

## **Hi-tech Germplasm Conservation**

India is a rich region for extant diversity of horticultural crops owing to it being one among eight Vavilovian Centers of crop plants origin (NBAP, 2008). This diversity exhibits preponderance of variable land races or primitive types belonging to different crops including horticultural crops.

Around 80 species of major and minor vegetables, apart from several wild/gathered kinds occur in India.

Hi-tech technology-intensive methods like in vitro conservation and cryopreservation would help conserve genetic diversity for indigenous plants. In fact, of the total 4.3 lakh collections held in the National Gene Bank (NGB) less than 10% constitute those of horticultural crops (NBPGR, 2017). A low cost and highly beneficial conservation technology like ultra-dry storage needs to be harnessed for improving the scenario

## **Hi-tech Cultivars of Horticultural Crops**

Conventional breeding in horticultural crops especially fruit tree and plantation crops is difficult and time-consuming. Molecular approaches can be used for reducing the time-lag and inducing favourable traits in the varieties. There is great scope for somaclonal varietal development in horticultural crops. Somaclonal variation provides a new and alternative tool to the breeders for obtaining genetic variability relatively rapidly and without any sophisticated technology in the horticultural crops.

## **Hi-tech Propagation**

Availability of quality planting material is the basic need for expansion of truthful horticulture industry. However, unorganized sector is the source of more than 60% planting material. Further, most of the nurseries in production of horticulture planting material production and are concentrated in the vicinity of towns and cities. As per the star-rating programme of the National Horticulture Board (NHB), of the 689 nurseries rated none was 5-star rated and only 25 were 4-star rated. This reflects on poor status of adoption of modern technology by the horticultural nurseries.

## **Nutrient Management in Hi-tech Horticulture**

Hi-tech horticulture relies heavily on judicious application of irrigation and nutrients to horticultural crops. Adoption of drip irrigation has resulted in high yields and better quality in fruits (banana, grape, papaya, pomegranate, mandarin, coconut, arecanut and cashew), vegetables (cabbage, cauliflower, tomato, gherkin, baby-corn), cut-flowers (rose, carnation and gerbera), and plantation crops (tea, coffee and rubber). Fertiliser schedules and leaf nutrient guides have been developed for several horticultural crops

## **Enhancing Nutrient Use Efficiency (NUE)**

Fruit crops are highly nutrient exhaustive due to their perennial nature, and since these act as major sinks of absorbed nutrients. Fruit crops can remove 500-1000 kg N+P+K ha<sup>-1</sup> year<sup>-1</sup> which needs replenishment with better management practices. As a corollary, nutrient removal under hi-tech horticulture of fruits may be higher.

High density planting (HDP) increases the plant population per unit area. It increases the yield of fruit crops considerably. At the same time, it increases the amount of nutrients removed from soil. To compensate for these losses, it is necessary to increase the per hectare doses of fertilisers

### **Hi-tech Production**

Protected cultivation of horticultural crops is the ultimate form of hi-tech horticulture in India for today. In most of the states in India protected cultivation of horticultural crops is common. Among the various protected structures, fully-automatic polyhouses help for cultivation even under unfavourable climatic conditions. However, they are costly and economically viable only in limited parts of India. The cost-effective structures such as net houses and low poly-tunnels are popular and are rapidly increasing in proportion. Although initial costs are high, ultimately the high value fetched by high-quality produce brings much higher income to the farmers. A comparative statement worked out by TNAU justifies this amply. In frequent climatic aberrations these are useful for obtaining appropriate yields with better quality. Protected cultivation provides scope for less soil-dependent cultivation. The use of coco-peat and vermin-compost helps not only to increase yield but also to reduce soil-borne diseases. Presently the protected cultivation for horticultural crops in India is commercially practiced for plant propagation and commercial cultivation.

### **Exploitation of Natural Colour and Dyes from Horticultural Crops**

Many countries are now focusing on natural colourants which can be used as raw materials for food, cosmetics, pharmaceuticals, and textile industries. Natural colourants may also be used in color medicines (tablets, pills, facials and nail enamels). Better solid-liquid extractions, processing and formulation techniques are required so that farmers themselves can adopt it.

### **Processing and Value Addition**

Appropriate processing not only adds on value but is also beneficial to reduce post-harvest losses. Minimal processing for quick cooking of vegetables and their products, which are prepared with intermediate moisture, has great potential in the civil sector besides the defense sector. These convenient foods can be stored without refrigeration and can be marketed in both domestic and international markets

### **Cold-chain**

A cold chain or cool chain is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of refrigerated production, storage and distribution activities, along with associated equipment and logistics, which maintain a desired low-temperature range. The cold chain sector is part of India's second Green Revolution and high value products such as fruits, vegetables, meat, fish, poultry and dairy are critically dependent on it.