



A SCIENCE AND TECHNOLOGY NEWSLETTER

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PROMISING TECHNOLOGIES

Development of marker assisted selection (MAS) based advanced derived lines for resistance to tomato leaf curl New Delhi virus in tomato

The tomato leaf curl New Delhi virus (ToLCNDV) (genus *Begomovirus*, family *Geminiviridae*) is most predominant disease and causes huge economic loss in tomato, chilli, many cucurbits and cotton. Presently six genes *Ty-1*, *Ty-2*, *Ty-3*, *Ty-4*, *ty-5* and *ty-6* are being utilized to address the tomato leaf curl New Delhi Virus (ToLCNDV) disease and molecular markers linked to these genes are available for marker assisted selection (MAS). In present investigation, tomato breeding lines carrying different gene (s) i.e. *Ty-2*, *Ty-3*, *ty-5* and *ty-6* individually or gene combinations (*Ty-2+ Ty-3*), (*Ty-2+ ty-5*), (*ty-5+ ty-6*), were screened for resiliency to ToLCNDV disease at Division of Vegetable Science, ICAR-IARI, New Delhi (a hot spot for ToLCNDV disease) under field as well as artificial inoculation conditions. The *Ty* gene(s), alone and in pyramided combinations from donors were introgressed to IARI varieties viz. Pusa *Rohini*, Pusa *Ruby*, Pusa *Sadabahar* and Pusa *Sheetal* through hybridization. The introgression of *Ty* gene



Tomato hybrid resistant to ToLCNDV disease

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Police is controlling the crowd of farmers at the Institute (ICAR-CIAH, Bikaner) during the seed distribution of improved variety (AHK-119) of kachri

increased to 6093 (196.2%) ha and 54.22 (196.28 %) thousand tones, respectively in the year of 2017 in hot

arid and semi-arid regions.

Gross and net return: Studies showed that the gross return from AHK-119 in entire hot arid and semi-arid regions was ` 28.19 crores in 2007 which increased (three times) to ` 83.51 crores in 2017. Likewise the net return from *kachri* AHK-119 in these regions was ` 20.74 crores in 2007 which increased to ` 61.45 crores in 2017 which means, the net return from the improved variety of *kachri* AHK-119 in entire hot arid region also increased three times (196.28%) in 2017 in comparison to 2007. The net return from AHK-119 was 79.10 % and 337.99 % higher in comparison of local variety (local check) of *kachri* during 2007 and 2017, respectively.

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Identification of vegetable varieties for hot arid climate

The scanty and un-certain rains during monsoon, extremes of high temperature from March to October and low temperature from November to February, and all these factors together create an environment where very few vegetable crops and their genotype produce marketable yield. Varieties developed in favourable agro-climate did not perform well under abiotic stressed conditions of hot arid region, and therefore ICAR-CIAH, Bikaner has identified three varieties during 2018 for commercial cultivation under resource poor environment.

Palak – Thar Hariparna

Palak (*Beta vulgaris* var. *bengalensis* Roxb) variety *Thar*



Field view of *palak – Thar Hariparna*

Hariparna is developed through selection and is an improvement over the native population. It is trait specific and produce excellent quality leaves and 7-9 pickings from October to March. It exhibited very good initial plant growth and first tender leaves harvesting start at 35–40 days with October sowing. Tender leaves at marketable stages are 9.81–12.54 cm length, 5.72–8.11 cm width, 1.748–1.838 g weight and 100 leaves are 174.8–183.8 g in weight. Light-green to dark-green colour and bigger sized leaves are glossy, smooth, thick, soft and juicy. Marketable fresh leaf yield potential is 128.48–235.84 q/ha.



Ivy gourd – Thar Sundari

Ivy gourd or *kundru* variety *Thar Sundari* has been developed through clonal selection from regional diversity. The gynoeious plants are moderate in growth habit, prolific in bearing of female flowers and parthincarpic fruit development. Short-perennial plants respond to pruning and re-sprouted with on-set of spring and monsoon season, and after re-sprouting it took 50-55 days for first harvesting. For vegetable culinary, fruits are ready in 6.28–8.42 days from opening of female



Ivy gourd – *Thar Sundari*



Sponge gourd – *Thar Tapish*

flowers. Tender fruits of the highest marketable quality (A grade) are 5.83–6.48 cm length, 1.54–1.89 cm diameter and 11.76–13.54 g weight. The elongated-long shape tender fruits are light green-green-dark green in colour with non-clear white stripe and soft. The genotype recorded tender fruit yield of 2.85–3.48 kg/plant/season and yield potential is 248.2–351.7 q/ha with varying production situations.

Sponge gourd – *Thar Tapish*

Sponge gourd variety *Thar Tapish* is developed through hybridization (parentage AHSG-4 x AHSG-16). It is trait specific and first time bred through use of native

germplasm for better marketable fruit yield and moderate plants 2.43–2.62 m under abiotic stressed conditions. It exhibited superiority for 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 are 110–115 g weight, 20–22 cm length and 3.2–3.4 cm diameter. Fruit yield potential is 142.2–155.8q/ha with varying production situations.

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Micronutrients for spices

Micronutrients are those essential elements like copper, manganese, zinc, iron, boron, molybdenum etc, which are required by plants in very small amounts. The yield and quality of spices depends on the soils on which they are grown. Continuous exploitation of soil without replenishing the nutrients results in low yield, poor quality of the produce, besides making the crop susceptible to pests and diseases. Black pepper and cardamom are grown mainly in red and laterite soils of South India, Western

Ghats and North Eastern states where soils are highly weathered and low in nutrient status. Besides, low pH, imbalance in the availability of major and secondary nutrients and application of inadequate quantities of organic manures have worsened the situation. At present about 48.1% of Indian soils are deficient in available zinc, 11.2% in iron, 7% in available copper and 5.1% in available manganese. Besides, deficiencies of boron and molybdenum have also been reported in soils. Soils with multi-



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