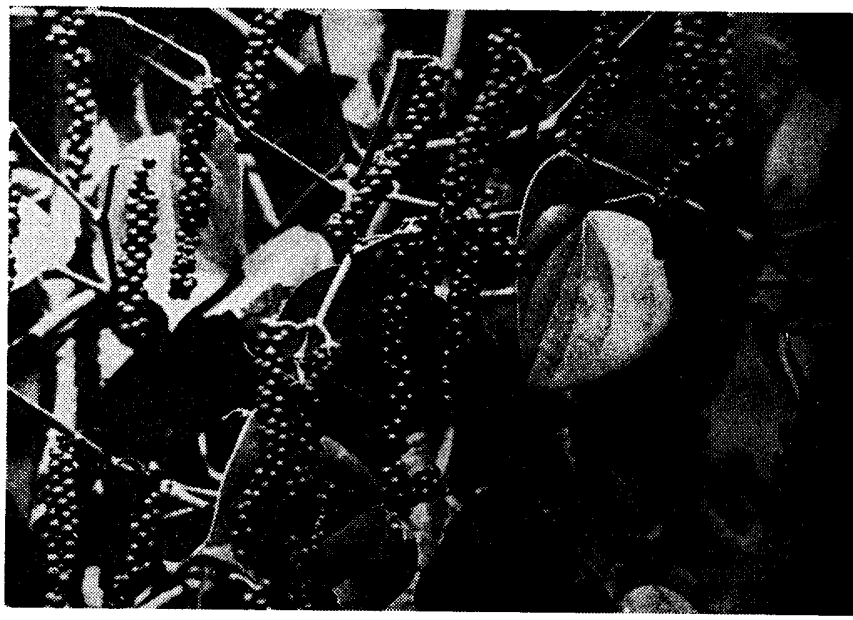
RP 1



The high-yielding pepper Panniyur-1 is capable of giving three to four times the yield of common local varieties.

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# ADVANCES IN SPICES RESEARCH

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DURING the year 1970, the export of spices accounted for 39 crores of rupees. Of this, 40% was accounted for by black pepper, 29% by cardamom, 10% by turmeric, 7% by ginger, 3% by chillis and 12% by other spices and curry powder.

There are innumerable problems facing the spices industry and trade in India which have adversely affected the production in recent years. The major factors are poor genetic stock, failure in modernisation of cultivation practices as well as plant protection measures. The ICAR had financed a number of *ad hoc* research schemes for improvement of spices industry. Valuable results have been obtained from these research schemes operated at various centres under the aegis of different organisations. The All India Co-ordinated Project which has come into operation from 1st October, 1970 is aimed at tackling the problems facing the spices industry and increasing production of commodities.

### Pepper

Pepper is the most important and earlier known spices of India which is considered to be the 'King of spices'. Indian pepper had had a prominent place in the world market till the beginning of the nineteenth century when Indonesia, Malaya, Sarawak and other far eastern countries started pepper cultivation on a commercial scale. India produces about twentysix thousand tonnes of pepper annually and bulk of the produce, i.e. nearly eighteen thousand tonnes, is exported.

Studies made on different aspects of pepper cultivation during the past two decades have yielded valuable information. A varietal collection comprising 69 varieties and types from India, Ceylon and Indonesia is being maintained and evaluated at the Pepper Research Station, Panniyur, Kerala. A new hybrid variety called Panniyur I (Photo above) has been evolved using

*Cheriyakaniakadan* and *Uthiramkotta* as male and female parents respectively. Panniyur I is a high yielder capable of giving 3-4 times the yield of the common local varieties. It is an early bearer which begins to yield from the second year of planting if properly looked after. The quality of Panniyur I is good and it compares very well with all other indigenous and exotic varieties. This has been found suitable for different agro-climatic conditions. The hybrid comes up well under east coast conditions as well and very good plantations of Panniyur I have been raised by Andhra Pradesh Forest Department.

Propagational trials have shown that planting rooted cuttings is the most efficient method for getting successful establishment. There is no valid data regarding manurial requirement of the crops. However, based on the available information, the manurial schedule recommended now is 100 g N, 160 g $P_2O_5$ and 60 g $K_2O$ in addition to 9 kg of well-composed farmyard manure or compost per vine per year. Application of lime at the rate of ½-1 kg per vine during alternate years is economic.

The 'pollu' flea beetle—*Longitarsus nigripennis* and 'wilt' diseases are the important menaces affecting pepper cultivation. The grubs of this small shining yellow flea beetle bore into, and feed within the berries making them hollow and dry. One grub destroys nearly 3-4 berries. D.D.T. 0.2% spray twice a year (July and October) is recommended for the control of this pest. In view of the high residual toxicity of DDT and such other chlorinated hydrocarbons, alternative insecticides which are efficacious in controlling this pest as also other pests affecting the crop are to be tried. Field trials using modern insecticides are being laid accordingly. The slow wilt caused by *Fusarium* sp., and *Diplodia* sp. and quick wilt by *Phytophthora palmivora* var. *pipins* are the two most important diseases of pepper, causing a great threat to pepper industry particularly in North Kerala. The slow wilt can be controlled by drenching the soil around the root zone of the affected vines with 0.1% ceresan wet. Preliminary studies on quick wilt disease have indicated that application of 1% Bordeaux mixture twice before the South-west and North-east monsoons respectively and drenching the soil with 0.1% wet ceresan wet after the receipt of South-west monsoon are effective.

Further collection and evaluation of germplasm are to be made to select high-yielding varieties resistant/tolerant to diseases and pests and exploitation of hybrid vigour by hybridisation and selection and evolution of new varieties. Pepper being a cross-pollinated crop, propagated vegetatively by cutting, it is possible to exploit the locked up variations and select superior types by screening large number of seedlings raised from each variety. While breeding new varieties, care should be taken for higher quality of the produce. Being an export-oriented crop, export market preference should be given priority in the breeding programme. Being a dry crop subject to heavy incidence of pests and diseases, evolution of an integrated method of control for combating them in combination with foliar application of nutrients has got wide scope.

Detailed investigations on the nutritional requirements are yet to be carried out. Experiments to determine the nutrient requirement of pepper, with live and dead standard, invite immediate attention. The quality of pepper in relation to fertilizer application and at different stages of growth and development of the berries is worth investigating.

**Cardamom**

Cardamom (*Elettaria cardamom*) known as the 'Queen of spices' occupies an important position as the second largest foreign exchange earning spice crop next only to black pepper. India is the important supplier of cardamom to the world market. The most popular varieties grown are Mysore, Malabar and Vazhukka. The larger cardamom of commerce, *Amomum sabulatum*, is cultivated in Assam and Bengal regions.

Realising the importance of the crop in the national economy, a survey and study of cardamom was initiated at Singampatti with the assistance of ICAR in 1940. Subsequently, in 1950s, ICAR sanctioned schemes for intensive study in Mudigere and Pampadumpara. Very valuable investigations have been initiated at these centres and valuable information gathered on flowering, fruit-set, cultural requirements, nursery technique, and pest and disease control. Survey, collection and evaluation of germplasm received top-most priority in these stations. 'Hema' series 1 to 12 evolved at Mudigere, seven selections at Pampadumpara, 5 selections at Appangala and Singampatti two selections, namely S. 71 and S. 81 were found to be high yielders. S. 71 was found suitable for low rainfall areas. The average yield on plantation scale works out to not more than 25 kg/ha, whereas these selections are able to give three-four-fold the yield under proper management. The quality of the fruit is also very high. Intra-and inter-varietal hybridisation attempted at Singampatti have also yielded a few hybrids which are under trial. The impact of research at these centres was not very much on production probably due to lack of co-ordinated effort to utilise the results of research.

Widespread occurrence of 'Katte' disease has considerably affected the productivity of cardamom. Earlier studies have shown that the disease is of virus origin and tramsmitted by banana aphid *Pentalonia*

*nigronervosa*. Recent studies at Mudigere have shown that the spread of 'Katte' is internal rather than external. The spread of the disease within a plantation is more associated with vector activity rather than vectorial population. Investigations at Indian Institute of Horticultural Research, Hessarghatta, showed that a total of 13 aphid species including *Pentalonia nigronervosa* act as vectors of the virus. An isolate of 'Katte' agent has been found to be sap transmissible passing on to cowpea and crotalaria. If further investigations confirm these findings, it would prove very useful for evolving cross protection tests. Effective control of the disease can be obtained by spraying with a systemic insecticide like Dimethoate (Rogor) or Phosphamidon (Dimecron) at 0.05%; complete removal and destruction of diseased plants along with rhizomes; removal of partially decayed pseudostems after harvest, removal of alternate hosts like wild *Amomum* plants, avoiding gap filling by clonal material, and replanting with 'Katte'-free seedlings after a lapse of three months. Diseases like clump rot in the high ranges of Kerala, and nursery leaf spot caused by *Phyllosticta elettariae* in Mysore State for which effective control measures are yet to be evolved.

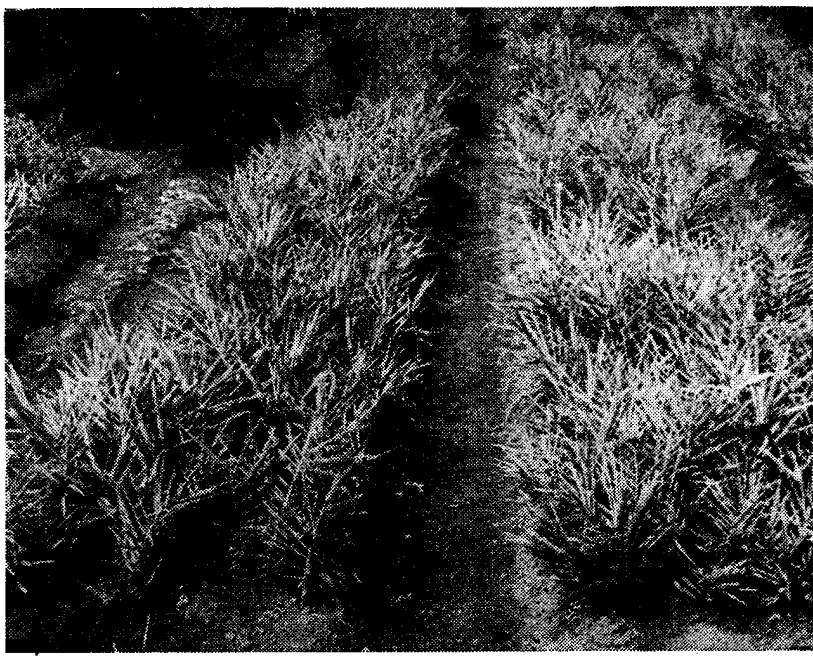
Among the pests affecting cardamom crop, the most important and destructive is cardamom thrips *Taeniothrips cardamom* which infest the inflorescence stalk, flowers and tender fruits. As a result of this damage, the inflorescence stalk gets stunted, flowers fall, and the capsules get malformed. Dusting with 10% BHC at monthly intervals was recommended. But in recent years the control of this pest has become highly complex because this treatment does not give satisfactory control of the pest. Field trials using different insecticides are now in progress.

Other pests of economic importance include the hairy caterpillars *Eupterote canariea*, *E. cardamomi*, *Lenodera vittate*, etc. stem and capsule borer, *Dichcrocis punctiferalis*, the rhizome weevil *Prodioctes heematicus*, etc. Integrated control schedules including biological control have to be worked out.

### Ginger

Another important spice crop is ginger. India accounts for more than 50 per cent of world production. Other important ginger growing countries are Taiwan, Jamaica, Africa, Australia, Mauritius, etc. Among the exotic and indigenous varieties, Maran, Nadia, Thingpuri, Narasapattam and Wynad Manantoddy were found to be high yielders. The yield and recovery percentage of dry ginger in different varieties are given in the Table below.

Ginger requires heavy manuring. Application of 25—30 tonnes of well decomposed cattle manure or compost per hectare at the time of planting and 300 kg ammonium sulphate, or other nitrogenous fertilizers on an equivalent basis, 375 kg superphosphate and 250 kg muriate of potash are applied as basal dressing at the time of planting and remaining ones in two split doses. Mulching of beds with green leaves is an important and essential operation. The beds are to be weeded and earthed up twice during the manurial application.



Ginger

| *Variety* | *Yield '000 kg/ha* | *Percentage of dry ginger to green ginger* |
|---|---|---|
| Rio-de-Janeiro | 17—23 | 16.25 |
| China | 13—18 | 17.00 |
| Maran | 17—23 | 22.00 |
| Nadia | 17—23 | 20.00 |
| Thingpuri | 17—23 | 20.00 |
| Narasapattam | 16—20 | 21.09 |
| Wynad Manantoddy | 12—18 | 17.08 |

Among the pests affecting ginger, the most important is shoot borer—*Dichocrocis punctiferalis*. Spraying the crop with 0.03% endrin at monthly intervals, 2 to 3 times from the second month after planting, controls the pest. The most important disease of ginger is the soft-rot or rhizome rot caused by *Pythium* sp. and *Sclerotium* sp. Drenching the soil with cheshnut compound or Dithane Z-78 at 0.15% concentration is found to control the disease effectively.

RP-1

Turmeric

*Problems which require further studies*

1. Evolving new high-yielding varieties having low fibre content, high recovery of dry ginger and high oleoresin content.
2. Standardisation of agro-techniques for different agro-climatic regions including the determination of optimum seed rate and spacing for high-yielding varieties.
3. Influence of intercropping on yield and quality of ginger and its economics.
4. Ginger is generally harvested at eight months' stage of growth. Yield and recovery of dry ginger are found to be better at this stage. Recent studies have indicated that the recovery of oleoresin is more in rhizomes harvested at 5 months stage of growth. Detailed investigations to determine the correct stage of harvest for different purposes in relation to yield and economic return to cultivators require immediate attention.
5. Utilisation of starch from spent ginger and isolation of protein for industrial use.

**Turmeric**

Turmeric is a tropical crop cultivated from almost sea level to 1200 m in places of moderate rainfall. India is one of the leading turmeric producing countries of the world. India produces annually 1.4 lakh tonnes and out of these, 0.11 lakh tonnes are exported every year.

The most important varieties are 'Duggirala', 'Tekurpeta', 'Kasturi', 'Pasupu', 'Armoor', and 'Chaya Pasupu'. Selection work carried out at the Turmeric Research Centre, Duggirala and Anantarajapet in Andhra Pradesh, resulted in isolation of four promising long-duration types, viz. Cll. 324, 325, 326 and 327 and one clone (Cli 317) in medium-duration types and one short-duration type (Ca. 73). The long- and medium-duration varieties come under *Curcuma longa* and short duration variety under *Curcuma aromatica.*

Like ginger, turmeric is also exacting in its manure requirements. Usually 40—50 tonnes of farmyard manure is applied at the time of land preparation. Chemical fertilizers like 60 to 100 kg each of N and $P_2O_5$, and 120 to 200 kg $K_2O$ per hectare are applied in split doses as in the case of ginger. Two mulchings with green leaves may be done at 12.5 metric tonnes per hectare.

Among the diseases, leaf spot (*Colletotrichum capsici*), leaf blotch (*Taphrina maculans*) and rhizome rot (*Pythium* sp.) are the important ones. Spraying the crop with 1 per cent Bordeaux mixture is recommended to control the foliage diseases, and drenching the soil with 0.3 per-cent cheshnut compound to control rhizome rot.

Among the pests, the shoot borer *Dichocrocis punctiferalis*, the leaf roller *Udaspes folus*, the rhizome scale *Aspidiotus harti* are the important ones. Other pests like *Panchaetothrips indica*, hairy caterpillar *Diacrisia obliqua* and leaf beetles *Lema* Spp. have also been recorded. Spraying 0.05 per cent Dimecron was found effective in controlling shoot borer attack. The foliage pests can be controlled with 0.025 per cent Parathion spray.

Wide variations are available in the indigenous material for duration, yield, colour, curcuma content and curing percentage. Extensive collection of germplasm, screening and selection based on yield, quality and resistance to pests and diseases is the immediate necessity.