

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

Effect of Integrated Nutrient Management on Growth and Yield of Cucumber

Dr. Rashmi Singh¹, Dr. P.K. Singh², Dr. N.K. Singh³

S.M.S. (Home science), Krishi Vigyan Kendra, Varanasi, India¹

Senior Scientist and Head, Krishi Vigyan Kendra, Varanasi, India²

S.M.S. (Plant Protection), Krishi Vigyan Kendra, Varanasi, India³

ABSTRACT: Cultivated cucumber is botanically known as *Cucumis sativus* L. and is native to India. It has the diploid chromosome number of $2n=14$ and *Cucumis hardwickii* is the probable progenitor of cultivated cucumber, which is small bitter cucumber with sparse and stiff spines and are generally found in abundance in the foothills of Himalayas (Singh, 2013). Cucumber is an annual creeping vine that grows by dint of the supporting frames and wrapping around with its spiralling tendrils. The plants grow to a towering height and leaves are large hairy triangular, ovate or somewhat cordate, 7-20 cm in length. Cucumber is predominantly monoecious which means it bears staminate and pistillate flowers separately on the same vine however the other sex forms like androecious, gynoeceous, hermaphrodite and andromonoecious has also been reported in cucumber. Staminate flower appears a week earlier than the pistillate flower. Flowers are yellow in colour and pollination is mediated by bees and other insects. Female flowers are recognized as it bears swollen ovary (resembles miniature fruit) at the base which will later develop into the edible fruits. Fruit of cucumber is botanically known as pepo. It is elongated and round to triangular in shape and the skin colour may vary from pale green to dark green. The fruit has high water content of about 95%. Many seeds are produced inside the single fruit, which are flat with pointed ends on both the sides, white to pale white in colour, 8-10 mm × 3-5 mm and the test weight of the seed is 20 g

KEYWORDS: integrated, nutrient, management, cucumber, growth, yield, pepo, gourd, *Cucumis sativus* L

I. INTRODUCTION

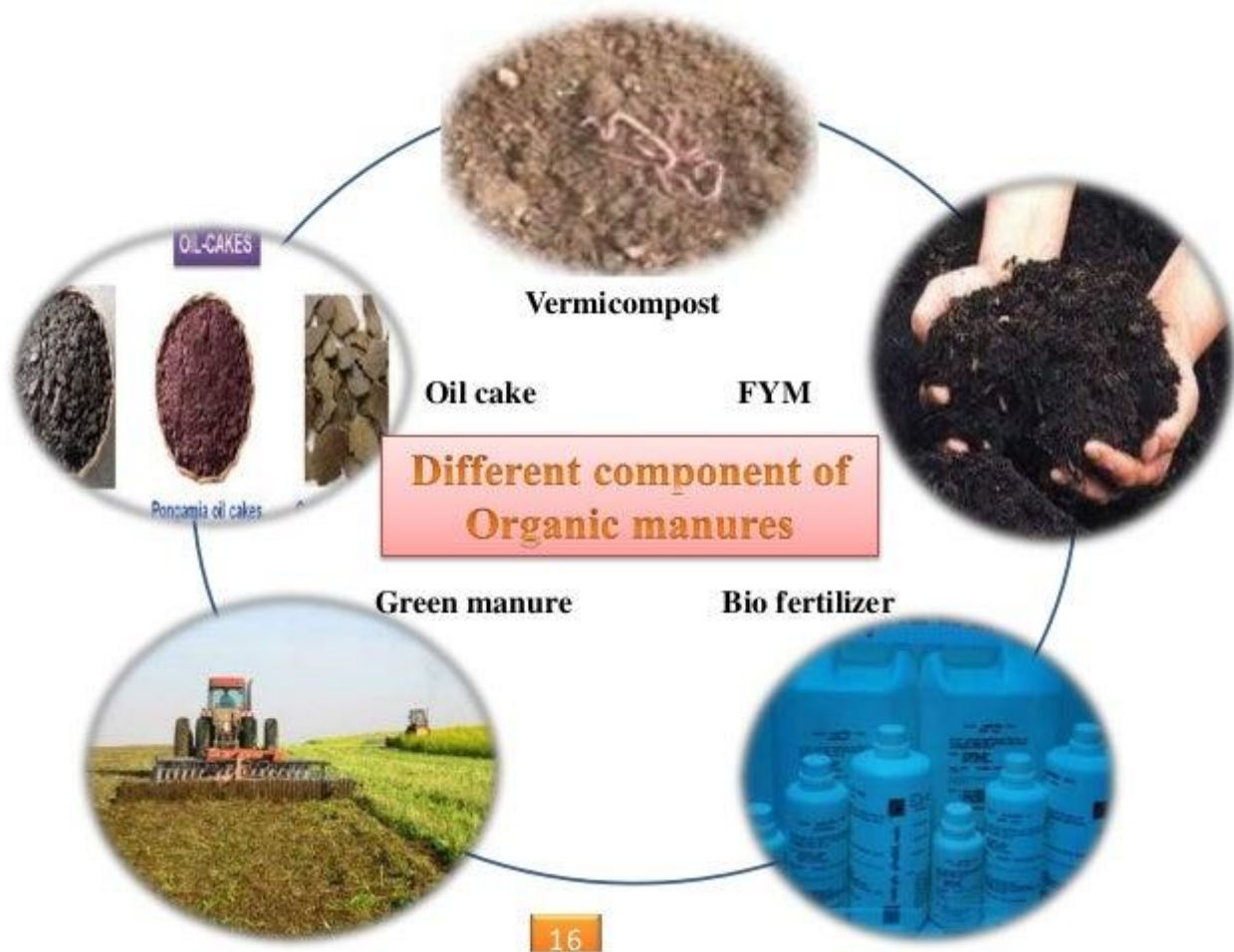
Being one of the popular members of gourd family, it is commercially cultivated for its immature and tender cylindrical fruits. Bitterness at the stem ends of cucumber fruits, usually discarded before eating, is due to the presence of bitter principle known as cucurbitacins which is tetracyclic triterpenes. Hence, metaxenia is a common phenomenon observed in cucumber and bitter gourd which is due to the presence of bitter pollen grains which fertilizes non bitter or normal ovule ultimately resulting in development of bitter fruits [3] Cucumber is widely grown for salad purpose and due to the realization of their importance in our daily diet the demand has been increasing presently. Edible portion of cucumber is enriched with 0.4% protein, 2.5% carbohydrates, 0.1% fat, 7.0 mg vitamin C, 25 mg phosphorus, 124 mg of potassium, 10 mg calcium and 1.5 mg iron per 100 g edible fruit. [1] Cucumber fruits have diuretic property, due to the high water content of about 95% which helps to keep the body hydrated and helps in eliminating all the toxins present in the body. It is used as a remedy for preventing constipation, jaundice and indigestion [4]

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018



16

Being a thermophilic crop, cucumber requires a warm climatic condition with abundant sunlight. They are highly susceptible to low temperature and require frost free environmental condition for their cultivation. Hence, their cultivation is restricted during winter season as they require high temperature (usually about 28- 30°Celsius) for their growth and development. However, the cultivation of cucumber can be made feasible during winter season under the protected condition. Protected cultivation of vegetable has emerged as an alternate production technology to overcome several biotic and abiotic stresses and to break the seasonal barrier to production.[2] It gives a boost to the nutrient and irrigation use efficiency along with the proper utilization of natural resources. This technology is being employed popularly for the year round and off season production of high value commercial crops like capsicum, tomato and cucumber. Success in the cultivation of cucumber under polyhouse condition during the off season can be achieved by the use of suitable cucumber hybrid like parthenocarpic variety or gynocious hybrid along with adequate incorporation of nutrient which becomes indispensable for the growth and development. An adequate supply of nutrient is another important factor for increasing the crop productivity in high value crop like cucumber. Presently, INM (integrated nutrient management) is gaining more importance as it ensures scientific management of soil health for optimum growth, yield and quality of crops in a sustainable manner. Excessive application of chemical fertilizer alone has adverse impact on the environment as it causes deterioration of soil health and the consumption of these inorganic products may jeopardize our health. Organic manures on the other hand are bulky in nature and has less analytical value due to its low nutrient content.[5,6]

International Journal of Innovative Research in Science, Engineering and Technology

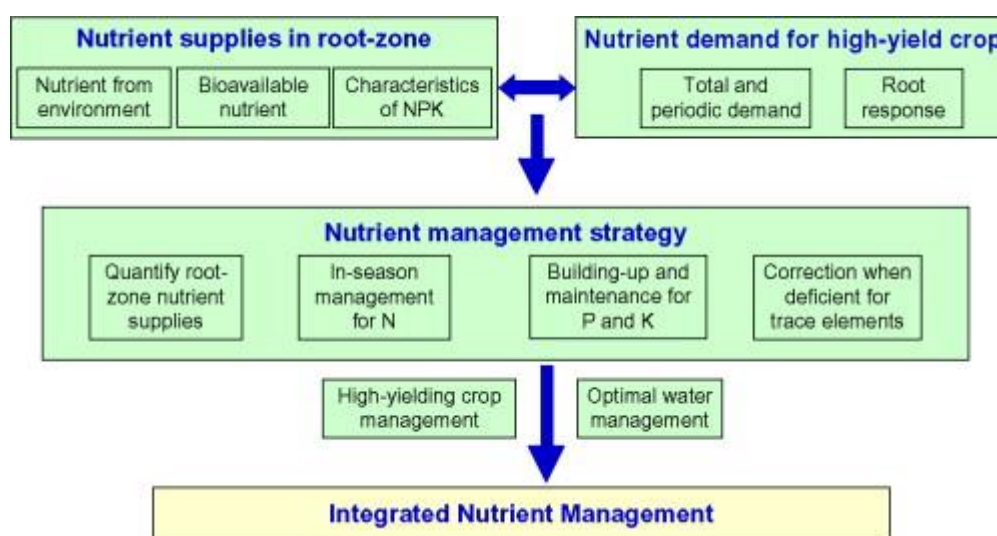
(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

II. DISCUSSION

In cucumber the fruit yield is related with the duration of fruiting season hence days to last harvest will be a positive character to increase fruit yield.



The present study indicated that either application of organic, inorganic and biofertilizer either alone or in combination enhance fruiting season than absolute control. Integrated application of 50% recommended NPK + FYM @ 10 t ha⁻¹ + vermicompost 2 t ha⁻¹ + biofertilizer (T11) recorded significant highest fruit length (19.79 cm), girth (15.13 cm), average fruit weight (194.13 g) and number of fruits vine-1 (11.07) than rest of other nutrient treatments. However, statistical parity was observed with module received recommended NPK + FYM @ 10 t ha⁻¹ + biofertilizer (T9) 19.31 cm for fruit length only. On the other hand, significantly reduced fruit yield (53.70 q ha⁻¹) which was contributed by significantly lowest vine length (550.67 cm), fruit girth (10.57 cm), average fruit weight (92.00 g) and number of fruits vine-1 (4.20) was recorded in absolute control. The similar effect of integrated approach of organic, inorganic and biofertilizer on fruit yield attributes in cucumber was reported by several scientists [7,8] in cucumber. Total fruit yield of cucumber varied significantly ranging from 53.70 q ha⁻¹ (absolute control, T12) to 214.05 q ha⁻¹ (50% recommended NPK+ FYM @ 10 t ha⁻¹ + vermicompost 2 t ha⁻¹ + biofertilizer, T11). However, significantly highest fruit yield of 214.05 q ha⁻¹ was recorded with integrated application of 50% recommended NPK + FYM @ 10 t ha⁻¹ + Vermicompost 2 t ha⁻¹ + biofertilizer (T11). Increased yield was also related with balanced nutrition, better uptake of nutrients by plants which helps in better fruit length, girth, weight of fruits. This might be due to significantly highest vine length, number of primary branches, days to last harvest, fruit length, fruit girth, average weight of fruits vine-1 and lowest sex ratio. The next best treatment was Recommended NPK + FYM @ 10 t ha⁻¹ + biofertilizer with fruit yield 183.05 q ha⁻¹ which might be due to better vegetative growth and yield attributing parameters. The above findings are in accordance with in cucumber. The results obtained from the study showed that integrated application of organic, inorganic and biofertilizer applied to cucumber was more effective for obtaining better vegetative growth, fruit yield attributing parameters and fruit yield. Thus, it may be concluded that integrated application of 50% RDF + FYM @ 10 t ha⁻¹ + vermicompost @ 2 t ha⁻¹ + biofertilizer not only increases vegetative growth but also fruit yield in cucumber.[9,10]

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

III. RESULTS

The value of a crop is not only assessed by its yield but also by the quality of the produce. The quality of cucumber fruit is often determined on the basis of ascorbic acid and TSS content. Though these characters are generally considered as varietal, however, it has also been observed that it is influenced by the nutrient management.



Ascorbic acid content of fruit was found to be significantly different among all the treatments. Maximum ascorbic acid content (9.40 mg 100g⁻¹) was observed with 50% NPK + 5 t vermicompost + biofertilizers followed 50% NPK + 7.5 t pig manure + biofertilizers with 9.20 mg 100g⁻¹. [11,12] The treatment T11 (50% NPK + 5 t vermicompost + biofertilizers) proved significantly superior to other treatments. However, the minimum ascorbic acid content (6.80 mg 100g⁻¹) was recorded in control. This might be due to the more availability of micronutrient like B, Cu, Mn, Zn etc. with the application of vermicompost in INM which might have increased ascorbic acid content of fruit. It is evident from the table 1 that various treatments had positive impact on the TSS content of fruit. The application of 50% NPK + 5 t vermicompost + biofertilizers (T11) recorded the maximum TSS content of fruit (3.56 oBrix) which was followed by treatment T10 (50% NPK + 7.5 t pig manure + biofertilizers) with the value of 3.34 oBrix. The treatment T11 (50% NPK + 5 t vermicompost + biofertilizers) was significantly superior over other treatments. The lowest TSS content of fruit (2.33 oBrix) was observed in T1 (control). The combined application of vermicompost, inorganic manures and biofertilizers might have led to balance C:N ratio which resulted in satisfactory nutrient availability and increased plant metabolism, which ultimately lead to increased carbohydrate accumulation in fruit as a result TSS increased. These results are in accordance with the findings of Triveni et al., (2015) in bitter gourd and Das et al., (2015) in bottle gourd they reported maximum content of ascorbic acid and TSS content was recorded with the integrated application of 50% NPK + 50% vermicompost + biofertilizers. [13,14]

IV. CONCLUSION

Yield of cucurbits is function of vine length, earliness with respect to female flowers, number of nodes, internodal length, number of female flowers, fruit set, fruit development, etc. These all attributes depend on nutrient level of soil and plants.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018



Cucumber farming

A number of authors have worked on improvement of yield in cucurbits through nutrient application. Prabhu et al. (2006) reported highest numbers of fruits, fruit size and weight through INM practices comprising organic, inorganic and biofertilizer inputs. Application of biofertilizers along with organic and inorganic inputs under protected conditions resulted highest fruit yield per vine and total fruit yield (quintal) per hectare when 75% RDF + 75% FYM+ *Azotobacter* + Phosphobacteria + *Trichoderma* was applied [15,16] The treatment is equal amount of N+ Organic sources + *Azotobacter* and PSB gave maximum primary branch count, fruit count, average fruit weight, fruit size in bottle gourd. By application of 75 % RDF of NPK along with rice straw, compost, humic acid and effective microorganism increased dry matter content, length of stem, leaf count, fruit count, weight of seed per fruit and seed index. The maximum growth, yield and yield attributes with good quality cucumber due to incorporation of 2 tons of vermicompost + 50% recommended dose of fertilizers + bio-fertilizers (5 kg *Azotobacter* and 5 kg phosphate solubilizing bacteria) per hectare.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018



Mohan et al. (2016) revealed that 60 per cent each of RDF and vermicompost along with *Azotobacter*, *Trichoderma* and PSB were found to be superior among all the combinations of organic, inorganic and bio-fertilizer sources of nutrients for characters, namely minimum number of days to 50 per cent flowering, average fruit length, fruit weight, edible fruit count and maximum edible fruit yield per hectare in cucumber cv. Swarna Ageti under polyhouse conditions.[17,18] The effect of cow-urine and bio-fertilizers at varying levels of drip irrigation on various parameters of cucumber in a naturally ventilated polyhouse during summer season and revealed that combined application of bio-fertilizers and fertilizers has positive effect on yield, growth and quality parameter due to addition of nutrients and saving of at least 50% of water and hence can be exploited as sustainable practices under INM. Dash et al. (2018) has also reported the greatest impact on fruit weight in cucumber due to application of INM [half recommended NPK + 10 tons of FYM + 2 tons of Vermicompost + Bio-fertilizer (4.0 kg *Azotobacter*+ 4.0 kg PSB)] per hectare[19]

V. FUTURE SCOPE

Biofertilizers and organic matters play critical role in chelation and absorption of micronutrients which contributes to a number of biochemical processes and so synthesis of many vitamins and bioactive substances. These chemicals improve quality of fruits in cucurbits. Further role of biofertilizers against diseases and pests is well established fact which prevents the qualitative deterioration in fruits. A study reported that quality character like Total Soluble Solid (TSS) was increased by application of biofertilizers. It was recommended that application of 75% RDF as N and P in comparison to biofertilizers (Nitroben and phosphorien) significantly increased the Vitamin C content and TSS content of fruit.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

सॉवरीया
विनय सागर

Cucumber - Khira Nazia East West



- Plant : Medium
- VigourFruit : Dark
- Green color, 18 - 20 cm
- longHarvesting : 40 days after sowingGood yield,
- Uniform shiny fruits

www.sawariyaagritech.com
Call Now +91-8989220031

It is reported that Vitamin C content & TSS content increased by application of 50% NPK + 5 ton per Vermicompost and biofertilizers. The application of biofertilizers like *Azospirillum* and Phosphobacteria, inorganic fertilizers has significant and vital effect on growth parameters of cucurbits. In light of the reviews from different scientist, biofertilizers are effective alternatives as a source of macro and micronutrients and have a potential to improve the growth parameters.[20]

REFERENCES

- 1) Alekar, A.N., P.S. Hirve, G.N. Deshmukh and R.P. Kharde (2015). Study the effect of integrated nutrient management on yield and nutrient uptake in pumpkin. *Journal of Horticulture*, 2: 136.
- 2) Anjanappa, M., J. Venkatesh and B.S. Kumara (2012). Influence of organic, inorganic and bio-fertilizers on flowering, yield and yield attributes of cucumber (cv. Hassan Local) in open field condition. *Karnataka J. Agric. Sci.*, 25(4):493- 497.
- 3) Arshad, I., W. Ali and Z.A. Khan (2014). Effect of different levels of NPK fertilizers on the growth and yield of greenhouse cucumber (*Cucumis sativus* L.) by using drip irrigation technology. *International Journal of Research*, 1(8): 650-660.
- 4) Bacha, M.R., S.A. Hussain, A. Rab and D. Wadan (2005). Effect of phosphorus levels and sowing dates on the growth and production of bitter gourd. *Sarhad Journal Agriculture*, 21(4): 591-594.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 1, January 2018

- 5) Bindiya, Y., I.P. Reddy, D. Srihari, R.S. Reddy and M. Narayanamma (2006). Effect of different sources of nutrition on soil health, bacterial population and yield of cucumber. *Journal of Research*, 34: 12-17.
- 6) Bindiya, Y., R.I. Prabhakar and D. Srihari (2016). Response of cucumber to combined application of organic manures, bio-fertilizers and chemical fertilizers. *Vegetable Science*, 41(1): 12-15.
- 7) Das, R., A.R. Mandal, S.P. Das and J. Kabiraj (2015). Evaluation of integrated nutrient management on the performance of bottle gourd [*Lagenariasiceraria* (Molina) Standl.]. *Journal of Applied and Natural Science*, 7(1): 18-25.
- 8) Dash, S.K., G.S. Sahu, S. Das, S. Sarkar, L. Tripathy, S.R. Pradhan and A. Patnaik (2018). Yield Improvement in Cucumber through Integrated Nutrient Management practices in Coastal Plain Zone of Odisha, India. *Int. J. Curr. Microbiol. App. Sci.*, 7(2): 2480-2488.
- 9) Eifediyi, E.K. and S.U. Remison (2010a). Effect of time of planting on the growth and yield of five varieties of cucumber (*Cucumis sativus* L.). *Report and Opinion*, 1(5): 81-90.
- 10) Eifediyi, E.K. and U.R. Samaon (2010b). Effect of inorganic fertilizer on the yield of two varieties of cucumber (*Cucumis sativus* L.). *Report and Opinion*, 5: 74-79.
- 11) Ghasem, S., A.S. Morteza and T. Maryam (2014). Effect of organic fertilizers on cucumber (*Cucumis sativus* L.) yield. *International Journal of Agriculture and Crop Science*, 7(11): 808.
- 12) Ibrahim, E.A. and A.E.A. El-Kader (2015). Effect of soil amendments on growth, seed yield and NPK content of bottle guard (*Lagenariasiceraria* L.) grown in clayey soil. *International Journal of Soil Science*, 10(4): 186-94.
- 13) Lallawmkima, I., S.K. Singh and M. Sharma (2018). Economics of Bio-fertilizer based Potato Cultivation in Subtropical Plains of India. *Journal of Environmental Biology*, 39.
- 14) Isfahani, F.M and H. Besharati (2012). Effect of bio-fertilizers on yield and yield components of cucumber. *Journal of Biology and Earth Sciences*, 2(2): 83- 92.
- 15) Jeffery, C. (1980). A review of cucurbitaceae. *Bot. J. of Linn. Soc.*, 81:233-247. Jilani, M.S., A. Bakar, K.A.
- 16) Waseem and M. Kiran (2009). Effect of different levels of NPK on the growth and yield of cucumber (*Cucumis sativus* L.) under the plastic tunnel. *Journal of Agriculture & Social Science*, 5(3): 99-101.
- 17) Kade, R.A., D. Singh, P. Kumar and S.K. Shroti (2009). Effect of various levels of NPK on core diameter and rind thickness of cucumber cv. Japanese Long Green. *Annals of Horticulture*, 2(2): 251-53.
- 18) Kameswari, P.L., M. Narayanamma, S.R. Ahmed and A. Chaturvedi (2010). Influence of integrated nutrient management in ridge gourd (*Luffa acutangular* (Roxb.) L.). *Vegetable Science*, 37(2): 203-04.
- 19) Kanaujia, S.P. and M.L. Daniel (2016). Integrated nutrient management for quality production and economics of cucumber on acid alfisol of Nagaland. *Annals of Plant and Soil Research*, 18(4): 375-380.
- 20) Khan, A.A., G. Jilani, M.S. Akhtar, S.S. Naqvi and M. Rasheed (2009). Phosphorus solubilizing bacteria: Occurrence, mechanisms and their role in crop production. *J. Agric. Biol. Sci.*, 1: 48-58.