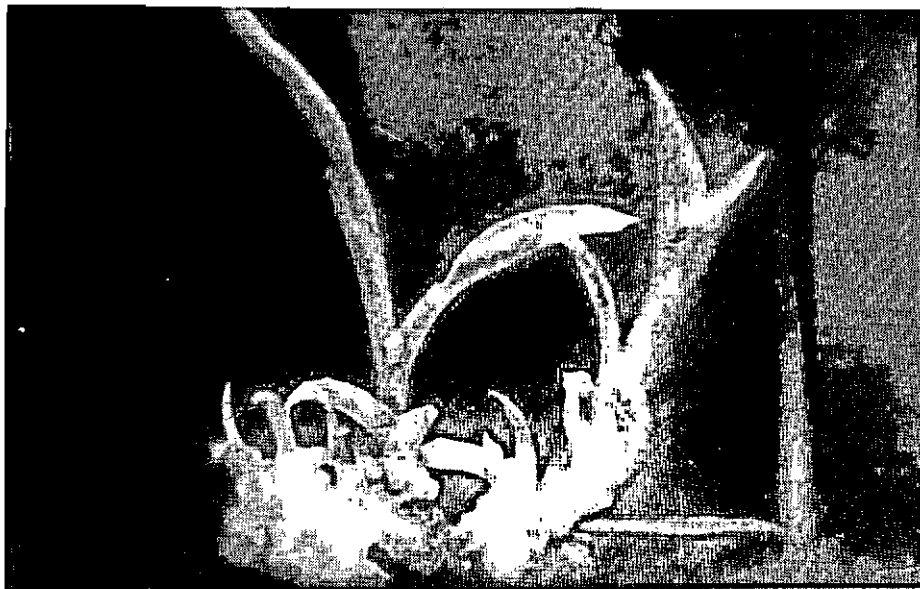


RESEARCH HIGHLIGHTS 1988-'89



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NATIONAL RESEARCH CENTRE FOR SPICES

CALICUT, KERALA, INDIA

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Cover photo :

Above : Shoot regeneration from callus in ginger

Below : 'In vitro' rapid multiplication of ginger

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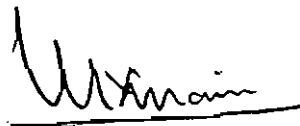
INTRODUCTION

The National Research Centre for Spices, Calicut was established during 1986 by merging the erstwhile Regional Station of Central Plantation Crops Research Institute at Calicut and Cardamom Research Centre at Appangala. The crops dealt by the NRCS include black pepper, cardamom, ginger, turmeric and tree spices like cinnamon, nutmeg, clove and allspice. The headquarters of the All India Co-ordinated Research Project on Spices is also at Calicut which is co-ordinating the research work carried out on spices including minor spices in the Co-ordinating Centres.

The 29 Research Projects on these crops are arranged under ten mega projects which are multi-disciplinary in nature. Some of the major achievements during 1988 include establishing the role of *Phytophthora capsici* also in the causation of slow decline of black pepper, enrichment of germplasm of spice crops, identifying high yielding Karimunda selections, control of leaf gall thrips in black pepper etc. Another achievement which deserves special mention is the substantial yield increase of cardamom (778 kg/ha) in demonstration plots by utilising the technologies developed by the Cardamom Research Centre at Appangala.

During the year NRCS organised the IPC Workshop on Joint Research for the control of black pepper diseases in which scientists working on black pepper diseases from Malaysia, Indonesia and India participated. Dr. Peter H. Tsao the well known authority on *Phytophthora* also participated as a special invitee of the Indian Council of Agricultural Research.

The achievements made under different research projects during 1988 are given in brief in this publication.



Kasaragod
31 March, 1989

(M. K. NAIR)
Director
Central Plantation Crops Research Institute
Kasaragod

PHYTOPHTHORA AND NEMATODE DISEASES OF BLACK PEPPER

Feeder root damage by *Phytophthora* on black pepper was observed to cause declining symptoms such as yellowing, defoliation and drying of the entire vine or part of the vine. Drying of the vine is proportional to the root damage. Such vines can live for more than two rainy seasons until root infection culminate in collar infection.

Performance of two open pollinated lines of black pepper P 1352 and P 24 in hot spot area for *Phytophthora* infection at Sirsi, Uttara Kannada, Karnataka is promising.

Black pepper berries collected from Metalaxyl (ridomil-ziram) treated vines, four months after the second spray did not show detectable levels of metalaxyl residues.

A baiting technique using *Albizia falcataria* leaflets as baits to isolate *Phytophthora* from black pepper soils has been developed.

GERMPLASM IN SPICES

Black pepper

Eighty four collections were added to germplasm of pepper. Two hundred and eight accessions were planted at N R C S Appangala.

Ginger and turmeric

Ten collections of turmeric and 28 collections of ginger collected from Wynad were added to the germplasm.

In the multilocation trial PCT-13 and PCT-14 gave a mean yield of 25.7 and 24.1 kg per 3×1m bed respectively compared to local (13.9 kg per 3×1m bed).

Cardamom

All the cardamom accessions assembled at NRCS, Appangala were found to be susceptible to 'Katte' virus in green house screening.

Tree spices

Clove seeds could be preserved in moist charcoal medium for 2 weeks after collection, without any loss of viability.

A wild nutmeg (*Myristica andamanica*), having long and oval seeds, was added to the germplasm.

BREEDING FOR HIGH YIELD AND RESISTANCE TO PESTS AND DISEASES

Black pepper

Karimunda selection Nos. 88 and 24 were the most promising among the 1st batch of 100 selections as per this year's yield data.

QUALITY ANALYSIS

Black pepper

Quality evaluation of 35 germplasm accessions indicated that accessions 10, 12, 22, 23, 30 and 31 contained high piperine (5.6–6.0% w/w), Acc. 12 contained high oleoresin (15.5% w/w) and accession 2 contained high essential oil (6.9% v/w). Among the 48 Karimunda

selections, selection 18 contained high piperine (6.7% w/w), Selections 12, 131 and 156 contained high oleoresin 13.3-14.73% and selection 109 contained high essential oil 5.5% (v/w).

Cardamom

Among the 33 germplasm accessions Acc. No. 2 had the highest husk to seed ratio, accession No. 71 contained high oleoresin 6.9% (w/w), accession Nos. 69 and 154 contained high essential oil 8.3% v/w. Accn. No. 44 had high flavour ratio of 1.11.

NUTRITIONAL REQUIREMENT AND CROP MANAGEMENT

Black pepper

In the spacing cum varietal trial using RCC poles as standards, during the third year of bearing, Karimunda under the spacing of 2.5m x 1.5m (2600 vines/ha) gave a mean yield of 1962 g of green pepper per vine followed by Panniyur 1 with 1590 g green pepper per vine at the same spacing. In Aimpriyan, the spacing of 3m x 3 m (1100 vines/ha) gave an yield of 1199 g green pepper/vine.

The effect of slow release nitrogenous fertilizers on the release pattern of urea-N in a laterite soil showed that application of neem coated urea followed by urea form resulted in the highest content of urea-N, ammonical and nitrate nitrogen in the soil. The total N content in the soil and leaf tissues were also high due to application of neem coated urea. The application of neem coated urea resu-

lted in the production of more laterals and more number of spikes per laterals in Panniyur-1.

DROUGHT TOLERANCE IN BLACK PEPPER

Characterisation of ten popular cultivars of black pepper viz., Karimunda, Aimpriyan, Kottanadan, Kalluvalli, Kuthiravally, Narayakodi, Thommankodi, Arakkulamunda, Neelamundi and Panniyur-1 have shown good relationship between depleting soil moisture and physiological parameters like stomatal resistance and leaf water potential. The study indicates the relative drought tolerance of cv. Kalluvally followed by Aimpriyan.

Ten Karimunda selections were screened for their tolerance to depleting soil moisture content. Based on the visual observation on wilting Selection No. 69 was found to be relatively tolerant.

PEST MANAGEMENT

Black pepper

Studies on the population dynamics of gall thrips *Liothrips karnyi* conducted at Kalpetta indicated that the pest population was high during June-August and low during December-March.

The population of the common predators *Montandoniola moraguesi* and *Androthrips flavipes* was high during August-September and July-September, respectively. Fourth instar nymphs of *M. moraguesi* consumed 2-3

larvae of gall thrips per day. Second stage larvae of *A. flavipes* consumed 4-7 eggs of gall thrips per day.

Field trials conducted with six insecticides for the control of gall thrips indicated that spraying of monocrotophos or dimethoate (0.05%) was effective in controlling the pest infestation.

The predatory thrips recorded on *Lepidosaphes piperis* was identified as *Aleurodothrips fasciapennis*. The predatory mite which was found to attack *Lepidosaphes piperis* and *A. destructor* was identified as *Bdella* sp.

DISEASE MANAGEMENT

Nematodes in cardamom

i) Pathogenicity trial

The P1 suckers inoculated with *Meloidogyne incognita* showed significant reduction in the number of tillers and total number of leaves, six months after inoculation.

Rhizome rot of cardamom

Survey conducted in 73 plantations in Coorg revealed that rhizome rot is a problem in only few pockets. The incidence varied from 0.2 to 47% in various plantations. Upto 12% yield loss was estimated due to rhizome rot in the severely infected plantations.

BIOTECHNOLOGY

Ginger

Callus was produced using vegetative bud, ovary and pseudostem as explants on MS modified medium with 2-4 D.

Organogenesis and plantlet formation were obtained from the calli derived from both vegetative bud and ovary on MS modified medium with low concentration of 2-4D and high concentration of BAP.

Cardamom

One thousand one hundred and fortyfive tissue culture plants were transferred to soil vermiculite mixture for hardening in the laboratory and subsequently to the cage house for further acclimatization.

PRODUCTION OF PARENTAL MATERIALS

Black pepper

About 4200 rooted black pepper cuttings of high yielding selections of Karimunda and Kottanadan were supplied to the developmental agencies for multiplication and distribution to the farmers.

Turmeric

About 2000 kg of elite seed material of turmeric was supplied to various Government agencies and farmers.

TRANSFER OF TECHNOLOGY

Training programmes

Training programmes on production technology, nursery techniques in black pepper and cardamom and Katte disease management were organised during 1988. 140 officials from various Government agencies, 11 progressive farmers from Uttara Kannada, Karnataka and 9 students from Allahabad Agriculture University participated in the training.

A Kisan mela was conducted at NRCS, Cardamom Research Centre, Appangala, wherein over 250 farmers participated.

High production technology in cardamom

In the pure stand of cardamom plantation an average yield of 778 kg/ha was obtained which is about 13 times more than the national average of 60 kg/ha.

In the mixed cropping trial with Robusta coffee an yield of 1400 kg dry cardamom/per ha was recorded during 1988.

WORKSHOP ON BLACK PEPPER DISEASES

An International Pepper Community Workshop on joint research for the control of black pepper diseases was organised by National Research Centre for Spices, (ICAR) in collaboration with IPC and was held at Goa during 27-29 October 1988. The meeting gave an opportunity for the scientists working on black pepper diseases from Indonesia, Malaysia and India to discuss and exchange views on various disease problems of black pepper and future strategies of disease management. The major decisions taken include (i) the quick wilt or foot rot of black pepper shall be named as '*Phytophthora foot rot*' and the yellows disease or slow wilt as slow decline (ii) use *Phytophthora capsici* for black pepper *Phytophthora* instead of '*P. palmivora*' MF₄. (iii) evolving superior genotypes with high degree of disease resistance and productivity and (iv) to layout uniform trials for the disease.

management for all the member countries of I.P.C. Dr. P.H. Tsao, Chairman, *Phytophthora* Committee, International Society for Plant Pathology and Professor of Plant Pathology, University of California, Riverside, U. S. A. participated in the workshop and delivered a special lecture on the taxonomy of black pepper *Phytophthora*.

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON SPICES

Black pepper

Two cultures of black pepper viz., No. 239 & 331 have been identified as high yielders and are under pre-release testing at Panniyur. Fertilizer application have been standardised at Panniyur centre as 50:50:200 gm NPK/vine/year.

Cardamom

High density plantings with 1.8m x 0.9 m and 1.8 m x 0.6 m were found beneficial. Cultures PV-1 from Pampadumpara and P-1 have been recommended for release as varieties in Kerala and Karnataka respectively.

Ginger

A Selection from High Altitude Research Station, Pottangi with an average yield of 16.6 tonnes fresh rhizomes/ha; 4.4% crude fibre and 1.9% essential oil was released as a variety 'Suprabha'.

The minimum weight of ginger seed rhizome has been standardised to be 20 gm/piece.

Intercropping ginger with french bean was found profitable in Koraput district of Orissa.

Seed treatment with Captafol (0.2%) or soil drenching with Dithane M-45 (0.3%) decreased the post emergence rot of ginger.

Turmeric

Turmeric selection PTS-10 from High Altitude Research Station, Pottangi, with an average yield of 20.7 tonnes fresh rhizomes/ha; 9.3% curcumin and 4.2% essential oil has been released as 'Roma'.

Cumin

Cumin Selection UC-19 from Rajasthan Agricultural University Jobner with an average yield of 7 Q/ha; 2.6% volatile oil; better grain quality and tolerance to wilt has been released as new variety Rz-19.

Another selection EC 109635 from Jagudan has exhibited tolerance to cumin wilt.

Coriander

Several selections like RCr, 41, UD-40, Co-2 and CS-287 have been found promising in different centres.

Fennel

Fennel selection VC-14-3-3 from Gujarat Agricultural University, with an average yield 7 Q/ha; 2.6% volatile oil has been released as Gujarat Fennel-1.

Fenugreek

A dual purpose variety viz. Co-1 has been released in Tamil Nadu which gives 4 tonnes of greens/ha and 5-6 Q grains/ha.

The causal organism of root rot of fenugreek has been identified as *Rhizoctonia solani*.