

THE EXAMINATION OF THE CUCUMBER PLANT RESPONSE TO VARIOUS TYPES OF ORGANIC MANURE

Gurdeep Singh¹, Navdeep Singh²

^{1,2}Guru Kashi University, Talwandi Sabo

ABSTRACT

It is regarded a desirable practise in any agricultural production system to apply organic wastes to the soil in combination with or without mineral fertiliser in order to increase plant quality and soil fertility. The present study aims to analyse the influence on cucumber (*CucumisSativa*) plants and soil parameters of three compost kinds (plant residues, animal residues, and mixed) when mixed with mineral nitrogen fertilisers. Summers of 2007 and 2008 saw a field experiment conducted at El-Nataf farm, Sakha Agricultural Research Station in Egypt's Kafr El-Sheikh Governorate. Saturation percentage, C/N ratio, pH, electrical conductivity, bulk density, and electrical conductivity of mature composts of plant wastes were greater than those of animal and mixed composts, according to the results.

Key words: Organic nitrogen Yield Combination Substitute Plant quality Cucumber

I. Introduction

Compost was compared to artificial fertilisers in a study by (Law-Ogbomo, et al. 2018) to see how it affected vegetable output and quality. Compost treatments reduced yields the first two years, but after that, there was no difference in vegetable production. Composting vegetable leftovers from greenhouse cucumber production were shown to be more cost-effective than animal manure (Tatli, et al. 2021). Crop output was 48 to 79 percent greater in greenhouse cucumber (*CucumisSativus L.*) cultivated on a medium that contained composted vegetables or vegetable waste and synthetic fertilisers than those planted in soil mixed with cattle dung at 2:1. (dry weight basis). Researchers (Pan, et al. 2022) evaluated the effects of compost and mineral fertilisers on the growth of green peppers and cucumbers in sandy soil. They discovered that adding compost to mineral fertiliser increased yields. Increased microbial biomass was achieved by the use of organic manure and chemical fertilisers. When compared to artificial fertilisers, the use of organic manures considerably enhanced levels of organic C and N, as well as the creation of water-stable aggregates on the soil. *Cucumissativa* (*Cucumissativus*) plants were grown in the 2007/2008 season and clay soil qualities were studied to determine the effects of three compost kinds (plant residues, animal residues, and combined plant and animal residues) on cucumber plants.

II. Literature Review

(Sarwar, et al. 2018) also found that silt and leaf manure increased fresh and dry biomass. As a result of improved moisture retention, aeration, and nutrients, treatment T8 resulted in the greatest increase of fresh and dry biomass. Leaf chlorophyll concentration was favourably influenced by various growth media proportions in this experiment, however plants grown in T8 combination with equal proportions of all media components

demonstrated the highest leaf chlorophyll content. Increased chlorophyll content may have been a result of increased nitrogen uptake from the growth medium. Cucumber leaf proline content was dramatically increased. Because proline biosynthesis has been activated and oxidation of proline to glutamate has been reduced, proline consumption has been decreased, and protein turnover has been raised, the amount of proline in the body has grown. As a catalyst for photochemical reactions, nitrogen has a significant influence on green pigments (Kumar et al. 1988). Nitrogen was shown to be responsible for the increase in chlorophyll content in both iris and coriander leaves, according to the same findings by (Oke, et al. 2020). Photosynthesis is boosted as a result of the increased chlorophyll concentration in the plants, which in turn leads to greater plant growth. Cucumber plants' photosynthetic rate was raised in response to several medium combinations in the current study. Due to the enhanced photosynthesis and respiration rates, this type of reaction is ideal for increasing the total development of plants. Nitrogen is an important nutrient for the regular development and production of plants. Net plant development is stimulated by increased nitrogen absorption through the roots, which in turn promotes the transfer of nutrients to the leaves. According to their results (Oke, et al. 2020). Coconut compost has been shown to boost the availability of nitrogen to plants, resulting in increased growth. Biosynthesis of nucleic acids and enzyme activation are all made possible by phosphorus' function in energy metabolism, gas exchange. In the same way, potassium is the most essential mineral nutrient for the management of water in plants, protein production, as well as drought tolerance and activation of particular enzymes.) It was shown that higher potassium content in the leaves of plants boosted plant development as a result of increased organic matter in the growing environment. Because of this, the total development and fruit production of cucumbers was improved in the current study, as nitrogen, phosphorous and potassium minerals were better available.

III. Materials and methods

Preparation and arrangement of windrows: Six heaps of various raw materials from various sources were prepared and placed into windrows for the purpose of composting. Each pile was about 3 metres long, 2.5 metres wide, and 1.5 metres high. A 10 cm bed of corn stalks was used to support each mound, and a plastic sheet was used to cover the whole thing as insulation. There were two of each sort of pile in the compost area: There was a plant/animal combination of 1:3 by weight in the first pile and a plant/animal mixture of 1:4 by weight in the second pile, both of which had been cut into small pieces and mixed by hand before being weighed. All piles were kept at 60 percent moisture and a C/N ratio of 30 to 35, as suggested after being rectified with the addition of mineral nitrogen. It took 90 days for samples to be gathered from each pile and the mature composts utilised for cucumber experiment analysis.

Organic and inorganic nitrogen applied to cucumbers (*Cucumis Saliva*) resulted in higher yields, as well as improved flavour and texture, during the summers of 2007 and 2008, respectively, at El-Nataf farm in the Kafr El-Sheikh Governorate, Egypt.

Silt was mixed with a variety of agricultural substrates, including leaf compost, organic compost, perlite, and coconut compost. Seeds were seeded in 9-L plastic pots filled with a variety of growth substrates, and the pots were placed in the greenhouse. Each treatment was replicated four times in the research.

IV. Results

Plant growth and production were dramatically boosted by the use of different growing medium alone or in combination. The results showed that the plants grown in leaf compost + perlite + silt (1:1:1) media combination had the best germination, plant growth, emergence percentage, gas exchange attributes, shoot/root length, shoot fresh and dry biomass, root fresh and dry biomass, number of leaves, leaf mineral contents, and chlorophyll concentration and yield. Cucumber plants' nutrient absorption was boosted by organic matter in substrates, but the effects on proline concentration were non-significant across all treatment combinations.

V. Discussion

Cucumber plants in pot culture systems were studied to see how different growing conditions affected their growth. Cucumber growth and productivity were shown to be enhanced by a variety of growing medium in the current study. It was discovered that vegetative and physiological parameters were considerably varied under all media combinations, than control where just silt was employed as a growth medium. When it came to cultivating cucumbers, it was discovered that the T8 mixture of coconut peat plus compost plus leaf compost plus perlite plus silt, as well as coconut peat plus perlite plus silt, was the most effective. Potting media are commonly used for a speedy emergence of seed, excellent seedling development, bedding plants, and nursery growing. Leaf manure + leaf compost+compost and inorganic perlite+silt were shown to have a shorter emergence time and resulted in faster growth than the other treatment. Early emergence is said to be dependent on aeration, temperature, and water content in the medium. The similar results were published by (Gao, et al. 2021) as they discovered that silt and leaf compost in 1:1 proportion, which demonstrated greatest sprouting percentage. Additionally, the findings are in line with those of (Nuagah, et al. 2020), who found that zinnia seedlings emerged early when silt, leaf manure, and compost were mixed together; similarly,

Cucumber kitchen gardening benefits from the use of balanced medium, which helps to ensure the proper length of the plant's shoots. Cucumber growth benefited from all of the media's proportions. Perlite, silt and leaf manure in (1:1:1) proportions were shown to provide the most stimulatory effect and the greatest increase in plant height. Because the pH and nitrogen amount were shown to be ideal in liliun by prior research, this ratio promotes optimal development (Solaiman, et al. 2020). Similar trend was noticed by (Law-Ogbomo, et al. 2018). (Law-Ogbomo, et al. 2018). The leaf chlorophyll concentrations are also crucial for the plant growth as these are directly engaged in the photosynthesis. Based on the medium used, T8 had the highest amount of leaves. A previous study by (Tatli, et al. 2021) indicated that combinational treatment produced the most leaves when compared to a single growth medium. Since root growth is directly related to rhizosphere variation, potting medium have a significant influence on root development; hence its ratio must be such that it produces a balanced pore spaces and solid particles. Based on the media treatments used in our current study, the amount of fresh and dry biomass varied. *Celosia cristata* and Carrot were found to have the maximum fresh and dry weight when grown in conjunction with several growth conditions (Pan, et al. 2022).

VI. Conclusion

In the end, the growth and productivity of cucumbers in different growing media was significantly different. There were significant improvements in the vegetative and gas exchange characteristics of the plants, as well as the fruit production and ionic balance of the plants when coconut peat was mixed with compost and leaf compost. A cucumber may be grown in the kitchen using this mix of materials. The study found that the average

cumulative yield of cucumbers was greater in plots that received plant compost over the 2007 and 2008 summer seasons than in plots that received mineral N and 25 percent organic N. Petiole nitrate levels fell by 52-69 percent in plots treated with N 100% organic compared to N 100% mineral. However, only the plots treated with compost-derived N showed an average cucumber fruit nitrate level. Organic nitrogen enhanced the soil's nitrogen and phosphorus levels, as well as the soil organic matter, substantially. The findings of the experiments show that the use of organic and inorganic fertilisers can improve plant growth, production, quality, and soil fertility. Additionally, it was shown that composted organic waste can replace up to 25% of the artificial nitrogen fertilisers now utilised.

VII. References

- Erwiha, G. M., Ham, J., Sukor, A., Wickham, A., & Davis, J. G. (2020). Organic fertilizer source and application method impact ammonia volatilization. *Communications in Soil Science and Plant Analysis*, 51(11), 1469-1482.
- Gao, Y. H., Lu, X. H., Guo, R. J., Hao, J. J., Miao, Z. Q., Yang, L., & Li, S. D. (2021). Responses of soil abiotic properties and microbial community structure to 25-year cucumber monoculture in commercial greenhouses. *Agriculture*, 11(4), 341.
- Law-Ogbomo, K. E., & Osaigbovo, A. U. (2018). Productivity of cucumber (*Cucumis sativus* L) and post-harvest soil chemical properties in response to organic fertilizer types and rates in an Ultisols. *Tropical and Subtropical Agroecosystems*, 21(3).
- Nuagah, M. B., Boakye, P., Oduro-Kwarteng, S., & Sokama-Neuyam, Y. A. (2020). Valorization of faecal and sewage sludge via pyrolysis for application as crop organic fertilizer. *Journal of Analytical and Applied Pyrolysis*, 151, 104903.
- Oke, O. S., Jatto, K. A., Oyaniyi, T., Adewumi, O. T., Adara, C. T., Marizu, J. T., ...& Adebayo, G. J. (2020). Responses of different poultry manure levels on the growth and yield of cucumber (*Cucumis sativus* Linn.) in Ibadan, Nigeria. *Journal of Research in Forestry, Wildlife and Environment*, 12(3), 206-215.
- Pan, L., Zhou, C., Jing, J., Zhuang, M., Zhang, J., Wang, K., & Zhang, H. (2022). Metabolomics analysis of cucumber fruit in response to foliar fertilizer and pesticides using UHPLC-Q-Orbitrap-HRMS. *Food Chemistry*, 369, 130960.
- Sarwar, M., Anjum, S., Khan, M. A., Haider, M. S., Ali, S., & Naseem, M. K. (2018). Assessment of sustainable and biodegradable agricultural substrates for eminence production of cucumber for kitchen gardening. *International Journal of Recycling of Organic Waste in Agriculture*, 7(4), 365-374.
- Solaiman, Z. M., Shafi, M. I., Beamont, E., & Anawar, H. M. (2020). Poultry litter biochar increases mycorrhizal colonisation, soil fertility and cucumber yield in a fertigation system on sandy soil. *Agriculture*, 10(10), 480.
- Tatli, S., Mirzaee-Ghaleh, E., Rabbani, H., Karami, H., & Wilson, A. D. (2021). Rapid detection of urea fertilizer effects on VOC emissions from cucumber fruits using a MOS E-Nose Sensor Array. *Agronomy*, 12(1), 35.