trees in areas with elevation >600 m in the Northern mountainous region and >650 m in other regions;

- For rubber growing areas with elevation >600 m in the Northern mountainous region and >700 m in other regions, or areas with unfavorable climates due to factors such as storms, Lao winds, low temperatures, etc., the immature period and average yield of the entire rubber plantation cycle will be considered and decided by the Group.

Article 22. Standards for rubber growing soil

- Rubber grows optimally on soils with heavy and medium mechanical composition, a useful soil layer of more than 2 m, good drainage, no waterlogging, less than 10% gravel or stone by volume, relatively flat terrain, water pH values between 4.5 and 5.0, humus content >4%, base saturation >40%, exchangeable potassium >0.20 mm equivalent/100g of soil;

- Rubber should not be planted in areas with the following soil limitations: an average slope >30°; groundwater depth <100 cm, hard laterite or gravel, stone ratio >70% of volume; from the ground surface to a depth of 150 cm there is bedrock (mother rock) or compacted clay layer; soil mechanical composition is sand (according to FAO classification).

Article 23. Classification of rubber growing soil

a. Limitation level of soil factors (Table 1)

Rubber growing land is classified based on seven main factors including: soil depth, mechanical composition, the presence of laterite or gravel in the soil layer, soil acidity, humus content, groundwater depth, and slope.

Table 1. Classification of the limitation level of rubber growing soil factors applied to common rubber growing areas

Indicator	Limiting Factors	Limitation Levels				
		0	**1**	**2**	**3**	**4**
1	Soil depth (cm)	> 200	150 - 200	120 - 150	100 - 120	< 100
2	Mechanical composition*	S, Spt	Spc, Tps, Tpsm, Tpsc	T, Trm, Tm	Tpc	C, Cpt
3	Laterite, gravel content (% volume)	< 10	10 - 30	30 - 50	50 - 60	> 60
4	Soil acidity (pH in water)	4.5 - 5.0	5.0 - 5.5 or 4.0 - 4.5	5.5 - 6.5 or 3.5 - 4.0	> 6.5 or < 3.5	-
5	Humus content in the 0-30 cm layer (%)	> 4	2.5 - 4	1 - 2.5	< 1	-
6	Groundwater depth (cm)	> 200	150 - 200	100 - 150	70 - 100	< 70
7	Slope (degrees)	< 5	5 - 10	10 - 15	15 - 30	> 30

*S: clay, Spt: loam, Spc: sandy loam, T: rich soil, Tm: fine rich soil, Trm: very fine rich soil, Tps: loamy soil, Tpsm: fine loamy soil, Tpsc: sandy loamy soil, Tpc: sandy soil, Cpt: soil sand, C: sand.

b. Classification of rubber growing soil

- Based on the limitation level of the above factors, rubber growing soil is classified as follows:

+ I: only factors at the limitation level 0 and 1;

+ II: one factor at limitation level 2;

+ III: one factor at limitation level 3;

+ IV: one factor at limitation level 4.

- Rubber planting is only permitted on soils classified as I, II, and III (equivalent to S1, S2, S3 according to FAO classification). Rubber should not be planted on IV grade soil, peatland and dipterocarp forest land.

Article 24. Management of rubber growing soil classification

- Before new planting or replanting, detailed land classification must be conducted (if the land classification survey has not been conducted according to the process from 2012 onwards). The land classification is carried out by a specialized agency/unit and appraised by the Group;

- The results of land classification must be accompanied by the main limiting factors, identifying the causes of limitations to have reasonable cultivation measures;

- Land classification results for categories I, II and III are one of the bases for calculating the immature period, the recommended fertilizer level for immature rubber and

mature rubber;

- Regulations on sampling of soil profiles: based on the terrain and homogeneity of the area proposed for rubber planting, conduct a survey to collect soil profile samples of layers at a depth of 0 - 150 cm, representing areas from 5 to 25 ha. In areas with flat terrain and no significant soil limitations, one profile should be sampled for every 20-25 hectares; in areas with flat terrain but significant soil limitations, one profile for every 5-10 hectares; and in sloped areas, one profile for every 10-15 hectares.

Article 25. Standards for rubber growing soil classification

- Apply the criteria for assessing the limitation level of the 7 indicators in Table 1 for all rubber growing areas.

Article 26. Management and use of land not suitable for rubber growing

- For land areas that are not suitable for rubber growing, fragmented areas or areas difficult to access and manage, the unit must submit to the Group for consideration and decision to change the land use purpose in accordance with actual conditions;

- Prioritize the use of land not suitable for rubber growing according to the goal of sustainable development: natural regeneration, forest restoration, afforestation, etc.

Article 27. Items and sequence of work for replanting and new planting

- Land preparation must be completed before the new planting season. Plantation construction works including main roads and plot roads must be completed before rubber planting;

- Land preparation for replanting and new planting should avoid burning and include the following items and sequence of work: tree felling, timber harvesting, stump removal, gathering in-lot piles, leveling the ground, root raking and clearing remaining stumps, roots, and branches;

- Depending on actual conditions, some of the above items do not need to be performed. After root raking (if any) and site cleaning, do not plow the topsoil on both flat and sloped lands;

- Measures to prepare land for replanting without stump removal can only be carried out with the consent of the Group;

- For areas with problems with root diseases, harmful insects or rodents, after collecting roots, branches, and twigs into piles, controlled burning should be conducted once the debris is sufficiently dry;

- Lands with cogon grass must be treated with herbicides to completely eliminate the grass before planting;

- Land must be cleared, and obstacles such as stumps, termite mounds with a diameter of 2-3 meters, pits, and ditches must be leveled to facilitate subsequent land preparation and new planting operations;

- On flat lands, if soil porosity meets requirements, it is recommended to use subsoilers (non-reversal plows) to rake roots, instead of using three-disc plows;

- For sloped land, root raking should only be done along planting rows using subsoilers, and not across the entire area.

Chapter II
LOT DESIGN AND PLANTATION CONSTRUCTION

Article 28. Rubber plot design

a. Plot design on flat land

- Plot design map: Create a layout design map of the plot and plot roads based on a topographic map at a 1/10,000 scale;

- Plot shape and area: Design plots with an area of 12.5 ha (500 m x 250 m) or 25 ha (500 m x 500 m);

- Density, spacing and direction of planting rows: density of 500 - 800 trees/ha, row spacing of 6 - 8 m, and tree spacing of 2.5 - 3.0 m, the planting rows should be oriented North-South. Common planting distances are 6 m x 3 m (555 trees/ha) and 7 m x 2.5 m (571 trees/ha). Areas affected by storms and winds, the planting rows should be oriented East-West.;

- For rubber plots that need intercropping, design double rows or single rows in the East - West direction (preferably double row), with a density of 500 - 800 trees/ha. The common planting distance for double rows is 15 x 5 x 2 m (500 trees/ha) and single rows is 10 x 2 m (500 trees/ha).

b. Plot design on sloped land

- Plot design map: Create a layout design map of the plot, plot roads, and erosion control system (if conditions permit) based on a topographic map at a 1/10,000 scale;

- Plot shape and area: Design the plot shape and size according to the specific terrain, with a minimum plot size of 6 ha. Each plot must have a road running diagonally across contour lines, connecting all planting rows for maintenance, transportation of supplies, fertilizers, and latex harvesting (Figure II.1).

- Density and spacing: Rubber should be planted on contour strips with a density of 500 - 600 trees/ha, with row spacing of 7 - 8 m and tree spacing of 2.5 - 3.0 m;

- The common planting distance on slopes ≤ 15° is 7 m x 2.5 m (571 trees/ha) and on slopes >15° is 8 m x 2.5 m (500 trees/ha). In areas with sharp terrain curves, row spacing may vary ± 1.0 m and the tree spacing may vary ± 0.5 m compared to the design distances.

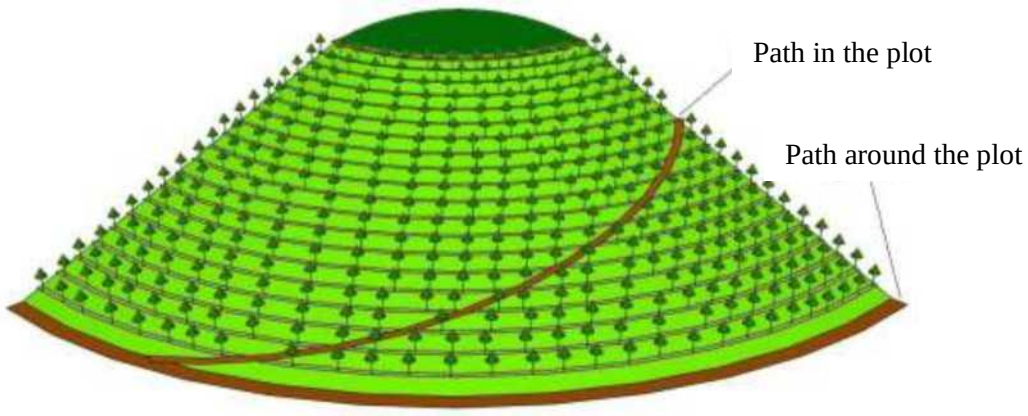


Figure II.1. Rubber plot design on sloped land

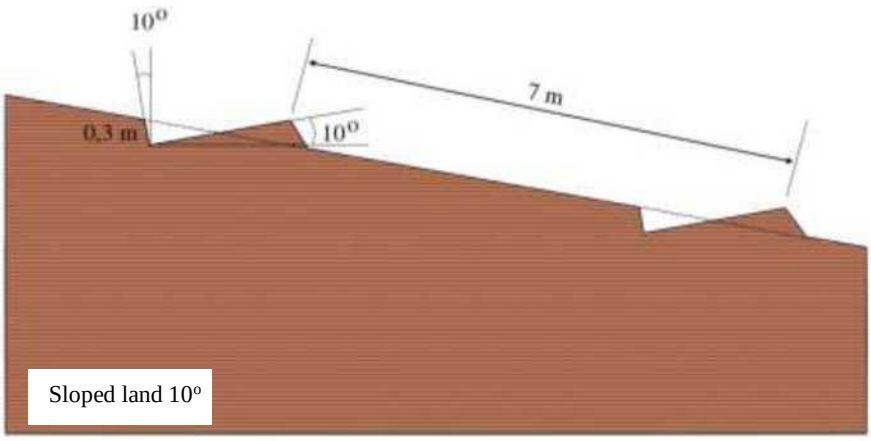
Article 29. Construction of contour strips on sloped land

- Contour strips should be constructed mechanically or manually, depending on specific conditions (Table 2). The contour strip has a slope of 10° from the negative slope to the positive slope, the positive slope wall is inclined towards the top of the slope 10° from the vertical (Figure II.2 and Figure II.3);

- In the first year, the contour strip should be at least 1.2 m wide and completed no later than the second year. For minimum strips, rubber is planted close to the positive slope; for complete runways, plant rubber 1/3 of the width of the runway away from the positive slope. Only extend the contour strip towards the positive slope.

Table 2. Dimensions and volume of excavation and embankment of contour strip according to slope

Slope (°)	Contour width (m)	Positive slope height (m)	Earthwork volume per 100 m (m^3)
10	2.0	0.3	18
15	1.9	0.4	21
20	1.8	0.5	23
25	1.7	0.6	25
30	1.6	0.7	27



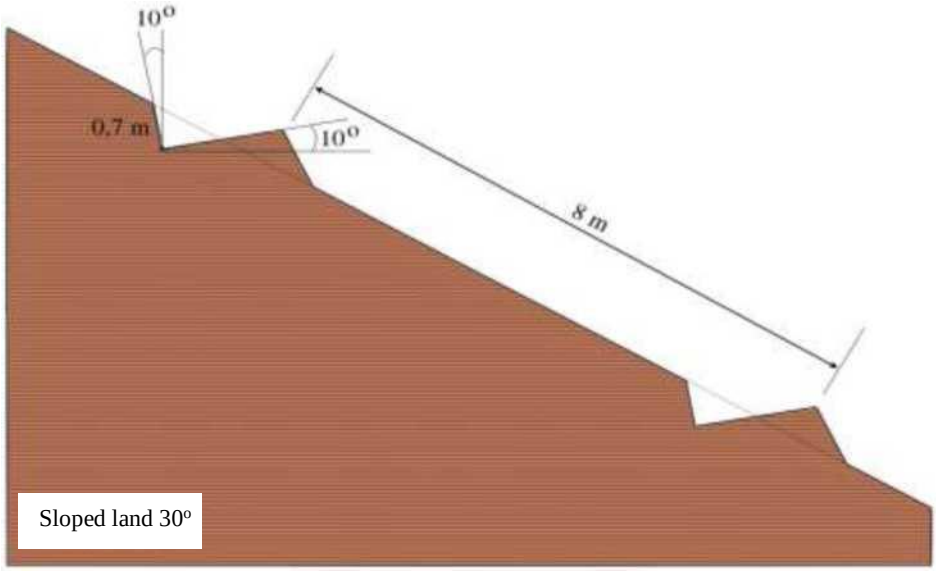


Figure II.2. Design of contour strips on 10° and 30° sloped land

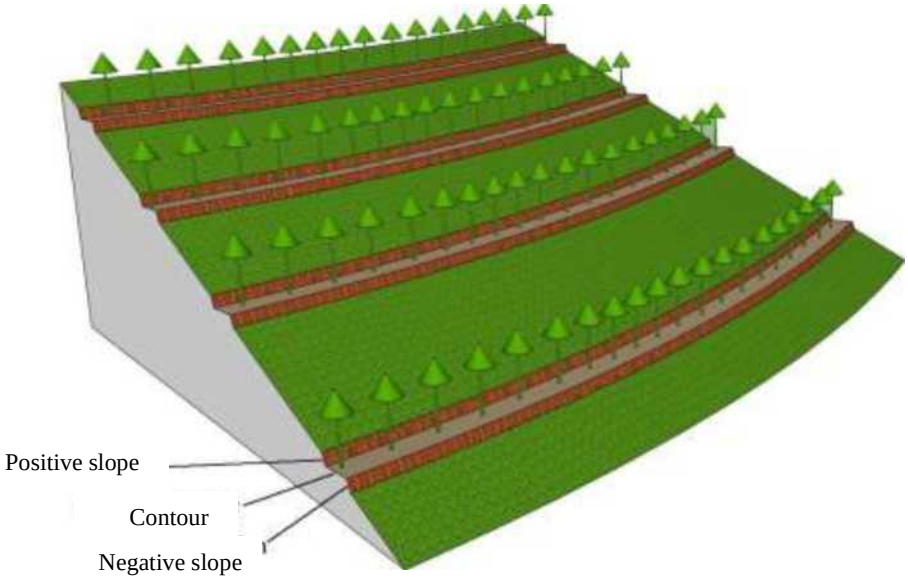


Figure II.3. Rubber planted in contour strips on 30° sloped land

Article 30. Construction of anti-erosion ditch systems on sloped land

On sloped land, if there are sufficient conditions for machinery and equipment, it is recommended to construct anti-erosion ditch systems according to the distances specified in Table 3;

Table 3. Distance between two ditches according to slope

Slope (°)	Distance between two ditches	
	Number of rubber rows	Distance (m)
10 - 15	11	77
15 - 20	9	72
20 - 25	7	56
25 - 30	5	40

- Shape and size of anti-erosion ditches according to Figure II.4a, II.4b and Table 4;

- Ditches should be designed discontinuously, with a 2.0 m gap between sections, and each section should be at least 40 m long. The 2.0 m gaps should be staggered relative to adjacent ditches;

- The volume of soil excavated and filled in the ditches depends on the slope as specified in Table 4.

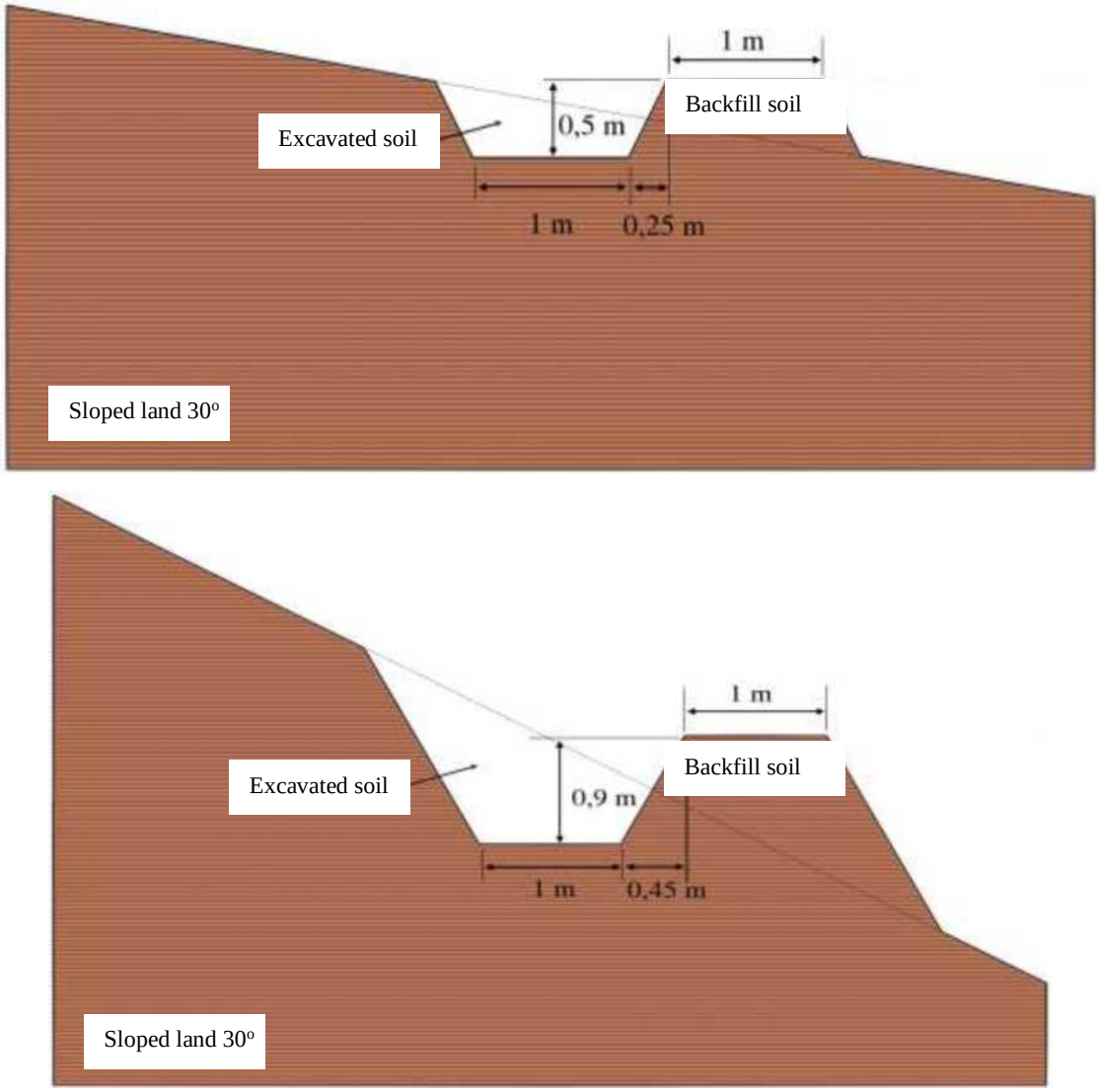


Figure II.4a. Design of anti-erosion ditches on 10º and 30º slopes

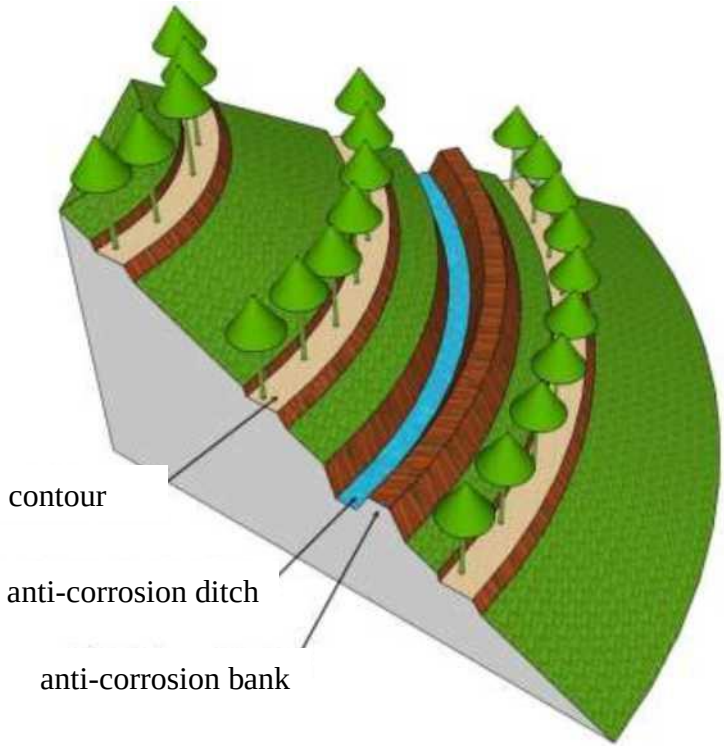


Figure II.4b. Rubber planted in contour strips and anti-corrosion ditches on 30° sloped land

Table 4. Dimensions of an-erosion ditches and earthwork volume by slope

Slope (°)	Ditch depth/bank height (m)	Ditch and bank width* (m)	Earthwork volume per 100 m (m^3)
10	0.5	0.25	43
15	0.6	0.30	61
20	0.7	0.35	82
25	0.8	0.40	108
30	0.9	0.45	140

* The ditch and bank width is calculated according to the vertical projection on the horizontal plane (Figure II.4a). The ditch bottom and top width are constant at 1.0 m across all slopes.

Article 31. Management of soil between rows and auxiliary works on the plot

- During the care process, limit plowing between rows, maintain controlled natural vegetation between rows (except cogon grass, bamboo, and reed). Do not plow the topsoil from the fourth year of planting onwards. In suitable areas, it is necessary to establish leguminous cover crops or other vegetation capable of soil protection.

- Regularly check and promptly detect landslides and erosion on the ditch, bank and topsoil to take timely measures. Plant trees to cover the entire bank and the top of the ditch slope with drought-resistant grasses, creepers, or shrubs;

- During the rainy season, for basin areas where water sources from outside intrude into the rubber area, it is necessary to apply measures to build dikes to prevent water from overflowing and dig drainage ditches to divert water away from the rubber growing area.

Chapter III
PREPARATION OF RUBBER SEEDLINGS

SECTION I. TYPES OF RUBBER SEEDLINGS USED FOR RE-PLANTING AND NEW PLANTING

Article 32. General provisions

- The Group issues the rubber variety structure applicable to each region in each phase, approves the variety structure and accepts the annual implementation results on the newly planted and replanted plantations of member units;

- Units under the Group strictly comply with the variety structure and planting ratio specified in the rubber variety structure applicable to each specific growing region/sub-region in each phase. In case of using planting varieties that do not comply with the recommended variety structure, it must be consented and approved by the Group;

- Must ensure the purity of the variety and quality standards of the replanted and newly planted rubber seedlings;

- Units using varieties and seed suppliers must comply with current regulations on plant variety management issued by the State and the Group;

- Encourage units under the Group to cooperate with the Rubber Research Institute of Vietnam to plant experimentally, conduct trial production or demonstrate new advanced varieties and international exchange varieties, especially rubber varieties in the direction of "latex - wood" or "wood - latex".

Article 33. Types of seedlings with no restriction on usage rate

- Rubber seedlings are pots with leaf whorls, priority is given to using pots with 1 - 3 leaf whorls;

- In case of planting with types of seedlings other than those specified above, the consent and approval of the Group are required.

Article 32. New types of seedlings encouraged to be used in experimental models before widespread use

- Rubber seedlings in root-trained bags and other advanced planting materials are aimed at testing or pilot production on a medium or small scale;

- Testing on a scale larger than 50 hectares must be agreed and approved in writing by the Group;

- Priority is given to the goal of combining advanced planting materials and testing new rubber varieties.

Article 34. Standards for replanting and new planting seedlings

- Rubber seedlings for replanting must ensure purity, have a clear origin, and meet quality standards.

- Seedlings in pruned-root bags (Bo) used for production with 1 to 3 leaf whorls: Bags must not be broken, trees must not have loose roots or broken roots; the diameter of the grafted rootstock must be > 12 mm (measured just below the graft union); the graft union at the leaf axil should be green or green-brown; the rootstock should not be scratched, peeled, or infected.

One-leaf-layer bags (B1): Rootstock standards similar to Bo bags; the first leaf whorl must be stable, with a height of ≥ 17 cm; leaves must not be deformed by disease or herbicide/growth stimulant impact; the diameter above the 5 cm shoot development point should be >3 mm, and the tree must be disease-free.

Two-leaf-layer bags (B2): Rootstock and leaf standards are similar to B1 bags; the upper leaf whorl must be stable, with a height of ≥ 37 cm; the diameter above the 5 cm shoot development point should be ≥ 5 mm, and the tree must be disease-free.

Three-leaf-layer bags (B3): Rootstock and leaf standards are similar to B2 bags; the upper leaf whorl must be stable, with a height of ≥ 47 cm, the diameter above the 5 cm shoot development point should be ≥ 7 mm, and the tree must be disease-free.

Article 35. Confirmation of the correct variety structure and the seedlings quality for replanting and new planting

- Confirming that the planted varieties are in accordance with the approved variety structure of the Group and that the seedlings meet the quality standards as stated in Article 33 is a mandatory requirement for all units of the Group before replanting or new planting;

- The organizations/units performing this confirmation must have the expertise and competence to meet the requirements for rubber variety confirmation and are approved by the Group.

SECTION II. RUBBER SEED PRODUCTION MANAGEMENT

Article 36. General provisions

- Production, supply and use of rubber seedlings in the Group must comply with the Law on Crop Production and the Group's regulations;

- Units under the Group are responsible for managing the production, supply and use of rubber seedlings in their units and affiliated units;

- Encourage units to research, apply and produce advanced varieties of seedlings (root training bags, etc.) to improve the quality of the plantation and investment efficiency.

Article 37. Seed management in multiplication garden

- Develop production plans and report progress according to the Group's unified form;

- The designed multiplication garden must ensure regulations on distance, density, and care regime according to the current Process;

- The multiplication garden must have a board clearly stating the name of the variety of each seed plot, including area, year of establishment, and a detailed diagram of the seed plot.

- The multiplication garden used for production must undergo annual seed purification, and the quality of grafted wood must meet the standards specified in current Process.

Article 39. Seed management in nurseries

- Develop production plans and report progress according to the Group's unified form;

- A detailed log must be kept for activities in the nursery, including timing, quantity, and quality of tasks such as seed placement, planting, seed source, fertilizer, watering, care, and pesticide use;

- The nursery must have a detailed diagram of the varieties, with each grafted variety organized into separate plots.

Article 39. Plant protection in multiplication gardens and nurseries

- Grafted wood and rubber seedlings leaving the nursery must be disease-free and free from other harmful organisms. Only herbicides, fungicides, and insecticides listed in the Technical Process on Plant Protection are permitted for use.

- The use of growth stimulants or growth inhibitors in the production of grafted wood and rubber seedlings is strictly prohibited.

SECTION III. ESTABLISHMENT AND MAINTENANCE OF RUBBER GRAFTED WOOD PLANTATIONS

Article 40. Location and design

- Choose a place with suitable climate conditions, a source of irrigation water, light-textured and well-drained soil, and a plantation location convenient for travel and transportation;

- Design the multiplication garden to ensure anti-erosion and anti-flooding in the rainy season, convenient for care and management;

- The multiplication garden is divided into many small plots, the plots can be 50 - 100 m long, 20 - 30 m wide, the plots are separated by a 3 m-wide pathway, and the main transportation routes should be 5 meters wide;

- Trees are planted in single rows, with spacing of 1 meter between rows and 0.5 or 1 meter between trees. This results in planting densities of 20,000 roots/ha or 10,000 roots/ha, excluding path areas (Figure III.1).

- Trenches should be dug 40 cm wide and 50 cm deep, or the equivalent depth should be made mechanically.

- Apply 20 tons/ha of decomposed manure or other high-quality organic fertilizers, along with 1.1 tons/ha of fused phosphate, spreading and mixing them evenly with the soil in the trench or hole.

- The multiplication garden can be planted with bare-root seedlings, pruned-root seedlings, seedlings with leaf whorls, or seed-grown plants for grafting in the garden.

Figure III.1. Design of rubber multiplication garden

Article 41. Care

- Ensure sufficient irrigation when planting, fertilizing, and prior to harvesting grafted wood. During dry seasons, apply 250 m^3/ha of water per week, continuously for 6 weeks before wood cutting. In cases of severe drought, increase the watering frequency to 2-3 times per week for 6 weeks to ensure grafted wood quality when leaving the garden.

- Keep the multiplication garden weed-free using manual methods or herbicides.

- Maintain two shoots per roots in the second and third years, and from the fourth year onward, maintain a maximum of three shoots per rootstock depending on the size of the rootstock.

Article 42. Seedling purification

- Regularly prune the shoots, ineffective branches and mixed-variety branches (if any);

- Thoroughly remove mixed-variety roots (if any).

Article 43. Grafted wood standards

- The grafted wood branch must be of the same age as the rootstock and peel easily;

- The number of viable graft unions varies depending on the variety, but on average, there should be 10 viable graft unions per meter of green or brown-green grafted wood, except for certain varieties like RRIV 106 and PB 255, which may have fewer viable graft unions.

Article 44. Leaf whorl raising and grafted wood cutting

- Leaf whorl raising: 20-25 days before cutting, prune the lower leaves, leaving petioles 1-2 cm long, while retaining the top two leaf whorls.

- Grafted wood cutting: Only cut grafted wood that has stable upper leaf whorls and can peel easily. Perform the cutting during cool weather.

- Cut the grafted wood 10 cm above the shoot development point with a clean cut, without damaging the base, and seal the cut with Vaseline;

- The amount of brown-green grafted wood available for the main harvest from 1 ha is approximately 10,000 meters in the first year, 22,000 meters in the second year, and 30,000 meters from the third year onward.

Article 45. Grafted wood without raising leaf whorls

- Harvest grafted wood without raising leaf whorls to collect graft unions with petioles (green graft unions). After cutting, immediately prune the leaves, leaving 1-2 cm of petiole, and store the wood in a cool and moist place.

- When cutting the graft unions, leave the petiole about 1 mm away from the abscission layer, avoiding any damage to the graft union’s bark.

- For long-distance transportation, arrange the grafted wood in layers with moisture-retaining materials, without bundling them tightly. Water the wood during cool weather while in transit.

- The time from cutting to grafting should not exceed two days.

Article 46. Preservation and transportation of grafted wood branches

- Immediately after cutting, carefully collect the grafted wood branches to avoid damage, dip both ends in wax or apply vaseline, and store it in a cool and moist area, avoiding direct sunlight.

- Preservation: Grafted wood branches are kept moist with wet burlap, damp sawdust, or water-saturated straw that does not generate heat, and stored in a well-ventilated area. For long-distance transport, tie the wood tightly into bundles, each bundle containing 20 branches. The vehicle transporting the wood branches must have a well-ventilated canopy, and the floor should be lined with moisture-retaining materials (e.g., burlap, straw, sawdust). Arrange the bundles of branches in layers, with each layer covered by moisture-retaining material. Water the wood during cool weather while in transit.

- The time from cutting to grafting should not exceed five days.

Article 47. Shaping and regenerative cutting

- Shaping: Maintain a single trunk per rootstock at a height of 50 cm. For subsequent harvests, cut 10 cm above the previous harvest point.

- Regenerative cutting: After 3-5 years of harvesting grafted wood, cut the main stem down to just below the initial shaping point.

- Grafting onto an old rootstock is not recommended. If re-grafting is necessary, it should be done on new shoots after regenerative cutting.

SECTION IV. ESTABLISHMENT AND MAINTENANCE OF RUBBER SEEDLING NURSERIES WITH LEAF WHORLS

Article 48: Planting season, location, and design

- The planting season for seedlings begins from July to September;

- Choose a location with suitable climatic conditions, available water sources, and convenient access for travel and transportation;

- The nursery design should ensure erosion control, good drainage, convenient for construction, care and management;

- The nursery is divided into plots, each measuring 20 x 10 meters, with 3-meter wide paths between plots. Large-scale nurseries have a main road width of 5 meters and secondary roads of 3 meters;

- The design density of the nursery ranges from 120,000 - 130,000 bags/ha if the bag size is 18 x 35 cm or 150,000 - 160,000 bags/ha if the bag size is 16 x 33 cm;

- Rows can be arranged in two ways:

+ Single rows: bags are placed in a furrow, with a spacing of 0.7 - 0.8 meters between the centers of the furrows;

+ Double rows: two rows of bags are placed in the furrow, with a 1.2-meter spacing between the centers of double rows. Bags are spaced 5 - 10 cm apart to allow irrigation pipes to be positioned along the double rows;

- Bags should be placed in furrows at a depth of 2/3 the height of the bag or with the top of the bag raised 10 cm above the ground;

Article 49: Soil bag preparation

- Use virgin PE bags, 0.08 mm thick, with perforated holes at the bottom half of the bag, spaced 6 cm apart and with a hole diameter of 5 mm;

- Bag sizes: depending on practical conditions, use bags of 14 x 33 cm, 16 x 33 cm, or 18 x 35 cm;

- Select rich soil with a friable texture to fill the bags (soil can be sourced locally or brought from other places). For grey soil, choose soil with a low sand content to avoid bag breakage. The soil must be relatively dry when placed in the bags;

- Base fertilizer:

+ 8 - 10 g/bag of fused phosphate fertilizer;

+ 30 - 50 g/bag of microbial organic fertilizer or 50 - 100 g/bag of well-decomposed manure.

- Filling the soil bags: The loose soil is evenly mixed with the base fertilizer. In the first round, fill the bag up to 2/3 of its height, shake gently to compact the soil slightly. In the second round, fill the bag to the top and shake again to settle the soil about 1 cm below the bag's edge. Soil bags must be evenly round and not bent in the middle.

Article 50. Preparation of rootstock seeds

- The amount of rootstock seed required for 1 ha of nursery is approximately 1,200 - 1,600 kg/ha, depending on the design density and type of rootstock seed;

- Rootstock seeds: priority is given to seeds from clones GT 1 and PB 260, followed by seeds from other popular clones. Select freshly fallen seeds with bright shells and fresh endosperm. Store seeds in a shaded, cool place; spread them on the ground in layers no thicker than 20 cm, and begin sprouting within 3 days;

- The amount of rootstock seed for nurseries is about 1,200 kg/ha;

- Seed treatment: place the seeds flat and gently tap to crack the shell slightly, then soak in clean water for 24 hours; after 12 hours, change the water once;

- Sprouting: prepare sprouting beds 1 meter wide and 15 cm high, covered with a 5 cm layer of fine sand, with walkways and roofs between the beds. After soaking, place the seeds belly-down in a single layer on the bed and cover them with sand until fully concealed, with approximately 1,000 - 1,200 seeds/m^2;

- Water the beds lightly twice a day, in the early morning and late afternoon, with around 4 liters of water/m^2 per watering. Avoid standing water on the sprouting beds;

- Prevent ants and termites from entering the sprouting beds by spraying or applying insecticide around the beds.

Article 51: Planting seedlings into bags

- 1-2 days before planting, water the soil bags thoroughly;

- Select seedlings with healthy stems and a single, normally developed taproot (straight, untwisted, not deformed, not broken), with a root length of about 3 - 10 cm, and plant them in the bags, ensuring uniform height across seedlings;

- Plant during cool weather, create a hole in the center of the bag, place the taproot straight into the hole, compact the soil around the root, and cover the seed with fine soil. Do not plant seedlings with broken stems or taproots;

- For 20 days after planting, inspect daily and replace any seedlings that fail to meet standards, such as broken shoots, rotten tops, weak growth, sap leakage on the stem, or albinism;

- For nurseries on red soil, seeds can be placed directly into the bags after sprouting, with 2 seeds per bag. Thin out the seedlings by removing one after the first leaf whorl is stable.

Article 52: Caring for rootstocks

- Water thoroughly after planting to compact the soil around the root system. During the dry season, water regularly to ensure moisture reaches the bottom of the bag. Each watering should use about 10 liters of water/m^2;

- Keep the nursery free of weeds by manual or chemical methods. Using PE mulch for weed control and moisture retention between rows is not recommended.

Article 53. Tree frafting

- Grafting period: Grafting is carried out sporadically from February to May to supply seedlings for planting within the same year, and it can be extended until November to prepare seedlings for the following year;

- Grafting is performed when the rootstock in the nursery bag reaches a base diameter of over 8 mm, measured 10 cm above the ground (Figure III.2). Grafting should be done during cool weather, avoiding grafting when the rootstock is still wet. Do not water the plants on the day of grafting;

- Grafted wood: The branch used for grafting should be of similar age to the rootstock and should peel easily. It can be a young bud, green bud, green-brown bud, or brown-green bud.

Figure III.2. Grafted bag nursery

Article 54. Top cutting and bag transfer

- The bandage should be removed 20 days after grafting. After removing the bandage, wait at least 15 more days before topping the seedlings.

- Top the grafted seedlings when the base diameter reaches 10 mm, measured 10 cm

above the ground. Cut the top approximately 5–7 cm above the graft union and immediately apply vaseline to the cut surface. If the rootstock is smaller, cut the top higher, about 10–12 cm above the graft union.

- After topping, lift the nursery bags out of the trench, remove any roots growing outside the bags, and place the bags near the transport area. Keep the bags sufficiently moist during transport to prevent the roots from loosening or the bags from rupturing.

Article 55. Care for leaf-layered nursery bags

- Transfer and arrangement of nursery bags: After topping, the nursery bags are transferred to a leaf-layered bag nursery. Arrange the bags in double rows, burying them about 10 cm deep, with the graft union facing outward. The space between the double rows should be 60 cm;

- Care for leaf-layered nursery bags: Provide sufficient water, regularly prune wild shoots, the nursery must be kept clean of weeds and all weeds in the bags must be removed. Periodically apply disease prevention measures and foliar fertilization;

- Select seedlings with stable and uniform top leaf whorls for planting; rotate the bags (lift and reposition them) about one week before transplanting.

Article 56. Production process of other types of seedlings

- The production process for other types of seedlings, such as bare-root seedlings, bagged seedlings, core-seedlings, and root-trained seedlings, can be referenced in the Appendix.

Chapter IV
RUBBER PLANTING

SECTION I. GENERAL PROVISIONS

Article 57. Rubber varieties

- Follow the recommended variety structure for each region/sub-region, as issued by the Group for each phase.

- Each plot should contain a single variety, and no more than 200 hectares of contiguous area should be planted with one variety.

- Multiple varieties can be planted on the same plot in cases of experimental planting, trial production, or demonstrations of new varieties.

Article 58. Plantation quality standards

- Replanting and new planting plots must adhere to the approved variety structure for each plot as designated by the Group.

- The plots must meet the standards of growth, development, density, and uniformity as specified in the Technical Process of Rubber Tree and the Group's current regulations, except for experimental plots with multiple varieties.

- At the end of the immature period, the effective tree rate must be over 90% of the designed density.

- At the end of the immature period, for areas without limiting factors related to climate or soil conditions, the total area brought into latex production must ≥ 98% of the original planted area. For other areas, this rate must be ≥ 95%.

SECTION II. KEY TECHNICAL STANDARDS

Article 59. Immature period and design yield

- The immature period of rubber plots is calculated from the year of planting and is determined by the suitability of the specific cultivation area; the average yield over the entire latex harvesting cycle is determined by the climate, environmental conditions, and soil quality of each region. The specific immature period and design yield are outlined as follows:

Table 5. Immature period and design yield for rubber growing regions

Growing region	Land class	Immature period (year)	Design yield for the entire harvest cycle (tons/ha/year)
Region 1 (Southeast)	I	≤7	1.8 - 2.6
	II	≤8	
	III	≤9	
Region 2 (Central Highlands <600 m, Cambodia, Southern Laos, Binh Thuan)	I	≤7	1.6 - 2.3
	II	≤8	
	III	≤9	
Region 3 (Central Coastal Region, Northern	I	8	1.4 - 2.0
	II	9	

Mountains, Central Highlands >600 m, Central Laos, Northern Laos)	III	10	

- For Region 1 and Region 2, no more than 20% of the total rubber area can have a maximum immature period stipulated for each region and land class in Table 5.

Article 60. First-year standards and annual trunk girth

- At the end of the first year of planting, depending on the planting material used, the following standards must be met:

+ For seedlings grown in leaf-layered bags or root-trained bags, the survival rate must be ≥ 98%, with more than 80% of the seedlings having 4 or more leaf whorls. For fall-planted areas, at least 2 leaf whorls must be achieved;

+ For experimental plots, trial production, or demonstrations of new varieties with multiple varieties planted on the same plot, the survival rate must ≥ 95%, with over 80% of the seedlings having 3 or more leaf whorls.

- The trunk girth, measured 1 meter above the ground at the end of the year, must meet the standards specified in Table 6

Table 6. End-of-year trunk girth standards for rubber growing regions

Growing region	**Land class**	**Trunk girth at 1 meter height (cm) by age (years)**								
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Region 1 (Southeast)	I	13	23	32	41	50	Opening tapping	Opening tapping	Opening tapping	Opening tapping
	II	12	21	29	37	44	50	Opening tapping	Opening tapping	Opening tapping
	III	11	18	26	32	39	45	50	Opening tapping	Opening tapping
Region 2 (Central Highlands <600 m, Cambodia, Southern Laos, Binh Thuan)	I	12	21	30	40	50	Opening tapping	Opening tapping	Opening tapping	Opening tapping
	II	11	19	27	35	43	50	Opening tapping	Opening tapping	Opening tapping
	III	10	17	23	30	37	44	50	Opening tapping	Opening tapping
Region 3 (Central Coastal Region, Northern Mountains, Central Highlands >600 m, Central Laos, Northern Laos)	I	11	18	26	34	42	50	Opening tapping	Opening tapping	Opening tapping
	II	10	16	22	28	35	43	50	Opening tapping	Opening tapping
	III	9	15	20	26	32	38	44	50	Opening tapping

***Note**: Trunk girth tolerance: ±1 cm)*

Section III. RUBBER PLANTING

Article 61. Digging of planting holes and basal fertilization

- Planting holes: Mechanical digging can be used depending on the conditions of each unit. For units with favorable conditions and depending on the actual terrain, the use

of subsoiling during land preparation is encouraged.

+ Mechanical drilling: The hole diameter should be ≥ 60 cm, and the depth should be ≥ 60 cm;

+ Mechanical scooping: The width of the bucket should be ≥ 60 cm, and the hole depth must be ≥60 cm. When scooping, the topsoil from the first scoop should be kept separately near the edge of the hole, while the soil of the subsequent scoops are left inside the hole;

+ Manual digging: The hole dimensions should be 60 cm in length, 60 cm in width, and 60 cm in depth, with a bottom size of 50 x 50 cm. When digging manually, separate the topsoil from the subsoil;

- For contour planting: The center of the hole must be at least 1 meter away from the negative slope (talus);

- Basal fertilization: Apply 300 g of fused phosphate and 5 - 10 kg of decomposed organic fertilizer or other organic bio-fertilizers as per the Group's regulations for each hole;

- Fertilizer mixing and hole filling must be done at least 15 days before planting. Use the topsoil to fill half of the hole, then mix the basal fertilizer with the surrounding topsoil to fill the hole completely. After applying the fertilizer, subsoiling can be used to break the hole wall. Place a stake in the center of the hole to mark the planting point.

Article 62. Planting season

- Plant at the appropriate season and only when the weather is favorable and the soil has enough moisture.

+ Southeast, Binh Thuan, Central Highlands, Laos, and Cambodia: Complete planting before July 31;

+ Northwest: Complete planting before July 15;

+ Northeast: Complete planting before April 15;

+ Central Coast: Complete planting before October 31 (including both spring and autumn crops);

- Any planting outside of these specified times must be inspected and approved by the Group.

Article 63. Planting of pruned-root seedlings and seedlings with leaf whorls

- Before planting, clear the grass and tree roots around the hole, then use a hoe to loosen the soil at the planting point within the hole to a size slightly larger than the bag and as deep as the height of the bag;

- Use a sharp knife to cut the bottom of the bag and trim any taproots extending from the bag. If the taproot is coiled inside the bag, it must be completely removed;

- Place the bag into the hole upright, with the graft union facing the prevailing wind direction. The base of the graft union should be level with the ground surface;

- Cut the PE bag vertically and gently pull the bag upwards. As you pull the bag, fill the hole with soil and press firmly to secure the bag. Be careful not to break the bag;

- Collect and dispose of the PE bags after planting according to regulations.

Figures IV.1a. Cutting the taproot and bottom of the bag

Figures IV.1b. Placing the bag into the hole and cutting the PE bag

Figures IV.1c. Filling the hole with soil while pulling the bag

Figures IV.1d. Filling and completing the planting process

Article 64. Replanting

- Replanting to shape the plantation must be done in the first year, or by the second year at the latest. Replant with the same variety and seedlings of similar development to the existing trees.;

- First-year replanting:

+ For plantations using seedlings with leaf whorls, replant dead trees 20 days after the initial planting; use bags with 2-3 stable leaf whorls for replanting;

+ The quantity of replacement seedlings to be prepared for replanting should be 10% of the number of trees initially planted in the first year;

- Second-year replanting:

+ Use bags with 3 or more leaf whorls for replanting;

+ The number of replacement seedlings prepared should be based on the year-end inventory from the first year, with a maximum of 5%. Replanting with core tum seedlings from the second year is encouraged if production allows (if conditions permit core tum production).

- Replanting must be carried out from the beginning of the replanting season and can last up to 1 month.

Chapter V
IMMATURE RUBBER TREE CARE

Section I. CULTIVATION TECHNIQUES IN IMMATURE RUBBER PLANTATIONS

Article 65. General provisions

- The units under the Group must comply with the regulations on cultivation techniques in immature rubber plantations according to the Technical process of Rubber Tree and the current documents of the Group;

- It is encouraged to apply mechanization in the stages of rubber care during the immature phase, suitable to the conditions and characteristics of each specific planting area, to increase labor productivity and reduce direct labor costs;

- Weed management during the immature phase should be done mechanically or manually, minimizing the use of chemical methods to protect the environment; also minimizing erosion, runoff, and evaporation during the rubber tree care process. Controlled maintenance of natural vegetation at a height of 15 - 20 cm between rows (except for weeds like cogon grass, broom grass, bulrush, and bamboo); managing weeds in the early years when the rubber trees have not formed a canopy, gradually reducing weeding or stopping weeding when the trees have spread their canopy;

- Strengthen management, protection, and monitoring during the dry season to prevent fires in the rubber plantations.

Article 66. Weeding in rubber rows

- General regulations for weeding in rows and on the mounds must ensure the following objectives and requirements:

+ Objective: Minimize the risk of burning the rubber plantations during the dry season and reduce competition from weeds with rubber trees;

+ Requirements: Clear weeds around the rubber tree roots (especially before fertilizing in the first and second years) and prevent weeds from covering the rubber trees. During the weeding process, care must be taken to minimize erosion and runoff on sloped land.

- Methods:

+ New planting year**:** Clear weeds around the rubber tree roots with a radius of 0.8 m and cut grass on the row;

+ Second and third years**:** Clear weeds around the rubber tree roots with a radius of 1 m and cut grass on the row;

+ Fourth year to the end of the immature period**:** Manage weeding 1.5 m from the tree root;

- Weeding methods:

+ New planting year**:** The first weeding should be done manually, the second time can combine weeding and moisture retention by plowing the soil toward the rubber tree rows at the end of the rainy season, plowing 1 m from the tree root;

+ From the second year onward**:** Apply mechanical methods combined with manual

methods, using chemicals only on areas with cogon grass, broom grass, American grass, bulrush, or bamboo that cannot be controlled mechanically or manually.

- The number of weeding times in the rows for various areas is specified in Table 7.

Table 7. Number of weeding times in rows at rubber growing regions

Growing region	1st year	2nd year	3rd year	4th + 5th years	6th year onwards
Southeast	2	3	2	2	1
Central Highlands	2	3	2	4	1
Northern Mountain, Central Coastal	2	3	2	4	1
Cambodia, Laos	2	3	2	3	1

- Notes:

+ In the new planting year, for lands with an average slope > 10°, weeding should be done in mounds to prevent soil erosion and runoff. For low-lying lands or lands with the nature of dry dipterocarp forest, weeding should be combined with raising the base around the tree to at least 10 cm above the natural ground level to limit localized flooding during the rainy season;

+ The number of weeding times in rows, in specific areas, may be less than or greater than the levels specified above, and units can adjust this during the immature phase, ensuring it does not exceed the total investment norms specified for each area.

Article 67: Management of weeds between rubber rows

a. General provisions:

- Manage weeds in the early years when the rubber plantation has not yet formed a canopy, gradually reducing weeding or stopping weeding when the rubber trees have canopied, according to the following objectives and requirements:

+ Objective: Prevent competition with rubber trees, ensure effective fertilizer use, and minimize the risk of fire in the rubber plantation during the dry season;

+ Requirements**:** Perform weeding at the right time and minimize adverse impacts such as soil erosion, runoff, moisture evaporation, and root damage to rubber trees;

- Based on the assurance of the above objectives and requirements, the local management unit is authorized to proactively decide on the control measures and the appropriate number of weeding times;

- For immature rubber plantations that have not yet formed a canopy and are not intercropped, the use of mechanized methods to manage weeds between rows is encouraged, maintaining a controlled natural vegetation cover of 15 - 20 cm between rows (except for cogon grass, reed grass, sedges, American grass and bamboo);

- For areas with slopes > 10°, do not eliminate weeds but only manage the natural vegetation between rows to limit soil runoff and erosion.

b. Number of weeding times between rows**:**

- For non-intercropped areas: the number of weeding times between rows for various regions is specified in Table 8.

Table 8: Number of weeding times between rows in rubber growing regions

Growing region	1st year	2nd year	3rd year	4th + 5th	6th year
Southeast	1	3	2	2	1
Central Highlands	1	3	2	3	1
Northern Mountain, Central Coastal	1	3	2	3	1
Cambodia, Laos	1	3	2	3	1

- For intercropped areas: during intercropping years, do not weed between rows; in subsequent years, when the intercropping period ends, the number of weeding times between rows is as specified in Table 8.

c. Notes on implementing weeding management norms in rubber plantations:

- Based on the assurance of the general requirements for managing weeds between rows, the unit is proactive in deciding on the weeding methods (mechanical or manual) and the appropriate number of treatments;

- The number of treatments may be less than or exceed the stipulated amount, the unit shall self-regulate for areas of the same planting year or different planting years in the rubber plantation, ensuring that the total investment cost does not exceed the specified limits.

Article 68: Regulations on plowing in immature rubber plantations

- To reduce erosion, runoff, prevent soil degradation, and limit plowing in immature rubber plantations, especially in dry regions, sandy soils, laterite soils, and sloped land;

- If plowing is applied, it should only be done on flat land and within the first three years of immature rubber; the soil should be plowed towards the rubber trees, with the plow line at least 1 m from the root of the rubber trees (in the planting and second year) and 1.5 m (in the third year); do not plow on land with an average slope greater than 10°; avoid deep plowing that damages the roots of rubber trees;

- In exceptional cases where plowing must be applied in immature rubber plantations after the third year to prevent fire, careful supervision is required to minimize harmful effects on rubber roots, applying minimal plowing techniques. In the case of land improvement plowing (for hard and compacted soil), written approval from the Group is required before proceeding.

Article 69: Tree mulching and whitewashing to prevent sunburn

- Encourage mechanical mulching, for areas where mechanization is not applicable, mulching can be done manually: in the first two years, mulch with grass, legume cover or plant residues from intercropping at the end of the rainy season. Before mulching, loosen the soil around the base, mulch in a ring shape 10 cm from the base, with a mulch radius of at least 1 m and a thickness of at least 10 cm, then cover with a layer of soil about 5 cm thick. For low-lying areas, when mulching, mound the base to a height of 15 - 20 cm, with a 1 m radius around the rubber tree;

- For mechanical methods: plow into the rows with a strip width for mulching of at least 2 m; in the first year, plow 1 m from the base, in the second year, plow 1.5 m from the base. Perform mulching at the end of the rainy season;

- In areas affected by prolonged heat that causes sunburn to rubber trees, in the first

two years, it is encouraged to whitewash (5% concentration) the brownish parts of the trunk, 1 m high from the ground.

Article 70: Establishment of legume mulch

- Encourage the establishment of legume mulch from the first year in areas that are not intercropped or have ceased intercropping;

- Types of legumes suitable as mulch in immature rubber plantations include Kudzu *(Pueraria phaseoloides)*, wild Kudzu *(Pueraria triloba)*, and Mucuna *(Mucuna bracteata, Mucuna cochinchinensis)*;

- For Kudzu and wild Kudzu, plant 3 rows of mulch between 2 rows of rubber trees at a spacing of 1 x 1 m (density of 4,000 - 5,000 holes/ha for intercropping). For Indian Mucuna *(Mucuna bracteata)*, plant a single row between 2 rows of rubber trees at a spacing of 5 - 6 m (density of 250 - 300 holes/ha for intercropping). Only plant Indian Mucuna in areas with severe drought conditions during the dry season and on sloped land;

- Weeding and fertilizing the mulch are necessary for its rapid growth in the first year, particularly ensuring the application of phosphate fertilizer when planting cover crops.

Section II: CONTROLLED PRUNING AND CANOPY DEVELOPMENT OF IMMATURE RUBBER TREES

Article 71: General provisions

- After planting, timely prune seedlings and lateral shoots;

- Do not prune, top, or shape the canopy of the plantation during the dry season;

- Only top and shape trees that have not branched at a height of >3 m.

Article 72: Controlled pruning of lateral shoots

- In the first year, only prune lateral shoots when the uppermost leaf whorl is stable;

- From the second year onward, controlled pruning must be conducted. In the two stable uppermost leaf whorls of the tree (from the bottom up called whorls A and B, Figure V.1), always retain 2 - 3 shoots per whorl for continued growth. Prune all shoots in whorl A when whorl C stabilizes, but retain 2 - 3 old shoots in whorl B and 2 - 3 new shoots in whorl C. Continue this process for whorls D, E, etc. Maintain controlled pruning until the tree's canopy is shaped.

Figure V.1: Controlled pruning of shoots

(always retain 2 - 3 shoots per whorl in the two stable uppermost leaf whorls)

Article 73. Canopy creation for immature rubber trees

- Conditions for canopy creation for immature rubber trees: Canopy creation shall only be performed on rubber trees aged 2-3 years that are taller than 3 meters but have not yet branched out;

- Time for canopy creation: Topping to create the canopy should occur at the beginning of the rainy season. For the mountainous regions in the North and North Central areas, topping to create the canopy should be done in the spring season;

- Method of topping for canopy creation:

+ Topping should be done at a height of approximately 3 meters, cutting at the uppermost leaf whorl while leaving 2-3 leaves at the cut apex. Topping should only proceed when the uppermost leaf whorl has stabilized; topping should not be performed on trees > 3 years;

+ The number of buds left on the apex to create a new canopy should be 2-3 buds, with a minimum distance of 15 cm between the buds, evenly distributed to ensure a balanced new leaf canopy, reducing the risk of branch breakage and canopy damage from wind.

Figure V.2. Topping to create canopy with 3 leaves left at the apex

SECTION III. EVALUATION, CLASSIFICATION, AND CONVERSION OF THE PURPOSE OF USE FOR INEFFECTIVE IMMATURE RUBBER PLANTATION

Article 74. General regulations on ineffective immature rubber plantations

- To avoid wasteful investment in areas of rubber that are ineffective, annual inspections and evaluations of plantation quality must be conducted, especially in areas with limited soil and climatic conditions within the rubber growing regions of the Group;

- The Chairman of the Members' Council/Board of Directors and the General Director of the unit:

+ Shall be responsible for organizing inspections, reviews, and reporting to the Group on the causes of ineffective plantations and proposing remedial measures.

+ Shall face disciplinary actions if they do not proactively organize reviews, reports, and proposals to the Group before the inspection teams from the Group discover the need for action.

+ Shall face disciplinary actions if they fail to implement the above regulations, continuing to care for the plantation as if it were a normal but ineffective plantation when brought into tapping;

- Ineffective immature rubber plantations are those that do not meet the standards for effective tree density, trunk girth shortfalls, and low girth rates, or exhibit poor growth due to unsuitable planting varieties, leading to an extended immature period beyond regulations:

+ Extended plantations**:** Plantations at the end of the immature period with effective tree density > 350 trees/ha but exhibiting growth shortfalls of 1-2 years (with the immature period defined according to the three land classes as stipulated in Article 59), with a maximum extension of no more than 2 years; remedial measures include the addition of fertilizers during the extension period, fire prevention, and disease control to prepare the

plantation for exploitation;

+ Non-extended plantations: Plantations that do not extend the immature period but have effective tree density between 250-350 trees/ha (due to various causes arising during the immature phase).

- Ineffective immature rubber plantations are those rubber areas that cannot be brought into exploitation as defined in Article 58 and must be converted for other purposes:

+ Immature plantations in the 3rd year with effective tree density <350 trees/ha;

+ Immature plantations in the 4th – 5th years with effective tree density <250 trees/ha; plantations failing to meet trunk girth standards after the first four immature years with a girth rate <50%; plantations with trunk girth increases over three consecutive years <3.5 cm/year, or a combination of low effective tree density and trunk girth shortfalls due to unsuitable planting varieties; low-quality immature rubber plantations identified as having no potential for tapping (due to either objective or subjective reasons); plantations extended for more than 2 years but the time of exploitation has not been determined;

- Units shall proactively propose appropriate remedial measures to the Group according to the classification of the plantation: either less effective plantations or ineffective plantations.

Article 75. Conversion of ineffective rubber plantation purposes

- Conversion conditions: Conversion applies to ineffective immature rubber plantations as defined in Article 74 or mature plantations where natural disasters or diseases have reduced productivity and output, leading to ineffective business operations; have appropriate solutions and crops to ensure production and business efficiency;

- Units must submit a written report on the causes (both objective and subjective), responsibilities, and specific proposals for handling, for the Group to consider and decide;

- Units proactively propose plans to convert the main harvested product target to suit actual conditions, from production in the direction of latex - wood, wood - latex, wood or vice versa or convert land use purposes to submit to the group for consideration.

Chapter VI
INTERCROPPING AND CROP ROTATION ON RUBBER PLANTATIONS

Article 76. General provisions

This process applies to intercropping and crop rotation on rubber plantation land under the following conditions:

Rubber must remain the primary crop, planted and cared according to the provisions of this Process; intercropped plants are supplementary, while rotation crops aim to improve soil conditions. Specific plans or projects must be reviewed and approved by the Group.

The growth and development of intercropped or rotation crops must not adversely affect rubber tree growth or compete for space and nutrients, nor should they degrade soil quality.

During planting, care, and harvesting of intercropped crops or products of intercropped plants, no damage should occur which damages rubber trees and hinder the care and harvesting of rubber latex and rubber wood. Soil preparation for intercropping must meet anti-erosion and anti-runoff requirements.

Article 77. Specific regulations for changing cultivation objectives on rubber plantations

- The purpose of changing cultivation objectives aims to adjust cultivation methods to suit the crop care process with the new objective for the remaining care period and to calculate the investment costs in accordance with the new objective;

- Conditions for changing from latex-wood to wood-latex plantation:

+ When income from latex harvesting does not cover the harvesting costs;

+ When the effective tree density is low ($\leq$ 250 trees);

+ To meet sustainable forest management requirements.

- Forms of conversion:

+ Maintain the current rubber trees and continue care as per forest care process, collect latex and harvest wood when it is economically effective;

+ Plant additional forest trees to increase coverage and variety diversity. Additional planting can occur in empty spaces or as strips between rubber rows, collect latex and harvest wood when there is economic reserve; wood can be harvested separately for each type of tree;

+ Maintain the current status of rubber trees or plant additional large timber trees and native forest trees; protect and conserve; harvest latex when conditions permit, do not harvest wood.

Authority to decide on converting rubber cultivation objectives: The Board of Directors of the Group decides for units in which the Group owns 100% of capital and approves/agrees for other units according to the Group's regulations."

Article 78. Intercropping with short-term crops

- Short-term crops are encouraged to be intercropped during the early stages of the immature plantation.

- For pure rubber plantation design: Intercropping is short-term annual crops planted ≥ 1.2 meters away from the rubber rows during the first two years of the immature phase and ≥ 1.5 meters away from the third year onwards. or intercropping with raised beds, the distance is calculated from the foot of the bed to the rubber row. No intercropping is allowed once the rubber canopy closes. Timely actions should be taken if the intercrop competes for nutrients, water, etc., affecting the rubber plantation's growth;

- Units are encouraged to establish legume mulch after the intercropping period or on ineffective intercropped land.

Article 79. Intercropping with long-term crops

- The harvest period of long-term intercropped crops (one or multiple cycles) can be shorter than or equivalent to the rubber tree’s production cycle;

- For wide-spacing designs: intercropped perennials with short trunks are planted ≥ 3 meters away from the rubber rows, intercropped trees with wide canopy and tall trunks are planted ≥6 m from rubber rows. During the rubber tree cycle, many intercropping cycles can be arranged depending on the life cycle of the intercropped tree;

- For strip or block intercropping: industrial and forestry crops must be planted at least 5 meters away from the outermost rubber row. For block intercropping, select locations along primary wind directions, plot edges, streams, plot boundaries, or alongside internal roads, leaving space at the beginning and end of each plot for rubber care operations. For strip intercropping, the intercropping strip design must be wide enough to facilitate the care and exploitation of long-term intercropping;

- Intercropping with long-term crops must include contingency plans if the rubber plantation is severely damaged by natural disasters or other objective reasons to the point of having to replant. Replanting must be done without being affected by long-term intercropping.

Article 80. Management and Care of intercropped rubber plantations

- During the process of planting, caring for, and harvesting intercrops, no negative impact should occur on the growth and development of rubber trees, nor should it hinder the maintenance, latex collection, or timber harvesting from rubber trees;

- At the end of the intercropping cycle, the land used for intercropping must be leveled. If wild shoots or regenerated sprouts from the intercrops remain, they must be thoroughly removed before handing the land back. During the process, disturbance to the rubber tree root system must be minimized;

- Measures to improve soil and organic farming are encouraged, including planting legume mulch after the intercropping cycle ends;

- Adjust the rubber tree canopy balance when trees become asymmetrical or lean during their growth cycle.

- Handling growth issues with rubber trees: in cases of water and nutrient competition, a deep trench (20 cm wide, 30 cm deep) should be plowed between the rubber rows and the intercropped plants, at least 1 meter away from the intercropped rows. If competition for space or canopy gaps occurs, prune or thin out the intercropped plants to ensure the rubber trees' growth is prioritized.

Article 81. General regulations on crop rotation

- Protect and improve soil quality for optimal land use, crop rotation is applied to

areas showing signs of degradation, areas needing soil improvement before replanting, or areas where severe diseases occurred during previous rubber planting cycles. Crop rotation also contributes to biodiversity in the Group's agricultural operations.

- Proper cultivation techniques should be followed for rotation crops to maximize production efficiency and minimize erosion and runoff; priority should be given to soil-improving crops or those with intensive cultivation investment.

- Crop rotation must not cause pollution, soil degradation, or damage to roads, inter-plot roads, erosion control ditches, contour systems, drainage systems, etc.

- The rotation cycle must follow the production cycle of the rotation crop but should not exceed seven years. If a longer rotation is necessary, written approval from the Group is required.

Article 82. Management of rotation crops and rotation duration

- The approved rotation crop types must be planted using the correct cultivation techniques, ensuring no land is left idle or wasted.

- During the rotation cycle and harvest of rotation crops, soil protection and improvement requirements must be met. In case of land degradation, damage to the traffic system, anti-erosion dikes, drainage system... there must be remedial measures and compensation;

- The duration of crop rotation depends on the specific conditions of the land and the unit's long-term land use objectives, and it must be approved by the Group.

Chapter VII
FERTILIZATION FOR RUBBER PLANTATIONS

Section I. GENERAL PROVISIONS

Article 83. General provisions

- Fertilization of rubber plantations must meet management and technical requirements, ensuring fertilizer quality and type, minimizing fertilizer loss, and maintaining fertilization effectiveness. Fertilizers derived from peat are prohibited.

- Units must balance and adjust fertilizer application according to the current state of the plantation:

+ Immature plantations: Fertilization should be adjusted based on soil conditions and tree growth. Fertilizer should be reduced for well-growing trees and increased for weak or poorly growing areas, ensuring the total fertilizer volume does not exceed the Group's prescribed limits;

+ Mature plantations: Adjust fertilizer application based on the current state of the plantation, productivity, and soil nutrient levels (if analysis results are available), as well as previous fertilization history and other technical and management factors;

- Fertilization should only proceed once weeds are controlled. Mechanical fertilization is encouraged where appropriate. Fertilizer application should be based on nutrient diagnostics to ensure efficient and economical use of fertilizers.

Article 84. Regulations on fertilizer quality management

- Only fertilizers meeting the quality standards specified by national technical regulations, having a declaration of conformity, and complying with the Group's fertilizer management regulations should be used;

- For inorganic fertilizers: the allowable error margin for the main nutrient elements must not exceed the permissible limits; for organic fertilizers: moisture content should not exceed 30%, organic matter content should not be less than 20%, the C/N ratio should not be below 12, and harmful substances (arsenic, lead, mercury, cadmium, etc.) and harmful microorganisms (*Salmonella*, *E. coli*, etc.) should be below the permitted levels (see Appendix IX for quality specifications and allowable deviations);

- Fertilizers produced by the unit (if any) can only be used if they meet the quality criteria outlined in national technical regulations and are certified compliant, with a valid production license;

- New types of fertilizers used for the first time in the Group's member units must have clear origins. The manufacturing company must meet national production and business conditions, and the fertilizer must undergo trials. The trial results must be approved by the Group for use in pilot areas;

- Companies must follow the Group's sampling process, send samples for analysis, and be responsible for the acceptance of fertilizer quality, including fertilizers produced by the unit itself;.

- Fertilizer purchase contracts must include specific terms regarding the type, nutrient content, and main quality indicators of the fertilizer, providing a basis for quality and quantity inspection and evaluation.

Article 85. Annual fertilization plan and fertilization management outside the lots

- By the first quarter of each year, each unit must develop a fertilization plan for the entire year, detailing the types, rates, and quantities of fertilizer to be used for each age group of rubber trees and submit it to the Group for evaluation before implementation.

- For each fertilization cycle, the unit must prepare a detailed fertilization plan for each plot in the affiliated units and have a plan to supervise the fertilization;

- Establish a steering committee to manage the fertilization process at all levels, assign personnel to closely monitor each worker's application of fertilizer to ensure there is no loss of fertilizer, and to prevent uneven or improper application.

- Fertilizer must be applied according to the correct type, in the correct quantity, at the right location, during the appropriate season, and in the proper manner. For flat areas, fertilizer should be buried in the soil if the rubber trees have not yet closed their canopy. For sloped areas, fertilizer should be applied into designated pits.

- During each fertilization period, there is a record of fertilizer acceptance for each plantation (detailing the type of fertilizer, quantity used, the individuals who applied it, supervisors, etc.). Upon completion of the fertilization cycle, the unit must report the fertilizer usage to the Group.

SECTION II. FERTILIZATION OF MULTIPLICATION GARDEN AND NURSERY

Article 86. Fertilization of rubber trees of multiplication garden

- Fertilizer types and quantities should follow Table 9. The total amount of fertilizer should be split into three applications, applied when the soil is sufficiently moist. Fertilization should cease one month before the cutting of the grafted wood.

Organic microbial fertilizer should be supplemented every three years at a rate of 1,500 kg/ha, applied in the furrows.

Table 9. Fertilizer amount for rubber trees in multiplication garden

Fertilization year	Pure (kg/ha)			NPK Fertilizer (kg/ha)	Single Fertilizers (kg/ha)		
	N	P2O5	K2O	NPK 16-16-8	Urea	Phosphate	KCl*
1st year	200	200	100	1,250	435	1,250	167
2nd year	250	250	125	1,562	543	1,562	208
From 3rd year onwards	300	300	150	1,875	652	1,875	250

**Note: KCl can be replaced by K_2SO_4 if soil pH $H_2O \geq 4$, with a conversion rate of 1 KCl = 1.2 K_2SO_4.)*

Article 87. Fertilization of bags with leaf whorls in nursery

- Fertilizer type, amount, and fertilization frequency should follow Table 10;

- Fertilization time: The first fertilization should be made when the trees reach two stable leaf whorls, with subsequent fertilizations spaced 30–45 days apart when new leaf whorls stabilize. Fertilization should stop 30 days before grafting;

- Fertilization technique: Mix the three types of fertilizers evenly, drill a 3 cm deep

hole near the edge of the planting bag, and apply fertilizer into the hole; avoid applying near the base of the tree;

- Watering when fertilizing: Water thoroughly immediately after fertilizing each tree.

Table 10. Fertilizer amount for pruned-root bags and bags with leaf whorls in nursery

a. Bag size: 16 cm x 33 cm

Fertilization times	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single fertilizer (g/plant)		
	N	P2O5	K2O	NPK 16-16-8	Urea	DAP	K2SO4
1st year	0.4	0.4	0-2	2.5	0.5	0.9	0.3
From 2nd year onwards	1.0	1.0	0.5	6.2	1.4	2.1	1.0
Post-topping							
1st year	0.6	0.6	0.3	3.7	0.8	1.3	0.6
From 2nd year onwards	1.4	1.4	0.7	8.7	2.0	3.0	1.4

b. Bag size: 18 cm x 35 cm

Fertilization times	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single fertilizer (g/plant)		
	N	P_2O_5	K_2O	NPK 16-16-8	Urea	DAP	K_2SO_4
1st year	0.6	0.6	0.3	3.7	0.8	1.3	0.6
From 2nd year onwards	1.4	1.4	0.7	8.7	2.0	3.0	1.4
Post-topping							
1st year	1.0	1.0	0.5	6.2	1.4	2.1	1.0
From 2nd year onwards	2.0	2.0	1.0	12.4	2.8	4.2	2.0

SECTION III. FERTILIZATION OF IMMATURE RUBBER PLANTATIONS

Article 88. Application of inorganic fertilizer

- Priority is given to the application of fertilizers based on regional nutrient diagnosis to maximize the economic and technical benefits. If no regional diagnosis is available, follow the recommendations in Table 11.

- Type: Use the recommended types of fertilizers, if other types are used, prior approval from the Group is required.

- On flat land, give priority to using NPK 16-16-8 mixed fertilizer; for sloping land areas, planting on contour lines, only use NPK 16-16-8 mixed fertilizer instead of single fertilizer;

- Dosage: dosage and type for each soil class according to the following table.

Table 11. Inorganic fertilizer dosage for immature rubber plantations

Soil class	Planting year*	Pure (kg/ha)			NPK fertilizer (kg/ha)	Or single fertilizer (kg/ha)		
		N	P2O5	K2O	NPK 16-16-8	Urea	NC phosphate **	KCl
I	1st year	20	20	10	125	43	125	16

	From 2nd year onwards	40	40	20	250	86	250	33
II	1st year	22	22	11	137	47	137	18
	From 2nd year onwards	45	45	22	281	97	281	36
III	1st year	25	25	12	156	54	156	20
	From 2nd year onwards	50	50	25	312	108	312	41

** Planting year according to immature year is specified in Article 58, Chapter IV.*

*** When pH value H_2O > 6, replace fused phosphate with superphosphate.*

Article 89. Method of fertilization for immature rubber plantations

- For flat land:

+ From the 1st to the 2nd year: dig scarf-shaped trenches or holes around the base of the rubber tree, 30–80 cm away from the tree based on the canopy projection.

+ From the 3rd year onward: it is recommended to fertilize by machine, dig trenches and cover the fertilizer;

- For sloped land >10° and areas planted on contour lines:

+ From the 2nd to the 3rd year: dig scarf-shaped trenches or holes 30–70 cm from the tree base, depending on tree age.

+ From the 4th year onwards: apply fertilizer into the fertilization trench between two rubber trees, about 50 cm from the edge of the negative slope, the size of the fertilization trench is 80 cm long, 20 cm wide, 20 cm deep, about 50 cm from the negative slope. If there is a multi-purpose hole, apply fertilizer into the multi-purpose hole, before applying, scrape off the leaf soil from the hole, spread the fertilizer evenly in the hole and cover it with local plant residue;

+ Number of fertilizations: 1-2 times/year in the 2nd-3rd year, depending on the actual conditions of each region. If fertilizing twice a year, divide the amount of fertilizer equally for each fertilization. From the 4th year onwards, apply the entire amount of fertilizer at once. Fertilize when the soil is moist enough, do not fertilize during heavy or continuous rain;

Article 90. Design of multi-purpose pits in immature rubber plantations

- General requirements: In areas with significant fertilizer leaching, it is recommended to apply fertilizer in multi-purpose pits. The design of these pits must ensure effective use without obstructing mechanization in the plot.

- Pit location: located in the area adjacent to the position of the strong root growth of the rubber tree at the time of using the hole to apply inorganic fertilizer. On flat land, in immature rubber plantations during their second year until the trees form a closed canopy, pits should be arranged in alternating rows on either side of the rubber trees, with one pit for every two trees, located 1.5 meters from the tree row (Figure VI.1). In rubber plantations from canopy closure to tapping age, pits should be arranged in alternating rows between two rows of rubber trees, with one pit for every four trees, placed equidistantly between the two rows (Figure VI.2). On sloped land, pits should be placed along contour lines, between two rubber trees, adjacent to the positive slope, with one pit for every two trees (Figure VI.3).

- Multi-purpose pit dimensions: The pits should be 60-80 cm long, 40-60 cm wide, and 30-40 cm deep.

- Pit digging season: Applicable from the second year of immature period, pits should be dug at the beginning of the rainy season or near the end of the rainy season, ensuring the soil remains sufficiently moist for about a month.

- Technical requirements when accepting multi-purpose pits: Pits should be dug in the correct location with the required dimensions, have a relatively flat bottom, and the excavated soil should be evenly distributed around the pit's edge. The pits should not obstruct agricultural mechanization.

Article 91. Foliar fertilization for newly planted rubber trees

- Foliar fertilization is used during the first planting year and not for trees in their second year (except in certain cases, such as autumn-planted trees from the previous year or for second-year trees that require supplementary planting). It is also not used in areas with cold climates (Northern mountainous regions, North Central regions) or in sloped areas (planted along contour lines);

- Number of sprays: A maximum of three sprays for the Southeast Region and Cambodia, and two sprays for the Central Highlands and spring-planted areas (when cold weather has subsided);

- Spraying time: The first spray is applied when the tree has stable leaf whorls, and subsequent sprays are applied 30 days apart. Foliar fertilizer should only be sprayed on non-rainy days with outdoor air temperatures above 15°C, between 7 a.m. and 10 a.m;

- Foliar fertilization can be combined with pest and disease control treatments;

- Only legally compliant and certified foliar fertilizers are allowed for use.

Article 92. Cases for adjusting inorganic fertilizer regimes in immature rubber plantations

- Fertilizer regimes according to the process may be adjusted (reduced, suspended, or increased) in the following cases:

+ A fertilization formula based on nutritional diagnosis by the Institute and approved by the Group;

+ Immature rubber plantations with established legume mulch (Kudzu, Mucuna) are advised to reduce or cease organic fertilizer use, suspend inorganic fertilizers, or reduce nitrogen by 50% in the fertilization formula;

+ In plantations frequently affected by wind and storms causing branch breakage, nitrogen application may be reduced to manage canopy growth;

+ In cases where soil conditions and tree growth are good, can temporarily stop or reduce fertilizer volume, adjust to increase for trees/areas with growth deficit;

+ Recommendations by the Technical Management Board or the Institute;

- Note: All plantations with adjusted fertilizer regimes must undergo periodic annual growth assessments, evaluating the effects of the adjustments on tree growth, and the results must be reported to the Group.

Article 93. Additional organic fertilizer application in immature rubber plantations

- Organic fertilizer should be supplemented to enhance soil fertility and increase the efficiency of inorganic fertilizers when the organic matter content in the topsoil (0-30 cm) is < 2.5% or the carbon content is < 1.45%. The use of organic fertilizers for soil improvement

is encouraged.

- Note:

+ Organic fertilizers cannot fully replace inorganic fertilizers, therefore, when organic fertilizers are added, they must be combined with inorganic fertilizers to ensure adequate nutrient supply for the trees;

+ Organic fertilizers should not be used in the following cases: (i) when the soil's organic matter or carbon content exceeds the above levels, (ii) in immature plantations with green manure pits or plantations with well-established legume mulch in their first two years, (iii) in areas experiencing local flooding or waterlogging, (iv) with non-decomposed organic fertilizers or untreated and untested industrial or processing waste.

Section IV. FERTILIZATION FOR MATURE RUBBER PLANTATIONS

Article 94. Inorganic fertilization for mature rubber plantations

- Priority should be given to applying fertilizers based on regional nutritional diagnosis to enhance the economic and technical efficiency of fertilizer use. If regional nutritional diagnosis is not available, recommendations in Table 12 should be followed.

- This applies from the first year of tapping until the end of the tapping cycle in mature rubber plantations according to process.

- Types:

+ On flat land, the use of NPK 16-8-16 compound fertilizer is encouraged. For sloped areas planted along contour lines, only NPK 16-8-16 compound fertilizer or a ratio determined by regional nutritional diagnosis results should be used.

+ It is possible to combine inorganic fertilizers with organic fertilizers.

+ Number of fertilizations and time: Apply the full amount of fertilizer once at the beginning of the rainy season when the soil is sufficiently moist. Fertilizers should not be applied during heavy or prolonged rain;

- Fertilization method:

+ On flat land: Mix well and evenly spread the fertilizer over a strip 1.0 - 1.5 meters wide between two rows of rubber trees, or apply it into humus pits. In flat areas, the use of mechanization for fertilization is encouraged.

+ On sloped land: Apply fertilizers in trenches or multi-purpose pits as done during the immature period after canopy closure (as described in Article 89).

- Dosage: Dosage and type of fertilizer for mature rubber trees are listed in Table 12.

Table 12. Dosage of additional inorganic fertilizers for mature rubber plantations

Soil class	Pure (kg/ha)			NPK fertilizer (kg/ha)	Or single fertilizer (kg/ha)		
	N	P2O5	K2O	NPK 16-8-16	Urea	NC phosphate **	KCl
I	45	22	45	281	97	137	75
II	50	25	50	312	108	156	83
III	55	27	55	343	119	168	91

**When the pH value of $H_2O \geq 6$, replace fused phosphate with superphosphate.*

Article 95. Fertilizer adjustments for mature rubber plantations

- Fertilizer use for mature rubber plantations should aim for efficiency, ensuring productivity, output, and regulated cost. Fertilizer quantities can be adjusted depending on the condition of the plantation, soil status, and other factors.

- In cases where different groups of plantations need to be prioritized for fertilization, the recommended order is as follows: plantations aged 1-5 years of tapping > plantations aged 6-10 years of tapping > plantations aged 11-18 years of tapping.

- When organic fertilizers need to be supplemented, apply at least 50% of the annual investment in fertilizer for soils with more than 50% sand content, high gravel content, or low organic matter content (<2.5%).

- Cases for suspending fertilization in mature plantations: This includes plantations nearing the end of their productive life for liquidation, extensive plantations, and low-yield plantations due to factors unrelated to the soil, such as low tapping density, poor clones, or deteriorated tapping panels.

Figure VI.4. Fertilizer application position for mature rubber plantations on flat land

Chapter VIII
LATEX HARVESTING AND CARE OF MATURE RUBBER PLANTATIONS

Section I. GENERAL PROVISIONS ON RUBBER HARVESTING

Article 96. Management of mature rubber plantations

- When a plantation transitions from the immature phase to a mature rubber plantation, the management of the plantation is calculated based on the tapping years, not the planting years.

Article 97. Standards for rubber plantations for tapping

a. Standards for rubber plantations ready for tapping

- Rubber trees are considered ready for tapping when the girth reaches ≥ 50 cm, and the bark thickness is at least 6 mm when measured at a height of 1 meter;

- An immature plantation with 50% or more of the trees meeting the tapping standards can be opened for tapping;

- For plantations with more than 90% of trees meeting the tapping standards, all remaining trees with a girth of 40 cm or more will be opened for tapping.

b. Standards for rubber plantations ready for controlled upward tapping

Normal mature rubber plantations can begin controlled upward tapping from the 10^{th} tapping year.

c. Standards for re-tapping on regenerated bark

When re-tapping on regenerated bark, the bark thickness must be at least 8 mm or the regeneration period must exceed 10 years.

d. Standards for new tapping in special plantations

- Applicable to plantations with limited investment, specifically:

+ Immature plantations awaiting liquidation due to conversion of land use purposes;

+ Plantations in the immature phase managed with extensive care, or plantations with poor growth and low effective tree density (under 250 trees/ha), but still evaluated as capable of being tapped and producing latex;

+ Immature plantations that have been extended more than two years beyond the normal immature period for each soil class;

+ Other types of plantations as proposed by the Technical Management Board.

- Special plantations can begin tapping when:

+ The rubber trees have a girth of ≥ 45 cm measured at 1 meter above the ground;

+ An immature plantation with more than 50% of trees meeting the above standard can begin tapping. At the start of the third year, all trees with a girth greater than 40 cm should be tapped.

Article 98. Classification of rubber plantations for latex harvesting

- Group I: Plantations for upward tapping on original bark;

- Group II: Plantations for upward tapping or combination of both upward and upward

tapping;

- Group III: Plantations for final latex collection before being converted to timber harvesting;

- In Vietnam, the average latex harvesting cycle for plantations is 20 years (ranging from 17 to 23 years);

- In Laos and Cambodia, the average latex harvesting cycle is 17 years (ranging from 15 to 19 years).

Article 99. Regulations on final tapping

- Normal plantations that have completed the latex harvesting cycle, as per Article 97, must apply the final tapping regime for at least 03 years, which must be approved by the Group;

- If timber needs to be harvested earlier than the prescribed latex harvesting cycle due to poor productivity or other reasons, a different plantation must be planned to extend the latex harvesting cycle, with an equivalent area for final tapping;

- A replanting plan for the next 5 years should be developed, reviewed, and updated annually. The plan must ensure the appropriate structure of the plantations and economic efficiency. The final tapping plan must be approved by the Group;

- In special cases, plantations may be converted to final tapping before reaching the age limit based on one of the following conditions:

+ The plantation's productivity is under 1,200 kg/ha for 2-3 consecutive years (under 800 kg/ha in the North Central and Northwest regions for 2-3 consecutive years);

+ The tapping density is less than 50% of the design density;

+ The plantation is located within an area due for timber harvesting, requiring timber harvesting to align the area for easier production organization;

+ The plantation must be converted for other purpose of use as required by local authorities, either for other crops or other economic purposes, according to the planning approved by the Group.

Section II. RUBBER HARVESTING REGIME

Article 100. Rubber tapping regime

a. Length of the upward tapping cut:

- For Group I and Group II plantations, the length of the upward tapping cut is half of the tree circumference on the original or regenerated bark, denoted as S/2;

b. Length of the upward tapping cut:

- For a 20-year cycle:

+ From the 10^{th} to the 17^{th} year: the upward tapping cut is S/4 (Girth at 1.3 meters above ground > 55 cm) or S/2, ensuring the minimum length of the upward tapping cut is 10 cm

+ From the 18^{th} year onwards: the upward tapping cut is S/2;

- For a 17-year cycle:

+ From the 10^{th} to the 13^{th} year: the upward tapping cut is S/4;

+ From the 14th year onwards: the upward tapping cut is S/2.

For Group III plantations: the length of the upward tapping cut is half of the tree circumference on the III original bark, denoted as S/2U.

c. Tapping frequency

- A standard d3 tapping frequency (every three days) is applied for all rubber growing areas and all rubber clonal varieties;

- In areas with a labor shortage, a reduced tapping frequency is applied: d4 (every four days), d5 (every five days), d6 (every six days), or d7 (every seven days);

- The transition to a reduced tapping frequency is prioritized as follows: newly tapped plantations, plantations that have just switched to upward tapping BO-2, and plantations starting upward tapping.

- The tapping frequency may be adjusted in line with the climatic conditions of the region, ensuring the bark consumption over the years follows the standard d3 tapping frequency.

Article 101. Latex stimulation regime

a. For clonal varieties with moderate response to stimulants: This includes PB 235, PB 260, RRIV 106, RRIV 124, RRIV 114, RRIV 115, RRIV 209, IRCA 130, RRIV 2, RRIV 3, RRIV 4, RRIV 5, and other new varieties.

Table 13. Latex stimulation regime for d3 and d4 tapping frequencies for clonal varieties with moderate response to stimulants

Group I plantation				
Tapping panel	**d3 tapping frequency**		**d4 tapping frequency**	
	Tapping year	**Stimulation regime**	**Tapping year**	**Stimulation regime**
BO-1	1	ET 2.5% Pa 2/y	1	ET 2.5% Pa 3/y
	2-5	ET 2.5% Pa 3/y	2-6	ET 2.5% Pa 5/y
	6	ET 2.5% Pa 4/y	7	ET 2.5% Pa 6/y
BO-2	7	ET 2.5% Pa 3/y	8	ET 2.5% Pa 5/y
	8-9	ET 2.5% Pa 4/y	9	ET 2.5% Pa 6/y
Group II plantation				
Upward	10	ET 2.5% La 6/y	10	ET 2.5% La 8/y
Upward	11 - 17	d3. ET 2.5% La 7/y	11 - 17	d4. ET 2.5% La 9/y
Upward		d6. ET 2.5% Pa 3/y		d8.ET 2.5% Pa 4/y
Group III plantation				
Upward		ET 5.0% La 8/y		ET 5.0% La 10/y
ownward		ET 2.5% Pa 5/y		ET 2.5% Pa 6/y

For PB 260 and RRIV 124 clones, the stimulation frequency is reduced by 1 time compared to other clonal varieties.

In case of applying d5 tapping frequency, increase the stimulation frequency by 1-2 times and applying d6 tapping frequency, increase it by 2-3 times compared to d4.

For Group III plantations, the active ingredient concentration can be 2.5% with the frequency increased up to 1.5 times compared to the standard 5% concentration.

b. For clonal varieties with good response to stimulants: This includes GT 1, RRIM 600, PB 255, RRIV 1, RRIC 121, VM 515, IAN 873, etc

Table 14. Latex stimulation regime for d3 and d4 tapping frequencies for clonal varieties

with good response to stimulants

Group I plantation				
Tapping panel	**d3 tapping frequency**		**d4 tapping frequency**	
	Tapping year	**Stimulation regime**	**Tapping year**	**Stimulation regime**
BO - 1	1	ET 2.5% Pa 3/y	1	ET 2.5% Pa 4/y
	2 - 5	ET 2.5% Pa 4/y	2 - 6	ET 2.5% Pa 6/y
	6	ET 2.5% Pa 5/y	7	ET 2.5% Pa 7/y
BO - 2	7	ET 2.5% Pa 4/y	8	ET 2.5% Pa 6/y
	8 - 9	ET 2.5% Pa 5/y	9	ET 2.5% Pa 7/y
Group II plantation				
Upward	10	ET 2.5% La 7/y	10	ET 2.5% La 9/y
Upward	11 - 17	d3. ET 2.5% La 8/y	11 - 17	d4. ET 2.5% La 10/y
Upward		d6. ET 2.5% Pa 4/y		d8. ET 2.5% Pa 5/y
Group IUII plantation				
Upward		ET 5.0% La 10/y		ET 5.0% La 12/y
Upward		ET 2.5% Pa 5/y		ET 2.5% Pa 6/y

Note: in case of applying d5 tapping frequency, the latex stimulation frequency increases 1 - 2 times and applying d6 tapping frequency, increases 2 - 3 times compared to d4 tapping frequency.

For Group III plantations, the active ingredient concentration can be 2.5% with the frequency increased up to 1.5 times compared to the standard 5% concentration.

For plantations for final tapping, apply the tapping regime depending on actual conditions.

Article 102. Physiological diagnosis of latex

Physiological diagnosis of latex will be applied to plantations exhibiting abnormal yield patterns in order to determine the appropriate latex harvesting regime. This method is conducted by the Rubber Research Institute of Vietnam.

Article 103. Tapping panel planning

- For newly tapped plantations, the tapping panel is planned starting from the first tapping year for the entire harvesting cycle (Figure VIII.1);

- Each year, the tapping panel is planned at the beginning of the tapping year and remains unchanged throughout the year;

- The upward tapping cut must be located opposite the upward tapping cut. If both cuts are made on the same side, they must be at least 30 cm apart;

- Once a plantation has switched from BO-1 to BO-2 tapping panel, the practice of cutting at the tree base in the first three months of the tapping season is not applied;

- The planning of the tapping panel for the opened tapping plantations is different from this process, requiring consultation from the Rubber Research of Vietnam and approval from the Group;

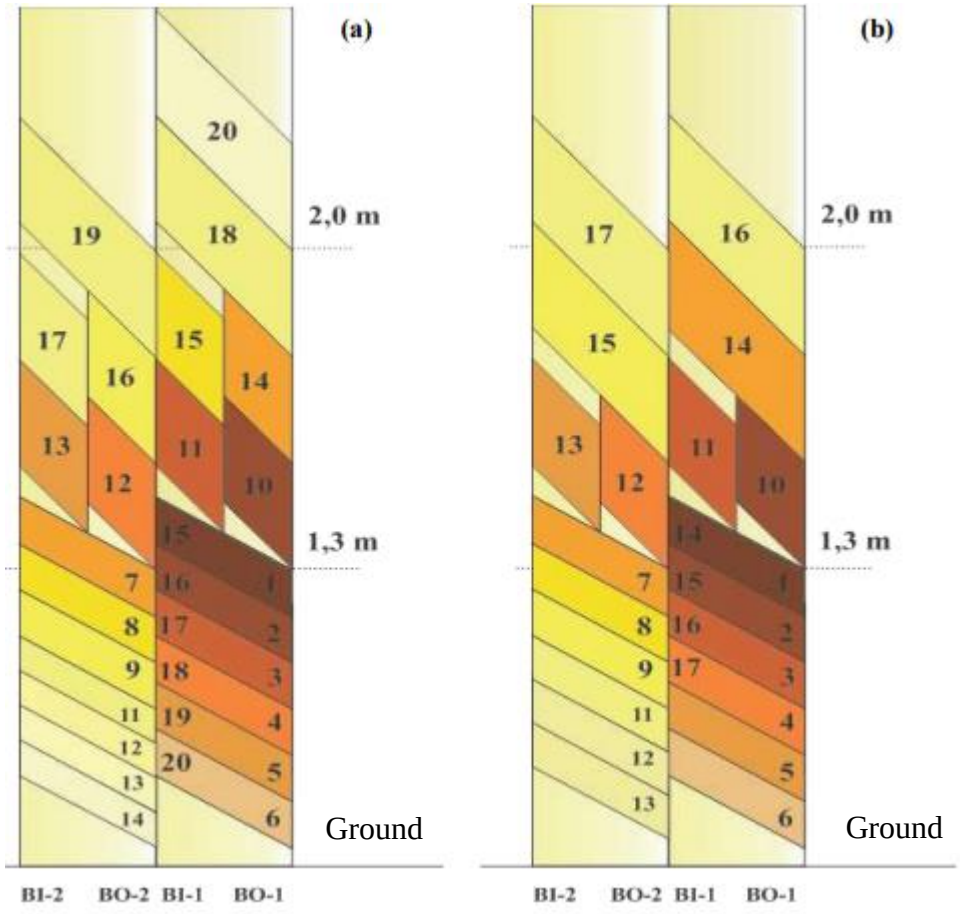


Figure VIII.1. Tapping panel planning diagram for mature rubber plantations with a 20-year latex harvesting cycle (a); and 17-year latex harvesting cycle (b)

Section III. DESIGN AND OPENING OF TAPPING CUTS

Article 104. Division of tapping sections and tapping shifts

- The number of trees in each tapping section is divided based on the terrain of the plantation, tree density, tapping year, condition of the tapping panel, tapping regime, and latex collection method. For Group I plantations, the sections must remain stable from the first year of tapping. For Group II plantations, the sections should be defined at the beginning of the year to avoid disruption when switching to upward tapping.

- Tapping shifts for the same worker must not be positioned next to each other.

- Each tapping section must be clearly marked and numbered

Table 15. Number of Tapping Trees per Section Based on Year and Terrain/Density

Terrain, density of tapped trees	**Plantation group**				
	Group 1		**Group 2**		**Group 3**
	1st year	2nd year onwards	**(b)**	**(b)**	
1. Water latex collection					
Flat land	450 - 550	600 - 650	450 - 500	550 - 600	250 - 300
Sloped land >15° or sparse density	400 - 450	500 - 550	400 - 450	500 - 550	220 - 250
2. Coagulated latex collection					
Flat land	550 - 650	700 - 750	550 - 600	650 - 700	300 - 350

Sloped land >15° or sparse density	450 - 550	600 - 650	500 - 550	600 - 650	250 - 300

(a) Applicable to the combined tapping regime with two upward cuts (d3 or d4) and one upward cut (d6 or d8).

(b) Applicable to the single upward cut tapping regime and the tapping regime using ethylene stimulation.

Note: No upper limit is set for the number of tapping trees or tapping sections

Article 105: Equipment for tapping trees

- The tapping tree is fully equipped with braces, latex collection trays, and cups. In the case of combined upward and upward tapping, separate braces, trays, and cups should be provided for each tapping cut;

- Braces should be tied 35 cm away from the tapping cut for both controlled upward and upward tapping. In Group I and Group II plantations, braces should not be fastened to the rubber tree trunk. The braces should be tied using steel spring wire ϕ = 1.0 mm or nylon wire, excluding polypropylene *(PP)* material;

- Trays should be placed 10 cm below the tapping cut for upward tapping and 15 cm below the tapping cut for controlled upward tapping. The depth should be 2 mm from the wood, and the slope of the tray should be 30° to the horizontal axis of the tree trunk;

- Cups for latex collection should be made of burnt clay with a glazed interior or plastic with a smooth interior, the cup volume should range from 500 ml to 1,000 ml depending on the group of trees. For the method of coagulated latex collection in the plantation, larger cups from 1,800 ml to 2,000 ml should be used;

- Rainwater shields or covers for the tapping panel, cup covers, or cup membranes.

- Latex collection trays (for upward tapping cut).

- Latex collection tube (for plantations with tapping panels placed high), and polypropylene *(PP)* material must not be used.

Article 106: Tapping cut design

a. Height of the tapping cut

- For newly tapped trees, the tapping cut should be 1.2 to 1.3 meters above the ground, depending on the conditions of each unit, but a uniform tapping height of BO-1 must be used across the entire area.

- For continuous upward tapping, the tapping cut should be maintained for at least 6 years at the BO-1 panel. After that, the tapping cut should be moved to the BO-2 panel, which has the same height as the BO-1 tapping panel (1.2 - 1.3 meters above the ground).

- Controlled upward tapping should have the tapping cut height between 1.2 meters (or 1.3 meters) and 2.0 meters above the ground. Heights above 2.0 meters are considered out of control.

b. Slope of the tapping cut:

- For upward tapping, the slope of the tapping cut should be 32° to the horizontal axis.

- For upward tapping, the slope of the tapping cut should be 45°.

c. Tapping cut design

The tools required for designing the tapping cuts include (Figure VIII.3):

- A 150 cm tape measure with markings for the tapping cut, tray installation, and brace positioning.
- A 3-knot cord (100 cm) or a pre-marked tape measure to divide the tapping area into two or four equal parts.
- A template (flag) with a handle to ensure the correct slope.
- A marker to indicate monthly bark consumption.
- A notching tool.
- The tapping cut markers and templates for upward and upward tapping should be marked and designed differently.

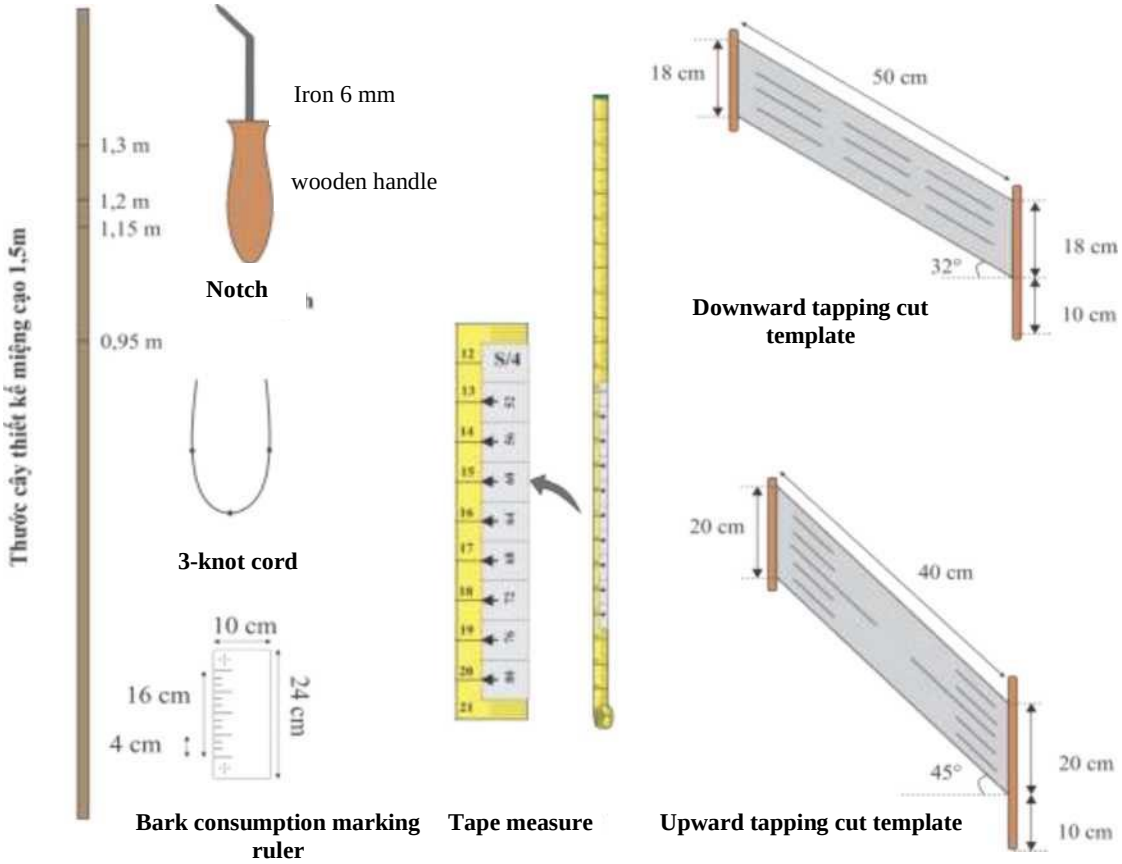


Figure VIII.3: Tools for tapping cut design

Design process:

* **For upward tapping**

- Use the tape measure to check and mark trees that meet the tapping criteria (Figure VIII.4a).

- The tapping cut should be uniformly opened on the same side of the plantation, facing toward the center of the row for ease of observation, inspection, and management. In the case of planting trees along the contour line, the tapping cut should face inward along the row planted along the contour line;

- Place the tape measure to mark the boundary, the tapping cut, the latex collection tray installation, and brace placement (Figure VIII.4b).

- Use the three-knot cord to divide the rubber tree trunk into two equal parts (Figure VIII.4c).

- Determine the back boundary by making a vertical notch along the trunk (Figure VIII.4d).

- Place the template at the correct position of the front boundary to ensure accurate tapping cuts and quarterly bark consumption lines (Figure VIII.4e).

- Use the template to mark the monthly bark consumption and set boundary marks for both the front and back (Figure VIII.4f).

- Create a 10-11 cm long front groove, deep to the fine sand layer (shaped like an elephant's head and mouse tail). The groove must be perpendicular to the ground (Figure VIII.4g).

- After completing the tapping cut design, equip the tree with the necessary materials (Figure VIII.4h).

Figure VIII.4a. Use the tape measure to check and mark trees that meet the tapping criteria

Figure VIII.4b. Place the tape measure to mark the boundary, the tapping cut, the latex collection tray installation, and brace placement

Figure VIII.4c. Use the three-knot cord to divide the rubber tree trunk into two equal parts

Figure VIII.4d. Determine the back boundary by making a vertical notch along the trunk

Figure VIII.4e. Incise accurate tapping cuts and quarterly bark consumption lines

Figure VIII.4f. Use the template to mark the monthly bark consumption and set boundary marks for both the front and back

Figure VIII.4g. Stamping and compete design

Figure VIII.4h. Equip the tapping tree with the necessary materials

Figure VIII.4. Upward tapping cut design technique

*** Upward tapping cuts**

- In the same lot, the upward tapping cuts should also be designed uniformly on one side to facilitate observation, inspection, and management;

- Place the tape measure and notch tool to mark the boundary from a position 1.3 meters (or 1.2 meters) above the ground straight upward (Figure VIII.5a);

- Use a cord with three knots or a pre-marked tape measure to divide the rubber tree trunk into two equal parts (for S/2 tapping cut) or four equal parts (for S/4 tapping cut) (Figure VIII.5b);

- Determine the back boundary by making a vertical notch along the tree trunk (Figure VIII.5c);

- Place the template at the correct position of the front boundary to ensure the correct tapping cuts and the bark consumption lines either monthly or quarterly between the front and back boundaries. Note that the slope of the upward tapping cut must be 45° from the start of the tapping process. It is not allowed to start with a lower slope and gradually increase to the required angle (Figures VIII.5d, e, f);

- Create a front groove from the tapping cut to the tray installation position (15 cm long), deep into the fine sand layer (shaped like an elephant's head and mouse tail). The groove must be perpendicular to the ground (Figure VIII.5g);

- After completing the tapping cut design, equip the tree with the necessary materials (Figure VIII.5h).

d. Additional tapping

- In areas with distinct rainy and dry seasons, start additional tapping for trees that meet the criteria at the beginning of the tapping season and in September and October each year. In other areas, additional tapping should be done at the beginning of the tapping season and in August and September each year. The tapping cut on newly tapped trees

should be at the same height as the current tapping cut of trees that were tapped earlier;

- In the third year, begin tapping all trees with a trunk circumference greater than 40 cm. The tapping cut on newly tapped trees should be at the same height as the current tapping cut of trees that were tapped earlier;

- In areas with a labor shortage for latex tapping, staggered tapping may be allowed based on the available workforce. However, tapping is only permitted until the end of September each year;

Figure VIII.5a. Place the tape measure and notch tool to mark the front boundary from a position 1.3 meters above the ground straight upward

Figure VIII.5b. Use a cord with three knots to divide the rubber tree trunk into two or four equal parts

Figure VIII.5c. Determine the back boundary for S/4 tapping cut

Figure VIII.5d. Determine the back boundary

Figure VIII.5e. Place the template at the correct position of the front boundary to ensure the correct tapping cuts

Figure VIII.5f. Incise the bark consumption lines monthly or quarterly between the front and back boundaries

Figure VIII.5g. Tapped tree after design

Figure VIII.5h. A tapped tree fully equipped

Figure VIII.5: Technique for design & opening of upward tapping cut

Article 107: Opening of tapping cuts

a. Opening of new tapping cuts

*** Upward tapping (Figure VIII.6)**

After designing, perform the initial tapping in three cuts:

- Cut 1: Standard cut (Figure VIII.6a);

- Cut 2: Wedge cut (Figure VIII.6b);

- Cut 3: Finalize the tapping cut, gradually pressing the knife to the required depth, avoiding excessively deep cutting when opening the tapping cut.

Figure VIII.6a. Standard cut

Figure VIII.6b. Wedge cut

Figure VIII.6c: Open the front groove

Figure VIII.6d: Install the tray

Figure VIII.6e: Completed tapping cut

Figure VIII.6f: Tapped tree completed and fully equipped

Figure VIII.6: Opening the Upward Tapping cut

* ***Upward Tapping (Figure VIII.7)***

After designing, perform the initial tapping in an upward direction with three cuts, similar to the typical upward tapping method. The depth of the tapping should gradually increase until it reaches a range of approximately 1.1 mm to 1.3 mm. You may perform 2–3

upward cuts to create a support point or a tray for guiding the latex flow. When tapping upward within the control range, if a rain cover is made for the tapping panel, the latex guiding tray must be attached; however, if only making a rainwater gutter, it is possible to consider installing a gutter to support the flow of latex;

- The maximum allowable bark consumption when opening the tapping cut is 2 cm for both upward and upward tapping.

Figure VIII.7a: Standard cut

Figure VIII.7b: Wedge cut

Figure VIII.7c: Open the front groove

Figure VIII.7d: Install the tray

Figure VIII.7e: Tap 2 - 3 cuts upward to prevent the latex from spreading

Figure VIII.7f: Tapped tree completed and fully equipped

Figure VIII.7: Opening of upward tapping cut

b. Reopening of tapping cuts

Reopening the tapping cut for trees that have already been tapped for both upward and upward tapping:

- When reopening the tapping cut on each tree, two consecutive cuts must be made;

- The allowable bark consumption during reopening is between 0.5 cm and 1 cm;

- The reopening should be done in sections, completing one section before moving to another.

Section IV. TECHNICAL REQUIREMENTS FOR LATEX HARVESTING

Article 108. Tapping season

- The opening of tapping depends on the actual production conditions of the region, when the new foliage is stable, and weather conditions are favorable;

- For combined upward - upward tapping, the upward tapping cut is opened at the start of the tapping season, while the upward tapping cut is opened around mid-May or mid-September;

- Stop tapping when trees begin to sprout new leaves (foot of the leaf), and stop tapping the entire plantation when 30% of the trees have sprouted new leaves. If less than 30% of the trees have sprouted but the yield is not economically viable, tapping should be paused;

- Resume tapping when trees have stable foliage, and trees with stable foliage should be tapped first. In cases of prolonged drought, the tapping start date may be postponed;

- Stop tapping if the average air temperature is below 15°C for 3 consecutive days, and resume tapping once the temperature rises above 15°C.

Article 109. Tapping depth

- Tapping depth should be between 1.1 mm and 1.3 mm from upper layer for both upward and upward tapping.

- Avoid shallow tapping (over 1.3 mm from the upper layer), deep tapping (less than 1.1 mm from the lower layer), or excessively deep tapping (damaging the wood).

Article 110. Bark consumption - Bark consumption marking

- Upward tapping cut:

+ d3 tapping frequency: Bark consumption of 1.1 mm - 1.5 mm per tapping, with a maximum bark consumption of 18 cm per year;

+ d4 tapping frequency: Bark consumption of 1.2 mm - 1.6 mm per tapping, with a maximum bark consumption of 15 cm per year;

+ For d5, d6 tapping frequencies: Bark consumption of 1.5 mm - 2.0 mm per tapping, with a maximum bark consumption of 14 cm per year for d5 tapping frequency and 12 cm per year for d6 tapping frequency.

- Upward Tapping cut:

+ For controlled upward tapping: At d3tapping frequency, the bark consumption should not exceed 2 mm per tapping, and the maximum bark consumption is 3 cm per month. At d4 tapping frequency, the bark consumption should not exceed 2.2 mm per tapping, with a maximum bark consumption of 2.5 cm per month;

+ For uncontrolled upward tapping: At d3tapping frequency, the bark consumption should not exceed 3 mm per tapping, with a maximum bark consumption of 4.5 cm per month. At d4tapping frequency, the bark consumption should not exceed 3.5 mm per tapping, with a maximum bark consumption of 4 cm per month;

- Annually, before restarting tapping, bark consumption should be marked, using a template to mark standard lines on the bark to control monthly and quarterly bark

consumption, and the slope of the tapping cut.

Article 111. Tapping line standards

The tapping line must have the correct slope, a trough, a square front, and a square back. It should not deviate from the tapping cut, should not exceed the boundaries, and should not be wavy.

Article 112. Pre- and Post-tapping procedures for each tree

- For liquid latex collection:

+ Before tapping, remove the latex from the string and cup, adjust the hanging supports, clean the cups, and place them on the supports. After tapping, flip the cups to collect the latex and move to the next tree. Special attention should be given to collecting latex for controlled upward tapping;

+ The tapping direction should follow the adjacent trees along the same row. In the next tapping cycle, change the tapping direction or the order of trees;

+ Latex should only be collected after receiving an order from the team leader. Collect latex from the trees tapped first, using a scraper to gather any remaining latex in the cups, and place the cups back in their original position to catch any late-dripping latex.

+ For fast-coagulating latex varieties, after tapping, the farm should proactively collect the latex first and store it in a container before transporting it to the central collection point. The concentration and dosage of ammonia solution (NH_3) should be provided by the processing plant.

+ For trees treated with stimulating chemicals, latex should be collected in the afternoon. During the rainy season, chemicals (provided by the processing plant) can be used to prevent latex from coagulating in the cups.

- For batch latex collection:

+ Before tapping, remove latex from the string, and after tapping, guide the latex into the cups and check the rain cover and cup. Move to the next tree after confirming that the cup is properly positioned. If the cup is near full, exchange it with one that contains less latex to prevent overflow. Special attention should be given to collecting latex for controlled upward tapping.

+ The tapping direction should follow the adjacent trees along the same row. In the next tapping cycle, change the tapping direction or the order of trees.

+ Chemicals may be used to prevent latex from coagulating and aid in latex management.

Article 113. Tapping hours - latex collection - delivery and quality

a. Tapping hours

Depending on the weather conditions throughout the year, tapping should begin when the tapping line is clearly visible. Tapping should not be done during hot midday hours or when the air temperature is below 15°C.

b. Time for collecting liquid latex and coagulated latex

- Liquid latex collection time: After completing the tapping on each tree, workers must wait for the instructions from the team/group leader before collecting the latex. The waiting time for latex collection depends on the weather, but for liquid latex, it must be

collected and transported to the factory within 7 hours after tapping. After collection, the latex should be immediately transported to the receiving point.

- Coagulated latex collection time: After 1 - 3 taps, proceed with harvesting the coagulated latex. After tapping, coagulated latex should be harvested from the next tapping section. It is recommended to allow the latex to dry for 1 - 2 hours before delivery. Note: When collecting coagulated latex, a portion of serum should be left in the cup. Once the latex is collected, it must be transported to the designated receiving point according to regulations.

c. Latex delivery and reception

- For liquid latex: When pouring liquid latex from the collecting bucket into the storage container, a filter with a hole size of 5 mm should be used, and measures must be taken to cover it (such as a lid or covering film) to prevent foreign materials like leaves from falling into the latex. After pouring, the liquid latex is gathered at the receiving point, marked with the collector's number or name and the container's code (packaging code) for farms that weigh latex for workers using a scale.

- For coagulated latex: Collecting, sorting, and cleaning process should be followed to remove visible impurities such as leaves, bark, insects, PP or PVC bag fibers, metals, dirt, and other contaminants. The latex should then be organized and arranged at the receiving point.

- At the receiving point, latex is weighed by tapping section, and full records should be made on a production tracking sheet, noting the quality of the latex. After that, it is gathered for transportation to the factory. When pouring liquid latex into the tank of the transporting vehicle, a 3 mm mesh filter must be used.

- For large-scale units with areas of 50 - 100 hectares, a latex reception station should be set up. At the station, a centralized storage tank can be established so that workers can rest after delivering latex to the group representative.

d. Latex quality

- Cup latex and coagulated latex should be cut and checked for quality inside and left to dry on the receiving floor for at least 1 hour before weighing for acceptance, separated by individual collectors.

- Rubber strip latex should not be rolled into a ball. After removing the scraping debris and other impurities, it should be cleaned to remove dirt and left to dry on the receiving floor.

- The quality of liquid latex and coagulated latex must meet the processing requirements for each type of natural rubber as per the specifications of the processing unit or the latex purchasing facility. Special care should be taken to avoid contamination with impurities (scraping debris, leaves, branches, sand, dirt, dust, packaging fragments, cleaning rags, etc.).

- For rubber lots intended to supply liquid latex for centrifuged latex processing, regular quality checks should be performed when the liquid latex is received at the factory. If the volatile fatty acid (VFA) value of the liquid latex exceeds the specified threshold of 0.05, the factory must trace the origin of the latex and identify the lots with high VFA values. Afterward, the farm manager must guide the workers to implement a disinfection cleaning process for the latex tapping tools and containers to prevent further VFA increases.

e. Conditions at latex delivery place

- The latex reception point must be kept clean and regularly sanitized, with a shelter, liquid latex storage tank, dirty latex storage area, clean water basin for washing, and drainage channels for collecting and processing wastewater.

- A resting area for workers should be provided while waiting to deliver latex.

- A central location for storing cleaned latex containers should be set up.

- Tapping and latex collection tools and containers should be checked for cleanliness before latex is collected.

- The floor for storing coagulated latex must be clean, dry, and well-ventilated, with no direct sunlight affecting the raw materials.

- Latex weighing tools, quality acceptance tools, and DRC or TSC measuring devices must be cleaned and stored in a dry place.

f. Storing latex during transport to the factory

- For liquid latex used in processing SVR block rubber and RSS sheet rubber: It is preserved using ammonia solution (NH_3). Ammonia should only be used when the latex is stable (in a naturally liquid state, without clumping). The required amount of ammonia depends on the collection time, transport duration, and specific conditions. The liquid latex received at the factory must have a pH $\leq$ 8 and an ammonia content as calculated and specified by the factory.

- For liquid latex used in centrifuged rubber processing: The liquid latex is preserved using a 10% ammonia solution with a concentration of 0.3 - 0.4% by weight of the liquid latex. The ammonia solution is provided by the factory, and the quantity required is calculated by the factory. This solution is divided into two parts:

+ Part 1: 70% of the ammonia solution is provided daily for each collector, to be added to a 35-liter container before adding the latex. This preservation step is crucial to control VFA increase in the latex.

+ Part 2: The remaining 30% is added to the storage tank of the transport vehicle before the latex is loaded.

- For coagulated latex: PP or PVC bags should not be used as containers, covers, or floor liners during storage and transport. When storing, latex types should be separated to make it easier to identify the type and collection time, preventing mixing of different types.

Article 114. Provision of latex tapping tools for workers (Figure VIII.8)

- Latex tapping knife: Workers must be equipped with at least two latex tapping knives or one modular latex tapping knife with at least one spare blade. The knives should be used for specific types of tapping or improved tapping knives. Note that the improved tapping knife, designed for both upside-down and upright taps, should only be used for the upright tap on the first round;

- Latex collection tools:

+ For collecting liquid latex: A latex filter sieve, latex scraper, 1 ammonia bottle, a basket/container for mixed latex, a 10 - 20 liter latex bucket, and some 20 - 35 liter containers.

+ For collecting coagulated latex: A basket/container for collecting coagulated latex (10 - 20 kg), and some 20 - 35 kg containers.

- Other tools**:** A bark scraper, a tube of tree grease (vaseline), two sharpening stones (a coarse stone for rough sharpening and a fine stone for finishing), and cloth rags for wiping;

- Technical Requirements:

+ Tapping knives must be of good quality, regularly sharpened after completing each tapping session, and equipped with a blade protector for safety.

+ All tools must be kept clean; baskets/containers for latex must be durable, easy to use, easy to clean, and should not affect the quality of the latex. Note: Do not use rags made from polypropylene (PP) material for wiping or cleaning.

- The tapping section of the tree must have an upside-down bucket support or a hanging bucket system.

Figure VIII.8a. Type of tapping knives

Figure VIII.8b. Types of latex containers for the liquid latex collection method

18l plastic barrel

Figure VIII. 8c. Latex containers for the coagulated latex collection method

Figure VIII.8d. Some materials used for rubber latex harvesting

Article 115. Regulations for applying grease (vaseline) to tapping cuts before annual tapping break

- Applies to Group I plantations in all rubber growing regions.

- Grease (vaseline) should be applied to the regenerated bark around the tapping cuts with a 5 cm (d3) wide band for group I trees, and a 4 cm (d4, d5) wide band for other groups. Apply from the back to the front of the tapping cut to protect the tapped surface of the entire tree in the plantation from environmental conditions such as cold, heat, etc.

- Application time: Before the tapping break season, after harvesting all mixed latex, dirt latex, and cleaning the tapping area.

Section V. LATEX STIMULATION

Article 116. Type of stimulants and concentration used

- The latex stimulating chemical used should contain ethephon (2-chloroethyl phosphonic acid).

- The concentration of active ingredient used is 2.5% for Group I and II trees; Group III plantations and trees being tapped for timber harvesting should use a 5% concentration or can use a 2.5% concentration. If a 2.5% concentration is used, the number of applications in the year can be increased by up to 1.5 times compared to using a 5% concentration

Article 117. Time for applying latex stimulants

- In regions with distinct dry and rainy seasons (Southeast, Central Highlands), stimulants should be applied in May, June, July, August, October, November, and December.

- In other regions (Central Coast, Northern Mountain regions), stimulants should be applied in April, May, June, August, September, and October.

- Apply the stimulant 24 to 48 hours before the next tapping.

- Do not apply when the tapping panel is still wet or when it is about to rain.

- Do not apply when the weather is dry, the air temperature is below 15°C, or during the leaf drop season in winter.

Article 118. Method for applying latex stimulants (Figure VIII.9)

- Panel application (Pa): This method is applied to the upright tapping cut. Stir the stimulant thoroughly before use, and use a brush to apply a 1 cm wide, even layer of the stimulant to the regenerated bark near the tapping cut.

- Lace application (La): This method is applied to the horizontal tapping cut. Stir the stimulant thoroughly before use, and use a brush to apply a thin, even layer directly on the tapping panel. If the latex layer on the tapping cut is thick, remove the latex before applying.

- For plantations with horizontal tapping cuts that are difficult to access, a special application tool should be used. The stimulant should be placed in a pump with a hose connected to a brush for application. The principle remains the same as the Lace Application (La), but due to the height, it is acceptable for some stimulant to also be applied to the regenerated bark.

- Application tools for latex stimulants: Brush size 8 or an improved brush with a width of 0.8 cm. Special tool for applying latex stimulants on high tapping cuts (for upward cuts that are out of reach).

Figure VIII.9a. Apply stimulant to the downward cutting cut (Pa)

Figure VIII.9b. Apply stimulant to the upward cutting cut (La)

Figure VIII.9c. Apply stimulant to the uncontrolled upward cutting cut (Pa)

Figure VIII.9d. A brush connected to a syringe for applying stimulant to the uncontrolled upward cutting cut

Figure VIII.9. Method of applying latex stimulants

Article 119. Dosage and frequency of latex stimulant application

- Group I plantations: Tapping age from 1 to 5 years, apply from 0.5 to 1 gram per tree per application using the Pa method.

- Group I plantations: Tapping age from 6 to 10 years, apply from 0.75 to 1.5 grams per tree per application using the Pa method.

- Group II, III plantations: Tapping age over 10 years, apply from 1 to 2 grams per tree per application on upward taps using the Pa method; from 0.75 to 2 grams per tree per application on upward taps using the La method.

- The interval between two applications must be at least 3 weeks.

Article 120. Standards for trees to use latex stimulants

- Trees must be growing normally and have good tapping technique.

Do not apply latex stimulants to trees with cut tops, trees with severe disease, trees showing signs of dry tapping panels, or very small trees.

Article 121. Technical control on plantations using latex stimulants

- If the dry rubber content (DRC) of the plantation is below 25%, do not use latex stimulants.

- If the percentage of trees with dry tapping panels exceeds the following levels compared to the previous inspection, stimulants should not be applied:

+ Group I plantations: > 3%;

+ Group II plantations: > 10%.

Article 122. safety measures when using latex stimulants

- Avoid contact of latex stimulants with skin and eyes. In case of skin contact, wash immediately with soap and warm water. If contact is made with the eyes, rinse the eyes thoroughly with clean water and seek medical attention immediately.

- Used latex stimulant containers must be collected and disposed of according to

regulations.

- When applying latex stimulants to upward tapping cuts, wear protective glasses to prevent stimulants from getting into the eyes.

- Never eat, drink, or smoke while applying latex stimulants..

Article 123. Storage of latex stimulants

- The product should always be stored in a cool place, away from direct sunlight.

- Follow the expiration date indicated on the packaging.

Article 124. Tapping technique with ethylene gas stimulants

- This method involves stimulating latex using ethylene gas (C_2H_4). The ethylene gas is directly pumped into the rubber tree bark tissue in cycles via gas containers attached or placed near the tapping cuts.

- This method is applied in combination with short tapping cuts and tapping frequencies (d3, d4, d5, and d6) on Group II plantations.

a. Standards for plantations

- Plantations applying this technique must meet the following conditions:

+ The tapping age must be 15 years or older.

+ The canopy should be healthy and free from serious diseases affecting the trunk or tapping panel. The trunk girth at 1.0 m height should be greater than 60 cm.

+ At least 70% of the trees must meet the standards for this technique;

- Plantations not suitable for ethylene gas stimulation:

+ Do not apply this technique to plantations tapping at d2 frequency.

+ Do not apply to plantations with inadequate bark or poor latex withdrawal areas.

+ Do not apply to plantations where incorrect tapping methods or tapping cessation have occurred.

b. Harvesting regime for ethylene gas stimulation

- S/6U d3 6d/7 10m/12. ETG G/3;

- S/4U d3 6d/7 10m/12. ETG G/3;

- In cases where tapping work is insufficient, apply d4 tapping frequency (every four days, with ethylene gas applied every three cuts/tapping) or d5 and d6 (every five and six days, with ethylene gas applied every two cuts/tapping).

Section VI. MEASURES TO PROTECT RUBBER TREES FROM RAIN

Article 125. Season for implementing rain protection measures

- Rain protection measures should be implemented at the beginning of the rainy season.

Article 126. Targets and techniques for installing rainwater gutters and roofs

- All mature rubber plantations must implement rain protection measures, except for those where the tapping panel is too high to be accessible.

- Depending on the tapping method and the region, appropriate rain protection methods should be applied;

+ For water latex collection, apply rainwater gutters or roofs. In areas with heavy rain and wind, install a roof over the tapping panel (tapping panel roof) and combine it with a cup roof or a cup covering film as needed.

+ For natural coagulated latex collection, install a roof over the tapping panel combined with a cup roof or covering film as needed.

- Installation techniques: Techniques for installing rainwater gutters, tapping panel roofs, and cup covering films are detailed in Appendix XI.

Section VII. TECHNICAL INSPECTION SYSTEM

Article 127. Technical inspection system

a. Routine inspection schedule (in addition to regular inspections)

- Group/team: daily inspections.

- Plantation: monthly inspections.

- Company: at least every 3 months.

- Group: periodic inspections (1) point recheck, (2) at least once a year for every 3 units in a region, or (3) unannounced inspections on an irregular basis.

b. Inspection and ranking method

- For each part of the plantation, inspect 3-5 trees randomly.

- After each inspection, record the number of technical errors, points deducted, and technical ranking. Monthly inspection results from the plantation level are used as a basis for determining performance-based wages attached to technical results.

Article 128. Marking technical violations

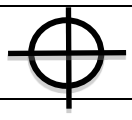
- Mark technical violations with pen or colored chalk on the inspected trees as in Table 16:

+ Group/team: yellow;

+ Plantation: white;

+ Company: red.

Table 16. Violation Marking Symbols

- Close		- Wavy tapping cut	
- Mildly deep		- Misaligned tapping cut	
- Severely deep		- Not perpendicular	
- Mildly shallow		- Poor cleanliness	
- Severely shallow		- Untapped tree	
- Thin bark		- Poor collection	
- Mildly thick bark consumption		- Poor equipment and care for tapped trees	

- Severely thick bark consumption		Tapping intensity violation	

Article 129. Plantation management

- Each plantation must have a plot map at a scale of 1:10,000;

- Each plot must have a sign with information such as plot name, cloning line, area (ha), planting year, planting method, planting distance, and tapping commencement year, marked in white paint on four rubber trees at the corners of the plot, with the sign positioned 2 meters above the ground.

- Boundary markers for tree parts must be marked  with paint on the rubber tree trunks at a height of 1.6 meters.

- Trees that are not tapped due to disease should be marked with an "N" at 1.4 meters above the ground, and their latex collection channels should be removed.

- A diagram for each plot must be created, detailing the area, planting year, variety, planting density, planting method, year of latex harvesting, number of existing trees, number of broken trees;.

- The plantation must monitor and record the latex yield, fertilizer, pesticides, and latex stimulant types used for each plot. Any changes in plot size or tree numbers must be updated in the plot records.

- At the end of the year, a comprehensive evaluation of the plantation's productivity must be conducted.

Article 130. Technical document management

- The group/team must maintain daily latex yield records and technical inspection logs for each individual in group/team.

- The plantation must maintain plot maps, plot history, and latex yield records, as well as technical inspection records and worker skill rankings.

- The plantation and company must summarize information on plantation area, yield, and productivity, labor usage for tapping, and worker skill rankings, incorporating technical inspection results. A reward and penalty system must be in place based on performance.

- The plantation and company must prepare an annual plan for managing the planning and design of tapping cuts and panels (Appendix IX).

Chapter IX

PLANT PROTECTION

Article 131. General regulations on plant protection

- When an infected plantation is infected, it must take immediate measures according to the provisions stated in the Plant Protection process;

- When a pest or strange disease appears on the rubber plantation which is not specified in Article 131 below, it must be reported to the Group and samples from the damaged tree part must be taken and sent to the Institute to identify the harmful agent and take measures to handle it properly and promptly. The sampling method is guided in Section 4, Appendix XII);

- Regularly visit the page "Diagnosis of pests on rubber trees" (https://chandoanbenhonline.rubbergroup.vn) to update information on the pest status and refer to the Group's guiding documents, regulations and decisions of the State on Plant Protection to comply with the implementation;

- Do not use active ingredients of pesticides when they have not been tested for economic and technical effectiveness; The recommended pesticide concentration is the concentration of the active ingredient, calculated in percentages (%) and parts per million (ppm); The recommended adhesives for use are commercial concentrations;

- Restrict or prohibit the use of pesticides based on heavy metals (copper, lead,...) in rubber plantations;

- Apply safety measures when managing and using pesticides;

- Always use clean, impurity-free water and neutral pH to mix pesticide;

- The method of investigation and assessment of the level of diseases shall be carried out according to Appendix XII of the process;

- The method of mixing the pesticides is guided in Appendix XIII of the process.

Section I. Major pests and diseases on rubber trees

Article 132. Main pests and diseases on rubber trees (Table 17)

Table 17. The main types of pests and diseases on parts of rubber trees

Agent	Damaged parts	Harm on	
		Rubber trees in human gardens and nursery gardens	Rubber trees in KTCB gardens and business gardens
Disease	Leaf	1. Powdery mildew 2. Leaf tip wilt 3. Rainy season deciduous disease 4. Corynespora Disease 5. Bird's eye spot disease	1. Powdery mildew 2. Leaf tip wilt 3. Rainy season deciduous disease 4. Corynespora Disease 5. Pestalotiopsis deciduous disease

		6. Pestalotiopsis deciduous disease 7a. Sunburn	6a. Sunburn 7a. Harmful cold
	Branch	8a. Botryodiplodia	8a. Pink fungus disease 9a. Botryodiplodia 10. Dry tops and branches 11a. Lightning strikes 7b. Harmful cold
	Trunk	7b. Sunburn 8b. Botryodiplodia	8b. Pink fungus disease 9b. Botryodiplodia 12. Tapping facial stripe ulcers 13. Fusarium bark rot 14. Dry shaved face 11b. Lightning strikes 6b. Sunburn 7c. Harmful cold
	Root		15. Brown root disease 16. Root Neck Disease
Deep	Leaf	1. Sentence structure 2. Red spider, yellow spider 3. Mealybugs 4. Bed bugs	1. Sentence structure 2. Worm 3. Red spider, yellow spider 4. Mealybugs 5. Bed bugs
	Bark		6. Shell-eating worms
	Roots and roots	5. Termites 6. Root cult	7. Termites 8. Root Cult

Section II. LEAF DISEASE

Article 133. Powdery mildew

- Agent: caused by the fungus *Oidium heveae* Steinm;
- Distribution: throughout rubber growing areas, focusing on the annual leaf change season;
- Harm: the disease causes young leaf loss and rubber flowers of all ages;

- Symptoms: on diseased leaves, there is a white fungus on both sides of the leaf (Figure IX. 1);
- Treatment:

+ For kernel gardens, nursery gardens and basic construction plantations (KTCB): use tebuconazole at a concentration of 0.0125% (125 ppm) or hexaconazole at a concentration of 0.01% (100 ppm). Mixed with a 0.2% concentration adhesive. Spray evenly on shoots and young leaves when 15% of plants have bird's-foot papillae, stop spraying when 80% of plants have stable leaf layers, with a cycle of 8-10 days/time in cool weather (morning or evening);

+ For commercial plantations: use tebuconazole with a concentration of 0.0125% (125 ppm) or hexaconazole with a concentration of 0.01% (100 ppm). Mixed with a 0.2% concentration adhesive. The spray dosage is 400 - 700 liters/ha, only spray during cool weather (early morning or evening)

Spray 2 times 8-10 days apart. At the time of spraying for the first time, it is necessary to meet two factors in terms of the percentage of trees in the garden: (i) at least 30% are sprouting and (ii) 15-20% have young leaves at the bird's foot stage, leaves that have not been infected or have just been infected at a very mild level (level 1).

Only spray for the 3rd time when the weather is still favorable for the disease to develop, the foliage is not stable and must be approved by the Group. The time of spraying is 8-10 days after the 2nd time.
+ Cases of using foliar fertilizer must have the opinion of the Group.

Article 134. Leaf tip wilt

- Agent: caused by the fungus *Colletotrichum gloeosporioides* (Penz.) Sacc;
- Distribution: the disease appears in the rainy season;

- Symptoms: leaf tips are wilted and deformed, young leaves less than 15 days old are easy to fall off due to disease, old leaves that do not fall off are deformed, leaf surface is rough (Figure IX. 2).

+ Use one of the following pesticidess: hexaconazole concentration 0.01% (100 ppm); tebuconazole concentration 0.0125% (125 ppm); propiconazole concentration 0.0125% (125 ppm); pyraclostrobin concentration 0.005% (50 ppm). Mix the pesticides with an adhesive concentration of 0.2%;

+ Only processed on kernel gardens, nurseries and garden of the 1st - 2nd year. The first spraying time when 15-20% of the plants produce young leaves in the papillae stage, spraying on young leaf shoots. Stop spraying when 80% of the plant has a stable leaf layer. Cycle every 7-10 days in the morning when it is cool.

Article 135. Rainy season deciduous disease

- Agent: caused by the fungi *Phytophthora botryosa Chee* and P. palmivora (Bult.) Bult;

- Distribution: the disease occurs during the rainy season, especially during the period of heavy rain lasting for many days;

- Harm: the disease causes old defoliation, the degree of damage varies depending on the region and the clonal flow (DVT);

- Symptoms: A characteristic symptom is the appearance of one or more white resin nodules on the leaf petiole after it falls off (Figure IX. 3). The fungus also causes the death of newly planted grafts and the death of seedlings in nursery gardens and nursery gardens. On business plantations, the fungus can spread down the tapped face, causing tapped stripe ulcers;

+ For nursery gardens, nursery gardens and eco-gardens: it is necessary to spray and treat as soon as the disease is detected, use metalaxyl at a concentration of 0.07% (700 ppm). If the young shoots are infected, the rotten part must be cut off and applied metalaxyl at a concentration of 0.35% (3,500 ppm), then vaseline;

+ For business plantations: no spraying. When the disease appears, apply metalaxyl at a concentration of 0.35% (3,500 ppm) to the tapped face to prevent and treat tapped line ulcers. Nitrogen fertilizer (50 kg of urea/ha) can be applied at the time of defoliation to promote the plant to produce new leaves.

Article 136. Corynespora Disease

- Agent: caused by the fungus Corynespora cassiicola (Berk. & Curt.) Wei;

- Distribution: the disease appears all year round and on all stages of growth of rubber trees. The Southeast region has 2 peak disease peaks: late May to early June and late August to early September every year;

- Harm: particularly serious harm on susceptible rubber products (RRIV 3, RRIV 4). The fungus attacks the leaves and shoots, killing the nursery seedlings, reducing the effective graft eye ratio of the gardener. The disease can cause mass deciduous loss many times, reducing growth and productivity, if the disease is severe, it will cause the death of trees in the garden and business;

- Symptoms: appear on leaves, petioles, and buds with different symptoms depending on leaf age and sensitivity of dvt:

+ On the leaves: the lesion is gray to brown in shape with a yellow border around it, the center of the lesion sometimes forms a hole. The damaged young leaves curl and deform, then they will fall off. In some dvt, the diseased leaves are characterized by a fishbone-like black spot along the leaf veins. If favorable conditions are encountered, the spreads cause the death of each part of the leaf, then the leaves change yellow - yellow-orange color and fall off one leaf by one (Figure IX. 4);

+ On shoots and petioles: cracks along the buds and petioles are diamond-shaped, pus oozes and then turns black, the lesion can grow up to 20 cm long, causing bud death and death of the whole plant. On the wood there is a black stripe running along the lesion. On the petioles there are black cracks with a length of 0.5 - 3.0 mm. If the petioles are damaged, all the leaflets fall off when they are still green, although no symptoms appear on the leaf plates.

+ Use one of the following pesticides: *tebuconazole* with a concentration of 0.0125 - 0.0150% (125 - 150 ppm); *hexaconazole* concentration 0.01% (100 ppm); *pyraclostrobin* concentration 0.005% (50 ppm). Mix the pesticides with an adhesive concentration of 0.2%;

+ For nursery gardens, nursery gardens and eco-tree gardens: spray to evenly coat young leaf shoots, with a cycle of 7-10 days/time when it is cool (morning);

+ For business gardens: spraying pesticides when the disease is detected at a mild level (level 1 - 2) and 3% - 5% of young leaves fall off due to infection. In the Southeast region, with high-yielding and frequently infected RRIV 3 and RRIV 4 plantations, spraying is carried out in the period of May - June or August - September every year when the disease recurs. The same treatment should be applied to adjacent plots planted with the same variety. Wet spray all foliage and young shoots. Spray early in the morning and stop

when the sun starts to shine (10:00 - 10:30), spray 2-3 times, cycle every 7-10 days. The amount of spraying solution is 600 – 700 liters/ha/time. In case of severe illness, the intensity of tapping must be reduced or the latex harvest must be suspended. Ensure adequate fertilization according to the procedure, where conditions allow, the amount of potassium fertilizer can be increased by 25% compared to the process so that the plant increases its resistance to diseases. Regularly check the garden, especially when the weather changes from rainy to sunny, as this is a favorable condition for disease outbreaks. For plantations with a history of severe disease, it is recommended to collect and burn the remnants carrying pathogens (leaves, small branches) in the annual deciduous season.

Article 137. Bird's eye spot disease

- Agent: *Drechslera heveae* (Petch) M.B. Ellis;

- Distribution: the disease often occurs on vegetation in nursery gardens, especially in low-lying and bad soils;

- Harm: the disease damages young leaves and young shoots, causing poor plant growth, leading to a low rate of use as a rootstock;

- Symptoms: the lesion is characteristic like a bird's eye, 1 - 3 mm in size with white in the center and a pronounced brown border on the outside, marks always appear on the leaf plate. On young leaves, the fungus deforms and falls off the leaflets one by one, while on old leaves the lesion persists throughout the leaf growth stage. Infected buds are often swollen compared to normal shoots (Figure IX. 5);

- Treatment:

+ Cleaning the grass to make the garden ventilated to reduce the conditions for spreading.

+ Fertilize in a balanced and adequate manner.

+ Prevention and treatment with pesticides: use one of the following pesticidess: *hexaconazole* with a concentration of 0.01% (100 ppm); *propiconazole* concentration 0.0125% (125 ppm); *pyraclostrobin* concentration 0.005% (50 ppm). Mix the pesticides with an adhesive concentration of 0.2%. Handle only on nursery. The first spraying time when 15-20% of the plants produce young leaves in the papillae stage, spraying on young leaf shoots. Stop spraying when 80% of the plant has a stable leaf layer. The cycle is 7-10 days/time when it is cool (morning).

Article 138. Pestalotiopsis deciduous disease

- Agent: caused by the fungus *Pestalotiopsis* sp;

- Distribution: is a new disease on rubber trees. The disease has been recorded in Indonesia, Thailand, Malaysia and Sri Lanka. There have been no reports of detecting this disease on rubber trees in Vietnam;

- Harm: the disease causes damage to leaves, buds, branches, fruits and seeds but mainly on adult leaves. The disease causes defoliation, leading to a decrease in latex production;

- Symptoms: on the diseased leaves there are initially small dark brown spots with yellow halos, then the lesions expand into rust or light brown spots that are round or fishscale-like. The spots vary in size, which can be located individually or combined together to form larger spots. On the leaves there are one or several dozen disease spots (Figure IX. 6);

- Treatment:

+ It is necessary to actively prevent the disease from Vietnam;

+ To take good care of, fertilize and prevent other diseases so that the plantation can increase its resistance;

+ Regularly monitor, if detecting diseases, quickly report to the Group's Technical Management Board and Plant Protection Research Department (Vietnam Rubber Research Institute) for timely handling measures;

+ Pesticides: *hexaconazole, propiconazole* and *chlorothalonil* are able to control the disease.

Figure IX. 1. Symptoms of powdery mildew

Figure IX. 2. Symptoms of leaf tip wilt

Figure IX. 3. Symptoms of deciduous disease in the rainy season

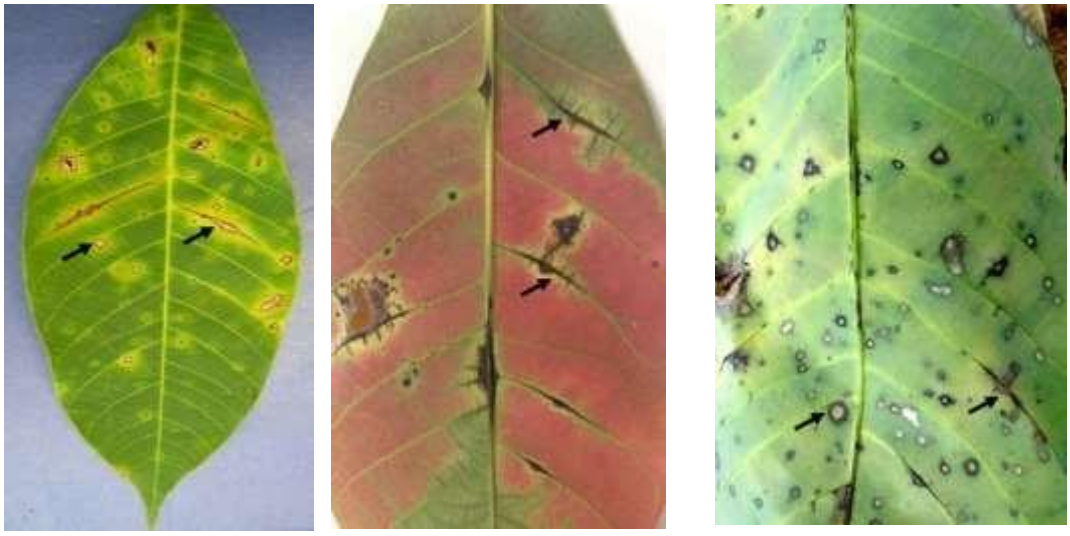


Figure IX. 4. Symptoms of Corynespora disease (fishbone and spotted)

Figure IX. 5. Symptoms of bird's eye disease

Figure IX. 6. Symptoms of Pestalotiopsis

Section III. STEM DISEASES

Article 139. Dry the tops of the branches

+ As a result of Corynespora diseases, powdery mildew, blackening of leaf tips, deciduous in the rainy season, Botryodiplodia, aphids,...;

+ Due to windstorms, cold, drought, lightning, lack of fertilizer, waterlogging,...;

- Harm: can cause the death of trees in nursery gardens, nursery gardens and eco-gardens. With a business plantation, it can cause the death of part or all of the trees;

- Treatment: depending on the cause of the disease, appropriate treatment measures such as fertilization, cold fighting, drought fighting. Timely treatment of leaf diseases and insects. When the tree or branch is sick, it must be sawed at an angle of 45° 10-20 cm below the dead part and then apply a thin layer of vaseline.

Article 140. Pink fungus disease

- Agent: caused by the fungus Corticium salmonicolor Berk. & Br;

- Distribution: severe disease in areas with two distinct rainy and sunny seasons, elevation < 300 m. The disease usually occurs during the rainy season;

- Harm: the disease is harmful to rubber trees from 3 to 12 years old and is most severe in stage 4
- 8 years old, causing the death of branches, amputation of tops;

- Symptoms: lesions appear on the trunk and branches with browned bark. Initially, the lesion had white "spider web" fungal silk with pus discharge. When the disease is severe, the fungus turns pink, pus flows a lot and spreads. When the branches die, the leaves dry out and do not fall off, many buds grow under the lesion (Figure IX. 7);

- Treatment:

+ Early detection of diseases for timely treatment. Use *validamycin* at a concentration of 0.060 – 0.075% (600 – 750 ppm) or *hexaconazole* at a concentration of 0.025% (250 ppm). Mixed with 1.0% concentration binder;

+ Wet spray evenly from 20 cm above the lesion to 10 cm below the lesion with a cycle of 10-14 days until the disease is cured. After spraying, the diseased plants must be checked and marked for re-treatment if the disease has not been cured;

+ Stop scraping the latex of dead trees and seriously ill trees. In the dry season, sawing is carried out to cut off trees, dead branches and put out the cover of the lot for processing.

Article 141. Botryodiplodia

- Agent: caused by the fungus *Botryodiplodia theobromae* Pat;

- Distribution: common in rubber-growing areas in Vietnam and harmful to most growth stages of rubber trees. Fungi are usually active, mainly concentrated in the rainy season, if encountering unfavorable environmental conditions, the fungus will live latently in the form of nodes. Fungal diseases are spread by spores and typhoid bacteria, mainly thanks to humidity, free water, and wind. In addition to rubber trees, fungi also parasitize nearly 500 species of trees of different families, mainly woody trees;

- Harm: the disease reduces the rate of live grafting, death of seedlings, and growth retardation. Severe disease (level 4 or higher) will reduce yield by 20-30% for business plantations. Severe disease for a long time will cause the plant to dry out and tapped completely;

- Symptoms: the site of the pest is mainly on the shoots, branches and stems with bark from green to brown. Symptoms vary depending on the stage of the garden:

+ Tum bare garden: on the rootstock, small pimples appear and then bind together to make the bark rough, less plastic and difficult to peel off when grafting, affecting the survival rate (Figure IX. 8a). The disease appears at the site of the grafted eye, which begins at the time of opening the bandage, causing the phenomenon of re-death of the grafted eye;

+ Tum gourd and garden replanting - new planting: the disease appears on the shoots with initial symptoms with dark black indentations, then spreads and dies completely dry, the dead bark appears small black spots containing many spores. The dead wood is white with small black-brown veins, the dead bark is difficult to separate from the wood;

+ Kernel garden: small pimples appear on the green-brown bark, then bind together, making it difficult to peel off when grafting, reducing the rate of live grafting (Figure IX.8b);

+ KTCB plantation (1-2 years old on green-brown bark): cracks appear on the shoots in the form of diamonds and then develop in the direction of upwards and downwards. At the disease site, there is a phenomenon of pus leaking out and then blackening, the bark and wood are dry and porous. As the lesion spreads, the young foliage will dry out and wilt but not fall off, and black-brown spots appear on the dead bark (Figure IX.8c). The disease usually appears at the time of the change of season. The level of damage is scattered or concentrated 10-15 trees/point;

+ Gardens of trees 3 years old or older (browned bark) and business gardens: initially small pimples of 1-2 mm scattered appear, then the pimples are linked into clusters with an area of 4-5cm2 or spread to the entire branch. Plants that are severely infected cause the epidermis to thicken due to the many layers that form, peeling off the bark (Figure IX.8d&e). The hard crust and soft crust become harder and thicker, then cracks appear, sometimes pus oozing out, and there is no pus cushion underneath.

+ Cracks in the bark of rubber trees due to the disease develop very slowly, mainly in the direction from the outside to the inside. The plant is slow to grow, the primary bark is convex, the surface is rough, so it cannot be opened to scrape or can cause the death of the tree. The fungus also often penetrates

through cracks in the stem (caused by other causes), attacks inwards, destroys the strata, and rots the bark, affecting the growth and production of pus (Figure IX. 8f).

- Treatment: Correctly identify the disease for accurate prevention and treatment, it is necessary to clearly distinguish and avoid confusion with shell cracking or peeling caused by other causes such as physiological dryness, sunburn, lightning, cold or prolonged dryness, etc.

+ Pay attention to spraying pesticidess only during the rainy season. For KTCB plantations and business gardens, only spray pesticides to treat diseased plants when the plantation has more than 50% of the trees infected with 2 acute diseases or more. Trees with diseases of level 4 or higher are immediately dealt with when detected.

+ Nursery gardens and nursery gardens: spray the room for newly grafted nursery gardens (tums, gourds) and trees with leaf layers with one of the following pesticidess: hexaconazole with a concentration of 0.015% (150 ppm); tebuconazole concentration 0.0375% (375 ppm); pyraclostrobin concentration 0.0075% (75 ppm). Mix the pesticides with an adhesive concentration of 0.3%. Treat 2-3 times with cycles every 10-15 days. Seedlings must be cleaned of diseases before planting.

+ KTCB plantations (1-2 years old on green-brown bark): use one of the following pesticidess: hexaconazole with a concentration of 0.015 - 0.025% (150 - 250 ppm); tebuconazole concentration 0.05% (500 ppm), pyraclostrobin concentration 0.01% (100 ppm). Mix with 0.5% concentration adhesive. Treat 2-3 times with a cycle of 10-15 days/time. When the shoot dies, cut it at an angle of 45° 10-20 cm below the dead site and apply a thin layer of vaseline to the cut site.

+ Gardens of trees aged 3 years or older (browned bark) and commercial plantations: use hexaconazole with a concentration of 0.025% (250 ppm), in combination with an adhesive, with a concentration of 0.5 - 1.0%. Treat 2-3 times with a cycle of 10-15 days/time. Spray to cover the disease. Pay attention to spraying at a height of 0 - 3 m from the elephant's feet. Stop tapping severely diseased plants to cure the disease.

Article 142. Fusarium bark rot

- Agent: caused by the fungus *Fusarium equiseti;*

- Distribution: appears on the KTCB garden and business garden. Fungi are usually active, mainly concentrated in the rainy season;

- Harm: the disease harms most parts of the plant, slows down the growth of the garden of KTCB trees, causes rot of the scraped surface, reduces yield;

- Symptoms: bark, bark, and libe swell, browning and cracking, pus oozing from the cracks. On plants that are only 1-2 years old, severe symptoms can lead to leaf fall, young branches die backwards, and the plant stops growing. On business rubber trees, disease symptoms appear on the tapping cut, shaved face with many black or rotten stains, the severely diseased bark is dry, porous, brown and tends to spread, underneath the lesion there is a latex cushion, the wood inside the lesion is blackened. The anterior and posterior lines are cracked and darkened inside (Figure IX. 9);

+ KTCB plantations: spraying with *hexaconazole* at a concentration of 0.015% (150 ppm) or *metalaxyl* at a concentration of 0.0525% (525 ppm). Coordinates with 0.3% concentration adhesive. Spray 2 - 3 times with a cycle of 10 - 15 days;

+ Business plantations: stop tapping seriously ill trees, apply preventive treatment on the tapping cut with *metalaxyl* pesticides with a concentration of 0.35% (3,500 ppm) mixed with an adhesive concentration of 1.0% for all shaved trees on the infected lot 2-3 times with a cycle of 10-15 days. Adjacent plots need to apply disease prevention to the entire shaved tree with a cycle of 1 month during the rainy season. Apply the pesticides evenly on the tapping cut and the bandage wall 1 - 1.5 cm wide on the regeneration shell close to the tapping cut. Note to disinfect knives with the above pesticidess to limit the spread of the disease through razors.

Figure IX. 7. Symptoms of pink fungus on branches and trunks

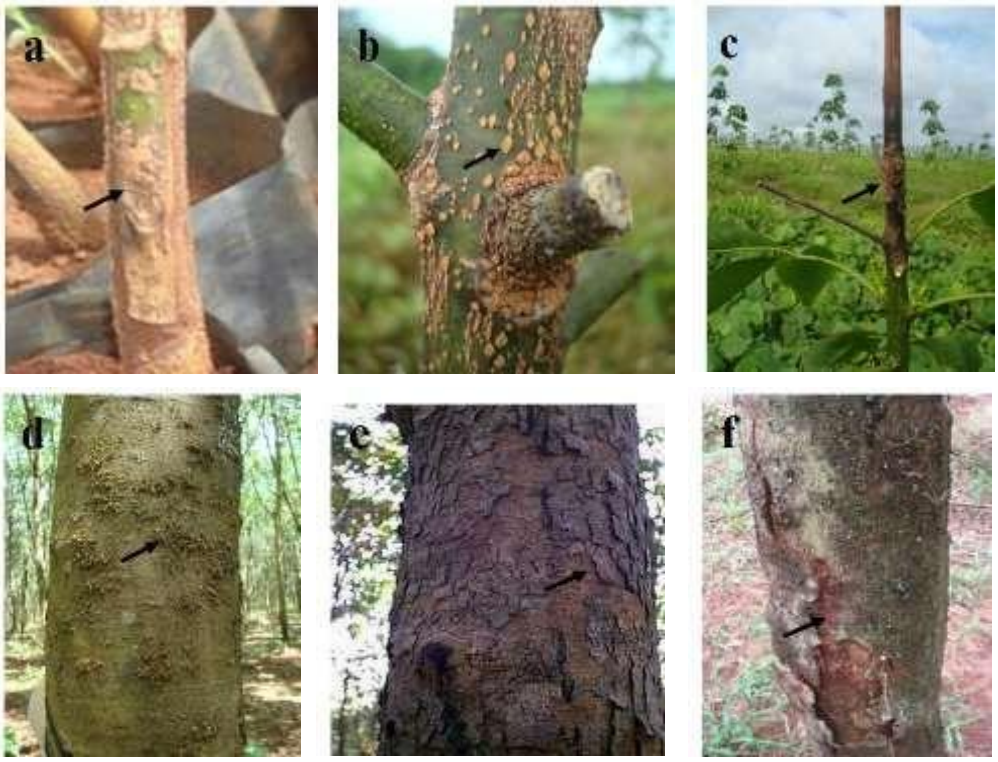


Figure IX. 8. Symptoms of Botryodiplodia: (a) on the rootstock, (b) on the green bark, (c) on the young shoots of the garden, (d) and (e) on the browned bark, (f) the fungus attacks the inside through the cracks.

Figure IX. 9. Symptoms of Fusarium bark rot on the following: (a) nursery garden, (b) newly planted garden, (c) KTCB garden, (d) shaved surface, (e) tapping cut and money boundary, (f) posterior mouth and posterior boundary.

Section IV. FACIAL DISEASES

Article 143. tapping facial stripe ulcers

- Agent: caused by the fungus *Phytophthora palmivora* (Bult.) Bult and *P. botryosa* Chee;

- Distribution: the disease occurs commonly in areas with heavy rainfall and high humidity and low temperature;

- Harm: when the plant is severe, the lesion destroys the entire shaved surface and grows on the regenerated shaved surface as well as the virgin bark, losing the shaved surface area and making it difficult to scrape the latex later. If the scraped surface is severely damaged, it can reduce the yield by up to 100%;

- Symptoms: the initial lesion is not obvious with small vertical stripes that are slightly concave and light brown just above the shave line (Figure IX.10). If not prevented, the lesions will reconnect into large patches, at this time the shell is rotted and has pus as well as yellow fluid leaking from the wound with a foul smell. Under the lesion there is a latex cushion and black stripes on the wood, the strata statue is destroyed and the wood is exposed;

- Treatment:

+ Indirect:

• Do not shave when the tapping surface is wet and shaved off;

• Proper tapping technique brings good disease prevention effect;

• Some areas suffer from deciduous leaves in the rainy season and severe facial stripe ulcers, so reduce the intensity of tapping or take a break from tapping during heavy rains;

• Use rain gutters or rain shelters.

+ Direct: Use metalaxyl at a concentration of 0.35% (3,500 ppm) mixed with a binder at a concentration of 1.0%. The pesticides is smeared with a bandage 1 - 1.5 cm wide on the tapping cut after collecting pus. Apply the room periodically once a month in the rainy season in areas at high risk of disease, susceptible varieties or when the garden is deciduous in the rainy season. Apply treatment every 10 days until the disease is gone.

Article 144. Dry shaving

- Agents: not microorganisms but physiological phenomena, consequences of excessive tapping of latex for a long time, the plant is malnourished or due to the physiological characteristics of the individual;

- Distribution: appears on all business rubber plantations. Sometimes it also appears on trees that have not been shaved latex;

- Harm: loss of immediate and long-term output throughout the economic cycle;

- Symptoms: initially part of the tapping cut does not have pus, there is a phenomenon of early pus clotting on the tapping cut. The inside of the bark is light to dark brown, this phenomenon develops mainly in the area under the tapping cut and spreads rapidly. If the pus continues to be scraped, the disease will develop, causing the entire shaved face to become dry, brown and the bark to crack. Cracks usually originate from the tapping cut and gradually spread down the tapping surface or from the base up along the pus pipe. The plant is completely dry, there is still no sign of difference on the foliage and the plant still grows normally. Shaved dried plants can be divided into two types:

+ Total dryness: the tapping cut is completely dry, the tapping surface is dry and cracks appear on the tapping shell;

+ Partial dryness: the tapping cut is dry in short sections. If the plant is given a tapping break for a while, the plant can recover and give normal latex.

- Treatment:

+ Room: shave in accordance with the prescribed tapping regime. Adequate care and fertilization of plantations, especially those with latex stimulants, must comply with the regulations stated in the latex harvest;

+ Treatment: Currently, there is no effective solution to treat the disease. When you see that the shaved tree has no pus on 1/2 of the length of the tapping cut, you must take a break from tapping for 1-2 months, then check the disease condition, if it is cured, shave again with a lighter intensity.

Section V. ROOT DISEASES

Article 145. Brown root disease

- Agent: caused by the fungus Phellinus noxius (Corner) G. H. Cunn;

- Distribution: The disease often appears on rubber trees planted in areas that were previously forests with many woody trees or replanted plantations. If the planting pit still has tree roots, there is a risk of infection due to the available source of fungi transmitted through rubber trees;

- Harm: causing tree death;

- Symptoms: the manifestation of the disease appears on the foliage and roots, it is necessary to observe the combination of the two parts for the most accurate identification (Figure IX.11).

+ On foliage: stunted foliage, yellowish-green leaves shrink and droop. Many small branches in the lower part of the canopy shed their leaves. After that, the entire foliage falls off and the plant dies.

+ On the roots: the diseased roots grow many intertwined baby roots, sticking to a layer of soil 3-4 mm thick that is difficult to wash. After washing, the outer surface of the root is yellow-brown, and the dead wood has dark brown veins and is easy to crush. The fruiting body usually appears on the body near the ground. Root symptoms are the main sign to identify an infected plant.

- Treatment:

+ Prevention: when reclamation, the roots in the planting pit must be cleared to reduce the initial source of infection. On areas at risk of disease, mix 100-150 g of sulfur powder into the hole 5-7 days before planting;

+ Treatment: for diseased plants and neighboring trees, use hexaconazole with a concentration of 0.025% (250 ppm) mixed in water to irrigate around the root within a radius of 0.5 m with a dosage of 3-5 liters/plant and must be treated 2-3 times with a cycle of 2 months;

+ For dead trees, sawn 10-15 cm from the ground, then use triclopyr with a concentration of 1.25% (12,500 ppm) in diesel oil to sweep the cut or dig up all the roots to destroy the source of the disease.

Article 146. Root Neck Disease

- Agent: by *Pythium* spp in combination with *Phytophthora* spp;

- Distribution: the disease usually occurs during the rainy period with high humidity combined with low temperature. Currently, the disease has appeared in the northern mountainous region;

- Harm: fungal diseases destroy the bark of the root collar, affecting growth. Severe disease can cause plant death;

- Symptoms: appear on the root collar 0-10 cm above the ground, initially the lesion is slightly concave with pus oozing. Under favorable conditions, the lesion will spread, the bark will rot black, and the wound will smell bad. Rotten bark and exposed wood, which is a favorable location for other agents to invade and kill the tree (Figure IX. 12);

- Treatment: Do not cause injury to the plant during the care period (weeding, fertilizing,...). Check and detect infected trees early, mark them for treatment. Remove the dead shell at the lesion, then use a 0.35% (3,500 ppm) metalaxyl pesticides mixed with a 1.0% adhesive, spray or scan. Allow the pesticides to dry, then use vaseline to sweep a thin layer to seal the lesion. After 25-30 days, re-examine the lesion and repeat treatment when there are still harmful symptoms. Stop tapping infected plants, only open the tapping again when the tree has fully recovered.

Figure IX.10. Symptoms of shaved face stripe ulcers

Figure IX.11. Symptoms of brown root disease on the root collar and on the roots

Figure IX.12. Symptoms of root neck sores

Section VI. OTHER HARMS

Article 147. Sunburn

- Agent: due to the impact of high temperatures. Some typical cases are as follows:

+ Due to sudden changes in temperature when moving young trees in the shade for planting in the sun;

+ Irrigation is not humid enough, the temperature range of the day is high;

+ Cabinets and tanks that are not carefully made cause heat radiation, which usually occurs in areas with silty soil near the surface or in the prolonged hot season;

- Distribution: occurs on KTCB plantations, nursery gardens and nursery gardens. Usually common in the dry season;

- Symptoms: patchy or partial burning of leaves with a silvery-white color then turning brown, then leaves fall off or wither, young shoots die due to dehydration. On the KTCB tree, the brown stem near

the ground 0 - 20 cm appears a lanceolate-shaped indentation with a dark color and the bark is dead. The lesions are directed in the same direction in the West and Southwest directions (Figure IX.13);

- Treatment: nursery gardens need to be fully watered in cool weather. For KTCB plantations, it is necessary to make tubs and cabinets thoroughly and 10 cm away from rubber tree stumps during the dry season. Whitewash 5% of the trunk in areas where sunburn often occurs. When the plant is dying, saw at an angle of 45° 10-20 cm below the lesion and apply a thin layer of vaseline to the cut site.

Article 148. Lightning strikes

- Agent: due to the impact of a high-intensity electric current;

- Distribution: occurs irregularly and occurs during the rainy season, especially at the intersection between the dry season and the rainy season;

- Harm: potentially harmful to KTCB rubber trees and latex harvesting trees. It can kill the branches or the entire tree;

- Symptoms: occur very quickly, on the foliage wilted as if dipped in boiling water. After that, the leaves fall off while they are still green. The peel is dry and dark brown, when broken in half, the piece of bark has white silk fibers due to the latex drying out. The wood right next to the statue is dry and has black stripes. The damaged trees are concentrated in spots and scattered in the lot. After 1-2 weeks, the dried wood and bark appear light yellow powder due to weevil infestation (Figure IX.14);

- Treatment: need early detection, saw cut 20-30 cm below the dead site and apply vaseline. Use a 5% lime solution to sweep the damaged stem. For trees that are harvesting latex, stop tapping the damaged trees to have time to recover.

Article 149. Harmful cold

- Agent: due to the impact of prolonged low temperature (below 10°C);

- Distribution: occurs in the cold season when the temperature is lower than 10°C for a long time, usually severe in the northern hillsides and valleys;

- Harm: harms all stages of plant growth, causing the death of shoots or the entire tree;

- Symptoms: young leaves are deformed, then withered, old leaves wither. The growth peak dies and spreads down, making the stem black. Cracks appeared on the body, initially oozing yellow fluid followed by pus flowing into streaks. If the low temperature lasts for a long time, it can cause the death of the whole tree (Figure IX.15).

- Treatment:

+ Do not use fertilizers to stimulate the emergence of young shoots and leaves in the cold season;

+ Making a tub will help the plant better resist cold;

+ On the garden of KTCB trees: when the stem is dead, cut 10-20 cm below the dead site and apply vaselin. On the trunk: scrape off the dead bark and apply vaselin.

Article 150. Management of damaged plantations due to broken beans

- When the plantation is broken due to natural disasters (thunderstorms, winds and storms), the unit shall quickly make damage statistics, classify them according to detailed damage and quickly report to the Group;

- Handling measures:

+ Inventory and classification of types (root inclination, non-root inclination, branch breakage, branch fracture, tip fracture, main stem fracture, root ,...) depending on the current situation for handling (Table 18);

+ In the treatment of broken plantations, it should be noted: (i) labor safety, especially on business plantations, (ii) early release to prevent plantation fires and stabilize production, (iii) trees that must be liquidated are inventoried and marked before sawing to avoid confusion with other trees.

Table 18. Measures to treat broken trees

Broken trees	Remedies
KTCB Garden	
Trees with root rot	Compacting the soil so that the tree stands firmly.
Resilient Tilt Curvature	Prioritize the treatment of heavy trees first, you can cut all branches or only cut the branches in the inclined direction such as the canopy alignment treatment. The rope can be pulled, supported if it is effective and feasible.
The tree breaks across the trunk, the trunk is broken	Saw at an angle 45o below the 20 cm fracture, apply vaseline. When the plant sprouts, prune the shoots proportionately.
The plant is not resilient: root loss, tilt $\geq 45^0$ and stump root break.	The saw liquidates the broken body.
Business garden	
The tree is tilted $< 45^0$ and the root of the stake has not been broken	The entire branch can be cut or only the branch in the inclined direction can be cut to limit further breakage if it is effective. The rope can be pulled, supported if it is effective and feasible.
The group of trees is not able to recover: peeling the roots, tilting $\geq 45°$ and breaking the roots of the stake or breaking across the trunk, the trunk is 2.0 m or less.	Liquidation saw.

Article 151. Poisoning with pesticides and fertilizers

- Agents: due to plant contact with pesticides, fertilizers used at high concentrations exceeding the permissible threshold;

- Harm: causing poisoning to plants, affecting growth, especially seedlings in nursery gardens, nursery gardens and nursery schools;

- Symptoms: mild symptoms of poisoning are wavy leaf plates, deformation, wrinkles and rough leaf surface. Worse are variegated burns on the leaves (leaf tissue dies), leaves turn yellow, leaf margins curl upwards, leaves fall off, the plant falters, shoots die and many wild shoots arise (Figure IX.16);

Treatment: watering the foliage in case the plant is slightly poisoned by the use of pesticides or foliar fertilizers. Abundant irrigation in case of poisoning due to fertilization.In case of bud death, cut at an angle of 45° 10-20 cm below the lesion and apply vaseline to the cut.

Figure IX.13. Sunburn

Figure IX.14. Clay

Figure IX.15. Harmful cold

Figure IX.16. Poisoning with fungicides

Section VII. PESTS Article 152. *Hypomeces squamosus*

- Worms belonging to the order of hard wings, wings with a metallic color (Figure IX. 17) usually live in clusters of 3-4 birds, hide under the leaf surface, fake death when falling to the ground, fly not far, gnaw old leaves leaving leaf veins behind. The larvae feed on rubber roots;

- Treatment: catching fishing with a racket; spraying *cypermethrin* at a concentration of 0.02% (200 ppm) or *alpha-cypermethrin* at a concentration of 0.02% (200 ppm).

Article 153. Caterpillars and leaf-eating caterpillars (in the families *Noctuidae* and *Tortricidae)*

The pest feeds on the leaves and shoots of rubber trees. When there is a large pest, *the concentration of abamectin* is 0.0036 - 0.0072% (36 - 72 ppm) or *cypermethrin* at a concentration of 0.01 - 0.02% (100 - 200 ppm).

Article 154. Red spider and yellow spider

- *Appears in the season of new leaves at the same time as powdery mildew. Spiders are common on rubber trees in nursery gardens and plantations, located on the underside of the leaves. Leaves damaged by yellow spiders have ripples, the edges of the leaves are asymmetrical, so it is easy to mistake them for zinc deficiency (Zn). When the leaves are damaged by yellow spiders, the edges of the leaves shrink;*

- Treatment: spraying only when the pest is severe, spraying *abamectin* at a concentration of 0.0036 - 0.0072% (36 - 72 ppm) or *cypermethrin* at a concentration of 0.01 - 0.02% (100 - 200 ppm).

Article 155. Bark-eating worms

- Harming the primary and regenerative shells, affecting the rubber latex harvest. Some common species are Euproctis subnotata, Hemithe brachteigutta and Acanthopsyche snelleni;

- Treatment: spray only when the pest is severe, spray *cypermethrin* at a concentration of 0.02% (200 ppm).

Article 156. Termite pests of rubber trees

- Do *Globitermes sulphureus* Haviland (Figure IX.18) and *Coptotermes curvignathus* Holmgren belong to the *Termitidae family,* order *Isoptera.* Termites often form wet mud lines that rise above the ground, eating the roots and killing the plant.

- Treatment:

+ Do not fill in garbage, fresh grass into the planting pit. The damp garbage cabinet must be far from the rubber root, weeding does not cause root neck wounds;

+ Use *imidacloprid* at a concentration of 0.02 - 0.04% (200 - 400 ppm) or *alpha-cypermethrin* at a concentration of 0.01 - 0.02% (100 - 200 ppm) to irrigate termite nests at a dosage of 4 - 5 liters/termite nest or around the stump of a tree at a dosage of 0.5 - 1.0 liters/tree;

+ In areas where termites are common, when preparing a mixture of fresh cow manure for root pools, it is necessary to add *imidacloprid* with a concentration of 0.08% (800 ppm) or *alpha-cypermethrin* with a concentration of 0.04% (400 ppm). For gourds, irrigation, imidacloprid at a concentration of 0.06 - 0.08% (600 - 800 ppm) or *alpha-cypermethrin* at a concentration of 0.03 - 0.04% (300 - 400 ppm) at a dosage of 50 ml/gourd at the time of 2 - 3 days before planting.

Article 157. Root mutilation (family *Melolonthidae)*

- Distribution: often appears in gray land, especially in places where organic fertilizers have not decayed or where buffaloes and cows are grazing;

- Agent: cactus is the common name for the larvae of beetles. Creamy white larvae, C-shaped curved stems (Figure IX.19), feed on tree roots, causing tree death or breakage.

- Treatment:

+ Do not graze buffaloes and cows in rubber plantations;

+ Absolutely do not use non-decayed organic fertilizers to fertilize rubber gardens;

+ Use *imidacloprid* with a concentration of 0.03 - 0.05% (300 - 500 ppm) around the root (with a dosage of 200 - 300 ml of solution/plant 1-2 years old). In the nursery garden, where there is usually a defilement, the soil must be treated before the rubber beads are placed. Areas that are frequently harmed by decubation should use a lamp to catch adult bugs.

Article 158. Mealybug *(Pinnaspis aspidistrae);* Scale aphids *(Saissetia nigra* Nietn., *S. oleae* Olivier and *Lepidosaphes cocculi)*

- It is an insect that sucks and harms leaves, young shoots and branches on 1-4-year-old KTCB rubber; on the kernel garden or nursery garden, causing leaf loss, stunted growth or death of branches (Figure IX.20). In addition to rubber trees, they also harm intercropping and carpet cover trees;

- Treatment: use *abamectin* with a concentration of 0.0036 - 0.0072% (36 - 72 ppm) or *imidacloprid* with a concentration of 0.01 - 0.02% (100 - 200 ppm) sprayed on the damaged plant, 2 - 3 times with a cycle of 7 - 10 days.

Article 159. Black beetle *(Mesomorphus villiger)*

- It is an insect that does not directly harm rubber trees, usually lives on the trunk, when concentrated in large quantities on the tapping surface, it will hinder the harvest of latex, sometimes a source of impurities of latex;

- Treatment: spray only when the pest is severe, spray *cypermethrin* or *alpha-cypermethrin* at a concentration of 0.02 - 0.03% (200 - 300 ppm).

Article 160. Ladybug *(Epilachna indica* and *Harmonia axyridis)*

- Larvae often appear during the leaf change season, eating the flesh of young leaves, causing yellowing and leaf deformation. In addition to rubber trees, they also harm intercropping and carpet cover trees;

- Treatment: spray only when the pest is severe, spray *cypermethrin* or *alpha-cypermethrin* at a concentration of 0.02 - 0.03% (200 - 300 ppm).

Figure IX.17. Fishing for rubber leaves

Figure IX.18. Rubber termites

Figure IX.19. Larvae harm the roots

Lepidosaphes sp.

Pinnaspis aspidistrae

Saissetia sp.

Figure IX.20. Some species of mealybugs and scale aphids harm rubber

Section VIII. WEED MANAGEMENT

Article 161. General

- Only kill grasses that are harmful to the growth and development of rubber trees (thatched grass, American grass, le,...), or are at risk of being the source of garden fires;

- After spraying, the area must be isolated from irresponsible people and livestock for a period of 3-4 weeks;

- To encourage the use of other measures (mechanized, biological, etc.) to reduce costs, be safe for people and the environment, as well as to protect the soil, limit erosion and leaching of soil nutrients;

- It is recommended to use plant residues (grass, intercropping, carpet) to make rubber-based cabinets, thereby helping to increase fertility, maintain soil moisture, reduce erosion and leaching;

- Encourage the planting of carpets or suitable trees to increase land use value and limit weeds.

Article 162. Lawn management for nursery

- For nursery gardens, small manual or mechanized weeding is the main thing, pre-germination herbicides can be used at appropriate times.

- Use of herbicides:

+ Herbicide: use the herbicide before germination of the active ingredient *oxadiazone* at a dosage of 0.625 kg a.i/ha or *S-metolachlor* at a dosage of 2.4 kg a.i/ha, the pesticides is mixed in water at an amount of 500 liters/ha;

+ Soil preparation: the soil is cleaned of grass and plant residues, then the surface is leveled;

+ Spraying: use a shoulder sprayer with a capacity of 8-15 liters, divided into two batches, the first batch is 3-5 days before planting seeds or seedlings and the second batch is 45-50 days after the first spraying;

+ Note: spray evenly on the soil surface when there is enough moisture and do not disturb the soil surface after spraying for at least 7 days. Spray the 2nd wave on the ground and limit the contact of the pesticides with the seedlings.

Article 163. Lawn management for carpet covering legumes

- Herbicides: use pre-germination herbicides with the active ingredient *oxadiazone* at a dosage of 0.50 kg a.i/ha or *S-metolachlor* at a dosage of 1.92 kg a.i/ha, the pesticides is mixed in water at an amount of 500 liters/ha;

- Soil preparation: the soil is cleaned of grass and plant residues, then the surface is leveled;

- Spraying: at the time of 3-5 days before sowing and do not disturb the soil surface after spraying for at least 7 days.

Article 164. Managing weeds on rubber plantations with herbicides

Grass *(Imperata cylindrica* (L) Beauv.), Bamboo leaf grass

- Use the herbicide *glufosinate ammonium* at a dosage of 0.60 - 0.75 kg a.i/ha. The pesticides is mixed in water with an amount of 500 - 600 liters/ha;

- Spraying season: preferably when the grass grows strongly, the leaves are still green, not yet flowering;

- Spray time in the morning, not in the afternoon. After spraying 4-6 hours before rain, the herbicide effect is the highest;

- Pay attention to spray thoroughly so that the pesticides comes into contact with the entire leaf stem of the grass;

- Do not allow the pesticides to come into contact with the leaves, young shoots, and green bark of rubber trees.

Other Grasses:

- *Glufosinate ammonium* liều lượng 0,45 - 0,60 kg a.i/ha;

- *Ammonium glufosinate* at a dose of 0.45 kg a.i/ha in combination with diuron at a dose of 0.50 kg a.i/ha.

Article 165. Managing weeds in rubber plantations by mechanized means

KTCB plantation:

- On the fairway (distance between two rows of rubber): use a motorized shoulder-mounted transmitter or a tractor-mounted transmitter. Weeding 5 - 10 cm from the ground, do 1 - 3 times/year;

- On the runway (crops): combine grass distribution and plowing upside down in the planting rows to manage the grass and root cabinet for the first 2 years in a place with flat terrain.
From the 3rd year onwards, only weeding is carried out. Implemented 1-3 times/year; Business garden: Use a motorized shoulder-mounted transmitter or a tractor-mounted transmitter. Weeding is 5-10 cm from the ground, 1-2 times a year.

Section IX. USE AND PRESERVATION OF pesticidesS AND SAFETY IN PLANT PROTECTION

Article 166. Regulations on management and use of pesticides

- Only use pesticidess on the list prescribed by the Ministry of Agriculture and Rural Development and have been tested on rubber trees. In case of using pesticidess outside the list of pesticidess that require pesticidess to be tested first on rubber trees;

- Regarding the quality of pesticidess: there must be a clear origin, quality certification or inspection certificate of the manufacturer for the supplied pesticide shipment; if there is none, it is necessary to send samples for quality inspection (analysis of active ingredient content) of the shipment as prescribed at pesticide testing laboratories designated by the Plant Protection Department - Ministry of Agriculture and Rural Development;

- Purchase and use pesticidess according to the actual amount needed in the year, avoid using pesticidess near the expiration date (less than 1 month), overdue to reduced or ineffective preventive treatment;

- When spraying for disease prevention and treatment, there must be a technical staff to guide how to mix and spray; there is a spraying diary clearly stating the time, place, type of pesticides, the person who performs it, records the implementation technique, has the signature of the person who performs it and the technical supervisor.

Article 167. Medication use

In order to use the pesticides effectively, it must comply with requirement 4 as follows:

- The right pesticides: each pesticides is only used for prevention and control for the appropriate subjects. Use only pesticidess on the list authorized by the Ministry of Agriculture and Rural Development;

- At the right time: at the stage of development of the harmful agent so that the pesticides has a highly effective killing effect;

- Proper way: each pesticides has a different way of administering it. Must follow the characteristics of the pesticides and the instructions in the procedure;

- Correct concentration and dosage: do not arbitrarily increase or decrease the concentration or dosage of the pesticides because it will affect the treatment efficiency or have adverse effects such as harming people and rubber trees.

Article 168. Toxicity of pesticides

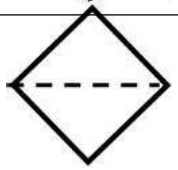
- All pesticides can be toxic to humans and the environment;
- The World Health Organization (WHO, 2009) divides pesticides into the following groups:

WHO Rankings	Toxicity	LD^{50} in mice (mg/kg)	
		By mouth	Leather
I a	Extremely toxic	< 5	< 50
I b	Very toxic	5 - 50	50 - 200
II	High Toxicity	50 - 2.000	200 - 2.000
III	Medium Poison	> 2,000	> 2,000
U	No acute toxicity	> 5,000	

The lower the $LD^{value\ of\ 50}$, the higher the toxicity.

- Circular 38/2010 of the Ministry of Agriculture and Rural Development divides pesticides into 4 toxic groups and stipulates colored lines and icons indicating the toxicity of pesticides (Table 19).

Table 19. Symbol of pesticide toxicity classification according to the Ministry of Agriculture and Rural Development

Grouping	**Ampersand**	**Symbol**	**LD^{50} orally (mg/kg)**	
			Solids	**Liquid**
Ia, Ib Very toxic	**Very toxic** Black letters, red lines		< 50	< 200
II High Toxicity	**High Toxicity** black letters, gold lines		50 - 500	200 - 2000
III Medium Toxicity	**Dangerous** black letters, blue lines		>500 - 2000	>2000 - 3000
IV Toxicity	**Careful** black letters, green lines,	No Symbols	> 2000	> 3000

Article 169. Safety when taking pesticides

- Do not eat or smoke while spraying. Do not use pesticidess for other purposes such as treating scabies, bed bugs, lice, mosquitoes,...;

- Protective equipment is required when dispensing and spraying. After spraying, clothes must be changed and washed. The maximum duration of pesticides contact is not more than 6 hours a day.

– Do not use a leaking sprayer as it may cause poisoning. Rinse the tank after spraying and do not pour it into ponds, lakes or grazing places;

- Do not spray against the wind and avoid letting the pesticides come into contact with all parts of the body. If it is contaminated with the pesticides, it is necessary to wash it immediately and wash it several times with clean water and soap. If you feel tired, you should take a break and replace someone else;

- Do not use the medicine packaging for any other purpose;
- Do not use food packaging to store pesticides;

- Do not use children and pregnant women in any work related to pesticides;

- In case of poisoning, apply all means for emergency treatment and take to the nearest health agency along with the poisoning pesticides.

Article 170. Pesticide storage

- The pesticides needs to have a clear label;

- pesticidess must be classified separately according to prevention and treatment objects and have their own names. Do not mix pesticides with fertilizers in the warehouse;

- When receiving and distributing medicines, they must be signed between the deliverer and the recipient for safety management.

- Pesticide storage should be away from residents, water sources, food, and livestock. The warehouse needs to be built firmly with non-combustible materials, where it is not flooded. The warehouse must have firefighting, gas prevention and emergency equipment.

Article 171. First aid for people suffering from pesticide poisoning

When someone is poisoned by pesticides, it is necessary to immediately take the following steps:

- Quickly move the victim out of the contaminated area;
- If the victim is no longer breathing, artificial respiration should be performed;

- Change the clothes contaminated with pesticidess, clean the victim's body with soap and clean water. Avoid causing wounds on the skin because it will make the pesticides enter the victim's body faster;

- If the eyes are stained with the pesticides, it must be washed several times with clean water, at least for 15 minutes;

- If ingested or swallowed, the pesticides should not cause vomiting unless instructed on the pesticides label. Only use your fingers or chicken feathers to hook your throat to make you vomit. Do not use salt water and never use your mouth to make contact with the victim;

- Give the victim an activated carbon solution (3 tablespoons mixed in 200 ml of water) that has the effect of absorbing toxins in the gastrointestinal tract;

- If the victim has a seizure, use gauze or comb,... blocking between the two teeth to prevent the

victim from biting his tongue;

- Keep the victim warm, airy and quiet and immediately take them to the nearest medical facility with the poison medicine.

Article 172. Symptoms of pesticide poisoning

- All pesticides are toxic to users. Symptoms may appear immediately after poisoning, or after a few hours or days. Depending on the toxicity, dosage, degree of infection and time of contact with the pesticides, there are different manifestations;

- Mild poisoning: Headache, nausea, dizziness, fatigue, burning of the skin (eyes, nose, throat), diarrhea, sweating, poor appetite (loss of taste).

- Moderate poisoning: Vomiting, blurred vision, severe abdominal pain, rapid pulse, shortness of breath, pupil contractions, heavy sweating, muscle (muscle) tremors, convulsions,...;

- Severe poisoning: Muscle convulsions, inability to breathe, loss of consciousness, weak pulse (inability to catch pulse). In some cases, it can be fatal;

- When an accident occurs, the victim is in an instant coma, must have been poisoned, and needs to take timely emergency measures. Note: in case of severe poisoning manifested after 12 hours from contact with the pesticides, it is due to other causes;

- Type of poisoning:

+ Acute poisoning: is a consequence of an accident, or suicide.

+ Chronic poisoning: due to repeated exposure to a significant amount of pesticidess.

Article 173. Organization and management of environmental protection

- Network organization: The farm level has a specialized team in charge of environmental protection.

At the company level, there are full-time officers in charge of environmental protection. Plant protection officers and specialized organizations must master the symptoms and techniques of prevention and treatment of common main diseases of rubber trees, estimate and forecast the pest situation of the unit to guide timely prevention and treatment.

Investigation: each time investigating, the technicians rely on the conventional assessment method to calculate the disease rate (TLB%), disease index (CSB%) or average disease severity (CBTB) on each garden and each rubber service. Then summarize it and report it to the direct management level.

Article 174. Handling pesticide packaging after use

- Pesticide packages after use must be collected into containers as prescribed and then transferred to units with functions and capacity for appropriate treatment according to current regulations;

- Containers must meet the following requirements: located in appropriate, easily recognizable locations, near pesticides preparation points, not affecting domestic water sources, residential areas, traffic and rural beauty; made of durable materials, not chemically reacting with waste stored inside; waterproof; ensuring that they are not exposed to wind, water to move; have a tube or rectangular cube with a capacity of 0.5 - 1 m^3, with a closed lid; on the outside there is the inscription "Container for post-use pesticide packaging" and a danger warning symbol. There must be at least 01 container concentrated in each unit;

- Post-use pesticide packages stored in containers must be transferred for treatment within 12 months;

- Pesticide users are responsible for: collecting post-use pesticide packages and putting them into containers as prescribed; keep it separate and not to share it with domestic waste and field sanitation waste; not to use for other purposes; not to burn or bury on their own; Enterprises directly investing in rubber production are responsible for: organizing the collection of post-use pesticide packages in their respective management areas; sign a transfer contract with a unit with a hazardous waste treatment license for treatment; fulfill the responsibilities of waste source owners in accordance with regulations on hazardous waste management.

Chapter X

HARVESTING RUBBER WOOD

Section I. GENERAL PROVISIONS ON RUBBER WOOD HARVESTING

Article 175. Management of rubber wood harvesting plantations

- Rubber wood together with latex is the main product of the rubber tree cultivation process, the wood harvesting is carried out on the principle of optimizing the efficiency of the rubber tree cultivation process, ensuring economic, social and environmental factors and in accordance with the development orientation of the investor;

- Conditions for harvesting timber:

+ When the rubber plantation ends the latex harvesting cycle according to the forest management process or plan; the end of the research and experiment period according to the topic;

+ When the latex yield of the plantation does not ensure efficiency for the investor;

+ When the density of plantations is low, it is necessary to harvest timber for replanting or use for other purposes;

+ When there is a small area interspersed in an area that has reached the time of timber harvesting, it is necessary to harvest timber in order to be contiguous and convenient in the production organization;

+ When the plantation is damaged by natural disasters or epidemics and is unable to recover or is capable of recovery but is predicted to be ineffective for the remaining time;

+ When the timber harvesting proves to be more effective than continuing to maintain latex harvesting and the determination of timber harvesting is made and approved in the investment project;

- For rubber plantations whose main product is wood - latex (wood is the main product, latex is the secondary product), wood harvesting is carried out according to the process of the main timber tree;

- Authority to decide on timber harvesting: decided by the Board of Directors of the Group for units that own 100% of the capital and approve/agree for other units according to the Group's regulations.

Article 176. Time and area of rubber wood harvesting

- It is necessary to formulate short-term, medium-term and long-term timber harvesting plans, the timber harvesting area includes all areas eligible for timber harvesting specified in Article 175;
- No white logging for the purpose of replanting an inter-lot area with an area of more than 50 hectares for land with a slope of more than 15 ^{o};

- The harvest of timber must be carried out in a variety of seasons throughout the year to ensure a stable supply of timber raw materials for the market, at least 3 times a year; it is necessary to balance to prioritize timber harvesting during the period of stopping latex scraping or favorable natural conditions in timber harvesting, the timber harvest season is at the beginning of the fourth quarter of the previous year and in the first quarter of the year of replanting;

- Assessment of timber reserves: timber before harvesting must be assessed for reserves, the determination of reserves must be calculated correctly and sufficiently, based on the results of inventory of the number of trees, height and diameter of each tree according to the standard method of making cells or counting the whole lot. The time for determination of reserves to the time of timber harvest must not exceed six months apart;
- Estimation of the value of timber after harvest: must be consistent with the market price at the time of timber harvesting, the value of each rubber lot must be determined from the price of each unit of measurement of logs and firewood and timber reserves of the harvested lot;

- Competence to decide on the timber harvesting process: The Group's Board of Directors shall promulgate the process, implementation order, reserve assessment method, and organization of timber harvesting in accordance with current regulations for general implementation throughout the Group.

Article 177. Taking full advantage of wood and firewood for rubber plantations affected by natural disasters

For plantations that are broken due to rainstorms, whirlwinds or other natural disasters, in order to quickly handle and restore production:

- Expeditiously organize the inventory, classification and marking of root trees, trees with broken trunks, inclined trees, and broken branches of branches. Identify trees that are no longer resilient. Quickly clean up broken trees to restore production;

- Make an inventory record, determine the reserves of wood and firewood, propose the reserve price, organize the sale of broken trees that are no longer recoverable in order to minimize damage and recover maximum capital;

- For severely damaged plantations, after the restoration of production, procedures for harvesting timber from plots with the remaining density of less than 50% of the design shall be established for replanting.

Article 178. Forms of wood harvesting

- Selling plantations to customers through auction or designated sale, customers have the full right to use wood and firewood after harvest;

- Hiring contractors to harvest timber, units to pay for timber harvesting and use timber and firewood after harvest;

- Units organize the harvesting of timber and use of wood and firewood after harvest;

- The Board of Directors of the Group shall decide on the form of timber harvesting in accordance with the provisions of law.

SECTION II: TIMBER HARVESTING TECHNIQUES

Article 179. Preparation before harvest

1. Make a long-term and annual harvest plan

- Medium- and long-term plans are plans to harvest timber and replant plantations within a certain period of time, in order to organize plantation business with efficiency and stability in cycles and rotations;

- The annual timber harvest plan shall be approved by the Board of Directors of the Group on the basis of proposals of member units and appraisal opinions of the Group's professional boards.

2. Wood harvesting design

a) Determination of exclusion zones

- Determine the location and boundaries of the exclusion area on the field and show it on the map;

- Areas excluded to avoid impacts in the timber harvesting process include: forest areas with high conservation value, along rivers and streams that need to be protected against erosion and water sources.

b) Identification of timber harvesting areas

- Marking the lot is tight, the rows of trees are tight, the rows of trees are not tight;
- Extra-professional measurement: measuring the diameter and height of the tops, under the branches of chopped trees;
- Internal calculation: determination of commercial timber and firewood reserves.

c) Selection of the direction in which the tree falls

Directing the tree to fall towards the gap between the trees and the trees, down the slope; The tree is tilted more than 10°, so choose the direction of natural fall.

d) Identification of the network of transport routes

- Identify the road network on the map, prioritizing the available inter-lot roads;

- Failing to design roads to access locations: steep terrain, landslides, swamps, unstable land areas, forests in need of protection;

- Limit cutting through streams, if passing through streams, it is necessary to build works to cross the streams.

e) Determination of the timber yard system

Timber yards are arranged in bare and dry land; convenient transportation.

g) Identification of shacks, protection stations, signboards

- Near harvest areas, transport roads, clean water sources; flat, drainage;
- It is necessary to have signs on the construction site and guards so that people know and avoid accidents when passing;
- Do not arrange camps in rubber wood harvesting areas.

3. Preparation before harvesting wood

a) Delivery and receipt of timber harvesting areas

- Handing over the approved timber harvesting design dossier;

- Delivery and receipt of boundaries, areas and order of harvest lots; boundaries of exclusion areas; system of transport roads, wooden yards;

- Make a record of handing over and receiving the harvest area according to the handover contents.

b) Construction of camps

- Distributing vegetation in the shacks, cutting down rotten dry trees that may be dangerous to humans;

- Build a system of drainage ditches and level the ground to avoid causing water stagnation in the shack. Determination of domestic water supply sources at camps;

- Dig pits to dump scrap and garbage.

c) Construction of timber yards

- Clear all trees and shrubs close to the ground, ensure water drainage and facilitate the loading and unloading and transportation of wood;

- Regularly clean up burning materials in and around the logging yard.

Article 180. Sawing, Transportation, Transportation

1. Felling

a) Preparation before felling

- Re-check the labor protection equipment to ensure the safety of workers. Unify the warning signal when the tree falls;

- Inspecting and maintaining tools before cutting them down, ensuring that the tools are in good and safe operation;

- Place the signage system at the top of the paths leading to the sawing area;

- Based on the design, redefine the direction of the tree's fall; identify factors affecting the direction of fallen trees; take measures to adjust the pouring direction such as using wedges or pulling cables when the tree deviates from the desired pouring direction;

- Phat clears the avoidance road to run when the tree falls, ensuring that it is not entangled when running.

b) Lowering trees

- Tight root height: to save wood, the root height is as low as possible (preferably 1/2 of the trunk diameter);

- Saw circuit opening mouth:

+ Cut the opening vein in the selected pouring direction;

+ Depending on the diameter (d) of the tree cut at the place where the mouth is cut, the method of opening the mouth is used: the small tree $d < 20$ cm opens the mouth with one cut; the $20 \text{ cm} < d < 50$ cm plant opens its mouth in two lobes to form a triangle; $d > 50$ cm open the mouth with two parallel strokes;

+ The depth of the opening vein (b) depends on the inclination of the trunk and the deviation of the foliage. For trees with symmetrical foliage $b = (1/4\text{-}1/3)d$. For trees inclined to the direction of pouring, choose the depth of mouth opening $b = (1/5\text{-}1/4)d$. The tree is tilted in the opposite direction to the chosen direction of opening the mouth $b = 1/5d$ using wedges, poles or using a pulling device to the selected pouring direction;

- Neck cutting circuit: the neck cutting circuit is on the opposite side of the mouth opening circuit and perpendicular to the tree trunk, the neck cutting circuit must be about 1/10d higher than the mouth opening circuit, the depth of the neck cutting circuit is usually about 1/10d from the deepest point of the mouth opening circuit to allow the tree to fall safely;

- Leave the hinge: for the tree with the natural pouring direction that coincides with the prescribed pouring direction, the hinge is left as a rectangle, with a width of about 1/10d, if the falling direction of the tree according to regulations is different from the natural pouring direction of the tree, it is necessary to adjust the falling direction of the tree with a trapezoidal hinge, the large bottom of the hinge towards the fallen tree (depending on the direction of the steering more or less, the large bottom of the hinge is big or small), in addition, you can use supporting tools such as wedges, winches,... (for large trees) and use poles, or fishing rods (for small trees);

- Treatment of pestle trees: if there is a pestle plant, it must be treated immediately before cutting down other trees, not cutting down the pestle tree holding the pestle tree to knock down the pestle tree, but using a winch or rope to pull the pestle tree.

2. Cutting branches, cutting pieces

a) Cutting branches

- When cutting branches, you must choose a safe standing position, avoiding the broken tip hitting you;

- Cutting branches is done from the base to the top, cutting the branches at the top of the trunk and above the slope first, then turning the tree back to cut the branches at the bottom;

- In case the top of the tree is located in the void, cut the branches on both sides first, and the branches below cut later;

- For bent branches, cut the circuit on the front compression side, cut the circuit on the rear tension side so as not to be torn along the wood and ensure the safety of the operator;

- If during felling, the tops of the trees fall into the flow area, it is necessary to clean them up immediately, not affecting the flow;

- Cut the top at the smallest point as required by the product specification to make the most of the main product.

b) Cutting

- When cutting to one side of the cutting circuit ensures safety and has a good bypass route. In a steep place, the pruner must stand above the slope relative to the trunk to cut;

- Segmenting and cutting based on the condition of the tree trunk and meeting customer requirements so as to be most beneficial in terms of commercial value;

- Trees lying horizontally on a slope must stand on a sturdy timber, when cutting the last vein, they must stand on the slope;

- At the cutting position, the tension-resistant wood and compression-resistant wood must be cut 1 in the compression-bearing part first, then cut 2 in the tension-bearing part to avoid sawing and sawing.

2. Transportation of timber

- Means of transport must follow the designed transport route, not enter the exclusion area; transporting the right load, ensuring safety;

- Prioritize cutting before transporting. When transporting long timber, do not let the end of the wooden bundle slip the ground to avoid the ploughwood from falling to the ground and destroying the topsoil;

- Fully equipped with labor protection equipment and ensuring safety when transporting;

- Make lists of exploited forest products as prescribed.

3. Loading and unloading on the wooden yard

- Limit to the lowest level the rotation of tractors in the yard, especially crawler tractors;

- Timber on the yard must be classified according to groups and use purposes;

- Do not leave rubber wood on the lot or wood yard for more than 2 days;

- Avoid direct sunlight on the top of the logs, causing the wood to crack. Wooden shielding in bad weather;

- Loading wood on the car needs to be neat and fastened on the trunk. Do not transport rubber wood in bad weather conditions;

- Garbage and scrap on the site must be collected in one place, avoiding rainwater from flowing into the exclusion zone, flows and dams.

4. Transportation of rubber wood

- Timber transport vehicles must strictly comply with traffic safety, only carry the prescribed load for each type of vehicle to both ensure fuel saving and prevent the road surface from being damaged;

- Vehicles with large traction should only be used in necessary cases such as when the road is too bad or muddy to limit the damage to the road surface caused by the wheels;

- Timber stacked on a car must be reasonably distributed in terms of load, must be loaded carefully to avoid pushing horizontally and sliding behind the vehicle during movement;

- Fuel and wastes during maintenance of vehicles must be collected in prescribed places, without affecting surface water, rivers and streams and groundwater.

Article 181. Post-harvest activities of rubber wood

1. Post-harvest cleaning of rubber wood

Immediately after the end of the sawing and cutting of wood harvesting, the timber harvesting area must be cleaned with the following contents:

- Cutting down trees that have fallen and broken due to the process of sawing, cutting, collecting branches and tops of felled trees;

- Clear branches, tops that fall into exclusion areas and in streams, dams. Clear the flow if it is buried;

- Return the site to clean wood, firewood, branches and branches for the garden owner to carry out replanting activities.

2. Environmental treatment

- Remedy erosion and landslides when operating and transporting timber or building shacks and timber yards;

- Treat wastes and chemicals from petrol and oil and daily life in accordance with current regulations;

- Cleaning of tree branches and wood, clearing of water sources affected, congested or alluvial due to soil erosion;

- Disposal of flammable material sources;

- Crossing works (culverts, temporary bridges) on the transport road must be dismantled;

- Before handing over the timber harvesting area, the roadbed must always be in good condition, and the subsidence must be repaired.

Article 182. General guidelines when harvesting rubber wood

1. Cleaning the accommodation and shack

- The camp must be equipped with medicine cabinets with medicines for common diseases in the forest (such as influenza, malaria, diarrhea, bandages, hemostasis, etc.);

- Equip fire prevention and fighting supplies and equipment;

- Regularly sweep and emit mosquito control around the shack;

- Toilets must have closed lids and regularly spray disinfectants and kill mosquitoes;

- Manage and classify waste for treatment in accordance with regulations;

- It is necessary to equip garbage cans with lids or containers that meet standards to store industrial and daily waste, then the waste is sorted and treated according to regulations so as not to pollute the environment.

2. Safety instructions for employees

- Workers in charge of timber harvesting must be fully equipped with necessary protection such as hard hats, shoes, protective socks, gloves, protective clothing and noise-canceling equipment for sawmill workers;

- Workers must be trained in the techniques they perform and learn the rules of occupational safety, first aid training and fire prevention and fighting.

3. Guidance on fire prevention and fighting

- There are regulations on fire prevention and fighting in fuel storage areas and motorcycles. There are no-fire signs and protective fences. Do not leave flammable materials around;

- Fire-retardant equipment and tools such as fire-retardant tanks, water tanks, sand tanks, etc. must regularly inspect and ensure quantity and quality;

- When cooking, it is necessary to avoid letting the fire spread to other works. After cooking, the fire and firewood must be extinguished;

- Do not start a fire in the sawing area.

Part III. ADDENDUM

Appendix I. EXPLANATION OF COMMON TERMS

In this process, the following terms are construed as follows:

- **Tree posts:** mark trees that need to be cut down with paint;
- **Tapping panel:** where it is scraped to harvest rubber latex;

- **Homogeneous tape: rubber** planting tape runs along a relatively homogeneous line, the ice surface is 1.5 - 2 m wide, with an inclination from the outside to the inside of 10^{O};

- **Spores: the** reproductive organs of the fungus. Spores can be sexually or asexually reproduced;

- **Buded polybag, budding polybag:** the seedling in the transplanted pot is then cut off the phagocytic canopy, has a live grafted eye and has a stable root system;

- **Whorl polybag budding:** seedlings grow from the top-cut bulb to form one or more leaf layers;

- **Root trainer plant:** seedlings grow from top-cut pots to form one or more layers of leaves in a hard PE potting tube, have a predominant root system and have gone through the tempering process;

- **Plant disease: a** complex dynamic, characteristic of a pathological process. Caused by parasites or by an unfavorable environment. Leads to disruption of normal physiological functions. Transform the structure of plant cells and tissues. Reduces the yield and quality of the crop. That process depends on the nature of the host, the parasite, and the habitat;

- **Epidermis:** the outermost part of plant cells;
- **Rolling:** rolling out water, squeezing out water;

- **Controlled Upward Tapping: a system** of face-down tapping proposed by Malaysia in 1976, using a specialized razor, performed on the original tapping shell above the tapping cut. The factors of slope, length, depth of scraping mouth, chip wear and movement of workers are strictly controlled;

- **Disease severity scale:** the harmfulness of each type of disease is divided into different levels based on the degree of damage of the individual being investigated. The degree of damage is assessed based on the symptoms manifested on each individual (on leaves/foliage/stems/roots) of each type of disease;

- **Average disease severity scale:** is the average value of disease severity of individuals (leaves/foliage/stems,...) investigated (assessed);

- **Anti-pestle trees:** are trees that have been cut down but do not fall down but lean on other trees;

- **Effective trees in the KTCB stage:** are trees with trunk girders reaching ≥ 70% of the standard trunk girders as prescribed;

- **Host plant:** a plant that is invaded by parasitic organisms from which the parasitic organism obtains nutrients;

- **Seedling:** rubber trees grow from seeds;

- **Minimal care: the** lowest level of care for rubber plantations, focusing only on weed management and fire prevention for plantations (fire-resistant weeding from 1 to 2 times/year depending on specific conditions);

- **Plant nutrition diagnosis:** analysis and evaluation of nutrient composition in soil and leaves to determine the deficiency or excess of a nutrient element and the balance between nutrient elements. From these assessments, based on the nutrient scale in soil and foliar soil (which has been developed through a systematic system of experiments on fertilizer dosage and ratio over many years), appropriate increased or decreased fertilizer doses will be recommended to maintain or enhance growth. effective yield of garden latex;

- **Latex diagnosis: a** tool to assess the health status of the latex system to determine the appropriate latex harvesting regime, avoiding overharvesting or underharvesting of the clonal stream. The physiological diagnosis of pus is based on the results of analysis of physiological parameters including sugar content (sucrose), inorganic phosphorus content (Pi), thiols content (R-SH) and total solids content (TSC). The results of the physiological diagnosis of latex objectively reflect the current status of the garden that is harvesting latex, thereby helping to propose appropriate technical measures;

- **Surfactants:** substances that increase adhesion to increase the effectiveness of pesticides. Adhesives increase the adhesion of the seeds or droplets to the surface of leaves, branches, stems, resisting external influences such as wind, rain, mechanical collisions, etc,...;

- **Latex stimulant:** a chemical or equivalent compound used to stimulate rubber tree latex;

- **Additives:** inert substances that are not toxic to pests, mixed with active ingredients to form finished pesticides forms to make them easy to use;

- **Tapping system:** a combination of three factors in rubber latex harvesting including the length and direction of the scraping mouth, the tapping pace and the stimulation mode;

- **Disease severity index (%), infection index:** an index reflecting the severity or severity of the disease;

- **Fertilizer quality criteria: technical** parameters on characteristics, components and content reflecting fertilizer quality are specified in technical regulations and standards announced for corresponding application;

- **Seedling bud:** a bud that grows from the stump of a vegetative tree after being grafted and cut off;

- **Core tum (core stump): the** bare tump inserted in the pot is large in size (about 30 cm x 60 cm), develops many layers of leaves and is cut at the top at a height of 3 m (after about 24 months of rearing in the pot) before planting;

- **Pests:** species, strains or biological forms of plants, animals or harmful microorganisms that harm crops and agricultural products, lose yield or reduce the quality of agricultural products, including: insects, fungal diseases, nematodes, bacteria, viruses, phytoplasma, weeds, rats and other organisms;

- **Clone identification: identify the rubber** clone through the morphology of the tree (shape and characteristics of the canopy, stem, branches, leaves, bark, seeds, latex color,...) or by molecular indicators;

- **Bark thickness:** the thickness of the original or regenerated bark measured from the outside to the inside of the rubber trunk;

- **Clone: clone** rubber material, selective clone lines put into production are called rubber varieties. The name of the rubber variety consists of the initials of the letter of origin, accompanied by a digit with a space in the middle. Examples: RRIV 1, GT 1, RRIM 600;

- **Tapping cut:** the length shaved during latex shavings;

- **Contour line:** also known as a level line, representing points of the same height on a topographic map;

- **Mainstream homogeneous roads:** the main homogeneous roads serve as a basis for designing almost parallel planting rows in the middle of the 2 main homogeneous lines;

- **Relative level lines:** parallel lines are located between 2 main level lines, points on a relatively level line have more or less different terrain elevations, on the relative level line there is a slightly uphill section and a slightly downhill section;

- **Ethephon: a** chemical that regulates plant growth (2-chloroethyl phosphonic acid), used as an exogenous source of ethylene. Ethylene participates in a lot of plant physiological processes (stimulates defoliation, promotes flowering, promotes fruit ripening,...). On rubber trees, ethylene has the effect of prolonging the latex flow time and stimulating the regeneration of pus;

- **Grafting (grafting):** using a vegetative organ of one plant (graft) grafted onto another tree (graft). A graft is a common name for a branch with an eye (graft), a bud eye (graft), a part of the top, a part of the bulb with an eye, etc. used to graft onto the rootstock. Grafts are usually taken from plants that have been selected and are of high yield and quality. A rootstock is a tree that grows from the seeds of mother trees or bulbs of the same species (grafted with the same species) or different species (grafted with different species) with a grafted branch, which is a part to receive and nurture the graft;

- **Timber - latex clone varieties: rubber** varieties are prioritized for the goal of wood reserves, followed by latex yield;

- **Latex - timber clone rubber varieties: rubber** varieties are prioritized for latex yield targets, followed by timber reserves;

- **Bark consumption:** the thickness of the bark is removed on the tapping cut (face) after each tapping of pus or after a unit of time (months, years);

- **Geographic Information System (GIS): an** information technology system that acquires, stores, manages, processes, analyzes and displays spatial or geographic data in order to assist in solving information synthesis problems for human purposes. For example: Supporting decision-making on planning and management of land use, natural resources, environment, and traffic; urban development planning; archiving administrative data;

- **Active ingredient (a.i.):** the main chemical or group of chemicals in the product, responsible for the desired effect (preventing, destroying, repelling, minimizing pests; stimulating to increase rubber latex production,...);

- **Hypha:** mycelium arising from spores

- **LD ^{50} (lethal dose):** an index that indicates the acute toxicity of a pesticide for warm-blooded animals (in mg of poison per kg of rat weight). LD^{50} is the amount of poison that kills 50% of the mice in the experiment. The lower the LD^{50}, the higher the toxicity;

- **Dosage:** the amount of the pesticides to be applied to 1 unit of area (the unit is kg/ha, liters/ha) or for each treatment (application) on the plant (the unit is calculated in grams/tree/application);

- **Forest development:** Cutting down and removing vines, shrubs, and regenerative trees for non-purpose purposes,... before the main exploitation to ensure that the trees fall in the desired direction, not to break the adjacent trees;

- **Wood vein (xylem):** a circuit that transports water and inorganic substances dissolved in it (raw resin) from the roots to the leaves;

- **Libe (phloem):** a circuit that transports dissolved organic substances synthesized in leaves (saffron) throughout the parts of the plant;

- **Tapping surface:** see "Tapping Table";

- **Planting density:** the number of rubber trees planted per unit area (ha);

- **Tapping cut:** see "Tapping line";

- **Money mouth, back mouth:** where the tapping cut is adjacent to the money line (money mouth) and the back line (back mouth). See more money boundaries, rear boundaries;

- **Parasitic fungus: a** plant form with cells that do not contain chlorophyll and cell membranes high in chitin, causing disease to the host (plants, animals,...);

- **Acute poisoning:** the pesticides enters the body once, causing immediate poisoning manifested by characteristic symptoms;

- **Chronic poisoning:** the pesticides enters the body in small doses, many times for a long time, the pesticides will accumulate in the body until at some point the body will weaken, there are parts of the body that are damaged due to the effect of the pesticides;

- **Nutrient elements in fertilizers:** chemical elements necessary for plant growth and development, including: macronutrient elements (N, P, K); macronutrient elements (Ca, Mg, S, Si); and micronutrient elements (B, Co, Cu, Fe, Mn, Mo, Zn). These elements must be in the form of absorbable crops;

- **Concentration:** 1. the amount of the pesticides to be diluted with 1 unit of solvent volume, usually water (the unit of calculation is %; g or cc (ml) of the pesticides/liter of water); 2. The percentage of active ingredients contained in finished pesticidess;

- **Tapping frequency: the** time gap (days) between 2 shaves. Symbol: dn where n is the number of days between 2 scrapes. For example, d3 is 2 shaves 3 days apart or 3 days 1 shave;

- **Fertilizer:** inorganic or organic compounds of natural or synthetic origin, which have the function of supplying nutrients to plants or have the effect of improving soil to increase crop yield and quality;

- **Macro fertilizer:** the fertilizer in the main ingredient contains at least 01 macronutrient element, including single fertilizer, compound fertilizer, mixed fertilizer, organic mineral fertilizer, bio-mineral fertilizer;

- **Single fertilizer:** the fertilizer in the main ingredient contains only 01 macronutrient element. For example, urea fertilizer, super phosphate fertilizer, KCl fertilizer;

- **Chemical fertilizers (inorganic fertilizers, mineral fertilizers):** fertilizers produced from the main raw materials are inorganic or synthetic organic substances, processed through chemical processes or mineral processing;

- **Mixed fertilizer:** the fertilizer in the main ingredient contains at least 02 macronutrient elements produced by mixing from different types of fertilizers;

- **Mineral organic fertilizers:** fertilizers in the main composition include organic matter and at least 01 macronutrient element;

- **Bio-organic fertilizers:** fertilizers in the main composition include organic matter and at least 01 biological substance (humic acid, fulvic acid, amino acid, vitamins, etc.);

- **Traditional organic fertilizer:** fertilizer derived from animal waste, plant by-products, plants or other domestic organic wastes processed by traditional composting methods;

- **Microbial organic fertilizers:** fertilizers in the main components include organic matter and at least 01 species of useful microorganisms;

- **Organic fertilizer:** the type of fertilizer in the main substance composition contains only organic matter and nutrients produced from the main raw materials are natural organic substances (excluding synthetic organic substances), processed through physical processes (drying, crushing, sieving, mixing, moistening) or biological (brewing, fermentation, extraction);

- **Organic mineral fertilizers:** single fertilizers, compound fertilizers or compound fertilizers supplemented with organic matter;

- **Foliar fertilizer:** a fertilizer used to provide nutrients to plants through stems and leaves;

- **Complex fertilizer:** the fertilizer in the main ingredient contains at least 02 macronutrient elements linked together by chemical bonds. For example, DAP, KNO3 fertilizers;

- **Biofertilizers:** fertilizers produced through biological processes or of natural origin, in composition containing one or more biological substances such as humic acid, fulvic acid, amino acids, vitamins or other biological substances;

- **Intermediate fertilizer:** the fertilizer in the main ingredient contains at least 01 intermediate nutrient element, excluding lime, gypsum, maroon, dolomite in the form of natural exploitation that has not been processed and produced into fertilizer;

- **Trace fertilizer:** the fertilizer in the main ingredient contains at least 01 trace nutrient element;

- **Tapping task:** the number of rubber trees divided by the latex tapping work each day;

- **tapping session:** the number of shaved trees in a group of workers or inter-groups on the same day. With tapping pace d3: divide into 3 tapping sessions A, B and C. With tapping pace d4: divide into 4 tapping sessions A, B, C and D;

- **Impact spectrum:** the different pests that the pesticides can affect. Broad-spectrum: the pesticides can eliminate many pests on many different crops. Narrow spectrum: (also known as special treatment) pesticidess that eliminate few pests (the higher the selectivity of a pesticide, the narrower the spectrum of impact);

- **Prevention:** preventing pests from entering and growing in plants (prevention). Surround and destroy pests before or after they have entered the tree (treatment);

- **ppm (parts per million):** concentration of parts per million;

- **Fruiting body: the** part of the fungus (ear fungus,...) where spores are formed;

- **Integrated Pest Management (IPM):** a pest management system that uses all possible appropriate techniques and measures in the specific environment and population fluctuations of pests, in order to keep the density of pests below the level that causes economic losses;

- **Front channel, back channel:** are two vertical incisions on the trunk, parallel to each other, and the tapping cut line is located between these two boundaries, in order to limit the scope of the tapping table and the predetermined tapping cut length (e.g., S/2 or S/4). The location of the latex catcher and latex catcher is at the money line;

- **Lateral root: a** small-sized root that grows from the stake root (main root, rat tail root);

- **Tap root:** is the only main root that grows vertically formed from the seed embryo;

- **Horizontal roots:** see "Eagle roots";

- **Wintering and refoliation: the** annual deciduous stage of rubber trees replacing them with new foliage;

- **Regenerated forest:** forest formed from the restoration process of vegetation with the main role of regenerated wood trees from seeds, shoots or both. Depending on the form, it is divided into natural regenerated forests (entirely due to the process of natural restoration) or artificially regenerated forests through reforestation;

- **Parasites:** a group of organisms that live thanks to the host organism and harm this organism. The parasitic organism that lives depends on the host to perform life functions;

- **Disease agent (causal agent):** an organism or adverse element of the environment that is likely to cause disease;

- **Taluy yin:** the vertical soil wall of the horizontal ice at the bottom of the slope;
- **Taluy Duong:** the vertical soil wall of the upper level of the slope;

- **Trade name:** the name given by the company that manufactures or distributes pesticidess to distinguish products between one company and another. The trade name consists of 3 parts: the name of the pesticides, the content of the active ingredient and the form of the pesticides;

- **Pesticides: toxic** compounds of natural origin or chemical synthesis used in agriculture to prevent pests of crops and agricultural products in fields, gardens and warehouses;

- **Technical pesticidess (pure pesticidess):** pesticidess that are newly manufactured through technology, have a very high content of active ingredients, used as raw materials for processing finished pesticidess;

- **Finished products (commercial products):** pesticidess processed from technical pesticidess, with quality standards, goods names and trademarks, registered at competent authorities, allowed to be put into circulation on the market and used. Finished pesticidess often have low levels of active ingredients and added additives;

- **Herbicides:** a group of pesticides used to eradicate wild plant species mixed with crops, disputes over living space, nutrients and water, causing crops to weaken and yield low.

+ **Systemic herbicide:** the pesticides is absorbed through the roots and leaf stems and transported through other parts through the vascular system of weeds;

+ **Contact herbicide:** only effective when the pesticides is in direct contact with weeds;

+ **Selective herbicide:** kills one or a group of weeds that have been predetermined and do not affect other groups of weeds or plants;

+ **Non-selective herbicide:** kills all types of weeds including plants;

+ **Post-emergence herbicides:** are treated when the grass has formed leaf stalks. Has a contact or circulation effect, effective for most annual and perennial weeds, or benign grasses such as thatched grass, bear grass,...;

+ **Pre-emergence herbicides:** pesticidess that have the effect of killing weeds before grass seeds germinate or as soon as the grass is germinating. The pesticides enters the plant through the cotyledon roots and cotyledons, the pesticides affects the germination and bud formation of weeds.;

- **Fungicides:** a group of pesticides used to prevent harmful fungi, protect crops and agricultural products after harvest. Includes the following groups:

+ **Systemic fungicide: absorbed** by plants through roots, stems, leaves and transported to other parts through the vascular system;

+ **Contact fungicide:** only effective when the pesticides comes into direct contact with rabies.

- **Insecticides:** a group of pesticides used to prevent and control insects that harm crops, forest trees and agricultural products in warehouses. Some pesticides are also used to get rid of spider mites that damage plants;

- **Symptoms:** signs of changes in the external structure of the diseased part due to the reaction of the plant and the impact of the pathogen. Symptoms of the disease manifested externally can be observed and recognized in many different forms: local dead tissue, color change, change in the shape of the diseased organ, tissue rot, wilting, sap flow and many other forms of symptoms manifested locally or throughout the plant;

- **Whorl polybag budded stump: a** bare tump inserted in a pot and grows with one or more leaf layers;

- **Tum bare (budded stump):** a grafted rubber stump, with a live grafted eye and the bladder root (horizontal root) is removed after emergence;

- **Cambium: secondary** meristem located between the bark and wood of the trunk, which is the place where the inner wood cells and the outer libe cells are produced, including the latex vascular system. The statue on the top of the rubber tree is usually about 1-1.2 mm thick depending on the variety, age and season;

- **Base route:** the route runs from the foot to the top of the hill at a place with a typical slope for that area;

- **Disease incidence: the** percentage of diseased trees (leaves), the disease rate reflects the prevalence of the disease in the garden;

- **Timber transportation:** It is the process of moving timber and forest products from internal timber yards to concentrated areas (called timber warehouses) for further distribution.

- **Timber transport:** Timber after felling is brought from the harvest area to a concentrated place adjacent to the focal points of internal transportation routes; this process is called "transport" and the place where forest products are concentrated is called a timber yard.

- **Original bark:** the bark of the rubber tree is formed from the beginning;

- **Renewed bark:** the shell on the scraped surface is regenerated after scraping the pus on the original bark;

- **Immature plantation: rubber** plantation in the period from planting to before tapping latex;

- **Mature plantation: rubber** plantation in the period from the time of tapping latex to harvesting;

- **Replanted rubber plantations:** rubber plantations planted on land where rubber was previously grown;

- **Fully shaved plantations: rubber** plantations are shaved with high intensity (multiple tapping cuts or the length of the tapping cut is greater than S/2 or the tapping pace is high (d1, d2) or the stimulation mode is higher than the process,...) to take full advantage of latex before switching to wood harvesting or switching to other purposes;

- **Timber harvesting plantations:** rubber plantations have expired the latex harvesting cycle according to the process; the time for research and experimentation has expired; the density of plantations is low, the yield of latex plantations does not ensure the efficiency of the investors who need to harvest timber for replanting or use for other purposes; plantations with small areas interspersed in areas that have reached the time of timber harvesting points are necessary to harvest timber for convenient areas and areas in production organization; plantations damaged by natural disasters or epidemics are unable to recover or are expected to be ineffective in the remaining time;

- **Prolong cultivation:** plantations that have not yet been shaved even though they are eligible for tapping or plantations that have expired the prescribed tapping period but are not yet eligible for tapping and have a plan to extend them for a certain period of time (1-2 years) to be put into operation more effectively;

- **Extensive farming:** plantations with limited quality, poor growth or low effective tree density (<250 trees/ha) but assessed to be capable of exploitation and latex, so they are still maintained and applied to the minimum care regime;

- **Rubber breeding garden (budwood garden):** a garden that produces rubber seed branches, also called grafted wood for grafting eyes;

- **Nursery garden:** the garden produces all forms of rubber seedlings (naked tum, tum bo, top-cut gourd, gourd with leaf layers, gourd with roots).

Appendix II
LOOK UP SLOPE BY DEGREE (°) AND PERCENTAGE (%)

Degree (°)	Percentage (%)	Degree (°)	Percentage (%)	Degree (°)	Percentage (%)
0,5	0,9	15,5	27,7	30,5	58,9
1,0	1,7	16,0	28,7	31,0	60,1
1,5	2,6	16,5	29,6	31,5	61,3
2,0	3,5	17,0	30,6	32,0	62,5
2,5	4,4	17,5	31,5	32,5	63,7
3,0	5,2	18,0	32,5	33,0	64,9
3,5	6,1	18,5	33,5	33,5	66,2
4,0	7,0	19,0	34,4	34,0	67,5
4,5	7,9	19,5	35,4	34,5	68,7
5,0	8,7	20,0	36,4	35,0	70,0
5,5	9,6	20,5	37,4	35,5	71,3
6,0	10,5	21,0	38,4	36,0	72,7
6,5	11,4	21,5	39,4	36,5	74,0
7,0	12,3	22,0	40,4	37,0	75,4
7,5	13,2	22,5	41,4	37,5	76,7
8,0	14,1	23,0	42,4	38,0	78,1
8,5	14,9	23,5	43,5	38,5	79,5
9,0	15,8	24,0	44,5	39,0	81,0
9,5	16,7	24,5	45,6	39,5	82,4
10,0	17,6	25,0	46,6	40,0	83,9
10,5	18,5	25,5	47,7	40,5	85,4
11,0	19,4	26,0	48,8	41,0	86,9
11,5	20,3	26,5	49,9	41,5	88,5
12,0	21,3	27,0	51,0	42,0	90,0
12,5	22,2	27,5	52,1	42,5	91,6
13,0	23,1	28,0	53,2	43,0	93,3
13,5	24,0	28,5	54,3	43,5	94,9
14,0	24,9	29,0	55,4	44,0	96,6
14,5	25,9	29,5	56,6	44,5	98,3
15,0	26,8	30,0	57,7	45,0	100,0

Appendix III
LOT DESIGN ON SLOPING LAND

1. Prepare machinery, tools and personnel

1.1. Instruments

- A simple macro sight or compass with a viewfinder;
- Aiming mia comes with a telescope or compass;
- Ruler of the letter T or letter A (Figure 1, Figure 2);
- Measuring 30 - 50 m long;
- Tape measure with gout (no more than 30 m long) to release the planting venoms in rows and plants in rows;
- 2.5 - 3 m high aiming arrows with paint or cloth tape for easy identification from a distance;
- Planting hole venom 0.5 m long, pestle mallet to close the planting venom, tools to bait the sight hole.

1.1.1. T-ruler

Structure and use of a T-shaped ruler: the ruler is in the shape of a T-shape, the body of the ruler is 1.5 m high with a vertical wire attached to it, there is a pin at the foot to be fixed to the ground, the ruler arm is 0.6 m wide at right angles to the ruler body on the ruler handle with a sight slot (Figure 1). The T-ruler applies the principle of determining the horizontal reticle, the difference of the horizontal planes to determine the horizontal line and slope in percentages.

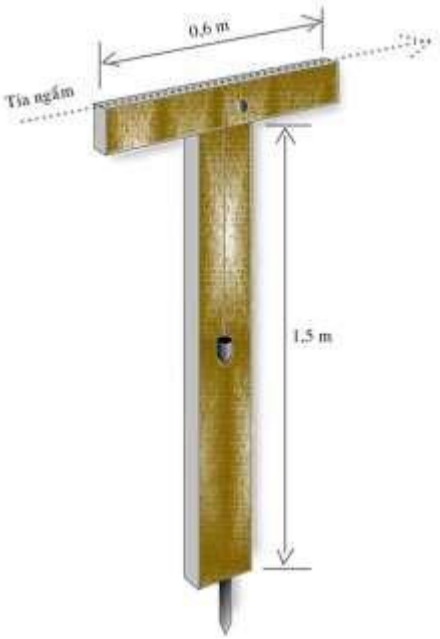


Figure 1. T-ruler shape and construction

How to determine the parallel line with a T-ruler: position the ruler in one position, turn the aiming direction of the ruler to the left or right of the slope along the approximate parallel line, balance the ruler vertically with a vertical wire, keep an eye on the sight, the point where the aiming beam hits the slope is the place where the elevation is equal to the top of

the ruler arm, plug in the marker marker at this location. Continue to perform the same steps on the approximate level line until the level line is determined. Note, the shorter the aiming distance, the higher the accuracy of the alignment line, it is recommended to aim at a distance of 10-30 m depending on the terrain. *How to measure the slope with a T-ruler:* position the ruler at a position, called point 1, turn the ruler's aiming direction up to the end of the slope, balance the ruler vertically with a vertical wire, keep your eyes on the crosshair, mark the point where the crosshair hits the slope, called point 2. Use a ruler to measure the distance between points 1 and 2 on the ground to obtain the length L1. Continue until the total length of L is about 30 - 50 m, at this time it has been measured n times (L1, L2,..., Ln). Calculate the slope D (%) as follows: D (%) = n * 1.5 / (L1 + L2 + ... + Ln) * 100 After having D (%) to have a % slope more accurate than D' (%), refer to the correction factor K according to Sub-Table 1:

Sub-table 1. The coefficient K corrects the approximate slope value (%) D in non-copper measurements

D (%)	10	20	30	40	50	60	70	80	90
Factor K	0,995	0,980	0,955	0,921	0,878	0,825	0,765	0,697	0,622

Then recalculate the corrected slope using the formula

D' (%) = n * 1.5 / K * (L1 + L2 + ... + Ln) * 100

1.1.2. Ruler A

Structure and use of the A-shaped ruler: the ruler is in the shape of an A-shape, each longitudinal bar on the two sides is 2 m long, the crossbar is 1.0 m long connected to the midpoint of each vertical bar, the top of the ruler hangs the vertical wire across the crossbar at the marker of the ruler in the balanced position on the horizontal plane (Figure 2). Rely on the principle of equilibrium on this horizontal plane of the ruler to determine the equilibrium line.

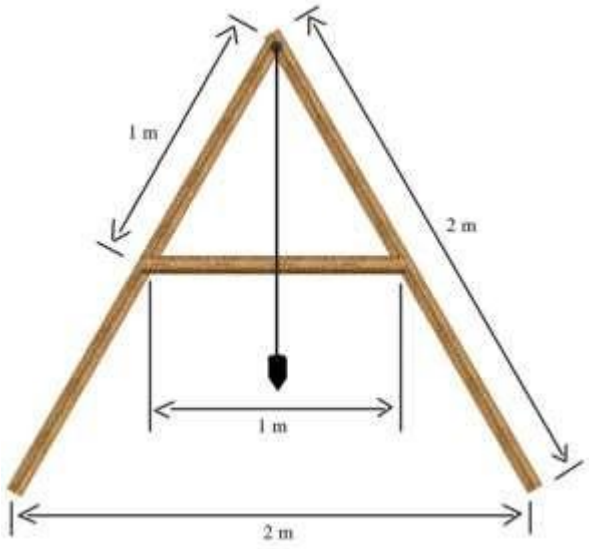


Figure 2. Shape and structure of the A-ruler

How to determine a parallel line with an A-shaped ruler: position one ruler foot at one location, turn the other ruler foot to the left or right side of the slope along the approximate

parallel line until the ruler is perpendicular to the vertical line. Continue to perform the same steps on the approximate level line until the level line is determined. Since each movement is only one ruler step (2 m), determining the parallel line with an A-ruler will take more effort and time than a T-ruler, but the accuracy will be higher.

1.2. Human Resources

- A team leader who holds the sight, sighting and general operation of the whole group;
- A person who keeps the sights and maneuvers;
- Two people holding a long gauge and a glow ruler;
- Two people plant pepper and plant venom.

2. Steps to proceed

If you want to design crops according to the horizontal band, it is necessary to sequentially carry out the following steps: launching the root line, launching the main horizontal lines, opening the lots, releasing the tattle of the same level planting rows.

2.1. Stem gland launch

The base route is a straight line that runs from the bottom of the hill to the top, launched in a place with a typical slope for the area. On a steep hill, it is necessary to have 2-3 root lines as a base for launching the main homogeneous lines in the next step. To determine the root route, it is necessary to use a long-latitude sight or a compass with a crosshair. Some points to note when determining the root route:

- Before using a new compass, it is necessary to compare with the original compass of the establishment or farm to correct the angle of deviation, if any;

- Aiming and insertion of aiming points should always be carried out from a distance to close together, so that the intermediate aiming points must pass through at least three aiming points;

- The sequence of launching the root line is carried out from the bottom of the slope up. The approximate distance between the two targets on the base line should not exceed 50 m, depending on the slope and terrain, in which the greater the slope and the more complex the terrain, the narrower the distance between the two targets. On a slope of 5° - 10°, the distance between the two sights is 5 rows of rubber, on a slope of 10° - 20° with a distance of 4 rows, on a slope of 20° - 30° with a distance of 3 rows. The distance between the sights on the base line is also the distance between the main parallel lines that will be launched later.

2.2. Launch of mainstream lines

On the original line that has been launched, based on the inserted sights, use a T-ruler to launch the parallel lines. For batches that need to be launched more precisely, an A-ruler can be used.

The main homogeneous roads are used to design planting rows, design anti-erosion bank ditches, carpet covers, and lot roads. In the terrain with a steep slope, the main contours are parallel to each other. In the terrain of complex slopes with many conformations and buffalo habitats, the main contours will be thick in places with large slopes and sparse in places with small slopes; In these terrains, it is necessary to straighten the main parallel lines almost parallel to each other.

2.3. Lots

The plot is the release of the boundaries of the edges of the lot cover and the heart of the lot lines. The basis for conducting the plot on the slope is the upper and lower edges of the slope running along the main parallel line, the two side edges running diagonally up the slope with a slope not exceeding 10°.

2.4. Venom release

Releasing venom is the design of planting goods on relatively homogeneous lines between the 2 main homogeneous lines. Carry out the release of the venom after the construction of the level bands on the crops. The process of launching rows of plants at the same level is carried out from the top of the slope down. Some points to note when launching rows of plants at the same level:

- Do not use wires that are easy to stretch and exceed 30m in length to make wire rulers with gout;

- When encountering an obstacle that cannot stretch the rope with gout, rely on the launched rows to insert the sting for the launching row according to the principle of "U" looping.

Appendix IV

SETTING UP AND CARING FOR TUM TRAN GARDEN

1. Seasonality, location, design

- The seedling planting season is from July to September;

- Choose a place with suitable climatic conditions, with irrigation water sources, soil with light structure and easy drainage, and garden locations convenient for travel and transportation;

- Reclamation and soil preparation are completed at least 15 days before planting seedlings. The soil must be cleared and leveled;

- The design of the garden ensures erosion resistance, good drainage, convenient for construction, care and management;

- The nursery garden is divided into each plot with a size of 20 m x 10 m, between the plots there is a 2 m wide path connecting to the transport road. For large-scale nursery gardens (>1.0 hectares), the main transport road is 5 m wide and the branch road is 3 m wide;

- Design of double-row crops with a distance of (90 cm + 30 cm) x 20 cm (single rows are 30 cm apart, double rows are 90 cm apart and trees are 20 cm apart), the design density is about 80,000 points/ha. To improve the quality of the nursery, it is possible to design single-row plants with a distance of 80 cm x 20 cm (rows 80 cm apart, trees 20 cm apart from trees), the design density is about 60,000 points/ha;

- Digging trenches 50 cm deep and 40 cm wide, which can be used mechanically to cut goods while still ensuring a depth of more than 50 cm;

- Fertilize manure 20 tons/ha (or organic fertilizers meeting quality standards) and fused phosphate fertilizer 1.0 tons/ha. For humus-rich soils (newly reclaimed soil), there is no need to apply organic fertilizers;

- Mix manure with soil, fill in the trench about 15 days before planting seedlings.

2. Prepare the rootstock

- Seeds as grafts: priority is given to the seeds of the GT 1 and PB 260 clones, followed by the seeds of other common clones. Choose freshly shed seeds with shiny shells and fresh emulsion embryos. Store the seeds in a cool, sheltered place; scatter the seeds on a substrate not more than 20 cm thick and sprinkle the seeds immediately within 03 days;

- The number of rootstock seeds for the tum garden is about 1,200 kg/ha;

- Seed treatment: place the seeds on their back, tap gently so that the seed shell has just cracked, then soak in clean water

24 hours; after 12 hours, change the clean water once;

- Seeds: 1.0 m wide and 15 cm high on 5 cm thick fine sand, between the leaves there is a passage and a roof. After soaking, the seeds are placed side by side together in a layer on the lip and covered with enough sand to cover the seeds, the number is about 1,000 - 1,200 grains/m^2;

- Water lightly 2 times a day in the early morning and cool afternoon, the amount of water is about 4 liters/m2 /irrigation. Avoid stagnant water on the drip;

- Prevent ants and termites from entering the leaf by spraying or spreading insecticides around the leaflets.

3. Planting trees in the nursery

- After 8-10 days of rooting, choose plants with strong stems and only one stump root that develops normally (straight roots are not twisted, not deformed, not broken...) with a root length of about 3-10 cm and planted in the nursery (Figure 3); planting trees in cool weather;

- Make a hole at the planting point deeper than the length of the sprout root to place a plant; Place the roots of the stake straight down in the hole, squeeze the soil to cut down the roots and cover the seeds with fine soil. Remove plants with broken stems or stump roots;

- Within 10 days after planting seedlings, immediately check and replace unsatisfactory trees daily: dead, broken shoots, withdrawn tops, weak growth, pustules on the trunk, albino trees,...

Figure 3: Choosing seedlings from seed trees to plant in the nursery

4. Care:

- Water abundantly immediately after planting the plant to compact the soil around the root system. During the dry season, water at least 2 times a week with a water volume of about 10 liters/m2 /time. Water when it is cool, in the early morning or late afternoon. Water abundantly the day before and after grafting, do not water on the day of grafting;

- The nursery must be kept clean of grass by hand or chemicals. It is not recommended to use PE coated film to limit weeds and retain moisture between rows. Do not hoe near the root of the tum at least one month before grafting;

- The nursery needs to be pruned twice:

+ 1st time: when the tree reaches 3-4 layers of leaves, prune the trees that are too bad, stunted and do not grow.

+ 2nd time: 10-15 days before grafting, prune trees that grow too poorly and cannot be grafted.

5. Apply rubber fertilizer to the garden

- Type of fertilizer, dosage and number of applications according to Table 2;

- Fertilization time: the first application when the plant reaches two stable leaf layers, the subsequent fertilization is 30 days apart, the last fertilizer is applied at least one month before grafting;

- How to apply: mix all fertilizers well just before applying. The first time spread manure between two single rows 10 cm from the base; from the second time onwards, spread manure along both sides of the double row 15 cm from the root. After fertilizing, loosen lightly to bury the manure. In the dry season, fertilizing is combined with abundant watering.

Sub-table 2. Amount of fertilizer for bare garden rubber

Fertilization	Pure (kg/ha)			NPK fertilizer (kg/ha)	Or single fertilizer (kg/ha)		
	N	P_2O_5	K	NPK 16-16-8	Urea	Phosphorus	KCl*
1st time	60	60	30	375	130	375	50
From the 2nd time	120	120	60	750	260	750	100

** KCl can be replaced with ^{K2SO4} if the soil has a pHof H2O ≥ 4, equivalent weight 1 KCl = 1.2 ^{K2SO4})*

6. Plant grafting

- Start grafting when the rootstock diameter measures 10 cm from the ground reaches ≥ 10 mm and when the plant has a stable top leaf layer;

- Applying the technique of blue, green-brown and blue-brown eye grafting according to the window grafting method, only leaf axillary eyes and fish scales with clear germ tissue (rice grains) are selected;

- Nursery and nursery gardens must be fully watered during the grafting period. Do not transplant when the stump is still wet, it is recommended to transplant the tree when it is cool.

7. Standard tum bare

- The diameter of the tum tree measured 10 cm from the ground is ≥ 13 mm for direct planting or ≥ 12 mm for use as a tum pot with a layer of leaves;

- Tum trees have stump roots at least 40 cm long from the root collar;
- The tum tree is not crushed or peeled off, the roots are straight, the graft eye is alive and well connected.

8. Preparation, handling and storage of tum

- Open the bandage 20 days after grafting, then at least 15 days before the graft. Watering the garden before planting;

- Cut the top of the tum at a height of 5-7 cm from the upper eyelid of the grafted eye, the cross-section is tilted to the opposite side and apply vaseline immediately after cutting;

- Cut off all the roots of the stump, avoid touching the roots of the stump, cut off the stump roots at least 40 cm long from the root collar or leave them longer than the standard, which will be re-processed at the place of planting;

- The tum from the root collar down is treated by dipping in a thick mud mixture consisting of 2/3 of clay + 1/3 of fresh cow (buffalo) manure + 4% superphosphate fertilizer and water. For areas where termites are often harmful, add *imidacloprid* or *alpha-cypermethrin* with a concentration of 0.5% to the mixture. It is possible to use the Institute's root stimulating preparations to treat tums;

- Fasten the tum into a bundle with a soft cord, the graft eye is turned inward (Figure 4);

- If the tum is transported far away, the storage time shall not exceed 10 days after emergence. When transporting, the car must have a cool canopy, the floor of the car is spread with moisture-retaining cushions (sacks, straw, sawdust,...). The bundles are arranged in layers, every two layers are covered with a moisturizing cushion (sacks, straw). Water 2 times a day when it is cool on the road;

- When arriving at the gathering point of the tum tum at the tum bong garden, it must be preserved by arranging the tum bunches in a well-drained pit with a cool roof. Cover the roots with sand or fine soil and water control with just enough moisture.

Figure 4: Tum, bundle of eyes grafted inward

9. Produce tum bare on a temporary nursery

- Choosing land: it is possible to use land other than the nursery or between the rows of basic construction rubber in the first and second years to produce bare tum used as a tum gourd with a layer of leaves. Choose loose, fertile and well-drained soil;

- Seasonality: when there are good rootstocks, planted from July to September;

- Prepare the soil: clean and level; cut rows or loosen the soil to ensure that the planting bed is deeper than 40 cm. It is possible to combine the tilling of the beds and the mixing of the lining fertilizer;

- Top dressing: newly reclaimed land or humus-rich soil does not need top dressing;

- Planting distance and stages: seed selection, treatment, planting, grafting,... similar to the production of tum in the nursery.

Appendix V
SETTING UP AND CARING FOR A 2-3-TIERED TUONG GOURD GARDEN

1. Seasonality, location, design

- In order to produce 2-3 layers of leaves for the new planting season or mile planting, the tum is planted in the previous pot about 5-6 months ago. The planting season is from October to November to prepare for planting in the early season of next year and from February to March to prepare for planting in June to August;

- Choose a place with suitable climatic conditions, irrigation water sources, and convenient locations for travel and transportation;

- The design of the garden ensures erosion resistance, good drainage, convenient for construction, care and management;

- The nursery garden is divided into each plot with a size of 20 m x 10 m, between the plots there is a path 3 m wide. The nursery garden is large-scale with a main road design of 5m wide;

- The design density of the gourd garden with a leaf layer is from 120,000 to 130,000 gourds/ha if the gourd size is 18 cm x 35 cm or from 150,000 to 160,000 gourds/ha if the gourd size is 16 cm x 33 cm;

- Design your rows in two ways:

+ Double row: arrange two rows of pots in the trench, the pots are placed next to each other with a gap in the middle and the soil should not be filled in this gap. The distance between the two centers of the double row is 1.2 m (Figure 5);

+ Single row: arrange a row of gourds in the trench, the distance between the two centers of the trench is 0.7 m - 0.8 m apart.

- Place the bulb in the trench at a depth of 2/3 of the height of the bulb or the mouth of the bulb is higher than the ground 10 cm.

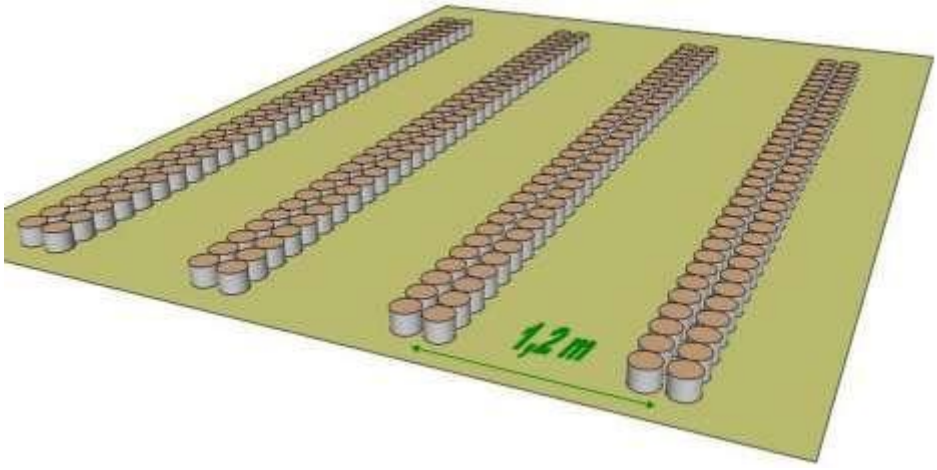


Figure 5. Planting distance for double-row gourd gardens

2. Specifications of gourd and tum

- Use a virgin PE gourd bag, 0.08 mm thick, 1/2 of the length of the gourd at the bottom with many holes, holes 6 cm apart, hole diameter 5 mm;

- Pot size: 18 cm x 35 cm or 16 cm x 33 cm for 6-8 month old tums;

- Tum specifications: the graft eye lives stably, the diameter of the tum measured 10 cm from the root collar is 12 mm or more for tums 6-8 months old and less than 22 mm for tums over 10 months old;

- Root treatment before plugging into the pot: the plant has a straight stump root, 27 - 30 cm long from the lower eyelid of the grafted eye for the bulb of 18 cm x 35 cm or 25 - 28 cm long with the bulb of 16 cm x 33 cm. Apply vaseline to cover the tail cut and the root pool again (or use the Institute's root stimulating preparation) before inserting it into the pot.

3. Prepare the soil

- Choose loamy soil with a loose structure to pot (soil on the spot or transported from other places). For gray soil, choose soil with a low percentage of sand to avoid potting breakage. The soil must be relatively dry when placed in the pot;

- Type of fertilizer liner and application dosage:

+ Fused phosphate fertilizer: 10 g/pot.

+ Organic microorganisms: 10 g/gourd or manure 50-100 g/gourd.

- Put the soil into the pot: loose, smooth soil has been mixed with fertilizer according to the quantity. The soil is put into 2/3 of the gourd bag, shake well enough tightly; Next, fill the mouth of the gourd with soil and shake it well to bring the soil down 1 cm from the mouth of the gourd. The soil pot must be evenly rounded, not broken in the middle.

4. Plant tum in the pot

- Water the soil 1 day before planting. Use a tattoo plant (venom) to poke a hole in the center of the bulb to a depth equal to the length of the treated tum root; insert tum into the center of the bulb to keep the lower eyelid of the grafted eye 1 cm from the ground, the grafted eye facing outward;

- After planting the tum in the pot, water 1 time a day, from the plant reaches 1 layer of leaves or more, water once every 2 days or have an appropriate irrigation regime according to the conditions of each region to keep the pot moist enough in the dry season.

5. Care

- The nursery must be kept clean of grass and remove all the grass in the pot. It is not recommended to use PE coated film to limit weeds and retain moisture between rows;

- At the initial stage, where there is a high temperature, it is necessary to make a trellis; the area where the cold occurs should be covered with clear PE and the height is suitable for care. Open the trellis when the tree has a stable leaf layer and good weather to help the plant grow well and avoid disease;

- Regularly check for timely removal of vegetative and transverse shoots.

6. Apply 2-3 layers of leaf rubber fertilizer

- Type of fertilizer, dosage and number of applications according to Table 3;

- Fertilization time: the first application when the plant reaches a stable leaf layer, the next times are 30-45 days apart when the plant has a stable new leaf layer;

- Fertilization technique: mix three types of fertilizer evenly, poke a hole 3 cm deep near the wall of the pot, then apply fertilizer to the hole; avoid fertilizing near the root;

- Watering when fertilizing: wherever the fertilizer is applied, water it right there;

- Supplement foliar fertilizer spraying according to the instructions of the product, foliar fertilizer can be sprayed in combination with disease prevention and treatment pesticidess when necessary and these chemicals are allowed to be mixed together.

Sub-table 3. Amount of fertilizer for rubber garden tum gourd 2 - 3 layers of leaves

a) Bulb size 16 cm x 33 cm

Fertilization	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single division (g/tree)		
	N	P_2O_5	K	NPK 16-16-8	Urea	DAP	K_2SO_4
1st time	0,4	0,4	0,2	2,5	0,5	0,9	0,3
From the 2nd time	1,0	1,0	0,5	6,2	1,4	2,1	1,0
After cutting the tops							
1st time	0,6	0,6	0,3	3,7	0,8	1,3	0,6
From the 2nd time	1,4	1,4	0,7	8,7	2,0	3,0	1,4

b) Bulb size 18 cm x 35 cm

Fertilization	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single division (g/tree)		
	N	P_2O_5	K_2O	NPK 16-16-8	Urea	DAP	K_2SO_4
1st time	0,6	0,6	0,3	3,7	0,8	1,3	0,6
From the 2nd time	1,4	1,4	0,7	8,7	2,0	3,0	1,4
After cutting the tops							
1st time	1,0	1,0	0,5	6,2	1,4	2,1	1,0
From the 2nd time	2,0	2,0	1,0	12,4	2,8	4,2	2,0

7. Prepare for potting for planting

- After the tree reaches 2 stable leaf layers, the first time is to be rotated, one month before planting again, and each group of trees with the same growth rate is divided separately;

- Tum gourd standard with leaf layers: grafted shoots have at least two stable and healthy leaf layers. It is necessary to keep the pregnancy moist enough when transferring the pregnancy; The gourd is not broken, the tree is not rooted.

Appendix VI
SETTING UP AND CARING FOR A 5-TIERED TUM GOURD GARDEN

1. Seasonality, location, design

- Depending on the new planting season in each region, tum is planted in the pot 8-9 months before being planted outside the lot;

- Choose a place with suitable climatic conditions, irrigation water sources, and convenient locations for travel and transportation;

- The nursery garden is designed to ensure erosion resistance, good drainage, convenient construction, care, management and transportation;

- The nursery garden is divided into plots with a size of 20 m x 10 m, between the plots there is a road 3 m wide. The large-scale nursery has a main road 5 m wide;

- Design your rows in two ways:

+ Double row: arrange two rows of pots side by side in the trench, do not fill the gap between the pots. The distance between the two double centers of row is 1.2 m;

+ Single row: a row of pots is placed in the trench, the distance between the two centers of the trench is 0.7 - 0.8 m apart.

- The depth of laying the pot into the groove is equal to 2/3 of the height of the pot.

2. Specifications of gourd and tum

- Use a virgin PE gourd bag, 0.08 mm thick, 1/2 of the length of the gourd at the bottom with holes 6 cm apart, hole diameter 5 mm;

- Pot size: 20 cm x 40 cm for tums 10 months old and below or 25 cm x 50 cm for tums over 10 months old.

- Tum specifications: grafted eyes live stably, with a straight root pile. For tums 10 months old and younger, the diameter of 10 cm from the root collar reaches 12 mm or more, 30 - 35 cm long from the root collar. For tums over 10 months old, the diameter is no more than 24 mm and the length is 40-45 cm;

- Treat the tum before inserting it into the pot: cut off the root of the stake (rat tail), apply vaseline to seal the cut and re-root pool (or use the Institute's root stimulating preparation) before inserting it into the pot.

3. Prepare the soil and plant tum in the pot

- Preparation of potting soil: similar to the production of 2-3 layers of leaves;
- Planting tum in gourd: similar to producing tum gourd with 2 - 3 layers of leaves.

4. Care

- Watering and weeding: similar to the production of 2-3 layers of leaves;
- Making trellises: similar to the production of 2-3 layers of leaf tumour;
- Pruning of vegetative shoots and horizontal shoots: similar to the production of 2-3 layers of leaves.

5. Apply rubber fertilizer to the garden with 5 layers of leaves

- Type of fertilizer, dosage and number of applications according to Table 4;

- Fertilization time: the first application when the plant reaches a stable leaf layer, the next times are 30-45 days apart when the new leaf layer is stable;

- Fertilization technique: mix three types of fertilizer evenly, poke a hole 3 cm deep near the wall of the pot to apply fertilizer to the hole; avoid fertilizing near the root;

- Watering when fertilizing: wherever the fertilizer is applied, water it right there;

- Supplement spraying foliar fertilizer according to the instructions of the product, foliar fertilizer can be sprayed in combination with preventive pesticidess when necessary and these chemicals are allowed to be mixed together.

Sub-table 4. Amount of fertilizer for garden rubber with 5 layers of leaves

a) Bulb size 20 cm x 40 cm

Fertilization	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single division (g/tree)		
	N	P_2O_5	K	NPK 16-16-8	Urea	DAP	K_2 NUMBER 4
1st time	1,0	1,0	0,5	6,2	1,4	2,1	1,0
From the 2nd time	2,0	2,0	1,0	12,4	2,8	4,2	2,0

b) Bulb size 25 cm x 50 cm

Fertilization	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single division (g/tree)		
	N	P_2O_5	K_2O	NPK 16-16-8	Urea	DAP	K_2SO_4
1st time	1,4	1,4	0,7	8,7	2,0	3,0	1,4
From the 2nd time	2,8	2,8	1,4	17,4	4,0	6,0	2,8

6. Expand the density of trees, island gourds

- After the plant reaches 2 stable leaf layers, the first time the potting density is extended, and the potting is arranged in a single row;

- Stir the gourd when the plant reaches 4 stable leaf layers, stir for the last time 1-2 months before planting;

- Each round of election rotation needs to be classified separately by groups with similar growth rates;

7. Prepare for potting for planting

- Choose a pot with a stable top leaf layer and must reach a height of over 1.5 m for planting;

- It is necessary to keep the pot moist enough when transporting to avoid root decay and breakage of the pot.

Appendix VII
SETTING UP AND CARING FOR THE "CORE TUM" NURSERY

1. Seasonality, location, design

- The season of planting tum in the pot is from June to August;

- Choose a place with suitable climatic conditions, irrigation water sources, and convenient locations for travel and transportation;

- The "core tum" nursery is established in the form of interplanting in the 1st year of replanting;

- The location of the garden must ensure erosion resistance, good drainage, convenient construction, care, management and transportation;

- The seedling pit in the nursery is in the form of a pan with a width of 70 cm, long 70 cm and 70 cm deep, the bottom of the pit is 50 cm x 50 cm wide; The pits are designed with a distance of 1.5 m x 1.0 m (rows are 1.5 m apart, trees are 1.0 m apart), 3 rows of seedlings are planted between two rows of rubber of the replanted plantation. The density of seedlings is about 4,500 trees/ha.

2. Specifications of gourd and tum

- Use a virgin PE gourd bag with a size of 30 cm x 60 cm, the gourd bag has 3 rows of holes at the bottom, in the middle of the bottom of the gourd bag is cut 1 small hole;

- Tum specifications: grafted eyes live stably, have a straight pile root, tum with a diameter of not more than 25 mm and root length of 40 - 50 cm;

- Treat the tum before inserting it into the pot: cut off the tail of the mouse, apply vaseline to seal the cut and re-root pool (or use a root stimulant preparation) before inserting it into the pot;

3. Prepare the soil and plant the tum in the pot

- Choose loamy soil with a loose structure to pot (soil on the spot or transported from other places). The soil must be relatively dry when put into the pot;

- Put the soil into the pot: loose, smooth soil has been mixed with fertilizer (50 g/pot), the soil is put into 2/3 of the potting bag, shake well enough tightly, then fill the mouth of the pot and shake well to bring the soil down 1.0 cm from the mouth of the pot. The soil pot must be evenly rounded, not broken in the middle;

- Use a tattoo (venom) to pierce the hole in the center of the bulb to a depth equal to the length of the treated tuber root, insert the tuber into the center of the bulb to keep the eyelid under the graft 1.0 cm from the soil;

- Place the pot in the hole so that the edge of the pot is about 1 cm lower than the natural ground.

4. Care

- Weeding 3 times a year and before fertilizing;
- Watering in conditions of prolonged drought;
- Regularly prune wild shoots and check for disease prevention in a timely manner.

5. Apply garden rubber fertilizer "core tum"

- Use NPK 16-16-8 fertilizer with a dosage of 100 g/pot/year, divide the amount of fertilizer into 3 times a year, each application is 2 months apart;

- Fertilization technique: poke a hole 3 cm deep near the wall of the pot to apply fertilizer to the hole; avoid fertilizing near the root.;

- Watering when fertilizing: wherever the fertilizer is applied, water it right there; should be watered abundantly 1 day before fertilizing;

- Supplement spraying fertilizer through the leaves every 15 days when the plant reaches 1 stable leaf layer; Foliar fertilizers can be sprayed in combination with prophylactic pesticidess when necessary and these chemicals are allowed to be mixed together.

6. Prepare for potting for planting

- When the plant is about 24 months old, cut the top at a height of 3 m, apply vaseline and pick up the plant with a small digger/scoop (single bucket), keep the pot intact, reduce the length of the root pile and leave only 10 cm from the bottom of the pot;

- Transport seedlings to the lot for planting.

Appendix VIII
SETTING UP AND CARING FOR THE ROOT TRAINING NURSERY

1. Seasonality, location, design

- The seedling planting season starts from July to September;

- Choose a place with suitable climatic conditions, irrigation water sources, and convenient locations for travel and transportation;

- The design of the garden ensures erosion resistance, good drainage, convenient for construction, care and management;

- The nursery garden is divided into plots of 20 m x 10 m, between the plots there is a path 3 m wide. The nursery garden is large-scale with a main road 5 m wide and a secondary road 3 m wide;

- The design density of the root training gourd garden is 150,000 - 160,000 gourds/ha;

- The design of the rack is an iron rack inside with cells to fit the bag, the rack has a width of 20 cm and a length depending on the length of the nursery;

- Design the rows in double rows, arrange two rows of pots on the racks, the distance between the two centers of the double rows is 1 m;

- Place the pot on the rack so that 1/3 of the bottom of the pot bag is below the ground;

- The nursery is shaded by PE film so that the light intensity is only about 70%.

2. Specification of the gourd bag

- The root treatment gourd bag is made of *polypropylene plastic* with a volume of 750 ml with a thickness of
1.5 mm. The gourd bag has the shape of a dead cone, the length is 28 cm, the diameter of the gourd mouth is 8 cm, the diameter of the bottom of the gourd is 5 cm, the drainage hole at the bottom of the gourd bag is 2.2 cm in diameter (Figure 6);
- Inside the gourd sac, 1 cm from the mouth of the gourd, there are 6 wavelines protruding and evenly spaced along the body of the gourd bag;

- Root gourd bags are reused many times (at least 5 times).

Figure 6: Root training gourd bag

3. Prepare to pot the substrate

- The substrate for potting includes treated plant residues and decayed organic fertilizers in appropriate proportions, supplemented with molten phosphorus, SBIO probiotics, fungicides,...;

- The substrate is placed in the pot 2 weeks before the graft is placed.

4. Prepare the rootstock

- The number of rootstock seeds needed for 1 hectare of rooting garden is about 1,200 - 1,600 kg/ha depending on the design density and type of rootstock seeds;

- Selection and treatment of rootstock seeds as prescribed in Article 53.

5. Plant plants in the pot

- 1-2 days before planting the plant in the pot, the substrate in the pot must be watered abundantly;

- Choose trees with strong stems and only one stump root that develops normally (straight roots without twisting, deformity, breakage, etc.) with a root length of about 3-10 cm to plant in pots, choose trees of the same height to plant in turn;

- Plant a tree in cool weather, make a vertical hole in the middle of the pot to plant a tree, put the root of the stake straight down in the hole, squeeze the soil to cut off the roots and cover the seeds with fine soil, do not plant trees with broken stems or root stalks;

- Within 20 days after planting the plant into the pot, immediately check and replace unsatisfactory trees such as broken buds, withdrawn tops, weak growth, pus on the trunk, albinism,...

6. Rootstock care

- Water abundantly immediately after planting the plant to compact the soil around the root system. In the dry season, it must be watered regularly, ensuring to keep enough moisture to the bottom of the pot. The amount of irrigation water is about

10 liters of water/m2 /irrigation;

- The nursery must be kept clean of grass by manual or chemical methods. It is not recommended to use PE coated film to limit weeds and retain moisture between rows.

7. Plant grafting

- Grafting time: grafting from January to May;

- Transplant when the plant in the pot has a root diameter of more than 6 mm measured at a distance of 10 cm from the ground. Graft the plant when it is cool, do not graft when the rootstock is still wet. Do not water on the day of grafting, after grafting, water must be watered to ensure sufficient moisture;

- Grafted wood: has the same age as the rootstock, easy peeling.

8. Cut the tops and transfer the gourds

- After 20 days of grafting, open the bandage. After opening the bandage, at least 15 days before cutting the top;

- Cut the top of the pot with a live graft with a root diameter of more than 8 mm measured 10 cm from the ground. Cut the top about 5-7 cm high from the upper eyelid of the grafted eye, immediately apply vaseline on the cutting surface. If the rootstock is small, the top should be cut higher, about 10-12 cm from the graft eye;

- After cutting the tops, lift the gourds from the supports, cut off the roots that stick out of the gourds and transport the gourds to the site of care and rooting.

9. Take care of the leaf layer and root training

- The top-cut gourd is placed in the supports so that 1/3 of the bottom of the gourd bag is below the ground, about 60 cm wide between the two edges of the support;

- The nursery garden is kept clean of grass, all grass in the pot is uprooted, wild shoots are regularly pruned and disease prevention is periodically combined with foliar fertilization;

- When the plant has 1 stable layer of leaves, open the cover net to start the root training process;

- Root training process: after opening the net for 2 weeks, the gourd bag supports are lifted so that the bottom of the gourd bag is 5-10 cm from the ground. The roots of the stakes poking out of the bottom of the gourd bag are cut close to the bottom of the gourd bag. Water immediately after cutting the roots. Regularly inspect and cut off the rooted part from the bottom of the potting sac. Water daily if there is no rain;

- Leaf layer hardening process: when the plant has 2 stable leaf layers, the watering regime is reduced to 1 every 2 days until the plant leaves the garden;

- Choose a pot with a stable, uniform top layer of leaves for planting (Figure 7).

Figure 7: Root gourds preparing for planting

10. Fertilization

- Use a single fertilizer mixed with the dosage and number of applications specified in sub-Table 5;

- Fertilization time: for rootstocks, the first application is carried out when the plant reaches 2 stable leaf layers, the next times are 30-45 days apart when the new leaf layer is stable; stop fertilizing 30 days before grafting. For gourds with cut tops after grafting, apply for the first time 7-10 days after cutting the tops; the next application when the plant has a stable layer of leaves;

- How to fertilize: you can apply directly or dilute fertilizer to water the pot, wherever the fertilizer is applied, water it right there; It is recommended to water the pot 1 day before fertilizing. For direct fertilization, mix three types of fertilizers well, poke a hole 3 cm deep near the wall of the pot to apply fertilizer to the hole; Avoid applying near the root. For diluted dressing, dissolve manure with water, water fertilizer on each root, avoid watering near the root.

Sub-table 5. Amount of fertilizer for root training garden rubber

Fertilization	Pure (g/plant)			NPK fertilizer (g/plant)	Or DAP + single division (g/tree)		
	N	P_2O_5	K	NPK 16-16-8	Urea	DAP	K_2O NUMBER 4
1st time	0,100	0,100	0,050	0,625	0,125	0,225	0,075
From the 2nd time	0,250	0,250	0,125	1,550	0,350	0,525	0,250
After cutting the tops							
1st time	0,150	0,150	0,075	0,925	0,200	0,325	0,150
From the 2nd time	0,350	0,350	0,175	2,175	0,500	0,750	0,350

11. Planting gourds for root training

- Before planting, it is necessary to clear the grass and roots,... around the hole, then gently pull out the seedling with both roots and substrate from the potting bag with your hands, use the empty potting bag that has just been pulled down vertically in the middle of the planting point so that the mouth of the potting bag is horizontal with the ground to create a planting hole (Figure 8);

- Place the seedling in the planting hole, the graft eye facing the direction of the main wind, the lower eyelid of the graft eye is horizontal to the ground;

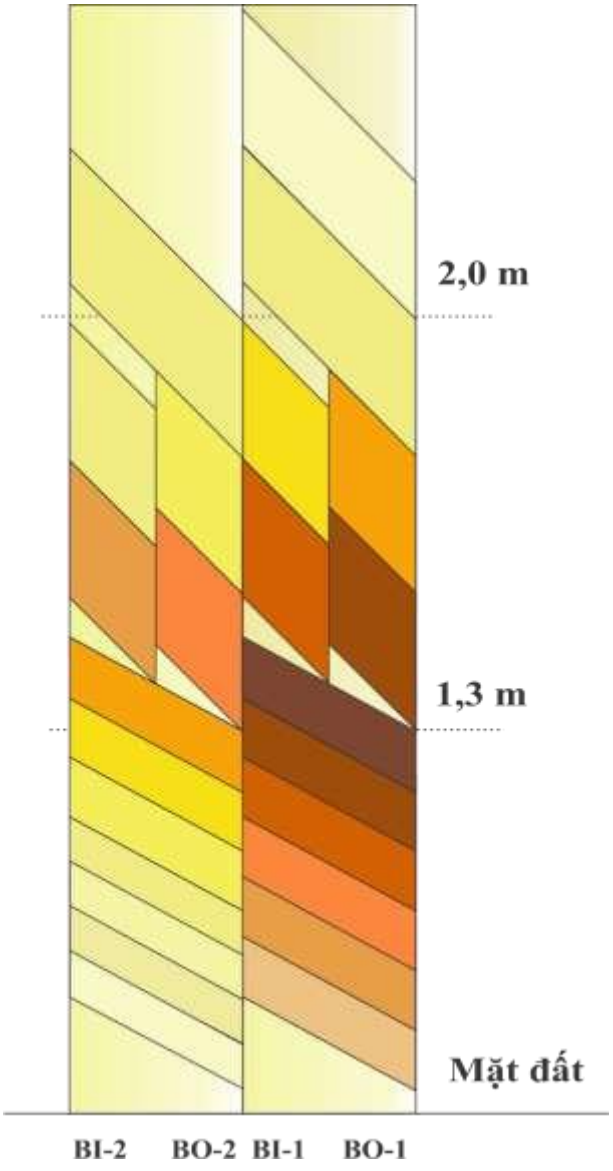
- Use your hands to gently squeeze the soil around the mouth of the newly planted pot, do not stomp close to the root to avoid breaking the pot; finally, loosen the soil to create a basin around the root, cover the soil at the level of the eyelid under the graft;
- Root gourd bags after planting must be collected for reuse in future crops.

Figure 8: Root cultivation technique

Appendix IX

ANNUAL PLANNING AND DESIGN MANAGEMENT DIAGRAM OF tapping cutS AND tapping BOARDS WITH A CYCLE OF 20 YEARS

Batch:	Teams:	NT:	Company:
DVT:	Year of planting:	Five shavings:	Year of tapping upside down:
TM: TC:		Distance (density):	

Diagram of the location of the tapping board through the years of tapping pus	tapping age	Productivity		Stimulation mode (times/year)	
		Kg/ha	Kg/tree	Back	Prone
	1				
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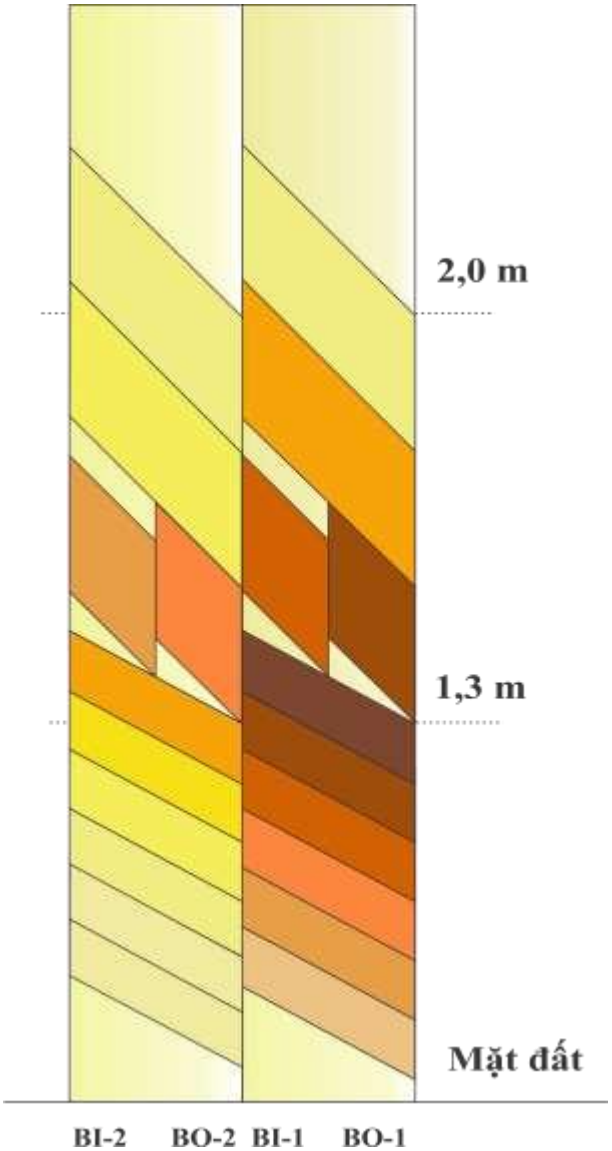
	23				

A) ANNUAL PLANNING AND DESIGN SCHEME AND tapping TABLE WITH A CYCLE OF 17 YEARS

Batch:	Teams:	NT:	Company:
DVT:	Year of planting:	Five shavings:	Year of tapping upside down:
TM: TC:		Distance (density):	

Diagram of the location of the tapping board through the years of tapping pus	tapping age	Productivity		Stimulation mode (times/year)	
		Kg/ha	Kg/tree	Back	Prone
	1				
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Appendix X
SUMMARY OF INTERNATIONAL SYMBOLS ON LATEX HARVESTING REGIME

1. tapping cut length:

S/2 (shave half the trunk); S/4 (shave off a quarter of the trunk ring); S/6 (shave off one-sixth of the trunk ring).

2. tapping direction:

D:99990101000000+0000 Downward tapping; U: Upward tapping.

3. tapping pace:

d3: Shave once every three days; d4: Shave once every four days; d5: Shave once every five days; d6: tapping once every six days; 6d/7: Shave the pus for six days, take one day off in a one-week cycle.

4. tapping Cycle:

10m/12: Scrape the pus for 10 months in a one-year cycle.

5. Scraping board (also called scraping side):

BO-1: The first scraping board of the primary shell on the original scraping board (the letter B is the original scraping board, the letter O is the original shell, and the attached number 1 is the order of the scraping surface); BI-2: The 2nd scraping table of the first reborn shell on the original scraping board (the letter B is the original scraping board, the letter I is the first reborn shell, the attached number 2 is the order of the scraping surface); HO-1: The first scraping board of the original shell on the face-down tapping board, the letter H is the face-down tapping side or high tapping side, the letter O is the original shell, the number 1 is the order of the tapping side; HO-4 The fourth scraping board of the original shell on the face-down tapping board, the letter H is the face-down or high shaved side, the letter O is the original shell, and the number 4 is the order of the shaved face.

6. Coordinated tapping on your back:

The "+" sign is between the two tapping modes.

Example: S/2D d3 + S/4U d3 (tapping in combination with two tapping cuts in one day. The tapping cut is half a circle in length, tapping at a pace every three days. The tapping cut is a quarter of the length of the trunk, shaved at a pace of every three days).

7. Latex stimulation mode:

- Chemical name: ET (abbreviated as Ethephon).

RF (short for the method of stimulation with ethylene gas according to the RRIMFLOW technique).

-Concentration: 2.5% or 5% (stimulant concentration is 2.5% or 5%).

- Application method: Pa (apply a stimulant on the regenerated shell just above the tapping cut, this method is usually applied to tapping cuts upside down).

La (apply the stimulant right on the tapping cut without peeling off the wire, this method is usually applied to the tapping cut upside down).

- Number of applications in a year: 4/y (applied four times in a year).

G/3 (air pump once in three latex scrapes).

Example:. ET 2.5% Pa 2/y (apply ethephon stimulant with a concentration of 2.5%, apply on the regenerated shell right on the tapping cut, apply 2 times in a year).

Symbol example of a complete latex harvesting mode: S/2D d3 6d/7 10m/12. ET 2.5% Pa 4/y (shave half a circle around the trunk, shave every three days, shave one day off a week, shave ten months in a year; apply a 2.5% concentration ethephon stimulant on the regenerated bark just above the tapping cut, apply four times in a year).

S/2D d4 6d/7 10m(4-1)/12. ET 2.5% Pa 5/y + S/4U d4 6d/7 9m(5-1)/12. ET 2.5% La 6/y
(Combined tapping of 2 shaves face down and back on the same day. The tapping cut is half a circle around the trunk, shaved once every four days, shaved one day off on six days of the week, shaved ten months (from April to January of the following year) in a year; Apply the 2.5% concentration ethephon stimulant on the regenerative shell just above the tapping cut, apply five times in a year. The tapping cut is a quarter of the trunk in length, shaved every four days, shaved one day off a day of the week, shaved for nine months (from May to January of the following year) in a year; Apply ethephon stimulant at a concentration of 2.5% right on the tapping cut without stripping the wire, apply six times in a year).

S/6U d3 6d/7 10m(4-1)/12. RF G/3 (Face-down shave with a tapping cut length of one-sixth of the trunk, shave once every three days, shave one day off a week, shave for ten months (from April to January of the following year) in a year; apply the ethylene gas stimulation technique RRIMFLOW, after three shaves, the gas is pumped once).

Appendix XI
TECHNIQUES FOR INSTALLING RAINWATER GUTTERS AND RAIN CANOPIES

a. Materials (Fig. 9.1)

- Rainwater gutters can be made of PE (polyethylene) sheets with a thickness of about 0.3 mm or foam sheets with a thickness of 1.0 mm. The gutters have a curved shape like a crescent, the width of the chute is about 4-5 cm. The length and curvature of the chute used depends on the body circumference and the length of the scraper. The trough must be about 20 cm longer than the tapping cut (10 cm beyond the front boundary and 10 cm beyond the back boundary);

- The roof is made of PE *(polyethylene) plastic,* or equivalent material with a thickness of about 0.3 mm. The roof has a curved shape like a crescent, the roof width is about 14 - 16 cm. The length and curvature of the roof used depends on the body circumference and the length of the scraper. The roof must be about 30-35 cm longer than the tapping cut (15-20 cm beyond the posterior boundary and 15 cm beyond the anterior boundary);

- The cup cover is made of PE *plastic (polyethylene)* with a thickness of about 0.3 mm, a length of 33 - 35 cm, a width of about 26 cm or a cup cover film with a size of 50 x 60 cm.

- Stapler, stapler No. 10, bark scraper, soap, parachute.

- Trough/roof adhesive has good plasticity, adhesion, waterproofing and does not affect rubber trees. It is recommended to use solid asphalt glue.

b. Rainwater gutter installation technique

- Mounting position of the rainwater gutter: The chute must be mounted above the tapping cut with a slope of 32° - 34° from the horizontal axis for both the tapping cut and the tapping cut upside down.

+ For the tapping cut, at the beginning of the tapping and the second year of shaving, attach the trough on the virgin shell about 5-7 cm from the location of the first tapping cut. From the 3rd tapping year onwards, the mounting position is changed 1 time per year, the mounting position on the shell is regenerated at the tapping discharge position of the previous year of the preceding shave. When switching to the BO-2 scraper, the chute mounting position is similar to that on the BO-1 scraper;

+ For the face-down tapping cut, the trough is mounted above the expected tapping shell loss in a year by about 5 cm from the posterior mouth.

- Techniques for attaching rainwater gutters:

+ Use a scraper to clean the surface of the trunk right at the place of attaching the trough with a tape 2-3 cm wide beyond the front and back boundaries 10-15 cm. Next, scrape 2 vertical lines parallel to the front and back boundaries 3-5 cm from the outside of the tapping board on each side to make a rainwater waterproof road into the tapping cut, dredging through the design board to wear the tapping shell in 10 cm. Note that deep dredging is not allowed, which is easy to crack the shell, leading to a high rate of rainwater leakage (Figure 9.2);

+ Use thick glue to glue the trough, before pulling the glue into the soap, squeeze the glue in the palm of your hand with your hands, then use your hands to pull the glue from the back mouth to the mouth of the money, pull through the mouth of the money and the mouth of the back 10 cm on each side. If the trough attachment position is low, you can pull the glue from the front mouth to the back mouth. Note that in recessed places, it is necessary to pull the glue thicker than in other places. Next, pull 2 rainwater sealant lines vertically and parallel to the front and rear boundaries (Figure 9.3);

+ Fix the rainwater trough on the front line by pressing 2 adjacent needles. Then pull the foot of the rainwater trough close to the glue line from the end of the trough on the side of the money boundary to the end of the trough on the back boundary, then fix the two adjacent needles as on the side of the money line. Next, press 2-3 needles in the middle of the trough. If attached to the regeneration case, the needle is clicked from the front mouth to the back mouth with a distance of 3-5 cm between the two needles. The staple is 2-3 mm from the foot of the rain trough, for cases where the tree is convex or concave, it is necessary to press an additional needle (Figure 9.4, Figure 9.5 and Figure 9.6).

+ Reinforcement: About 2-3 months to re-check and apply additional glue to the leaking chutes. If there is a leak in the recessed areas of the trunk or the needles are peeling off, press more needles and apply additional glue.

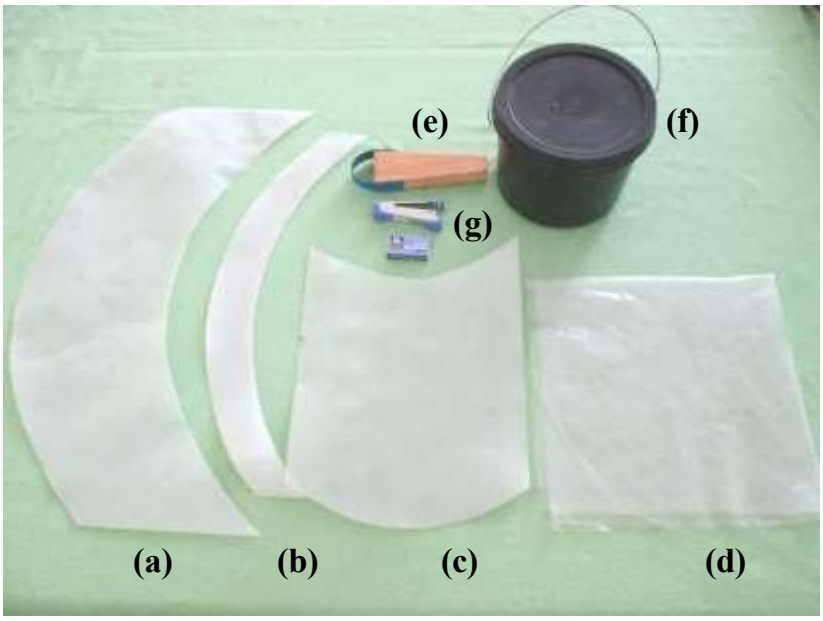

Figure 9.1 Rain cover for rubber trees: shaved roof (a); rainwater gutter (b); cup roof (c); cup coating film (D); dredging and cleaning of tree bark (e); glue barrel (f); Stapler and stapler (G)

Figure 9.2. Use a scraper to clean the trunk right at the location where the rain trough and rainwater waterproof road are attached to the tapping cut

Figure 9.3. Use your hands to pull the glue to attach the rainwater trough and two rainwater waterproof lines to the tapping cut

Figure 9.4. Staple to fix the trough on the side of the money mouth

Figure 9.5. Staple fixing the trough on the posterior side

Figure 9.6. Staple in the middle of the rain trough

Figure 9.7. The tree with a complete rain trough seen from the rear mouth

Figure 9.8. The tree attaches a complete rain trough in front view

Figure 9.9. The tree with a complete rain trough seen from the mouth of the money

c. Techniques for attaching a razor roof

- Mounting position of the razor canopy: The roof is mounted above the tapping cut with a slope of 30 - 34° for both the tapping cut and the tapping cut upside down. For the tapping cut, the roof is mounted about 8-10 cm from the tapping cut. For the tapping cut, the roof is mounted about 5-8 cm above the expected tapping shell loss in a year, about 5-8 cm from the posterior mouth;

- Method of attaching the scraper canopy:

+ Use a scraper to clean the surface of the trunk right at the place of attaching the trough with a tape width of about

2 - 3 cm, scrape through the posterior boundary 5 cm, then scrape diagonally down at an angle of about 45°, length about 10 - 15 cm; scrape through the money line about 15 cm. Next, scrape two parallel vertical lines and about 3-5 cm from the anterior and posterior boundaries, scrape through the design board of the shaved shell in the year 10 cm. Note that deep dredging is not allowed, which can easily cause the shell to crack, leading to a high rate of rainwater leakage (Figure 10.1).

+ Fix the roof of the tapping face at the position of the edge of the money on the scraped shell with 2 adjacent needles, the tail of the roof cover is 15 cm away from the money boundary. Pull the foot of the roof to shave close to the trunk, staple 2-3 mm from the foot of the roof, the distance between the two needles is 3-5 cm from the posterior boundary

5 cm (Fig. 10.2 and Fig. 10.3). Then turn the roof upside down to hug the trunk to the needle line (Figure 10.4). Then pull the foot of the diagonal trough downwards from the rear boundary at an angle of about 45°, then click the needle inside the roof until the rest of the roof is finished (Figure 10.5).

+ After the roof of the shaved face has been fixed, use glue to glue the trough (solid glue), pull a small line of glue close to and along the foot of the roof from the rear mouth to the front mouth (Figure 10.6). In the case of a low tapping cut, the glue can be pulled from the front mouth to the back mouth. Next, pull two glue lines parallel to the front and back mouths along the pre-dredged line to create a burr to prevent and waterproof rainwater from entering the scraping surface. Then, use your index finger to push up the tapping visor, so that the tapping visor is completely covered with the adhesive line; continue to roll the roof rim upwards with a width of 1-2 cm to form a rainwater drainage ditch (Figure 10.7).

Figure 10.1. Use a scraper to clean the trunk right at the location of the roof to shave and the road to prevent rainwater from seeping into the tapping cut.

Figure 10.2. Staple to fix the tapping face canopy at the mouth

Figure 10.3. Staple the canopy on the posterior orifice side beyond the posterior boundary by 5 cm

Figure 10.4. Turn the roof upside down, shave close to the needle

Figure 10.5. Break the back of the canopy to form a 45° angle to the horizontal and staple it inward

Figure 10.6. Apply glue close to the needle and 2 rainwater waterproof lines

Figure 10.7. Push the tapping roof up to cover all the adhesive lines

Figure 10.8. The roof rim shaves upwards

Figure 10.9. Complete shaved canopy mounting tree

Figure 10.10. Tree-mounted shaved face cover and complete cup roof

d. Technique of attaching the cup canopy

- Attach the cup canopy above the latex cup, about 5-7 cm from the money mouth of the tapping cut;

- Use parachute nails to attach to the two corners of the cup roof, fold the corners of the cup roof, use staples to fix the parachute nails;

- Press the parachute nail to the trunk to fix the cup cover, so that the cup cover is evenly divided in the middle of the latex ditch and there is a gap between the cup cover and the latex ditch of 2-3 cm. Pay attention to avoid the roof of the cup from touching the latex catcher trough, causing the latex to flow out.

e. Coating film attachment technique

Method of attaching the cupping film (size 50 x 60 cm):

- Stone pillars at 2 ends of the film covering the cup at the edge of 50 cm in length;

- Use 2 adjacent staples to fix the end of the film without stones attached to it 5-10 cm from the mouth of the money, 1-2 cm from the money boundary, the other end without stones pulled down about 10-15 cm from the money boundary and press 2 adjacent needles to fix them, press 2-3 needles in the middle to firmly hold the film covering the trunk.

Appendix XII
GUIDANCE AND INVESTIGATION TO ASSESS THE LEVEL OF DISEASE ON RUBBER PLANTATIONS

1. Time of investigation

- Investigate and assess the severity of the disease only at the time when the disease appears and causes harm to the plantation (disease season);

- It is recommended to proceed at the stage when the plant is most susceptible to the disease.

2. Investigation sampling method

- Choose 3 - 5 points/lot diagonally or stepped;

- Select the number of points, the number of investigation trees and the classification of diseases as follows:

Sub-table 6. Number of investigation and disease level

Type of disease	Investigation Points	Number of trees/point	Total number of trees	Acute illness
White chalk	3 - 5	10	30 - 50	0 - 5
Leaf loss in the rainy season	3 - 5	10	30 - 50	0 - 5
Black wilting of leaf tips	3 - 5	10	30 - 50	0 - 5
Corynespora	3 - 5	10	30 - 50	0 - 5
tapping stripe ulcers	5	30 - 35	150 - 175	0 - 5
Pink mushroom	5	30 - 35	150 - 175	0 - 5
Botryodiplodia	5	30 - 35	150 - 175	0 - 5

Sub-table 7. Classification and degree of powdery mildew, leaf tip wilt and

Corynespora according to leaf symptoms

Acute illness	Degree disease	Symptom
0	No disease	No lesions.
1	Very light	A few lesions or oil spots, look closely.
2	Light	The lesions occupy up to 1/8 of the leaf area (≤ 12.5%).
3	Average	The lesions occupy over 1/8 to 1/4 of the leaf area (> 12.5% - ≤ 25%).
4	Heavy	The lesions occupy more than 1/4 to 1/2 of the leaf area (> 25% - ≤ 50%).
5	Very heavy	The lesions occupy more than 1/2 of the leaf area (> 50%) or fall leaves.

Note: *Evaluate by bud, take the middle leaflet and 5 leaves/bud, the middle leaf if it falls off is rated level 5.*

Sub-table 8. Classification and degree of powdery mildew based on the entire canopy

Acute illness	Severity of the disease	Symptoms and degree of damage on foliage
0	No disease	There are absolutely no infected leaves.
1	Very light	White spots or oil spots can be seen to see the disease, most of the leaves are not infected or at level 1.
2	Light	White spots or oil spots, disease spots are scattered on the leaves, most of the leaves are infected at level 2, the number of young leaves falls off less than 10% of the foliage.
3	Average	Many white spots on the leaves, most of the leaves are infected at level 3, with slightly deformed leaves, slightly curly, the number of young leaves falling off from 10% to 25% of the foliage.
4	Heavy	The fungus appears clearly on the leaf plates, most of the leaves are infected at level 4, many leaves are deformed, curly yellow, the number of leaves falls from over 25% to 50% of the foliage.
5	Very heavy	The fungus appears clearly on the leaf plates, most of the infected leaves are at level 5, most of the leaves are deformed, curly yellow, and the number of leaves falling off is over 50%.

Sub-table 9. Classification and degree of Corynespora disease based on the entire canopy

Acute illness	Severity of the disease	Symptoms and degree of damage on foliage
0	No disease	There are absolutely no infected leaves.
1	Very light	A few diseased leaves, look closely to see.
2	Light	There are many diseased leaves on the canopy, which are easy to see. Most of the leaves are infected at level 1 - 2. The number of fallen leaves is less than 5%.
3	Average	Most of the leaves on the canopy are infected at level 2 - 3, the number of leaves falling off is from 5% to 25%.
4	Heavy	Most of the leaves on the canopy are infected at level 3 - 4, the number of leaves falls from over 25% to 50%.
5	Very heavy	Most of the leaves on the canopy are infected at level 3 - 5, the number of leaves falling off is over 50%.

Sub-table 10. Classification and severity of deciduous disease in the rainy season

Acute illness	Severity of the disease	Eyesight	Leaf	Fallen leaves in the ground
0	No disease		Normal Green	No fallen leaves
1	Very light	When you get closer, you can see the yellow leaves	It's hard to find.	Very little leaf fall
2	Light	When you get closer, you can see the yellow leaves	It is easy to see yellow leaves, some branches and leaves falling.	Very little leaf fall
3	Average	Easy remote viewing	Most leaves are yellow or fall off up to 25% of the foliage.	Leaves shed a lot and are clearly visible when entering the lot
4	Heavy	Easy remote viewing	Leaves fall from above 25% to 50% of the foliage.	Leaves spread in a thin layer
5	Very heavy	Easy remote viewing	Leaves fall off over 50% of the foliage.	Leaves covering the ground

Note: yellow leaves and green leaves falling off the ground are the main characteristics to assess the severity of deciduous disease in the rainy season.

Sub-table 11. Classification of Powdery mildew, Corynespora and Rainy Season Deciduous disease levels based on average disease severity (CBTB) and disease index (CSB %)

CBTB	CSB (%)	Infection level
0	0	No disease
≤ 1	≤ 20	Very light
> 1 to 2	> 20 to 40	Light
> 2 to 3	> 40 to 60	Average
> 3 to 4	> 60 to 80	Heavy
> 4	> 80	Very heavy

Sub-table 12. Classification and degree of shaved stripe ulcers

Acute illness	Severity of the disease	Extent of harm
1	Very light	There are small black stripes scattered on the tapping line.
2	Light	One or more disease stripes together account for less than 1/8 of the length of the tapping cut.

3	Average	The clustered or spreading disease stripes are attached to each other, accounting for 1/8 to 1/2 of the length of the tapping cut.
4	Heavy	The ulcers occupy over 1/4 to 1/2 of the area of the shaved surface, develop on top of the regenerated shell, and yellow leachate flows out.
5	Very heavy	The ulcers occupy over 1/2 of the tapping surface.

Sub-table 13. Classification of rosy fungus

Acute illness	Severity of the disease	Degree of treatment	Extent of harm
1	Very light	The disease is very easy to cure if treated promptly.	There is a white border, you can see it when you look closely.
2	Light	The disease is very easy to cure if treated promptly.	The fungus is white, may have pus flowing.
3	Average	The disease is easily cured if treated promptly.	The lesion is clearly visible, the fungus is pinkish, and the foliage is still green.
4	Heavy	Cure	The fungus is pink, blisters, oozing pus profusely, and the foliage changes color.
5	Very heavy	Incurable	The fungus is pink, the bark is rotten, pus flows a lot, the yellow leaves do not fall off, and many wild shoots grow at the bottom.

Note: If there are many lesions on the same tree, evaluate which one is the most harmful to the canopy.

Sub-table 14. Classification of pink fungus infection and shaved stripe ulcers

Pink fungus disease		tapping facial stripe ulcers		
CTR (%)	Severity of the disease	CBTB	CSB%	Severity of the disease
0	No disease	0	0	No disease
< 5	Very light	≤ 1	≤ 20	Very light
≥ 5 - ≤ 10	Light	> 1 to 2	> 20 to 40	Light
> 10 - ≤ 20	Average	> 2 to 3	> 40 to 60	Average
> 20 - ≤ 40	Heavy	> 3 to 4	> 60 to 80	Heavy
> 40	Very heavy	> 4	> 80	Very heavy

Sub-table 15. Classification of Botryodiplodia

Acute illness	Severity of the disease	Extent of harm
1	Very light	The lesions are scattered on the stem, the size is < 5 mm, the total size of the combined lesions accounts for 10% of the bark area from the branching position downwards.
2	Light	The lesions are scattered on the stem, the size is < 5 mm, the total size of the combined lesions accounts for over 10% to 25% of the bark area from the branching position downwards.

3	Average	Lesions appear a lot on the body, the total size of the combined lesions accounts for over 25% to 40% of the area of the shell

		the location of the branches downwards, sometimes with cracks or pus rust.
4	Heavy	The lesions appear from over 40% to 75% of the area of the bark on the stem from the branching position down or the lesions are linked together, causing many cracks or pus to appear.
5	Very heavy	Diseases associated with the trunk cause the bark to crack into patches that can easily separate the bark from the stem, there is pus leaking out on the cracked line, the bark is rotten, or lesions appear on the trunk on more than 75% of the bark area from the branching position downwards.

Sub-table 16. Botryodiplodia infection classification is based on average disease severity (CBTB) and disease index (CSB %)

CBTB	CSB (%)	Infection level
0	0	No disease
≤ 1	≤ 20	Very light
> 1 to 2	> 20 to 40	Light
> 2 to 3	> 40 to 60	Average
> 3 to 4	> 60 to 80	Heavy
> 4	> 80	Very heavy

3. Formula for calculation of disease rate, average disease severity and disease index

- Calculation of disease rate

(TLB): Number of affected individuals

$$TLB\% = \frac{\text{Number of affected individuals}}{\text{Total number of individuals investigated}} 100$$

- Moderate severity of disease (CBTB):

$$CBTB = \frac{\sum (\text{number of individuals with disease of each degree x corresponding disease level})}{\text{Total number of individuals investigated}}$$

- Calculation of disease index (CSB%): ∑ (number of individuals with disease at each level x corresponding disease level)

$$CSB\% = \frac{\sum (\text{number of individuals with disease at each level x corresponding disease level})}{\text{Highest severity value x Total number of individuals surveyed}} \times 100$$

Note: During the disease season, it is necessary to organize a periodic investigation of the disease situation once every 1 month.

4. Disease sampling methods

- Disease samples are taken at locations including healthy and diseased tissues, taken in the early or middle stages of the disease, when harmful microorganisms are still in an active state;

- The specimen is stored in a paper bag (do not use a plastic bag). Package the sample carefully to avoid impact and condensation. Separate packages of specimens taken at different locations and locations, not combined into one package;

- Each package of specimens must be labeled with a pencil or written without fading (according to the form below). Write 2 copies, 1 sent with the form, 1 retained for comparison and comparison when receiving feedback.

SPECIMEN LABEL

- Sample Numbering:
- Name of host tree: DVT: Year of planting:
- Infected plant parts:
- Sampling location:
+ Lot:
+ Group:
+ Farm:
+ Company:
+ Elevation (if any):
+ Latitude/longitude (if any):
- Date of sampling:
- Name of the sampler:
- Contact address:
-
- Symptoms and severity of the disease:

Appendix XIII
HOW TO MAKE PESTICIDES

1. pesticidess mixed in water

- pesticides type: Aqueous powder (BHN, WP), emulsion (ND, EC, SC), solution (DD, L);
- Only use clean water, without impurities, do not use alum water.
- How to make it by following these steps:

+ Put 1/3 of the clean water in the sprayer;

+ Next, give a sufficient amount of pesticidess and adhesives,... enter and then shake the bottle or stir well to allow the medicine to dissolve completely;

+ Shake or stir the remaining 2/3 of the water to create a homogeneous solution before spraying.

Heed:

- Use the right type of spray bottle for spraying;
- Spray the pesticides properly;
- The medicine must be used up within the day;
- Always apply safety guidelines to the sprayer;
- Apply isolation measures from people and animals to avoid pesticides poisoning.

2. Unprepared pesticidess

- Type of pesticides in the form of: Granules (H, G), Powder (B, D);
- Calculate the sufficient amount of medicine/area to be treated or each plant;

- Use your hands with rubber gloves or a sprayer to handle the pesticides according to the features of the machine.

Sub-table 17. The amount of the pesticides mixed by concentrations (in ml or g)

Concentration (%)	Ratio	Sprayer Tank Volume									
		1	5	8	10	12	16	25	30	50	100
0,01	1/10.000	0,1	0,5	0,8	1,0 2,0	1,2 2,4	1,6 3,2	2,5 5,0	3,0	5,0	10,0
0,02	1/5.000	0,2	1,0	1,6	2,50	3,0 3,6	4,0 4,8	6,3 7,5	6 7,5	10,0	20,0
0,025	1/4.000	0,3	1,3	2,0	3,00	4,8 6,0	6,4 8,0	10,0	9,0	12,5	25,0
0,03	1/3.333	0,3	1,5	2,4	4,00	9,0	12,0	12,5	12,0	15,0	30,0
0,04	1/2.500	0,4	2,0	3,2	5,00	12,0	16,0	18,8	15,0	20,0	40,0
0,05	1/2.000	0,5	2,5	4,0	7,50	24,0	32,0	25,0	22,5	25,0	50,0
0,075	1/1.333	0,8	3,8	6,0	10,00	30,0	40,0	50,0	30,0	37,5	75,0
0,1	1/1.000	1,0	5,0	8,0	20,00	36,0	48,0	62,5	60,0	50,0	100,0
0,2	1/500	2,0	10,0	16,0	25,00	48,0	64,0	75,0	75,0	100,0	200,0
0,25	1/400	2,5	12,5	20,0	30,00	60,0	80,0	100,0	90,0	125,0	250,0
0,3	1/333	3,0	15,0	24,0	40,00	90,0	120,0	125,0	120,0	150,0	300,0
0,4	1/250	4,0	20,0	32,0	50,00	120,0	160,0	187,5	150,0	200,0	400,0
0,5	1/200	5,0	25,0	40,0	75,00	240,0	320,0	250,0	225,0	250,0	500,0
0,75	1/133	7,5	37,5	60,0	100,00	360,0	480,0	500,0	300,0	375,0	750,0
1,0	1/100	10,0	50,0	80,0	200,00	480,0	640,0	750,0	600,0	500,0	1000,0
2,0	1/50	20,0	100,0	160,0	300,00	600,0	800,0	1000,0	900,0	1000,0	2000,0
3,0	1/33	30,0	150,0	240,0	400,00	1200,0	1600,0	1250,0	1200,0	1500,0	3000,0
4,0	1/25	40,0	200,0	320,0	500,00			2500,0	1500,0	2000,0	4000,0
5,0	1/20	50,0	250,0	400,0	1000,00				3000,0	2500,0	5000,0
10,0	1/10	100,0	500,0	800,0						5000,0	10000,0

Sub-table 18. Volume of the mixture for a sprayer with a volume of 8 liters (in ml or g)

Water volume/hectare (liters)	Number of tanks/ 1,000 m^2	Amount of pesticides used for 1 hectare (liters or kg)									
		0,25	**0,5**	**0,75**	**1,0**	**1,25**	**1,5**	**1,75**	**2,0**	**2,5**	**3,0**
240	3	8,3	16,6	25	33,3	41,6	50,0	58,3	66,6	83,3	100,0
320	4	6,2	12,5	18,7	25,0	31,2	37,5	43,7	50,0	62,5	75,0
400	5	5,0	10,0	15,0	20,0	25,0	30,0	35,0	40,0	50,0	60,0
480	6	4,1	8,3	12,5	16,6	20,8	25,0	29,1	33,3	41,6	50,0
560	7	3,5	7,1	10,7	14,2	17,8	21,4	25,0	28,5	35,7	42,8
640	8	3,1	6,2	9,3	12,4	15,6	18,7	21,8	25,0	31,2	37,5
720	9	2,7	5,5	8,3	11,1	13,8	16,6	19,5	22,2	27,7	33,3
800	10	2,5	5,0	7,5	10,0	12,5	15,0	17,5	20,0	25,0	30,0
900	11	2,2	4,4	6,6	8,8	11,1	13,3	15,5	17,7	22,2	26,6
1000	12	2,0	4,0	6,0	8,0	10,0	12,0	14,0	16,0	20,0	24,0

Appendix XIV

STRUCTURE OF RUBBER VARIETIES IN THE PERIOD OF 2016 - 2020

(According to Decision No. 345/QD-HDTVCSVN dated 30/10/2015 and Decision No. 86/QD-HDQTCSVN dated 16/4/2019 of Vietnam Rubber Industry Group)

TABLE I: MASS-PRODUCED VARIETIES (planted up to 80% of the area)		
Growing region	Sub-region	Varietal structure
Southeast	A	RRIV 106, RRIV 209, RRIV 114, RRIV 1, PB 255
	B	RRIV 209, RRIV 106, RRIV 103
	C	RRIV 103, RRIV 209, RRIV 106
Central Highlands	A	RRIV 209, RRIV 106, RRIV 103, PB 312
	B	RRIV 209, RRIV 103, RRIV 106, PB 312
	C	RRIV 103, RRIV 209, RRIV 106
South Central Vietnam	A	RRIV 106, RRIV 124, RRIV 209, RRIM 712, PB 312
	B	RRIV 1, RRIV 106, RRIV 124, RRIV 209
	C	RRIC 100, RRIC 121, RRIM 600, RRIV 124
North Central Vietnam	A	RRIC 100, RRIC 121, RRIM 712, RRIV 103, RRIV 124
	B	RRIC 100, RRIC 121, RRIV 103, RRIV 124
Northern Mountainous Region (Northwest)		IAN 873, RRIV 1, RRIV 103, RRIV 107, RRIV 124
Cambodia		RRIV 1, RRIV 106, RRIV 107, RRIC 121
Southern Laos		RRIV 1, RRIV 106, RRIV 107, RRIV 124, RRIV 209
Northern Laos		RRIV 1, RRIV 124, RRIV 103, IAN 873

TABLE II: MEDIUM-SIZED PRODUCTION VARIETIES (planted up to 15% of the area)						
Southeast	Central Highlands	South Central Vietnam	North Central Vietnam	Northern Mountainous Region (Northwest)	Cambodia	Laos
RRIV 5	RRIV 106	RRIV 1	RRIV 1	RRIV 209	RRIV 115	RRIM 600
RRIV 109	RRIV 107	RRIV 103	RRIV 103	RRIV 210	RRIV 120	PB 312
RRIV 103	RRIV 110	RRIV 104	RRIV 209	RRIC 121	RRIV 124	RRIM 712
RRIV 114	RRIV 111	RRIV 209	RRIV 230	PB 312	RRIV 205	VNg 77-4
RRIV 115	RRIV 231	PB 312	RRIV 231	RRIM 712	RRIV 206	RRIV 209
RRIV 120	RRIM 600	RRIC 100	VNg 77-4	VNg 77-4	RRIV 209	RRIV 230
RRIV 124	RRIC 121	RRIM 600	RRIM 712		IRCA 130	RRIC 121
RRIV 206		RRIM 712	IAN 873			
RRIC 121		PB 260				
IRCA 130						

TABLE III: EXPERIMENTAL VARIETIES (planted 5% of the area)
- Rubber varieties of RRIV 101 - 125 and RRIV 201 - 231 (in addition to those in Tables I and II); new rubber varieties introduced by the Vietnam Rubber Research Institute; rubber varieties in the international breed exchange program. - Rubber varieties for wood: RO 20/100, RO 25/254.

(According to Decision No. 86/QD-HDQTCSVN dated 16/4/2019 of Vietnam Rubber Industry Group)

TABLE I: MASS-PRODUCED VARIETIES (planted up to 80% of the area)		
Growing region	Sub-region	Varietal structure
Southeast	A	RRIV 106, RRIV 209, RRIV 114, RRIV 1, PB 255
	B	RRIV 209, RRIV 106, RRIV 103
	C	RRIV 103, RRIV 209, RRIV 106
A RRIV 209, RRI	106, RRIV	103, PB 312, Central Highlands B RRIV 209,
RRIV 103, RRIV	106, PB 312	
	C	RRIV 103, RRIV 209, RRIV 106

TABLE II: MEDIUM-SIZED PRODUCTION VARIETIES (planted up to 15% of the area)						
Southeast	Central Highlands	South Central Vietnam	North Central Vietnam	Northern Mountainous Region (Northwest)	Cambodia	Laos
RRIV 5	RRIV 106	RRIV 1	RRIV 1	RRIV 209	RRIV 115	RRIM 600
RRIV 109	RRIV 107	RRIV 103	RRIV 103	RRIV 210	RRIV 120	PB 312
RRIV 103	RRIV 110	RRIV 104	RRIV 209	RRIC 121	RRIV 124	RRIM 712
RRIV 114	RRIV 111	RRIV 209	RRIV 230	PB 312	RRIV 205	VNg 77-4
RRIV 115	RRIV 231	PB 312	RRIV 231	RRIM 712	RRIV 206	RRIV 209
RRIV 120	RRIM 600	RRIC 100	VNg 77-4	VNg 77-4	RRIV 209	RRIV 230
RRIV 124	RRIC 121	RRIM 600	RRIM 712		IRCA 130	RRIC 121
RRIV 206		RRIM 712	IAN 873			
RRIC 121		PB 260				
IRCA 130						
Traditional varieties that have been proven to grow and yield and are subject to the Group's appraisal are allowed.						

TABLE III: EXPERIMENTAL VARIETIES (planted 5% of the area)
- Rubber varieties of RRIV 101 - 125 and RRIV 201 - 231 (in addition to those in Tables I and II); new rubber varieties introduced by the Vietnam Rubber Research Institute; rubber varieties in the international breed exchange program. - Rubber varieties for wood: RO 20/100, RO 25/254