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Thar Tapish: Sponge gourd variety developed for hot arid climate

Sponge gourd (*Luffa cylindrica* L.) is much liked indigenous and cooking cucurbit vegetable. Thar Tapish is selection through hybridization breeding from combination of AHSG-4 × AHSG-16. It was recommended in 2018 by ICAR-CIAH, Bikaner for cultivation under hot arid climate. It is developed for marketable quality fruit yield (145.8 q/ha) under high temperature and abiotic stress conditions. It took 50 days for first tender fruit harvest. Tender fruits are ready in 7-9 days for harvesting and with 95–145 g weight and dehydration (8.35% dry product) are found best for fresh market. Vines are medium in growth (2.52 m) with 4.82-5.33 branches.

THE gourd cucurbitaceous crop-plants, viz. bottle gourd, sponge gourd, ridge gourd, bitter gourd, ivy gourd and spiny gourd are the traditional vegetables of semi-arid and tribal areas of north-western part of India. These are seasonal or perennial gourds for longer duration of harvest and play important role in both fresh and dehydrated form for vegetable culinary, and income too. Non-availability of crop-specific genotypes suited to the environmentally stressed and resource based production sites is the prime limitation of vegetable promotion under hot arid climate. Sponge gourd (*chikni torai*) has potential for tender fruits and now, CIAH technology is much viable to the growers for getting higher benefits under high temperature and moisture stressed conditions as summer and rainy season fresh fruits, low-input, vertical harvesting and seed crop.

Background

Sponge gourd (*Luffa cylindrica* L.) is an indigenous cucurbit and cooking vegetable but not yet exploited much with respect to use of its native germplasm for breeding trait-specific genotypes suited to the high temperature and abiotic stressed conditions of hot arid environment. Realizing the benefits of vegetable farming under resource constraints arid region of Rajasthan, systematic germplasm and varietal collections (22) were made and evaluated over the period from year 1997–2005, and up to 2010 sufficient breeding material (lines, F_1 and F_2) generated at CIAH, Bikaner and further purified to achieve the improvement objectives. Four prioritized traits, i.e. tender fruit quality, earliness, number of marketable fruits/plant and seasonal yield were kept to screen the material under prolonged period of high temperature (38-48 °C) situations.

Dehydrated slices of sponge gourd for vegetable purpose

Field view of sponge gourd crop with drip technology

Flowering and fruiting in Thar Tapish

Fruit development stages of Thar Tapish

Further, all the developed breeding material was studied over the seasons in 2014 under abiotic and biotic stressed conditions of the hot arid environment to screen-out and to identify trait specific/high yielding promising lines. During spring–summer and rainy–winter season of 2015, eight selected genotypes including Pusa Chikni (check) were tested for comparative analysis. Based on 2015 and 2016 performance studies, line AHSG/2015/F_5/01 (F_5 pedigree of cross combination AHSG-4 ×AHSG-16) exhibited potentiality for better quality marketable fruit yield under high temperature conditions, and released as Thar Tapish in 2018, and also tested under AICRP on vegetable crops from 2019 to 2021.

Thar Tapish

Sponge gourd variety Thar Tapish is a selection and developed through hybridization breeding (parentage AHSG-4 × AHSG-16), and recommended in 2018 by ICAR-CIAH, Bikaner for cultivation under dry-land climate. It is trait-specific and first time bred variety through use of native germplasm for better marketable quality fruit harvest and moderate growth plants 2.43–2.62 m under high temperature and abiotic stressed conditions.

Thar Tapish exhibited superiority for earliness and yield attributes such as node number to first male flower (7.62–9.27), node number to first female flower (9.14–10.62), days to first male flower (32.4–39.4 DAS), days to first female flower (36.5–44.3 DAS), days to first harvesting of tender fruits (49.2–52.4 DAS), number of fruits/plant (9.74–12.47) and marketable fruit yield/plant (1.18–1.42 kg). Green–dark green colour tender fruits (A-grade) at marketable stages with 110–115 g weight, 20–22 cm length and 3.2–3.4 cm diameter are produced. Fruit yield potential is 142.2–155.8 q/ha with varying production situation and season.

Mature fruits for seed harvest are ready in 30–32 days and are 33.06–36.51 cm in length and 6.72–7.53 cm in diameter. Seed is black and 0.91–1.14 cm in length, 0.67–0.83 cm width and 8.18–10.12 g is weight (100 seeds). A vine recorded 6.38–8.52 ripen fruits and 89.32–153.36 g seed yield/plant. The number of seeds/fruit is 103.67–321.24 and 10.38–26.19 g weight of seeds/fruit.

Production technology

The systematic experimentations at ICAR-CIAH for harvest of tender fruits and seed-crop adopting channel and drip system of cultivation resulted in standardization of production techniques and suggested as package of practices for sponge gourd. In the developed and lay-out field, channels or deep furrows of 50 cm width are prepared at 2.0 m distances which are of about 25 m length on one-side of water supply line. For drip system, fertilized channels are converted into seed-beds on which laterals are laid-down. Here, only channels/seed-beds are

Fruit set studies in sponge gourd

Fruit variability of sponge gourd breeding lines

Marketable quality fruits of Thar Tapish

Typical seeds of sponge gourd, black (AHSG-04) and white (AHSG-05)

fertilized with FYM (50 q), vermin-compost (5 q), DAP (100 kg), SSP (100 kg), urea (50 kg), MOP (50 kg) and 25 kg neem-leaf farm matter as basal dose/ha and mixed thoroughly. On-set of monsoon rains is the best time for *kharif* sowing and February for summer crop in the arid region. With surface covering CIAH-technology, seed sowing in first week of January is best to eliminate the ill-effects of low temperature and harvesting fruits in the March month.

About 2 kg seed is enough for hectare crop, and prior to sowing it should be soaked in water for 4-6 hours and also treated with fungicide. Sowing is done at inner-down slope of channels or near to drippers of lateral lines. At each 50 cm distance sowing point, 2-3 seeds are sown, and thinning is done at 18-21 days allowing 1 or 2 healthy plant/point. Crop is irrigated at an interval of 5-6 days by flood method only in the channels or 2-3 days for 1.5-2.0 hours with drip technology (laterals 14-16 mm and 4 lph in-line emitters) under the sandy soil conditions. Manual hoeing and weeding should be done at 18-21, 30-35 and 45-55 days of crop growth. At the same period, 50 kg/ha urea in three split doses is applied at initial growth, flowering and fruit-set stages. Arid region is best for quality seed production and an isolation distance of 500 m is enough. Integration of inter-culture operations, spraying, roughing and monitoring is beneficial to maximize the returns.

Pests and diseases

As far as pest and diseases are concerned, no serious insect-pest and disease incidence is observed under field conditions. However, the fruit-fly (14.32–22.55%) and viral infestation may occur during October–November and thus prophylactic spraying is recommended in August and September months to control the pest and vectors. For this purpose, schedule similar to manual hoeing and weeding as mentioned above is also practiced for prophylactic spraying of insecticides to manage the sucking insects-pests and fruit-fly in sponge gourd. Protection measure from birds and wild animals is also required.

Harvesting and yield

The variety Thar Tapish is most suitable for rainy and summer season and recorded yield potential of 142.2–155.8 q/ha which results in income of ₹ 1,25,000-1,40,000/ha/season. The fresh fruits can be dehydrated and stored for off-season use as vegetable. Fruits harvested 8-9 days after fruit set are most suitable for dehydration purpose. After harvesting, fruits are washed, fruit stalk and distal end trimmed and cut into vertical slices by use of sharp knife. Thereafter, slices are spread in trays and kept for dehydration in shade. Shade drying is recommended for retaining green colour in dehydrated end product. Dry product yield is 8.12% of fresh weight. Dried slices are required to be kept in warm water, 2 hours before consumption as vegetable. The rehydration ratio of dried slices is observed at 4.99. For making vegetable, 100 g of dried slices are enough for one nuclear family.

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