

Varieties developed for medicinal crops

Increased demand for natural products is creating a high pressure on medicinal plants and natural resources, causing their severe depletion due to overexploitation and unsustainable collection practices. Improved varieties and methods for safe herbal raw material production help in bringing herbs under cultivation. ICAR-IIHR developed elite varieties of Aswagandha, *Centella asiatica* and Velvet bean. Technologies for safe production which can be adapted for medicinal crops are also available. The information on the available technologies for medicinal crop production at ICAR-IIHR are discussed here in this article.

MEDICINAL plants have been utilised to treat ailments in human and animals since time immemorial. Medicinal plants being rich source of high value pharmaceuticals, nutraceuticals and aromatic compounds are potential source for development of new plant based drugs and can play a key role in developing affordable healthcare system. The demand for natural products is on surge globally and WHO estimates that up to 80% of population mainly depend on herbal medicine for basic healthcare. It is reported that 25% of prescribed drugs contain plant extracts or substances obtained from plant source. It is estimated that the global trade in medicinal plants is US\$800 million per year. Due to the increased demand, there is a high pressure on natural resources and growing concern about diminishing wild populations, loss of genetic diversity, local extinctions, and habitat degradation. Conservation of medicinal crops is a major concern. Majority of the medicinal plant

species are still collected from the wild and very few are commercially cultivated. Bringing medicinal plants under cultivation and developing better varieties with enhanced phytoconstituents of industrial importance is the need of the day. Besides varieties and cultivation practices, the technologies for safe production are very important to reap safe and residue-free produce. ICAR-Indian Institute of Horticulture Research (ICAR-IIHR) is a premier research organization working in the area of conservation, varietal development, and production aspects of medicinal crops. Brief information on technologies on medicinal crops from ICAR-IIHR is discussed below.

Conservation and planting material production

ICAR-IIHR maintains a rich herbal garden which encompasses 200 medicinal tree and shrubs. Besides this, a large number of germplasm in different crops is also collected and maintained.



Arka Ashwagandha



Arka Ashwagandha Roots



Arka Dhanwantri pods



Arka Dhanwantri seeds



Arka Shubra pods



Arka Shubra seeds



Arka Daksha
pods



Arka Daksha seeds



Arka Prabhavi



Arka Divya

Table 1. Details of medicinal crop varieties identified at ICAR-IIHR

Crop	Variety	Description
<i>Solanum viarum</i>	Arka Sanjeevini	A nearly spine free variety suitable for high density planting (1,11,000 plants/ha) with a solasidine content of 1.45 to 1.83% and berry yield of 9000 kg/ha.
<i>Withania somnifera</i>	Arka Ashwagandha	Higher dry root yield (11.95 q/ha) and total withanolide content (0.580%) with 180 days maturity. It also shows field tolerance to bacterial wilt, late blight diseases and pests (<i>Epilachna</i> beetle, mites and aphids).
<i>Mucuna pruriens</i> Velvet Bean	Arka Dhanwantari	Long duration (180-190 days) line of <i>Mucuna pruriens</i> var <i>utilis</i> without the itchy trichomes with high L-dopa (4-4.5%) and high seed yield (4-4.5 t/ha).
	Arka Aswini	An early maturing line (120-130 days) of <i>Mucuna pruriens</i> var <i>utilis</i> with high L-dopa content (3.5-4.0%). Selections lack itchy trichomes on pods and are suitable for commercial cultivation.
	Arka Shubra	High yielding long duration (180-190 days) variety with non-irritant trichomes, produces medium size seeds with white seed coat. It yields 4.5 to 5.5 t/ha under support, 2.25 to 2.75 t/ha under surface cultivation with high L-dopa content of 5.43% and yield of 269.67 kg/ha. (IIHR PS 2).
	Arka Charaka	High yielding medium duration (155-165 days) variety with non-irritant trichomes, produces medium size seeds with black shiny seed coat. It yields 4.0 to 4.25 t/ha under support and 2.0 to 2.25 t/ha under surface cultivation with high L-dopa content (4.80%) and yield (200 kg/ha) (IIHR PS 6).
	Arka Shukla	Medium duration (155-165 days) variety with the seed yield of 3.0 to 3.5 t/ha under support and 2.0 t/ha under surface cultivation with the L-dopa content of 3.86% and yield of 150.39 kg/ha. It produces medium bold size seeds with white seed coat. (IIHR Sel.3).
	Arka Daksha	Medium duration (150-160 days) variety with the seed yield of 3.5 to 4 t/ha under support and 1.8 to 2.2 t/ha without support, produces brown mottling bold seeds with 3.72% L-dopa content and 150.39 kg/ha of L-dopa yield. (IIHR Sel.8).

Crop	Variety	Description
Centella asiatica	Arka Prabhavi	Higher biomass yield @ 2.3 MT/ha/year, erect plant with broad leaves, every 30 days harvest, higher Asiaticoside content 2.25 to 3.85%, Higher Tri-terpenoid content up to 6.82 to 7.27%.
	Arka Divya	Higher biomass yield of 2.5 MT/ha/year, erect plant, very broad leaves, easy to harvest, every 30 days harvest, moderate Asiaticoside content 0.54 to 1.69%; Moderate Tri- terpenoid content 1.67 to 3.56%; good for green vegetable purpose.

It also maintains a nursery where the planting material of more than 70 different herbs are being multiplied. The seed and planting materials of the identified varieties of medicinal crops are also being multiplied through seed village concept.

Varietal development

Research work at ICAR-Indian Institute of Horticulture Research focusses on genetic improvement and improved production technologies in medicinal crops to facilitate their commercial cultivation. Crop breeding research resulted in identification of superior lines at Institute level in Ashwagandha (*Withania somnifera*) with higher withanaloide content, Velvet bean (*Mucuna* sp.) with increased L-Dopa, Mandukaparni (*Centella asiatica*) with greater asiaticoside content and Khasi kateri (*Solanum kahsanum*) with higher solasodine. The varieties were developed through selection, polyploidy and recombinant breeding. The varieties developed from ICAR-IIHR are well received by growers and Industry and have been licenced through Institute Technology Management Unit (ITMU). The details of the varieties developed at ICAR-IIHR are given in Table 1. Breeding efforts are on way in Kalmegh (*Andrographis paniculata*), Bhringaraj (*Eclipta alba*), Brahmi (*Bacopa monnieri*) and Madhunasi (*Gymnema sylvestre*) and promising lines are under trails.

Safe production technologies

In order to supply safe, authentic, reliable raw material to the industry, it is imperative to adopt safe production technologies in cultivation of medicinal crops. Organic farming of herbs enhances soil and plant quality and organically grown herbs fetch higher revenue and are accepted well in global markets. ICAR-IIHR developed organic production technologies for Kalmegh, *Coleus forskohli*, *Centella asiatica* and Brahmi. Besides this, safe and cost-effective plant health management technologies are available at ICAR-IIHR which can

be adopted in cultivation of medicinal crops. Some of them are bio-pesticides (*Trichoderma harzianum* – 1% WP, *Pseudomonas fluorescens* – 1% WP, *Trichoderma viride* – 1.5% WP, *Verticillium chlamydosporium* (*Pochonia chlamydosporia*) – 1% WP, Bionematicide *Paecilomyces lilacinus* (= *Purpureocillium lilacinum*) 1% WP) and biofertilisers (Arka Microbial consortia). Botanical formulations like neem and pongamia soaps which are effective against sucking pests and Arka Mealy melt which dissolves the outer coating of mealybugs for mealybug management, pheromone traps, etc. can also be exploited in medicinal crops cultivation.

Integration of quality seed and planting material, safe production technologies in cultivation of medicinal crops and following proper post-harvest practices can immensely improve the quality of raw materials. Production of high-quality herbs boosts our share in global trade and in turn revenue to the growers. Promotion of quality research, organized cultivation, processing and marketing of medicinal crops should be taken up as a priority. Such initiatives create opportunities to improve the income of small and marginal farmers and also create avenues for entrepreneurship in medicinal crop sector.

SUMMARY

The prospects of herbal industry depends on the supply of raw materials and bringing medicinal plants under cultivation ensures authenticity, quality and traceability. The technological interventions like improved varieties, efficient and safe production tools can greatly enhance the production of quality herbal raw material.

For further interaction, please write to:

Dr K Hima Bindu (Principal Scientist), Division of Flower and Medicinal Crops, ICAR-Indian Institute of Horticultural Research, Hessarghatta Lake, Bengaluru, Karnataka 560 089.
*Corresponding author: Himabindu.K@icar.gov.in

Tractor-operated raised-bed former-cum-planter for multiplier onions

A tractor-operated raised-bed former-cum- onion bulb planter has been developed for planting multiplier onions. The drive to the metering unit is derived from the ground wheel. A shoe-type furrow opener is fitted to the planting frame in front of onion bulb delivery tube. A funnel-shaped box was also fitted at the bottom of the seed delivery tube to prevent spillage of the onion bulb outside the furrow. This ensures an uninterrupted free-fall of the onion bulb from metering disc to furrow. The furrow opener assembly was mounted independent to the planter unit hence it can be positioned as required to ensure proper row spacing. The effective field capacity of the machine was 0.3 ha/h with field efficiency of 75%.



Source: ICAR Annual Report 2022-23