Effect of integrated nutrient management on the growth and nutrient content of chilli (Capsicum annuum L.)

D Gokul, P Poonkodi and A Angayarkanni

DOI: https://doi.org/10.22271/chemi.2020.v8.i4ae.10040

Abstract
A field experiment was conducted at farmer’s field in Sivapuri village, Chidhambaram taluk, Cuddalore district, Tamilnadu with chilli variety K2 as the test crop. The experimental soil was sandy clay loam. The treatments consisted of application of inorganic fertilizers, organic manures and biofertilizers in different combinations. The experiment was laid out in randomized block design and replicated three times. The growth attributes and nutrient content were recorded at 60, 90 and 120 DAT. The results of the experiment revealed that the application of 75% recommended dose of fertilizers + poultry manure @ 5 t ha^{-1} + biofertilizers + 2% MgSO_{4} (T11) registered the maximum growth attributes (plant height, leaf area index, number of branches plant^{-1}, chlorophyll content) and nutrient content (N, P, K, Ca, Mg and S) of chilli.

Keywords: NPK fertilizers, FYM, sheep manure, pressmud, poultry manure, chilli

Introduction
Chilli (Capsicum annuum L.) is one of the commercial high value crops. It is called as the universal spice of India. Chillies belong to the family Solanaceae and originates from South America. Chillies are excellent source of vitamins with minerals like molybdenum, magnesium, potassium and copper. It is an essential ingredient of Indian curry. It is predominantly popular for its green pungent fruits, which is used for culinary purpose. It has been widely accepted that organic manure application alone could serve as a holistic approach towards achieving agriculture as it is nature based, environment friendly and ensures the conservation of resources for the future.

Use of organic manures to meet the nutrient requirements of crop would be an inevitable practice in the years to come for sustainable agriculture since organic manures not only improve yield but also maintain the physical, chemical and biological properties of soil. Organic sources for incorporation into the soil are becoming scarce. Essential elements locked up in the organic manures are slowly mineralized and made available to the crops, which helps in increasing the growth and nutrient content besides improving the fertility of the soil. Organic manures like farm yard manure, sheep manure, pressmud and poultry manure considered as a store house of various nutrients which are essential for the plant growth. Use of organic manures alone cannot fulfill the crop nutrients requirement.

Farmyard manure is decomposed mixture of dung and urine of farm animals along with litter and left over material from roughages or fodder fed to the cattle. The droppings of sheep and goats contain higher nutrients than farm yard manure and compost.
The sweeping of sheep or goat sheds are placed in pits for decomposition and it is applied later to the field. Pressmud is a solid residue, obtained from sugarcane juice before crystallization of sugar. Generally, pressmud is used as manure in India. It is a soft, spongy, lightweight, amorphous, dark brown to black coloured material. The poultry manure or chicken manure is the organic waste from poultry composed of mainly faeces and urine of chickens. The excreta of poultry birds ferment very quickly. Poultry manure has been found to decrease the bulk density, increase the water holding capacity, organic matter content, oxygen diffusion rate and aggregate stability of soils.

The integrated supply and use of plant nutrients from chemical fertilizers and organic manures has shown to produce higher growth and nutrient content than when they are applied alone. Hence, the present investigation was carried out to find out the effect of Integrated Nutrient Management on growth and nutrient content of chilli (*Capsicum annuum* L.).

**Materials and Methods**

A field experiment was conducted at farmer’s field Sivapuri village, Chidambaram taluk, Cuddalore district during 2019 to find the effect of integrated nutrient management on growth and nutrient content of chilli variety K2, as the test crop under irrigated condition with eleven treatments replicated thrice in a randomized block design. The experimental soil was sandy clay loam. The treatments were T1 - 100% recommended dose of fertilizers (control), T2 - 100% recommended dose of fertilizers + FYM @ 25 t ha⁻¹ (farmer’s practice), T3 - 75% recommended dose of fertilizers + sheep manure @ 5 t ha⁻¹, T4 - 75% recommended dose of fertilizers + sheep manure @ 5 t ha⁻¹ + biofertilizers, T5 - 75% recommended dose of fertilizers + sheep manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄, T6 - 75% recommended dose of fertilizers + pressmud @ 10 t ha⁻¹, T7 - 75% recommended dose of fertilizers + pressmud @ 10 t ha⁻¹ + biofertilizers, T8 - 75% recommended dose of fertilizers + pressmud @ 10 t ha⁻¹ + biofertilizers + 2% MgSO₄, T9 - 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹, T10 - 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers, T11 - 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄. Recommended dose of fertilizers were applied uniformly to all plots. The biofertilizers *Azospirillum and Phosphobacteria* were applied. The 2% MgSO₄ was given as a foliar spray at 30, 60 and 90 DAT. The inorganic fertilizers, organic manures, biofertilizers and foliar spray were applied as per the treatment schedule. Growth attributes and nutrient content were analysed at different stages of chilli production.

**Results and Discussion**

**Growth attributes (Table 1)**

### Plant height

From the data, it is found that the plant height of chilli at different stages of growth was significantly influenced by the integrated application of inorganic fertilizers, organic manures and biofertilizers in different combinations. Among the different treatments experimented, the application of 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ (T11) registered the maximum plant height of 96.62, 107.92, 122.56 cm at 60, 90 and 120 DAT respectively. This was followed by the treatments T8, T9, T10, T4, T2, T9 and T8. However, the treatments T3 and T10, T7 and T2, T3 and T6 were on par with each other. The lowest plant height of 76.24, 83.58 and 93.24 cm at 60, 90 and 120 DAT respectively were recorded in control (T1). The increased plant height might be attributed to the supply of macro elements through recommended dose of fertilizers. The increased plant height might also be due to the application of poultry manure which contains high N content and was made available to plants through mineralization to stimulate the plant growth and also increased uptake of primary nutrients and fast movements of photosynthates within the plant system (Vimera et al., 2012) [10].

The biofertilizers viz., *Azospirillum* and *Phosphobacteria* included in this treatment might have stimulated the hormones, vitamins and other growth factors which in turn lead to increased plant height. The foliar spray of MgSO₄ as water soluble fertilizer might be the another reason for increased plant height in this treatment. Increase in plant height due to foliar application of nutrients was reported by Haleema et al. (2018) [4] in chilli. The lowest plant height in control treatment might be due to application of inorganic fertilizers alone and it was less effective than the combined application of organic and inorganic fertilizers.

### Leaf area index

The leaf area index was significantly influenced by different integrated nutrient management practices. The data with respect to 60, 90 and 120 DAT, the maximum leaf area index was observed with application of 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ (T11) with leaf area index of 1.37, 1.61 and 1.85 respectively. The treatment next in order was application of 75% recommended dose of fertilizers + sheep manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ (T5). This was followed by the treatments T8, T10, T4, T2, T9, T3 and T6. However, the treatments T10 and T11; T3 and T4; T7 and T8 were not significantly different from each other at 30 DAT and the treatments T8 and T10; T7 and T2; T3 and T6 were comparable to each other at 60, 90 and 120 DAT. The minimum leaf area index of 0.55, 0.64 and 0.76 was recorded in the treatment with application of 100% recommended dose of fertilizer alone (T1) at different stages of plant growth viz., 60, 90 and 120 DAT.

This might be due to availability of dry matter in organic manure namely poultry manure that contains more nutrients and higher light interception which resulted in increased leaf area and higher photosynthetic activity and improved plant growth. These results are in agreement with findings of Islam et al. (2018) [6]. The increase in leaf area brought out by the nitrogen supply through N fertilizer, poultry manure and *Azospirillum* might be due to increased supply of nutrients which stimulated cell division, cell expansion and which expanded the individual leaf as reported by Taylor et al. (1993) [14]. The increase in plant spread was attributed due to inorganic fertilizers and organic manure and biofertilizers application which ascertained to increased nutrients levels such as nitrogen, phosphorus and potassium in plants, and leads to increased plant metabolites that helped to build up the plant tissues. The increase in leaf area might be due to better nutrient uptake, photosynthesis, besides excellent physiological and biochemical activities due to application of *Azospirillum* and *Phosphobacteria*. These results are in conformity with the findings of Malik et al. (2011) [8].

### Number of branches per plant

The appraisal of data revealed that the application of inorganic fertilizers, organic manures and biofertilizers significantly differed in the number of branches plant⁻¹ at 60,
of amino acids. These results indicated that the treatments next in order were T₇, T₄, T₅, T₆, T₈, T₉ and T₁. However, the treatments T₆ and T₇, T₉ and T₂ were not significantly different from each other. The minimum SPAD values of chlorophyll content (46.51, 46.89 and 47.17 at 60, 90 and 120 days respectively) were observed in the treatment applied with 100% recommended dose of fertilizers alone (T₁). This might be attributed to the nitrogen present in inorganic nitrogen fertilizer, poultry manure and Azospirillum which involved in the formation of chlorophyll and thereby leads to effective photosynthetic rate of chilli plant.

The poultry manure included in this treatment might have supplied the required nitrogen needed for the chilli plant to enhance the chlorophyll content. The nitrogen is a constituent of chlorophyll molecule which is important for preparation of starch in leaves and production of amino acids. These results are in conformity with the findings of Khandaker et al. (2017) [7]. The application of Azospirillum fixed the atmospheric nitrogen and thereby improved the nitrogen level in both soil and plant. Magnesium supplied by foliar application as 2% MgSO₄ in this treatment might have helped to capture the sun’s energy for growth and production through photosynthesis. Photosynthesis takes place in green pigments of chlorophyll in chilli plants and magnesium is the center atom of the chlorophyll molecule, with each molecule which might have enhanced the chlorophyll content.

**Table 1: Effect of integrated nutrient application on growth attributes of chilli at different stages of growth**

| Treatment Details | Plant height (cm) | Leaf area index | Number of Branches plant⁻¹ | Chlorophyll content (SPAD values) |
|-------------------|------------------|----------------|-----------------------------|----------------------------------|
|                   | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT |
| T₁ - 100% RDF alone (Control) | 76.24 | 83.58 | 93.24 | 0.55 | 0.64 | 0.76 | 7.34 | 9.73 | 9.88 | 46.51 | 46.89 | 47.17 |
| T₂ - 100% RDF + farm yard manure @ 25 t ha⁻¹ (Farmer’s practice) | 84.87 | 93.56 | 105.75 | 0.86 | 1.02 | 1.15 | 8.40 | 11.10 | 1.14 | 52.33 | 52.50 | 53.32 |
| T₃ - 75% RDF + sheep manure @ 5 t ha⁻¹ | 79.14 | 87.07 | 97.46 | 0.63 | 0.77 | 0.89 | 7.74 | 10.26 | 10.42 | 48.57 | 48.97 | 49.63 |
| T₄ - 75% RDF + sheep manure @ 5 t ha⁻¹ + biofertilizers | 88.12 | 97.33 | 109.71 | 0.98 | 1.15 | 1.32 | 8.82 | 11.09 | 1.20 | 54.01 | 54.32 | 54.89 |
| T₅ - 75% RDF + sheep manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ | 93.38 | 104.62 | 118.34 | 1.24 | 1.41 | 1.67 | 9.54 | 12.67 | 1.31 | 57.08 | 57.85 | 58.15 |
| T₆ - 75% RDF + pressmud @ 10 t ha⁻¹ | 73.09 | 86.86 | 97.07 | 0.62 | 0.76 | 0.88 | 7.67 | 10.19 | 10.34 | 48.44 | 48.75 | 49.52 |
| T₇ - 75% RDF + pressmud @ 10 t ha⁻¹ + biofertilizers | 84.90 | 93.83 | 105.94 | 0.88 | 1.04 | 1.17 | 8.48 | 11.25 | 1.51 | 52.51 | 52.55 | 53.39 |
| T₈ - 75% RDF + pressmud @ 10 t ha⁻¹ + biofertilizers + 2% MgSO₄ | 91.11 | 101.09 | 114.31 | 1.12 | 1.34 | 1.50 | 9.21 | 12.21 | 1.60 | 55.65 | 55.93 | 59.45 |
| T₉ - 75% RDF + poultry manure @ 5 t ha⁻¹ | 82.03 | 90.42 | 101.65 | 0.75 | 0.88 | 1.02 | 8.08 | 10.70 | 10.93 | 50.21 | 50.84 | 51.46 |
| T₁₀ - 75% RDF + poultry manure @ 5 t ha⁻¹ + biofertilizers | 91.02 | 100.71 | 114.29 | 1.10 | 1.31 | 1.47 | 9.15 | 12.14 | 1.51 | 55.59 | 55.87 | 56.40 |
| T₁₁ - 75% RDF + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ | 96.62 | 107.92 | 122.56 | 1.37 | 1.61 | 1.85 | 9.86 | 13.09 | 1.52 | 58.57 | 59.49 | 59.98 |
| SE₉ | 1.256 | 1.477 | 1.743 | 0.015 | 0.019 | 0.022 | 0.123 | 0.154 | 0.165 | 0.670 | 0.712 | 0.716 |
| CD (p=0.05) | 2.578 | 3.081 | 3.636 | 0.031 | 0.040 | 0.046 | 0.256 | 0.320 | 0.345 | 1.397 | 1.486 | 1.493 |

**Nutrient content of plant and chilli fruit**

**Nitrogen (Table 2):**

The perusal of data on nitrogen content by chilli plant at 60, 90, 120 DAT and by fruit revealed that the maximum nitrogen content of 3.66, 2.96, 2.21 and 1.01% were recorded with application of 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ (T₁₁) at 60, 90, 120 DAT and by fruit respectively. The treatments next in order were T₉, T₈, T₁₀, T₄, T₅, T₆, T₇, T₉, T₆ at 60, 90, 120 DAT and by fruit. But, the treatments T₆ was comparable to T₁₀ and the treatments T₅ and T₁ were on par with each other. At 60, 90, 120 DAT and by fruit, the minimum nitrogen content of 2.71, 2.24, 1.41 and 0.74% respectively was registered in the treatment with application of 100% recommended dose of fertilizers alone (T₁). This might be due to the addition of nitrogen through inorganic fertilizer, poultry manure and biofertilizer (Azospirillum) which increased the nitrogen content of plant and fruit. Application of inorganic fertilizers alone failed to produce maximum nitrogen content of plant and fruit. The similar findings were reported by Rohit Pawar and Barkule (2017) [11].
Phosphorus (Table 2)
The results showed that the maximum phosphorus content of 0.36, 0.48, 0.44 and 0.33% were registered in the treatment T1 (75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄) at 60, 90, 120 DAT and by fruit respectively. The treatment next in line was T5 recording the phosphorus content of 0.34, 0.46, 0.42 and 0.52% at 60, 90, 120 DAT and by fruit respectively. These treatments were followed by T6, T10, T4, T5, T2, T6, T3, T6, and T1. The phosphorus content increased with increase in the content of nitrogen, it means that phosphorus supply depends upon nitrogen availability. Reduction of 25% inorganic fertilizer, 5 tonnes of poultry manure ha⁻¹ and Phosphobacteria might have caused to produce higher value. The reason behind is that poultry manure might have caused to produce some organic acid for release which may be responsible for the release of phosphorus from insoluble compounds. The similar findings were reported by Roychoudhury et al. (1990) [12].

Potassium (Table 2)
From the data, it is found that the integrated nutrient application significantly influenced the potassium content in chilli. With respect to plant at 60, 90, 120 DAT and by fruit, the treatment T1 (75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄) registered the highest potassium content of 1.17, 1.52, 2.23 and 1.20% respectively. This treatment was followed by the treatment T3 (75% RDF + sheep manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄). The treatments next in order were T6, T10, T1, T4, T2, T5, T1 and T8. But, the treatments T9 and T10, T2 and T2, T3 and T4 were not significantly different from each other. The least potassium content was recorded in the treatment T11 (100% recommended dose of fertilizers alone) registering the potassium content of 0.86, 1.03, 1.41 and 0.71 at 60, 90, 120 DAT and by fruit respectively. This might be due to translocation of oxygenated compounds from source to sink. The increased potassium content in chilli fruit might be due to better mineralization of nutrients from poultry manure, enhanced activity of well developed net work of root and soil aggregate formation. The present findings are in agreement with those reported by Dademal et al. (2004) [2] and Singh et al. (2004) [13].

Calcium (Table 3)
The investigation of the data revealed that the maximum calcium content on plant and fruit were noticed in the treatment T11 (75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄). This treatment was recorded the maximum value of 0.70, 0.73, 0.77 and 0.48% at 60, 90, 120 DAT and by fruit respectively. The treatment T1 (100% recommended dose of fertilizers alone) registered the minimum calcium content of 0.41, 0.42, 0.48 and 0.21% at 60, 90, 120 DAT and by fruit respectively. This might be due to the presence of some amount of calcium in the soil also along with addition of organic manure namely poultry manure. A part of free available calcium may have been adsorbed in to colloidal sites of humic substances present in poultry manure might be another reason. As result, entry of calcium into fruits of chilli plant. These results are in conformity with findings of Premamali et al. (2019) [10].

Magnesium (Table 3)
The data pertaining magnesium content at 60, 90, 120 DAT and fruit, the treatment T5 (75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄) registered the highest magnesium content (0.83, 0.97, 0.86 and 0.50% at 60, 90, 120 DAT and by fruit respectively). The treatment T9 (75% recommended dose of fertilizers + sheep manure @ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄) was next in order registering the magnesium content of 0.78, 0.92, 0.81 and 0.46% at 60, 90, 120 DAT and fruit respectively. These treatments were followed by T6, T10, T1, T4, T2, T5, T3 and T6. However, the treatments T7 and T3 and T8 were not significantly different from each other. The treatment T1 (75% recommended dose of fertilizers alone) registered the minimum uptake of magnesium (0.32, 0.47, 0.38 and 0.18% at 60, 90, 120 DAT and by fruit respectively). This might be due to the fact that plants were fertilized with foliar spray of magnesium sulphate and application of organic manure enhanced photosynthetic process which increased the magnesium content of fruit. The sulphur supplied through foliar application and organic manure increased the sulphur content which had synergistic effect with magnesium thereby increased the magnesium content of chilli fruit. These results are in consonance with findings of Harris et al. (2018) [3].

Sulphur (Table 3)
Among the different treatment combinations tried, the highest sulphur content of chilli was noticed in the treatment T5 (75% recommended dose of fertilizers + pressmud @ 10 t ha⁻¹ + biofertilizers + 2% MgSO₄). This treatment was registered the maximum sulphur content of 0.356, 0.286, 0.268 and 0.084% at 60, 90, 120 DAT and by fruit respectively. The minimum sulphur content of 0.253, 0.167, 0.159 and 0.054% were not significantly different from each other. The treatments T9 and T7 and T1 and T6 were not significantly different from each other. The least sulphur content was recorded in the treatment T1 (100% recommended dose of fertilizers alone) registering the sulphur content of 0.253, 0.167, 0.159 and 0.054% at 60, 90, 120 DAT and by fruit respectively. This might be due to application of sulphur through pressmud and foliar application of magnesium sulphate as 2% had a significant effect on chilli. The organic manure viz., pressmud might have enhanced fruit quality by increasing endogenous content of promotors, plant hormones and decreased inhibitors. The similar findings were reported by Dilmaghani et al. (2012) [3].

Table 2: Effect of integrated nutrient application on nitrogen, phosphorus and potassium content of plant and chilli fruit

| Treatment Details | Nitrogen (content %) | Phosphorus (content %) | Potassium (content %) |
|-------------------|----------------------|------------------------|-----------------------|
|                   | 60 DAT | 90 DAT | 120 DAT | Fruit | 60 DAT | 90 DAT | 120 DAT | Fruit | 60 DAT | 90 DAT | 120 DAT | Fruit |
| T1 - 100% RDF alone (Control) | 2.71 | 2.24 | 1.41 | 0.74 | 0.21 | 0.32 | 0.29 | 0.20 | 0.86 | 1.03 | 1.41 | 0.71 |
| T2 - 100% RDF + farm yard manure @ 25 t ha⁻¹ (Farmer’s practice) | 3.12 | 2.51 | 1.70 | 0.85 | 0.27 | 0.39 | 0.35 | 0.26 | 1.00 | 1.24 | 1.79 | 0.91 |
| T3 - 75% RDF + sheep manure@ 5 t ha⁻¹ | 2.86 | 2.33 | 1.53 | 0.78 | 0.23 | 0.35 | 0.31 | 0.22 | 0.91 | 1.12 | 1.53 | 0.79 |
| T4 - 75% RDF + sheep manure@ 5 t ha⁻¹ + biofertilizers | 3.36 | 2.67 | 1.88 | 0.89 | 0.29 | 0.42 | 0.47 | 0.32 | 1.06 | 1.32 | 1.93 | 0.95 |
| T5 - 75% RDF + sheep manure@ 5 t ha⁻¹ + biofertilizers + 2% MgSO₄ | 3.58 | 2.89 | 2.15 | 0.97 | 0.34 | 0.46 | 0.42 | 0.32 | 1.14 | 1.47 | 2.18 | 1.13 |
| T6 - 75% RDF + pressmud @ 10 t ha⁻¹ | 2.82 | 2.31 | 1.50 | 0.77 | 0.23 | 0.35 | 0.31 | 0.22 | 0.90 | 1.10 | 1.51 | 0.78 |
| T7 - 75% RDF + pressmud @ 10 t ha⁻¹ + Biofertilizers | 3.18 | 2.55 | 1.75 | 0.86 | 0.27 | 0.40 | 0.35 | 0.26 | 1.01 | 1.26 | 1.81 | 0.92 |
| T8 - 75% RDF + pressmud @ 10 t ha⁻¹ + biofertilizers + 2% MgSO₄ | 3.47 | 2.77 | 2.04 | 0.94 | 0.32 | 0.44 | 0.39 | 0.31 | 1.11 | 1.41 | 2.10 | 1.05 |
| T9 - 75% RDF + poultry manure @ 5 t ha⁻¹ | 2.98 | 2.40 | 1.61 | 0.81 | 0.25 | 0.37 | 0.33 | 0.24 | 0.95 | 1.19 | 1.67 | 0.85 |
| T10- 75% RDF + poultry manure @ 5 t ha⁻¹ + biofertilizers | 3.42 | 2.76 | 1.99 | 0.93 | 0.32 | 0.44 | 0.39 | 0.31 | 1.10 | 1.39 | 2.08 | 1.04 |
Table 3: Effect of integrated nutrient application on calcium, magnesium and potassium content of plant and chilli fruit

| Treatment Details | Calcium content (%) | Magnesium content (%) | Sulphur content (%) |
|-------------------|---------------------|-----------------------|---------------------|
|                   | 60 DAT | 90 DAT | 120 DAT | Fruit | 60 DAT | 90 DAT | 120 DAT | Fruit | 60 DAT | 90 DAT | 120 DAT | Fruit |
| T0 - 100% RDF alone (Control) | 0.41 | 0.42 | 0.48 | 0.21 | 0.32 | 0.47 | 0.38 | 0.18 | 0.33 | 0.16 | 0.17 | 0.054 | 0.054 |
| T1 - 75% RDF + sheep manure @ 5 t ha⁻¹ | 0.55 | 0.54 | 0.62 | 0.32 | 0.53 | 0.67 | 0.56 | 0.30 | 0.29 | 0.20 | 0.21 | 0.064 | 0.064 |
| T2 - 75% RDF + inorganic fertilizers (FYM) | 0.48 | 0.45 | 0.33 | 0.54 | 0.68 | 0.56 | 0.31 | 0.31 | 0.24 | 0.25 | 0.073 | 0.073 |
| T3 - 75% RDF + sheep manure@ 5 t ha⁻¹ + biofertilizers | 0.58 | 0.60 | 0.65 | 0.36 | 0.61 | 0.73 | 0.63 | 0.34 | 0.29 | 0.20 | 0.20 | 0.065 | 0.065 |
| T4 - 75% RDF + sheep manure @ 5 t ha⁻¹ + biofertilizers | 0.67 | 0.67 | 0.74 | 0.45 | 0.78 | 0.92 | 0.81 | 0.46 | 0.33 | 0.25 | 0.24 | 0.077 | 0.077 |
| T5 - 75% RDF + sheep manure @ 5 t ha⁻¹ | 0.45 | 0.46 | 0.52 | 0.24 | 0.38 | 0.52 | 0.44 | 0.21 | 0.27 | 0.19 | 0.19 | 0.061 | 0.061 |
| T6 - 75% RDF + presswood @ 10 t ha⁻¹ | 0.56 | 0.54 | 0.62 | 0.33 | 0.54 | 0.68 | 0.56 | 0.31 | 0.31 | 0.24 | 0.23 | 0.073 | 0.073 |
| T7 - 75% RDF + presswood @ 10 t ha⁻¹ + biofertilizers | 0.62 | 0.64 | 0.71 | 0.41 | 0.73 | 0.85 | 0.75 | 0.42 | 0.36 | 0.28 | 0.26 | 0.084 | 0.084 |
| T8 - 75% RDF + poultry manure @ 5 t ha⁻¹ | 0.50 | 0.51 | 0.59 | 0.29 | 0.47 | 0.59 | 0.50 | 0.26 | 0.26 | 0.18 | 0.17 | 0.058 | 0.058 |
| T9 - 75% RDF + poultry manure @ 5 t ha⁻¹ | 0.61 | 0.63 | 0.70 | 0.40 | 0.66 | 0.79 | 0.69 | 0.38 | 0.30 | 0.22 | 0.21 | 0.069 | 0.069 |
| T10 - 75% RDF + poultry manure @ 5 t ha⁻¹ + biofertilizers | 0.70 | 0.73 | 0.77 | 0.48 | 0.83 | 0.97 | 0.86 | 0.50 | 0.34 | 0.27 | 0.25 | 0.081 | 0.081 |
| T11 - 75% RDF + poultry manure @ 5 t ha⁻¹ | 0.008 | 0.009 | 0.010 | 0.013 | 0.007 | 0.008 | 0.007 | 0.007 | 0.002 | 0.003 | 0.002 | 0.001 | 0.001 |
| SE | 0.180 | 0.192 | 0.022 | 0.028 | 0.015 | 0.017 | 0.016 | 0.015 | 0.007 | 0.005 | 0.004 | 0.002 | 0.002 | 0.002 |
| CD (p<0.05) | 0.008 | 0.014 | 0.019 | 0.033 | 0.007 | 0.008 | 0.007 | 0.007 | 0.002 | 0.003 | 0.002 | 0.001 | 0.001 | 0.001 |

Conclusion

This study concludes that the combined application of inorganic fertilizers, organic manures and biofertilizers resulted in higher growth and nutrient content of chilli. The results revealed that application of 75% recommended dose of fertilizers + poultry manure @ 5 t ha⁻¹ + biofertilizers (Azospirillum and Phosphobacteria) + 2% MgSO₄ as a foliar spray improved the growth attributes and nutrient content of chilli compared to other treatments tried.

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