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INFLUENCE OF SOIL PARENT MATERIALS AND SOIL-RELATED FACTORS ON THE GROWTH AND YIELD OF RUBBER UNDER FELCRA SCHEME, SENDAYAN

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INFLUENCE OF SOIL PARENT MATERIALS AND SOIL-RELATED FACTORS ON THE GROWTH AND YIELD OF RUBBER UNDER FELCRA SCHEME, SENDAYAN

by

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A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Agricultural Science
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It is hereby certified that we have read this thesis entitled 'Influence of Soils and Soil-Related Factors on the Growth and Yield of Rubber Under FELCRA Scheme, Sendayan' by Edgardo A. Auxtero, and in our opinion it is satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirements for the degree of Master of Agricultural Science

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Dedicated to: My dear Mother,

Auntie Regina

and Late Grandfather

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EDGARDO ANTIGA AUXTERO
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

An abstract of the thesis presented to the Senate of Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Master of Agricultural Science

INFLUENCE OF SOIL PARENT MATERIALS AND SOIL-RELATED FACTORS ON THE GROWTH AND YIELD OF RUBBER UNDER FELCRA SCHEME, SENDAYAN

by

Edgardo Antiga Auxtero

February 1986

Supervisor : Professor Othman Yaacob

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Faculty : Agriculture

The influence of two terrain classes (i.e. 5 to 25% and 25 to 50% slopes) on soils developed from two parent materials (i.e. granite and sedimentary rocks) on the growth and yield of rubber (Hevea brasiliensis) after four years of tapping was evaluated by using the field data, viz. girth and yield of rubber from 1980 to 1983, obtained from the Federal Land Consolidation and Rehabilitation Authority (FELCRA) Scheme at Sendayan, Negri Sembilan.

Rubber grown on sedimentary rock derived soil on steep slopes (25 to 50% slope) after four years of tapping showed significantly bigger girth than those grown on same soil on undulating to rolling terrain (5 to 25% slope). The mean monthly and yearly dry weight of rubber after four years of tapping was significantly higher in areas planted on sedimentary rock

derived soils located on steep terrain. The growth of rubber as influenced by the interaction of parent material and slope over time was not significant during the same period of tapping. However, the overall yield of rubber was significantly higher on soils derived from sedimentary rocks on steep terrain than on soils derived from granite on similar terrain.

Abstrak tesis yang diserahkan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi sebahagian dari syarat yang diperlukan untuk mendapatkan Ijazah Master Sains Pertanian.

INFLUENCE OF SOIL PARENT MATERIALS AND SOIL-RELATED FACTORS ON THE GROWTH AND YIELD OF RUBBER UNDER FELCRA SCHEME, SENDAYAN

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Pengaruh dua kelas rupa bumi (5 hingga 25% dan 25 hingga 50%) bagi dua jenis tanah iaitu yang terbentuk daripada bahan induk granit dan batuan endapan terhadap tumbesaran dan hasil getah (<u>Hevea brasiliensis</u>), setelah empat tahun ditoreh dinilai dengan menggunakan data-data ladang seperti ukurlilit batang dan hasil getah dari tahun 1980 hingga 1983 yang didapati dari Lembaga Pemulihan dan Penyatuan Tanah Negara (FELCRA) di Sendayan, Negri Sembilan.

Pokok getah yang ditanam pada tanah yang terbentuk dari batuan endapan pada rupabumi yang curam (25 hingga 50% kecerunan) setelah empat tahun ditoreh menunjukkan ukurlilit yang lebih besar daripada yang ditanam pada tanah yang sama pada rupabumi yang beralun dan berdang-aling (5 hingga 25 kecerunan). Purata bulanan dan tahunan berat kering getah yang ditoreh selepas empat tahun memberikan nilai

yang tinggi bila ditanam pada tanah berasal dari batuan endapan yang mempunyai kelas rupa bumi yang curam. Interaksi bahan induk dan cerun tidak memberi kesan yang bermakna bagi tumbesaran pokok getah dalam tempoh torehan yang sama. Walau bagaimanapun, bagi keseluruhan hasil getah adalah lebih tinggi bagi tanah yang terbentuk daripada batuan endapan dari batuan granit pada rupa bumi yang curam.

CHAPTER 1

INTRODUCTION

The rubber tree (Hevea brasiliensis, Willd. ex A. Juss.) Muell-Arg. belongs to the family of Euphorbiaceae. It is believed to be a native of tropical rain forests of South America. Rubber tree planting material introduced to Malaysia was first acquired in 1876 from Sir Henry Wickwam's collection grown at Singapore's Kew Royal Botanic Gardens. In 1877, rubber was first planted in Malaysia at the Residency grounds at Kuala Kangsar in Perak. Through the pioneering efforts of Mr. H. N. Ridley, successful establishment of rubber plantation came to existence in Malaysia, since 1888. Malaysia with a mean annual rainfall of 1000 to 2500 mm and short dry spells from February to March and from July to August and a wet spell from October to December generally proves to be well-suited to large scale cultivation of Hevea (Edgar, 1958).

With the discovery of the vulcanization process, Hevea soon became an important plant that supplies the increasing demand for natural rubber in the various industries. It is estimated that the world's growth demand for the total natural elastomers is 7% per year while that of the synthetic isoprenic type is only 4% (Ani, 1974; Allen et al, 1974 and Ariffin, 1977). The estimated world's demand for the total elastomer is 19 million tonnes and is expected to increase to 24 million tonnes by 1990 (Leong, 1979). Mohd Nor (1979) reported that the future prospects of natural rubber appears to be better compared to that of synthetic. This is due to oil price increases and the International Rubber Price Stabilization Agreement between the producer and consumer countries.

Malaysia is the world's largest producer of natural rubber. Rubber makes up over a quarter of Malaysia's gross exports and the industry provides employment to about one-third of the economically active population. Rubber is the major export commodity and contributed 15% to its GNP (Tan, 1983).

The rubber production of Malaysia for 1985 was expected to reach 2.7 million tonnes and based on the estimates made by the Rubber Research Institute of Malaysia (RRIM) (Appendix 1), Malaysia has to produce 3.10 million tonnes by 1990 and 3.78 million tonnes by the year 2000 in order to maintain its current 45% share in the world's natural rubber market. This increase in production over time has to be achieved by increasing the yield of existing areas under rubber and by opening up of new areas for rubber planting (Mohd Nor, 1979).

Peninsular Malaysia has a land area of 13,211,307 hectares and of this, 8,100,443 hectares are considered to be suitable for agriculture while the remaining 5,110,864 hectares are lands with slopes greater than 20 degrees (38%) and therefore considered not suitable for agriculture (Paramananthan, 1981). Of the land suitable for agriculture, about 3,473,527 hectares are already under cultivation, leaving only about 4 million hectares of potential land available for development. Most of these lands are marginal lands consisting of land with slopes exceeding 15 degrees (28%). Total land area cultivated with rubber in Peninsular Malaysia is estimated to be 1,971,017 hectares (Department of Statistics, 1983).

The rubber growing areas of Peninsular Malaysia are mainly confined to an elongated north-south strip along the west coast (Noordin, 1981). Scattered concentrations are also found on the east coast states of Kelantan, Pahang and Trengganu. Rubber is cultivated on a wide range of terrain ranging from level to steep topography and on a wide variety of soils.

It is reasonable to expect that this variation in soils and their related physical and chemical properties, coupled with the range of slope classes, would be responsible for the wide range in yields of rubber currently obtained. Another very important factor in the determination of the yield is the level of management. Thus, if Malaysia aims to attain an increase on its production of rubber, a closer understanding of the soil and soil-related factors affecting the growth and yield of rubber is indispensable. These data will assist the rubber growers in selecting the best land for new development and also help to improve yields from existing areas under rubber. A better understanding of these varied physico-chemical properties of the soil tantamounts to determine the extent of <u>Hevea</u> performance on a given soil with defined properties and would help to refine the current agro-management practices for greater productivity (Chan et al, 1974).