THE BETEL VINE IN THE NORTHERN PROVINCE

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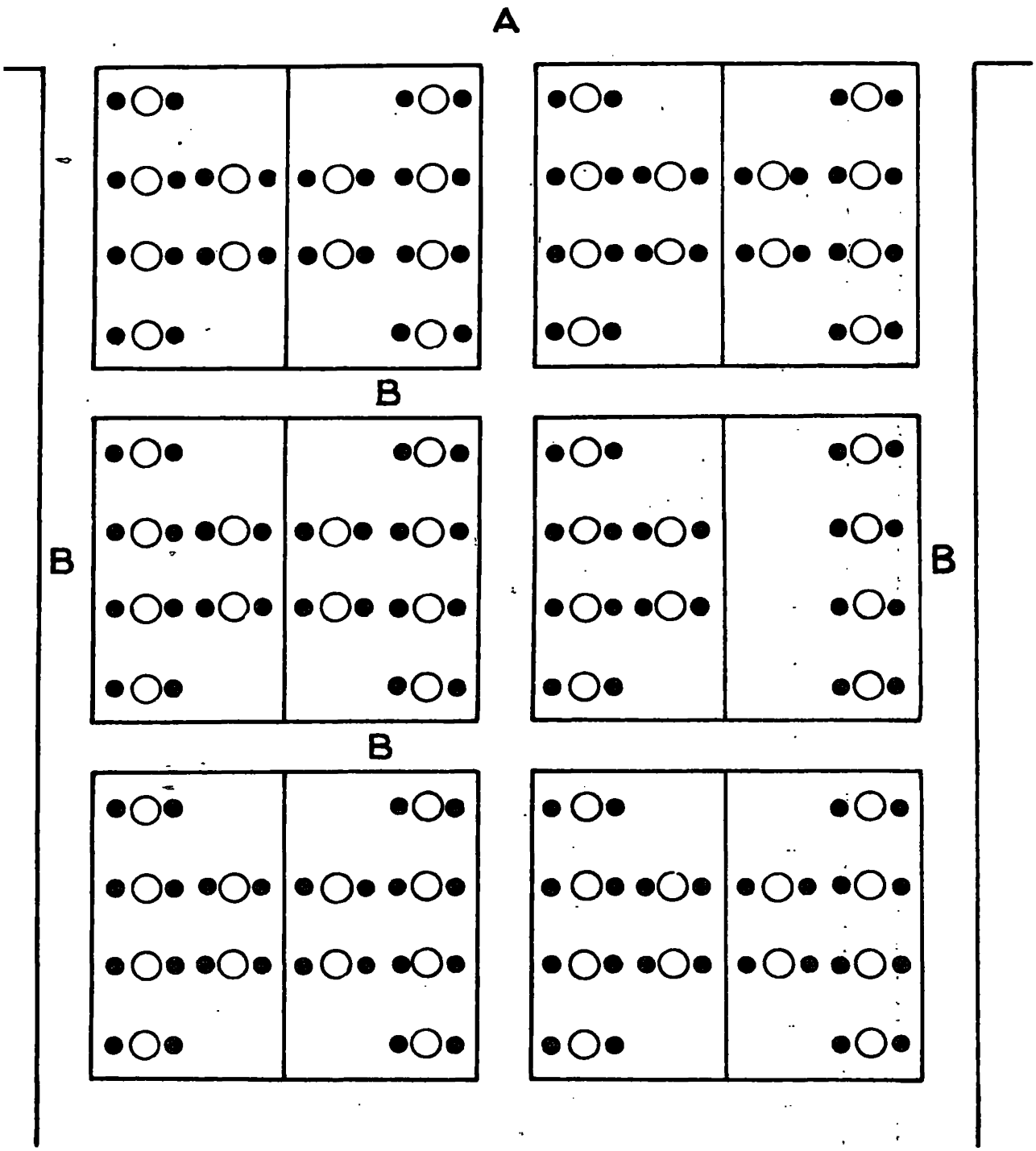
THE betel vine is indigenous to Ceylon and has for centuries been under cultivation in certain parts of the Northern Province. It is a perennial plant which is subject to constant pruning for the development of a particular system of branching and is also trained to grow along a live support or standard for a period from about 6 to 15 years, though there are some vines which live for as many as 20 to 30 years.

The crop is confined to the garden lands of certain villages situated in the Valikamam North and West Divisions of the Jaffna district and in the Nanaddan and Mantai areas of the Mannar district. It is only in these localities that the soil and well-water available for irrigation are suitable for the cultivation of the vine which requires a fairly uniform degree of moisture in the soil, ample protection from winds which are severe in the dry season and a certain amount of shade for the admission of diffused light. Each betel grove consists of a large number of small beds in which the vines are planted and is regularly irrigated from a well in the garden through an elaborate system of channels. In the Jaffna Peninsula, *Erythrina indica* Lam. (T. *mullumurukku*) is used as the standard while in the Mannar district the common standard is the *murunga* (*Moringa oleifera* Lam.). These standards provide shade and serve as a wind-break but, in addition, there is a small belt of plantains surrounding the betel grove and further, in the Jaffna district, a

live fence of *Erythrina indica* and, in the Mannar district, a high fence of palmyrah leaves are established along the boundary of the garden.

In former years. betel leaves were exported from Jaffna to the neighbouring districts but most of what is now grown is consumed locally. Some of the Colombo betel from the Western Province now finds its way into the Jaffna market on account of its lower price. The betel produced in the Mannar district is usually sufficient to meet the local demand but occasionally Maho betel is imported from the North-Western Province during periods of scarcity.

The total area under cultivation at present is estimated at about 70 acres in the Jaffna Peninsula and about 25 acres in the Mannar district, a considerable decrease having taken place within recent years in the former area on account of the serious damage caused by bacterial leaf spot and collar rot diseases. In many cases whole groves have been completely destroyed. The first indication of an attack in the case of bacterial leaf spot disease caused by *Bacterium betle* Rag. is the presence of small, water-soaked spots on the under side of the leaves between the veins. The spot increases in size, becomes angular in shape, turning brown and finally black with a yellow halo around. The stem is later attacked and the whole vine then withers and dies. In collar rot disease, due to *Rhizoctonia solani* Kühn, the attack first takes place at the collar of the vine. The roots are next killed and finally the stem wilts and dies. In the Mannar district these two diseases are more or less absent. This may be due to the fact that the greater shade given by the *Erythrina* standards and the excessive irrigation practised in Jaffna are more conducive to infection by these diseases while in Mannar the light shade provided by the *murunga*, which is kept low, and the method of cultivation which does not result in so much moisture in the soil and humidity in the atmosphere being maintained within the betel grove, lead to greater freedom from attack by these diseases. In spite of the intensive manner in which the crop is cultivated and the care and attention given it in Jaffna, the losses due to these two diseases are very heavy and betel growers now view with alarm the state into which this small, but important industry has fallen. In this article, an account is given of the general methods



A MAIN IRRIGATION CHANNEL

B SIDE IRRIGATION CHANNEL

○ ERYTHRINA INDICA SUPPORTS

● BETEL VINE

FIG. 1 THE MAVIDDUPURAM SYSTEM

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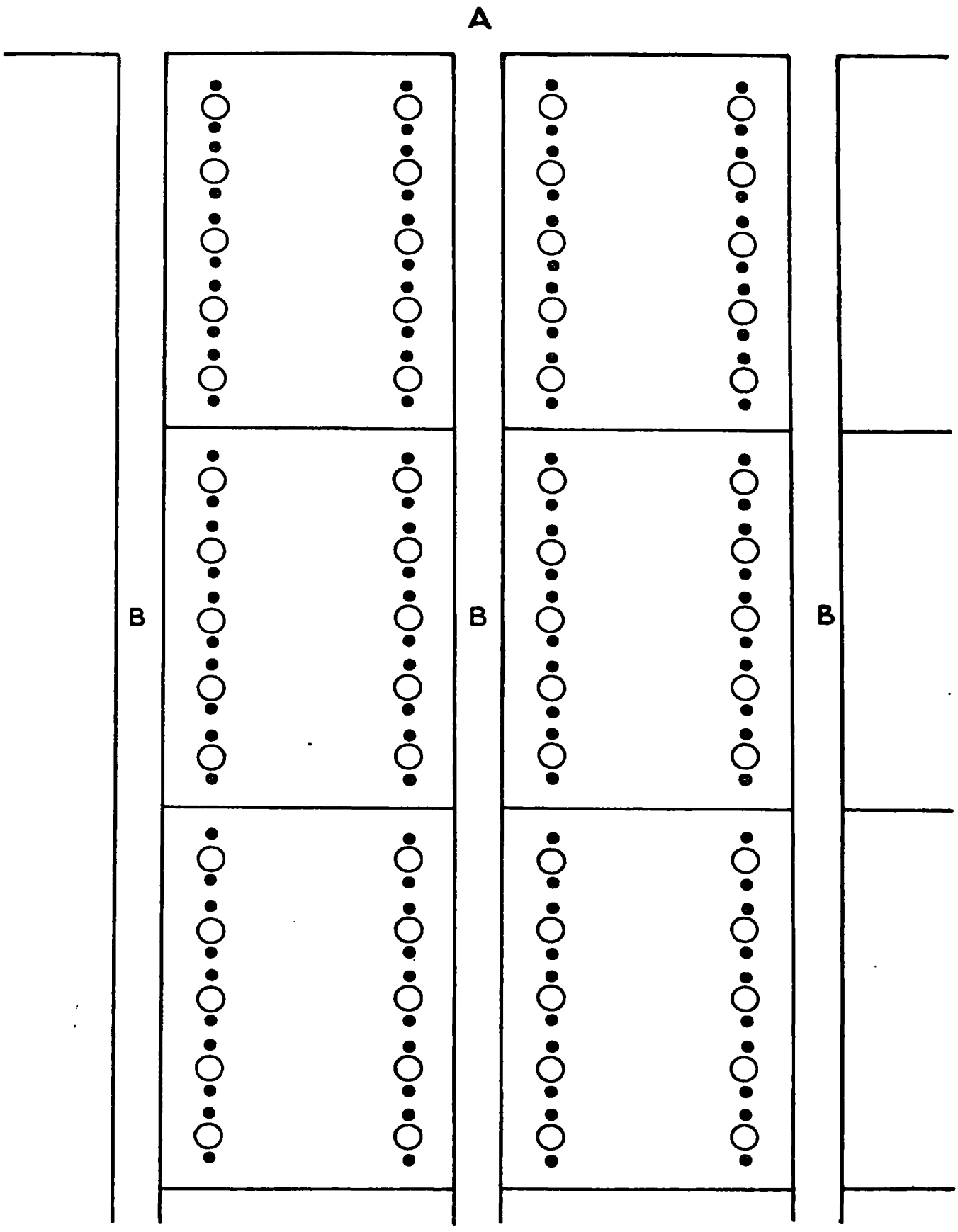


A MAIN IRRIGATION CHANNEL
B SIDE IRRIGATION CHANNEL
○ ERYTHRINA INDICA SUPPORTS
● BETEL VINE

FIG. 11 THE SILLALAI SYSTEM

Block by Survey Dept. Ceylon.

of cultivation of the betel vine as adopted by the growers in the Northern Province while indicating some of the improvements possible for the production of a better crop.

SOILS

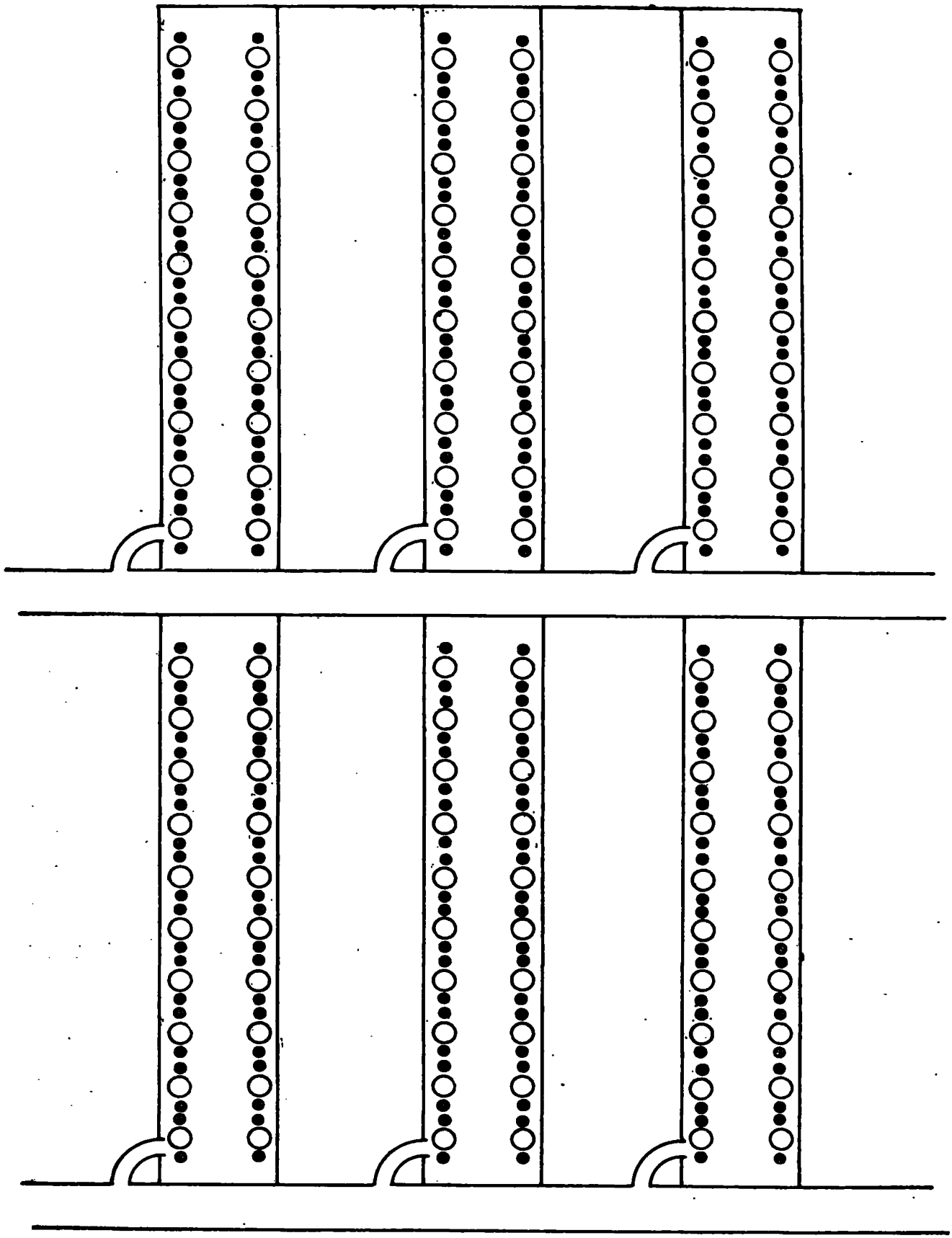
The betel vine is only cultivated on the red and brown limestone clay soils in the Jaffna Peninsula while in the Mannar district it is grown on a grey loam. The presence of lime as well as a certain degree of brackishness in the water used for the irrigation of the vines is held to be essential in Jaffna for good quality. In the Valikamam North division of the Jaffna district some of the rocky lands are brought under cultivation each year by the removal of the surface limestone rock.

SYSTEMS OF CULTIVATION

In the Jaffna Peninsula, there are two methods of cultivation, each confined to a group of villages. In the first group, referred to as Maviddupuram, consisting of the villages of Maviddupuram, Kankesanturai, Kolankalatty, Karukampani, Pannalai and Tellipallai in the Valikamam North division, the vines are trained to grow on single standards of *Erythrina* while in the second group known as Sillalai comprising the villages of Sillalai, Matakal, Pandaterippu, Ilavalai, Chankanai and Vaddukoddai the vines are trained on trellises in which *Erythrina* form the standards. In the Mannar district, the cultivation is confined chiefly to the Nanaddan but also the Mantai areas and single standards of *murunga* are used, but in each row there are a few jungle stumps about 4 to 5 feet high.

Under the Maviddupuram system, the vines only remain for about 5 to 6 years while under the Sillalai system they continue for about 10 to 15 years and even more but the quality of the crop is inferior to that under the former system largely on account of the differences in soil and water. Under the Mannar system the vines last for about 6 to 10 years.

The vines are planted in depressed beds which are subject to basin irrigation. In the Maviddupuram system the beds measure about 5 by 3 feet and the arrangements of standards and vines is shown in fig. I. Under the Sillalai system the beds are about 6 by $4\frac{1}{2}$ feet and are laid out as shown in fig II, while



○ MURUNGA STANDARDS
● BETEL VINE

FIG. III THE MANNAR SYSTEM.

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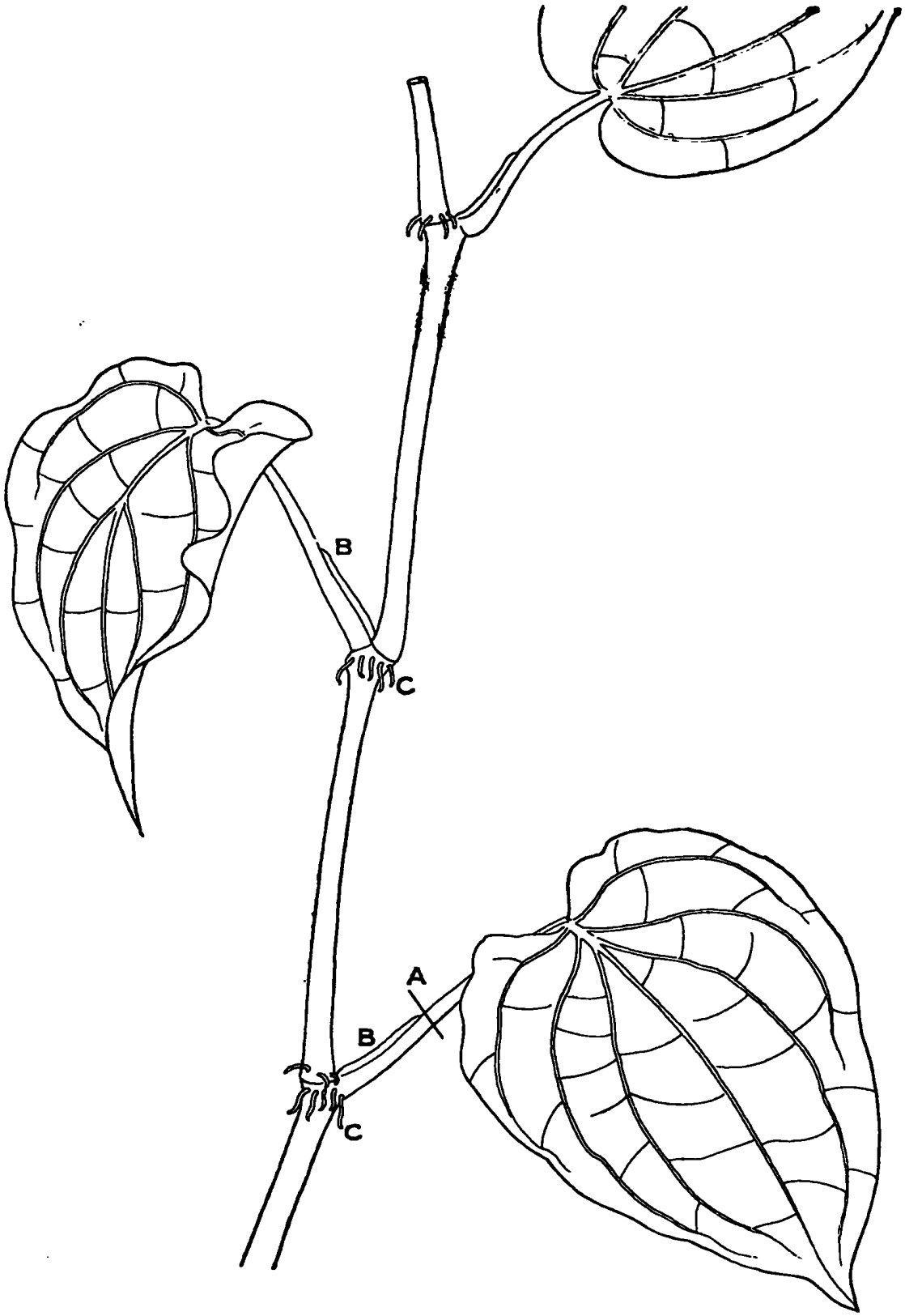
the Mannar system has beds about 2 feet wide but of any convenient length, with an interspace of 3 feet between alternate beds as seen in fig. III. In the last-named system the standards are planted along the two longer sides of each bed at about 2 feet apart. Many betel growers, however, in the Maviddupuram area are now adopting the Sillalai method of laying out beds on account of the fact that both irrigation and picking operations are less difficult.

In India, the common standard used for the betel vine is *Sesbania grandiflora* Pers. (T. *agati*). It can be periodically topped like *Erythrina indica* and it is also a good windbreak. In view of the fact that this plant does not cast such heavy shade as *Erythrina* it should prove more useful as a standard in Ceylon against the incidence of bacterial leaf spot and collar rot diseases. Another standard used in India is the arecanut palm which could be profitably employed in certain areas owing to the value of the nuts from the palm.

In the preparation of the beds, it would be preferable if these could be made flat or very slightly raised with channels running between them and along the two longer sides. Each bed should not be more than about 2 feet wide, the standards being planted about 1 ft. apart along the two longer sides. In this way excessive moisture in the soil around each vine through flooding of the whole bed when it is irrigated is avoided because water only passes through the channel. This will tend to reduce the incidence of the two diseases.

CROP ROTATION

Garden lands which have previously been under betel in the Maviddupuram centre are not again planted with the same crop for about 1 to 3 years. They may remain fallow for about a year during which time cattle are penned. After this they are planted with some of the following crops:— Tobacco, chillies, brinjals, *kurakkan* and the small millets, *e.g.*, *Panicum miliaceum* Linn. (T. *pani samai*) and *Setaria italica* Beauv. (T. *tenai samai*). In place of tobacco or *kurakkan*, chillies and brinjals are sometimes grown from about February or March to about August. Tobacco, which is usually planted in January, may be followed by *kurakkan* from about July to October. *Dioscorea*



THE LOWEST LEAF IS REMOVED AT A

A THE LOWEST LEAF REMOVED AT A
B PETIOLAR WING
C ADVENTITIOUS ROOTS

FIG. IV SHOWING A CUTTING OF THE BETEL VINE FOR PLANTING.

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yams (T. *sirukilangu*) are planted in August or September to provide shade if the betel is to be planted during the following November to January.

In the Sillalai area *kurakkan* is grown from about June to September. The land is then kept fallow and, in January, manioc is interplanted with *Amarantus* (T. *kirai*), the seed of which is sown just before the manioc cuttings are put in. The manioc is harvested during October and the land remains fallow until the vines are planted between November and January. The penning of cattle and goats is not usually done in this centre but well-rotted cattle manure is applied before the beds are made. In the Mannar system the land is kept fallow for two years before replanting.

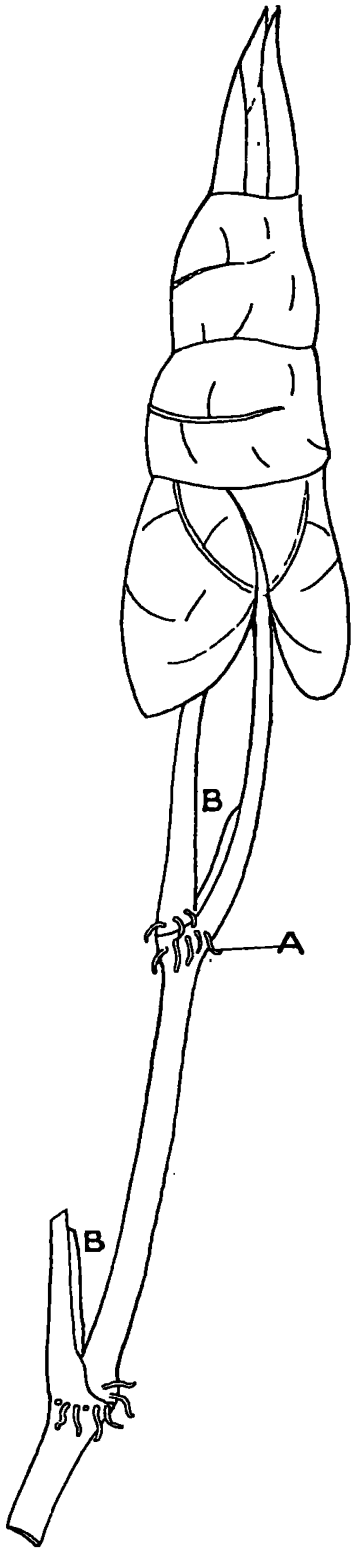
PLANTING

The betel vine is, generally, planted in the two Jaffna centres between November and January but also—more often in the Sillalai area—during April and May. Planting in the latter period is now being preferred by some cultivators because bacterial leaf spot disease is not as severe in the dry season, especially during the periods following pruning, as it is in the wet season. In the Manner area, planting is done during February, April or July as it is during these months that cultivators are free from their paddy field work.

It is advisable to sterilize the soils of the beds to prevent bacterial leaf spot and collar rot diseases. This can easily be done by placing a layer of brushwood about 6 in. to 1 foot thick over the beds and burning it so that the surface soil becomes heated and thus sterilized against the organisms responsible for these diseases.

The cuttings to be planted are, generally, selected from vines which are not less than 1 to 2 years old and are taken from the main shoots when these are topped or from the side shoots of the first order. A bundle of about 100 cuttings is sold for about Rs. 3·00.

In the Maviddupuram and Sillalai centres a cutting consists of three nodes and three leaves (fig. IV). Just before planting the lowest leaf is removed, leaving about $\frac{1}{2}$ inch of the leaf stalk. The second leaf is raised vertically and rolled round the stem



A ADVENTITIOUS ROOTS

B PETIOLAR WING

FIG. V SHOWING THE BETEL VINE CUTTING WITH THE LEAVES FOLDED OVER BEFORE PLANTING.

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while the top leaf is wrapped round the second as in fig V. This is done to protect the cutting from drying. It is then planted by burying the lowest node with the middle node kept at soil level. After about three weeks, the leaves are opened in the evening, but are tied up again in the same way 3 or 4 days later. Cuttings may be kept for 4 or 5 days before being planted either in a nursery or in the open by keeping them under shade and giving them a daily watering. A small quantity of *kurakkan* (*Eleusine Coracana* Gaertn.) seed is sometimes placed amongst the bundles and, after germination, the sprouted seed has the effect of keeping the cuttings cool and moist.

In the north-east monsoon, the cuttings are planted directly in the beds, but during April and May they are first propagated in a nursery, in which they are placed slantwise about 4 inches apart. After about 15 to 20 days, when they have commenced growing, they are carefully removed each with a ball of earth and transplanted in their permanent sites, the soil around being firmed down. Care should be taken to prevent the use of cuttings raised in nurseries affected with bacterial leaf spot and collar rot diseases. Planting is always done in the evenings and soon afterwards the beds are irrigated. *Dioscorea* yams are planted about three months earlier to provide shade for young vines. They are also covered with dried plantain leaves or cadjans which are removed after about a month.

In order to enable the vines to climb up the *Erythrina* standards which are planted about $1\frac{1}{2}$ months later, sticks of the local guava (*Psidium guajava* Linn.) or *nochchie* (*Vitex Negundo* Linn.) are placed a month after the vines are planted one alongside each. When the vines have reached a height of about 2 feet they are tied to the *Erythrina* standards with *adavian* (strips adjoining the mid ribs of the palmyrah leaf) which are not wetted easily and therefore do not encourage the growth of fungi on them. From a cutting two shoots may be developed, one from the axil of the topmost leaf and the other from the middle leaf but only the more vigorous shoot is allowed to develop.

In the Mannar system the cuttings are brought down, coiled and buried in the soil two or three times at intervals of

about three months. After about a year they are put on the *murunga* and the shallow pits are joined together in a row and made into one long depressed bed about 2 feet wide.

When the vines have reached a height of about 3 to 5 feet, split arecanut or palmyrah stems, about 1½ inches wide, are tied in tiers, in the Sillalai system, to the *Erythrina* standards. There are about eight of these tiers, at about 2 feet apart lower down and about 1 foot apart higher up.

IRRIGATION

The cuttings are daily irrigated in the two Jaffna systems for about 12 days after planting and thereafter every alternate day. If they are both planted during April or May, irrigation is done both morning and evening for about three weeks and after that on alternate days, usually in the evenings. Basin irrigation is practised, the water being led into each bed from the channel adjoining it, the soil being always maintained in a moist condition.

Under the Mannar system the vines are irrigated every alternate day, the water being issued down the long row of beds while the interspaces between the rows of beds are kept dry. It is considered that the Mannar system of irrigation is more satisfactory than the other two in that the soil around each vine itself is not kept as moist as in the other systems. It would, however, be even better if the beds themselves were not flooded, but if the water were allowed to flow in channels on the sides adjoining the row of standards in each bed. In this way sufficient moisture in the soil would be provided for the vines to grow but such excessive moisture which predisposes the vines to the two diseases mentioned before is avoided.

MANURING

Well-decayed and powdered cattle manure is applied under the two Jaffna systems over the beds about three times a year, the first application after planting being made in June, the next in October and then again in February the following year, the application being renewed annually thereafter during these months. After each manuring the plots are irrigated for three consecutive days. Well-made compost is preferable to cattle manure but fresh cattle manure should never be used though

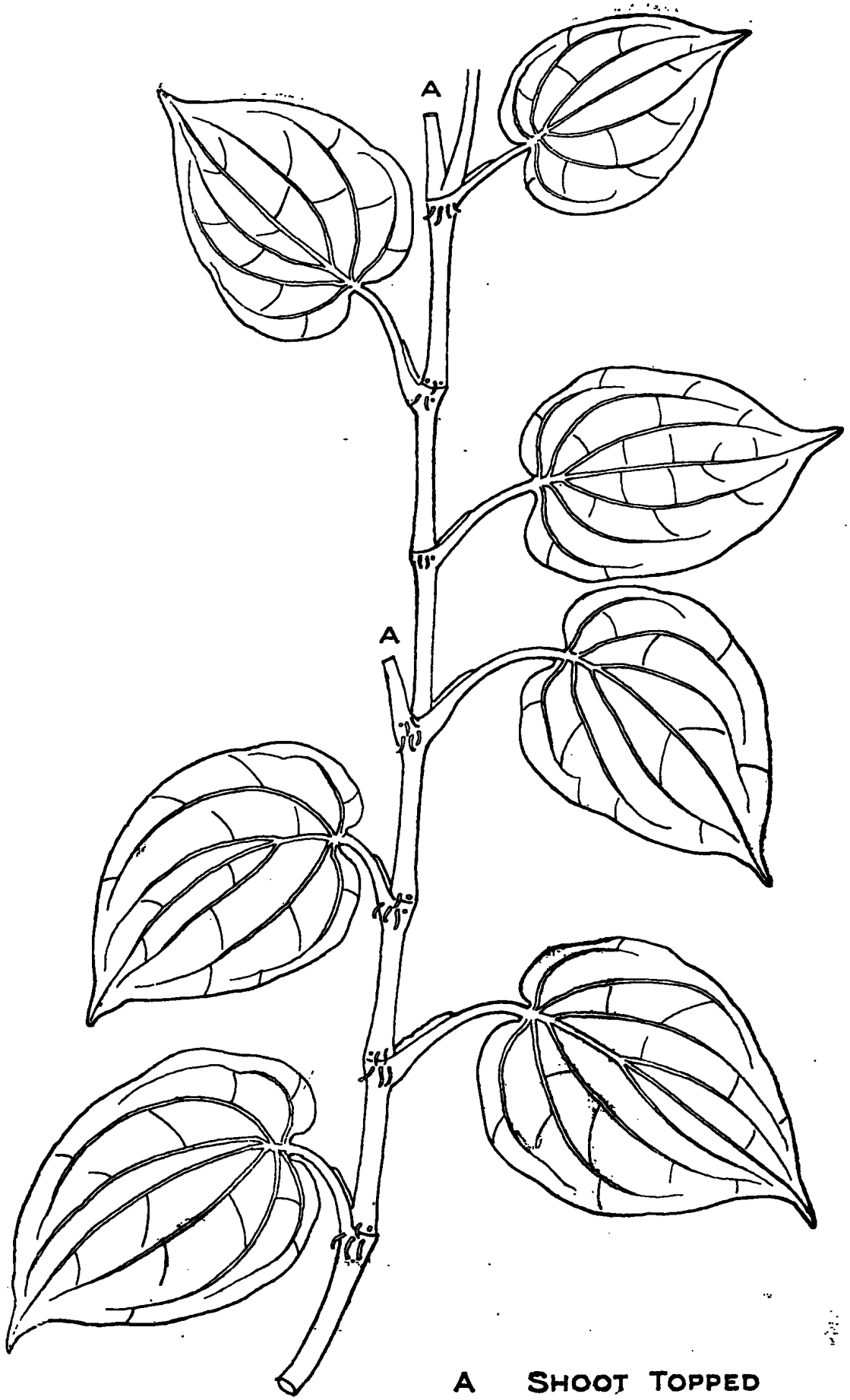

FIG. VI SHOWING THE SYSTEM OF PRUNING.

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liquid manure is sometimes added to bring out a dark colour which it is reported also results from the use of dry leaves of the Tulip tree, *Thespesia populnea* Linn. (T. *puvarasu*), and the arecanut. When any green leaves are available they are suitable but they should only be taken from areas where collar rot disease of betel or other plants has not occurred.

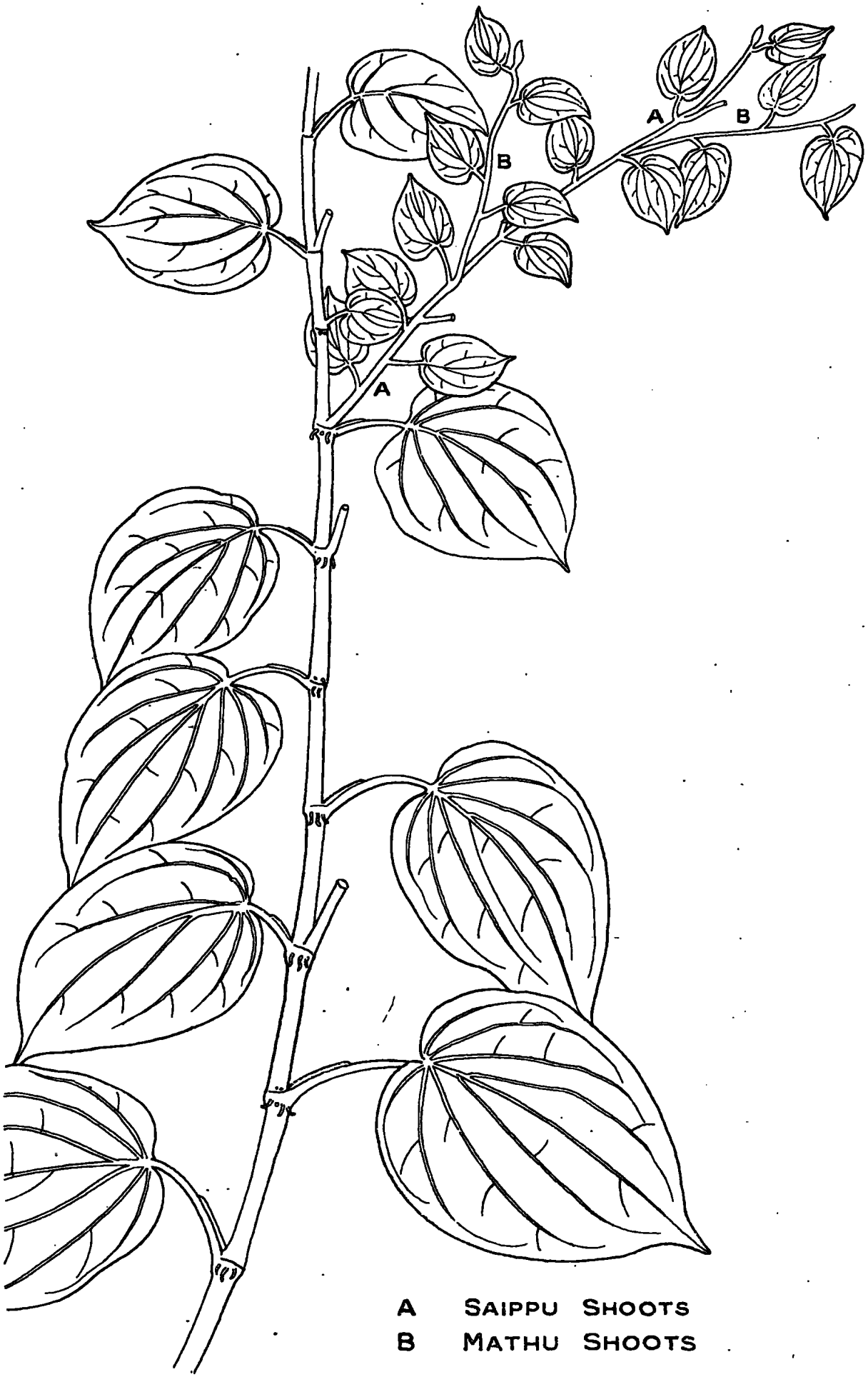
In the Mannar system, two baskets full of well-rotted cattle manure which have been left for about a year are added to each pit. Goat manure and green leaves are not used. This application is repeated each time the vine cuttings are buried. After the vines have been trained to their permanent standards they are manured once a year with well-rotted cattle manure.

PRUNING

About two months after planting in the case of the two Jaffna systems, when about five leaves are produced on the young vine, the shoot is topped to three leaves. Growth is then continued from the bud in the axil of the topmost leaf and again, two months later, the next topping is done leaving 2 to 3 leaves on the new axis (fig. VI). This process of topping or pruning is continued every two months or so, confining the growth of each new axis to about two to three leaves. After each pruning the shoot is tied at the top to its support with *adavian* strips.

In the Mannar system the cuttings as already stated, are brought down coiled and buried in the soil 2 or 3 times every three months. It is only after about 9 to 10 months that pruning commences.

After pruning, the buds in the axils of the leaves belonging to the axis which has been topped begin to develop but any shoots except one springing from the topmost axillary bud are nipped off. About six months from the time of planting side shoots are allowed to develop from the axillary buds in some of the leaves from about the fifth axis upwards. On these shoots which form the second order of branching the pruning is carried out as before. The same process of branching is allowed to continue and shoots from the axillary buds in the leaves from the second axis upwards are also allowed to develop. The leaves which are produced on the main axis and the second order of branches are known as *saippu*, while those formed on the



A SAIPPU SHOOTS
B MATHU SHOOTS

FIG. VII SHOWING THE SAIPPU AND MATHU SHOOTS.

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third order of branches which develop in the axils of the leaves of the second order of branches are known as *mathu* (fig. VII). The latter are held to be the best grade of betel. About six toppings on the main axes are necessary before *mathu* shoots or the third order of branches are allowed to develop. They commence to form on each vine about one year after planting.

The *saippu* leaves are large and leathery and dark green in colour. They are not as flaccid but are more pungent and have longer petioles than the *mathu* leaves. There is a prominent petiolar wing which encloses the petiole at its base and protects the tender bud in axil of the leaf. This dries up later leaving a scar on the petiole. Adventitious roots are also prominently developed at the nodes of the main axes.

The *mathu* leaves on the other hand are smaller, thinner and lighter in colour. Their petiolar wings and adventitious roots are barely visible.

The vines are allowed to grow to a height of 6 to 8 feet in Jaffna but in the Mannar system only to a height of about 4 to 5 feet—as far as the top of the standards—in order to facilitate picking. In the Sillalai system, the various branches are allowed to spread freely but upwards. Each shoot is straightened out as much as possible before it is tied. This work is done by trained and experienced labourers who are paid Rs. 1·25 to Rs. 1·50 a day. If the work is not correctly done few new shoots will form and the yield will be poor.

The *Erythrina* standards which are kept to a height of 6 to 8 feet in the Maviddupuram system and 8 to 10 feet in the Sillalai system are topped once in April and again in December to admit light and air to the betel vines.

PICKING

When the vines are about one year old picking commences and, generally, two pickings a month under the Maviddupuram and Mannar systems are done throughout the year while in the Sillalai system the leaves are picked about once a month and when the vines are older about once in 40 days. In the case of *mathu* leaves, the third leaf from the top is picked but if the bud in the axil of the topmost leaf has not emerged the two lower leaves are retained and only the fourth picked. It is reported

that about 300 leaves can be picked each time from a vine, but from the Mannar area only about 20 to 25 leaves are picked because no *saippu* leaves are removed.

GRADING

After picking, the leaves are graded and bundled. In the Maviddupuram centre there are four grades, *viz.*, *mathu*, *aduval*, *saippu* and *kalippu* while in the Sillalai centre there are only two grades, *viz.*, *mathu* and *saippu* and in the Mannar area only one grade, *viz.*, *mathu*. The number of leaves per bundle varies with the grade in the case of the first named centre, while in the second centre a bundle contains about 100 leaves and in the third centre about 1,000 leaves. The prices which obtain are as follows :

No. 1 *quality—Mathu.*—These are the leaves picked from the *mathu* shoots and sold at the Maviddupuram centre by the growers at Rs. 2·00 to Rs. 4·00 per bundle of about 500 to 600 leaves. From the Sillalai centre a bundle of about 100 leaves sells at 30 to 40 cents while the Mannar betel fetches 75 cents to Re. 1·00 per bundle of 1,000 leaves.

No. 2 *quality—Aduval.*—This grade contains a mixture of *mathu* and *saippu* leaves and is sold only from the Maviddupuram centre at Re. 1·00 to Rs. 1·50 per bundle of 1,000 leaves.

No. 3 *quality—Saippu.*—These leaves obtained from the main axes and those from the second order of branches command a price of 75 cents to Re. 1·00 per bundle of 500 to 600 leaves from Maviddupuram while the Sillalai leaves fetch 15 to 20 cents per bundle of 100 leaves.

No. 4 *quality—Kalippu.*—These are small crumbled *saippu* leaves which sell at 5 to 10 cents per bundle of 100 leaves both from Maviddupuram and Sillalai.

The best quality betel is reported to be produced around Maviddupuram, where the soil and water are most suitable for this crop. But Jaffna betel from any area is considered locally to be superior to that produced from any other part of the Island or India. The Jaffna betel leaves are more pungent and of a better flavour ; they are also broader and of a darker green

colour. The Indian betel imported into Ceylon is even less pungent, smaller and of a lighter green colour than the Colombo betel. It is reported that for a ' chew ' of betel, half a leaf of the Jaffna variety suffices and is equivalent to a full leaf of the Mannar and the Colombo betel and to two to three leaves or more of the Indian betel.

While the best *mathu* leaves in Jaffna fetch a price of 30 to 40 cents per 100, the Colombo betel is only sold at 15 to 20 cents per 100, the Mannar betel at 8 to 12 cents and the Indian betel at about 3 to 5 cents per 100. The local leaves are about 100 to a pound, while the Colombo leaves are about 150 and the Indian about 250.