



# CSIR COMPLEX PALAMPUR

## A PROFILE



CSIR Complex Palampur is the youngest R&D establishment of the Council of Scientific & Industrial Research (CSIR). In seventies, the Govt. of Himachal Pradesh took initiative for having a CSIR laboratory in the state. Subsequently, CSIR appointed an Expert Committee with Prof. A. K. Sharma as the Chairman. This committee recommended that since Himachal has vast potential for exploration and systematic utilization of natural resources; a National Laboratory of CSIR could be set up at Palampur. Subsequently, Prof. Nurul Hasan, the then Vice President of CSIR, laid the foundation stone of this Complex on 2nd July 1983. With a modest beginning from a small rented building and a skeleton staff, the laboratory shifted to the present building on 1st June 1986. Today the Institute has 23 scientists, 21 technical assistants, 28 supporting personnel and over 48 field staff. Located in an area of 227 acres, in the back-drop of snow clad Dhauladhar hills; the laboratory provides congenial environment for multi-disciplinary research in the frontier areas of plant sciences.

There are four major scientific departments in the Institute, viz., (a) Hill Area Tea

Science, (b) Floriculture, (c) Biotechnology, (d) Natural Plant Products. There is also a unit for Technology Transfer and Marketing to disseminate and propagate the developed technologies.

The laboratory has made significant impact particularly for revival of Kangra tea industry and creating an awareness for floriculture industry in Himachal Pradesh. The cultivation of scented flowers and other aromatic plants has also been successfully promoted in the state.

*Some of the significant achievements are as under:*

### TEA

The improved agro-technology for management of tea gardens, promoted by this laboratory, resulted in an increase of tea production from 6.77 lakh kg in 1985 to 12.00 lakh kg in 1992. China hybrid tea plants (nearly 150 years old) are today yielding up to 14000 kg of green leaf per hectare per year. This is due to improved techniques of pruning, plucking, transplantation, disease weed & pest management; and nutrient application, developed and introduced



by this laboratory. With this success story behind, this Institute has now been approached by U.P. Govt. for developing tea industry in Uttar Pradesh.



The tea scientists and technologists of this laboratory are now tackling the problems of diseases, pests, weeds and computerization of process management. Software packages, for designing irrigation channels and making fertilizer recommendations, have been developed. Investigations are being conducted on tea blister blight, including axenic culturing of the pathogen, ultra structure of host-parasite relationship, chemical control of the disease and its effect on tea quality. Cultural growth conditions of primary root rot pathogens have been optimized with an objective of developing immuno-diagnostics. Mosaic disease has been found to be associated with virus particles. A technique for chemical control of weeds, including *Lantana camara*, in tea plantations has been developed. Spectrophotometric analyses of endosulfan, dimethoate and ethion for estimating residues in made tea are being conducted. The laboratory has developed a germplasm collection of 246 accessions. These are being characterized and evaluated for quality, and resistance to biotic and abiotic stresses. A set of 76 selected accessions is currently under field trial for evaluating their yielding ability and performance.

Technologies for tea processing and making superior quality black tea have also been developed. Polyphenol oxidase of floral parts of tea plant has been found to be a useful biochemical marker for characterizing different clones and genetic stocks. A NADP<sup>+</sup> dependent geraniol dehydrogenase was detected in tea shoots and the regulatory properties of phenylalanine ammonia lyase (PAL), purified from tea shoots, have been studied. Tea concentrate with typical aroma and a basal concentrate, that can be blended with other flavours for a variety of cold beverages, have been developed.

## FLORICULTURE

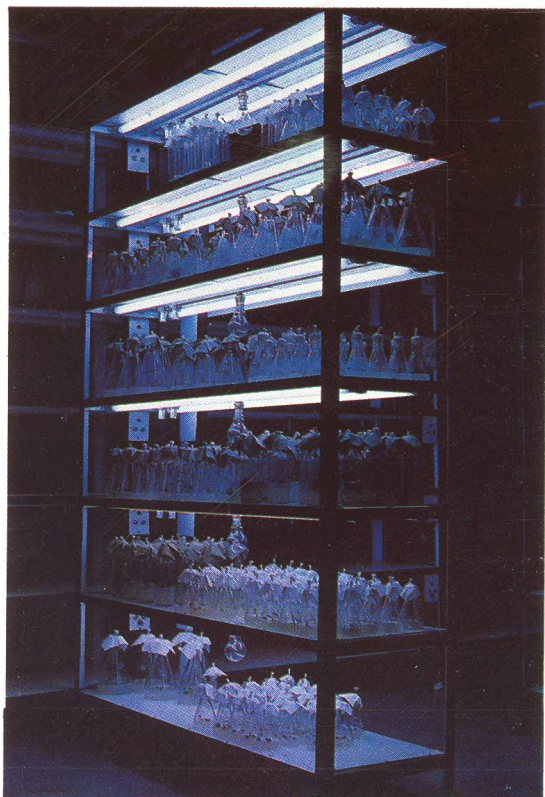
A germplasm collection with more than 200 accessions of Gladiolus, Chrysanthemum, Rose, Carnation, Lilies, etc., with recent addition of 10 accessions of Tulips from Holland, is being maintained and evaluated. Agrotechniques for year-round production of Gladiolus, Carnation and Chrysanthemum have been developed and successfully taken up by four farmers around Palampur. It is now possible to supply these flowers in the off-season (April-December), for marketing in plains and bringing higher returns to the growers of Himachal. A hybridization programme in Gladiolus has been taken up; 436 F<sub>1</sub> hybrids; superior in colour and vigour have been selected for further tests. Similar efforts are being initiated in Tulips.





Low cost polyhouses suitable for use by small growers have been designed and tested. Five species of sub-temperate weedy/wild plants are being domesticated for use as ornamentals. Chrysanthemum virus-B has been isolated from cv. Shyamal. A comprehensive technique for production of Bean Yellow Mosaic Virus free gladiolus plants and virus free Carnations has been developed. A bio-control agent *Galerucella placida* Baly for controlling *Polygonum* sp. a major weed of Himachal Pradesh has been identified.

## BIOTECHNOLOGY



The techniques for micro-propagation of tea have been successfully standardized. Direct and profuse somatic embryogenesis from cotyledonary explants of tea has been obtained. Somatic embryos of tea were encapsulated in sodium alginate beads and made into synthetic seeds, which successfully germinated under controlled conditions, and these plantlets were transferred to field/pots. Multiple shoot formation from nodal segments and rooting of tea shoots have been obtained. A highly branched variant of tea has been identified and this character has been retained in four subsequent subcultures. This has a great potential in enhancing the productivity of tea because of increased numbers of tender pluckable shoots.

Complete *in vitro* regeneration of plants in Maggar bamboo (*Dendrocalamus hamiltonii*) has been achieved using juvenile tissue from elite clones. Six plants are now ready for transfer to field. Such physiologically young plants, when grown over a large area in the state, will save the bamboo crop in Himachal Pradesh, when rest of the clumps will die due to gregarious flowering -- a process, which already seems to have begun.

Physiological basis of bud break in tea, breaking dormancy in Gladiolus, and prolonging shelf life of fruits/fruit juices and cut-flowers are being studied, with use of chemicals like menadione, cobaltous chloride, etc.

## NATURAL PLANT PRODUCTS

Western Himalayas including the hills of Himachal Pradesh are rich in medicinal/aromatic plants, some of which need to be explored and utilized. The climate is congenial for cultivation of *Rosa damascena*, *Lavandula* (Lavender) and other plants like *Polianthes tuberosa* (tuberose). Naturally growing plants of *Tagetes minuta*, *Jasminum grandiflorum* and *Cestrum nocturnum* also have great potential.





With the technologies developed at this Laboratory, the cultivation of *Rosa damascena* has become highly profitable yielding up to Rs. 45000/- per ha, after second year of planting. Nearly 25 acres of *Rosa* plantation has come up in Himachal Pradesh during the last 3-4 years. Small farmers and mahila mandals have also taken up income generation programme through raising *Rosa damascena* and *Tagetes minuta*. The laboratory provides all the help for agrotechnologies and extraction of rose oil/rose water to the growers. Chemical evaluation of rose and *Tagetes* oil was carried out and seven new compounds were identified in *Tagetes* oil.

### TECHNOLOGY TRANSFER & MARKETING

The Technology Transfer and Marketing Group provides agrotechnology and processing technology to the needy farmers. The technological support has been provided to 1660 tea growers, 50 scented rose farmers and 2 flower growers in Himachal Pradesh. Twenty seven 5-Year Technology Demonstration Plots on tea agrotechnology have been completed, 10 are under progress and 9 are being taken up, in the tea growers' fields. Advisory visits by scientists were extended to crop growers besides distributing advisory bulletins, and organizing training programmes, workshops, seminars and exhibitions for the farmers. The Institute has supplied 50,000 plants of scented rose; 75,000 tea plants and tea cuttings; and 24,000 bulbs, corms and rooted cuttings, and 52 kg cormels of commercial ornamental plants to farmers. In addition to catering to the technological needs of small farmers of Himachal, the Institute also provided consultancies to big tea growers in U.P., Darjeeling, and Assam, as well as to entrepreneurs of other crops outside Himachal.

### BIODIVERSITY

The valleys of Kangra and Kullu have rich and diverse flora. Many of these are unknown while others are becoming extinct due to over exploitation. An inventory of plants in the region is being prepared. A floristic survey of Palampur zone revealed the occurrence of about 370 species belonging to 76 families and 260 genera. *Crassocephalum crepidioides* (Benth.) S. Moore has been recorded for the first time from Himachal Pradesh. Plant species (trees and shrubs of ornamental and medicinal value, herbaceous plants for soil conservation, industrial oil bearing properties and biomass production for energy)

have been identified and techniques for their cultivation, care and preservation are being developed.

A community programme to preserve the plant diversity using scientific knowledge as well as traditional methods has been initiated with the help of three Non-Government Organizations (NGOs) in this region.



The laboratory is well equipped with many sophisticated instruments like FTIR, GCMS, HPLC, Liquid scintillation counter, Ultracentrifuge, ELISA, etc.

This small laboratory hence, is poised for innovative research and technology development programmes for raising the level of hill economy so that these can compete or even surpass the industrially rich plains. The dedicated team of scientists, with quest for excellence, are fully confident to achieve this in near future.

For further information, please contact:

Prof. Akshay K. Gupta

Director

CSIR Complex

Palampur

Himachal Pradesh

Pin- 176 061 INDIA

Phones: 01894 - 2340 (Off.)

2045 (Res.)

Grams: CONSEARCH PALAMPUR

Fax: 91-1892-4113