



3. INTRODUCTION

The Institute

The Central Institute for Subtropical Horticulture (CISH) was started as Central Mango Research Station on September 4, 1972 under the aegis of the Indian Institute of Horticultural Research, Bangalore. The Research Station was upgraded to a full-fledged Institute and named as Central Institute of Horticulture for Northern Plains on June 1, 1984. The Institute later renamed as Central Institute for Subtropical Horticulture (CISH) on June 14, 1995, is serving the nation on different aspects of research on mandated subtropical fruits.

The Institute has two experimental farms, one at Rehmankhara approximately 25 km away from the city and the other at Rai Bareli (R.B.) Road, in the city of Lucknow. The experimental farm at Rehmankhara has an area of 132.5 ha comprising 4 blocks (block I-15.5 ha, block II-35.5 ha, block III-37.42 ha & block IV-44.08 ha) and R.B. Road campus has an area of 13.2 ha. In order to meet the emerging challenges in frontier lines of research on subtropical fruits, the Institute has modern nursery facilities, well established orchards fully equipped laboratories and persistent endeavours for human resource development for capacity building. A trainees hostel-cum-guest house is located at R.B. Road Campus for accommodating farmers, trainees and experts.

The Institute has in place MoUs to facilitate capacity building avenues with Allahabad Agricultural Institute (Deemed University), Allahabad, APS University, Rewa, Babasaheb Bhimrao Ambedkar University, Lucknow, Bundelkhand University, Jhansi, and Lucknow University, Lucknow for pursuing M.Sc. and Ph.D. degrees of their students at this Institute. Institute has also been recognized by IGNOU, New Delhi as one of the study centres for offering one year Diploma Course on value added products from fruits and vegetables. National Horticulture Mission has also identified the Institute as nodal centre for imparting training on rejuvenation of old and senile mango orchards and meadow orcharding in guava.

The QRT, while reviewing the progress made by the Institute, has recommended to modify the mandate

and objectives of the Institute to focus on select major and minor subtropical fruit crops.

Mandate

To undertake basic and applied research to enhance productivity and develop value chain for major and minor subtropical fruits.

To act as national repository of above fruit crops.

To act as a centre for human resource development and provide consultancy to stake holders.

To develop linkage with national and international agencies to accomplish the above mandate.

Objectives

Management of genetic resources of mandated fruit crops and their conventional and molecular characterization.

Crop improvement through breeding and genetic engineering.

Enhancing productivity through improving quality and quantity of planting material using modern propagation techniques and rootstocks, precision farming practices including mechanization and management of biotic and abiotic stresses.

Reduction in post-harvest losses through improved post-harvest management practices, value addition and diversification of products.

Human resource development, transfer of technology and evaluation of its socio-economic impact.

Data storage and retrieval on all aspects of mandated crops.

Past Achievements

Crop Improvement

The Institute has the world's largest germplasm collection of mango numbering 721 accessions,



collected from different indigenous and exotic sources.

A promising mango hybrid CISH-M-1 (Amrapali x Janardhan Pasand), which is a regular bearer having yellow colour with red blush, firm flesh and scanty fibres was released as 'Ambika'. It has good potential for domestic and export markets.

The regular mango hybrid H-39 (Amrapali x Vauraj), having yellow colour with red blush, firm flesh, high TSS (240 B) and high, carotenoids content was released as 'Arunika'.

The mango hybrid, 'H-1084', was found promising.

A regular bearing and high yielding clone Dashehari-51 has been released for commercial cultivation. It yielded 38.8 per cent higher than that of the normal 'Dashehari'.

Mango cv. 'Elaiichi' was found free from floral malformation and is being used in breeding programme.

A South Indian mango cv. 'Totapuri' was found regular bearer and good yields under Lucknow conditions. It may be cultivated in Northern India for its pulp consistency and blending purposes.

The Institute has 114 accessions of guava and 7 *Psidium* spp. maintained in its field gene bank.

Two open pollinated seedling selections of coloured guava, CISH-G-3 and CISH-G-4, have been released as 'Lalit' and 'Shweta' by the Institute for commercial cultivation. Fruits of 'Lalit' are attractive, saffron yellow with red blush, medium sized, firm and pink flesh. It gives 24 per cent higher yield than the popular variety 'Allahabad Safeda'. 'Shweta' has subglobose fruits with few soft seeds, high TSS (14°B) and attractive pink blush. It has good yield potential.

Institute has 54 accessions of bael maintained in the field genebank. Two promising selections 'CISH-B-1' and 'CISH-B-2' have good table and precise qualities.

The Institute has 32 collections of papaya, 35 of litchi, 35 of aonla, 7 of banana, 43 of jamun, 38 of khirnee, 30 of karonda, 24 of tamarind, 30 of mahua, 8 of chironji, 17 of woodapple, 10 of mulberry, 3 of cape gooseberry, 8 of custard apple,

2 of carambola, 3 of lasora and 2 of roseapple in its field gene bank.

Crop Production

Rejuvenation technique for old and unproductive mango and guava trees has been standardized and demonstrated at farmers' field.

Techniques for meadow orcharding and canopy management in guava have been standardized and recommended. Consequently, it has been adopted by farmers in Maharashtra, Haryana, Punjab, Rajasthan and Uttar Pradesh. About 400 ha area related to this technology has come up in different parts of the country.

Mango based cropping system has been developed and cowpea-potato system has been found to give higher monetary returns in 10 years old orchards.

Soil application of paclobutrazol @ 4 g tree⁻¹ (3.2 ml m⁻¹ canopy diameter) has been found to manage irregular bearing problem in mango cv. 'Dashehari' and has resulted in increased flowering and fruiting.

Soil application of 1kg each of N, P and K (tree⁻¹ year⁻¹) to 10 year old Dashehari mango trees increased the yield. Trench application of fertilizers around the tree in July has been found most efficient.

Two sprays of urea (10%) on guava cv. 'Allahabad Safeda' and 20 per cent on cv. 'Sardar' at bloom could cause flower drop and eliminate poor quality rainy season crop.

Planting papaya at a spacing of 2 x 1.8 m in the month of September gave the highest yield and good quality fruits.

Crop Protection

IPM modules for mango insect pests and diseases have been developed, standardized and disseminated amongst the clientele groups.

Entomogenous fungus, *Verticillium lecanii*, egg parasites, *Agrostocetus* spp., *Gomatocerus* sp. and *Polynema* spp., and predators, *Chrysopa lacciperda*, *Mallada boninensis* and *Coccinella septempunctata* were found potential biocontrol agents against hoppers.



Critical levels of weather parameters were identified for forecasting the epidemic of powdery mildew.

Mango bacterial canker disease (MBCD) could be checked by spraying of Streptocycline (200 ppm) at 10 days interval. Antagonists *Bacillus coagulans*, *Pseudomonas* spp. and *Acinetobacter* sp. were found potent bio-control agents for MBCD pathogen.

Post-harvest diseases of mango, viz. anthracnose and stem end rot could be controlled by dipping the fruits in 0.025 per cent carbendazim in hot water ($52 \pm 1^\circ\text{C}$) for 15 minutes.

Gliocladium roseum was found associated with guava wilt disease.

Aspergillus niger (AN17), *Trichoderma harzianum*, *T. viride* and *Penicillium citrinum* were found effective in integrated management of guava wilt.

A cross (F_1) between *Psidium molle* x *P. guajava*, identified as resistant rootstock against guava wilt, has been multiplied for large scale demonstration trials.

Four endophytic bacteria and lac based compounds were found effective against root-knot nematode, whereas the potency of entomopathogenic nematode has been demonstrated against insect pests under *in vitro* conditions.

Post-harvest Management

Maturity indices for commercially grown mango cvs 'Dashehari', 'Langra', 'Mallika', 'Amrapali' and 'Chausa' were worked out.

A simple low cost mango harvester with a harvesting capacity of 800 to 1000 fruits per hour was fabricated and demonstrated.

Three temperature gradients, viz. 12, 15 and 10°C , were worked out to enhance the shelf life of Dashehari, Langra and Chausa fruits up to 3, 2 and 3 weeks, respectively.

Uniform ripening of early harvested mangoes could be achieved by dipping of fruits in 750 ppm ethrel in hot water ($52 \pm 2^\circ\text{C}$) for 5 minutes.

Corrugated fiber board (CFB) boxes of 2 and 4 kg capacities were fabricated for packaging and transportation of mango and guava fruits.

Pre-harvest sprays of calcium chloride dihydrate (2%) at 10 days interval was found to check the jelly formation in mango.

Guava fruits cv. 'Allahabad Safeda' could be stored for 28 days at 5°C in 0.25 per cent ventilated LDPE bags.

Methodology for preparation of raw mango squash (panna) has been standardized.

Mango pulp sterilized at 75 to 78°C could be stored in glass jars successfully up to 12 months under refrigeration or with 1000 ppm SO_2 under ambient conditions.

Beverages prepared from blends of mango-pineapple (1:1), mango-pear (any ratio) and mango-papaya (2:1) were found acceptable.

Recipe for oil less mango pickle and sweet papaya chutney have been developed which could be stored for nine months safely.

The techniques for preparation of sweetened and brined (salted) aonla segments and cider (aonla and guava) have been standardized.

Methodology has been standardized for the preparation of *mahua* (*Bassia latifolia*) wine through alcoholic fermentation.

A good quality vinegar from mango peel could be obtained by use of *Acetobacter aceti*.

Transfer of Technology

Institute undertook implementation of sponsored training programmes on production, protection and post-harvest management of subtropical fruits for the benefit of orchardists and extension workers of various State Departments. Institute also provided training on different aspects pertaining to cultivation of mango and other fruit crops for scientists and development workers from within the country and abroad.

Library

The library of the Institute is well equipped having books, periodicals, reports, reprints and C.D. ROMS pertaining to relevant aspects of subtropical horticulture along with internet surfing, computer and reprographic facilities. Currently, the library has 3085 scientific and technical books and 7457 back volume of journals and subscribes 111 journals. Out of which



49 foreign journals are being subscribed as printed as well as Internet version. Additionally, 34 M.Sc. and Ph.D. theses related to Institute's mandate crops are also available. About 200 annual reports are received from ICAR Institutes/Universities/International Institutions on exchange basis. The library has also been automated through LS EASE software (Libsys) e-connectivity for accessing e-resources is also in place.

Art and Photo Cell

During the year, 4000 photographs were exposed and edited by image processing software for research and exhibition purposes. One hundred thirty-five charts/graphs, 90 posters and 470 labels/strips/nameplates were prepared depicting various research/

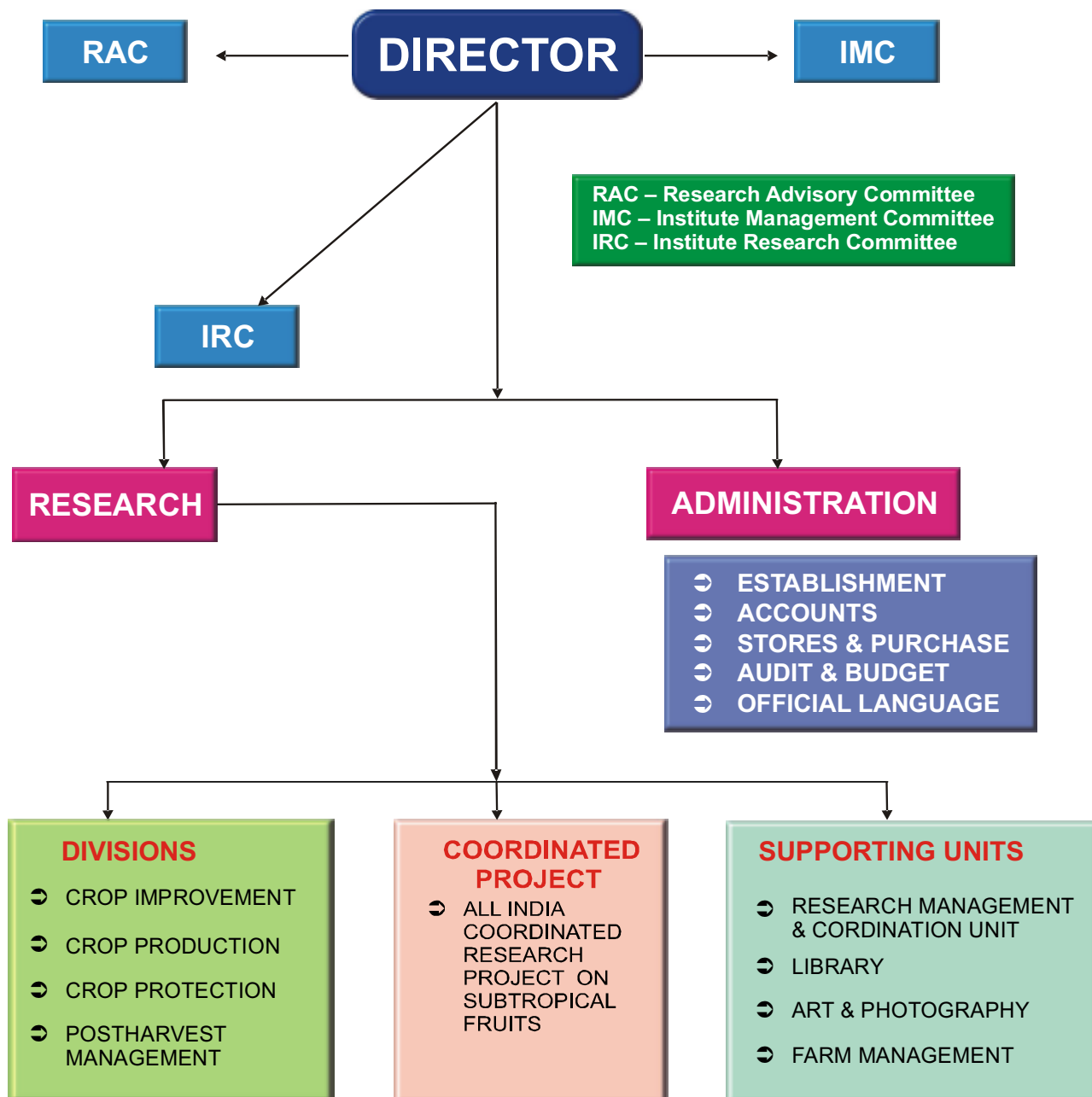
extension activities for publication of papers, technical/ extension bulletins and exhibitions.

Organizational Set-up

The Institute functioning is organized through four Divisions, *viz.* crop improvement, crop production, crop protection and post harvest management. It also houses the headquarters of the All India Coordinated Research Project on Subtropical Fruits. The complete organizational set-up of the Institute is shown in organogram. Apart from working in research specific areas, targeted programmes were also carried out through interdisciplinary approaches cutting across Divisional boundaries.



Organogram



Financial Set-up

Budget Allocation & Expenditure (2008-2009)

(Rupees in lakh)

Sl. No.	Head	Non-Plan		Plan		AICRP(STF)		A.P. Cess Funded Project		Externally Aided Projects		Revolving Fund Scheme	
		Budget	Expn.	Budget	Expn.	Budget	Expn.	Budget	Expn.	Budget	Expn.	Budget	Expn.
1.	a) Estt. Charges	794.00	794.02	-	-	207.34	207.34	5.25	3.70	56.50	30.20	-	-
	b) Wages	19.00	18.98	-	-	-	-	-	-	-	-	-	-
	c) OTA	0.15	0.15	-	-	-	-	-	-	-	-	-	-
2.	T.A.	6.50	6.50	10.00	10.00	4.31	4.31	2.25	1.50	7.00	5.70	-	-
3.	HRD	-	-	4.25	4.25	-	-	-	-	-	-	-	-
4.	Other charges including Equipments	120.00	120.00	210.75	210.75	38.35	38.35	4.67	2.05	115.07	74.38	26.79	10.70
5.	Minor Works	5.00	5.00	-	-	-	-	-	-	-	-	-	-
6.	Major Works			150.00	150.00	-	-	-	-	-	-	-	-
7.	<u>AR&M</u>												
	a) Residential Buildings	3.00	3.00	-	-	-	-	-	-	-	-	-	-
	b) Office Buildings	30.00	30.00	-	-	-	-	-	-	-	-	-	-
	TOTAL :	977.65	977.65	375.00	375.00	250.00	250.00	12.17	7.25	178.57	110.28	26.79	10.70





Revenue Receipts (2008-2009)

(Rupees in lakh)

1.	Farm Produce	15.66
2.	Sale of Products	1.26
3.	Sale of Publication/Tender Forms etc.	1.92
4.	Guest House charges/License Fee/ Rent	1.73
5.	Training / Consultancy	4.06
6.	Auction of Vehicle/ Other Machine tools	2.01
7.	Interest on 'P' Loans	5.38
8.	Interest on TDR	7.12
9.	Electric/Water/Transport charges	2.05
10.	Misc. Receipts	0.06
11.	Sale of Mango Harvester	0.13
TOTAL		41.38

Staff Position (as on 31.3.2009)

Sl. No.	Category	Sanctioned	Filled
1.	Scientific	47	38
2.	Technical	57	55
3.	Administrative	25	22
4.	Supporting	44	43
TOTAL		173	158

Staff Changes

Promotion

Scientific

- i) Dr. S.K. Shukla, Senior Scientist (Hort.) granted merit promotion to the post of Principal Scientist (Hort.) w.e.f. 01.04.2008.

Technical

- i) Shri Abhay Dixit, T-6 (T.O.) granted merit promotion to the post of T-7-8 (T.O.) (Lab) w.e.f. 01.07.2007.
- ii) Shri Sanjay Kumar, T-6 (T.O.) granted merit promotion to the post of T-7-8 (T.O.) (Lab) w.e.f. 01.07.2007.
- iii) Shri S. K. Arun, T-6 (T.O.) (Lab) granted one advance increment w.e.f. 01.07.2007.
- iv) Dr. Om Prakash, T-6 (T.O.) (Lab) granted one advance increment w.e.f. 01.07.2007.
- v) Shri Ramendra Tewari, T-5 (T.O.) granted merit promotion to the post of T-7-6 (T.O.) (Workshop) w.e.f. 01.01.2003.

- vi) Shri A. K. Singh, T-5 (T.O.) granted merit promotion to the post of T-6 (T.O.) (Lab) w.e.f. 24.02.2006.
- vii) Shri Ram Sharan, T-5 (T.O.) granted merit promotion to the post of T-6 (T.O.) (Lab) w.e.f. 01.01.2007.
- viii) Shri Prem Kumar, T-5 (T.O.) granted merit promotion to the post of T-6 (T.O.) (Photo) w.e.f. 24.02.2006.
- ix) Shri Bahadur Singh, T-5 (T.O.) granted merit promotion to the post of T-6 (T.O.) (Workshop) w.e.f. 01.01.2008.
- x) Shri R. P. Mishra, T-4 granted merit promotion to the post of T-5 (T.O.) (Driver) w.e.f. 01.01.2005.
- xi) Shri Ayodhya Prasad, T-4 granted merit promotion to the post of T-5 (T.O.) (Driver) w.e.f. 01.01.2005.
- xii) Shri Mashooq Ali, T-4 granted merit promotion to the post of T-5 (Workshop) w.e.f. 01.01.2005.
- xiii) Shri J.K.Khare, T-4 (Lab) granted two advance increments w.e.f. 01.07.2006.
- xiv) Shri C.P.Dwivedi, T-5 (T.O.) (Lab) granted three advance increments w.e.f. 01.07.2007.
- xv) Shri Chandra Bahar, T-4 (Workshop) granted two advance increments w.e.f. 01.01.2006.
- xvi) Shri Ram Dayal, T-3 (Lab) granted three advance increments w.e.f. 01.07.2007.

Administrative

- i) Shri A. K. Seth, Sr. Clerk promoted to the post of Assistant w.e.f. 01.12.2008.
- ii) Shri Vidya Sagar, Jr. Clerk promoted to the post of Sr. Clerk w.e.f. 22.07.2008.
- iii) Shri Vijendra Singh, Jr. Clerk promoted to the post of Sr. Clerk w.e.f. 01.12.2008.
- iv) Shri Satyawati Verma, Jr. Clerk granted ACP to the next higher grade w.e.f. 15.06.2008.
- v) Shri B. C. Lohani, Sr. Clerk granted ACP to the next higher grade w.e.f. 29.09.2008.

Supporting Staff

- i) Smt. Savitri Devi, S. S. Grade-I granted ACP scale to the next higher grade w.e.f. 17.07.2007.