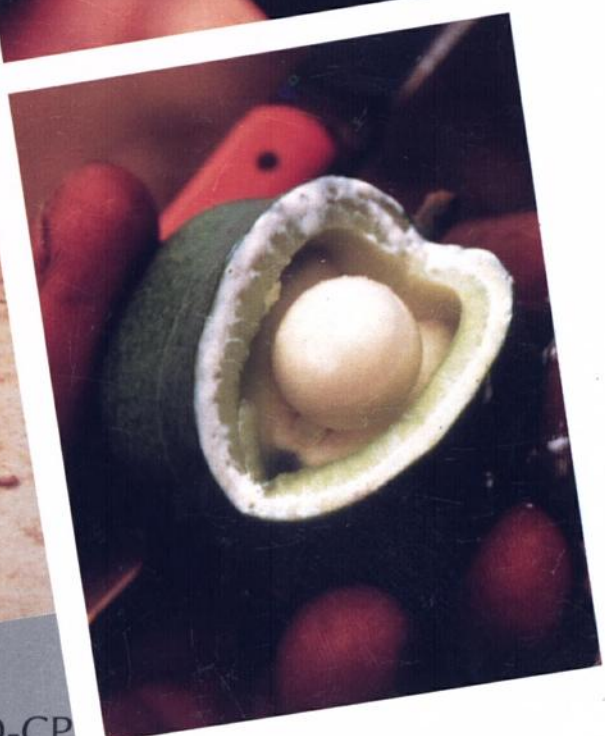
RUBBER

A Pictorial Technical Guide For Smallholders

by Michel Delabarre

and Dante Benigno



CIRAD-CP

RUBBER

A Pictorial Technical Guide For Smallholders

by Michel A. Delabarre
and Dante A. Benigno

This edition is published by

CIRAD, département des Cultures Pérennes (CIRAD-CP)
Service Information et Communication
2477, avenue du Val de Montferrand
BP 5035
34032 MONTPELLIER CEDEX 1
FRANCE

Originally published in Indonesia under the title:
Budidaya Tanaman Karet
Petunjuk Tehnik Praktis Bagi Petani
by Michel A. Delabarre and Dante A. Benigno

ISBN 2-87614-148-5

Printed in Thailand
by Amarin Printing and Publishing

Introduction

This fully-illustrated rubber technology book is the English translation of the book edited in 1990 which has been developed for the smallholder rubber farmer in Indonesia, who would like to acquire the proper technology for rubber production, thereby increasing the yield and tappable years of his trees, increasing his income, and improving his family lifestyle.

This book presents in sequential order all the activities required for the establishment and maintenance of a rubber plantation. It is divided into several chapters with 68 plates and more than 400 figures, each of which illustrates and describes in detail, in simple language, how to perform the task required.

If the step by step procedures, illustrated by the photographs, diagrams and drawings, are strictly followed by the smallholder farmer, the authors guarantee that his plants will be up to standard and that he will not fail to reward of his efforts.

Acknowledgement

This book would not have materialized without the help of several people to whom we owe so much for their invaluable comments, criticisms and recommendations during its preparation. We would particularly like to thank the following:

Dr. Carsalade Henri, previous Director of **CIRAD** (Centre de Coopération Internationale en Recherche Agronomique pour le Développement) who provided funds for the printing of this book, **Dr. Weil Alain**, previous Director of **CIRAD - CP**, (Centre de Coopération Internationale en Recherche Agronomique pourle Développement, département des Cultures Pérennes) **Dr. Meunier Jacques,** Director Scientifique of **CIRAD - CP** and **Mr. Gener Paul,** Director of **CIRAD-CP** programs who contributed greatly to the preparation of this book.

Dr. Ir. Rachmat Soebiapradja, Director General of Estates, **Ir. Soetardjo Soewarno**, Director BRPT, **Mr. Syamsul Arifin**, Project Manager of SRDP (Smallholder Rubber Development Project), and **Ir. Imran Ma'aroef**, Project Manager of SCDP (Smallholder Coconut Development Project), all of the Ministry of Agriculture, Republic of Indonesia, who financed the authors trips to the Project areas and provided guidance, encouragement, criticism and suggestions for the improvement of this book.

Dr. Ir. Basuki, Director Pusat Penelitian Perkebunan, Sungei Putih and **Dr. Ir. Sultoni Arifin**, previous Director Balai Penelitian Perkebunan, Sembawa, Republic of Indonesia for providing access to their research stations for materials required in the preparation of this book, particularly on the different rubber clones. The authors would like thank also **Mr. Raymond Bourgoing** of **CIRAD - CP** who kindly allowed the printing of his photographs for Plates 8.4 and 8.5, (the absence of these plates would have made this book incomplete).

Authors

DANTE RUMUALDO A. BENIGNO obtained his Bachelor of Science degree in Agriculture, major in Agronomy, from the University of Southern Mindanao, Philippines in 1959. In 1963 he obtained his Master of Science degree, major in Plant Pathology, from the University of the Philippines at Los Banos and in 1971 his Doctor of Philosophy degree, major in Plant Virology, from the University of Wales in the United Kingdom. Dr. Benigno was an Associate Professor of Plant Pathology and Chairman of the Department of Plant Pathology, College of Agriculture, University of the Philippines at Los Banos before joining the Smallholder Coconut Development Project in Indonesia as the Crop Protection Specialist. He was also recently appointed as the Training and Extension Advisor for this Project. In 1986 he published **An Illustrated Colored Handbook on Coconut Pests and Diseases** (in Indonesian), which served as the field manual for the extension workers and farmer participants of SCDP. In 1991, he edited **COCONUT, A Pictorial Technical Guide for Smallholders,** written by Raymond Bourgoing of IRHO/CIRAD, the format of which was based on his book on coconut pests and diseases. This book on rubber follows the same format as the coconut handbook.

MICHEL ABEL DELABARRE obtained his diploma in Agronomy from the Agronomy High School of Nogent-sur-Marne (ESAAT) France in 1962. After graduation he joined the Rubber Research Institute (IRCA) as a Pathologist. He continued his studies at the University of Abidjan (Ivory Coast) where he obtained his Doctor of Philosophy degree in 1977. During this time he was also involved in rubber research in Colombia, South America and served as a consultant with INCORA (Institute Nacional por la Reforma Agraria) in 1967. He has served on missions conducting studies on rubber crop protection in various countries including Liberia, Cameroon, and Brazil for about 25 years. From 1971 until 1983 he was involved in Agropharmacology, establishing, supervising and managing four agropharmaceutical experiment stations in Africa, Taiwan and the Philippines. In 1985 he was assigned by IRCA to Indonesia as a consultant to Balai Perkebunan Penelitian, Sembawa (Rubber Research Institute). He then joined the Smallholder Rubber Development Project of the Directorat General of Estates, Ministry of Agriculture, and served as the Rubber Production Adviser for the Project from 1986 until mid-1992.

Preface

The work of a rubber grower is similar to that of other farmers, albeit on a different time scale: he has to choose a technical procedure, i.e. a logical and ordered sequence of operations that enables him to reach the targets he has set himself.

This implies:

- that he has a full command of all the techniques used in rubber cultivation,
- that he has at his disposal all the elements he needs to choose the appropriate techniques in his particular context.

Mastery of techniques is a matter of *apprenticeship* and individual skill, but has little to do with the cropping context. A technique is acquired once and for all and the only challenge is an apprenticeship in new techniques, to complete the range of possibilities.

Choosing a technical procedure is much more complicated and depends on changeable phenomena in both space and time, linked to the environment and socio-economic constraints. Adapting techniques to environmental variations is more a matter of experience than an apprenticeship in the solutions to be applied. No situation is identical to the next and successive choices are linked to each other.

While it is relatively easy to transfer well-mastered technical know-how, attempting an exhaustive analysis of all the uses to which it can be put is a much more delicate issue.

It is in this context that this book has been written. It is drawn from the authors experience in rubber development projects in Indonesia and is intended for smallholders and supervisors.

This is a practical guide, designed to provide immediate concrete and simple answers to the daily problems encountered by growers when implementing a technique. The authors have therefore opted for a visual approach, with illustrations to back up the text.

It is not a teaching manual, or an analytical work on rubber cultivation techniques. Neither has it been designed as a decision-making tool.

The techniques described were derived from the know-how acquired by the authors in many Asian, African and Latin American countries. They can be divided into three categories:

- Some are universal and largely independent of the environment (such as budgrafting).
- Others are more particularly adapted to the Indonesian conditions that inspired this book (clone and fertilizer recommendations); the information required to transfer them to other contexts is of course given.
- The final category contains techniques whose use will depend on the situation in hand (such as *Imperata cylindrica* control).

Innovation also comes from practice. If any of the techniques described can be improved, let us hope that they will be, by a grower who first came across them in this book. What better tribute could the authors wish for?

Hubert Omont

Head, CIRAD-CP Rubber Programme

CONTENTS

Chapter 1

SOIL SUITABILITY

PLATE 1.1

DETERMINING SOIL LAYERS

You can determine soil layers using a soil auger or by digging. On flat land, take one sample per hectare, preferably from the center of the field. In undulating or sloping (up to 40%) areas, take three samples per hectare - one from each of the highest, mid and lowest points of the field.

1. Two common types of soil auger: FAO-type (1a) and screw-type (1b).

2. Bore a hole to a depth of 120 cm, bringing up a soil sample every 10 cm. Lay the samples on the ground in sequence as shown below:

cm.

0 10 20 30 40 50 60 70 80 90 100 110 120

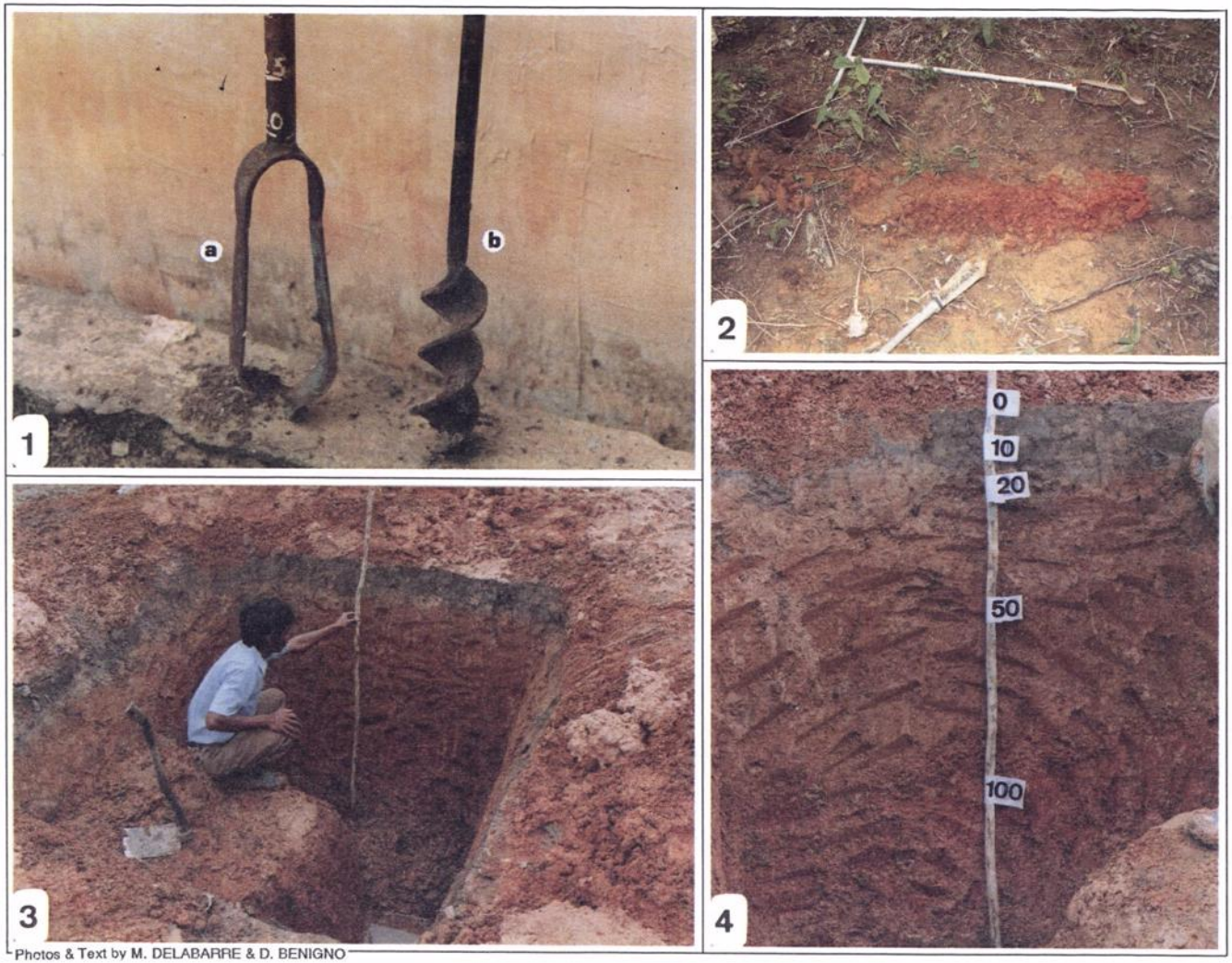
|===|===|===|===|===|===|===|===|===|===|====|====|====|

3. In the absence of a soil auger, you can dig a hole, 2 x 1 x 1.5 meters (refer to Annex 1, page 1, to make the pedo-unit)

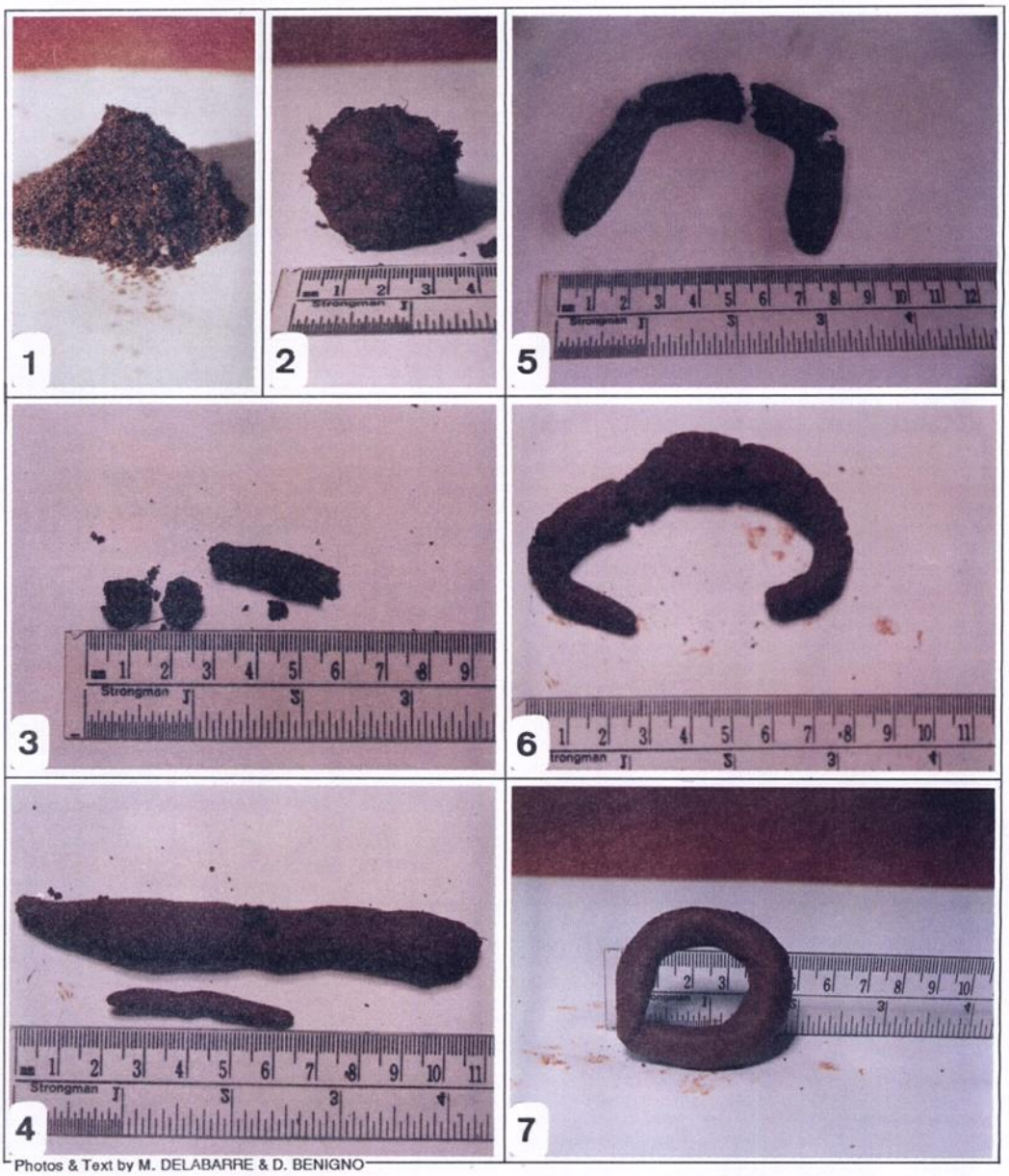
4. Record the characteristics of the different soil layers on Form 1 (Annex 1, page 2). Refer to Table 1 (Annex 1, pages 3, 4, 5 and 6) for a detailed description of soil characteristics.

REMARKS: Areas not suitable for rubber production:

a. > 40% slope
b. Peat soils
c. Flooded areas which cannot be drained
d. White, black or bluish colored soils
e. Soil with a hard pan, or a compact gravel/stone layer at a depth of 50-110 cm



Photos & Text by M. DELABARRE & D. BENIGNO



Photos & Text by M. DELABARRE & D. BENIGNO

PLATE 1.2

DETERMINING SOIL TEXTURE

Soil texture is determined by the sizes and proportions in which the small mineral particles - sand, silt, loam and clay - are present. Obtain three soil samples (spoonful size) from (1) topsoil (0-20 cm), (2) subsoil (40-50 cm) and (3) lower subsoil (80-100 cm) and roll each sample separately between your palms or on a hard flat surface. If the soil is too dry, making it hard and difficult to roll, moisten it a little to facilitate rolling.

1. A soil is considered sandy if particles run through your fingers forming a cone or pyramid shape.

2. A soil is considered sandy-loam if it feels gritty between your fingers and does not stick to them. It can just be molded to form a ball (about 2 cm diameter) but cannot be rolled into a sausage shape . A sandy-loam soil contains about 50 to 70% sand, 15 to 20% clay and 10 to 30% silt.

3. A soil is considered loamy if it is slightly gritty, sticks a little to the fingers and will roll into a sausage shape which breaks up easily at diameters less than 2 mm or lengths smaller than 6 cm. This soil contains about 50% sand, 25 to 50% silt and 7 to 25% clay.

4. A soil is considered silt-loam if it is hard when dry and sticky when wet and rolls into a sausage shape readily without breaking easily at diameters less than 2 mm diameter or lengths greater than 10 cm. This soil contains about 50% or more silt and 12 to 27% clay.

5. A soil is considered sandy-clay-loam if it feels slightly gritty to the touch when dry and is readily formed into a sausage shape which can be bent to form a half-ring with small cracks on the surface. The sausage shape breaks up if the diameter of the rolled soil is less than 2 mm. This soil contains about 45% sand, 25% silt and 20 to 35% clay.

6. A soil is considered silty-clay-loam if it feels smooth to the touch when dry and is readily formed into a sausage shape which can be bent to form a half to a full ring with large cracks on the surface. This soil contains about 27 to 40% clay and less than 20% sand.

7. A soil is considered clayey if it is very hard when dry and very sticky when wet and can be readily rolled into a sausage shape which can be bent to form a ring without large cracks on the surface. This soil contains about 20% sand, 20% silt and 60% clay.

REMARKS: Refer to Annex 1, page 6, for illustrations.

Chapter 2

LAND CLEARING AND PREPARATION

PLATE 2.1

CLEARING SECONDARY FOREST

Undertake clearing of secondary forest two months before the end of the rainy season, and burning at the beginning of the dry season.

1. Secondary forest occurs where shrubs (bushes) and large trees grow side by side.

2. To clear secondary forest, first cut the shrubs as closely to the ground as possible using a jungle knife.

3. After the shrubs have been cut, fell the large trees using a chainsaw, axe or jungle knife.

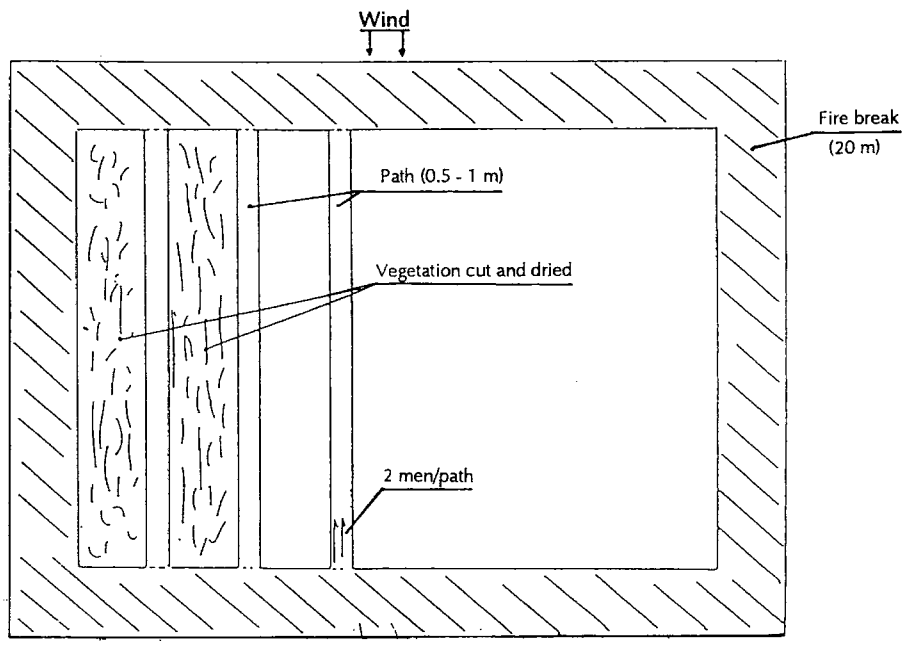
4. Separate and collect all long trunks and branches, removing all side branches. These will serve as your stakes (poles) for marking and laying out planting rows.

5. Leave all cut shrubs and trees to dry in the sun for about 3 weeks.

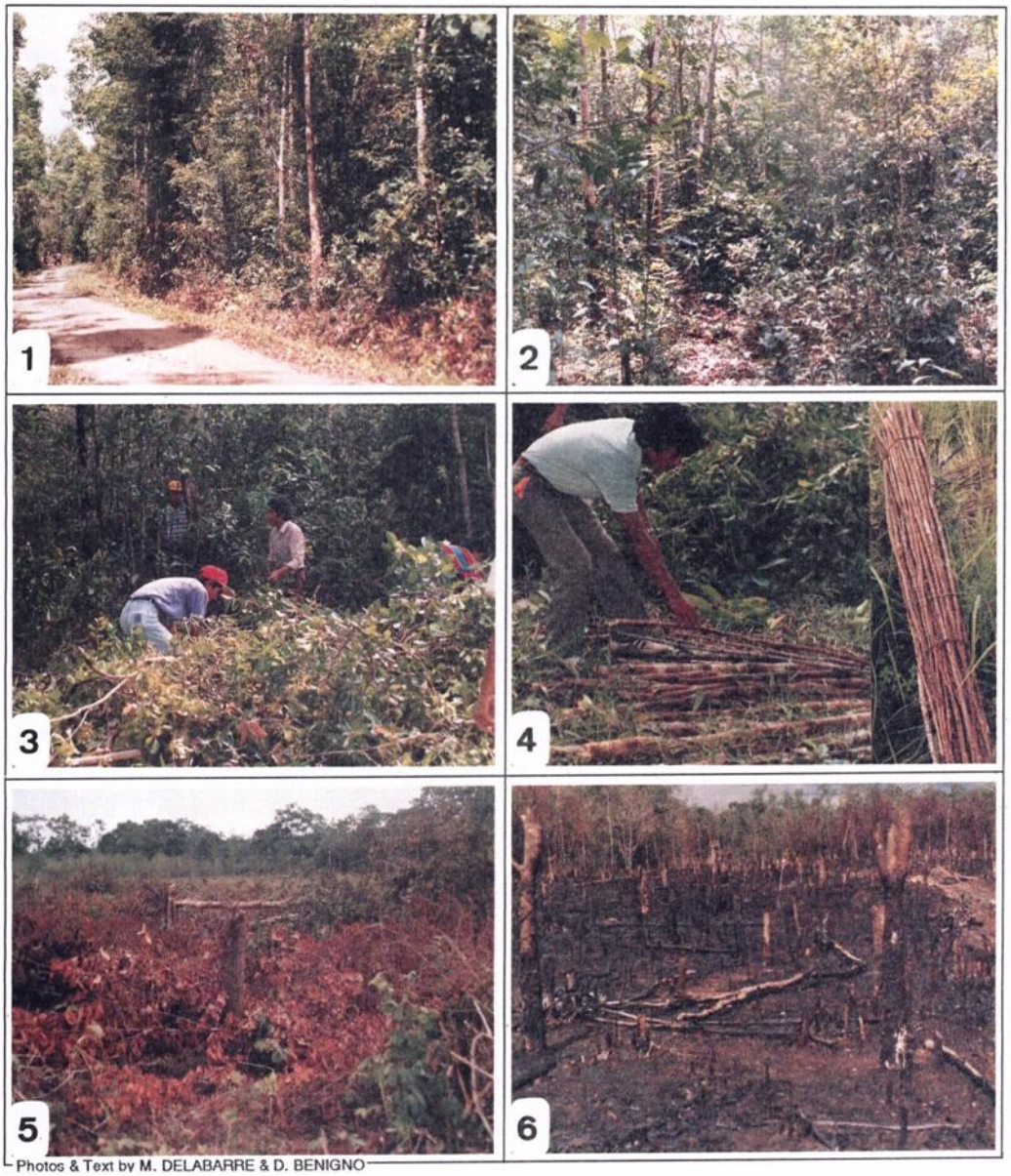
6. Burn all leaves and discarded stems and branches.

REMARKS:

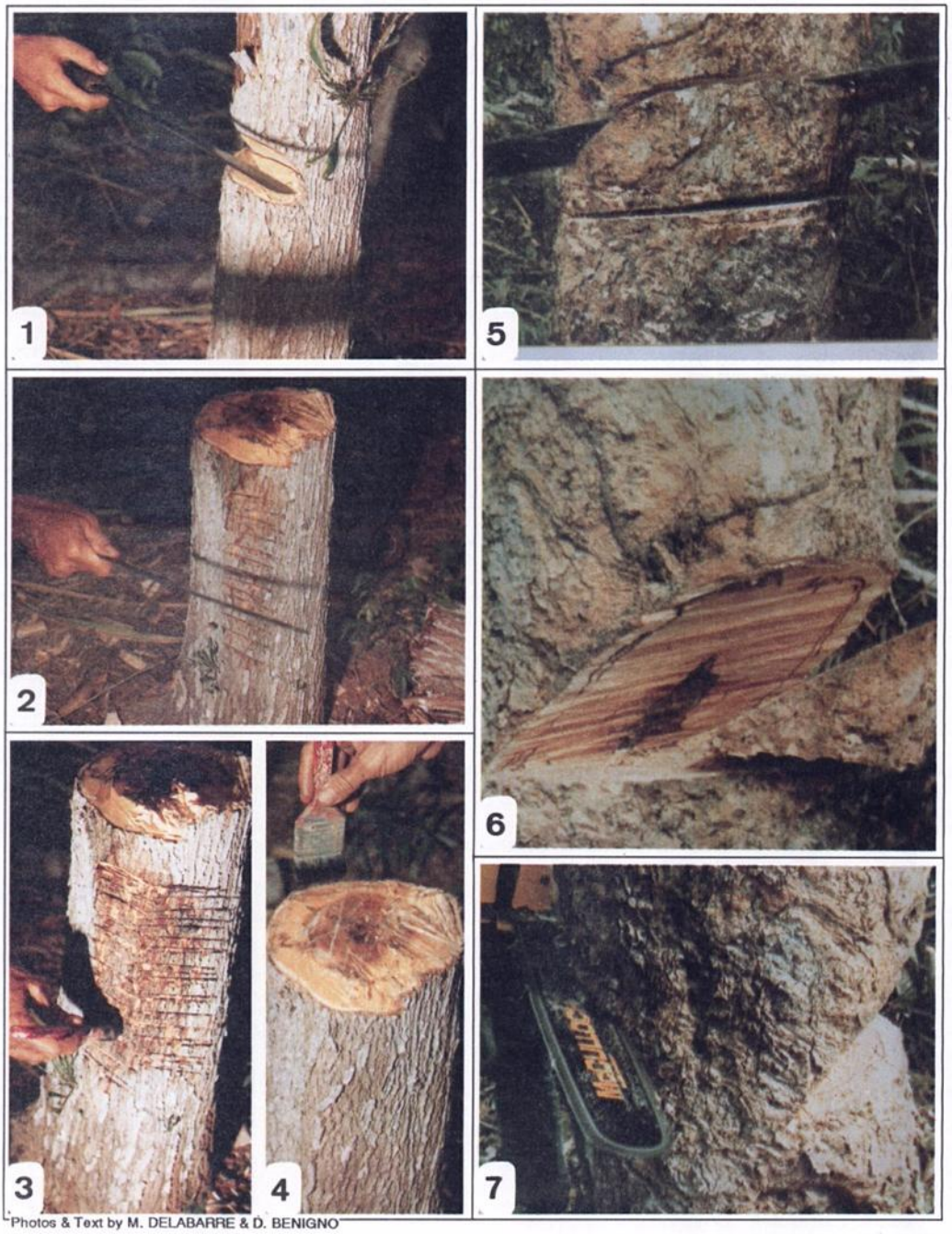
When setting fire, be sure that workers are moving against the wind (Refer below for illustration).



Layout for burning



Photos & Text by M. DELABARRE & D. BENIGNO



Photos & Text by M. DELABARRE & D. BENIGNO