



# Effect of organic fertilizers on *Capsicum annum* L. Tukaram Gitte & Haribhau Waghire\*

Department of Botany, Vaidyanth College, Parli-Vaijnath-431515 (MS), India

\*Department of Botany, Maharaja Jivajirao Shinde Mahavidyalaya, Shrigonda-413701 (MS), India.

**Abstract:** *Capsicum annum* L. belongs to family Solanaceae. It is rich source of vitamins A, C and E. Present investigation deals with studying the effect of chemical and organic fertilizers and statistical analyses of the results obtained thereof. The data will be useful to determine the efficient use of fertilizers on economically important plants.

**Keywords:** Capsicum, Organic Fertilizers.

## Introduction

*Capsicum annum* L. commonly known as Chillies, green or red fruits of *Capsicum annum* L. belong to the family Solanaceae. Chillies are native of Peru and Mexico and Portuguese were the first to introduce chillies in India during 15th century. Its cultivation became popular in the 17th century. The largest producer of Chillies in the world is India, accounting for 15 lakh tonnes in 2014-15. Chilli is rich source of vitamins A, C and E. Hundred gram of edible portion of capsicum provides 24 k cal of energy, 1.3 g of protein 4.3 g of carbohydrate and 0.3 g of fat. As per traditional farming, farmers' uses farm manures and cow dung as nutrient source to the crops to supplement the natural supply available through soil and atmosphere. This system of low nutrient supply can only sustain low productivity of crops. Increasing needs for enhanced crop productivity due to ever increasing population necessitated the breeding of high yielding varieties of crops which requires high amounts of nutrition for high production. Continuous use of chemical fertilizers and pesticides alone is not the best way to sustain agricultural production consistent with maintenance of soil fertility, health and the protection of environment. An inefficient farming system may aggravate environmental disorders like acid deposition in air, green house effect, depletion of ozone layer in stratosphere, soil erosion, contamination of ground water, loss in diversity of flora and fauna. In simple words, organic farming is the cultivation of crops through organic inputs with intensity to minimize the use of chemical fertilizers and pesticides that is hazardous to the environment. Organic materials such as bio-digested slurry, poultry manure, and green leaf manures. *Azolla* and FYM can substitute for inorganic fertilizers to maintain productivity and environmental quality.

The chemical fertilizers like N, P and K have played significant role on increasing the yield and quality in plants during early seventies. But in recent years the usage of chemical fertilizers indiscriminately in an unbalanced manner has been shown to result in several problems like loss of fertility, soil health and multiple

nutrient deficiencies and loss of microbial activities etc, which ultimately resulting in reduced crop productivity and quality.

With the increase in population our compulsion is not only to stabilize agricultural production but also to increase it further in sustainable manner. Excessive use over years of agro-chemicals like pesticides and fertilizers has affected the soil health and lead to declining of crop yields and quality of products. Hence, a natural balance needs to be maintained at all cost for existence of life and property. Keeping these things under consideration use of organics in chilli cultivation as target dose of application and to study its effect on growth, yield and biochemical parameters of chilli, the present study was conducted with the aims is to study the effect of individual and combinational application of organics on growth ,yield and biochemical parameters on chilli.



Figure 1 *Capsicum annum L.*

### Materials and Methods:

**Experimental site:** The experiment was conducted on an experimental field at the department of Botany S.S.G.M College Kopargaon. Dist. Ahmadnagar during 2019-2020.

**Soil:** Soil type of experimental plot was fairly uniform, medium black cotton type, with uniform texture and well drained. Sowing of seedling: Seeds of 'PALIDIAN' were obtained from NASIK district nursery. Raised beds of  $3.0*10*0.15 \text{ m}^3$ . (L\*B\*H) size were prepared.

Experiments in complete randomized block design were conducted. Area of experiment was ploughed deeply and was harrowed thrice to bring the soil to fine tilth. The field was divided into plots as per required dimensions by using the measuring tape; rope and pegs. Seed were sown into the soil. Different concentrations of organic fertilizer were prepared prior to spray with distilled water in different concentrations. Data on plant height, number of branches per plant, number of leaves per plant and leaf area were collected at the time of flowering. Number of fruits, total yield per plant and fresh and dry weight of plant were collected after harvesting. The experiment was laid out in randomized block design with 3 replications comprising 4 treatment combinations viz.

TREATMENT	FERTILIZER	CONCENTRATION
T <sub>0</sub>	Control	
T <sub>1</sub>	NPK	100%
T <sub>2</sub>	<i>Azolla</i>	50%
T <sub>3</sub>	FYM	25%
T <sub>4</sub>	NPK + <i>Azolla</i>	75%

The Beds were prepared for sowing the seeds. 10 cm each seedling were planted in the soil. Organic (NPK, *Azolla*) and inorganic (urea, FYM) fertilizer were used for the plants. Different concentrations were applied for plants to see the effects on different parameters. Different growth plant parameters like plant height, number of leaves, leaf area, days to 50 % bud appearance days. 50% flowering number of flower plant, no of days for harvesting and yield parameters such as fruit length, average of fruits were taken during this investigation.

**Transplanting:** 40 days old uniform and healthy seedlings were selected and transplanted flat beds. Before transplanting irrigation was given and seedling were transplanted at spacing 45 x 45 cm and light irrigation was given till the seedlings were established. Gap filling was done with healthy seedlings wherever required.

**Biometric observations:** Five plants were selected from each plot as observational plants and were labelled. The observations in respect to growth yield and quality parameters were recorded.

**Plant height:** Measurement of Plant Height, Number of Leaves per Plant, and Number of branches per Plant etc.

Plant height was measured starting from the base of the stem to the tip of the highest leaf by using ruler and measuring tape. The unit used for plant height measurement was centimetre (cm). Number of leaf per plant was accomplished by manual observation where the number of leaves per plant was counted. The length and width of the selected leaf was measured using a ruler. The number of branches per plant was done by manual observation where the number of branches emerging from the main stem of the chilli plant was counted.

Number of fruits, weight, fruit length, chilli fruits/pods was counted manually; the weight of the individual pod was measured by electronic weighing balanced using a gram unit. The length of fruit was measured by using a ruler. The unit used for plant height measurement was centimetre (cm). The diameter of fruit was measured by using Digital Vernier Calliper. The unit used for fruit diameter was centimetre (cm).

## Results and Observations:

The data obtained were statistically analysed with proper interpretation.

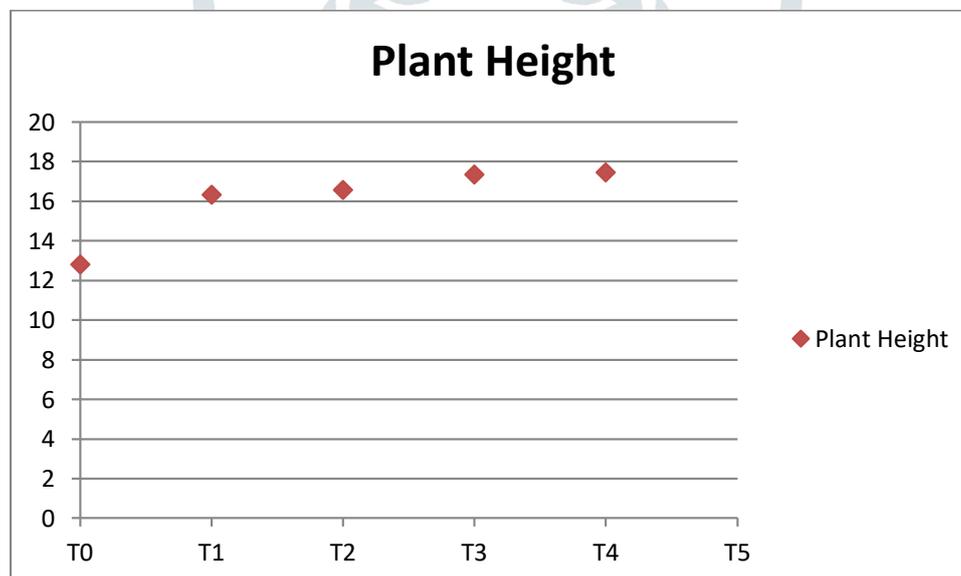
### Observation Table:

Treatment	Plant Height (cm)	No. of Branches	No. of Leaves	Fruit Weight (gm)
0	12.8	3.44	19.81	20.5
1	16.33	7.522	23.45	21.63
2	16.56	6.11	25	21.73
3	17.33	7	26.67	22.73
4	17.44	7.45	26.7	28.27

### Growth parameters:

#### 1. Height of plant (cm)

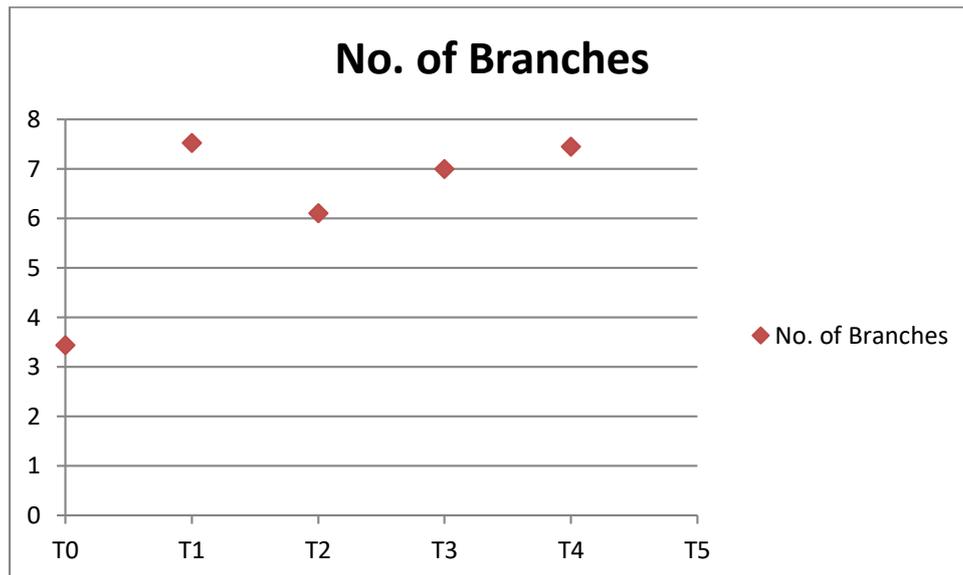
Plant height for each treatment was recorded and the data presented in following graph



Plant height in NPK + *Azolla* treatment shows the highest plant height (17.44 cm) while control, with no organic fertilizer application, gives the shortest (12.8 cm) chilli plant. This shows that application of organic fertilizers help to improve growth of chilli plant. Natesh *et al.* state the organic fertilizer influenced significantly the growth parameter. This might be due to the improvement in soil physical condition for the plant growth along with increased availability of N, P and K at the early stage of crop growth. Nitrogen, phosphorus and potassium contained in organic fertilizer have great effects in plant growth and development. Plants need high concentration of this primary nutrient as any deficiency of these essential nutrients will prevent good plant growth.<sup>9</sup> Thus, sufficient nitrogen, phosphorus and potassium supplied by organic fertilizer help in producing sturdy and taller chilli plants.

## 2. Number of Branches

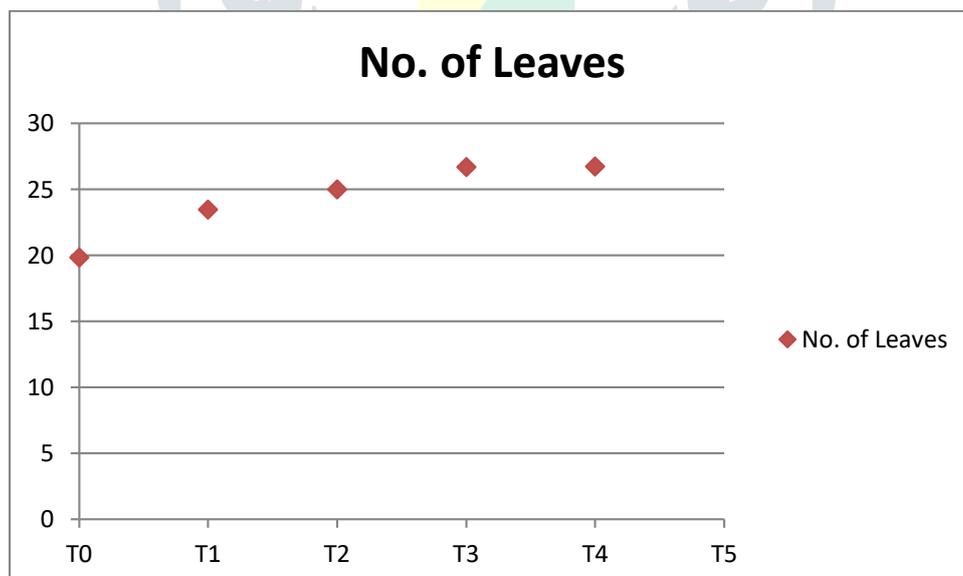
Number of Branches for each treatment was recorded and the data presented in following graph:



Number of Branches in NPK treatment shows the highest number of branches (7.522) while control, with no organic fertilizer application, gives the shortest (3.44) chilli plant. This shows that application of organic fertilizers help to improve growth of chilli plant.

## 3. Number of Leaves

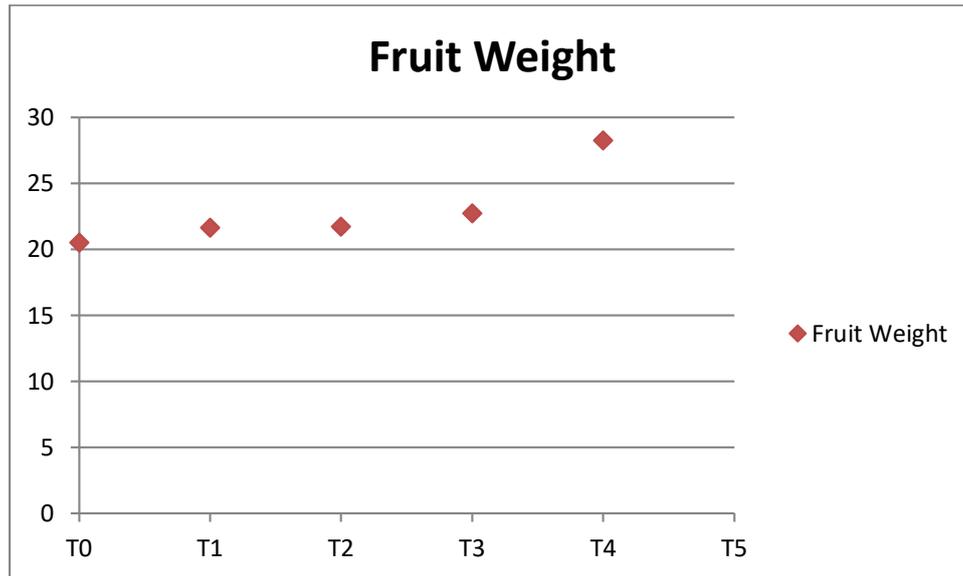
Number of Leaves for each treatment was recorded and the data presented in following graph



Number of leaves in NPK + Azolla treatment shows the highest Number of leaves (26.7) while control, with no organic fertilizer application, gives the shortest (19.81) chilli plant. This shows that application of organic fertilizers help to improve growth of chilli plant.

#### 4. Fruit weight

Fruit weight for each treatment was recorded and the data presented in following graph



Treatment 4 has the highest fruit weight (28.27 gm) as compared with the other treatments. The results are to some extent in agreement with Roychowdhury *et al.* who observed an improvement in fruit weight with increasing nitrogen contents in organic fertilizer.

#### Conclusion:

From the overall results, treatment with FYM gives the highest plant height, higher number of leaves and highest number of branches and highest fruit weight. On the other hand, treatment supplemented with FYM and *Azolla* gave positive effect in number of fruit produced, weight of fruit. Control treatment shows the lowest overall growth and yield performance in chilli plants. Thus, it can be concluded that application of organic fertilizer has significantly affected the growth, quality of chilli plants. Application of organic fertilizers helps to supply nutrients as required for growth of chilli plant.

#### References:

- [1] Anandan, M. (2000). An integrated approach of biofertilizer for sustainable agriculture. *Intensive Agriculture*, March-April, 2000.
- [2] Annanurova, M.A., Rozyeva, M., Talakov, T. and L.P. Slavinskaya (1992). Effect of fertilizers on some physiological process and fruit quality in tomato. *Izvestiya Akademii Nauk Turkmenistan Seriya Biologicheskikh Nauk*, 3: 49.
- [3] Cerna, K. (1980). Effect of FYM and graduated rates of mineral nutrient on yield formation in *Capsicum*. *Sbornic UVTIZ, Zahradnictvi*, 7(4): 297301.
- [4] Damke, M.M., Kawarkhe, V.J. and C.O. Patil (1988). Effect of phosphorus and Potassium on growth and yield of chilli. *PKV Res. J*, 12(12): 110-114.
- [5] Fugro, P.A. (1996). Role of organic pesticides and manures in management of some important chilli diseases. *J. Mycol. Pl. Pathol.*, 30(1) : 9697.
- [6] Surlekov, P and V. Ronkov (1989). Effect of Fertilization on *Capsicum* productivity and soil agrochemical and biological properties in Monoculture. *Pochroznaniei Agrokhimiya*, 24(2) : 17-23