

Effect of Panchagavya on Growth and Yield of Capsicum

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Abstract: A field experiment was carried out in College of Agriculture, OUAT, Bhubaneswar, Odisha during rabi season 2011-12 with nine treatments (T_1 : control, T_2, T_3, T_4 : Panchagavya @ 2%, 2.5% and 3% concentration at 10 days interval, T_5, T_6, T_7 : Panchagavya @ 2%, 2.5% and 3% concentration at 15 days intervals, T_8, T_9 : 0.25% panchagavya at 10 days interval and 4 ml neem oil per plant alternatively at 10 days and 15 days interval respectively). The results of the experiment revealed that foliar application of panchagavya at 2.5% concentration (30ml/liters of solution) and 4 ml of neem oil per plant alternatively at 10 days interval produce highest number of branches (4.34), early 50% flowering (42.10 days) and more number of fruit (7.63) followed by 0.25% panchagavya at 10 days interval and 4 ml neem oil per plant alternatively at 15 days interval which was significantly higher than control. Quality parameters like chlorophyll content in (4.15 mg g⁻¹), TSS (6.17° Brix) and ascorbic acid content (168.3 mg/100g) are also found to be highest under this treatment. The yield per hectare was also found to be highest under T_8 which was 60.08% more than that of control. Key words : capsicum, growth, Panchagavya, quality and yield

INTRODUCTION

In India, the hot and sweet peppers (green) are grown in an area of 7700 hectares with a production of 65900 tonnes and a productivity of 8.6 t ha⁻¹ in 2011 (IIVR vegetable statistics, 2013). The main growing states in India are Himachal Pradesh, Karnataka, Tamil Nadu, Maharashtra, Andhraradesh, Uttaranchal, Madhya Pradesh, West Bengal, Rajasthan, Punjab, Orissa, North eastern states and Bihar. Sweet peppers are very rich in vitamins, even more so than the tomatoes especially in A and C. The vitamin C content was found as high as 321 mg/100g. Vitamin B₁ and B₂ ranged from 0.02 to 0.1 mg per 100g of fresh weight, folic acid amounted to 1.3-2.9 mg/100g of dry weight. Bell pepper contains 92.4% water and the food value per 100g of edible portion is energy 29 calories, protein 1.2g, calcium 11 mg, Vitamin A 870 I.U., ascorbic acid 175 mg, thiamin 0.06 mg, riboflavin 0.03 mg and niacin 0.55 mg. Heavy use of chemicals in agriculture has weakened the ecological base in addition to degradation of soil, water resources and quality of the food. The indigenous technical knowledge which

were emerged out of the field experiences based on varied situations and problems have now great relevance as we are going back to traditional and low input sustainable crop production system to maintain soil productivity as well as fertility. India has a treasure of Indigenous knowledge concerning plant health, which was developed and documented several centuries ago. Panchagavya has been one piece of such traditional wisdom ment to safeguard plants and soil micro-organisms. In Sanskrit panchagavya means the blend of five products obtained from cow. It is made from cow dung, urine, ghee, milk and curd. Panchagavya is a popular foliar nutrition prepared by organic growers of Tamil nadu as an indigenous material and used widely for agricultural and horticultural crops [9].

MATERIALS AND METHODS

The field experiment was carried out at experimental plots of the Department of Horticulture, College of Agriculture, O.U.A.T., Bhubaneswar on sandy loam soil with pH 6.03, organic carbon 0.39%, available N, P and K was 180, 20 and 120 kg/ha respectively. Bhubaneswar is located on 22°15' north altitude,

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80°22' east longitude and on an altitude of 25.5 m above the mean sea level. The present experiment was conducted in RBD having nine treatments and three replications comprising of panchagavya and neem oil. Panchagavya was applied at different doses and different time of application. The seeds of capsicum were sown in the nursery bed and after one month they are transplanted in the mainfield at a spacing of 50m × 45m. The treatments consists of T₁-control (only recommended dose of chemical fertilizer is applied), T₂-foliar spray of 2.0% panchagavya at 10 days interval (6 sprays), T₃-foliar spray of 2.5% panchagavya at 10 days interval (6 sprays), T₄-foliar spray of 3.0% panchagavya at 10 days interval(6 sprays), T₅-foliar spray of 2.0% panchagavya at 15 days interval(4 sprays), T₆-foliar spray of 2.5% panchagavya at 15 days interval (4 sprays), T₇-foliar spray of 3.0% panchagavya at 15 days interval (4 sprays) T₈-foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval(4 sprays), T₉-foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval (4 sprays). All recommended package and practices were followed and fertilizer dose @ 120:80:80 kg/ha was applied to all the treatments. Panchagavya was prepared by taking cow urine(3 litres), fresh cow dung(5 kg), milk (3 litres), ghee (500 g) and curd (2 litres) from a desi cow. During process of fermentation, coconut water (3 litres), ripe banana fruit (12 nos.) and sugarcane juice (3 litres) were added. After 21 days it was strained and used for foliar application in chilli at varied concentrations and at different time intervals as per schedule. Observations on the growth and yield attributing characters like plant height (cm),

50% days to flowering, number of leaves, leaf area (cm²), number of fruit, fresh weight of fruit (g) and yield per hectare were carried out and the quality parameters like Chlorophyll content, TSS and ascorbic acid content was also recorded and the mean data of all the observations were subjected to proper statistical analysis.

RESULTS AND DISCUSSIONS

The results from table 1, it was revealed that plant height in capsicum was significantly varied with different treatments and found to be highest in T₉ (73.84 cm) followed by T₈ (71.46cm) and the lowest value was observed in T₁ (55.42 cm). This may be due to the positive influence of growth promoting hormones which accelerated the mobility of photosynthates [2],[3],[5]. With respect to the number of branches per plant, it was found that foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval (6 sprays) increases the number of branch per plant (4.84) significantly than control (3.33) and similarly, increase in number of branches per plant also increases the number of leaves and leaf area per plant in T₈ and T₉. So highest number of leaves per plant (108.67) was recorded in T₈ followed by T₉ (98.87) and with slight change in the trend the highest leaf area was found under T₉ (69.47 cm²) which was at par with T₈ (69.12 cm²). The increase in branches, number of leaves and leaf area may be due to the hormonal effect of Panchagavya [6],[8].

From the table 2, it is clearly seen that the number of fruits per plant was considerably increased due to application of panchagavya and neem oil and it

Table 1
Effect of different treatments on growth of the Capsicum

Treatments	Plant height (cm)	No. of branches (cm)	No. of leaves	Leaf area (cm ²)
T ₁ Control (only recommended dose of chemical fertilizer is applied)	55.42	3.33	75.76	60.83
T ₂ Foliar spray of 2.0% panchagavya at 10 days interval (6 sprays)	62.90	3.67	81.44	61.44
T ₃ Foliar spray of 2.5% panchagavya at 10 days interval (6 sprays)	62.93	3.76	92.97	63.26
T ₄ Foliar spray of 3.0% panchagavya at 10 days interval (6 sprays)	69.67	3.95	96.74	65.38
T ₅ Foliar spray of 2.0% panchagavya at 15 days interval (4 sprays)	59.64	3.53	79.10	62.53
T ₆ Foliar spray of 2.5% panchagavya at 15 days interval (4 sprays)	66.32	3.62	88.88	62.68
T ₇ Foliar spray of 3.0% panchagavya at 15 days interval (4 sprays)	59.20	3.86	95.02	63.26
T ₈ Foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 10 days interval(6 sprays)	71.46	4.84	108.67	69.12
T ₉ Foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval(4 sprays)	73.84	4.1	98.87	69.47
SEM	0.58	0.1	2.39	0.79
C.D.(0.05%)	1.73	0.3	7.16	2.35

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Table 2
Effect of different treatments on yield attributes of the Capsicum

Treatments	No. of fruits	Fresh weight of fruit (g)	Yield (t ha ⁻¹)
T ₁ Control (only recommended dose of chemical fertilizer is applied)	4.82	54.95	7.09
T ₂ Foliar spray of 2.0% panchagavya at 10 days interval (6 sprays)	5.54	58.1	8.21
T ₃ Foliar spray of 2.5% panchagavya at 10 days interval (6 sprays)	6.87	64.86	9.64
T ₄ Foliar spray of 3.0% panchagavya at 10 days interval(6 sprays)	7.13	71.2	10.49
T ₅ Foliar spray of 2.0% panchagavya at 15 days interval(4 sprays)	6.1	56.07	7.71
T ₆ Foliar spray of 2.5% panchagavya at 15 days interval(4 sprays)	6.53	65.27	8.88
T ₇ Foliar spray of 3.0% panchagavya at 15 days interval (4 sprays)	6.92	68.1	10.28
T ₈ Foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval (6 sprays)	7.22	84.26	11.35
T ₉ Foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval(4 sprays)	7.63	76.13	10.67
SEM	0.22	1.44	0.12
C.D. (0.05%)	0.67	4.33	0.35

was varied from 4.82 to 7.63. The highest number of fruits per plant was noticed in T₉ (7.63) which was at par with T₈ (7.22). The accumulation of cytokinin and auxin in their auxiliary buds have favoured the plants to produce more number of fruits per plant [6], [10]. The fresh weight of the fruit, the most important determinant of yield in capsicum was influenced by application of panchagavya and neem oil. The increase in fresh weight may be due to better efficiency of chlorophyll pigment, producing more photosynthates and increased allocation of photosynthates in the economic part in okra [10]. Results of revealed that application of foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval(6 sprays) gives the highest yield per hectare (11.35 t ha⁻¹) which was significantly higher than control and soil applications of panchagavya. This is due to better source-sink relationship better vegetative growth, more number

of flowering, more number of fruits till maturity. This might be due to hormonal effect of Panchagavya increase in photosynthetic activity of plants which causes better source-sink relationship in capsicum and insecticidal properties of neem, which protects the plants from different insect pest which was the ultimate cause of higher yield [2],[4][7],[9].

From Table 3, it was revealed that, the TSS content of capsicum was found to be highest under T₈ which was at par with the treatment T₄ and T₉, but significantly higher than control. The chlorophyll content in the leaves varied greatly and was found to be highest in T₈ (4.15 mg g⁻¹) followed by T₉ (4.08), which was significantly higher than control. It may be due to readily availability of nutrients present in Panchagavya for synthesis of chlorophyll pigment[4]. Ascorbic acid content of the fruit increased in most of the cases due to foliar spray than control and foliar spray of 2.5% panchagavya and neem oil 4ml per

Table 3
Effect of different treatments on quality of the Capsicum

Treatments	TSS	Chlorophyll content	Ascorbic acid content
T ₁ Control (only recommended dose of chemical fertilizer is applied)	5.47	3.54	158.2
T ₂ Foliar spray of 2.0% panchagavya at 10 days interval (6 sprays)	5.67	3.86	163.1
T ₃ Foliar spray of 2.5% panchagavya at 10 days interval (6 sprays)	5.80	3.94	163.4
T ₄ Foliar spray of 3.0% panchagavya at 10 days interval (6 sprays)	6.13	4.05	164.3
T ₅ Foliar spray of 2.0% panchagavya at 15 days interval (4 sprays)	5.53	3.76	160.2
T ₆ Foliar spray of 2.5% panchagavya at 15 days interval (4 sprays)	5.77	3.84	161.3
T ₇ Foliar spray of 3.0% panchagavya at 15 days interval (4 sprays)	5.98	4.05	165.6
T ₈ Foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval (6 sprays)	6.17	4.15	168.3
T ₉ Foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval (4 sprays)	6.03	4.08	166.1
SEM	0.06	0.08	0.82
C.D.(0.05%)	0.17	0.24	2.46

liter alternatively at 10 days interval (6 sprays)(T₈) found to be highest (168.3 mg/100 g) which was at par with the treatment with foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval (4 sprays) [10].

CONCLUSION

From the above experiment T₈ (foliar spray of 2.5% panchagavya and neem oil 4ml per liter alternatively at 10 days interval, 6 sprays) found to be the best treatment followed by T₉ (foliar spray of 2.5% panchagavya and neem oil 4 ml per liter alternatively at 15 days interval, 4 sprays)

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