



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(12): 1144-1148
Received: 18-09-2025
Accepted: 30-10-2025

Ningdalli Mallikarjun
Agriculture Research Station,
Bidar, Karnataka, India

SunilKumar NM
College of Agriculture, Kalburgi,
Karnataka, India

Gnyandev B
KVK, Kalburgi-II, Karnataka,
India

Sidram Y
College of Agriculture, Kalburgi,
Karnataka, India

A case study of FLD on demonstration of fruit cracking management practices in muskmelon in Bidar

Ningdalli Mallikarjun, SunilKumar NM, Gnyandev B and Sidram Y

DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i10o.4393>

Abstract

Muskmelon (*Cucumis melo* L.) is one of the important cucurbit crops grown during late rabi and summer season. In Bidar district, muskmelon is growing over an area of around 300 ha with a production of 5850 tonnes. Since muskmelon is a short duration crop, many farmers are willing to grow as a catch crop after the green gram or black gram or soybean, however the yield of muskmelon is not matching with the potential yield and also the quality of the fruit is being affected by the disorder like fruit cracking under size. ICAR- Krishi Vigyan Kendra Bidar conducted FGD (Focused Group discussion) during 2023-24 in the muskmelon growing area of Bhalki taluka and formulated and conducted the FLD to address the maximizing yield with reducing fruit cracking in muskmelon during 2024-25. For the demonstration 10 farmers were selected from Tarnalli and Halbarga villages of Bhalki taluka of Bidar district. A series of follow up visits, off campus training and informing through messages to the farmers has empowered the farmers to address their problems faced earlier for the muskmelon production and resulted is realized the yield up to 31.3 t/ha with quality produce that gave the better income of 1,37,150 Rs/ha.

Keywords: FLD, Muskmelon, demonstration, protective cultivation, fertigation, cracking

Introduction

Muskmelon (*Cucumis melo* L.) is an economically important and widely consumed vegetable-fruit crop cultivated primarily in warm tropical and subtropical regions, though its production has gradually expanded into temperate zones in recent years. In India, muskmelon is especially popular across northern and central states such as Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh, Andhra Pradesh, Telangana, and Karnataka. Taxonomically, muskmelon ($2n = 24$) belongs to the family Cucurbitaceae, a diverse group commonly referred to as cucurbits (Schaefer *et al.*, 2009) ^[21].

The crop is believed to have originated in tropical Africa, with secondary centers of diversity reported in Central Asia, including parts of southern Russia, Iran, Afghanistan, and north-western India (Whitaker and Davis, 1962) ^[37]. Muskmelon is valued not only for its refreshing flavor and high consumer acceptability but also for its rich nutritional profile. Per 100 g of edible portion, it supplies 26-41 calories, 0.6-1.0 g protein, and essential minerals such as calcium (5-10 mg), iron (0.2-0.4 mg), magnesium (8.17 mg), and phosphorus (7.39 mg) (Howard *et al.*, 1962) ^[7].

Given its dietary significance, adaptability, and increasing market demand, muskmelon continues to be an important crop for nutritional security and horticultural diversification.

In Karnataka the muskmelon is grown in an area of 6280 ha with the production about 12560 Metric tons. In Bidar district the area under muskmelon crop is being increased year by year. In the present year the area under muskmelon in the Bidar district is 210 ha area which produces about 4620 tones with the productivity of 22 t/ha. In recent years many of the growers are facing the problem of lesser yield and poor quality. The undersize fruits with more unmarketable fruits with pre harvest fruit crackings are issues for lower income to the muskmelon growers.

Organic manures and bio fertilizers are the important components of integrated nutrient management. There is a need to encourage the farmers to adopt the INM practices for better nutrient supply to the crop to maximize the yield without affecting the quality of the fruits. To achieve the quality parameters of fruit viz. The size, weight and appearance of fruits without

Corresponding Author:
Ningdalli Mallikarjun
Agriculture Research Station,
Bidar, Karnataka, India

any cracks micronutrient management with IPM practices and proper water management is to be practiced. These technologies were recommended with training program and the required critical inputs were provided to the selected farmers to carryout demonstrations.

Materials and Methods

The Frontline Demonstration (FLD) was carried out during 2024-25 in ten farmers' fields located in Tarnalli and Halbarga villages of Bhalki taluka, Bidar district, under the supervision of ICAR-KVK Bidar. Bidar falls under the Northern Eastern Transition Zone (Zone-1) of Karnataka and is geographically positioned at 17°55' N latitude and 77°39' E longitude. The district lies at an elevation ranging from 580 to 610 meters above mean sea level, with the broader plateau region varying between 640 and 684 meters. The area receives an average annual rainfall of approximately 937 mm, predominantly during the monsoon season (June to September), with peak rainfall usually occurring in August followed by July.

Under the FLD programme, technologies recommended by the University of Horticultural Sciences, Bagalkote, and the Indian Institute of Horticultural Research (IIHR), Bengaluru, were demonstrated on one acre per farmer, along with a control plot for comparison. The major technological interventions included the use of improved variety, seed treatment with bio-inputs, balanced nutrient application, drip irrigation with fertigation, foliar nutrition, and integrated pest management (IPM) practices. Yield and other relevant observations were recorded to assess the impact of the demonstrated technologies.

Technology gap, extension gap, and technology index were computed following the methodology of Samui *et al.* (2000) ^[19]:

- Technology gap = Potential yield - Demonstration yield
- Extension gap = Demonstration yield - Farmers' practice yield

The Technology Index (%) was calculated as:

$$\text{Technology index \%} = \frac{\text{Technological gap}}{\text{Potential yield}} \times 100$$

Growth Characters

Vine Length (cm)

Vine length was recorded at the time of the final harvest to assess the vegetative growth performance of the crop under different treatments. Measurements were taken using a measuring tape, starting from the cotyledonary node up to the apical tip of the vine. This parameter serves as an important indicator of plant vigor and canopy development, which ultimately influences photosynthetic efficiency and yield potential. The recorded values were expressed in centimeters.

Number of Leaves per Plant

The total number of functional leaves present on each plant was counted at the harvesting stage. Leaf count is a crucial growth parameter as it directly relates to the plant's photosynthetic capacity and carbohydrate accumulation. Five representative plants per replication were observed, and the average number of leaves per plant was calculated and documented.

Leaf Length and Leaf Width (cm)

To evaluate leaf morphology, a fully developed leaf located midway along the vine was selected from each plant. Leaf length and width were measured during the harvest stage to ensure uniformity across observations. These measurements provide

insights into leaf expansion, surface area, and overall plant health. Mean values for leaf length and width were calculated and expressed in centimeters.

Yield Characters

Days to First Flowering

The number of days from the date of sowing to the appearance of the first open flower on each plant was recorded. This parameter reflects the earliness of flowering, which is a critical component in determining crop duration and seasonal adaptability. The values were expressed in days.

Days to 50% Flowering

This parameter was recorded as the number of days from sowing until half of the plants within each replication reached the flowering stage. Days to 50% flowering provides a reliable estimate of crop uniformity and reproductive readiness, which are important for synchronized fruit set and improved yield.

Days from Flowering to Fruit Formation

The interval between the appearance of the first flower and the formation of the first fruit was recorded and expressed in days. This duration indicates the efficiency of pollination and fruit set processes and is an important determinant of overall crop productivity.

Number of Fruits per Plant

Fruits harvested from five randomly selected and tagged plants in each replication were counted to obtain the number of fruits per plant. This parameter reflects the reproductive efficiency and yield potential of the crop. The average number of fruits per plant was calculated and used for comparison among treatments.

Fruit Length and Fruit Width (cm)

Ten fruits were randomly selected from each plot to assess fruit size characteristics. Fruit length was measured from the apex to the base, while fruit width was recorded at the point of maximum diameter. These measurements provide important information on fruit development, marketable quality, and consumer preference. The average fruit length and width were calculated and expressed in centimeters.

Fruit Weight (kg)

Fruit weight was determined to evaluate the influence of different treatments on fruit development and marketable produce. For this purpose, ten fruits were randomly selected from each plot to ensure representative sampling. Each fruit was weighed individually using a calibrated electronic balance with high precision. The average fruit weight was then calculated by dividing the total weight of the sampled fruits by the number of fruits weighed. The final values were expressed in kilograms (kg). This parameter is a key indicator of fruit size, quality, and overall yield potential.

Fruit Yield per Plant (kg plant⁻¹), Fruit Yield per Plot (kg plot⁻¹), and Fruit Yield per Hectare (q ha⁻¹)

Fruit yield parameters were recorded to assess the productivity of the muskmelon crop under the demonstrated technologies. Fruits harvested from each plant were collected separately, ensuring that no fruit was left unaccounted for. The harvested fruits from tagged plants in each replication were weighed using an electronic balance to obtain the fruit yield per plant, expressed in kilograms per plant (kg plant⁻¹).

For determining fruit yield per plot (kg plot⁻¹), all fruits

harvested within the designated demonstration plot area were weighed collectively. This measurement reflects the overall performance of the crop under field conditions and captures variations in plant density, environmental influences, and management practices.

To estimate the fruit yield per hectare (q ha^{-1}), the plot yield was extrapolated to a hectare basis using standard conversion methods. Yield per hectare, expressed in quintals per hectare (q ha^{-1}), provides a direct comparison with regional productivity benchmarks and helps evaluate the effectiveness of the demonstrated interventions at a larger production scale.

These yield assessments collectively offer a comprehensive understanding of crop performance, allowing for accurate evaluation of technological interventions and their potential for improving muskmelon productivity under farmer field conditions.

Results and Discussion

Yield Potential of Muskmelon

The results of the Frontline Demonstration revealed a significant improvement in the yield of muskmelon when recommended production technologies were adopted. The average fruit yield recorded in the demonstration plots was 31.3 t ha^{-1} , which was notably higher compared to the yield obtained under farmers' conventional practices (25.6 t ha^{-1}). This reflects a 22.26% increase in yield, demonstrating the positive impact of improved

varieties, seed treatment, balanced nutrient application, and micro-irrigation systems such as drip and fertigation.

The higher yield under demonstration conditions may be attributed to better crop establishment, enhanced nutrient uptake, improved water-use efficiency, and effective pest and disease management through integrated approaches. The collective influence of these interventions resulted in increased fruit size, number of fruits per plant, and overall productivity.

The substantial yield advantage clearly indicates that farmers were highly responsive to the introduced technologies and acknowledged their benefits in real-field conditions. Successful adoption further confirms the suitability and practicality of the recommended package of practices for muskmelon cultivation in the agro-climatic conditions of Bidar district.

Similar findings were reported by earlier researchers who observed enhanced muskmelon productivity under improved agronomic and protected cultivation practices. Ban *et al.* (2006) ^[1], Cantliffe *et al.* (2001; 2003) ^[3, 4], Jovicich *et al.* (2004) ^[9], Kultur *et al.* (2001) ^[10], Logendra *et al.* (2001) ^[12], Olson *et al.* (2006) ^[8], Rodriguez *et al.* (2006) ^[17], Shaw *et al.* (2001; 2004) ^[22, 25] have all documented increased yield performance of muskmelon with the adoption of scientifically recommended cultivation technologies. Overall, the present study reinforces the importance of disseminating advanced and location-specific technologies to bridge the yield gap and enhance muskmelon productivity at the farmer level.

Table 1: Yield gap analysis of cultivation of muskmelon (Average of 10 farmers)

Particular	Area (ha)	No of farmers	Fruit yield (t ha^{-1})	Potential yield (t ha^{-1})	Percent increase over farmers practice	Technological gap (t ha^{-1})	Extension gap (t ha^{-1})	Technology index
FLD	4	10	31.3	36.3	22.26	5.8	5.7	15.97
FP	4	10	25.6	-				

Table 2: Ancillary parameters analysis of cultivation of muskmelon (Average of 10 farmers)

Parameters	Demo	Check
Average size of the fruit (kg)	1.6	1.3
Duration of crop (days)	82	88
Fruit cracking percentage (%)	3	18
Number of fruits per vine	4	3

Table 3: Economic analysis of cultivation of muskmelon (Average of 10 farmers)

Particular	Fruit yield (t ha^{-1})	Cost of cultivation (Rs ha^{-1})	Gross returns (Rs ha^{-1})	Net returns (Rs ha^{-1})	B:C ratio
FLD	31.3	2,05,750	688600	137150	3.34
FP	25.6	2,00,250	563200	362950	2.81

FLD: Frontline demonstration FP: Farmer's practice

Technology Gap Analysis

The technology gap, defined as the difference between the potential yield and the demonstrated yield, was found to be 5.8 t ha^{-1} . This relatively small gap indicates that the implementation of improved production technologies significantly enhanced the productivity of muskmelon under field conditions. The narrow difference also highlights the effectiveness of the demonstrated package of practices, suggesting that further refinement and wider adoption could help farmers approach the crop's full yield potential.

Extension Gap Analysis

An extension gap of 5.7 t ha^{-1} was recorded between the demonstration plots and farmers' traditional practices. This substantial gap underscores the crucial need for strengthening extension activities aimed at disseminating improved technologies. Awareness creation through training programs,

field demonstrations, farmer field schools, and regular technical advisories can motivate farmers to adopt scientific interventions. Adoption of high-yielding varieties, modern irrigation systems, balanced nutrient management, and integrated pest management will help narrow this gap. Similar observations were reported by Hiremath and Nagaraju (2010) ^[5], who emphasized that continuous exposure to modern agricultural innovations encourages farmers to replace outdated practices with advanced technologies.

Technological Index

The technological index reflects the practicality and adoptability of an innovation under farmers' conditions. In the present study, the technological index was calculated as 15.97%, indicating a high level of feasibility of the recommended muskmelon production technologies. A lower technological index value denotes better performance and acceptability of the

demonstrated technologies at the field level. The results suggest that the improved interventions are well-suited to the region's agro-climatic conditions and can be effectively scaled up.

Economic Analysis

The economic performance of the demonstrated technology was superior to that of the farmers' practice. The demonstration plots recorded a higher gross return (₹6,88,600 ha⁻¹), net return (₹1,37,150 ha⁻¹), and a favorable benefit-cost ratio (3.34). The increased economic gains are attributed to the higher fruit yield obtained through improved agronomic practices such as varietal selection, seed treatment, integrated nutrient management (INM), integrated pest management (IPM), and the use of drip irrigation with fertigation. These findings indicate that muskmelon productivity and profitability can be significantly enhanced through the adoption of scientific production technologies. The results of the Frontline Demonstrations emphasize the need to bridge the existing technology and extension gaps by developing location-specific technology modules, strengthening capacity building of farmers and extension personnel, and encouraging wider dissemination of recommended practices. Such efforts will contribute to improving muskmelon cultivation efficiency in diverse agro-ecosystems.

Conclusion

The Frontline Demonstration clearly showed that the adoption of improved production practices, particularly Integrated Nutrient Management (INM), had a significant positive impact on the growth and yield performance of muskmelon. Key growth attributes such as vine length, number of leaves per plant, leaf length, and leaf width were all enhanced under the demonstrated technology compared to the farmers' practice. Similarly, yield traits—including average fruit weight, fruit yield per plant, fruit yield per plot, and overall fruit yield per hectare—showed marked improvement in the demonstration plots. The results indicate that INM, combined with recommended interventions such as varietal improvement, seed treatment, drip irrigation with fertigation, and IPM practices, can substantially boost muskmelon productivity. Additionally, a noticeable reduction in fruit cracking percentage further highlights the effectiveness of the demonstrated technologies. Overall, the study confirms that the integration of scientific nutrient management with improved agronomic practices is a viable approach to enhancing the growth, yield, and economic returns of muskmelon under field conditions. Wider adoption of these technologies by farmers can play a crucial role in bridging existing yield gaps and improving productivity in the muskmelon-growing regions.

References

- Ban D, Goreta S, Borosic J. Plant spacing and cultivar affect melon growth and yield components. *Sci Hortic*. 2006;109:238-243.
- Sadiq AU, Kpalo SY, Dosunmu I, Obiukwu SC. Knowledge, attitude, and practices towards food waste management among households in Karu Local Government Area, Nasarawa State, Nigeria. *Environ Rep Int J*. 2025.
- Cantliffe DJ, Funes J, Jovicich E, Paranjpe A, Rodriguez J, Shaw N. Media and containers for greenhouse soilless grown cucumbers, melons, peppers, and strawberries. *Acta Hortic*. 2003;614:199-203.
- Cantliffe DJ, Shaw N, Jovicich E, Rodriguez JC, Secker I, Karchi Z. Passive ventilated high-roof greenhouse production of vegetables in a humid, mild winter climate. *Acta Hortic*. 2001;559:195-201.
- Hiremath SM, Nagarju MV. Karnataka J Agric Sci. 2010;23(2):341-342.
- Yousuf S, Geelani SM. Comprehensive study on the socio-economic impact of tourist inflow in the Kashmir Valley. *Environ Rep Int J*. 2025.
- Howard FD, Macgillivray JH, Yamaguchi M. Vegetable varieties and production. Bull No. 788. California Agric Exp Stn, Univ of California, Berkeley; 1962.
- Olson SM, Simonne E, editors. Vegetable production handbook for Florida 2006-2007. Univ of Florida, IFAS Cooperative Extension Service; 2006.
- Jovicich E, Cantliffe DJ, Stoffella PJ. Fruit yield and quality of greenhouse-grown bell pepper as influenced by density, container, and trellis system. *HortTechnology*. 2004;14:507-513.
- Kultur F, Harrison HC, Staub JE. Spacing and genotype affect fruit sugar concentration, yield, and fruit size of muskmelon. *HortScience*. 2001;36:274-278.
- Okoronkwo CU. Predictive food microbiology: A model to achieving shelf-life extension and product maximization. *Microbiol Arch Int J*. 2025.
- Logendra LS, Gianfagna TJ, Specca DR, Janes HW. Greenhouse tomato limited cluster production systems: Crop management practices affect yield. *HortScience*. 2001;36:893-896.
- Olson SM, Simonne EH, Stall WM, Roberts PD, Webb SE, Taylor TG, *et al*. Cucurbit production in Florida. 2006. p. 191-237.
- Patel NL. Off season musk and watermelon production a possibility. *The Hindu*. 2012;2:2.
- Aravinda Sai R, Cheena J, Venkatalaxmi K, Raja Goud CH, Naveen Kumar B. Effect of integrated nutrient management on growth and yield attributes of muskmelon (*Cucumis melo* L.). *Pharma Innov J*. 2022;11(8):1801-1808.
- Muzaffar SS. Meeting the demand: Achieving zero hunger through balanced food supply and demand. *Agric Arch Int J*. 2022.
- Rodriguez JC, Cantliffe DJ, Shaw NL, Karchi Z. Soilless media and containers for greenhouse production of 'Galia' type muskmelon. *HortScience*. 2006;41:1200-1205.
- Thomas S, Mathew L. Plant growth promoting rhizobacteria enhancing vigour and yield: A brief review. *Agric Arch Int J*. 2024.
- Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. J Indian Soc Coastal Agric Res. 2000;18:180-183.
- Anushi AK, Ghosh PK. From seed to succulence: Mastering dragon fruit propagation techniques. *J Plant Biota*. 2024.
- Schaefer H, Heibl C, Renner SS. Gourds afloat: A dated phylogeny reveals an Asian origin of the gourd family (Cucurbitaceae) and numerous overseas dispersal events. *Proc R Soc Lond B Biol Sci*. 2009;276:843-851.
- Shaw NL, Cantliffe DJ, Taylor BS. Hydroponically produced Galia muskmelon: What's the secret? *Proc Fla State Hortic Soc*. 2001;114:288-293.
- Ayana DT, Olika GI. Effect of mulching practice as soil moisture conservation for tomato (*Lycopersicon esculentum* Mill.) production under supplemental irrigation in Ethiopia. *Acta Biol Forum*. 2024;3(2):43-47.
- Ayo-Dada OB, Popoola SO, Aminu BH, Kolawole-Daniels A, Adegbile OM, Olakunle WG, *et al*. Assessing marine litter pollution and ecotourists dynamics along Lagos coastline beaches. *J Divers Stud*.
- Shaw NL, Cantliffe DJ, Rodriguez J, Shine C III. Economic

- feasibility of producing Galia muskmelons in passive-ventilated greenhouses and soilless culture in north-central Florida. *Proc Fla State Hortic Soc.* 2004;117:38-42.
26. Iolamen T, Osabuohien OL, Chibuike EG. Effect of planting dates on the yield and yield components of cowpea in the Guinea Savannah agroecology of Nigeria. *Agric Arch Int J.*
 27. Attitalla IH, Gaballa MF, Alraaydi NS, Abid AAD. Exploring the antimicrobial capabilities of date palm seed essential oil. *Microbiol Arch Int J.* 2024.
 28. Shetti P, Singh S, Kumbar V, Dodamani S, Paranjape R, Kubade M. Therapeutic versatility of apigenin and quercetin: Broad applications in health and wellness. *Acta Pharma Rep.* 2025.
 29. Osuntokun OT, Adekahunsi AO. Biohazard signatures of cough syrup isolates from patent medicine shops. *J E-Science Lett.* 2024;5(1):7-19.
 30. Shafiwu AB. Consumer preferences and willingness to pay for safer vegetables in Ouagadougou, Burkina Faso. *Agric Arch Int J.* 2024;4(1):26-33.
 31. Islam S, Ali M, Howlader P, Mehedi MNH, Bose SK. Enhancing garlic productivity using alginate oligosaccharides. *Agric Arch Int J.* 2025.
 32. Umar MA, Abdulkadir A, Tarfa MA, Saquib M, Bulama AU. *In vitro* propagation of arid zone tree species in Maiduguri, Nigeria. *Environ Rep Int J.* 2025.
 33. Dash SK, Hansdah B, Baral JRRB, Sahoo SL. *Christella parasitica*: A potent pharmacological and pesticidal pteridophyte. *J Plant Biota.* 2024.
 34. Beese S, Kanwar B, Dhiman SR, Thakur D. Advancing quality and productivity in floricultural crops through CRISPR/Cas9 technology. *J Plant Biota.* 2023;2.
 35. Kulkarni S, Rathod A. Impact study of front line demonstration on productivity of muskmelon (*Cucumis melo* L.) in Northern Dry Zone of Karnataka, India. *Int J Curr Microbiol App Sci.* 2018;Special Issue 7:896-899.
 36. Thapa U, Ansari ZG, Ramesh S, Anbalagan K, Rabi A. Plant hormones and growth regulators: Mechanisms, interactions, and agricultural applications. *Agric Arch Int J.* 2024;3:11-20.
 37. Whitaker TW, Davis GN. *Cucurbits*. New York: Interscience; 1962.