PACKAGE OF PRACTICES
FOR
PEPPER

ICAR

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Kerala

PEPPER

The black pepper is the dried berry of a perennial climbing vine, *Piper nigrum* (Family Piperaceae). It is one of the earliest known spices of India. Indian pepper has had a prominent place in the world markets from very early times till the beginning of the 19th century, when Indonesia and Malaysia started pepper cultivation on a large scale.

The total world production of pepper is estimated at around 1,02,700 tonnes of which India's share is about 25% During 1972-73, India exported nearly 26,200 tonnes of pepper valued at Rs. 14.8 crores. The Indian black pepper is considered to be superior in quality to that produced in other countries and consequently fetches a higher price in international markets. The principal buyers of Indian pepper are the USSR, USA, Italy, and Canada.

Pepper is cultivated mostly in the submountainous tracts of the Western Ghats. Kerala is the most important pepper producing state accounting for almost 96% of the country's production. Karnataka and Tamil Nadu make up the rest.

Pepper is grown almost throughout Kerala. In Karnataka, it is confined to the districts of South Kanara, North Kanara and Coorg, and in Tamil Nadu to Nilgiris and Kanyakumari districts.

CLIMATE AND SOIL

Pepper is a plant of the humid tropics. An annual rainfall of over 250 cm is ideal for its cultivation. Pepper, can, however, come up in areas of lower rainfall also

provided it is evenly distributed throughout the year. It can tolerate a temperature of 10-40°C. Pepper is grown from almost sea level to an altitude of 1,200 m. Pepper thrives best on virgin soil rich in humus. Though the soils best suited for this crop are the clay loams, it is widely grown on red loams and sandy loams overlaying the lateritic hill slopes of the Western Ghats. When grown on slopy land, the slopes facing south should be avoided and the north and north-eastern slopes selected for planting so that the vines are not subjected to the scorching effect of the southern sun during the summer months.

PROPAGATION

Pepper is propagated best from cuttings of the runner shoots which originate at the base of vines. Cuttings from lateral fruiting shoots from the top portion of the vines can also be used for planting. Vines raised from the latter start bearing from the second year and produce a satisfactory crop by the fourth year, but they are short-lived. Further, it may not also be desirable to take large numbers of cuttings from these fruit-bearing lateral shoots as this will affect the yield of the plant adversely.

Cuttings for planting should be collected only from high yielding and healthy vines possessing desirable characters. The runner shoots of selected vines are kept coiled in the forks of 2 or 3 sticks fixed in the ground near the vine to prevent the shoots from coming into contact with the soil and striking roots. These shoots are separated from the vines in February/March and 2-3 node cuttings are planted in suitable nursery beds or polythene bags or bamboo baskets filled with fertile soil and given partial shade. They will soon strike roots and become ready for planting in May/June.

If the soil in the nurseries is infested with the root knot nematode, *Meloidogyne incognita*, the rooted cuttings will also get affected by them. Such infected seedlings are characterised by poor growth and their roots will show the characteristic knot-like protrusions. This can be easily prevented by disinfesting the potting mixture by methyl bromide @ 500 g per tonne of soil under a polythene cover for 24-48 hr.

SEASON AND PLANTING

Pepper is grown both as an intercrop and as a pure crop. Large scale cultivation of pepper is done on the hill slopes using special standards as in Cannanore district of Kerala and South Kanara district of Karnataka. It is cultivated as an intercrop of jack, mango, coconut, and arecanut with these plants as standards. Pure crops of pepper found typically on hill slopes of North Kerala use mostly *Erythrina* as standard.

Pepper is generally planted with the onset of the south-west monsoon. Pits of 0.5 m cube are dug at a spacing of 3-4 metres. With the first rains in May-June, primary stems of *Erythrina indica* ("murikku" in Malayalam) raised from seeds are planted for standards. Certain other trees like silver oak, and *Garuga pinnata* "Karayam" are also used. With the onset of the monsoon 2 or 3 rooted tings are planted individually in small pits of about 30 away from the base of the standards. At least one node the cutting should go below the soil. Pepper plants are ded when they are young.

CULTURAL PRACTICES

As the rooted cuttings grow up, they should be tied to the standards as often as required till the vines get established themselves on the standards. The young pepper vines should be protected from heat and sun during the summer months by providing them with artificial shade if necessary. Excessive shading during flowering and fruiting affect the yield adversely. It is also said to favour the incidence of the "pollu" flea-beetle. Regulation of shade by lopping the branches of standards is, therefore, essential.

Cultivation of the soil is important in pepper, particularly since it is grown as a rainfed crop. Usually 2 diggings are given during August-September and October-November. They are either done around the vines to a diameter of about 2 metres or for the entire area. The vines are also earthed up at this time. On the hill slopes digging of the soil will expose it to soil erosion and, therefore, soil conservation measures like contour bunding or terracing should be adopted. Growing of a cover crop is the cheapest and best method of preventing soil erosion. In such cases digging may be done only around the vines. Planting of leguminous cover crops like *Calopogonium muconoides* is recommended under the west coast conditions to prevent soil erosion. Sown with the summer showers in April-May, this plant provides an effective cover all over the area with the onset of monsoon rains. During summer, the crop dries off leaving a thick mulch. It gets incorporated in to the soil during rainy season and a self-sown cover crop is again obtained in the subsequent year.

MANURING

Since pepper is a perennial vine and continuous cropping over a number of years can result in depletion of

soii fertility and consequent decline in yield, it is necessary to fertilise the crop regularly and judiciously. Every pepper vine may be manured with about 9 kg of well rotted cattle manure or compost as basal dose and 200 g N, 160 g P_2O_5 and 60 g K_2O annully in 2 split doses when they are 3 years old and with smaller graded doses when young. The manures should be applied around the vine at a distance of about 30 cm and depth of about 15 cm and lightly forked into the soil. Application of lime at the rate of ½-1 kg per vine during April-May in alternate years will also be beneficial.

VARIETIES

Pepper occurs as pure male or female plant or as a bisexual one. Pure male plants are met with in wild forms only. A few of the cultivated types occur only as pure females. Most of the cultivated varieties are bisexual. They however show differences in the relative amounts of male and female flowers in their spikes. The bisexual varieties are the ideal ones for planting and the unisexual ones like 'Uthirankotta' and 'Karuvilanchi' may be avoided.

More than 75 different varieties of pepper are known to be cultivated in our country. Each tract has its own selection of popular varieties. The most common varieties of pepper cultivated in the northern region of Kerala are 'Kalluvalli', 'Balankotta', 'Kottavalli', 'Karinkotta', 'Cheriakodi', and 'Uthirankotta'. Among them, 'Kalluvalli' (a hardy and drought resistant variety) and 'Balankotta' (predominantly bisexual and a regular and high yielder are the most popular varieties. The south Kerala region has nearly a dozen popular cultivated varieties, the common ones being 'Cheriakaniakadan', 'Valiakaniakadan', Karimunda', 'Narayakodi','Chola', 'Kottanadan', Kuthiravalli',

'Karuvilanchi', 'Chumala' and 'Perumkodi'. Among them. 'Karimunda' and 'Kaniakadan' are the most popular ones- The commonly cultivated varieties of Karnataka are 'Malli, gasara', 'Doddigya' and 'Arasina Moratta'.

A hybrid variety 'Panniyur-I', has been evolved at the Pepper Research Station, Panniyur, Kerala State. Its parents are 'Uthirankotta', a north Kerala variety (female) and 'Cheriakaniakadan', a popular south Kerala variety (male). It combines all the desirable characters of the two parents. It can give 3-4 times the yield of other varieties. It is also early bearing in that it begins to yield from the second year of planting. It also possesses a wide adaptability. A progeny orchard for the large scale multiplication and distribution of planting materials of this hybrid variety has been established at the District Agricultural Farm, Neriamangalam (Idikki district, Kerala State).

PESTS AND DISEASES

Pests: So far, 20 insects have been recorded as pests of pepper in India. The most important ones are the 'pollu' or flea beetle *(Longitarsus nigripennis* Mots.*)*, the top shoot borer *(Laspeyresia hemidoxa* Meyr.*)*, the marginal gall forming thrips (*Gynaikothrips karnyi* Bagnall), and the scale insect (*Mytilaspis piperis* Green).

1. Pollu beetle (*Longitarsus nigripennis* Mots.): The grubs of the flea beetle feed on tender berries and make them hollow. Such infested berries are seen as small dark berries on spikes. The adult beetle lays eggs in shallow depressions on tender berries. The grubs feed on the contents of berries. One grub can destroy 3-4 of them. Fully grown

grubs fall into the soil for pupation. The damage caused by the 'pollu' beetle may be as higher as 30-40% in certain areas.

Cultural operations like raking the soil beneath the vines may be effective in reducing pest infestation. Application of insecticides to the soil controls the grubs when they fall on the ground for pupation. The earlier recommendation for the control of this pest was spraying with 0.2% DDT twice a year in July and October. In view of the high residual toxicity of DDT, other insecticides like quinalphos and dimethoate were also tried and are found to be very effective.

2. Top shoot borer (*Laspeyresia hemidoxa* Meyr.): The caterpillars damage terminal shoots by boring into them. It results in the drying of the terminal shoot. The incidence of the pest is more when the vines put forth new shoots. Spraying the vines with parathion 0.025% is effective in controlling it.

3. The marginal gall forming thrips (*Gynaikothrips karnyi* Bagnall): The thrips make marginal galls on leaves within which they live in colonies. Because of their feeding, the leaf tissues become thickened and in severe cases of infestation, the whole leaf gets a crinkled appearance and the growth of vines will be affected. Spraying with 0.025% parathion or 0.05% malathion controls this pest.

4. Pepper scale (*Mytilaspis piperis* Green): It appears as small dark grey boat-shaped encrustations on the main stem and leaves. Badly infested vines dry up gradually. Nursery plants and young vines are often killed after severe

infestation by them. Application of organophosphorus insecticides including systemic ones is effective in controlling them.

Other pests like mussel scale (*Lecanium marsupiale* G.) and the mealy bug (*Pseudococcus virgatis* Ckll.) may also at times cause substantial damage. They suck up the sap and weaken the plants. Spraying with 0.025% parathion is effective in controlling them.

DISEASES. The important diseases of pepper are (1) quick wilt caused by *Phytophthora palmivora* var. *piperis*, (2) slow wilt caused by *Fusarium* sp., and (3) 'pollu' disease caused by *Colletotrichum necator*.

1. Quick wilt: The disease is caused by a fungus *Phytophthora palmivora* var. *piperis*. It is a serious disease of pepper in Kerala. It occurs during the south-west monsoon period. The infection appears as water-soaked lesions on the main vines at 25-30 cm above ground level. The infected tissues decay, the leaves turn flaccid and pale and fall off. The lesions then spread downwards and affect the roots. The vines die within 10-21 days of infection. The disease can be prevented by 2 sprays of 1% Bordeaux mixture, before the onset of the south west monsoon and north east monsoon, particularly on the collar region and basal portion of the vines up to one metre above ground level.

2. Slow wilt: The disease is caused by a fungus *Fusarium* sp. The disease appears from September and often takes a heavy toll of the vines. The attack is mainly on the roots. The leaves gradually turn pale yellow and fall off. It takes usually 3-4 months from the time of appear-

ance of the initial symptoms to the death of vines. Application of ceresan wet, O.1% to the root zone, helps in controlling the disease. Recently, the association of a burrowing nematode, *Radopholus similis* has been reported with the disease. Hence a control schedule incorporating nematicides is being worked out.

3. Pollu disease: It is caused by a fungus *Colletotrichum necator*. It first appears in September-October. The affected berries show water-soaked brown coloured sunken and linear patches in the early stages. The discolouration gradually enlarges in size. The berries split and the fungus fructifies on the surface. Such berries then turn black in colour and dry prematurely. The disease can be controlled by spraying with 1% Bordeaux mixture.

Other diseases of minor importance are the red rust caused by *Cephaleuros parasiticus*, anthracnose caused by *Collectotrichum* sp., and 'damping off' in nursery caused by *Rhizoctonia solani*. The red rust and anthracnose are controlled by spraying with 1% Bordeaux mixture and the damping off by treating the nursery beds with O.1% ceresan wet as a soil drench.

HARVESTING AND CURING

The pepper plants flower in May-June and light rains during this period are considered beneficial for fruit set. It takes 6-8 months from flowering to ripening. The harvesting is usually done from November to February in the plains and a couple of months later in the hills. It is done when the first berries are separated from the spikes by

rubbing them between the hands or trampling them under the feet. After separation, the berries are dried in the sun for 7-10 days until the outer rind of the berry turns black in colour and shrunken in size and gets the characteristic wrinkled appearance of the commercial black pepper.

The white pepper of commerce is prepared by removing the outer rind and the pulp below it from the berries before their drying. For this, spikes with fully ripened berries are collected in gunny bags and steeped in flowing water for about 7 days. The soft outer rind of the berries is then removed by rubbing them with hands in a bucket of water. The seeds are then cleaned by washing with fresh water. They are then dried for 3-4 days by which time they become somewhat dull in colour. The produce is further cleaned by winnowing and again polished by rubbing with a cloth. The recovery of white pepper is about 25% of ripe berries while that of black pepper is about 33%.

YIELD

Although the vines begin to yield from the third year onwards, they become fully bearing only in the seventh or eighth year. One hectare of the crop yields about 600-800 kg black pepper which can be considerably increased with high yielding varieties and adoption of better management practices. The yield begins to decline after about 25 years. Under favourable conditions they may even live upto 60 years.