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Effect of different organic and inorganic fertilizers on growth and yield of cucumber (*Cucumis sativus* L.) in lateritic soil of Konkan (M.S.)

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Abstract

A field experiment entitled "Effect of different organic and inorganic fertilizers on yield, nutrient content and quality of cucumber (*Cucumis sativus* L.)" laid out in Randomized Block Design comprising thirteen treatment combinations replicated thrice and observations of three stages of growth period viz at 30 DAS, 60 DAS and after harvest, at Department of Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.) during *kharif* season of 2015. The effect of different inorganic fertilizers and organic manures like FYM, vermicompost and poultry manure either alone or in combinations on growth and yield attributing characters, yield of cucumber were studied.

The application of 50% RDF through inorganic plus 50% RDN through poultry manure (T₉) shown its significance on the growth and fruit yield response indicatives its suitability for cucumber cultivation in lateritic soil of Konkan (M.S.).

Keywords: konkan, cucumber, organic, inorganic

Introduction

Cucumber is one of the most important vegetable crop. It has high place in diet. It is a rich source of carbohydrate, vitamins and minerals. It is one of the fastest growing vegetable crop. Tender fruits before maturity are used as salad, pickles as well as cooked vegetable. The cultivation of cucumber in India was practiced before 3000 years (De Candolle, 1882). India is the second largest producer of vegetables in the world, next to China. India producing about 678.15 million tonnes of cucumber from an area of around 43.28 million hectares (Anonymous, 2014) [2]. It fetches premium price in summer season. Cucumber is in demand throughout year and cultivated in open field, raise bed, polyhouse and under shade net. Cucumber can be grown in a wide range of soil i.e., clay to sandy loam. The soil pH between 5.5 to 6.7 is considered as suitable for cucumber.

Cucumber requires heavy supply of plant nutrients especially N, P and K fertilizers for ensuring good plant growth and giving higher yield. The fertilizers are powerful crop management tools and can make effective contribution to crop production only, when all other production factors are in reasonable balance and receive appropriate attention. Number of investigators has shown that there is a definite and nearly constant requirement of NPK for production of high yielding varieties of cucumber.

Intensive use of only chemical fertilizers to achieve high production has created various problems. Continuous application of heavy doses of chemical fertilizers without organic manures has led to deterioration of soil health in terms of physical and chemical properties of soil, decrease in soil microbial activities, and also reduction in soil humus (Anjanappa *et al.*, 2011) [1]. Intensive cultivation and improper fertilizer use leads to deficiency of nutrients, thus resulting in lower yield of crops. Therefore, the use of farm input in the form of organic manure has become necessary. Number of investigations were undertaken to study the effect of different chemical fertilizers on cucumber in different soils; on the other hand, the use of organic nutrient sources such as FYM, poultry manures, vermicompost *etc.* remains as alternative choice for the production of residue free wholesome produce, and to maintain soil health. The information on holistic approach with suitable combination of organic manure and inorganic fertilizers on growth and yield and quality of cucumber in lateritic soil of Konkan region is very meager.

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Keeping in view the above facts, the present investigation was undertaken entitled, "Effect of different organic and inorganic fertilizers on growth and yield of cucumber (*Cucumis sativus* L.) in lateritic soil of Konkan (M.S.)."

Materials and Methods

The experiment was conducted at Department of Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri during *kharif* season of 2015. The effect of different inorganic fertilizers and organic manures *viz* FYM, vermicompost and poultry manure either alone or in combinations on growth and yield attributing characters, yield of cucumber were studied. The experiment was laid out in Randomized Block Design (RBD) with thirteen treatments replicated thrice. The treatments comprised of four sources of nitrogen *viz.*, urea, FYM, Vermicompost and Poultry manure.

The experimental field soil was sandy clay loam in texture, slightly acidic in reaction and having low electrical conductivity, very high in organic carbon, low in available nitrogen, very low in available phosphorus and moderately high in available potassium. In general, soil properties of experimental site showed a typical lateritic soil of Konkan region. Well decomposed FYM, Vermicompost and Poultry manure was applied 15 days before sowing as a broadcast in single dose as per the treatment plan. Nitrogen @ 135 kg ha⁻¹ was applied in three splits doses *viz.*, first dose of 50 per cent N at the time of sowing, second dose of 30 per cent N after 30 days of sowing and remaining 20 per cent dose of N after 60 days of sowing. Phosphorus was applied @ 60 kg ha⁻¹ and Potassium was applied @ 30 kg ha⁻¹. These fertilizers were applied in a single dose at the time of sowing as per treatment plan. The cucumber crop cv. Sheetal was sown at a spacing 0.6 m x 4.0 m. The plot size was 4.0 x 3.0 m. Weeding and plant protection measure were followed as and when needed. Observations were recorded at different stages of growth periods *viz* at 30 DAS, 60 DAS and after harvest. The data were statistically analyzed by the method suggested by Panse and Sukhatme (1985) [6].

Results and Discussion

In the present investigation an attempt has been made to study the effect of different organic and inorganic fertilizers on growth and yield of cucumber (*Cucumis sativus* L.) in lateritic soil of Konkan. The results obtained are presented in relevant Tables as follow

A) Effect of different organic and inorganic fertilizers on vine length of cucumber (m)

The data presented (Table.1) on vine length of crop when studied revealed that the length of cucumber vine increased gradually from sowing to harvest of the cucumber crop. At 30 DAS, 60 DAS and after harvest vine length ranged from 0.50 to 1.68 m, 1.50 to 4.71m and 2.21 to 5.66 m with an average value of 1.37, 4.07 m and 4.95 m, respectively.

Application of 50% RDF through inorganic plus 50% RDN through poultry manure treatment (T₉) recorded significantly the highest vine length of cucumber i.e. 1.68 m, 4.71 m and 5.66 m over rest of all the treatments at 30 DAS, 60 DAS and after harvest, respectively. It might be due to the slow release of nutrients through the poultry manure for longer period. Further, due to the application of urea in split doses might

have helped to the requirement of the crop which resulted into the increase in the length of the vine. Similar findings were also reported by Kameswari *et al.* (2011) [4].

B) Effect of different organic and inorganic fertilizers on Yield attributing characters and yield of cucumber (kg ha⁻¹):

• Number of fruits per vine of cucumber

The data presented on number of fruits per vine of cucumber presented in Table 1. When studied revealed that the number of fruits per vine varied from 5.47 to 9.20 kg ha⁻¹ with an average value of 8.36 kg ha⁻¹.

A critical look on data further revealed that treatment (T₉) receiving equal integration of RDF through inorganic + RDN through poultry manure recorded the highest number of fruits per vine (9.20), but this treatment was found to be statistically at par with almost all remaining treatments except (T₁) and (T₃). Length of vine was found to be decreasing in the treatment (T₁) and (T₃) as compared to other treatments. The number of fruits per vine is closely associated with growth parameters like length of vine etc., which can be attributed to the nutrient availability and its uptake; this might have favorable effect in increasing, the chlorophyll content in leaves resulting in better synthesis of carbohydrates and buildup of more new cells which might have increased the number of fruits per plant (Maynard 1962) [5].

• Weight of cucumber fruits per plot:

It was observed that weight of fruit ranged from 12.37 to 19.81 kg per plot with mean value of 17.19 kg per plot. The data further revealed that treatment (T₉) receiving equal integration of RDF through inorganic + RDN through poultry manure was found to be significantly superior (19.81 kg per plot) over the treatments T₃, T₅, T₈ and T₁₁; however, it was at par with T₂, T₄, T₆, T₇, T₁₀, T₁₂ and T₁₃.

• Yield (kg per ha)

The effect of different organic and inorganic fertilizer showed a significant effect on the yield of cucumber fruits. The fruit yield of cucumber ranged from 10309 to 16512 kg ha⁻¹ with an average value of 14323 kg ha⁻¹ (Table 4.2 and Fig. 4.2). The treatment (T₉) receiving equal integration of RDF through inorganic + RDN through poultry manure recorded the significantly highest yield of cucumber (16512 kg ha⁻¹), but at par with T₂ (15649 kg ha⁻¹), T₆ (14274 kg ha⁻¹), T₇ (14697 kg ha⁻¹), T₈ (15510 kg ha⁻¹), T₁₁ (15134 kg ha⁻¹), T₁₂ (14704 kg ha⁻¹) and T₁₃ (15320 kg ha⁻¹). The remaining treatments, treatment T₂, T₃, T₄ and T₁₀ were statistically at par with each other.

It was observed that the treatment T₉ receiving 50% RDF through inorganic plus 50% RDN through poultry manure recorded significantly highest number of fruits, weight of fruits per plot and fruit yield of cucumber over rest of all the treatments. This may be due to the presence of more per cent of N in poultry manure than the other two organic manures used i.e. FYM and vermicompost. Kameswari *et al.* (2011) [4] and Dodake (2015) [3] also reported the highest fruit yield with 50% RDF plus 50% poultry manure in ridge gourd and bitter melon, respectively.

Table 1: Effect of different organic and inorganic fertilizers on Yield attributing characters and yield of cucumber (kg ha⁻¹)

Tr. No.	Treatment	Vine length (m)			No of fruit per vine ⁻¹	Weight of fruit per plot (kg)	Yield (kg ha ⁻¹)
		30 DAS	60 DAS	At Harvest			
T ₁	Absolute control	0.50	1.58	2.21	5.47	12.37	10309
T ₂	RDF (135:60:30) through inorganic fertilizers	1.66	4.42	5.05	9.13	18.78	15649
T ₃	50% RDF through inorganic + 50% RDF through FYM	1.36	4.05	4.95	7.07	16.84	14029
T ₄	80% RDF through inorganic fertilizers	1.58	4.49	5.04	8.33	18.61	13860
T ₅	80% RDN through FYM	1.65	4.31	5.24	8.90	16.63	12258
T ₆	Vermicompost (VC) @11 t ha ⁻¹	1.28	3.95	5.33	8.58	17.13	14274
T ₇	Poultry manure (PM) @4.5 t ha ⁻¹	1.54	4.68	5.19	9.07	17.64	14697
T ₈	50% RDF through inorganic + 50% RDN through vermicompost	0.93	3.81	4.68	8.47	16.73	15510
T ₉	50 % RDF through inorganic + 50 % RDN through poultry manure	1.68	4.71	5.66	9.20	19.81	16512
T ₁₀	50% RDN through FYM + 50% RDN through vermicompost	1.38	4.49	5.18	8.80	17.64	13943
T ₁₁	50% RDN through FYM + 50% RDN through poultry manure	1.04	3.87	5.25	8.47	14.71	14704
T ₁₂	80% RDN through vermicompost (VC)	1.53	4.19	5.13	8.20	18.16	15134
T ₁₃	80% RDN through poultry manure (PM)	1.62	4.33	5.48	9.03	18.38	15320
	mean	1.37	4.07	4.95	8.36	17.19	14323
	S.E. ±	0.08	0.17	0.21	0.57	0.98	813.26
	C.D. (P=0.05)	0.24	0.51	0.61	1.68	2.85	2373.73

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