T Damodaran[1]* and
Akath Singh

From orchard to opportunity: Building resilient and sustainable horticulture system

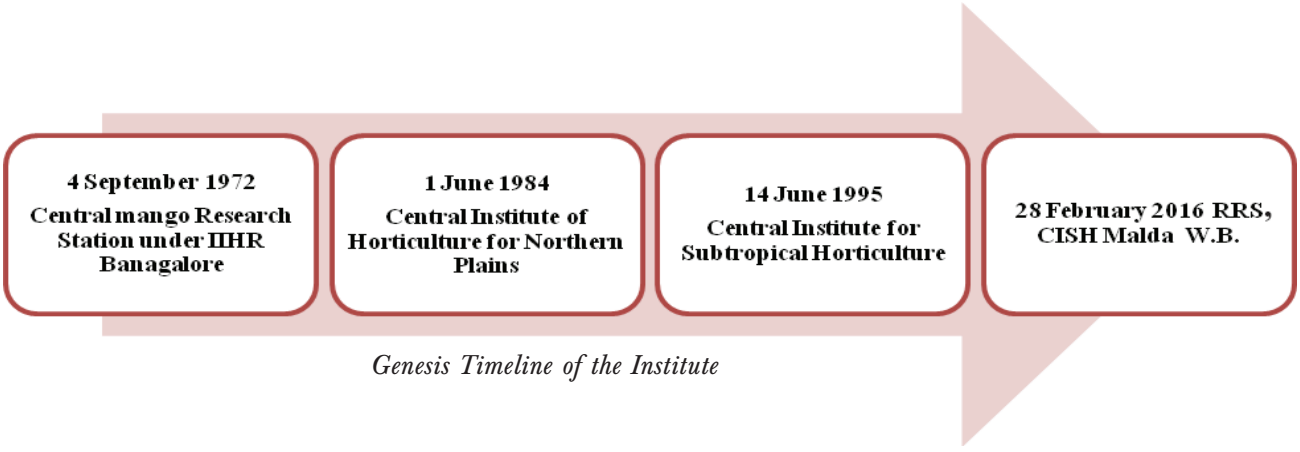
The ICAR–Central Institute for Subtropical Horticulture (CISH), Lucknow, is a premier research institute functioning under the Indian Council of Agricultural Research (ICAR), New Delhi. The institute has evolved over decades in response to the scientific, economic, and social needs of fruit growers in the subtropical belt of India. Its genesis, growth, and achievements are closely intertwined with the horticultural heritage of Uttar Pradesh, especially the Kakori–Malihabad region near Lucknow, which has long been celebrated as a cradle of mango cultivation, harbouring more than 30,000 ha of the GI-tagged *Dashehari* cultivar.

Keywords: *Dashehari,* Guava, ICAR-CISH, Kakori-Malihabad Region, Mango

THE origin of ICAR–CISH can be traced back to the early 1970s, a period when India was consolidating its agricultural research infrastructure following the success of the Green Revolution. Horticultural crops, particularly fruits, were increasingly recognized for their potential to improve nutritional security, generate higher farm income, and promote diversification in agricultural production systems. Recognizing the need for a dedicated centre for mango in the subtropics, ICAR established the Central Mango Research Station on 4 September 1972 at Rehmankhera, Kakori, which was later converted into a full-fledged research institute.

Evolution of ICAR–CISH: Linking scientific excellence with cultural heritage

The institute began functioning as a full-fledged ICAR institute with clearly defined objectives that included genetic resource conservation, crop improvement, production and protection technologies, post-harvest



Genesis Timeline of the Institute

Turn to page 3

Continued from Cover II

From orchard...

management, and technology dissemination. Over time, the institute expanded its research programmes to address challenges in the fruit industry and strengthened its infrastructure, including experimental orchards, laboratories, model accredited nurseries, scientist- and farmer-training facilities, and residential accommodation for scientists and trainees. These efforts enabled tangible improvements in the production of major fruit crops such as mango and guava in the region and across the country as a whole.

To further strengthen its regional research outreach and technology dissemination, the institute established a Regional Research Station and a Krishi Vigyan Kendra (KVK) at Malda, West Bengal, on 28 February 2016 and 21 January 2017, respectively, to strengthen horticulture in the eastern region. Malda and Murshidabad, districts known for the origin of GI-tagged mango cultivars such as *Himsagar*, *Lakshman Bhog*, and *Fazli*, further substantiated the establishment of the regional station.

The historical and cultural backdrop of Kakori and Malihabad, featuring the mother tree of *Dashehari* from

Historic Mother tree of *Dashehari*

which this renowned mango variety originated, provides a unique context for the existence of the institute in the region, often referred to as the "Mango Capital of India." This convergence of horticultural legacy and historical significance lends deeper meaning to the presence of a national horticultural institute in this area, linking scientific progress with cultural continuity.

Conservation of fruit genetic resources

Against this backdrop, ICAR–CISH has played a crucial role in conserving and strengthening the region's horticultural wealth while extending its impact across India and gaining global recognition. One of its most notable contributions lies in the conservation and characterization of genetic resources of fruit crops such as mango (775 accessions) and guava (152 accessions). The institute maintains one of the largest and most diverse mango germplasm collections in the world, comprising more than 20 exotic accessions. This living repository is invaluable for safeguarding genetic diversity, studying trait

Techno receptive orchards of ICAR-CISH

variability, and developing improved varieties capable of meeting future challenges such as climate change, emerging pests, and evolving market demands.

In addition to mango, ICAR–CISH has systematically collected, evaluated, and conserved germplasm of guava, aonla, bael, jamun, and other subtropical fruits, many of which were previously neglected despite their nutritional and medicinal value.

Research on orchard management practices–such as techno-receptive orchard management, high-density planting, and the development of crop-specific Good Agricultural Practices (GAPs) for mango and guava–comprising innovative technologies like fruit bagging, Integrated Pest Management using bio-intensive practices, harvesting protocols, and maturity assessment, has helped improve farm productivity and resource-use efficiency. Integrated pest and disease management strategies developed by the institute have reduced reliance on chemical pesticides, thereby promoting safer and more sustainable production systems.

Post-harvest management and value addition constitute another area where ICAR–CISH's impact has been substantial. Recognizing that a large proportion of fruit losses occur after harvest, the institute has developed technologies for improved harvesting, grading, packaging, storage, and transportation. Protocols for mango export, including treatments suitable for long-distance and sea-route transportation, have helped Indian mangoes

access international markets while meeting quality and phytosanitary standards. Post-harvest processed products and bio-fortified nutritional products have also been developed and commercialized as part of One Health initiatives, opening new avenues for entrepreneurship and agro-processing and contributing to rural employment generation.

Future way forward

ICAR–CISH will continue to align its research, innovation, and outreach efforts to address emerging challenges and unlock new opportunities in subtropical horticulture, with a clear focus on:

- Developing climate-resilient, high-quality cultivars of subtropical fruits using advanced breeding and genomics.
- Promoting natural and bio-intensive precision orchard management and resource-efficient horticultural production systems through digital and AI-based innovations.
- Strengthening the value and supply chains of mango, guava, banana, and jamun, while opening vistas for new introductions such as avocado and strawberry, to provide economic stability to farmers through a fruit-based systems approach.
- Developing bio-fortified processed products through stronger industry partnerships to enhance value chains, reduce post-harvest losses, and improve farmer incomes and export competitiveness.
- Accelerating technology commercialization, start-ups, and entrepreneurship through incubation, public–private partnerships (PPPs), and FPO linkages.
- Enhancing outreach, capacity building, and digital advisory services for faster adoption of innovations across subtropical regions.

For furthe information, please write to:
[1]Director, ICAR-Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 226 101, Uttar Pradesh, *Corresponding email: tdamodaran73@gmail.com

ICAR-CISH VISION

To be a global leader in subtropical fruit research and development, ensuring food and nutritional security through sustainable horticulture praectices.

ICAR-CISH MISSION

To develop improved vareities, production and protection technologies for subtropical fruits and enhance farmers, income through technology transfer.

ICAR-CISH HISTORY

1972	Established as Central Mango Research Station
1984	Upgraded to Central Institute for Subtropica Horticlute
1999	Regional station established at Malihabad
2020	Recognized as Center of Excellence for Mango Research