

Growing a warm-season watermelon crop in cold desert Ladakh

Arpit Huria* and Dorje Angchok

Defence Institute of High Altitude Research, Leh, Ladakh 194 101

Watermelon is a typical warm season crop. The global consumption of watermelon is greater than that of any other cucurbits. It is widely grown in tropical and sub-tropical countries including India. However, watermelon is not traditionally grown in trans-Himalayan Ladakh region. Defence Institute of High Altitude Research, Leh, Ladakh conducted studies on feasibility of watermelon cultivation in open field conditions in high altitude conditions on various cultivars. The findings revealed that the watermelon can successfully be grown in open field conditions with the help of black plastic mulch in Ladakh region. The technology was successfully demonstrated at farmers' fields and the know-how was transferred to the State Agriculture Department and working NGOs for its further dissemination in various villages of Ladakh. The benefit received on per rupee investment (Cost:Benefit) in watermelon cultivation was 3.40. Currently, farmers are not only cultivating watermelon commercially but also providing it in the army ration for Ladakh sector.

Keywords: DRDO, Ladakh, Trans-Himalayan, Watermelon

Watermelon (*Citrullus lanatus*) belonging to Cucurbitaceae family is native to tropical Africa. Its global consumption is greater than that of any other cucurbits. The warm regions of tropical and subtropical countries provide ideal conditions for its growth. The most congenial temperature for its cultivation is 21-32°C. In India, it is extensively grown on the riverbeds of Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, and Andhra Pradesh. Past experiences and studies have shown that vast barren terrains of Ladakh, are favourable for the large-scale production of organic fruits and vegetables. It not only provides thriving environment for most of the cole and root crops, but also have sub-optimal heat units for cultivation of melons. However, watermelon is not traditionally grown in trans-Himalayan Ladakh region.

Ladakh, the land of high passes, is the only cold desert in the country. It has a total geographic area of 45,000 km², out of which

only 29 km² (0.23%) is under forest cover and just 10,319 ha (0.4%) is cropped area. The annual average precipitation in Ladakh is 115 mm. The region is characterized by extreme temperature fluctuations, high wind velocity, thin atmosphere with high UV-radiation and fragile ecosystem. The temperature goes up to -40°C during winters. Due to heavy snowfall during winters, the region remains landlocked for over six months a year. This leaves a very limited time-window for open cultivation of crops. Thus, farmers need diversified options for sustainable living.

Defence Institute of High Altitude Research (DIHAR), a constituent laboratory of Defence Research and Development Organization (DRDO) was established in Leh, Ladakh in 1962 with the mandate to augment fresh food availability to the troops deployed in Ladakh sector through the help of local farmers by developing agro-animal techniques. Since then, DIHAR has developed several agricultural technologies

suitable for high altitude Ladakh region in order to maximise the utilization of open cultivation time window and even grow the crops during winter months. During 1960s, only a few vegetables were grown in Ladakh including turnip, carrot, radish, potato, and onion. By 2018, DIHAR successfully demonstrated the feasibility of cultivation of 101 types of vegetables in high altitude Ladakh conditions. DIHAR also research upon various food crops which can be adapted in high altitude region apart from locally grown vegetables and fruits which can provide an alternative to the local farmers. One such diversified option that DIHAR has researched upon and successfully transferred its know-how and do-how to the local farmers, is the cultivation of watermelon.

The successful cultivation of warm season watermelon crop in cold-arid Ladakh was achieved by modifying the plant microclimate. The modification of the plant microclimate is used to enhance the



Farmers harvesting watermelon from their fields in Ladakh

plant growth, yield and to extend the growing season of horticultural crops in cooler climates. Black Plastic Mulch (BPM) was used to modify the plant microclimate in watermelon cultivation. BPM increases the soil temperature and offers possibilities for early production and higher yields of warm season crops. In addition, BPM reduces soil water evaporation and weed infestation. The fruit grown at high altitude are sweeter than those grown at lower altitudes as the studies indicate that fruit sweetness has a direct relationship with altitude of the growing area. It has also been noted that due to bright sunshine, the size of watermelon is also enhanced.

The field trials were conducted in DIHAR on five watermelon cultivars namely Beejo-2000, Arka Manik, KSP-1127, Swapnil and Sugarbaby. The yield potential and other quality parameters were recorded in mulched and non-mulched conditions. Silver-on-black plastic mulch (30 micron) was used with black surface facing the sun.

Spacing: Each furrow was 75 cm wide, and spacing between two furrows was 135 cm. Two rows of plants were grown on two sides of the furrow, and plants were spaced at 90 cm within a row.

Nutrient management: Farm yard manure @ 6 t/ha was applied

in the furrows at the time of field preparation. No use of pesticide, fungicide and weedicide were done throughout the growing season.

Transplanting: Seedlings with two-to-three true leaves were transplanted manually in early June.

Irrigation management: Irrigation was done at 3-day interval during initial plant establishment followed by 5-day interval at later stages.

Harvesting and yield: The fruit harvest began in mid-August and repeated twice at 2-week interval.



Ladakhi farmer with his harvested watermelon crop

The findings revealed that the best-performing cultivar, Beejo-2000 on BPM yielded an average of 28.9 t/ha marketable fruit, which is more than the national average yield of 24.9 t/ha. BPM was also found successful in suppressing of weeds which saved labour, time, and money.

The technology was successfully demonstrated at farmers' fields and the know-how were transferred to the State Agriculture Department and working NGOs for its further dissemination in various villages of Ladakh. According to the farmers, the average cost of cultivation of watermelon per kanal (500 m²) was ₹12,350. The costs and return of watermelon by farm size is represented on gross return received; net returns obtained after subtracting the total cost of cultivation of watermelon. The benefit received on per rupee investment (Cost:Benefit) in watermelon cultivation was 3.40. Overall, the estimated gross return of watermelon was ₹80,000 per kanal with net return of ₹61,850. The fruit harvested during August and September is usually marketed as off-season fruit. Thus, it can be concluded that watermelon has a high potential to increase the income of the farmers in trans-Himalayan Ladakh region and proving to be a diversified livelihood option for them.

SUMMARY

The cold arid trans-Himalayan region of Ladakh is characterized by a limited time-window for open cultivation of crops. Watermelon is one of the diversified options successfully adopted by the farmers of Ladakh which fetch them a good return even in off-season. Watermelon in Ladakh is now being successfully grown by the local farmers on commercial basis. Earlier only fruits like apple and apricot were supplied in army ration by the farmers. However, since 2019, the watermelon produce apart from the local market is also being supplied to the Defence Forces deployed in Ladakh sector.

*Corresponding author email: arpithuria@gmail.com