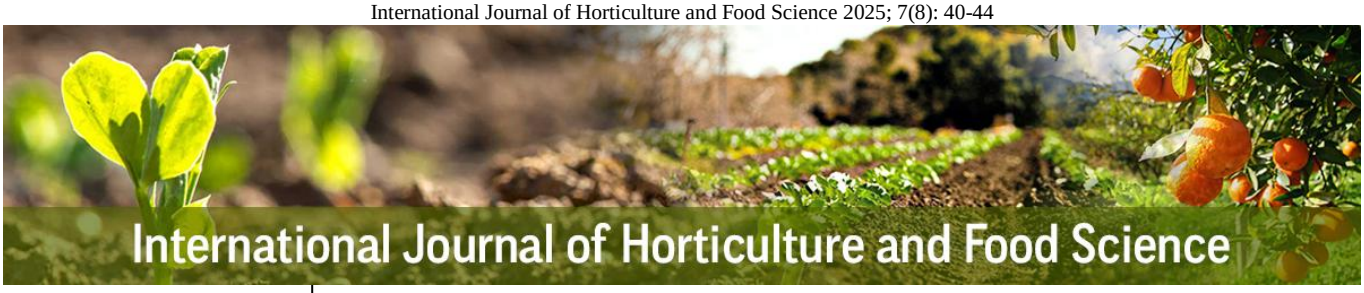

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Comparative studies of natural, organic, conventional and precision farming on growth and flowering of Brinjal (*Solanum melongena* L.)

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Abstract
"Comparative studies of natural, organic, conventional, and precision farming in Brinjal (*Solanum melongena* L.)" was the subject of an inquiry conducted in 2023-2024 and 2024-2025 at the Instructional farm in Jambuvadi, Department of Vegetable Science, College of Horticulture, J.A.U., Junagadh. Four treatments of various farming systems-natural farming, organic farming, conventional farming, and precision farming in Brinjal-were used in the experiment, which was set up using the large plot technique. Among the different farming systems, the maximum plant height at 60 DAT (67.11, 68.51 and 67.81 cm), plant height at 90 DAT (76.08, 78.37 and 77.22 cm), plant height at 120 DAT (88.69, 91.94 and 90.32 cm) was observed in precision farming during the year 2023-24, 2024-25 as well as in pooled, respectively. The minimum days to first flower initiation (37.97, 38.73 and 38.35) and days to 50% flowering (41.10, 40.83 and 40.97) was observed in organic farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Keywords: *Solanum melongena* L, Brinjal, growth, flowering, modules

Introduction
One of the most popular tropical vegetables grown in India is the Brinjal (*Solanum melongena* L.), an eggplant belonging to the Solanaceae family that is used by most people worldwide. It is grown in many countries, including central, south, and southeast Asia, as well as some parts of Africa and Central America (Grubben, 1977) [2]. Grown as a poor man's crop, it is a versatile vegetable crop that may be grown all year round and is adaptable to many agroclimatic zones. Despite being a perennial crop, it is frequently produced as an annual crop for commercial purposes. Both the rich and the poor like Brinjal, which is a significant vegetable crop of the plains in India and is grown year-round everywhere except at higher elevations (Premanath and Lakshmidevi, 1987) [8].

Natural farming (NF) is a unique chemical free farming method that is considered to be an agroecology-based diversified farming system established by Masanobu Fukuoka (Author, Philosopher and a Japanese farmer) introduced in his book "The One-Straw Revolution". This group of farming practices has extended to other Indian states. In areas like Karnataka and Andhra Pradesh in Southern India, it has achieved widespread success. In India, Shri Subhash Palekar (Padma Shri awardy), he describes Natural farming as Zero Budget Spiritual Farming (ZBSF) in his literature. "Low budget" means that the net cost of production for all crops is kept to a minimum. Cow dung, cow urine, and other locally accessible materials are utilized for seed treatment and other inoculations. In September 2015, Zero Budget Natural Farming (ZBNF) was initially launched under the Central Government's Rashtriya Krishi Vikas Yojana (RKVY).

The term "organic farming" was first used by Lord Northbourne. He elaborates on his idea of "the farm as organism" in his 1940 book "Look to the Land," which is where the name originates. Lady Eve Balfour conducted the first scientific side-by-side comparison of conventional and organic farming, influenced by Sir Albert Howard's work (Meena *et al*., 2013) [4]. Sir Albert Howard, the father of modern organic agriculture, developed the idea of organic farming, emphasizing animal manures, crop rotation and biological pest control for a superior farming system (Zankat *et al*., 2024) [15].

In the 1960s, MS Swaminathan led the Green Revolution, which emerged as the government's most significant initiative. It includes high yielding varieties, chemical fertilizers and chemical pesticides, *etc*. It has been a common conventional practice among the farmers in improving productivity to meet increasing demand. It may result in increased agricultural yields in the first few years, but it also reduces the land's potential for production, and farmers experience lower yields in subsequent years (Sati *et al*., 2018) [10]. Before planting seeds, the conventional farmer will give seed treatment to them and soak the seeds in fungicides and pesticides to keep insects and pests at bay and promote germination. This type of farming method is mostly used by farmers all over the world because it will give them good crop production.

The word 'Precision' means exactness or accuracy. Precision farming or precision agriculture or smart farming means the process by which one can get exact or accurate result of farming.

Because it focuses on carrying out the correct intervention of the appropriate input, right amount, right position, at the right time, and right way, it is known as "precision." Satellite farming or site-specific management crop systems are other names for precision farming. It is an agricultural management system built on the application of contemporary technologies across the entire process. Heterogeneous zones are typically found in a field, and technologies enable the identification and management of these zones. The harvest is increased as a result of farmers using seeds, fertilizer, and insecticides more effectively.

Materials and Methods

A field experiment on Brinjal var. GRB 7 was conducted at Instructional farm, Jambuvadi, Department of Vegetable Science, College of Horticulture, J.A.U., Junagadh during the period of 2023-24 and 2024-25. In order to test four distinct farming systems-natural farming, organic farming, conventional farming, and precision farming in Brinjal the experiment was set up using the large plot technique. Seedlings were prepared as per modules and transplanting was done 30 days after sowing.

Four modules were used for evaluation with 6 number of repetitions. Size of the module was 4.50 m × 25.10 m. Details of that modules are given below.

1. Module-I: Natural Farming (NF)

- Intercropping with marigold
- Seed treatment with *Beejamrut* @ 300 ml/kg seed
- *Achhadan*: Crop residue/weed mulch
- Spacing: 90 cm × 60 cm
- *Ghan Jeevamrut* 1250 kg/ha at time of transplanting
- Soil application of *Jeevamrut* @ 500 l/ha at 30, 60 and 90 DAT
- Plant protection: *Agniastra*, *Brahmastra*, *Neemastra etc.*

2. Module-II: Organic Farming (OF)

- Sole cropping of Brinjal
- Seed treatment with *Trichoderma* @ 4 g/kg
- *Achhadan*: Organic mulch (Wheat straw)
- Spacing: 90 cm × 60 cm
- Vermicompost: 2 t/ha
- FYM: 10 t/ha
- *Panchagavy*a 3% spray at 30, 45 and 60 DAT
- Plant protection: Pheromone trap, *Trichoderma*, *Beauveria*, *Metarhizium*, *NPV*, *etc.*

3. Module-III: Conventional Farming (CF)

- Sole cropping of Brinjal
- Seed treatment with Mancozeb @ 3 g/kg of seed
- Spacing: 90 cm × 60 cm
- FYM: 20 t/ha
- Recommended dose of chemical fertilizer (125-50-50 kg N-P_2O_5-K_2O/ha, 50% of N and full dose of P and K were applied in the basal and 25% dose of N was applied at 30 DAT and remaining 25% N was applied at 60 DAT)
- **Plant protection:** Recommended fungicides, insecticides, herbicides *etc.*

4. Module-IV: Precision Farming (PF)

- Sole cropping of Brinjal
- Seed treatment with Mancozeb @ 3 g/kg of seed
- Seedling were raised in plug tray
- Preparation of raised bed and plastic mulch (Size of bed: 1.0 m × 3.6 m, 50 cm between two bed, 90 cm between two rows in bed)
- FYM 10 t/ha
- Fertigation (150:100:100 kg N-P_2O_5-K_2O/ha, entire fertilizer dose through drip fertigation at an interval of 10 days in 10 equal splits)
- Plant protection: Recommended fungicides and insecticides were applied through drone

Height of the plant was measured in centimeters at 60, 90 and 120 DAT with the help of measure tap from ground level to the tip of the main stem. Number of days to 1st flower initiation was noted from the date of transplanting and on the basis of daily observation from each tagged plant. While days to 50% flowering based on first flowering in 50% of plants in module. Statistical analysis was performed on the data related to flowering and growth parameters using the procedures outlined by Panse and Sukhatme (1985) [6].

Results and Discussion

Growth paramaters

The data regarding plant height at 60 DAT, 90 DAT and 120 DAT are depicted in Table 1, 2 and 3, respectively.

Plant Heigh (cm) at 60 DAT

The result showed that effect of different farming systems on plant height at 60 DAT was found significant in Brinjal. The data indicated that the maximum plant height at 60 DAT (67.11, 68.51 and 67.81 cm) was observed in precision farming followed by conventional farming (64.20, 65.17 and 64.68 cm) during the year 2023-24, 2024-25 as well as in pooled, respectively. While, the minimum plant height at 60 DAT was observed in natural farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Table 1: Effect of natural, organic, conventional and precision farming on plant height at 60 DAT in Brinjal

Treatments	Plant height (cm) at 60 DAT		
	2023-24	2024-25	Pooled
Natural farming	58.45	56.70	57.57
Organic farming	59.09	57.36	58.22
Conventional farming	64.20	65.17	64.68
Precision farming	67.11	68.51	67.81
S.E.M±	1.574	1.524	1.095
C.D. at 5%	4.64	4.50	3.13
Y × T			
S.E.M±			1.549
C.D. at 5%			NS
C.V.%	6.20	6.03	6.11

Plant height (cm) at 90 DAT

According to an analysis of the data, various farming strategies had a substantial impact on plant height at 90 DAT. Significantly maximum plant height at 90 DAT (76.08, 78.37 and 77.22 cm) was observed in precision farming followed by conventional farming (73.55, 74.34 and 73.95 cm) during the year 2023-24, 2024-25 as well as in pooled, respectively. While, the minimum plant height at 90 DAT was observed in organic farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Table 2: Effect of natural, organic, conventional and precision farming on plant height at 90 DAT in Brinjal

Treatments	Plant height (cm) at 90 DAT		
	2023-24	2024-25	Pooled
Natural farming	69.44	68.34	68.89
Organic farming	69.16	67.35	68.25
Conventional farming	73.55	74.34	73.95
Precision farming	76.08	78.37	77.22
S.E.M±	1.647	1.652	1.167
C.D. at 5%	4.86	4.87	3.33
Y × T			
S.E.M±			1.650
C.D. at 5%			NS
C.V.%	5.60	5.61	5.61

Plant height (cm) at 120 DAT

The result showed that effect of different farming systems on plant height at 120 DAT was found significant in Brinjal. The data indicated that maximum plant height at 120 DAT (88.69, 91.94 and 90.32 cm) was observed in precision farming followed by conventional farming (85.92, 87.99 and 86.95 cm) during the year 2023-24, 2024-25 as well as in pooled, respectively. While, the minimum plant height at 90 DAT was observed in organic farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Table 3: Effect of natural, organic, conventional and precision farming on plant height at 120 DAT in Brinjal

Treatments	Plant height (cm) at 120 DAT		
	2023-24	2024-25	Pooled
Natural farming	82.91	81.24	82.07
Organic farming	81.33	80.00	80.66
Conventional farming	85.92	87.99	86.95
Precision farming	88.69	91.94	90.32
S.E.M±	1.722	1.611	1.179
C.D. at 5%	5.08	4.75	3.37
Y × T			
S.E.M±			1.668
C.D. at 5%			NS
C.V.%	4.98	4.63	4.81

Precision farming on plant height was influenced positively because it provide sufficient soil moisture near root zone and minimized the evaporation loss due to mulching. In comparison to the control, the plants grew more because of the prolonged moisture retention and availability, which also increased nutrient uptake for healthy plant growth and development. Similar findings have been obtained by Parmar *et al.* (2013) [7], Reddy *et al.* (2016) [9] and Pandiyan *et al.* (2018) [5].

Additionally, it's possible that fertigation treatments supplied NPK at steady amounts during the plant growth period. Young plants typically have reduced nutritional requirements due to their slow rates of absolute development. Similar to this, drip fertigation, which involves injecting nutrients directly around plant root systems, proved to be beneficial since it prevented leaching and improved nutrient consumption due to the ideal soil moisture levels. Shedeed *et al.* (2009) [12] have also found similar results.

Flowering paramaters

The data on flowering attributing characters such as number of days to 1st flower initiation and days to 50% flowering are depicted in Table 4 and 5.

Days to first flower initiation

Various farming systems produced significant effect on the number of days taken to first flower initiation. Significantly minimum days to first flower initiation (37.97, 38.73 and 38.35) was observed in organic farming followed by natural farming (38.50, 38.87 and 38.68) during the year 2023-24, 2024-25 as well as in pooled, respectively. While, the maximum days to first flower initiation was observed in precision farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Table 4: Effect of natural, organic, conventional and precision farming on days to first flower initiation in Brinjal

Treatments	Days to first flower initiation		
	2023-24	2024-25	Pooled
Natural farming	38.50	38.87	38.68
Organic farming	37.97	38.73	38.35
Conventional farming	41.13	41.77	41.45
Precision farming	41.57	42.33	41.95
S.E.M±	0.744	0.779	0.538
C.D. at 5%	2.19	2.30	1.54
Y × T			
S.E.M±			0.761
C.D. at 5%			NS
C.V.%	4.58	4.72	4.65

Minimum days to first flower initiation was recorded with organic farming might be due to the application of farmyard manure along with vermicompost resulted the better aeration, adequate drainage and creation of favourable soil environment for deeper penetration of root and higher nutrient extraction from the soil (Subbarao and Sankar 2001) [14]. The similar kind of finding was recorded by Shakila and Anburani (2008) [11].

Days to 50% flowering

Various farming systems produced significant effect on the number of days to 50% flowering. Significantly minimum days to 50% flowering (41.10, 40.83 and 40.97) was observed in organic farming followed by natural farming (41.57, 42.40 and 41.98) during the year 2023-24, 2024-25 as well as in pooled, respectively. While, the maximum days to 50% flowering was observed in precision farming during the year 2023-24, 2024-25 as well as in pooled, respectively.

Table 5: Effect of natural, organic, conventional and precision farming on days to 50% flowering in Brinjal

Treatments	Days to 50% flowering		
	2023-24	2024-25	Pooled
Natural farming	41.57	42.40	41.98
Organic farming	41.10	40.83	40.97
Conventional farming	44.07	45.13	44.60
Precision farming	44.67	45.47	45.07
S.E.M±	0.777	0.799	0.557
C.D. at 5%	2.29	2.36	1.59
Y × T			
S.E.M±			0.788
C.D. at 5%			NS
C.V.%	4.44	4.51	4.47

According to Anjanappa *et al.*, 2012 [1], early flowering under nitrogen input from organic manures may be the result of improved soil health, which enhances flowering parameters [1]. The results are consistent with those of Joshiya *et al.* (2020) [3] and Singh *et al.* (2012) [13].

Conclusions

On the basis of results obtained from the present investigation, it can be concluded that the precision farming performed better for growth parameters. Whereas, organic farming gave best results in flowering parameters in Brinjal.

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References

1. Anjanappa M, Venkatesha J, Kumara BS. Growth, yield and quality attributes of cucumber (cv. Hasan local) as influenced by integrated nutrient management grown under protected condition. Veg Sci. 2012;39(1):47-50.
2. Grubban GH. Tropical vegetables and their genetic resources. International Board for Plant Genetic Resources, FAO, Rome; 1977, p. 18-20.
3. Joshiya DR, Vadodaria JR, Nandre BM, Sharma MK, Wankhade VR. Studies on organic nutrient management on growth and flowering of cucumber (*Cucumis sativus* L.). Int J Curr Microbiol Appl Sci. 2020;9(2):133-7.
4. Meena RP, Meena HP, Meena RP. Organic farming: concept and components. Pop Kheti. 2013;1(4):5-14.
5. Pandiyan S, Ramawtar D, Yadav CM. Effect of precision farming treatments on growth, flowering and yield of okra. Int J Curr Microbiol Appl Sci. 2018;7(7):2774-82.
6. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: ICAR; 1985.
7. Parmar HN, Polara ND, Viradiya JR. Effect of mulching materials on growth, yield and quality of watermelon (*Citrullus lanatus*) cv. Kiran. Univ J Agric Res. 2013;1(2):30-7.
8. Premanath R, Lakshmidevi N. Studies on antioxidant activity of *Tinospora cordifolia* (Miers.) leaves using in vitro models. J Am Sci. 1987;6:1-10.
9. Reddy GC, Hebbar SS, Reddy GPD. Effect of plastic mulch and non-mulch on growth, yield and quality of red chilli (*Capsicum annuum* L.) under drip fertigation. Plant Arch. 2016;16(2):563-7.
10. Sati UC, Raghav M, Singh DC, Sobaran S, Singh DK, Singh KD. Integrated nitrogen management in okra under Tarai condition of Uttarakhand. Int J Chem Stud. 2018;6:1118-22.
11. Shakila A, Anburani A. Effect of certain organics and pressmud on growth and yield characters of tomato. Asian J Hortic. 2008;3(2):273-276.
12. Shedeed SI, Zaghloul SM, Yassen AA. Effect of method and rate of fertilizer application under drip irrigation on yield and nutrient uptake by tomato.

Ozean J Appl Sci. 2009;2(2):139-147.
13. Singh DP, Mishra UC, Prakash HG, Mishra O. Role of organic farming on yield and economics of bottle gourd after vegetable pea. Int J Agric Sci. 2012;8(1):165-167.
14. Subbarao TS, Sankar CR. Effect of organic manures on growth and yield of Brinjal. South Indian Hortic. 2001;49:288-291.
15. Zankat SB, Zankat HB, Hathi HS, Vasava HV. The essence of organic farming. Agric Mag. 2024;3(11):401-404.