ARYAVART SHODH VIKAS PATRIKA
RNI TITLED NO. UPBBIL04292
RNI REG. NO. UPBBIL/2014/66218 PP. NO.- 279-282
ISSN NO.-2347-2944
Vol.-9, No.-II, Issues-10 YEAR- Dec -2018

Integrated Nutrient Management For Growth Attributes, Production and Soil Characteristics of Cucumber (Cucumis sativa L.)

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Received- 02.11.2018, Revised- 10.11.2018, Accepted- 15.11.2018 **E-mail: drsanjaysoil@gmail.com**

Abstract: ***Afield experiment were conducted Agricultural Research farm Baba Raghav Das Post Graduate College Deoria, in kharif season 2016 and 2017 to study the influence of integrated nutrient management on growth, yield and soil characreristics of cucumber on sandy loam soil.The experiment were laid out in Randomized block design with twelve treatments and three replications.Results reveals that incorporation of different levels of inorganic fertilizer and vermicompost either alone or combination significantly increased growth attributes yield and soil fertility of cucumber campared to control plots.The maximum total number of leaves(104),number of branches per vine(13) vine length (130 cm) first fruit initiation (52 days) and yield 23.42 q ha-1 were recorded with the integrated use of T9 (50%RDF + vermicompost 12.5 t ha-1) followed T10 50%RDF + vermicompost 10 t ha-1) and T11 (50% RDF + vermicompost 7.5 t ha-1). The organic carbon, N P and K were higher observed in T9 followed by T10 and T11. Thw soil pH were slightly decrease and EC were slightly increased due to vermicompost organic manures applied plots. The organic manures as a sources of microbial food for their activity which takes place mineralization of oarganic to inorganic nutrients to available NPK build up in soil.***

Key Words: experiment, Agricultural, Research, influence, integrated, nutrient, management, growth.

Cucumber (Cucumis sativa) was domesticated about 3000 year ago and its indigenous to India. It is cultivated for fresh consumption as pickling cucumber for preservation marinated with vinegar, salt or other spices.Fruit varying in shape, size and colour contain 0.4% protein , 2.5% carbohydrates, 0.1% fat, mg vitamin , 25 mg P, 10 mg Ca and 1.5 mg Fe per 100 gram edible portion.Cucumber is the second most widely grown cultivated cucurbit the world after watermelon. Immature fruit are universally used as salad and curd for the preparation of "Ryata".The fruits and seed have cooling effect and prevent constipation.Fruit are good foe people suffering from constipation, Jaundice and indigestion. Fruit contain ascorbic acid oxidase, succinic acid and malic dehydrogenases. Seed oil is also used as antipyretic.The used chemical fertilizers has led to increase in crop production but deteriorated ecosystem. The increased prices of chemical fertilizers and its harmful impact on the soil environment and human health urged the farmer to adopt alternative sources of nutrients for crop production . Therefore to reduce dependency on chemical fertilizers and conserving the natural resources with sustainable crop production are vital issue present time which is only possible through integrated plant nutrient supply systems. The incorporation of organic manure along with chemical fertilizers improve physical, chemical and biological properties of soil (Banerjee et. al. 2016). The role of organic manures and chemical fertilizer used integrated nutrient management systems in sustaining crop production and improving environment quality. Used chemical fertilizer alone may not keep pace with time in maintenance of soil health for sustaining crop productivity (Sanjay Kumar et. al. 2015).The view of the above present investigation was conducted to study the effect of organic manures and inorganic fertilizer on growth attributes, yield and soil characteristics.

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ISSN NO.-2347-2944
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Materials and Methods- The field experiments were conducted during 2016 and 2017 for two consecutive years on the sandy loam soil at agricultural research farm B R D P G College Deoria affiliated to Deen Dayal aupadhyaya Gorakhpur University Gorakhpur (UP).The initial chemical properties of soil are given in Table-1.The experiment were laid out in Radamized Block design with twelve treatments and three replication consisted of T1- Control T2 -100% RDF (100:60:60 kg NPK ha-1) T3- 75% RDF T4- 50% RDF T5-Vermicompost 12.5 t ha-1 T6- Vermicompost 10 t ha-1 T7 - Vermicompost 7.5 t ha-1 T8 - Vermicompost 5 t ha-1 T9 50% RDF + Vermicompost 12.5 t ha-1 T 10 - 50 %RDF + Vermicompost 10 t ha-1 T11 - 50 % RDF + Vermicompost 7.5 t ha-1 T12 - 50 % RDF + Vermicompost 5 t ha-1.The seedling of cucumber were transplanted at 90 cm spacing and 2.5 m x 1.8 m plot size was maintained. N P and K were applied through urea , single super phasphate and muriate of patash respectively. Full dose of P and K and half dose of N were applied at the of transplanting and remaining ¼ dose of n was given at 30 DAT and ¼ were applied at flowering stage. Vermicompost were applied as per treatment in respective plot 7 days prior to transplanting. Standard method and procedures were followed for analysis of soil. Such as pH and EC (electrical conductivity) in 1:2.5 soil and distilled water suspension with the help of pH and EC meter (Jackson 1973). Organic carbon in soil sample by wet chromic acid digestion method (Walkely and Black 1934). Available N P and K in soil by alkaline permagnet method Subbiah and Asiza 1956 Olsen's method (Olsen et. al. 1954) neutral normal ammonium acetate extract method (Jackson 1973) respectively. The pooled data of two year observations has been summarized and discussed here.

Result and discussion-

Growth attributes and yields- The pertaining to cucumber growth attributes and yield (Table-2) reveals that maximum growth attributes like total number of leaves (104cm), number of branches vine-1 13 vine length (130cm) days of first fruit initiation (52) and number of fruit vine-1 (9.5) were recorded in T9 (50% RDF + Vermicompost 12.5 t ha-1) followed by T10 (50%RDF + Vermicompost + 10 t ha-1) and T11(50%RDF + vermicompost 7.5 t ha-1). Minimum growth attributes and yield of cucumber were recorded in control plots.The additional supply of vermicompost in integrated management improved physical properties of soil and available N P K buildup in soil and well develop root system resulting in better absorption of nutrients and water due to which vine length might have increased. The increased in vine length might be due to the role of N mineralization might have release nutrients of faster rate resulting into higher growth attributes of cucumber. The maximum growth attributes result in higher yield of cucumber due to significant improvement in moist soil NH4-N and NO3-N and oxidized soil NO3 N at different growth stage of cucumber. The increased in vine length might due to the role of N in promoting vegetative growth and enhancing cell division and elongation as well as greater chlorophyll synthesis P is easily mobilized in the plant and translocated into the meristemic zone and increase the activity of leaf formation and development in cucumber and K activity many enzymes involved in respiration and photosynthesis. The highest cucumber yield were recorded in T9 followed by T10 and T11 Minimum yield was recorded in control plots. The addition of vermicompost and inorganic fertilizer under integrated nutrients management might have improved the physical, chemical and biological properties of soil which help in better nutrients absorption and utilization by cucumber plants and more translocated to the ariel parts for the synthesis of several compounds resulting better plant growth and thereby increase in number of branches. Number of leaves per plant due to different treatments was significant at different treatments. These results were find a support and reported by Anjanappa et.al. (2012).

Chemical Properties of Soil- After Harvest of Cucumber plants Data in given Table -3 it reveals

that the properties of soil most likely to be affected by organic matter in the form of vermicompost are pH and EC partial pressure of CO2 and surface properties of soil. After harvest of cucumber plants in addition of vermicompost along with fertilizers N induces pH and slightly increased EC of soil as compared to control plots. Slightly decreased in pH were received T9 followed by T10 ,T11 and T12 vermicompost affect soil pH in two ways by producing organic acid and CO2 during decomposition of manures in soil. Generally it is noticed that little or change in EC occurs by applying vermicompost because even with fertilizers (which are soluble salt) the increase in EC has been short lived. Organic carbon increased in soil in dependent several factor like soil and climate affecting microbial activity. Addition of organic matter along with fertilizer to increase organic carbon insoil compare to control plots. This finding are in agreement with reported by Sharma et.al. 2001. The data (Table 3) showed significant increase in available N, P and K due to various treatments over control. Among the treatments the maximum amount of available N,P and K were recorded in T9 followed by T10 and T11 respectively. The lowest amount of available N, P and K was observed in control plots. After harvest of cucumber crop a considerable build up nutrient in soil due to organic manures and inorganic fertilizer combination to significantly increase soil fertility and availability of N, P and K contents in soil compared to control plots. The availability of N, P and K might be attributed to increased microbial activities in root zone which mineralized organic manure and also unavailable form of mineral nutrients in to available form in soil. These results were also conformity with Dutta et. al. (2016).

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Table 1: Physico-chemical properties of experimental soil

Parameters	Values
Bulk density (Mgm-1)	1.5
Textural soil	Sandy loam
pH	7.8
EC(dSm-^{1})	0.25
OC(g kg-^{1})	0.38
Available N (kg ha-^{1})	192.28
Available P (kg ha^{-1})	15.0
Available K (kg ha-^{1})	182.70

ISSN NO.-2347-2944
Vol.-9, No.-II, Issues-10 YEAR- Dec -2018

Table 2:

Influence of integrated nutrient management on growth and yield of cucumber.

Treatment	Total No. of leaves	No. of branches per vine	Vine length (cm)	Days of first fruit initiation	No. of fruit per vine	Yield ($Q\ ha^{-1}$)
T_1	76	6	60	68	6.3	14.12
T_2	93	9	119	65	7.8	20.24
T_3	86	7	110	63	7.2	19.86
T_4	83	7	95	60	7.0	17.54
T_5	87	9	118	63	7.7	19.80
T_6	85	8	111	62	7.3	18.54
T_7	89	8	106	61	7.2	17.76
T_8	80	7	102	60	7.0	16.92
T_9	104	13	130	52	9.5	23.42
T_{10}	98	12	120	55	9.0	21.75
T_{11}	95	10	112	56	8.5	20.54
T_{12}	93	9	106	60	8.1	19.16
SEm±	0.65	0.40	0.72	0.82	0.26	1.02
CD(P=0.05)	1.91	1.14	2.18	2.36	0.74	2.94

Table 3:

Influence of integrated nutrient management on the nutrient contents of soil after harvest of cucumber

Treatments	pH	EC(dSm^{-1})	OC($g\ kg^{-1}$)	N($kg\ ha^{-1}$)	P($kg\ ha^{-1}$)	K($kg\ ha^{-1}$)
T_1	7.7	0.25	0.38	190.24	14.90	180.54
T_2	7.7	0.26	0.39	200.00	16.54	200.54
T_3	7.7	0.26	0.39	197.00	16.30	198.60
T_4	7.7	0.26	0.38	193.00	15.40	197.60
T_5	7.5	0.30	0.45	194.00	15.82	188.60
T_6	7.6	0.29	0.44	193.00	15.60	184.78
T_7	7.6	0.28	0.43	192.00	15.40	183.64
T_8	7.6	0.27	0.42	191.00	15.20	182.54
T_9	7.5	0.29	0.44	215.00	17.54	200.54
T_{10}	7.6	0.28	0.42	213.00	16.82	199.62
T_{11}	7.6	0.28	0.42	210.00	16.60	197.56
T_{12}	7.6	0.27	0.41	206.00	15.40	196.67
SEm±	0.08	0.01	0.12	1.48	0.60	1.52
CD(P=0.05)	NS	0.03	0.32	2.92	1.21	2.81

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