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A review on response of organic and inorganic manures on cucurbits

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Abstract

Cucurbitaceae is a huge vegetable family that includes cucumber, gourd, melons, and gourds. This family of vegetables is considered beneficial for fitness as well as reasonably priced for vegetable production as it is extraordinarily demanded through purchasers. Those plants respond properly to fertilizers and natural fertilizers. Moreover, these crops respond substantially to the application of vitamins from numerous sources. Applying natural manure in mixture with biofertilizer and inorganic fertilizer to the soil is considered a valid control approach in any agricultural production gadget because it improves plant nice and soil health in the long term. The aim of this take a look at is to evaluate the impact of the software of organic, inorganic and biofertilizers in cucurbits on sustainable boom, productiveness and economy. Incorporated plant nutrient management is one of the modern day methods of supplying vitamins to plant life thru natural and inorganic way together to meet nutrient necessities. At the same time, the primary aim of included plant nutrient management is to minimize the usage of chemical fertilizers with out sacrificing yield. The study confirms that natural slurry in aggregate with inorganic fertilizer appreciably will increase the boom, yield and first-class parameters of cucurbits with a bigger B:C ratio.

Keywords: B:C ratio, biofertilizer and cucurbits

Introduction

Cucurbits are the largest institution of summer time seasonal veggies. Inside a unmarried family, the diversity and variety of diversifications for tropical and subtropical, temperate and arid deserts of India is extremely good (Rai *et al.*, 2008) [25]. They're grown in distinctive components of the sector for his or her nutritional cost. They're rich in nutrients, phosphorus, calcium, protein, carbohydrates, and so forth. Various parts of cucurbits or their seeds are said to contain anthelmintic, laxative and emetic properties due to secondary metabolite together with cucurbitacin content, and so on. A few cucurbits like bitter gourd and others are well known for its unique recuperation residences. Cucurbits are ate up in lots of paperwork consisting of salad (long melon, cucumbers and cucumbers), famous chocolates (ash gourd and pointed gourd), cakes (melons), pickled cucumbers (cucumbers, bitter gourd) and specially used for gastronomic purposes (Rai *et al.*, 2008) [25].

Pumpkins reply nicely to fertilizers and natural fertilizers. The growth and yield of crops is substantially inspired by organic and inorganic nutrients. However, organic and inorganic fertilizers supply nutrients to the soil in distinctive approaches. Organic fertilizers create a healthful soil surroundings for a long term, whilst inorganic fertilizers work an awful lot faster but do not create a sustainable surroundings. the usage of inorganic fertilizers for crops isn't so good for health because of residual consequences, however in case of natural fertilizers, such issues do no longer stand up, instead they increase the productivity of the soil as well as plants and aren't very less costly for everyday farmers. The software of high-input technology together with chemical fertilizers, pesticides, herbicides has advanced production, but there are growing concerns approximately the destructive outcomes of chemical use on soil productiveness and environmental first-rate. Natural manure is suitable for growing cucurbits due to the fact it is environmentally pleasant and has a soil-saving effect when used. They play an essential role in enhancing soil fitness and keeping soil sustainable for long-term addition of organic resources. In this context, biofertilizers, which include environmentally friendly, agriculturally useful microorganisms, assist enhance the soil with nutrients to hold soil fertility and supply crucial vitamins for crop boom.

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Biofertilizers can lead to greater vegetative increase and growth the provision of soil vitamins. But, way to a appropriate mixture of natural farmyard manure and biofertilizers, it could have a better effect on the yield consistent with unit location can be increased.

A review on response of organic and inorganic manures on cucurbits is being presented under the following sub heads:

1. Effect of application of inorganic nutrient sources in Cucurbits
2. Effect of organic manures on growth & yield of cucurbits
3. Combined Effect of organic & inorganic fertilizer on growth and yield of cucurbits
4. Effect of organic manure + biofertilizers on cucurbits
5. Effect of organic manure + biofertilizer + inorganic fertilizers on cucurbits

6. Effect of organic, inorganic manures, biofertilizers and combined on quality parameters of cucurbits.
7. Cost Economics analysis in Cucurbits

1. Effect of application of inorganic nutrient sources in Cucurbits

Nutrients are essential for crop growth and they give maximum contribution. Inadequate amount of these nutrients causes certain disorders, which automatically reduce the yield and leads to loss for the growers. In cucurbits, excessive nitrogen and consequently enormous vine growth requires to be avoided. The response of cucurbits plants on NPK fertilizers has been described through table 1.

Table 1: NPK application in cucurbits and their response

NPK application	Response/ effect	References
Application of nitrogen	Increased the length of vine, branching and per plant fruit yield in bitter gourd.	Reddy and Rao (2004)
Phosphorus levels	Positive effect on flower initiation and development in cucumber cv. Poinsette.	Umamaheswarappa <i>et al.</i> (2005) ^[41]
NPK fertilizer	Significantly affected the vine length, flowering, fruiting and marketable yield in water melon (<i>Citrulus lanatus</i> L.).	Oga and Umekwe (2013) ^[19]
Highest level of nitrogen	The maximum core diameter of fruits in cucumber	Kade <i>et al.</i> , (2009) ^[8]
Application of NPK fertilizer	Maximum fruit length, fruit weight and yield in cucumber.	Waseem <i>et al.</i> , (2008) ^[40]

2. Effect of organic manures on growth & yield of cucurbits

Organic fertilizers along with composted animal manure, compost and family waste. They offer nutrients and contribute to soil pleasant via enhancing soil shape, chemistry and degrees of biological activity. Enhance soil fertility by using increasing organic carbon and making NPK available to flora. They are regarded for the sluggish launch of vitamins and boom the natural rely content of the soil (Sarkar *et al.*, 2003) ^[30]. Enhancing soil natural rely is beneficial when decomposition is sluggish. But, the decomposition of organic fabric is strongly prompted by means of temperature and soil moisture. Which means vitamins can be released when the plant does now not want them. Because the nutrient content material of natural fertilizers is low and simplest constrained quantities of organic material are to be had in lots of regions, it's far typically difficult to fulfill the nutrient necessities of crops the use of handiest natural fertilizers (Morris *et al.*, 2007). a number of the natural fertilizers, fowl manure is pronounced to be suitable for the bitter gourd crop as it helps in growing the productiveness and increase of the vegetation. chicken droppings ought to beautify vegetative growth of vegetation such as increased leaf variety and vine elongation as said by means of Uranw *et al.*, (2020) ^[42].

Munoz *et al.*, (2004) ^[16] country that animal manure is frequently effectively available and can be a precious supply of vitamins. Rooster droppings produce organic count number that could enhance the physical situation of the soil. This sizeable reaction of Telfairia to the application of poultry manure in phrases of vine duration, range of leaves and quantity of vines may be attributed to the excessive absorption of nutrients by way of the plant. better vegetative boom of squash because of organic count number utility may be attributed to lower carbon: nitrogen and carbon: phosphorus ratios within the carried out manure. carried out natural manure accelerated root boom, that's related to nutrient absorption and vegetative boom of pumpkin as mentioned by means of Khandake *et al.*, (2022) ^[11].

Okoli and Nweke (2015) ^[20] discovered that chicken manure as organic manure and its combos are a very good source of soil change as they affected the boom and yield components of cucumber. Shafeek *et al.*, (2015) ^[31] stated very good sized outcomes that organic manure at a higher degree (three.2 t/feed) advanced plant boom, fruit yield, physical and chemical traits of fruit pleasant of watermelon vegetation. Eifediya *et al.*, (2017) ^[43] reported that organic amendments have been like environmentally pleasant fertilizers and resulted in better watermelon manufacturing compared to inorganic change (NPK fertilizer) in terms of effective outcomes on soil structural properties.

Table 2: Response of application of organic manures on cucurbits

Application of Organic manure	Response/ effect	References
Poultry manure	Increase vegetative growth of the crops such as increase in number of leaves and increase in vine length in bittergourd	Uranw <i>et al.</i> , (2020) ^[42]
Poultry manure 50% + Vermicompost 50%	Maximum Vine length, flower emergence in cucumber	Ahmad & Prasad (2022) ^[44]
Poultry Dung and cow dung treatments	Increased the internode length, length of vine, leaf number, leaf area in pumpkin	Khandake <i>et al.</i> , (2022) ^[11]
Poultry manure	Leaf production in fluted pumpkin (<i>Telfairia occidentalis</i>).	Umoetok <i>et al.</i> , (2007) ^[37]
Application of FYM and vermicompost	Increased yield in bitter gourd.	Gajjela <i>et al.</i> , (2018) ^[5]
Cattle manure	Significant effect on fruits and seed yields of squash. Increased yield of organic squash.	Jahan <i>et al.</i> , (2013) ^[7]

3. Combined Effect of organic & inorganic fertilizer on growth and yield of cucurbits

Inorganic fertilizers are also called mineral or chemical fertilizers. The vitamins in mineral fertilizers are pretty excessive and the discharge of those vitamins is rapid, as there is no want for decomposition. The application of these character fertilizers without a combination did not cause a considerable boom in yield and related tendencies, however way to a fantastic aggregate of fertilizers and natural fertilizers, they drastically extended the yield. Sareedha *et al.*, (2006) [27] found that the highest quantity of leaves, internodal duration in remedy with utility of pressed mud @ 25 t/ha with recommended dose of inorganic fertilizer and humic acid @ 0.25% accompanied via remedy with application of vermicompost @ five t/ha ha in aggregate with RDF humic acid @ zero.2% in cucumber (*Cucumis sativus* L.). similarly, maximum increase, yield and yield traits in nice cucumber were suggested with incorporation of two tonnes of vermicompost + 50% recommended price of fertilizers (50: 30: 30NPK) + biofertilizer (5 kg Azotobacter and five kg bacterial solubilizing phosphorus) according to hectare (Bindiya *et al.*, 2006) [2], even as extended vine period and early flowering had been pronounced because of application of fifty% RDF at the side of 2 t/ha vermicompost and a couple of kg/ha azospirilla + 2 kg/ha phosphobacteria.

Prasad *et al.*, (2016) [21] determined utility of cow dung along with NPK fertilizers. increase fruit yield, fruit length, fruit diameter and branching in sour gourd. Mulani *et al.*, (2007) [15] determined that application of 25% nitrogen thru neem cake and 75% thru poultry manure became found to be first-class for enhancing growth, yield and satisfactory parameters of bitter gourd inclusive of common vine length (5.38 m), fruit weight (eighty four. eighty g), fruit period (26.ninety four cm), fruit circumference (3.forty eight cm), flesh thickness (1.03 cm), variety of end result in step with vine (sixty three.eleven), fruit yield (263.33 kg ha-1) and durability (7.33 days).

Kumar *et al.*, (2019) [12] found out that the expanded yield of ridge gourd is at once associated with the growth in fruit weight and number of fruits in step with plant and the growth in fruit weight underneath the impact of organic manure and inorganic fertilizer aggregate may be because of higher rate of photosynthesis and sugar formation because of extended synthesis chlorophyll and enzyme interest, which results in the translocation of extra photosynthate to the growing end result, which ultimately ends in higher dry matter production and ultimately to higher yield. The favorable effect of natural manure on yield can be attributed to a better fee of chlorophyll synthesis, more photosynthetic to higher sugar production.

Table 3: Application of organic & inorganic fertilizers/manures for high yield in cucurbits

Organic & Inorganic Fertilizers	Response/ effect	References
Application of poultry manure @ 20t/ha	Yield of cucumber was higher.	Khan (2017) [10]
Vermicompost	Higher cucumber yield and cucumber fruit weight.	Ghasem <i>et al.</i> , (2014) [45]
vermicompost application	Fruit weight and yield was maximum in ridge gourd.	Kameswari <i>et al.</i> (2010) [9]
Cow dung application	Organic manure is best alternative in place of inorganic manure for increasing production of pumpkin	Uwa (2013) [38]
Organic manures along with inorganic fertilizers	Increased the growth attributes like vine length, number of leaves, leaf area, internodal length and dry matter production.	Sareedha <i>et al.</i> , (2006) [27]
Application of poultry manure + P and K + Azotobacter	Highest number of leaves plant-1, length of internode in of Ridge Gourd	Rathod, <i>et al.</i> , (2018) [46]
Application of NPK fertilizer	Higher vine length, flowering, fruiting and marketable yield in watermelon	Oga and Umekwe (2013) [19]
Application of Poultry manure + fertilizers	Significantly increased the number of leaves, fruit size and count, quality, weight and yield	Okoli and Nweke (2015) [20]

4. Effect of organic manure + biofertilizers on cucurbits

High priced commercial fertilizers are endorsed to obtain better manufacturing in cucurbits, however the use of extra inorganic fertilizers is regular with guidelines for soil fitness and environmental sustainability. Thus, judicious use of chemical fertilizers is required to attain better productiveness and keep environmental balance. The extensive use of handiest chemical fertilizers to reap excessive production has brought on problems. Consequently, biofertilizers have emerged as promising components of the nutrient supply gadget. The utility of biofertilizers, which are environmentally friendly and feature low fees, with inorganic fertilizers as part of an included nutrient control strategy and play a substantial function in plant nutrients. The application of biofertilizers has obtained tons attention in sustainable agriculture.

Isfahani and Besharati (2012) [47] mentioned that using biofertilizers improved the yield and yield of cucumber. Qun *et al.*, (2015) [48] mentioned that organic natural fertilizers can enhance soil enzyme pastime, alter soil microbial network structure, enhance soil great and fertility situations, thereby lowering wax gourd wilt disease. Sarhan

et al. (2011) [29] analyzed Azotobacter by myself or in aggregate with natural fertilizer advanced the quantitative and qualitative tendencies of squash fruit yield. The interplay effect of the combination of bio and natural fertilizers resulted in the first-class overall performance of squash in phrases of yield and exceptional. This result could be because of the discharge of boom-promoting compounds together with cytokinins, indoleacetic acid (IAA), and/or the release of siderophore compounds growing iron availability for various biophysical and biochemical processes. They explained that Azotobacter had an oblique effect in particular through improving soil structure and liberating compounds including polysaccharides that assist preserve soil particles intact. The above research indicate that the ability of fertilizers increases while used together with biofertilizers, leading to advanced soil situations and as a result accelerated crop yields.

Das *et al.*, (2015) [4] concluded that equal quantity of organic N+ + Azotobacter and PSB resources gave maximum variety of primary branches, range of fruits, average fruit weight and fruit length in bottle gourd. Waleed *et al.*, (2017) [39] determined that organic fertilizer blended with

biofertilizer had the satisfactory effect on plant increase parameters and soil nutrient availability which had been 36.3, 16.1 and 36.3 mg kg⁻¹ in N, P and K in cucumber.

5. Effect of organic manure + biofertilizer + inorganic fertilizers on cucurbits

Software of numerous combos of inorganic and natural sources of vitamins from neem oil and biofertilizers at most fulfilling levels has been proven to be effective in promoting germination percentage, plant boom, flowering and yield of cucumber Anjanappa *et al.*, (2012) [1] said that combos of inorganic, organic and biofertilizers are pleasant for earliness and higher productiveness of cucumber. This brought about an boom inside the quantity of culmination in step with plant and fruit weight in keeping with plant, which ultimately ended in higher fruit yield in line with hectare. improved fetal duration, fetal hollow space, fetal extent and fetal diameter have been attributed to balanced nutrition, higher nutrient consumption and synthesis of more carbohydrates.

Habibi *et al.*, (2014) [6] concluded that the utility of biofertilizers in aggregate with 50% chemical and organic fertilizers decreased using chemical fertilizers and produced better yields of pumpkin seeds and culmination. Das *et al.*, (2015) [4] concluded that identical quantity of organic N + Azotobacter and PSB resources gave most number of number one branches, wide variety of culmination, common fruit weight and fruit size in bottle gourd. Mohan *et al.*, (2016) [49] pronounced that 60 percentage RDF and vermicompost along side Azotobacter, Trichoderma and PSB had been discovered to be higher than all mixtures of natural, inorganic and biofertilizer nutrient assets for characters namely minimal variety of days to 50% flowering, average fruit length, fruit weight, range of fit to be eaten end result and most suitable for eating fruit yield in cucumber.

Natchathra *et al.*, (2017) [18] found out that seventy five percentage NPK along with vermicompost @ 2.5 t ha⁻¹ blended with azospirillum and phosphobacteria @ 2 kg ha⁻¹ in tinda had suitable potential to promote and enhance boom parameters due to effective and an alternative source of macro and micronutrients within the tinda crop.

Necessity of software of inorganic and organic nutrients in mixture with biofertilizers. Similarly, rapid availability of plant nutrients from inorganic sources, balanced C/N ratio, synthesis of auxin, growth substances, antifungal due to Azotobacter inoculation, and conversion of insoluble phosphate to soluble shape by way of PSB may have contributed to the boom in cucumber yield. similarly to these elements, growth and yield attributing developments can be justified as pronounced via Sudeshna *et al.* (2019) [33].

6. Effect of organic, inorganic manures, biofertilizers and combined on quality parameters of cucurbits

It's also essential to have a look at the quality parameters of cucurbits in reaction to the utility of natural, inorganic and biofertilizers. They not handiest notably increased the yield of cucurbits, however additionally showed great outcomes in first-rate parameters.

mixed utility of FYM @ 18.75 t/ha, compacted silt @ 18.75 t/ha, humic acid @ 30 t/ha and NPK (60:45:45 kg/ha) become determined to be the first-class remedy recording the best chlorophyll content (0.680 mg/g), dry

depend manufacturing (601.32 g/plant) and LAI (2.9)) as mentioned by means of Karuppaiah and Manivannan (2005) [34] for cucumber. Sreenivas *et al.*, (2000) [32] suggested that TSS content multiplied with increasing amount of vermicompost (zero, 5, 10 and 15 t/ha) in pumpkin. TSS reduced (non-extensively) with growing doses of chemical fertilizers (zero, 25, 50 and 100% of the encouraged dose of N, P₂O₅ and K₂O) in scalloped gourd.

Das *et al.*, (2015) [4] pronounced a huge interaction between biofertilizer and manure to growth plant chlorophyll concentration in pumpkin. Mahmoud *et al.*, (2017) [50] encouraged the application of 75% RDF as N and P over biofertilizers to noticeably growth nutrition content material and TSS content material. Thriveni *et al.*, (2019) [35] found that flowers supplied with T₁₀ recorded maximum ascorbic acid content (111.1 mg/one hundred g suitable for eating element), TSS (2.10oBrix) and protein content material (1.seventy six%), which have been at same level as T₇ and T₉. The growth in fruit ascorbic acid, TSS and protein content material in these treatments can be attributed to the integrated utility of natural and inorganic fertilizers along side biofertilizers (diazotrophs and PSB) which may have helped to enhance the uptake of foremost nutrients inclusive of micronutrients.

Chaudhary *et al.*, (2019) [3] found that software of fifty% RDF + 50% vermicompost + poultry manure recorded maximum (7.26%) Vit-C fruit in bottle gourd.

Prashanthi *et al.*, 2021 mentioned that they observed that a few best attributes which includes fruit TSS were considerably laid low with the software of various ranges of vermicompost, at the same time as vitamin C changed into notably stricken by the software of both natural and inorganic fertilizers in special mixtures. bitter gourd.

Khandake *et al.*, (2022) [11] showed that this application of natural dietary supplements increased leaf TSS content material, stepped forward flowering, fruiting and yield-attributing traits of pumpkin.

7. Cost Economics analysis in Cucurbits

Kishor and Saravanan (2019) [51] said in two kinds of Bottle gourd, range C.B.H. 11 turned into determined higher in specific organic and inorganic fertilizer treatments, in terms of economics maximum gross and net return changed into recorded in T₅ remedy however most fee gain ratio was recorded in T₇ remedy and lowest values were recorded in T₀ (manage) in bottle gourd.

Prasad *et al.*, (2019) [22] mentioned the very best gain: cost ratio for endorsed NPK best, observed through FYM @ 10 t/ha + half encouraged FYM and additionally for vermicompost @ 0.25 t/ha + half recommended NPK in bottle gourd.

Pravallika and Deepanshu (2020) [24] observed a higher advantage-cost ratio (1:three.28) in an aggregate of 50% RDF NPK + 50% bypass (vermicompost + hen manure) in bottle gourd.

Prashanti *et al.*, (2021) [52] showed that 50% RDF NPK + 50% Vermicompost + fowl manure treatment become located suitable in phrases of cost advantage ratio most gross returns and internet go back turned into recorded in 50% RDF NPK + 50% Vermicompost remedy + hen manure and value benefit ratio was located in remedy while minimum gross yield and net yield was recorded on top of things advocated dose of NPK120:60:60 kg/ha + FYM 20 t/ha. in bitter gourd, while application of inorganic fertilizer

@ 50% recorded most net earnings i.e. 152,681.95 (Rs./ha) with better benefit: price ratio (2.43) which became found to be the most large treatment. This better B:C ratio become particularly because of decrease value of cultivation the use of lower degree of inorganic fertilizer and higher yield production compared to final level reported through Sangeetha *et al.*, (2018) [53] for mustard.

Conclusion

Greens are a prime part of human nutrients. Nowadays, human beings are more aware of their fitness. Organically produced veggies are extra profitable for clients available on the market. So the usage of natural, biofertilizers and various mixtures of fertilizers enables us to offer accurate first-class and secure merchandise. On the other hand, the fee of inorganic fertilizers is higher and it'd make cultivation more costly for the farmer. Therefore, the mixed use of natural and inorganic fertilizers is considered the fine choice for crop production, improves exceptional, sustainability and is safe for the environment. The application of vermicompost and biofertilizers together influences plant metabolism by means of increasing the supply of implemented vitamins and the potential to maintain moisture.

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