

Before closing this paper, the writer would emphasize the fact that Castor-oil is not a crop for extensive cultivation as a pure crop on a large scale. One of the reasons for this is that it produces normal crops only under such conditions as are quite congenial to it, and one such condition is *shade* during at least, one part of the day not overhead shade, but side shade from large trees growing to the East or the West of the field.

A planter of very long experience, in a letter to the writer, says: "Castor-oil is a peculiar plant. I reared it in Africa. Grown wild, it yields well; cultivated in plantations, it hardly yields at all; moreover the oil is of irregular and inconstant density."

The same is to some extent observable in the Economic Gardens for the plants growing in the full sun—their growth is backward, their flowering is poor—whilst the trees which receive, either in the morning or in the afternoon, the shade from large neighbouring trees are showing quite good crops.

E. MATHIEU.

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- Tropical Agriculturist August 1914.
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- The Book of the Madras Exhibition 1915-1916.
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Betel.

One of the first things noticed by the newcomer to the East is the red appearance of the lips and teeth of the natives together with their habit of chewing. He may also observe, particularly in country districts, that many of the natives carry a small tin or receptacle of some description about with them. A peep into this tin would bring to light various things but chief amongst them would be found some betel nut and betel leaves. These form the chief constituents of the mixture, known as "betel," which is chewed by many of the Eastern peoples. In towns the mixture may be seen ready made up for sale.

It is intended to give a brief outline of these two ingredients namely Betel Nut, the seeds of *Areca Catechu*, L., and Betel Leaf, the leaf of *Piper Betle*, L. The production of the former particularly, is essentially a native industry and is interesting on this account.



C. B. ALLEN

THE PALM GROVE, HAWAII

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BETEL NUT.

ARECA CATECHU, L., the Betel Nut Palm (see accompanying plate).
General Description—

A palm which grows to a good height attaining in some cases 60 ft. Its stem is straight and cylindric, and ringed by the scars of fallen leaves. It is greyish in colour and is generally covered with lichens. The stem is very slender in comparison with its height but very strong nevertheless. The crown of leaves is rather small having a diameter of about 8 ft. The leaves are pinnate which places it in the feather-leaved section of Palms. They vary in length from 4 to 6 ft. and in the young state have a fairly straight leaf rhachis which forms an acute angle with the stem, but in older leaves the leaf-rhachis is curved. The colour of the foliage is yellowish green in plants grown in the sun and light green in plants growing in partial shade. The leaflets are more or less rigid giving the leaf a flat surface. Spathes are produced below the leaves and soon burst disclosing the much branched spadix which is pendulous and on the branches of which are produced the flowers. As the Palm is unisexual the female flowers are borne at the base of the branches while the male flowers are borne on spikes at the extremities of the branches and are arranged in two rows on the spike. In the plate facing p. 296 the two types of flowers can be easily distinguished the large unopened ones at the bases being the female and the tiny white crowded specks being the open male flowers. On the same plate will be seen a fine bunch of fruits which when they first appear are small and green. They very soon swell up and change colour becoming orange or orange scarlet when quite ripe and are from 1 to 2 inches in length when fully grown. The fruit consists of a fleshy pericarp surrounding the seed or betel nut. A fuller description of this palm will be found in the Gardens' Bulletin Vol. II, p. 252.

HISTORY.

Mention has been made of the "betel nut" for centuries, the earliest reference to it by a European being found in the writings of Marco Pole (1298 A.D.). Since that date the nut has been mentioned by many writers. Of its great antiquity there can be no doubt as mention of it has been found in manuscripts written in ancient Eastern languages. The nut has its place in the ceremonial and symbolic life of the people being offered as a polite indication of the termination of ceremonial visits. It is also symbolic of festivity and essential at the betrothal ceremony. It has held the same important position from earliest times.

HABITAT.

The exact locality in which this plant first grew is unknown as it has been found for centuries, cultivated over almost the whole of tropical Asia. It prefers a moist atmosphere as is shown in India where it is found growing only in localities which are notably

moister than other parts of that country. It does not grow at a very high elevation and is seldom found above 3000 ft. In Malaya it naturally thrives owing to the humidity of the atmosphere and is generally met with growing in compounds and occasionally in plantations. Almost every native compound in Malaya has its few "betel nut" palms which often serve a double purpose, to supply nuts and also to serve as a support for the "betel leaf."

PREPARATION OF NUTS.

Several varieties of the nut are met with in the market, the best class being those which have not undergone any preparation. These may be termed the natural or first class, and are simply dried in the sun before sending to the market. The artificial or second class includes all those varieties which have been prepared in some way before being placed on the market. The usual method of preparation is to boil the nuts either whole or cut into pieces. The latter operation is sometimes performed after boiling but not always. The value of the nuts largely depends on these factors and the natural class generally commands the highest prices in the market.

ARECA CATECHU OR KOSSA.

This is the only well known preparation extracted from the "betel nut." It is obtained in the following fashion. A quantity of scraped nuts are placed in water in a large copper pot; a handful of lime is added and the whole boiled for a time. The nuts are then removed and the same liquid is used for several subsequent boilings of nuts adding water when required. Eventually a thick red-brown substance is produced which is allowed to dry in the sun. This substance is Kossa and it is used to flavour and colour inferior nuts. So far as is known it has no particular value except for use in the above manner.

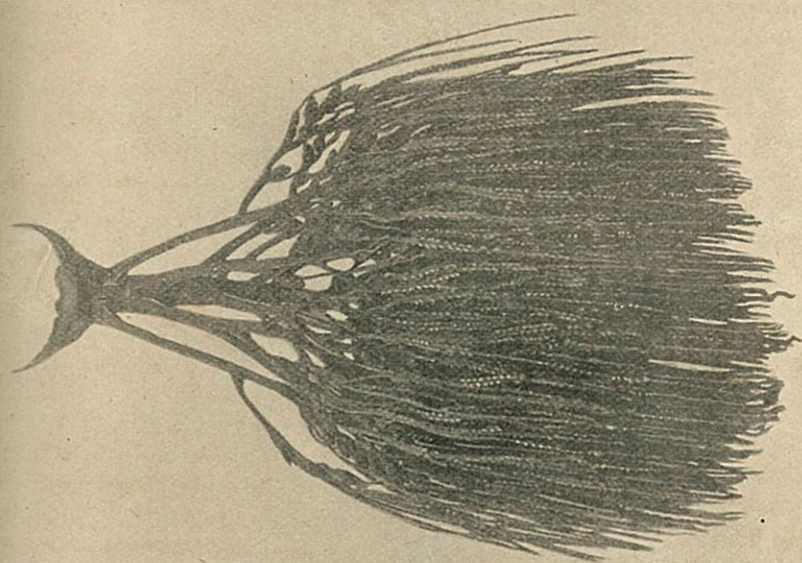
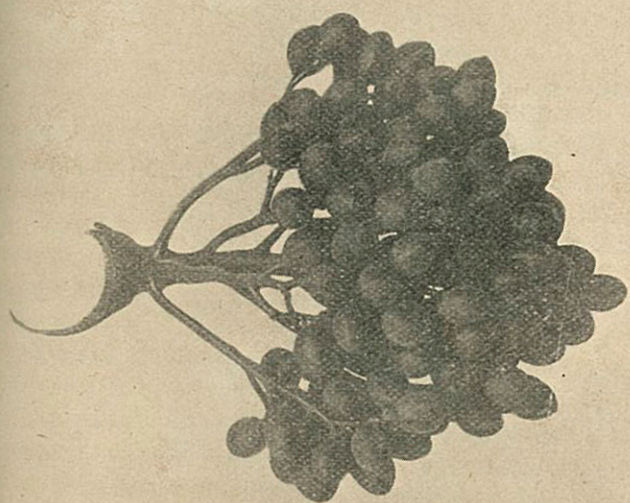
USES.

The chief uses of the "betel nut" are—

- (a) Masticatory.
- (b) Medicinal.

(a) Masticatory.—As previously indicated the chief use of the "betel nut" is for chewing purposes. It is sometimes chewed by itself but generally a small piece is rolled up in a "betel leaf" together with a little lime, catechu or kossa, cardamoms and cloves. Prepared in this way it may be seen in most native towns particularly in Indian Bazaars and shops. It is supposed to stimulate digestion and is also claimed to prevent dysentery and generally to strengthen the stomach.

(b) Medicinal.—The young nut possesses astringent properties and is used in the treatment of bowel complaints and ulcers. If used in powdered form it is very effective in the treatment of dogs for worms. The natives put it to many uses and with very good results.



CULTIVATION.

Propagation is effected by means of seeds which are sown in a part of the plantation set aside as a nursery. Transplanting is carried out after about 2 years, the intervening time being used to prepare the ground and grow other crops. In this first transplanting the plants are placed 12 to 15 feet apart and are interplanted with shade plants, bananas often being used for this purpose. This set of plants fruit about the tenth or twelfth year. About this time the intervening shade plants are removed altogether and the second transplanting takes place, the plants of the first set now assuming the double role of production and shade. The second set do not fruit for about 20 years. There is no third transplanting except to fill in gaps caused by failures. It will thus be seen that the plants are eventually about 6 or 7 feet apart each way. Oftentimes other plants are used to fill in the gaps such as coconuts and fruit trees so that eventually the plantation takes on a rather jungle-like appearance. It may also be mentioned that some plantations are purposely planted up with plants other than the "betel nut." Very often too the "betel leaf" is interplanted with the palm and uses the palm stems as supports. The type of soil does not very much matter provided the atmospheric conditions are suitable and that plenty of manure is given to the plants. This latter has a considerable effect on the yield of nuts and in some places manuring takes place at least every two years. A moist soil is preferred though it is not essential so long as there is a good rainfall.

The most extensive cultivation is carried out in India where there are many plantations ranging in size from 1 acre to 100 acres. Methods of planting up vary considerably but all follow much the same lines. A certain amount of plantation work has been carried out in Malaya as will be gathered from statistics quoted later. Almost every native compound has its few palms to ensure a supply of nuts. Considerable quantities of nuts have been exported in past years but with the advent of rubber this industry has waned.

GENERAL REMARKS.

The length of time which expires before a plantation bears fruit is rather surprising as generally speaking it takes from 20 to 30 years to bring all the trees into bearing. The average fruiting life of a plant is from 30 to 60 years bringing its age up to 50 to 90 years and even more occasionally. This marks the close of its productiveness and though it will live on many years after it is unproductive and of no use to the grower. It will be seen that this palm is long-lived and this may have influenced its survival in cultivation for so many centuries.

The following extracts have been taken from the Blue Book of the Straits Settlements and prove fairly conclusively that the acreage in the S. S. under "betel nut" is considerably less than it used to be.

Year	Colony.	Acreage.	Price per pikul.
1910	Singapore	290 acres	\$3
	Penang N. E.	Mixed with fruit	\$3 to \$4
	„ S. W.	3000 acres	\$2.20 to \$4
	Prov. Wellesley	4997 „	\$2 to \$7
	Dindings	Mixed with fruit	\$2 50 to \$3.50
	Malacca	do	\$2.50 to \$4.00
1914	Singapore	In patches	\$4
	Penang N. E.	Mixed with fruit	\$3 to \$4.50
	„ S. W.	1400	\$3.50 to \$4.50
	Prov. Wellesley	3579	\$4 to \$6
	Dindings	Mixed with fruit	\$2 to \$3.50
	Malacca	do	\$2.50 to \$4.00
1918	Singapore	In patches	\$5
	Penang N. E.	Mixed with fruit	\$4 to \$6
	„ S. W.	1250	\$6 to \$12
	Prov. Wellesley	3102	\$6 to \$8
	Dindings	Mixed with fruit	\$3 to \$6
	Malacca	do about 141	\$7

Presuming the acreage under "betel" "mixed with fruit" remains the same as it was 10 years ago, though it is unlikely, there is a large decrease in acreage in the settlements where acreage is definitely stated. Summarising the above we get—

Acreage in 1910—8287 acres.

„ „ 1914—4979 „ decrease 3308 acres.

„ „ 1918—4352 „ „ 627 acres.

Giving a total decrease of 3935 acres in eight years.

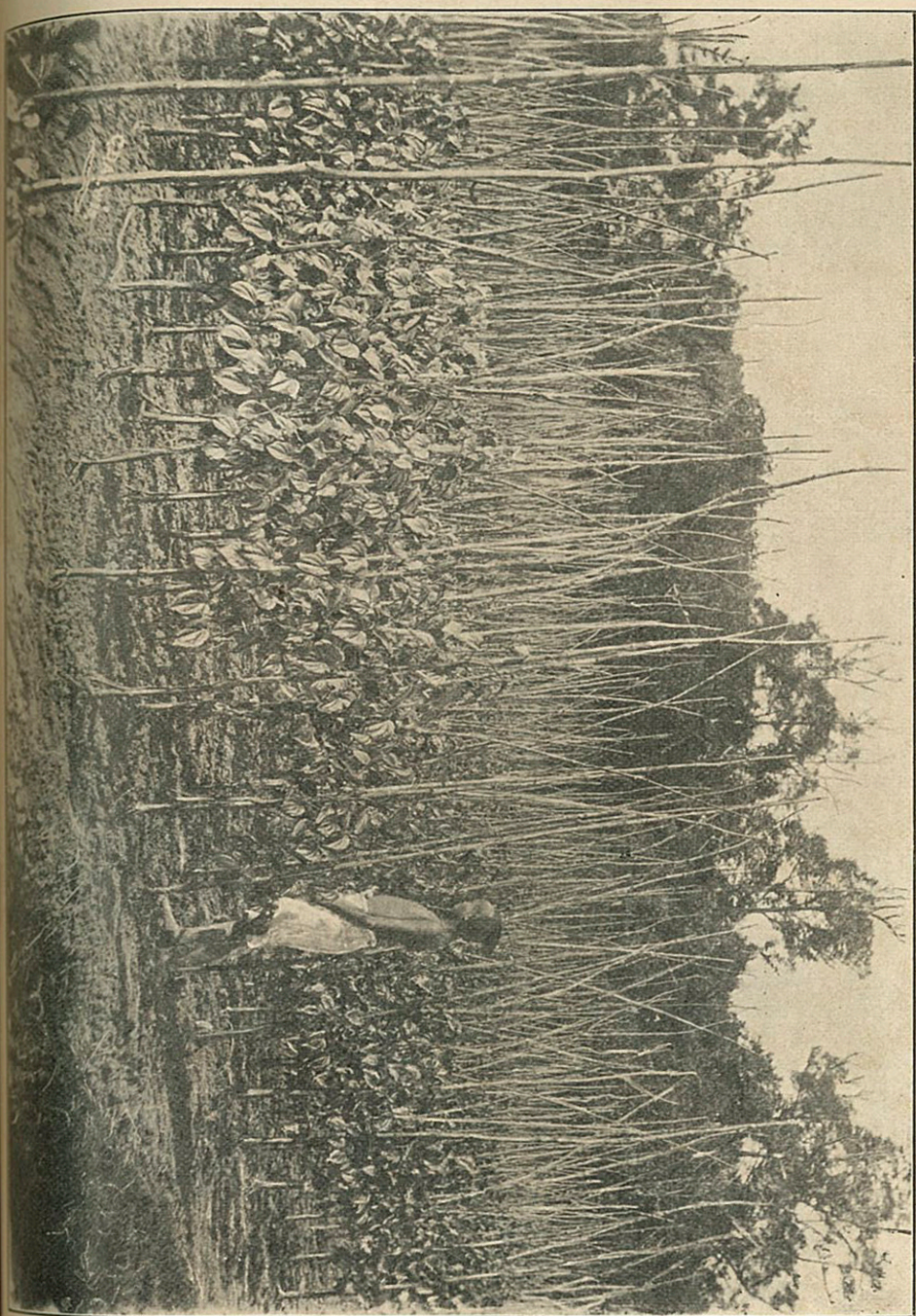
A comparison of the prices shows an upward trend. The difference in price per picul in eight years is very marked.

BETEL LEAF—(*Piper Betle*, L., see plate facing p. 298).

This plant is a pepper and belongs to the Natural Order *Piperaceae*.

General Description—

A perennial evergreen creeper or climber which grows to a considerable height given the necessary support. It has large heart-shaped leaves, which are thick and strongly 5 to 7-nerved. It produces spikes 4 to 6 inches in length of fleshy flowers which often cohere into a cylindrical mass.



HISTORY.

The "betel leaf" plant is mentioned in very early European writings, also in the manuscripts of the ancients. As would be expected it is always mentioned in connection with "betel nut" and seems to have been cultivated for centuries for the purpose of chewing with the "nut."

HABITAT.

It is considered indigenous to Ceylon, India and Malaya and is cultivated throughout tropical Asia for its leaves. Java is suggested as its original home. Like its companion the "betel nut" it requires a humid atmosphere and grows extremely well where such conditions are prevalent.

USES.

Its recognised use is for chewing purposes and as an ingredient of "betel." The method of mixing it up with other materials has already been indicated. It is chewed in the green state and has a sharp pungent taste and is considered sustaining and particularly advantageous to a people whose food does not include flesh. Its tonic and carminative properties supplying the deficiency.

CULTIVATION.

Unlike its companion it requires considerable attention and the successful growing of it requires expert knowledge. As would be expected methods vary in different places both in propagation and general culture. The following broad principles may however be laid down for its successful culture.

Propagation is effected by means of cuttings and the method varies. The following two methods will suffice—

(1) Cuttings are taken from two year old plants and cut into lengths of 12 to 18 inches each with five or six joints; they are then planted burying two of the joints.

(2) Fully grown plants cut down close to the root, are stripped of their leaves and divided into three or four portions which are laid horizontally in trenches and covered with earth. They commence growth from each joint.

A fairly constant temperature is best, together with a uniform amount of moisture. The nursery should be if possible in a slightly elevated position to ensure good drainage. A good supply of water must be given as the plants need a moist soil. This latter should be rich in humus and manured at regular intervals. Top dressing is often resorted to, various kinds of manures being used. Shade must be given and for this purpose shade plants such as bananas or the "betel nut" palms must be utilised, otherwise artificial shade must be provided. It is a good plan to give the land a rest after a few years and then plant some other crop returning to "betel leaf" later.

In Malaya it is generally met with in "compounds" using as supports the stems of the palms, in other cases stakes are used, trellis work or anything which will allow them to climb. Attention is always paid to maintaining a sufficiency of shade overhead.

The cultivation of the two plants discussed above is essentially undertaken by natives and is without doubt a purely native industry. Unfortunately statistics are not available as to the export trade in "betel nut" but it is certain that with the large amount of native labour in the country and the decrease in acreage under "betel nut" the exports must be considerably less than in past years. There is no export trade carried on with "betel leaf."

F. FLIPPANCE.

Some Trials of Food Plants in the Economic Gardens III.

The Sword Bean.

(*Canavalia ensiformis*).

The Sword-beans seen in the accompanying plate were introduced into the Economic Gardens from Japan in February, 1919. Its cultivation has now been brought to the fifth generation and shows by its remarkably heavy crops its adaptability to our local conditions. A local sword-bean is frequently seen growing in Malaya, the difference between this and the Japanese being in the colour of the flowers, which is mauve in the Japanese plant, and white in the local one; and in the seeds, the local bean being bright ruby-red in colour, and the Japanese pale pink. A third white-seeded variety, the seeds of which were procured from Mr. W. Dunman of Grove Estate, is also grown in the Economic Gardens. It is a plant of very robust growth with large handsome mauve flowers and it fruits profusely: it is popularly known as "Owen's Bean" from the name of the popular Secretary of the S. C. C.

The plot, on which the plants were grown, is on the lower edge of a hillside, a piece of yellow stiffish clay, but self-draining by its position. It had been manured six months previously and had given a crop of Roselle. A liming, a good breaking-up with the changkol, and a finish-off with the rake made it a first-rate bed for the sword-bean, which thrives better in a fairly firm clay bottom than on a sandy one.

The seeds were planted three feet apart on rows 2 feet apart, being sown with the eye (hilum) down at a depth of 3 inches. Contiguous to this plot, another bed was planted with seeds of the local sword-beans.

In both cases, the growth was very rapid and 4 weeks after sowing a frame of supports had to be put up with transverse sticks overhead, to train the fast climbing vines, and support the mass of foliage.