RUBBER.

REPORT ON LONGEVITY OF HEVEA BRASILIENSIS.

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Opinions have been expressed (see editorial, *The Straits Times*, Saturday, January 9, 1926). " That a considerable proportion of the rubber in Malaya is now past its prime, which we should put at 12 to 15 years. Bark renewal will not be as good....."

The opinion of this Department is contrary to the above, in fact, directly contrary on estates where the rubber is grown under good environmental conditions. Even on estates where environment cannot be considered first class, the experience of the Department is not reflected in the above opinion, which might apply to estates where proper care to ensure soil fertility has not been taken.

Observations on the longevity of *Hevea brasiliensis* are being recorded and yields are being taken on trees around 30 years of age. The results, up to date, indicate that when depreciating yields per acre are found, the true cause lies not in the age of the tree but in bad environmental conditions brought about by a number of causes such as soil erosion, severity and quality of tapping, bad soil moisture conditions, impoverished soils and disease.

The problem of longevity of rubber trees is an extremely difficult one as there are so many influencing factors which require to be considered. What the rubber producer in the East is concerned with is the commercial life of a tree growing under plantation conditions. The subject to be dealt with first is in respect of trees growing in their natural habitat, the Amazon region of South America.

Longevity of Rubber Trees in Brazil.—The age which Hevea attains in the virgin forests of Brazil is not known and it is only possible to form an idea thereof from the circumference of old trees. The following is a translation from the *Archief Voor de Rubber Cultuur* 1921, page 21. " Uli states that Hevea in its natural habitat attains a height of 40 meters—(say 130 ft.) and a girth of 5 meters (say 16½ ft.). Akers gives a photo of a Hevea of Mirary on the Madiera river with a circumference of 266 inches at a height of 3 feet. Even considering that Hevea is a quick growing tree, it will not be far wrong to estimate the age of such a gigantic tree at a century at least." Lock refers to *Hevea brasiliensis* as often reaching a height of 90 feet whilst the circumference near the ground may exceed 12 feet and Wickham reports that under favourable conditions it attains a girth in the trunk of 12 feet. Pinching in his report on this subject quotes from Akers *The Rubber Industry* (page 73) as follows.—" The girth of forest grown rubber trees varies to a marked degree in different localities of the Amazon valley. For mature trees it

ranges from 50 to 200 inches in circumference measured at a height of 3 feet from the base of the trunk. Occasional examples occur of the girth attaining such colossal dimensions as 300 inches. It is safe to consider the average girth of estrada trees in tapping as 100 inches or thereabouts and the average height 100 feet approximately. The age of the trees is extremely difficult to gauge with any degree of accuracy, owing to the absence of all reliable records in this direction. In the Madiera districts and elsewhere many trees are found that have been tapped for sixty years past, therefore they are probably not less than eighty years old, but the growth and development is so far influenced by surrounding conditions of locality, light, air, soil and exposure, that size cannot be regarded as a criterion of age." From observations made by Irving, *The Rubber Industry*, Torrey and Manders, page 45, twenty to thirty years seems to be the very least that could be expected to produce a tree of tappable dimensions growing under forest conditions. Heavy underbrush retards the growth of a tree in the early stages of growth but makes of it a very hardy member of the forest tribe, no doubt a question of the survival of the fittest. In the *India Rubber World* Vol. LV, No. 4, January, 1917, page 209, the following particulars are given of a big Hevea tree in South America, stated to be probably the largest in the world by J. Simao da Costa in a letter dated Para, December, 1916, to the Editor of the *India Rubber World*. This tree is 127 feet in circumference at the base and has a record of yielding for 120 days at the average of 22 lb. of rubber per day. The tree is situated in Brazil and is exploited by a whole family—father, mother and several children—which divides its time between cultivating cereals for food and extracting the latex from this tree. It is said not to be the only giant tree in the region, in fact there are thousands but this is the largest being tapped. The land in the district is considerably higher than the surrounding land and the writer concludes that it was from the seeds of these trees that the Hevea found its way east and south of Brazil, since native Hevea is found as far south as the seventeenth degree, and as far east as the south of Maranhao. The writer expresses the opinion that this tree must have been growing long before Colombus discovered America.

Longevity of rubber trees under plantation conditions in the East.—The longevity of a field of Hevea cannot be arrived at with any degree of certainty. The following factors may have direct influence on the span of life of the trees. (1) Introduction of the crop into another country. Although Hevea appears to be admirably suited to Malayan conditions it is difficult to say what effect there may be on the life of the tree when it becomes acclimatized to conditions other than those of its natural habitat. (2) Fungoid diseases and insect pests, (3) Soil conditions and deterioration of the soil by surface erosion or other causes. (4) Planting conditions e.g. distance of planting and drainage and (5) Past treatment of the trees in respect of tapping and pruning.

It will be of interest to review the earliest plantings in the East. Unfortunately no careful records of some of those in Malaya were kept, consequently it is difficult to ascertain the exact age of the respective plantings.

In the Gardens Bulletin, S.S., Vol. I, No. 8, information is given regarding the introduction of Hevea into the Colony. The first consignment from Kew of Hevea seedlings reached Singapore Botanic Gardens, in 1876. Some

were saved for at least a year but no record exists showing their further history. Twenty-two seedlings, a second consignment, sent a year later, arrived in June, 1877, and more than half of the number was planted in the Botanic Gardens. Nine plants were taken to Kuala Kangsar and planted behind the Residency. The first tree to flower in the East appears to be one of these nine trees for it is recorded that a tree at Kuala Kangsar flowered in March, 1880, at the age of 3½ years but did not set fruit until its third flowering in 1881. Probably in 1883 trees first fruited in Singapore. The Singapore seed crop was at first used up between the Botanic Gardens, Singapore, Sarawak, Kuala Kangsar, Kuala Lumpur, and Malacca. The smaller Kuala Kangsar crop increased the local plantation and supplied the seedlings which became widely distributed there and over Perak and others in Selangor and Negri Sembilan.

I inspected a few of the old Kuala Kangsar trees on 19-4-25. The trees are healthy looking in appearance and have fine branch and leaf development. They are now 42 years of age, and in spite of excessive over tapping in former years they look as if they will live for many years yet. These trees have not been tapped for several years.

Most of the old trees on Welds Road, Kuala Lumpur, said to be planted between the years 1895 and 1899 have been cut out. I examined two of those remaining. No. 1 has a girth of 6 feet 9 inches measured 3 feet from the ground and contains 24 latex vessel rows, one foot from the base while tree No. 2 has a girth of 6 feet and 11 latex rings at similar heights. The trees look healthy and one of them has excellent branch and leaf growth.

In October, 1898, 1306 rubber seedlings were planted out near the Offices of the Department of Agriculture, F.M.S., and S.S. spacing 18 feet by 18 feet.

The trees were raised from seedlings obtained from the Botanic Gardens, Singapore. A record was kept of the yield of a group of 48 of these trees during the year 1923 and found to be 412 lb. of No. 1 rubber. The number of trees to the acre in 1923 was 65. The average girth measured 3 feet from the ground on 21-5-25, was 55 inches. As is common with other old areas the trees have been most severely tapped in past years and considering all things I think the yield of these 27 year old trees is satisfactory as it works out at 558 lb. of No. 1 rubber per acre, per annum.

The first plantation in Ceylon is from the original seed procured by Wickham from the Amazon in 1876 and particulars are given in Bulletin No. 4, Hevea, Yields of some Henaratgoda Trees, published by the Department of Agriculture, Ceylon. The plants reached Ceylon towards the end of that year, and were planted at Henaratgoda in 1877. The plantation contains 40 trees planted irregularly. The second plantation was established about ten years later, in about 1886, with seed from the original trees. One tree at Henaratgoda known as No. 2, planted in 1877, has a circumference of 137 inches at 3 feet from the ground. It is reported that some of the original 1876 trees of Wickham's stock are still living in Ceylon in the Experimental Gardens at Peradeniya and Henaratgoda. In Lower Burma, at Mergui on the property belonging to Mergui Crown Rubber Co., many of the original trees sent over from Ceylon, in 1878, still flourish.

GENERAL REMARKS.

The rubber plantation industry is not sufficiently old to enable one to say what the length of life of Hevea may be, or even to state, with any degree of accuracy, the period over which a field of rubber trees will continue to yield a supply of latex sufficient to make it a paying proposition. One of the chief factors to be reckoned with is disease. Many of our old trees have been lost by fungoid diseases and insect attacks. In areas which have been severely thinned out one cannot afford to keep on losing trees year after year as there might then come a time when the number of trees to the acre is so small that a replanting programme may be necessary. Special supervision in such fields is required in order to endeavour to maintain the number of trees, per acre, at a reasonable standard. The replanting of diseased areas is a matter for investigation but it does not come within the scope of this report.

Soil erosion is another factor which may have a direct influence on the life of a tree. It is not reasonable to expect trees to continue to flourish in badly washed and impoverished soils for as long a period as trees growing in fertile soil conditions. Fortunately, however, most estates are now taking precautions to reduce soil erosion to a minimum.

The question of bark renewal is most important. In the " Third Report of the Executive Committee to the Members of the Rubber Research Scheme, Ceylon," Petch writes, " An inspection of some of the oldest trees in Ceylon has been made for the purpose of estimating the probable life of rubber trees under estate conditions. It would appear that after 30 years of age bark renewal is very slow and the power of recuperation of the trees is much less than with younger trees. However, from the examination made it was not possible to make any determination of the probable life of rubber trees in Ceylon."

In the same publication Taylor states, " An examination of the trees on the old Government Plantations at Yatipauwa and Edangoda has been made with the view to securing some estimation of the probable life of Hevea under estate conditions. These trees have received varied and somewhat severe treatment, and it is probable that under present conditions the life would be materially prolonged. Without further information than that furnished by these trees it is not possible to estimate the probable economic life of Hevea in Ceylon."

Practically all old trees have been severely tapped in the past and it is likely that better cultivation of the estates, conservation of the surface soil, conservative systems of tapping and good quality tapping will result in a longer period of increased yields but it should be remembered that plantation trees may possibly show signs of age earlier than trees growing in their natural habitat.

It is proposed to publish further information on yields from the oldest trees in Malaya, grown under varying conditions at a later date.—The Malayan Agricultural Journal, Vol. XIV, No. 1.