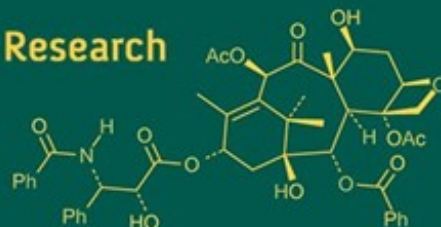
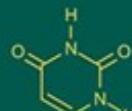


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Effect of organic fertilizers on pest complex of brinjal *Solanum melongena* L.

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ABSTRACT

The present investigation was undertaken during Rabi 2025–26 at the Instructional Farm, Department of Agronomy, College of Agriculture, Dapoli, to study the effect of organic fertilizers on pest incidence and on the biochemical and morphological parameters of brinjal (*Solanum melongena* L.) cv. Konkan Prabha. The experiment was laid out in a Randomized Block Design with eleven treatments and three replications, comprising different combinations of the recommended dose of fertilizer (RDF), farmyard manure (FYM), biofertilizers (Azotobacter and PSB) and Gau-Krupa Amrutam drenching/spraying. Weekly observations were recorded on the population of major sucking pests mainly aphid (*Aphis gossypii*), jassid (*Amrasca biguttula biguttula*), whitefly (*Bemisia tabaci*) and thrips along with shoot and fruit infestation caused by the brinjal shoot and fruit borer (*Leucinodes orbonalis*). Total chlorophyll, total soluble sugars, total phenol content, plant height, number of branches, leaf area index, trichome density and marketable fruit yield were also recorded and correlated with pest incidence. Among the treatments, T_{10} (100% RDF + 20 t FYM + Azotobacter + PSB + Gau-Krupa Amrutam drenching) consistently recorded the lowest population of sucking pests and the lowest shoot and fruit infestation, followed by T_9 , T_7 and T_6 , while the untreated control (T_{11}) recorded the highest pest incidence throughout the crop period. The same treatment also recorded significantly higher chlorophyll, soluble sugar and phenol content, better plant growth parameters and the highest marketable fruit yield (5.15 kg plot⁻¹; 2.77 t ha⁻¹). Correlation analysis showed a significant negative relationship between pest incidence and all the biochemical and morphological parameters studied, with phenol content and trichome density showing the strongest association with reduced pest damage. The study concludes that integrated organic fertilizers management, particularly the combination of RDF, FYM, biofertilizers and Gau-Krupa Amrutam, is effective in reducing insect-pest incidence while improving plant growth, biochemical status and yield of brinjal.

Keywords: *Solanum melongena*, Integrated nutrient management, *Leucinodes orbonalis*, Organic Fertilizers, Biofertilizers, Total phenol content, Trichome density, Host-plant resistance, Insect-pest population dynamics

Introduction

Brinjal (*Solanum melongena* L.) is an important vegetable crop of the family Solanaceae, extensively cultivated in tropical and subtropical regions. India possesses considerable genetic diversity of cultivated brinjal, comprising numerous indigenous land races and cultivars and is one of the major producers of the crop globally. In Maharashtra, brinjal is cultivated under diverse agro-climatic conditions, including the warm and humid environment of the Konkan region, where locally adapted cultivars such as Konkan Prabha are grown. The productivity and quality of brinjal are adversely affected by a complex of insect pests. Among them, the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenée (Lepidoptera: Crambidae), is a major economically important pest causing damage to both vegetative and reproductive plant parts. Other important pests include jassid, *Amrasca biguttula biguttula* (Ishida), aphid, *Aphis gossypii* Glover and whitefly, *Bemisia tabaci* (Gennadius). The occurrence and population dynamics of these pests are influenced by environmental conditions, crop growth and management practices (Dwarka *et al.*, 2024) [2].

Plant nutritional status is an important component of plant-insect interactions and can influence plant growth, physiological activity, biochemical composition and susceptibility to herbivorous insects. Nutrient sources, particularly organic fertilizers and biofertilizers, can modify soil fertility, nutrient availability and plant vigour. Such changes may alter biochemical constituents, including chlorophyll, phenolic compounds and sugars, as well as morphological attributes such as trichome density, thereby influencing insect colonization, feeding behaviour and population development.

Despite the importance of nutrient-mediated effects on plant-pest interactions, location-specific information on the response of the brinjal pest complex to different organic nutrient regimes remains limited under the

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agro-climatic conditions of the Konkan region. Therefore, the present investigation was undertaken to assess pest population dynamics under differential fertilizer regimes and to evaluate the influence of organic fertilizer variants on selected biochemical and morphological parameters of brinjal.

Materials and Methods

A field experiment was conducted at Instructional Farm, Department of Agronomy, College of Agriculture, Dapoli, Dist. Ratnagiri. For assessing pest population dynamics under differential fertilizer regimes in brinjal. The ready seedlings of 21 to 25 days old were transplanted on the selected plot and all the nutritional requirements for establishment of brinjal plot was given as recommended. The transplanted plot was kept free from any pesticide or insecticide application (sprays). The observation on different pests was recorded as soon as the infestation was noticed.

Experimental details

Location	: Instructional Farm Department of Agronomy, College of Agriculture, Dapoli.
Crop	: Brinjal
Season	: Rabi-2025-2026
Method of planting	: Flat Bed Method
Date of Transplanting	: 2 nd Jan 2026
Gross Area	: 469.86 m ²
Net Area	: 8.64 m ²
Spacing	: 60 cm×60 cm
Experiment Design	: Randomized Block Design (RBD)
No. of Treatments	: 11
No of Replication	: 3

Time and application

The entire quantity of FYM, Azotobacter, PSB was applied as the basal dose in a plot before the transplanting of seedlings. The treatment consisting of inorganic fertilizers was applied at varied doses. The nitrogen in the form of urea, out of the total recommended doses 50% of nitrogen and total quantities of phosphorous and potassium was applied as basal dose prior to transplanting. The remaining nitrogen was applied into split doses after 30 days after transplanting. Gau Krupa Amrutam (GKA) drenching and spraying was done at weekly interval from the date of transplanting.

Observations recorded

The observations were recorded on weekly basis as per standard meteorological weeks (SMW). On the experimental plot 5 plants were randomly selected for taking observations.

Method of recording observations

a) Sucking pest complex

For observation of sucking pests, five randomly selected plants from each plot were tagged. The number of Aphid (nymph and adult), Jassid (nymph and adult), Whiteflies (nymph and adult) was counted on three leaves representing top, middle, bottom portion of five randomly selected plants from each block area. Observations were recorded from second week after transplanting till last harvesting of the crop at weekly intervals.

Table 1. Treatment details :

Treatments	Descriptions
T1	100% Recommended Dose of Fertilizers
T2	100% RDF + 20Tonnes FYM
T3	100% RDF + 10Tonnes FYM

Treatments	Descriptions
T4	20Tonnes FYM + Gau-Krupa Amrutam Drenching
T5	20Tonnes FYM + GKA Drenching + GKA Spraying
T6	100% RDF + 20Tonnes FYM + GKA Drenching
T7	100% RDF + 20Tonnes FYM + GKA Drenching+ GKA Spraying
T8	100% RDF + Azotobacter +PSB
T9	100% RDF + Azotobacter +PSB+ 20Tonnes FYM
T10	100% RDF + Azotobacter +PSB+ 20Tonnes FYM+ GKA Drenching
T11	Untreated control

b) For *L. orbonalis* infestation

Observations were recorded on the basis of per cent shoot and fruit infestation throughout the crop period. The shoot infestation was recorded from 15 days after transplanting on five randomly selected plants in each block and per cent shoot infestation was calculated

$$\text{Per cent Shoot infestation} = \frac{\text{No. of infested shoots}}{\text{Total no. of shoots}} \times 100$$

c) For fruit infestation

The harvested fruits of each plot were observed carefully at every picking to ascertain per cent fruit infestation.

$$\text{Per cent fruit infestation} = \frac{\text{No. of infested fruits}}{\text{Total no. of fruits}} \times 100$$

3.2 Evaluating the effects of organic fertilizer variants on biochemical and morphological parameters on brinjal plants

1. Methodology:

For studying the effect of organic fertilizers variants on biochemical and morphological parameters in brinjal plants, the experimental plot was prepared in Randomized Block Design (RBD). The design consists of 3 replications and 11 treatments. The seedlings of brinjal were transplanted on experimental plot. All the treatments were randomly allotted in each replication. All the necessary cultural practices and fertilizer requirements was fulfilled as per requirements.

2. Experimental details:

Location	: Instructional Farm Department of Agronomy, College of Agriculture, Dapoli.
Season and Year	: Rabi 2025-26
Crop	: Brinjal
Variety	: Konkan Prabha
Method of planting	: Flat Bed Method
Spacing	: 60 cm X 60 cm
Net Plot Size	: 2.4m x 3.6m
Total Plot Size	: 469.86 m ²
Design	: Randomized Block Design (RBD)
No. of Replications	: 3 (Three)
No. of Treatments	: 11 (Eleven)
Date of Sowing	: 2 January, 2026
Fertilizer	: 150:50:50 NPK/Ha

3.2.3 Application of treatment

The entire quantity of FYM, Azotobacter, PSB was applied as the basal dose in a plot before the transplanting of seedlings. The treatment consisting of inorganic fertilizers was applied at varied doses.

The nitrogen the form of urea, while phosphorous and potassium were applied depending upon availability. Out of the total recommended doses 50% of nitrogen and total quantities of phosphorous and potassium was applied as basal dose prior to transplanting. The remaining nitrogen was applied into split doses after 30 days from transplanting. Gau Krupa Amrutam (GKA) drenching and spraying was done at weekly interval from the date of transplanting.

3.2.4 Method of recording observations

3.2.4.1 Morphological parameters of brinjal

a) Plant height:

Plant height was recorded from the base of the stem at ground level to the tip of the main shoot using a meter scale at 30, 60 and 90 days after transplanting (DAT). Mean plant height was calculated from five randomly selected tagged plants in each plot (Gomez *et al.*, 1984) [6].

Leaf area index (LAI)

LAI was computed using the formula

$LAI = \text{Leaf area per plant (cm}^2\text{) / Ground area occupied by the plant (cm}^2\text{)}$ Leaf area was measured by tracing method on graph paper, summing the area of all leaves per plant and dividing by ground coverage (Radford, 1967) [8].

c) Trichome density (no./cm²):

Fully expanded third leaves from the apex was collected and trichomes on both adaxial and abaxial surfaces was counted using a compound microscope fitted with a binocular microscope. (Levin, 1973) [7].

Number of branches per plant

Primary branches arising from the main stem was counted manually from five tagged plants per plot at 60 and 90 DAT and the mean was calculated.

Fruit yield (t/ha)

Fruits from each treatment block was harvested at commercial maturity and weighed. The cumulative weight of fruits from all harvests in a plot was summed, converted to kg/plot and extrapolated to quintals per hectare.

3.2.4.2 Biochemical characters of brinjal

The biochemical analysis was done at CIL, Department of Soil Science and Agricultural Chemistry, College of Agriculture, Dapoli.

• Preparation of samples:

The freshly collected shoot (at crop stage 30 DAT) and fruit samples (at first picking 60 DAT) was kept in hot air oven and was dried at a temperature of 50 °C for three days. These samples were powdered using mortar and pestle and was then stored at room temperature in a sealed polythene covers. The powder was then used for further biochemical estimation.

a) Total phenol content estimation

Total phenol content estimated by Folin-Ciocalteu Method.

• Principle

Phenolic compounds react with the Folin–Ciocalteu reagent under alkaline conditions to form a blue-coloured complex. The intensity of the blue colour is directly proportional to the phenol concentration and is measured spectrophotometrically (Model-μ controller-based UV VIS spectrophotometer type 117 TS) at 620 nm. The phenol content is calculated using a catechol standard curve.

• Materials Required:

- i. Oven-dried brinjal shoot/fruit powder
- ii. 0.3 N HCl
- iii. Folin–Ciocalteu reagent (FCR)
- iv. 20% Sodium carbonate (Na₂CO₃)

v. Distilled water

vi. Centrifuge

vii. Spectrophotometer

• Procedure:

Weigh 50 mg of oven-dried powdered sample. Homogenize with 25 ml of 0.3 N HCl. Centrifuge at 8000 rpm for 10 minutes. Collect the supernatant. Evaporate the extract to dryness. Dissolve the residue in distilled water and make the volume up to 25 ml. Pipette 0.2 ml of extract into a test tube. Add 0.8 ml distilled water. Add 1 ml Folin–Ciocalteu reagent. Allow to stand for 3 minutes. Add 1 ml of 20% sodium carbonate solution. Incubate for 30 minutes at room temperature. Measure absorbance at 620 nm using a spectrophotometer. Calculate phenol concentration from the catechol standard curve and express as mg catechol equivalent g⁻¹ dry weight (mg/g DW). Preparation of Catechol Standard. Dissolve 25 mg catechol in 100 ml distilled water (stock solution). Prepare the working standard by diluting 10 ml stock solution to 100 ml with distilled water.

• Calculation of Phenol:

$$\text{Phenol (\%)} = \text{Graph Factor} \times \text{Reading} \times \frac{\text{Total Volume} \times 1}{\text{Taken Volume} \times \text{Sample Weight}} \times 100 \times 10^{-4}$$

b) Total soluble sugars estimation

Total soluble sugars estimated using phenol-sulphuric acid method.

• Principle

Carbohydrates are dehydrated by concentrated sulphuric acid to form furfural derivatives, which react with phenol to produce an orange-yellow coloured complex. The colour intensity is proportional to the sugar concentration and is measured at 490 nm. Sugar concentration is determined using a glucose standard curve.

• Materials Required :

- i. Oven-dried brinjal shoot/fruit powder
- ii. 80% Methanol
- iii. 5% Phenol solution
- iv. Concentrated sulphuric acid (H₂SO₄)
- v. Distilled water
- vi. Centrifuge
- vii. Spectrophotometer
- viii. Glucose standard

• Procedure :

Weigh 100 mg of oven-dried powdered sample. Add 10 ml of 80% methanol. Centrifuge at 6500 rpm for 15 minutes. Collect the supernatant and re-extract the residue with 80% methanol. Pool the extracts and evaporate to dryness. Dissolve the residue and make the final volume to 2 ml. Pipette 0.1 ml of the extract into a test tube. Add 1 ml of 5% phenol solution.

After 3 minutes, add 5 ml concentrated sulphuric acid carefully. Keep the tubes in a cold water bath for 20 minutes for colour development. Measure absorbance at 490 nm using a spectrophotometer. Determine sugar concentration from the glucose standard curve and express as percentage (%) or mg glucose equivalent g⁻¹ dry weight, depending on the calculation method.

• Preparation of Glucose Standard :

Dissolve 500 mg glucose in 100 ml distilled water (stock solution). Prepare the working standard by diluting 1 ml stock solution to 100 ml with distilled water.

• Calculation of TSS:

$$\text{TSS (\%)} = \text{Graph Factor} \times \text{Reading} \times \frac{\text{Total Volume} \times 1}{\text{Taken Volume} \times \text{Sample Weight}} \times 100 \times 10^{-4}$$

Chlorophyll a and b estimation

Chlorophyll content was estimated following the method of Arnon (1949). Fresh leaf samples (0.5 g) from each treatment were collected in the morning and cut into small pieces. The samples were homogenized in a chilled mortar and pestle with 10 ml of 80% acetone under low light conditions. The homogenate was centrifuged at 5,000 rpm for 10 minutes and the residue re-extracted with 80% acetone until it

became colourless. All supernatants were pooled and the final volume was made up to 25 ml with 80% acetone. Absorbance of the extract was recorded at 663 nm and 645 nm using a spectrophotometer with 80% acetone as blank. Chlorophyll a, chlorophyll b and total chlorophyll was calculated using the following equations:

$$\text{Chlorophyll a (mg l}^{-1}\text{)} = \frac{12.7 \times A_{663} - 2.69 \times A_{645} \times V}{1000 \times W}$$

$$\text{Chlorophyll b (mg l}^{-1}\text{)} = \frac{22.9 \times A_{645} - 4.68 \times A_{663} \times V}{1000 \times W}$$

$$\text{Total chlorophyll (mg l}^{-1}\text{)} = \text{Chlorophyll a} + \text{Chlorophyll b}$$

The chlorophyll content was expressed as mg g⁻¹ fresh weight of leaf tissue.

3.2.5 Statistical analysis

From above all treatments data obtained was subjected to statistical analysis by following procedure pertinent to Randomized Block Design (RBD).

Experimental results

1. Assessing pest population dynamics under differential fertilizer regimes in brinjal

Table 2. Weekly incidence of Aphids on brinjal for *Rabi* 2025-26

Aphid incidence differed significantly among the nutrient-management treatments throughout the crop growth period. The population generally increased with crop age, with the highest incidence observed during the later crop-growth stages. T₁₀ consistently recorded the lowest aphid population, whereas the untreated control (T₁₁) supported the highest population.

The pooled mean aphid population was minimum in T₁₀ (7.44 aphids per three leaves), followed by T₉ (8.25) and T₇ (8.46), while T₁₁ recorded the maximum population (13.00 aphids per three leaves). T₁₀ resulted in the highest reduction over untreated control (42.77%) and was statistically superior to the other treatments.

The results demonstrate that integrated nutrient management substantially reduced aphid infestation compared with the untreated condition, with T₁₀ showing the most consistent suppressive effect during the crop period.

Table 3. Table. 3 Weekly incidence of *Thrips* on brinjal for *Rabi* 2025-26

Thrips population differed significantly among the nutrient-management treatments over the observation period. Population density increased with crop age, with the highest values generally occurring during the later SMWs. The magnitude of this increase, however, varied considerably among treatments.

The pooled population extended from 2.86 to 7.87 thrips per three leaves. T₁₀ maintained an overall mean of 2.86 thrips per three leaves, whereas T₉, T₇ and T₆ had 4.48, 4.56 and 5.05 thrips per three leaves, respectively. In T₁₁, the pooled population reached 7.87 thrips per three leaves.

Relative to T₁₁, the reduction obtained with T₁₀ was 63.66%. Reductions of 43.07 and 42.06% were calculated for T₉ and T₇, respectively. The transformed mean comparison (CD_{0.05} = 0.03) showed that none of the other treatments was statistically at par with T₁₀.

Table 4. Weekly incidence of Jassids on brinjal for *Rabi* 2025-26

Jassid population increased progressively from SMW 4 to SMW 14 under all nutrient-management treatments. At SMW 4, the population varied from 2.29 to 3.99 jassids per three leaves. T₁₀ and T₇ had comparatively lower populations of 2.29 and 2.42 jassids per three leaves, respectively, whereas T₁₁ registered 3.99 jassids per three leaves.

During SMW 5–9, the increase was relatively gradual in the integrated treatments. T₁₀ recorded 3.39, 3.00, 3.35, 3.73 and 4.40 jassids per three leaves during these weeks. In comparison, the untreated control increased from 5.08 jassids at SMW 5 to 9.87 at SMW 9.

The later observations showed a further rise in jassid abundance, with T₁₀ registering 5.29, 6.16, 6.78, 7.69 and 8.09 jassids per three leaves

from SMW 10 to 14. On pooled basis, T₁₀ had 4.92 jassids per three leaves against 10.86 in T₁₁, corresponding to a 54.70% reduction over the untreated control.

Table 5. Weekly incidence of Whiteflies on brinjal for *Rabi* 2025-26
Whitefly activity was comparatively low during the initial crop stage and increased thereafter. At SMW 4, population density ranged from 1.27 to 2.35 whiteflies per three leaves. T₁₀ contained 1.27 whiteflies per three leaves, statistically comparable with T₇ (1.33) and T₉ (1.42), while T₁₁ showed 2.35 whiteflies per three leaves. Between SMW 5 and SMW 9, the population continued to build up in all treatments. In T₁₀, the recorded values were 1.84, 2.33, 3.07, 4.31 and 4.80 whiteflies per three leaves, respectively. The corresponding values in the untreated control were substantially higher, increasing from 3.87 at SMW 5 to 9.38 at SMW 9.

During SMW 10-14, T₁₀ maintained the lowest population, with 8.44 whiteflies per three leaves at the final observation. The pooled mean for T₁₀ was 5.01 compared with 8.82 in T₁₁. Reduction over control reached 43.20% in T₁₀, followed by 36.39% in T₉ and 35.49% in T₇; T₁₀ was significantly different from all other treatments (CD_{0.05} = 0.02).

Incidence of *Leucinodes orbonalis* on brinjal

Table 6. Per cent Shoot infestation by *Leucinodes orbonalis* for *Rabi* 2025-26

The incidence of shoot infestation caused by *Leucinodes orbonalis* was first observed at 15 DAT and subsequently increased with advancement of the crop. At the initial observation, shoot infestation ranged from 0.00 to 4.00 per cent among the treatments. The integrated nutrient-management treatment T₁₀ [100% RDF + 20 t FYM + Azotobacter + PSB + Gau-Krupa Amrutam drenching maintained negligible shoot damage during the early crop stage.

At 60 DAT, shoot infestation under T₁₀ was 5.33 per cent compared with 18.67 per cent in T₁₁. The difference became more pronounced at 75 DAT, when T₁₀ recorded 8.00 per cent infestation against 21.67 per cent in the untreated control. At 90 DAT, infestation under T₁₀ remained at 8.00 per cent, whereas T₁₁ reached 25.00 per cent. Treatments T₉, T₇ and T₆ also maintained comparatively lower levels of shoot damage during the later observations, indicating a consistent treatment effect on the development of shoot infestation.

The pooled data further demonstrated the magnitude of treatment differences. T₁₀ had the lowest mean shoot infestation (4.00%), followed by T₉ (5.33%), T₇ (6.00%) and T₆ (7.11%), while the untreated control showed the highest pooled infestation (14.67%). Relative to T₁₁, the reduction in shoot infestation was 72.73% in T₁₀, 63.67% in T₉ and 59.10% in T₇. Statistical comparison indicated that T₁₀ was at par with T₉, T₇ and T₆, with a critical difference of 1.26 per cent. Thus, among the nutrient-management treatments evaluated, the integrated treatment T₁₀ maintained a comparatively lower level of *L. orbonalis* shoot infestation throughout the crop period.

Table 7. Per cent Fruit infestation by *Leucinodes orbonalis* for *Rabi* 2025-26

Fruit infestation by *Leucinodes orbonalis* differed among the nutrient management treatments during the four pickings. T₁₀ showed the least infestation, ranging from 9.00 to 12.33 per cent. The untreated control (T₁₁) had the highest infestation, ranging from 62.00 per cent in the first picking to 47.33 per cent in the fourth picking. Treatments

T₆, T₇ and T₉ also showed lower fruit infestation than the other treatments.

The pooled mean fruit infestation was lowest in T₁₀ (10.33%), followed by T₉ (16.58%), T₇ (17.08%) and T₆ (20.42%). T₁₁ recorded the highest pooled infestation (54.33%). The remaining treatments showed mean infestation ranging from 20.50 per cent in T₃ to 37.00 per cent in T₅.

Reduction in fruit infestation over the untreated control was highest in T₁₀ (80.99%), followed by T₉ (69.48%) and T₇ (68.56%). T₁₀ was statistically at par with T₉ and T₇ and these treatments were superior to the other treatments. The results showed that T₁₀ had the lowest fruit infestation among the treatments tested.

II. Evaluating the effect of organic fertilizer variants on biochemical and morphological parameters in brinjal plants

Table 8. Effect of organic fertilizer variants on biochemical parameters in brinjal

Total chlorophyll content, total soluble sugars (TSS) and total phenol content of brinjal shoots and fruits varied significantly among treatments. At 30 and 60 DAT, chlorophyll content was highest in T₁₀ (3.05 and 3.84 mg g⁻¹, respectively), on par with T₉, T₇, T₆ and T₈ and lowest in the untreated control T₁₁ (1.48 and 1.88 mg g⁻¹), reflecting a clear treatment-driven gradient in photosynthetic pigment accumulation.

TSS content followed a similar pattern: shoot TSS ranged from 2.56 mg g⁻¹ (T₁₁) to 8.33 mg g⁻¹ (T₁₀) and fruit TSS from 8.41 to 12.70 mg g⁻¹, with T₁₀, T₉, T₇ and T₆ forming a statistically superior group in both tissues (CD_{0.05} = 0.18 and 0.19, respectively). Total phenol content mirrored this trend, ranging from 1.95–4.24 mg g⁻¹ in shoots and 2.94–5.50 mg g⁻¹ in fruits, again with T₁₀ recording the highest values.

The consistent elevation of chlorophyll, sugars and phenolics under T₁₀ indicates that integrated organic nutrient management enhanced both the photosynthetic and biochemical-defence status of brinjal plants relative to the untreated control, supporting the biochemical basis for the reduced pest incidence observed under this treatment.

Table 9. Effect of organic fertilizer variants on morphological parameters in brinjal plants.

A Plant height, branch number, leaf area index (LAI), trichome density and marketable yield all responded significantly to nutrient management. Plant height peaked at 90 DAT in T₁₀ (92.20 cm), on par with T₇, T₉ and T₆, against a minimum of 54.13 cm in T₁₁; branch number similarly peaked in T₁₀ (55.60 plant⁻¹) versus 27.60 in the control.

Leaf Area Index and trichome density showed comparable trends, with T₁₀ recording the highest values at all observation stages (LAI 1.47 at 90 DAT; trichome density 3.03 mm⁻² at 90 DAT), both significantly greater than the untreated control (LAI 0.46; trichome density 2.39 mm⁻²), indicating superior canopy development and enhanced physical defence structures under integrated nutrition.

Marketable fruit yield was highest in T₁₀ (5.15 kg plot⁻¹; 2.77 t ha⁻¹), statistically at par with T₉ (2.65 t ha⁻¹) and T₆ (2.58 t ha⁻¹) and drastically higher than the untreated control (0.96 t ha⁻¹) (CD = 0.61 kg plot⁻¹), demonstrating that improved vegetative growth and reduced pest pressure under T₁₀ translated directly into yield advantage.

Table 10. Correlation of pest incidence with biochemical parameters of brinjal plant

Correlation analysis between pest population and plant biochemical constituents revealed significant negative associations for all parameters studied ($N = 11$; $r_{0.05} = 0.602$).

Total chlorophyll content at 60 days after transplanting (DAT) exhibited a highly significant negative correlation with shoot and fruit borer infestation ($r = -0.980$), indicating that plants with greater chlorophyll accumulation sustained substantially lower borer damage. Similarly strong negative correlations were recorded between chlorophyll content and populations of whitefly ($r = -0.953$), aphid ($r = -0.931$), thrips ($r = -0.919$) and jassid ($r = -0.897$), suggesting that

enhanced photosynthetic pigment status is closely associated with reduced susceptibility to the sucking-pest complex.

Total soluble sugar (TSS) content showed an equally pronounced inverse relationship with pest incidence, with the strongest association observed between shoot TSS at 60 DAT and shoot borer infestation ($r = -0.980$), followed by fruit TSS and fruit borer infestation ($r = -0.750$). Total phenol content recorded the highest correlation coefficient among all biochemical parameters, with shoot phenol at 60 DAT showing an r value of -0.983 against shoot borer infestation, underscoring the central role of phenolic compounds in mediating host-plant resistance.

The uniformly high negative correlation coefficients across chlorophyll, sugar and phenolic fractions indicate that these biochemical constituents function as reliable physiological indicators of pest resistance in brinjal. Since concentrations of all three were significantly elevated under integrated nutrient management, the results support a biochemically mediated resistance mechanism, wherein balanced organic and inorganic fertilization enhances the plant's inherent defence potential against its major insect pests.

Table 11. Correlation of pest incidence with morphological parameters of brinjal plant

Morphological traits of brinjal plants were also significantly and negatively correlated with pest population levels ($N = 11$; $r_{0.05} = 0.602$). Plant height at 60 DAT showed a strong negative association with shoot borer infestation ($r = -0.916$), while branch number per plant at 90 DAT recorded the highest correlation coefficient observed among morphological parameters, with aphid population ($r = -0.951$), indicating that architecturally vigorous plants were markedly less prone to sucking-pest colonization.

Leaf area index (LAI) exhibited consistently strong negative correlations with pest incidence at all crop growth stages, with the closest associations recorded at 90 DAT for aphid ($r = -0.946$) and whitefly ($r = -0.917$) populations. Trichome density followed a comparable trend, with the strength of the negative correlation increasing from 60 to 90 DAT (e.g., jassid: $r = -0.894$ to -0.911), reflecting the progressive contribution of physical surface defences to pest deterrence as the canopy matured.

Marketable fruit yield was strongly and negatively correlated with fruit borer infestation ($r = -0.917$), directly linking reduced pest pressure to improved productivity. Taken together, these results demonstrate that enhanced vegetative vigour, canopy density and trichome development all promoted under integrated nutrient management constitute measurable morphological correlates of pest resistance, reinforcing the biochemical evidence (Table 11) for a nutrition-mediated defence response in brinjal.

Discussion

The present investigation demonstrated that nutrient-management treatments significantly influenced the pest complex, biochemical characteristics, morphological traits and yield of brinjal cv. Konkan Prabha. T₁₀ (100% RDF + 20 t FYM + Azotobacter + PSB + Gau-Krupa Amrutam drenching) consistently recorded the lowest populations of aphid, thrips, jassid and whitefly and the lowest shoot and fruit infestation of *Leucinodes orbonalis*, whereas the untreated control recorded the highest pest incidence. This is consistent with Chumei *et al.* (2013) [1], who reported improved growth and productivity of brinjal under integrated application of inorganic fertilizers, FYM and biofertilizers.

The present investigation revealed that the incidence of major insect pests of brinjal, viz., aphid (*Aphis gossypii* Glover), thrips (*Thrips tabaci* Lindeman), whitefly (*Bemisia tabaci* Gennadius), jassid (*Amrasca biguttula biguttula* Ishida) and shoot and fruit borer (*Leucinodes orbonalis* Guenée), was significantly influenced by nutrient management regime. Populations of sucking pests increased progressively from the vegetative to the reproductive stage, while shoot infestation by *L. orbonalis* gave way to fruit infestation as fruiting advanced (Nirmala *et al.*, 2016) [4].

T₁₀ also recorded the highest chlorophyll, soluble sugars and phenol contents, together with superior plant growth and trichome density. Among these traits, phenol and trichome density provide the strongest biological support for an association with reduced *L. orbonalis* infestation. Prasad *et al.* (2014) [5] reported a negative association between phenol content and *L. orbonalis* infestation, while Kafy *et al.* (2025) [3] demonstrated negative relationships between phenol/trichome density and borer infestation.

The correlation analysis further showed strong negative associations between pest incidence and the measured biochemical and morphological traits. However, because these correlations were based on 11 treatment means, interpreted as associations rather than proof of causation. Notably, Kafy *et al.* (2025) [3] reported different relationships

for some traits, particularly chlorophyll and sugars; therefore, these parameters should not universally be described as resistance factors. The highest marketable yield was recorded in T₁₀ (5.15 kg plot⁻¹; 2.77 t ha⁻¹) and was statistically at par with T₉ and T₆, whereas the untreated control recorded only 0.96 t ha⁻¹. Overall, the results indicate that integrated nutrient management combining RDF, FYM and biofertilizers with Gau-Krupa Amrutam was associated with reduced pest incidence, improved plant biochemical and morphological attributes and greater marketable yield under the conditions of the present experiment.

Tables

I. Assessing pest population dynamics under differential fertilizer regimes in brinjal

Table 3. Weekly incidence of Aphids on brinjal for Rabi 2025-26

Tr. No	Mean number of aphids / three leaves / five plants											MEAN	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T ₁	4.33 (2.20)*	5.44 (2.44)	6.78 (2.70)	7.78 (2.88)	10.33 (3.29)	11.56 (3.47)	12.78 (3.64)	15.11 (3.95)	16.33 (4.10)	18.44 (4.35)	19.11 (4.43)	11.64 (3.91)	10.46
T ₂	4.67 (2.27)	4.33 (2.20)	5.33 (2.41)	6.22 (2.59)	6.78 (2.70)	9.44 (3.15)	11.00 (3.39)	12.22 (3.57)	14.34 (3.85)	16.56 (4.13)	14.89 (3.92)	9.62 (3.60)	26.00
T ₃	3.67 (2.04)	5.33 (2.42)	5.44 (2.44)	6.44 (2.64)	8.22 (2.95)	9.56 (3.17)	8.22 (2.95)	13.33 (3.72)	16.33 (4.10)	17.22 (4.21)	16.56 (4.13)	10.03 (3.67)	22.85
T ₄	3.17 (1.91)	5.33 (2.42)	5.33 (2.41)	7.44 (2.82)	9.56 (3.17)	11.78 (3.50)	13.00 (3.67)	14.89 (3.92)	17.22 (4.21)	18.44 (4.35)	17.33 (4.22)	11.23 (3.85)	13.62
T ₅	3.17 (1.91)	4.33 (2.20)	5.66 (2.48)	7.11 (2.76)	9.11 (3.10)	11.78 (3.50)	13.00 (3.67)	14.33 (3.85)	16.33 (4.10)	17.33 (4.22)	16.56 (4.13)	10.79 (3.79)	17.00
T ₆	2.83 (1.83)	4.33 (2.20)	5.00 (2.35)	7.00 (2.74)	7.78 (2.88)	9.56 (3.17)	12.00 (3.54)	13.11 (3.69)	13.00 (3.67)	14.89 (3.92)	14.00 (3.81)	9.41 (3.57)	27.62
T ₇	2.33 (1.68)	3.56 (2.01)	5.44 (2.44)	5.33 (2.42)	6.44 (2.64)	8.44 (2.99)	10.89 (3.37)	11.78 (3.50)	12.55 (3.61)	13.33 (3.72)	13.00 (3.67)	8.46 (3.41)	34.92
T ₈	3.50 (2.00)	4.78 (2.30)	5.44 (2.44)	6.67 (2.68)	8.11 (2.93)	10.33 (3.29)	12.33 (3.58)	13.00 (3.67)	14.33 (3.85)	16.56 (4.13)	14.78 (3.91)	9.98 (3.66)	23.23
T ₉	2.17 (1.63)	3.78 (2.07)	4.22 (2.17)	5.33 (2.42)	6.44 (2.64)	8.33 (2.97)	9.44 (3.150)	11.78 (3.50)	13.11 (3.69)	13.00 (3.67)	13.11 (3.69)	8.25 (3.37)	36.54
T ₁₀	2.17 (1.63)	3.22 (1.93)	4.00 (2.12)	4.78 (2.30)	6.55 (2.66)	7.00 (2.74)	8.44 (2.99)	9.11 (3.10)	11.67 (3.49)	11.78 (3.500)	13.11 (3.69)	7.44 (3.23)	42.77
T ₁₁	4.50 (2.24)	5.89 (2.53)	7.22 (2.78)	9.00 (3.08)	9.89 (3.22)	13.00 (3.67)	15.78 (4.03)	18.44 (4.35)	19.56 (4.48)	20.11 (4.54)	19.56 (4.48)	13.00 (4.10)	0.00
SE ±	0.12	0.10	0.07	0.05	0.05	0.06	0.05	0.06	0.07	0.05	0.08	0.02	
CD @ 5%	0.35	0.31	0.20	0.15	0.14	0.17	0.15	0.18	0.21	0.15	0.23	0.06	

*Figures in parentheses indicate square root ($\sqrt{x+0.5}$) transformed value

ROC – Reduction over control

Table 4. Weekly incidence of Thrips on brinjal for Rabi 2025-26

Tr. No	Mean number of thrips / three leaves / five plants											Mean	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T ₁	3.95 (2.49)	4.65 (2.66)	5.39 (2.82)	5.91 (2.93)	6.60 (3.07)	7.73 (3.28)	8.47 (3.41)	9.31 (3.55)	10.55 (3.75)	11.58 (3.90)	12.21 (3.99)	7.85 (3.30)	0.25
T ₂	3.20 (2.29)	3.31 (2.32)	3.49 (2.37)	3.89 (2.47)	4.53 (2.63)	4.96 (2.73)	5.69 (2.89)	6.49 (3.05)	7.62 (3.26)	8.42 (3.40)	9.11 (3.52)	5.52 (2.85)	29.86
T ₃	3.49 (2.37)	3.96 (2.49)	4.36 (2.59)	4.67 (2.66)	5.07 (2.75)	5.80 (2.91)	6.51 (3.05)	7.20 (3.18)	7.80 (3.29)	8.64 (3.44)	9.22 (3.54)	6.06 (2.96)	23.00
T ₄	3.60 (2.40)	4.02 (2.51)	4.45 (2.61)	5.11 (2.76)	5.67 (2.88)	6.62 (3.07)	7.36 (3.21)	8.29 (3.38)	9.29 (3.55)	10.34 (3.72)	10.58 (3.75)	6.85 (3.12)	12.96

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Tr. No	Mean number of thrips / three leaves / five plants											Mean	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T5	3.49 (2.37)	3.71 (2.43)	4.16 (2.54)	4.51 (2.62)	4.89 (2.71)	5.51 (2.85)	6.04 (2.96)	6.53 (3.06)	7.29 (3.20)	8.40 (3.40)	9.42 (3.57)	5.81 (2.91)	26.18
T6	2.97 (2.22)	3.26 (2.30)	3.53 (2.38)	4.02 (2.50)	4.44 (2.61)	4.85 (2.70)	5.22 (2.79)	5.93 (2.94)	6.42 (3.03)	7.13 (3.17)	7.80 (3.29)	5.05 (2.75)	35.83
T7	2.47 (2.07)	2.80 (2.17)	2.93 (2.21)	3.49 (2.37)	4.04 (2.51)	4.50 (2.62)	5.07 (2.75)	5.33 (2.81)	5.71 (2.89)	6.49 (3.05)	7.37 (3.21)	4.56 (2.64)	42.06
T8	3.13 (2.27)	3.73 (2.43)	4.29 (2.57)	4.96 (2.73)	5.65 (2.88)	6.17 (2.98)	7.07 (3.16)	7.33 (3.21)	7.93 (3.32)	8.60 (3.43)	9.07 (3.51)	6.18 (2.99)	21.47
T9	2.13 (1.96)	2.29 (2.01)	2.47 (2.07)	2.80 (2.17)	3.33 (2.33)	3.96 (2.49)	4.87 (2.71)	5.85 (2.92)	6.22 (2.99)	7.82 (3.30)	7.53 (3.24)	4.48 (2.62)	43.07
T10	1.91 (1.88)	2.13 (1.96)	2.36 (2.04)	2.44 (2.06)	2.56 (2.10)	2.76 (2.16)	2.93 (2.21)	3.11 (2.26)	3.40 (2.34)	3.76 (2.44)	4.09 (2.52)	2.86 (2.19)	63.66
T11	4.61 (2.65)	4.95 (2.73)	5.44 (2.83)	6.09 (2.97)	7.04 (3.15)	8.20 (3.36)	9.06 (3.51)	9.51 (3.58)	10.16 (3.69)	10.38 (3.72)	11.09 (3.83)	7.87 (3.30)	0.00
SE m ±	0.01	0.01	0.02	0.02	0.01	0.02	0.03	0.01	0.02	0.06	0.01	0.01	
CD at 5%	0.02	0.03	0.06	0.05	0.04	0.06	0.09	0.04	0.05	0.17	0.04	0.03	

*Figures in parentheses indicate square root ($\sqrt{x+0.5}$) transformed value

ROC – Reduction over control

Table 5. Weekly incidence of Jassids on brinjal for Rabi 2025-26

Tr. No	Mean number of jassids / three leaves / five plants											Mean	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T1	3.42 (1.98)*	4.00 (2.12)	5.78 (2.51)	7.20 (2.78)	8.91 (3.07)	10.36 (3.29)	12.20 (3.56)	13.15 (3.70)	14.49 (3.87)	15.71 (4.03)	17.38 (4.23)	10.24 (3.70)	5.71
T2	2.71 (1.79)	3.18 (1.92)	4.04 (2.13)	5.20 (2.39)	6.25 (2.60)	7.38 (2.81)	8.07 (2.93)	9.22 (3.12)	10.18 (3.27)	11.31 (3.44)	12.58 (3.62)	7.28 (3.20)	32.97
T3	2.80 (1.82)	2.98 (1.86)	3.51 (2.00)	5.49 (2.45)	6.60 (2.66)	7.89 (2.90)	8.49 (3.00)	9.31 (3.13)	10.09 (3.25)	11.27 (3.43)	12.60 (3.62)	7.37 (3.21)	32.14
T4	3.04 (1.88)	3.31 (1.95)	3.82 (2.08)	5.98 (2.54)	7.09 (2.75)	8.24 (2.96)	9.22 (3.12)	9.82 (3.21)	10.82 (3.37)	11.78 (3.50)	13.23 (3.71)	7.85 (3.30)	27.72
T5	2.86 (1.83)	3.07 (1.89)	3.49 (2.00)	4.22 (2.17)	5.16 (2.38)	6.13 (2.58)	7.20 (2.77)	8.36 (2.98)	9.38 (3.14)	10.18 (3.27)	11.02 (3.39)	6.46 (3.04)	40.52
T6	2.64 (1.77)	3.09 (1.89)	3.56 (2.01)	4.09 (2.14)	4.78 (2.30)	5.29 (2.41)	5.95 (2.54)	6.71 (2.69)	7.38 (2.81)	8.13 (2.94)	9.25 (3.12)	5.53 (2.85)	49.08
T7	2.42 (1.71)	2.86 (1.83)	3.22 (1.93)	3.67 (2.04)	4.16 (2.16)	4.98 (2.34)	5.53 (2.46)	6.20 (2.59)	6.71 (2.69)	7.27 (2.79)	8.02 (2.92)	5.00 (2.74)	53.96
T8	3.31 (1.95)	4.02 (2.13)	4.53 (2.24)	5.34 (2.42)	5.82 (2.51)	6.71 (2.69)	7.51 (2.83)	8.33 (2.97)	9.33 (3.14)	10.11 (3.26)	10.84 (3.37)	6.90 (3.13)	36.46
T9	2.86 (1.83)	3.35 (1.96)	3.58 (2.02)	4.13 (2.15)	4.13 (2.15)	4.89 (2.32)	5.51 (2.45)	6.25 (2.60)	7.24 (2.78)	8.15 (2.94)	9.22 (3.12)	5.39 (2.82)	50.37
T10	2.29 (1.67)	3.39 (1.97)	3.00 (1.87)	3.35 (1.96)	3.73 (2.06)	4.40 (2.21)	5.29 (2.41)	6.16 (2.58)	6.78 (2.70)	7.69 (2.86)	8.09 (2.93)	4.92 (2.72)	54.70
T11	3.99 (2.12)	5.08 (2.36)	6.49 (2.64)	7.47 (2.82)	8.53 (3.01)	9.87 (3.22)	11.98 (3.53)	13.45 (3.73)	15.53 (4.00)	16.91 (4.17)	20.16 (4.54)	10.86 (3.80)	0.00
SE ±	0.02	0.07	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	
CD @ 5%	0.06	0.2	0.08	0.05	0.05	0.05	0.05	0.04	0.06	0.04	0.03	0.03	

*Figures in parentheses indicate square root ($\sqrt{x+0.5}$) transformed value

ROC – Reduction over control

Table 6. Weekly incidence of Whiteflies on brinjal for Rabi 2025-26

Tr. No	Mean number of whiteflies / three leaves / five plants											Mean	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T1	2.13 (1.96)*	3.09 (2.26)	4.04 (2.51)	5.09 (2.76)	7.05 (3.15)	7.98 (3.32)	10.42 (3.73)	11.00 (3.82)	12.04 (3.97)	13.13 (4.12)	11.86 (3.94)	7.99 (3.33)	9.41

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Tr. No	Mean number of whiteflies / three leaves / five plants											Mean	ROC %
	SMW4	SMW5	SMW6	SMW7	SMW8	SMW9	SMW10	SMW11	SMW12	SMW13	SMW14		
T2	1.69	2.62	3.87	4.22	6.33	7.07	8.31	9.54	10.78	11.49	10.38	6.94	21.32
	(1.80)	(2.12)	(2.47)	(2.55)	(3.02)	(3.16)	(3.38)	(3.59)	(3.78)	(3.89)	(3.72)	(3.13)	
T3	1.91	2.84	3.67	3.67	6.33	7.38	9.24	10.47	11.38	11.71	11.38	7.27	17.57
	(1.88)	(2.19)	(2.41)	(2.41)	(3.02)	(3.22)	(3.54)	(3.74)	(3.87)	(3.92)	(3.87)	(3.20)	
T4	1.98	2.91	3.82	4.64	6.89	7.60	9.78	10.75	11.58	12.47	11.58	7.64	13.38
	(1.91)	(2.21)	(2.45)	(2.65)	(3.12)	(3.26)	(3.63)	(3.78)	(3.90)	(4.03)	(3.90)	(3.26)	
T5	1.78	2.78	3.64	4.33	6.71	7.47	9.44	10.35	11.29	11.91	12.33	7.46	15.42
	(1.83)	(2.17)	(2.41)	(2.58)	(3.09)	(3.23)	(3.57)	(3.72)	(3.86)	(3.95)	(4.01)	(3.23)	
T6	1.62	2.62	3.20	4.04	5.82	6.55	8.09	8.64	9.60	10.38	10.71	6.48	26.53
	(1.77)	(2.12)	(2.29)	(2.51)	(2.91)	(3.06)	(3.34)	(3.44)	(3.60)	(3.72)	(3.77)	(3.05)	
T7	1.33	2.11	2.91	3.49	5.09	5.67	7.00	7.93	8.69	9.24	9.11	5.69	35.49
	(1.65)	(1.95)	(2.21)	(2.37)	(2.76)	(2.88)	(3.15)	(3.32)	(3.45)	(3.54)	(3.52)	(2.89)	
T8	1.73	2.53	3.31	4.36	5.18	6.64	8.53	9.44	10.38	11.38	10.64	6.74	23.58
	(1.82)	(2.09)	(2.32)	(2.59)	(2.78)	(3.08)	(3.42)	(3.57)	(3.72)	(3.87)	(3.76)	(3.10)	
T9	1.42	2.13	2.80	3.44	4.89	5.67	7.05	7.67	8.31	9.24	9.09	5.61	36.39
	(1.69)	(1.96)	(2.17)	(2.36)	(2.71)	(2.88)	(3.15)	(3.27)	(3.38)	(3.54)	(3.51)	(2.87)	
T10	1.27	1.84	2.33	3.07	4.31	4.80	6.55	6.89	7.38	1.27	8.44	5.01	43.20
	(1.63)	(1.86)	(2.03)	(2.25)	(2.58)	(2.69)	(3.06)	(3.12)	(3.22)	(1.63)	(3.41)	(2.74)	
T11	2.35	3.87	4.04	5.51	8.00	9.38	11.78	12.47	12.58	2.35	13.73	8.82	0.00
	(2.03)	(2.47)	(2.51)	(2.85)	(3.33)	(3.56)	(3.93)	(4.03)	(4.05)	(2.03)	(4.21)	(3.47)	
SE ±	0.03	0.01	0.02	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
CD @ 5%	0.09	0.04	0.06	0.04	0.04	0.03	0.04	0.03	0.02	0.03	0.03	0.02	

*Figures in parentheses indicate square root ($\sqrt{x+0.5}$) transformed value

ROC – Reduction over control

DAT- Days after transplanting % ROC – Reduction over control

DAT- Days after transplanting % ROC – Reduction over control

Table 7. Per cent Shoot infestation by *Leucinodes orbonalis* for Rabi 2025-26

Tr. No.	Per cent Shoot infestation by <i>Leucinodes orbonalis</i>						Mean	% ROC
	15 DAT	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT		
T1	2.67	5.33	10.67	14.67	17.33	21.67	12.06 (20.32)	17.79
	(9.40)*	(13.35)	(19.06)	(22.52)	(24.60)	(27.74)		
T2	1.33	4.00	9.33	12.00	14.67	17.33	9.78 (18.22)	33.33
	(6.63)	(11.54)	(17.79)	(20.27)	(22.52)	(24.60)		
T3	1.33	4.00	9.33	13.33	13.33	16.00	9.56 (18.01)	34.83
	(6.63)	(11.54)	(17.79)	(21.42)	(21.42)	(23.58)		
T4	0.00	2.67	10.67	16.00	18.67	20.33	11.39 (19.72)	22.36
	(0.00)	(9.40)	(19.06)	(23.58)	(25.60)	(26.80)		
T5	1.33	2.67	8.00	10.67	13.33	16.00	8.67 (17.12)	40.9
	(6.63)	(9.40)	(16.43)	(19.06)	(21.42)	(23.58)		
T6	0.00	2.67	5.33	9.33	12.00	13.33	7.11 (15.47)	51.53
	(0.00)	(9.40)	(13.35)	(17.79)	(20.27)	(21.42)		
T7	0.00	1.33	4.00	8.00	10.67	12.00	6.00 (14.18)	59.1
	(0.00)	(6.63)	(11.54)	(16.43)	(19.06)	(20.27)		
T8	0.00	4.00	6.67	9.33	12.00	14.67	7.78 (16.19)	46.97
	(0.00)	(11.54)	(14.96)	(17.79)	(20.27)	(22.52)		
T9	0.00	1.33	4.00	6.67	9.33	10.67	5.33 (13.35)	63.67
	(0.00)	(6.63)	(11.54)	(14.96)	(17.79)	(19.06)		
T10	0.00	0.00	2.67	5.33	8.00	8.00	4.00 (11.54)	72.73
	(0.00)	(0.00)	(9.40)	(13.35)	(16.43)	(16.43)		
T11	4.00	6.67	12.00	18.67	21.67	25.00	14.67 (22.52)	0.00
	(11.54)	(14.96)	(20.27)	(25.60)	(27.74)	(30.00)		
SE ±	2.40	2.79	1.62	1.16	0.98	0.90	0.43	
CD @ 5%	7.09	8.23	4.78	3.41	2.90	2.67	1.26	

*Figures in parentheses indicate arcsine transformed values

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Table 8. Per cent Fruit infestation by *Leucinodes orbonalis* for Rabi 2025-26

Tr. No.	Per cent Fruit infestation by <i>Leucinodes orbonalis</i>				Mean	% ROC
	Picking I	Picking II	Picking III	Picking VI		
T1	23.00 (28.66)*	18.67 (25.60)	23.67 (29.11)	21.00 (27.27)	21.58 (27.68)	60.28
T2	26.00 (30.66)	18.33 (25.35)	24.67 (29.78)	25.00 (30.00)	23.50 (29.00)	56.74
T3	21.00 (27.27)	15.67 (23.32)	21.33 (27.51)	24.00 (29.33)	20.50 (26.92)	62.27
T4	37.67 (37.86)	24.00 (29.33)	33.33 (35.26)	33.33 (35.26)	32.08 (34.50)	40.95
T5	37.67 (37.86)	37.33 (37.66)	37.00 (37.46)	36.00 (36.87)	37.00 (37.46)	31.9
T6	17.67 (24.85)	13.67 (21.70)	24.00 (29.33)	26.33 (30.87)	20.42 (26.86)	62.42
T7	17.67 (24.85)	13.33 (21.42)	17.67 (24.85)	19.67 (26.33)	17.08 (24.41)	68.56
T8	40.33 (39.43)	20.33 (26.80)	25.33 (30.22)	23.33 (28.88)	27.33 (31.52)	49.7
T9	18.33 (25.35)	13.33 (21.42)	17.67 (24.85)	17.00 (24.35)	16.58 (24.03)	69.48
T10	12.33 (20.56)	9.00 (17.46)	9.67 (18.11)	10.33 (18.75)	10.33 (18.75)	80.99
T11	62.00 (51.94)	56.67 (48.83)	51.33 (45.76)	47.33 (43.47)	54.33 (47.49)	
SE ±	1.37	1.65	1.13	0.79	0.64	
CD @ 5%	4.03	4.88	3.34	2.33	1.89	

*Figures in parentheses indicate arcsine transformed values

Table 9. Effect of organic nutrient management on biochemical parameters of brinjal variety *Konkan prabha*.

Tr. No.	Total Chlorophyll(A+B) (mg/g)		TSS (mg/g)		Phenol (mg/g)	
	Shoot (30 DAT)	Shoot (60 DAT)	Shoot	Fruit	Shoot	Fruit
T1	1.90	2.34	4.80	9.55	2.18	3.23
T2	2.19	2.76	3.69	10.93	2.78	3.89
T3	2.01	2.67	2.96	9.73	2.40	3.52
T4	1.69	2.21	4.79	9.02	3.31	3.31
T5	2.26	2.91	5.86	10.71	3.41	4.05
T6	2.46	3.04	6.21	11.61	3.73	4.53
T7	2.65	3.32	7.03	11.99	3.86	4.96
T8	2.30	2.84	5.15	11.19	3.39	4.32
T9	2.80	3.40	7.23	12.52	3.99	5.22
T10	3.05	3.84	8.33	12.70	4.24	5.50
T11	1.48	1.88	2.56	8.41	1.95	2.94
SE ±	0.01	0.01	0.06	0.06	0.11	0.02
CD @ 5%	0.03	0.02	0.18	0.19	0.32	0.06

Table 10. Effect of organic nutrient management on morphological parameters of brinjal variety *Konkan prabha*.

Tr. No.	Plant height (cm)			Number of Branches			Leaf Area Index			Trichome Density (mm ²)		Yield kg/plot	Yield t/ha
	30	60	90	30	60	90	30	60	90	60 Days	90 Days		
	Days	Days	Days	Days	Days	Days	Days	Days	Days				
T1	29.47	46.33	71.70	1.27	7.60	38.60	0.43	1.13	0.97	2.46	2.52	3.76	2.44
	(5.93)*	(7.31)	(8.97)	(1.63)	(3.26)	(6.71)	(1.16)	(1.56)	(1.48)	(2.07)	(2.09)		
T2	31.57	46.33	72.37	0.93	9.93	49.60	0.52	1.34	1.18	2.57	2.65	3.13	2.27
	(6.12)	(7.31)	(9.01)	(1.47)	(3.65)	(7.54)	(1.22)	(1.66)	(1.59)	(2.10)	(2.13)		
T3	32.10	44.17	66.00	0.60	8.33	41.20	0.47	1.23	1.12	2.53	2.58	3.89	2.47
	(6.17)	(7.15)	(8.62)	(1.27)	(3.39)	(6.92)	(1.18)	(1.61)	(1.56)	(2.09)	(2.11)		
T4	15.10	34.40	43.49	0.00	6.40	33.80	0.33	0.97	0.83	2.69	2.76	0.81	1.40
	(4.39)	(6.37)	(7.09)	(0.50)	(3.03)	(6.31)	(1.08)	(1.48)	(1.41)	(2.14)	(2.16)		
T5	32.61	59.27	78.80	0.07	7.60	41.00	0.36	1.05	0.94	2.76	2.83	0.43	1.15
	(6.21)	(8.20)	(9.38)	(0.76)	(3.26)	(6.90)	(1.10)	(1.52)	(1.47)	(2.16)	(2.18)		
T6	32.44	63.36	84.60	1.47	10.53	46.00	0.52	1.39	1.22	2.73	2.80	4.34	2.58
	(6.20)	(8.46)	(9.70)	(1.71)	(3.75)	(7.28)	(1.22)	(1.68)	(1.60)	(2.15)	(2.17)		
T7	39.05	65.60	89.57	1.40	11.20	53.00	0.56	1.47	1.32	2.77	2.90	3.61	2.40
	(6.75)	(8.60)	(9.96)	(1.68)	(3.85)	(7.78)	(1.25)	(1.71)	(1.65)	(2.17)	(2.20)		
T8	34.57	62.10	82.74	1.73	8.00	45.80	0.47	1.29	1.15	2.56	2.64	3.23	2.30
	(6.38)	(8.38)	(9.60)	(1.82)	(3.33)	(7.27)	(1.18)	(1.63)	(1.57)	(2.10)	(2.13)		

(continued on next page)

Tr. No.	Plant height (cm)			Number of Branches			Leaf Area Index			Trichome Density (mm ²)		Yield kg/plot	Yield t/ha
	30 Days	60 Days	90 Days	30 Days	60 Days	90 Days	30 Days	60 Days	90 Days	60 Days	90 Days		
T9	37.09 (6.59)	63.77 (8.49)	86.27 (9.79)	1.80 (1.84)	10.47 (3.74)	50.00 (7.57)	0.59 (1.27)	1.54 (1.74)	1.40 (1.68)	2.87 (2.19)	2.95 (2.22)	4.64	2.65
T10	35.46 (6.45)	70.93 (8.92)	92.20 (10.10)	1.07 (1.53)	10.73 (3.78)	55.60 (7.96)	0.65 (1.31)	1.63 (1.78)	1.47 (1.71)	2.95 (2.22)	3.03 (2.24)	5.15	2.77
T11	11.67 (3.92)	33.25 (6.27)	54.13 (7.86)	0.00 (0.50)	4.40 (2.60)	27.60 (5.75)	0.20 (0.94)	0.50 (1.20)	0.46 (1.18)	2.33 (2.03)	2.39 (2.05)	0.21	0.96
SE ±	0.10	0.04	0.04	0.13	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.21	
CD @ 5%	0.29	0.12	0.12	0.37	0.07	0.06	0.026	0.026	0.028	0.03	0.022	0.61	

*Figures in parentheses indicate square root transformed values.

Table 11. Correlation of pest incidence with biochemical parameters

	Aphid	Thrips	Whiteflies	Jassids	Shoot borer	Fruit borer
Chlorophyll 30 DAT (shoot)	-0.896*	-0.888*	-0.936*	-0.867*	-0.972*	-
Chlorophyll 60 DAT (shoot)	-0.931*	-0.919*	-0.953*	-0.897*	-0.980*	-
TSS 30 DAT (shoot)	-0.896*	-0.919*	-0.936*	-0.867*	-0.972*	-
TSS 60 DAT (fruit)	-	-	-	-	-0.980*	-0.750*
Phenol 30 DAT (shoot)	-0.829*	-0.940*	-0.880*	-0.920*	-0.906*	-
Phenol 60 DAT (fruit)	-	-	-	-	-0.983*	-0.730*

N = 11

* Correlation is significant at 0.05 level r value = 0.602

Table 12. Correlation of pest incidence with morphological parameters

	Aphids	Thrips	Whiteflies	Jassids	Shoot borer	Fruit borer
Plant height 30 DAT	-0.794*	-0.681*	-0.758*	-0.736*	-0.785*	-
Plant height 60 DAT	-0.823*	-0.809*	-0.851*	-0.832*	-0.916*	-
Plant height 90 DAT	-0.768*	-0.733*	-0.777*	-0.706*	-0.826*	-
No. of Branches 30 DAT	-0.698*	-0.513*	-0.689*	-0.513	-0.649*	-
No. of Branches 60 DAT	-0.927*	-0.839*	-0.894*	-0.850*	-0.858*	-
No. of Branches 90 DAT	-0.951*	-0.879*	-0.929*	-0.850*	-0.901*	-
LAI 30 DAT	-0.939*	-0.826*	-0.910*	-0.794*	-0.872*	-
LAI 60 DAT	-0.929*	-0.809*	-0.900*	-0.829*	-0.872*	-
LAI 90 DAT	-0.946*	-0.834*	-0.917*	-0.845*	-0.893*	-
Trichome Density 60 DAT	-0.836*	-0.883*	-0.862*	-0.894*	-0.889*	-
Trichome Density 90 DAT	-0.849*	-0.887*	-0.878*	-0.911*	-0.898*	-
Yield	-	-	-	-	-	-0.917*

N = 11

* Correlation is significant at 0.05 level r value = 0.602

Conclusion

The study demonstrated that integrated nutrient management significantly improved pest suppression, plant growth, biochemical attributes and marketable yield of brinjal. Among the evaluated treatments, T₁₀ (100% RDF + 20 t FYM + Azotobacter + PSB + GKA drenching) recorded the lowest incidence of major insect pests, higher phenolic content and trichome density and superior growth and yield attributes. The treatment produced the highest marketable yield of 5.15 kg plot⁻¹ (2.77 t ha⁻¹). Overall, the results indicate that integration of mineral fertilizers, FYM, biofertilizers and GKA can form an effective nutrient-management approach for improving crop performance and reducing pest infestation in brinjal.

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