PEPPER AS AN INTERCROP IN COCONUT LANDS

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Pepper is an important crop in Sri Lanka. About one-fourth of the total production is consumed locally. Since pepper fetches a high price the coconut planters are keen to grow this as an intercrop. Small holders make use of jak, arecanut and capok trees as supports to grow pepper as a home garden crop. When pepper is planted systematically, 3 kg. of black pepper could be obtained annually from a single adult vine which could be valued at Rs. 200/-. In an acre of coconut, 500 pepper vines could be established. Research data gathered over a period of 8 years on pepper grown on glyricidia supports as an intercrop have not shown any adverse effects on coconut yield.

Subsidy for growing pepper

A subsidy of Rs. 2,625/- per acre is given by the Coconut Cultivation Board for growing pepper as an intercrop in coconut lands. This is paid in three instalments of Rs. 1,750/-, Rs. 525/- and Rs. 350/- Before planting pepper, the Coconut Development Officer of your area should be consulted.

Areas suitable for growing pepper

Coconut lands in Colombo, Gampaha, Kegalle, Kalutara, Galle, Matara and Kurunegala (Mawathagama, Polgahawela and Melsiripura area) are suitable for growing pepper. The dry areas like Wariyapola and Nikaweratiya in Kurunegala district are not suitable for growing pepper.

In areas such as Kegalle, Rambukkana, Giriulla, Polgahawela, Melsiripura, Gampaha, Baddegama and Hakmana, pepper is grown successfully.

Selection of suitable coconut lands

(a) Soil type

Sandy or clayey soils are not suitable. Lands with loamy soils with organic matter are suitable. Experitments have shown that pepper could be grown successfully in sandy soils by filling the planting holes with gravelly loam soil before planting pepper. Further, the soil should have good moisture holding capacity with drainage to drain out excess water during rainy season.

(b) Slope of the land

In slopy lands the lower most area is not suitable since there will be water logging during rainy season. In such lands, the upper most area will be subject to moisture stress. Hence in slopy lands, intermediate areas should be selected for pepper cultivation.

(c) Age of the coconut plantation

Coconut palms between 15–45 years of age will be suitable. In 1–2 years old under plantations, many growers have successfully established pepper. Here the pepper rows are arranged to suit the under plantation.

Suitable varieties and planting material

Three varieties of pepper are available. The local variety is not suitable since the yield is low. A high yielding indigenous variety known as "Swarna Lanka" has been introduced by the Minor Export Crops Department but it is difficult to get adequate planting material of this variety.

Kuchin and Paniyur–1 are two varieties introduced to Sri Lanka. Leaves, fruit bunches and the seeds are smaller in Kuchin than in Paniyur – 1 variety. Both these varieties are suitable for planting in coconut lands. The required planting material could be obtained from Minor Export Crops Department nurseries at Rs. 1.50 per plant. In addition to this, planting material could be obtained from nurseries approved by the Minor Export Crops Department. The Coconut Cultivation Board nursery at Mattamagoda, Kegalle issues Paniyur – 1 and Kuchin variety. Further advice could be obtained from the Coconut Development Officer of your area. Cuttings with 3–4 leaves are selected for planting.

Planting in the field

(a) Marking and preparation of planting holes

Between two coconut rows, two pepper rows could be accommodated, and pepper could be planted in a triangular system. About 500 pepper plants could be accommodated per acre. By arranging the rows in the East-West direction maximum amount of sunlight could be obtained for the crop.

After every 5th row of coconut, an area should be left for the movement of carts and tractors. In this interspace only one row of pepper may be planted.

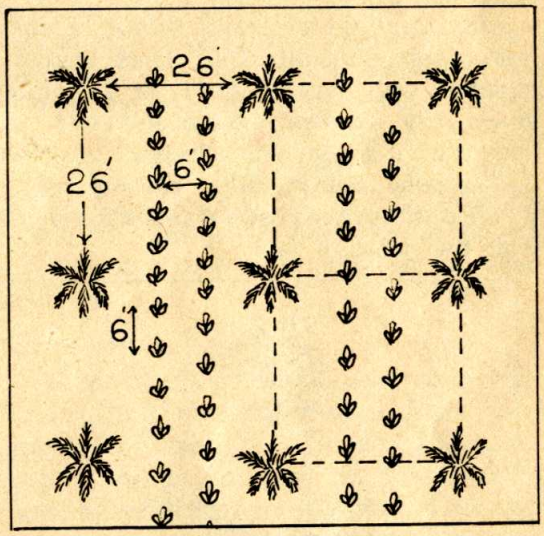
If the planting of the coconut plantation is irregular, it is difficult to plant the pepper vines in systematic rows. In such lands, pepper should be planted at least 2.6 m (8 ft.) away from adult palms. The minimum spacing between two pepper vines should be 2.0 m (6 ft.)

Some planters have planted pepper successfully in 2–3 years old under-plantations. When there are the old and new plantations, one row of pepper plants could be planted in the middle of two rows of young palms. Spacing between two pepper plants in a row should be 2.0 m (6 ft.). In such a plantation, removal of old palms should be done with care.

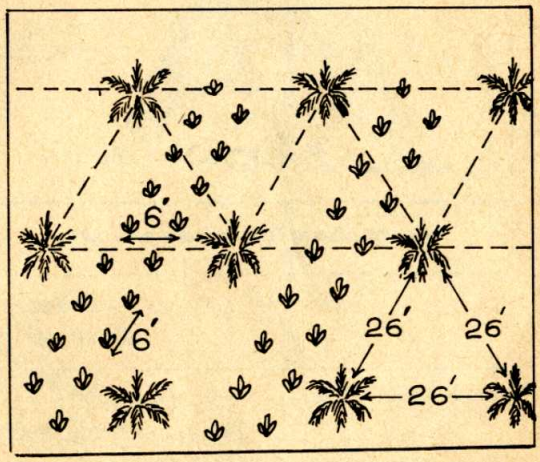
The size of the planting hole depends on the type of soil. For hard soils such as gravel, 60cm×60cm×60cm (2ft.×2 ft.×2 ft.) size pits are sufficient while for sandy loam soils, 45cm×45cm×45cm ($1\frac{1}{2}$ ft×$1\frac{1}{2}$ ft.×$1\frac{1}{2}$ ft.) size pits are sufficient.

(b) Planting

Planting should be done with the onset of April–May or September–October monsoonal rain. April–May monsoon is more suitable.



In coconut square planting.



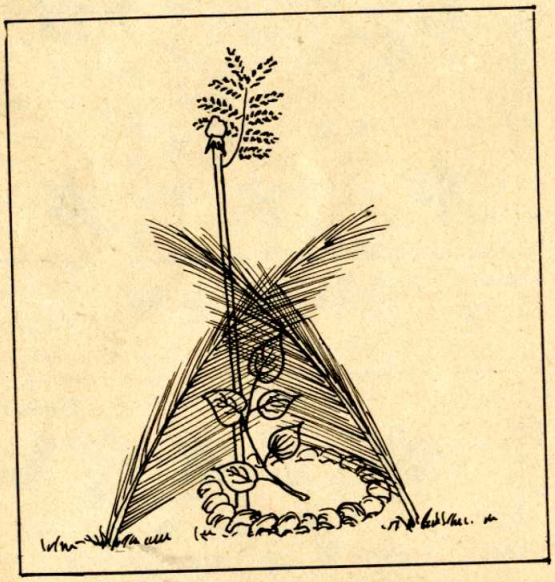
In coconut triangular planting.

After putting a layer of coconut husks at the bottom of the planting hole, it should be filled with surface soil mixed with cow dung. Add 60 g (2 oz) of rock phosphate to this soil mixture, for better root growth. Before planting, the polythene of the nursery plant should be removed.

In sandy soils pepper may manifest yellowing soon. The cause is nutrient deficiency due to leaching in sandy soils. In such situations, the planting holes should be filled with a mixture of gravel and clayey soil, before planting to improve nutrient retention.

(c) Mulching

After planting, the plants should be shaded from direct sunlight. The plants should be mulched with coconut husks or dry grass or straw. (vide diagram) Fibre dust should not be used since it accumulates moisture excessively, during rainy season, often causing root rot. If fibre dust has been used, it should be removed with the onset of rain.



Protect plants from direct sunlight.

(d) Filling vacancies

Some planting material should be kept for filling vacancies when need arises.

Maintenance of pepper

(a) Planting supports

Pepper vines require a support. Live supports or concrete or wooden posts could be used for this purpose. Concrete or wooden posts require a high capital outlay, therefore live supports are the popular ones. The easily available live support is glyricidia stakes. If glyricidia stakes are not easily available, capok stakes could be used.

Three metre (10 ft.) long mature glyricidia stakes should be planted 30 cm (1 ft) away from the pepper plant. The upper ends of stakes should be covered with a small amount of mud and a polythene cover to ensure better sprouting. Planting of live supports is recommended during the monsoon preceding the pepper planting monsoon. Thereby the sprouting of live supporting stake is ensured. Only 1–2 branches are allowed in the glyricidia support to prevent them from drying. When a branch spreads out, it is pruned during the rainy season. The pruned plant material is spread round the base of pepper vine to decay so that they will be recycled as plant nutrients to pepper vines. Unnecessary spreading branches of glyricidia supports should be removed so that completion and shade for pepper vines is minimised while keeping the supports alive.

(b) Use of fertilizer

Available organic and inorganic manures should be applied. Inorganic fertilizer mixture recommended by the Minor Export Crops Department (urea 4 parts by weight, rock phosphate 5 parts, muriate of potash 3 parts and kieserite 1 part) should be applied as follows:

	1st Year *Dose per vine*	*2nd Year* *Dose per vine*	*3rd Year & thereafter* *Dose per vine*
April–May Yala	125 g (4.4 oz) (Twice, during each monsoon)	500 g (17.5 oz)	700 g (250 oz)
Sept.–Oct. Maha	125 g (4.4 oz) (Twice, during each monsoon)	500 g (17.5 oz)	700 g (250 oz)

In the first year, fertilizer should be applied during the two monsoonal rains in 4 split doses while from the second year onwards fertilizer should be applied with the onset of the two monsoonal rainy seasons. If feasible application in four split doses could be advantageous.

After the third year and thereafter, the fertilizer mixture required for 100 pepper vines for each rainy season (Yala and Maha) is prepared by using the following formula.

	Kg.	*Lb.*
Urea (Nitrogen – 46%)	21.5	47.0
Rock phosphate (Phosphorus 28%)	27.0	59.5
Muriate of potash (Potassium 60%)	16.0	35.0
Kieserte (Magnesium – 24%)	5.4	12.0

Fertilizer should be applied on a moderately rainy day. It should be applied in a circle 15 cm (6 ins) away from the base of the vine up to a distance of 45–60 cm ($1\frac{1}{2}$ ft–$1\frac{1}{2}$ ft.) and forked into the soil. The manure circle should then be mulched with coconut husks.

In areas receiving heavy rains between two fertilizer applications, magnesium deficiency may occur. This is identified by yellowing of leaf. The area around veins may remain green. In order to correct this condition, 50 g of kieserite or dolomite should be applied round each pepper vine.

(c) Training vines and pruning

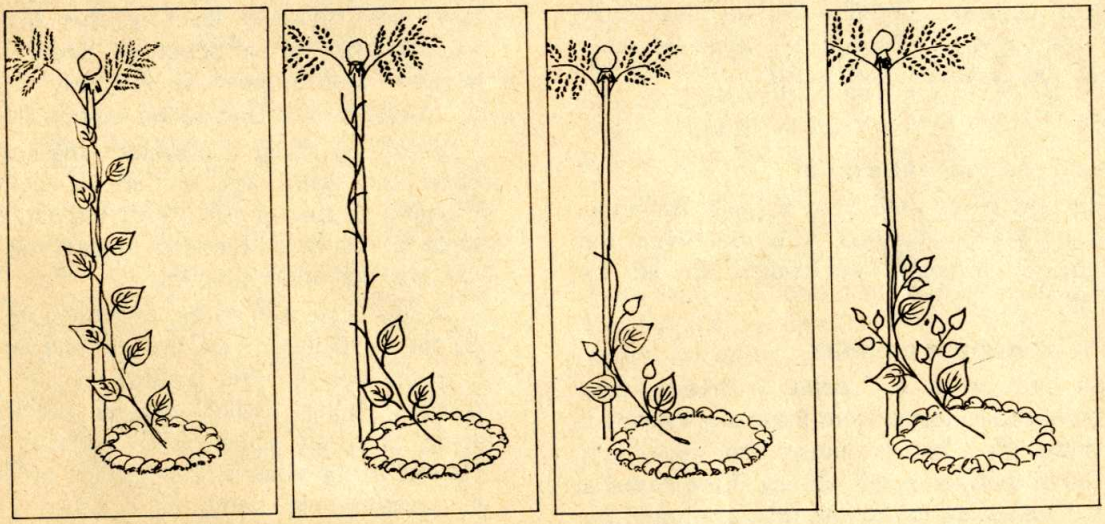
If the pepper vines are not pruned only one or two branches will grow along the support. Therefore in order to get a higher yield of pepper, pruning is very important.

Once 8–10 leaves are formed after planting, all leaves except the three lower most leaves should be removed. One week afterwards, the defoliated section of the vine is pruned. Then 2–3 branches will emerge. Once 8–10 nodes are formed in the newly formed branches, defoliation is done leaving the three basal leaves and a week afterwards, the defoliated section is pruned. Then from each of the pruned branches 2–3 vegetative branches will develop. Eventually, a single vine will have 7–9 branches (vide diagram). With banana strands or twine, the hanging vines should be tied to the support.

In order to control the height of pepper vine, the primary bud in each vine is removed after it has grown to 3 m (10 ft). In addition to this the unnecessary branches trailing along the ground should be removed at the time of fertilizing.

(d) Weed control

The popular method of weed control is by slashing and mammoty hoeing. After hoeing with mammoties to a distance of 3 ft. from the base of the pepper vine, the area should be mulched with coconut husks. The remaining area should be slashed. Mammoty hoeing the entire area is not advisable.



Training of peper vines.

Hoeing round the base of the pepper vines should be done with great care, since damage will either kill the vine or attract pathogenic fungi.

(e) Diseases and pests and their control

Diseases

1. Wilting disease

The parasitic fungus *Phytophthora palmivora* is the casual organism of this disease. The fungus causes a collar rot and the leaves turn yellow and are shed. Damage to the collar region and stagnation of water during rainy season are the main predisposing factors.

Vines that are affected by the disease should be removed and burnt. In order to prevent the healthy vines from getting the disease, 10% Bordeaux mixture should be applied from the base of the vine to a height of 30–45 cm (1–1½ ft). Five hundred grams of copper sulphate and 500g of slaked lime are taken separately into two plastic cans and to each of them 2.5 litres of water are added to dissolve. The lime solution is then added to copper sulphate solution while stirring the mixture with a stick.

As an alternative to Bordeaux mixture, any other copper fungicide available in the market can be used.

2. Small leaf disease

In this disease, the leaves become abnormally small. The leaves turn yellow with clear veins. Fruit production will be reduced rapidly. This is due to a virus. In order to control the disease, cuttings should never be taken from diseased vines for propagation. Diseased vines should be removed and burnt.

Pests

1. Leaf eating caterpillar

This pest is reported from Kegalle, Rambukkana and Mawanella area. After identifying the damage, a systemic insecticide should be applied.

2. Plant Hopper damage

The damage is noticeable in heavy rainy season and is reported from Southern Province. When the plant sap is sucked the leaves curl up. The primary buds will dry up. If the damage is widespread, systemic insecticides should be sprayed.

(f) Harvesting

There are two harvesting seasons – May–June and December–January. A bigger crop is expected in the Maha season. As production of black pepper is popular in Sri Lanka, well mature fruit bunches are harvested. Harvesting should be done when 1–2 fruits in a bunch turn reddish. The bunches are hand picked. Care should be taken not to detach the vine from the support when picking. For harvesting pepper from tall vines, specially constructed wooden scaffolding should be made use of

Harvested bunches are kept in a room for 1–2 days, and the pepper fruits are separated from the bunch stalks by trampling. Thereafter the fruits are sum dried to produce black pepper Immersion of bunches for 2 minutes in water at 80° c is often done to reduce the period of drying. The fruits are then either sun dried or dried with hot air.

(g) Income

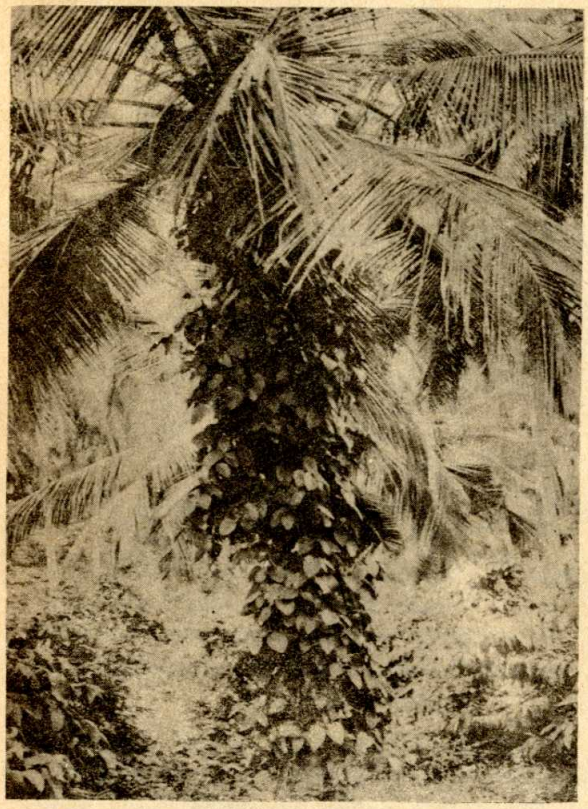
From a 5–6 years old vine, 2–3 kg. of black pepper could be obtained annually. The present price of 1 kg. of black pepper is Rs. 100–115. Therefore a single pepper vine can produce black pepper worth Rs. 250/- annually.

(h) Planting pepper using coconut palms as supports

This is popular among the coconut growers in Rambukkana, Mawanella, Kegalle and Kakmana area. This method has not shown any adverse effects on coconut. In gravel lands with low moisture level, pepper grows less successfully on productive coconut trees, whereas the pepper vines grow better on unproductive coconut palms with small crowns.

Before adopting this system, the soil conditions and palm age should be considered. Planting pepper vines to very old, tall coconut trees is not recommended since they will be removed for under planting.

In this system, planting holes should be dug 60 cm. (2 ft) away from the coconut palms and a single pepper vine planted in each of the planting holes. Other cultural practices are same as given earlier. Live supports are not planted as the vines will be trained on coconut. In areas where bamboos are used to pick coconuts the pepper vines are allowed to grow



unchecked for harvesting pepper with bamboo (geta unagaha). For such palms, a specially constructed ladder is necessary for harvesting. In the Southern Province where palms are climbed to harvest, pepper vines are restricted to grow up to 7.0 m (20 ft). Vines growing more than this height are kept pruned. It is necessary to apply fertilizer to both coconut and pepper.

Coconut palm as a supporter.