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Effect of Novel Organic Liquid Fertilizer on Growth and Yield in Chilli (*Capsicum annum* L.)

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ABSTRACT

The aim of the present investigation was to determine the effects of foliar application of a novel organic liquid fertilizer on growth and yield in chilli (Capsicum annum L. var. Shama). The pot experiments were carried out in Botanical garden, Fergusson College, Pune. Plants were sprayed with five doses (1% - 5%) of novel organic liquid fertilizer along with untreated control plants.Capsicum which belongs to family Solanaceae is referred to as red pepper. Chilli is an important commercial crop of India grown for its green fruits as vegetable and red form as spice. Many food industries have been using chilies in preparation of processed products and pharmaceutical preparations.The present investigation has revealed the consistent and significant results for growth parameters due to application of novel organic liquid fertilizer. Out of five different treatments, the 3% treatment resulted in maximum, plant height; number of branches per plant; leaf number; leaf area; fresh and dry weight of the plant; number of fruits per plant and total yield.

KEYWORDS: *Novel organic liquid fertilizers, chilli, growth parameters, yield.*

INTRODUCTION

During the past few decades, intensive agriculture involving exhaustive high yielding varieties has led to heavy withdrawal of nutrients from the soil. Generally, excessive amounts of inorganic fertilizers are applied to vegetables in order to achieve a higher yield [1] and maximum value of growth [2, 3, 4]. However, the use of inorganic fertilizers alone may cause problems for human health and the environment [3]. Long-term studies on various crops indicated that the balanced use of NPK fertilizer could not maintain the higher yields over years because of emergence of secondary and micronutrient deficiencies and deterioration of soil physical properties. Use of organic manures alone cannot fulfill the crop nutrients requirement [5]. Bokhtiar *et al* [6] reported that organic manures, when applied with chemical fertilizers gave better yield than individual ones. In recent times, consumers are demanding higher quality and safer food and highly interested in organic products [7]. Hence there is urgent need to improve organic fertilizers with natural minerals through biological processes.

In tune with the contemporary problem the present study was carried out to test the effect of novel organic liquid fertilizer on growth and yield in vegetable crops, for that we selected chilli as testing crop. Because, chilli (*Capsicum annuum* L.) is an important spice cum vegetable crop cultivated extensively in India [5] and it is reported to respond well to fertilizer application.

MATERIALS AND METHODS

The experiments were conducted in Botanical garden at the Department of Botany, Fergusson College, Pune. Twenty day old seedlings of chilli (*Capsicum annum* L. *var. shama*) were procured from authentic source (Scientific Seeds Pvt. Ltd.).

The novel organic fertilizer was prepared in our laboratory using organic raw materials *viz*. rice straw, neem cake, FYM, poultry waste, fish waste and press mud. As well as rock phosphate and basalt dust were used as phosphate source and potassium source respectively. Micronutrients like, Cu, Zn, Mg, Mn, Fe (all in sulphate form) and Boron were chelated separately (1g/liter) using seed amino acid.

Specifications of Novel organic Liquid fertilizer

Colour	pH	E.C.	N %	P %	K %
Greenish	5.8	4	3	3.5	2.5

A 1×5 factorial experiment in complete randomized block design with 3 replications was conducted. Plastic pots having a diameter of 30 cm and height of 25 cm. were used for pot experiments. Pots were filled garden soil. Four weeks old chilli seedlings of *var*. '*Shama*' were used for this experiment. Seedlings were planted in the plastic pots (four seedlings each). Different concentrations of the novel organic liquid fertilizer were prepared prior to spray with distilled water in different concentrations like 1%, 2%, 3%, 4%, and 5%. The common foliar application practice was used. The plants were sprayed every after 15 days of interval. Data on plant height, number of branches per plant, number of leaves per plant and leaf area were collected at the time of flowering, whereas, number of fruits; total yield per plant and fresh and dry weight of the plant were collected after harvesting.

RESULTS AND DISCUSSION

Effect of Foliar Treatments of Novel Organic Fertilizer on Vegetative Growth Characteristics

The results given in table -1 indicated the growth characters with significant differences in the values of plant height, number of branches per plant, number of leaves per plant and leaf area. All the aforesaid parameters expressed increase with the increase in dose of the novel organic liquid fertilizer. Out of five different treatments, the 3% treatment showed maximum values among them which was followed by 4% treatment and 2% treatment at the time of flowering. Malawadi [8] reported the similar results by treating the chilli seedlings with micronutrients. Our results are also in accordance with Patil *et al.* [9] showed the effect of organic and inorganic fertilizer on growth and yield in tomato.

Effect of Foliar Treatments of Novel Organic Fertilizer on Fresh and Dry weight of plant, Fruit number per plant and Yield per plant

The results obtained from present investigation clearly revealed that both fresh weight and dry weight in chilli plants increase with increase in percent treatment but the maximum values (46.09 g and 6.39 g respectively) when the plants sprayed with 3% of liquid organic fertilizer. These results may be attributed to greater accumulation of photosynthates by vegetative parts and fruits. Our findings are in tune with the Kumbhar and Deshmukh [10] and Bose and Tripathi [11], they found the similar results in tomato when treated with mixture of organic and inorganic fertilizers. The number of fruits per plant for all the treatments is recorded in table no2. The significantly highest numbers of fruits (42.07 per plant) were recorded in the plants supplemented with 3 % of liquid organic fertilizers. The results are in accordance with the findings of Patil *et al.* [9].

Higher fruit yield in chilli was reported (360.14 g/plant) in 3 % treated plants, which might be due to increase in values of fresh weights of the fruits per plant. Similar results were obtained by Kondapa *et al*. [5] in chilli plants treated with organic and inorganic fertilizers.

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Table 1 Effect of Novel Organic liquid fertilizer on growth parameters of *C. annum* at the flowering stage

Treatments	Plant height (cm)	Number of Branches per Plant	Number of leaves per Plant	Leaf Area (cm^2)
Control	27.96 ± 1.40	3.37 ± 0.33	28.43 ± 0.18	8.38 ± 0.24
1%	33.49 ± 0.37	4.71 ± 0.21	33.72 ± 0.18	10.22 ±0.39
2%	44.99 ± 1.06	5.49 ± 0.34	38.39 ± 0.93	13.58 ± 1.0
3%	60.11 ± 1.12	6.73 ± 0.24	46.08 ± 0.15	15.25 ±0.39
4%	45.02 ± 0.44	5.78 ± 0.15	39.83 ± 0.53	14.23 ± 0.71
5%	42.01 ± 0.59	5.53 ± 0.17	34.07 ± 0.38	10.43 ± 0.76

Table 2 Effect of Novel Organic liquid fertilizer on, fresh weight, dry weight of plant and yield per plant after harvesting

Treatments	Fresh weight of the plant (g)	Dry weight of the plant (g)	Number of Fruits per Plant	Total yield per plant (g/plant)
Control	20.46 ± 0.41	2.28 ± 0.07	13.32 ± 0.23	156.03 ± 1.20
1%	25.19 ± 0.24	4.26 ± 0.04	20.26 ± 0.14	206.10 ± 0.71
2%	39.62 ± 1.30	5.31 ± 0.05	30.63 ± 0.34	296.23 ± 0.90
3%	46.09 ± 0.33	6.39 ± 0.05	42.07 ± 0.18	360.14 ± 0.54
4%	41.30 ± 0.57	5.54 ± 0.09	33.94 ± 0.40	332.64 ± 0.39
5%	26.08 ± 0.24	4.36 ± 0.02	24.27 ± 0.29	256.21 ± 0.82

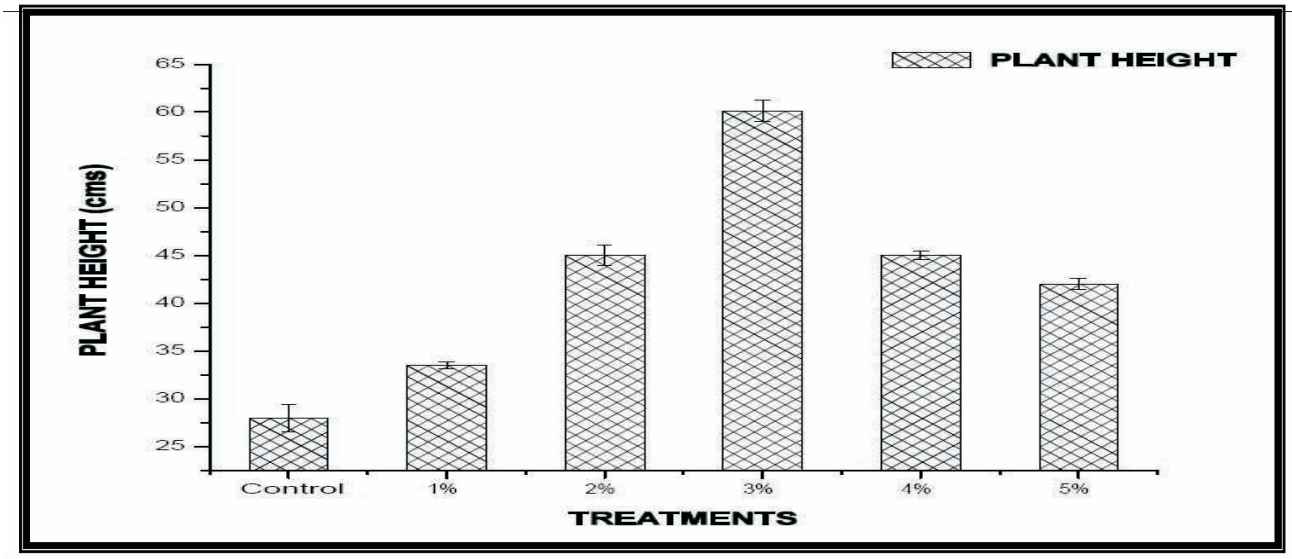

Fig 1.1 Effect of Novel Organic liquid fertilizer on plant height of *C. annum* at the flowering stage

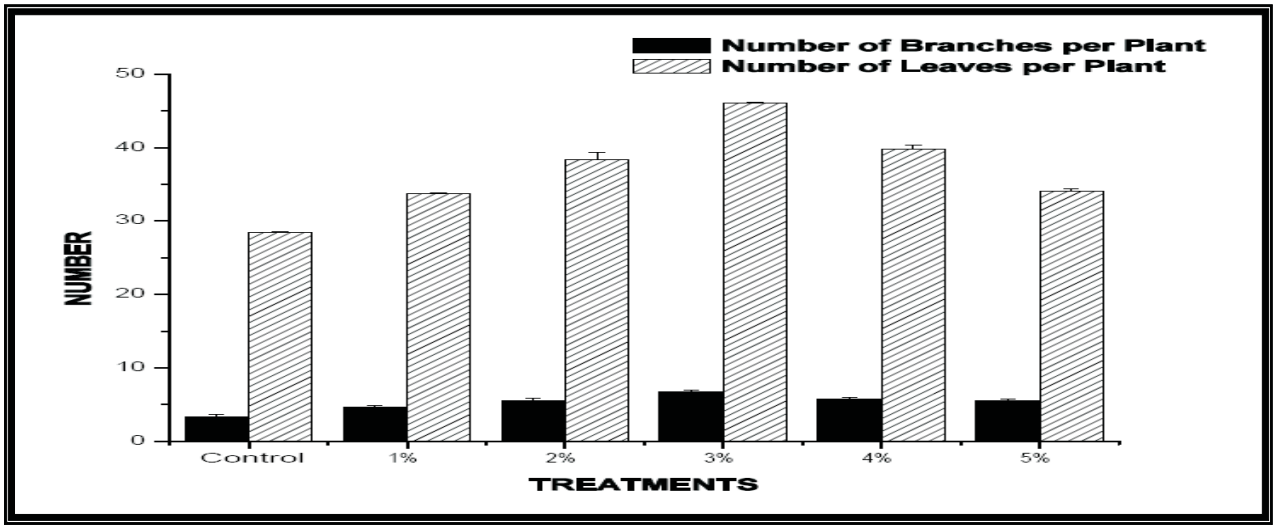

Fig 1.2 Effect of Novel Organic liquid fertilizer on number of branches and number of leaves per plant of *C. annum* at the flowering stage

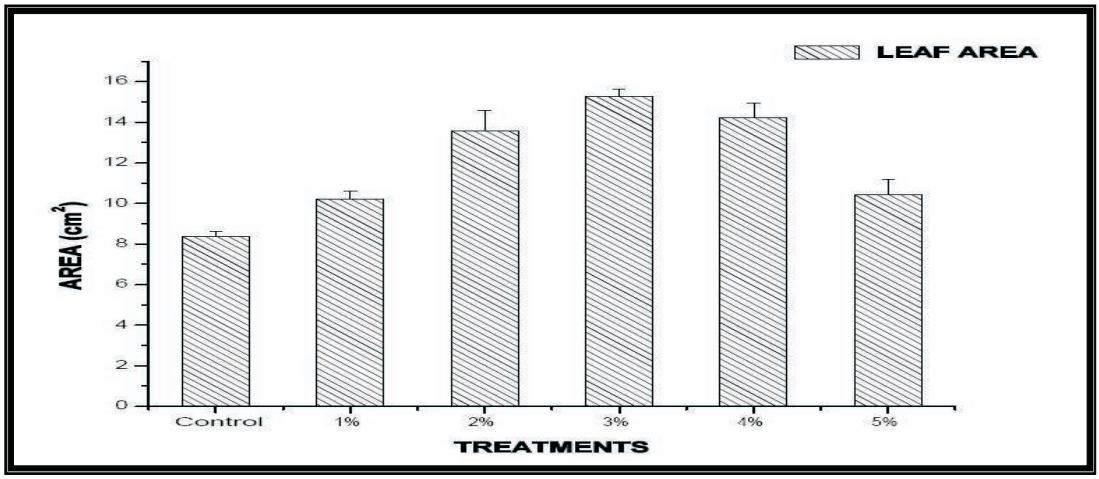

Fig 1.3 Effect of Novel Organic liquid fertilizer on leaf area of *C. annum* at the flowering stage

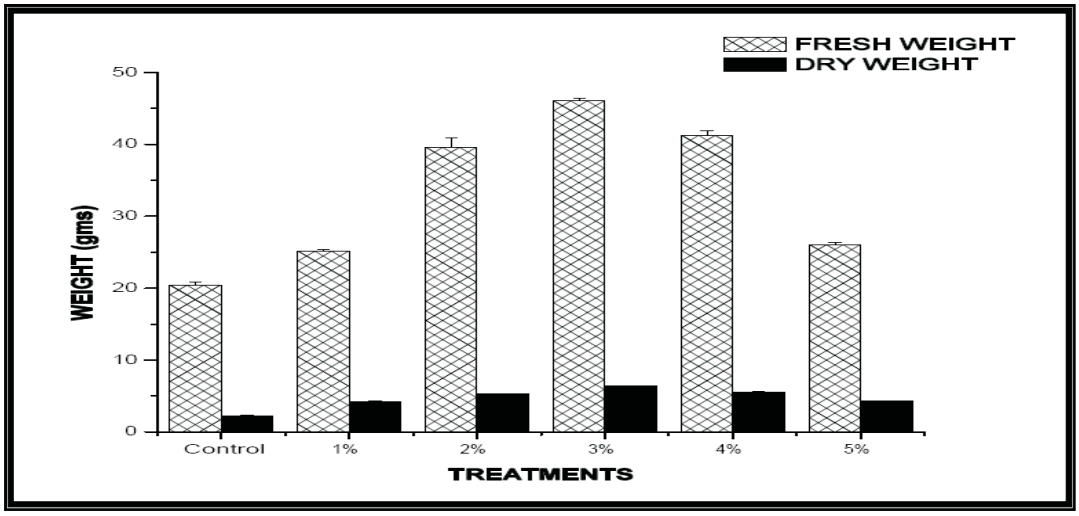

Fig 2.1 Effect of Novel Organic liquid fertilizer on fresh weight and dry weight plant of *C. annum*

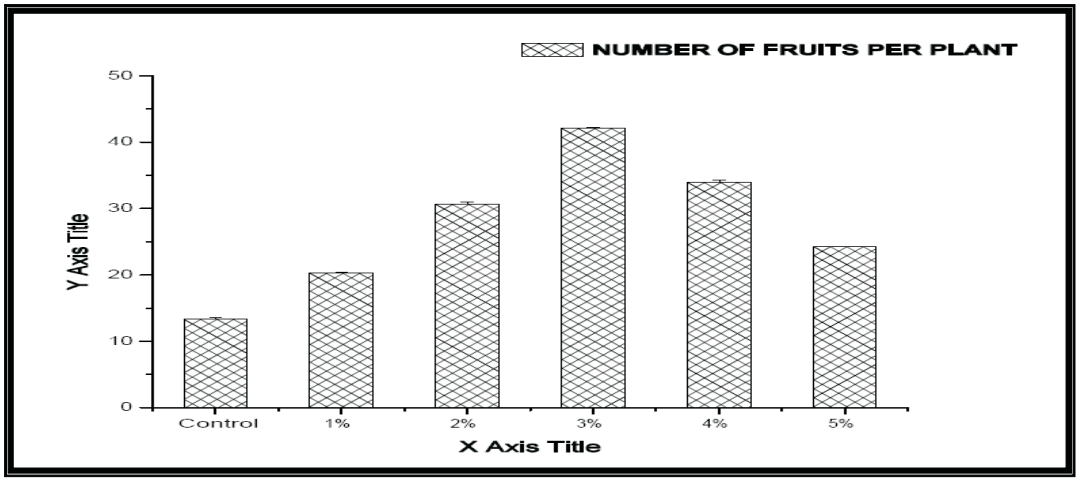

Fig 2.2 Effect of Novel Organic liquid fertilizer on fruit number per plant of *C. annum*

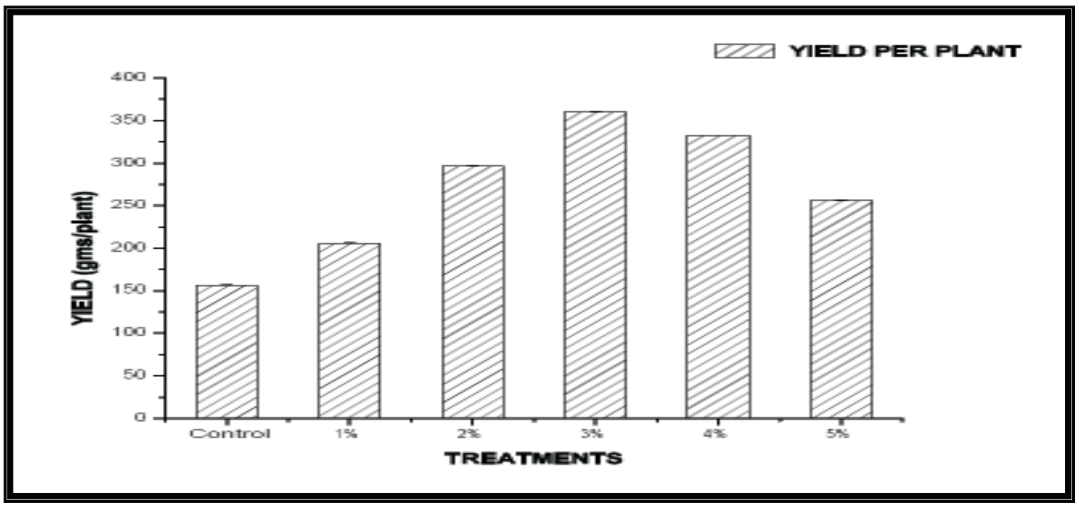

Fig 2.3 Effect of Novel Organic liquid fertilizer on total yield per plant of *C. annum*

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