Current Horticulture 12(2): 53–55, May–August 2024
DOI: 10.48165/chr.2024.12.1.012
Revised: 8 September 2023; Accepted 3 March 2024

Evaluation of high temperature tolerant longmelon (*Cucumis melo)* cultivar

B.R. Choudhary, Hanuman Ram, S.M. Haldhar[1] and Chet Ram

ICAR-Central Institute for Arid Horticulture, Bikaner, Rajasthan, 334 006

Abstract

Longmelon (*Cucumis melo* L. var. *utilissimus*), a warm season crop, can be grown in tropical and subtropical regions. The cv. AHLM-2 (Thar Sheetal) has been developed to produce early fruiting with quality fruits free from bitterness coupled with tolerance to high temperature. Varieties developed by the private sector are used by the farmers and their seed are expensive. The release of Thar Sheetal, an open-pollinated cultivar with better fruit length (27.62 cm) and fruit weight (81.82 g) is a prolific bearer (18.20-21.87 marketable fruits/ plant). Thar Sheetal has high yield potential of 136.31 q/ has under hot arid conditions, which is 22.11% higher than the control 'Punjab Longmelon-1'. It bears tender, attractive, light green fruits which are not bitter. Thar Sheetal can withstand high temperature and is able to set fruits up to 42° C under hot arid conditions.

Key words: Abiotic, Biotic, Hot arid, High temperature, Variability, Yield

Longmelon (*Cucumis melo* L. var. *utilissimus*) with tender fruit is used as a salad, pickle or cooked as a vegetable. India being the centre of diversity provides a wide range of variation for genetic improvement of melons (Pandey *et al.*, 2005). The persistence of large variability ensures better chances to select new genotypes having resistance/ tolerance against biotic and abiotic stress (Choudhary *et al.*, 2016 and Saroj and Choudhary, 2020). Therefore, evaluation of the variability is prerequisite in crop improvement programme.

Materials and Methods

The Thar Sheetal was evaluated during 2015 to 2017 (Choudhary and Saroj, 2018 and Choudhary *et al.*, 2018a). The experiment was conducted during summer season at ICAR-CIAH, Bikaner, Rajasthan. The soil of experimental field was loamy sand with a pH of 8.7, EC 0.20 dS/m and organic carbon 0.07%. The experiment comprised seven lines of longmelon including control in randomized block Design replicated thrice.

The data were recorded on five randomly selected plants from each replication for days taken to produce 50% pistillate flowering, fruit length (cm), fruit diameter (cm), fruit weight (g), number of marketable fruits/ plant, marketable fruit yield/ plant (kg) and fruit yield (q/ ha). Fruit length, fruit diameter and fruit weight were recorded at marketable stage. Diameter of fruits was measured with the help of Digital Vernier Caliper (MITU-TOYO, 300 mm, 0.01 mm reading capacity). Fruits were tested at tender stage for bitterness.

The number of fruit fly infested fruits and marketable fruits from five selected plants were counted separately from all pickings and calculated the per cent fruit fly infestation. The genotypes were categorised adopting the rating system proposed by Nath (1966) for fruit infestation as: immune (no damage), highly resistant (1–10%), resistant (11–20%), moderately resistant (21–50%), susceptible (51–75%) and highly susceptible (76–100%).

The pooled data of 03 years were statistically analysed online using http://dsdhakre.in/pooled.html. The data on percentage fruit fly infestation were analyzed through one-way ANOVA using SPSS 16 software (O'Connor, 2000). The DNA fingerprinting was done by using PCR profiling of 15 ISSR, 10 ScoT (start codon targeted polymorphism) and 10 CBDP (CAAT box-derived polymorphism) markers using Punjab Longmelon-1 cultivar as comparative control to assess the fidelity of varietal-specific bands.

The trials were conducted adopting recommended cultural practices (Choudhary *et al.*, 2018b). The field was prepared through disc harrow twice followed by planking to make the soil friable. The well-decomposed FYM (200 q/ ha) was applied at last ploughing. Seed treatment was

[1]College of Agriculture (CAU, Imphal), Manipur
*Corresponding author : hramdhanari@gmail.com

done with Thiram @ 2 g/ kg seed. The crop was established from seed sown in the field during second fortnight of February on drip system of irrigation installed maintaining 2.0 m space between rows and 60 cm from plant-to-plant. The 60 kg N, 80 kg P_2O_5 and 60 kg K_2O was applied with urea, DAP and muriate of potash, respectively. The half dose of nitrogen and full of phosphorus and potassium was applied before sowing in the marked area only.

The remaining dose of N was divided in two equal parts and applied at the time of vine growth and full blooming stage. Fertigation with water-soluble NPK 19:19:19 @ 10 kg/ ha was done at vine development and fruiting stage. Foliar spray of Boron @ 25 ppm at 2-4 true leaf stage and flower initiation stage was done. The crop was irrigated at 2-3 days interval for 1-1.5 hour through drip system having in-line drippers of 4 litre/ hour capacity. Weed control was done manually by performing 2 hand weeding at 15-20 days after sowing and again at 35-40 days after sowing.

The white fly, leaf miner and aphid were controlled by spraying Imidacloprid 17.8% SL @ 0.3 ml/ litre of water. Mite was controlled by need based spray of Propargite @ 2 ml per litre of water. To manage fruit fly, 12 Cue-lure traps were installed in one hectare field. Spinosad 45% SC (0.4 ml per litre of water) was also sprayed to control fruit fly (Haldhar *et al.*, 2014). Mencozeb @ 2 g per litre of water was sprayed to manage the *Alternaria* leaf blight disease. Drenching with Carbendazim @ 2 g per litre of water was carried out to manage the Fusarium wilt (Maheshwari *et al.*, 2022).

Results and Discussion

Fruit yield of 'Thar Sheetal' was higher than other genotypes and the control (Table 1). The increase in fruit yield of 'Thar Sheetal' was up to 43.20% over AHLM-5, followed by AHLM-1 (35.63%). Thar Sheetal recorded 22.11% higher yield over the control (Punjab Longmelon-1) during summer seasons at Bikaner. Fruit length varied from are 25.83-29.67 cm which is acceptable by consumersand a single plant produced 18.20-22.20 marketable fruits/plant under hot arid conditions.

The plants of Thar Sheetal have vine length of 2.15-2.38 m at last fruit harvest and produced profuse branching. It produced pistillate flowers on lower nodes (6.80-7.60). Thar Sheetal bears light green coloured, attractive and tender fruits at edible stage which are free from bitter principle at high temperature conditions (Choudhary *et al.*, 2018a). Thar Sheetal is capable to withstand high temperature and able to set fruits up to 42°C during April-May months under hot arid conditions of Rajasthan.

The melon fruit fly (*Bactrocera cucurbitae*) is a serious pest of longmelon and its outbreak cause substantial loss (30-100%) to growers. Therefore, Thar Sheetal was screened against melon fruit fly during 2015 and 2016. It was found moderately resistant

Table 1. On-station performance of longmelon lines for fruits/ plant[z] and marketable fruit yield (2015-17)

Line	Number of marketable fruits/ plant		Marketable fruit yield (kg/ plant)		Fruit yield (q/ ha)		Increase in fruit yield (%)
AHLM-1	14.18		1.03		100.50		+35.63
AHLM-2 (Thar Sheetal)	20.76		1.70		136.31		-
AHLM-3	15.24		1.09		104.56		+30.36
AHLM-4	15.25		1.08		102.38		+33.15
AHLM-5	15.00		1.03		95.19		+43.20
AHLM-6	16.82		1.23		114.88		+18.66
Punjab Longmelon-1 (C)	17.51		1.15		111.63		+22.11
	SE	CD (0.05)	SE	CD (0.05)	SE	CD (0.05)	
Location	0.34	0.68	0.03	0.07	2.70	5.47	
Treatment	0.52	1.05	0.05	0.11	4.12	8.35	
Treatment × location	0.89	1.81	0.09	0.19	7.13	14.47	
CV (%)	6.67		9.51		7.99		

[z]Varietal trials conducted in a randomized block design with three replications.

LSD: Least significant difference, SE: Standard error, Values within columns with different letters (superscript) are significantly different according to Duncan's test at P=0.05.

against melon fruit fly under field conditions. The fruit infestation varied from 29% (2015) to 30.67% (2016) under field conditions (Table 2).

Table 2. Reaction to per cent fruit infestation by melon fruit fly under field conditions

Line	Fruit infestation (%)	Category
AHLM-1	37.358	Moderately resistant (MR)
AHLM-2 (Thar Sheetal)	33.574	MR
AHLM-3	47.865	Susceptible (S)
AHLM-4	38.074	MR
AHLM-5	47.852	S
AHLM-6	42.109	MR
Punjab Longmelon-1 (C)	52.19	S
SEm+	2.068	
CD (0.05)	6.443	
CV (%)	8.386	

*Values in parentheses are angular-transformed.

SEm: Standard error of mean, CD: Critical difference, CV: Coefficient of variation

Based on the performance of Thar Sheetal at station trials, it was proposed for adaptive trials and conducted the experiment at Adaptive Trial Centre (ATC), Jodhpur, Rajasthan during summer 2018 along with the control. It gave fruit yield of 170.30 q/ ha which was 17.04% higher over check *i.e.* Punjab Longmelon-1. Further, Thar Sheetal was also evaluated at KVK, Fatehpur and KVK Pali during summer season of 2018. It was found suitable for cultivation in different agroclimatic conditions of Rajasthan and produced fruit yield of 165.0 q/ ha at KVK, Fatehpur and 178.0 q/ ha at KVK, Pali. In adaptive trial, Thar Sheetal took 46 days for first fruit harvesting which produced 32.60 cm long fruits weighing 110.16 g and yielded 3.70 kg marketable fruits/ plant.

The DNA fingerprinting of Thar Sheetal was done by using PCR profiling of 15 ISSR, 10 ScoT (start codon targeted polymorphism) and 10 CBDP (CAAT box-derived polymorphism) markers. Punjab Longmelon-1 cultivar was used as comparative control to assess the fidelity of varietal-specific bands. Ten ISSR markers, three ScoT and seven CBDP markers produced specific bands which differentiated Thar Sheetal from Punjab Longmelon-1.

Acknowledgements

The authors are thankful to the Indian Council of Agricultural Research, New Delhi for providing necessary funds to carry out this study.

References

Choudhary BR and Saroj PL. 2018. Development of high temperature tolerant variety of longmelon. *Indian Council of Agricultural Research News* (Oct.-Dec.): 18.

Choudhary BR, Haldhar SM, and Kumar S. 2018b. Longmelon. *In: Vegetable Crop Science*. M.K. Rana (Ed.). ISBN-13:978-1-1380-3521-8. CRC Press Taylor & Francis Group, New York. pp. 457-466.

Choudhary BR, Saroj PL, Haldhar SM, Maheshwari SK and Singh D. 2018a. Thar Sheetal fetches premium prices. *Indian Horticulture* (Sept.-Oct.): 58-59.

Choudhary BR, Pandey S, Rao ES, Singh D and Sharma, BD 2016. Characterization of variability in watermelon for DUS testing. *Current Horticulture* 4(2):30-34.

Haldhar SM, Choudhary BR**,** Bhargava R and Sharma SK. 2014. Development of an organic integrated pest management (IPM) module against insect-pests of muskmelon in arid region of Rajasthan, India. *Journal of Experimental Biology and Agricultural Sciences*, 2(1): 19-24.

Maheshwari SK, Choudhary BR, Haldhar SM and Berwal MK. 2022. Effectiveness of botanicals, inorganic salts and fungicide against Fusarium wilt of muskmelon under hot arid region of Rajasthan. *Journal of Agriculture and Ecology* 14: 21-25.

Nath P. 1966. Varietal resistance of gourds to the fruit fly. *Indian Journal of Horticulture* 23(1): 69-78.

O'Connor BP. 2000. SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behav. Res. Math., Instrum. and Comp.* **32**: 396-402.

Pandey S, Rai M and Singh B. 2005. Genetic variability and character association in muskmelon (*Cucumis melo* L.). *Indian Journal of Plant Genetic Resources* **18**(2): 212-216.

Saroj PL and Choudhary, BR. 2020. Improvement in cucurbits for drought and heat tolerance-a review. *Current Horticulture* **8**(2):3-13.