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Effect of different levels of fertigation and pesticide application on growth and yield of chilli cv. SITARA

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ABSTRACT : The present investigation entitled "effect of different levels of fertigation and pesticide application on growth and yield of chilli cv. SITARA." was carried out during *Rabi* season of the year 2012 on the open field of ASPEE, Agricultural Research and Development Foundation, year-2012, Tansa farm, Maharashtra. The experiment was laid out in Randomized Block Design. The five treatments (Contol, 60% RDF + Indoxacarb @ 30g a.i. /ha, 80% RDF + Indoxacarb @ 40g a.i. /ha, 100% RDF + Indoxacarb @ 50g a.i. /ha and 120% RDF + Indoxacarb @ 60g a.i. /ha) were replicated five times. The plant height at 45 DAT (19.04 cm), 90 DAT (42.26 cm) number of branches per plant at 45 DAT (3.37), 90 DAT (5.36) was found maximum with 120 % RDF + Indoxacarb @ 60g a.i. /ha. The highest number of fruits per plant (66.32), fruit weight/ plant (172.07 g) and yield t ha^{-1} (12.86) was found in treatment T_5 120 % RDF through fertigation. While, lowest number of fruits per plant (50.31), fruit weight / plant (123.07 g) and yield t ha^{-1} (9.07 t ha^{-1}) was found in treatment control. The treatment 120 % RDF through fertigation registered maximum gross return (2,57,200 Rs./ hectare), net return (2,05,107.97 Rs./hectare) and benefit: cost ratio (3.94:1) whereas, control recorded minimum for that. The data clearly revealed that the yield obtained with treatment T_5 (120 % RDF as fertigation) was significantly higher than all other treatments and also for growth parameters.

KEY WORDS : Fertigation, Pesticide application, Growth, Yield, Chilli cv. SITARA

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Chilli is an important commodity used as a vegetable, spice, medicinal herb, and ornamental plant by billions of people every day. It is also used as an ingredient in industrial products. The diversity in its uses, forms and shapes brings complexity into its production and distribution systems. Such diversity makes it difficult to implement a commodity based research and development agenda, especially at the international level, since this would require information on all aspects as the commodity is produced in the farmers' field and moves to the consumers' table. Green chillies are rich in Vitamin A and C, minerals and protein. It is also used medicinally, sauces, chutneys and pickles. It is used with many ingredients for local remedies. In West Indies, it is used to relieve the sinking at the epigastrium felt by drunkards. The pungency is due to the oleoresin 'capsicin' (a volatile alkaloid) contained in the skin and the septa of the fruit. Chilli was known to Indians about 400 years ago, when this crop was first introduced into India by Portuguese, towards the end of the 15th century. Its cultivation became

popular in the 17th century. Chilli is valued for its diverse commercial uses. Only a few perennial chilli varieties characterized by small-sized pods upright fruiting and high pungency are rarely cultivated commercially belong to *C. frutescens*.

The largest producer of chillies in the world is India accounting for 11 lakh tonnes of production annually (Khan and Raj, 2006) followed by China with a production of around 4 lakh tonnes. Mexico and Pakistan produces 3 lakhs tonnes each of chilli every year. India also leads in the context of maximum area covered under chilli cultivation. Total world chilli production in green form is 7 to 8 million tonnes (2 to 3 million tonnes in dry form).

Thus to fulfill the following objectives, this trial was undertaken:

- To study the performance of five different treatments of fertigation on chilli.
- To study the effect of different doses of fertilizer on yield of chilli.
- To demonstrate the effectiveness of improved management practices in chilli cultivation.

RESEARCH PROCEDURE

An experiment was carried out on chilli var. hybrid 'Sitara' at ASPEE Agricultural Research and Development Foundation Farm, Village-Nare, Taluka-Wada, district-Thane during the year 2012-13 in *Rabi* season under Randomized Block Design (RBD) with five replications and five treatments. The treatments include 4 levels of fertilizers application and Indoxacarb 15% SC *viz.*, 60% RDF + Indoxacarb @ 30g a.i. /ha, 80% RDF + Indoxacarb @ 40g a.i. /ha, 100% RDF + Indoxacarb @ 50g a.i. /ha and 120% RDF + Indoxacarb @ 60g a.i. /ha, recommended NPK applied through fertigation and 100 per cent recommended NPK through manual was treated as control (RDF- 37.5:25:50 kg NPK per ha). Healthy and uniform sized, 30 days old seedlings were taken separately from the seed bed and were transplanted in the experimental field on 18 November 2012 minting a spacing of 45 cm and 30 cm between the rows and plants separately. Plot size was 5.4 x 4.4 m. The seedlings were watered after transplanting. The plots were irrigated by using drip irrigation system as per water requirement of the crop. When the seedlings were established, the soil around the base of each seedling was pulverized. Gaps filling, weeding, irrigation and pest management were done as per requirement. Fruits were harvested at 8 days intervals during maturity to ripening stage. Harvesting was started from 23 FEB, 2013 and completed by 23 March 2013. Fertilizers were applied in 6 equal splits at 15 days. Urea and muriate of potash were applied through fertigation and single super phosphate fertilizer was soaked overnight in water and then supernatant liquid was used through fertigation for the chilli. Five randomly selected plants were used recording the data in replication from each treatment. Observations on plant growth parameters *viz.*, plant height and number of branches / plant at 45 and 90 DAT and green chilli yield were recorded. Data were statistically analyzed using appropriate statistical method.

Statistical analysis :

The recorded data were statistically analyzed (ANOVA analysis) using the software WASP, (developed at ICAR Research Complex for Goa, India). Sources of variation were fertilizer treatments. Mean comparisons were performed using LSD test to determine whether the difference between the variables were significant at $P < 0.05$.

RESEARCH ANALYSIS AND REASONING

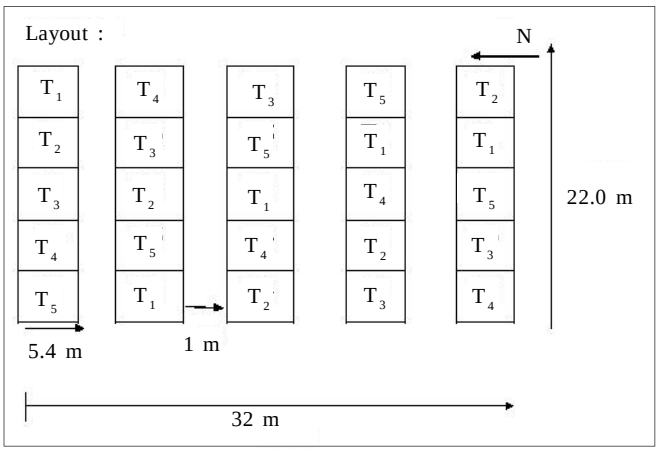
Plant height at 45 DAT of Capsicum was recorded significant variation by increasing different levels of fertilizers (Table 1). The highest plant height at 45 DAT (19.04 cm) was found with 120% RDF + Indoxacarb @ 60g a.i. / ha and the lowest plant height at 45 DAT (15.42 cm) was observed in control treatment. It was that plant height at 45 DAT increased gradually with the increment of fertilizer dose. This could be due to higher availability of N and their uptake that progressively enhanced that plant height at 45 DAT. This result is supported by Aliyu and Yusuf (1991).

Plant height at 90 DAT of capsicum was significantly increased by increasing different levels of fertilizers (Table 1). The highest plant height at 90 DAT (42.26 cm) was found with 120% RDF + Indoxacarb @ 60g a.i./ha and the lowest plant height at 90 DAT (38.07 cm) was observed in control treatment. It was that plant height at 90 DAT increased gradually with the increment of fertilizer dose. This might be due to higher availability of N and their uptake that progressively enhanced that plant height at first flowering. This result is similar with (Pervez *et al.*, 2004).

The number of branches per plant at 45 DAT was

increased significantly with the increase of fertilizer level (Table 1). The maximum number of branches per plant (3.37) at 45 DAT was found with 120% RDF + Indoxacarb @ 60g a.i. /ha and the lowest number of branches per plant (2.5) was found in control treatment. The number of branches per plant at 90 DAT was increased significantly with the increase of fertilizer level (Table 1). The maximum number of branches per plant (5.36) was found with 120% RDF + Indoxacarb @ 60g a.i. /ha and the lowest number of branches per plant (4.07) was found in control treatment. Number of branches per plant increased gradually with the increase of level of fertilizer and pesticide dose. These results are consistent with those reported by Jayakumara *et al.* (2014) and Aladakatti *et al.* (2012) in cotton, Bar-Tal *et al.* (2001) and Akanbi *et al.* (2007) in capsicum.

Number of days to 50 per cent flowering increased significantly with increase of fertilizer level (Table 1). The maximum number of days to 50 per cent flowering (59.20) was found in control treatment and the lowest



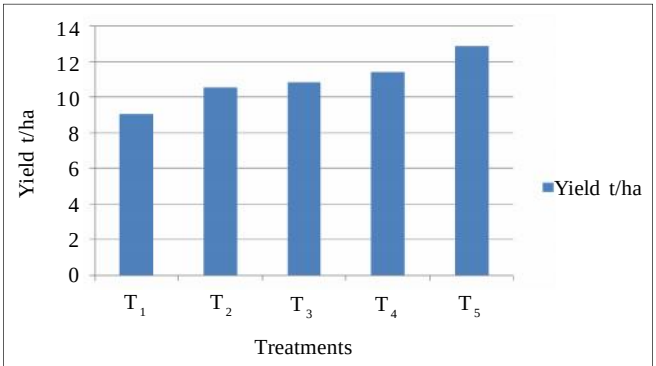


Fig. 1 : Effect of different levels of fertigation and pesticide application on yield of chilli cv. SITARA

Table 1: Effect of different levels of fertigation and pesticide application on chilli cv. SITARA

Treatments	Plant height, (cm)		No. of branches / plant		Days to 50% flowering	No. of fruits per plant	Weight of fruit (g) / plant
	45 DAT	90 DAT	45 DAT	90 DAT			
T_1	15.42	38.07	2.50	4.07	59.20	50.31	123.07
T_2	16.18	39.29	2.81	4.13	57.02	52.51	143.07
T_3	17.70	40.88	2.97	4.87	55.93	55.61	146.73
T_4	17.97	41.79	2.74	4.89	54.39	59.20	152.73
T_5	19.04	42.26	3.37	5.36	53.36	66.32	172.07
S.E.±	0.24	0.36	0.17	0.12	0.89	0.82	1.73
C.D. (P=0.05)	0.77	1.17	0.54	0.38	2.90	2.67	5.63
C.V. %	2.37	2.41	9.96	4.28	2.75	2.50	2.03

Table 2: Effect of different levels of fertigation and pesticide application on growth and yield of chilli cv. SITARA

Treatments	Green yield, (t/ha)	Expenditure, (Rs./ha)	Gross income, (Rs./ha)	Net income, (Rs./ha)	B:C ratio
T_1	9.07	43235.03	181333.33	138098.31	3.19
T_2	10.57	44721.02	211333.33	166612.32	3.73
T_3	10.87	47678.02	217333.33	169655.31	3.56
T_4	11.40	50135.03	228000.00	177864.97	3.55
T_5	12.86	52092.03	257200.00	205107.97	3.94
S.E.±	0.07				
C.D. (P=0.05)	0.22				
CV (%)	1.04				

number of days to 50 per cent flowering (53.36) was found with 120% RDF + Indoxacarb @ 60g a.i. /ha. Early flowering was observed in 120 per cent RDF applied through fertigation.

The number of fruit per plant increased significantly with the increase of fertilizer and pesticide level (Table 1). The highest number of fruits per plant (66.32) was found with 120% RDF + Indoxacarb @ 60g a.i. /ha and the lowest number of fruits per plant (50.31) was found in control treatment. Number of fruits per plant increased gradually with the increase of fertilizer dose. These results are consistent with those reported by Bar-Tal *et al.* (2001); Magdatena (2003) and Akanbi *et al.* (2007).

Fertilizer and pesticide level has significant effect on the average fruit weight / plant, and yield t ha^{-1}. Data presented in Table 1 and 2 showed that the highest fruit weight $plant^{-1}$ (172.07 g) and yield t ha^{-1} (12.86) was observed from 120 % RDF + Indoxacarb @ 60g a.i. /ha, while the lowest fruit weight $plant^{-1}$ (123.07 g) and yield t ha^{-1} (9.07) was belonged to the control treatment. These results are consistent with those reported by Bar-Tal *et al.* (2001); Magdatena (2003); Akanbi *et al.* (2007) and Aujla *et al.* (2007) who also reported that increasing the rate of fertilizer dose increases the average fruit weight $plant^{-1}$, total green yield t ha^{-1}. The trend of obtained results are in found in accordance of previous investigators such as Tei *et al.* (2000); Tumbare and Niikam (2004) and Aminifard *et al.* (2012) reported that increments in the fertilizers increased the total yield and fruit number of pepper.

Economics :

Result regarding in economics *i.e.* total expenditure, total gross income, net return and benefit: cost ratio are presented in Table 2. Result indicated that, among different levels of fertigation, 120 per cent applied RDF through fertigation registered maximum gross return (2,57,200 Rs./ hectare), net return (2,05,107.97 Rs./hectare) and benefit: cost ratio (3.94:1). Minimum gross returns (1,81,333.33 Rs./hectare), net return (1,38,098.31 Rs./hectare) and B:C ratio (3.19:1) was registered in control. Variation in these profit values was due to yield obtained from different levels of fertilizers and Indoxacarb.

Conclusion :

The present investigation "effect of levels of fertigation and pesticide application on chilli cv. SITARA" revealed that the plant height at 45 DAT (19.04 cm), 90 DAT (42.26 cm); number of branches per plant at 45 DAT (3.37), 90 DAT (5.36) was found maximum with 120 % RDF + Indoxacarb @ 60g a.i. /ha. The highest number of fruits per plant (66.32), fruit weight/plant (172.07 g) and yield t ha^{-1} (12.86) was found in treatment T_5 120 % RDF through fertigation. While, lowest number of fruits per plant (50.31), fruit weight / plant (123.07 g) and yield t ha^{-1} (9.07 t ha^{-1}) was found in treatment control. The treatment 120 per cent RDF through fertigation registered maximum gross return (2,57,200 Rs./hectare), net return (2,05,107.97 Rs./hectare) and benefit: cost ratio (3.94:1) whereas, control recorded minimum for that. The data clearly revealed that the yield obtained with treatment T_5 (120 % RDF as fertigation) was significantly higher than all other treatments and also for growth parameters.

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