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The Role of Organic Fertilizer on The Growth of Ornamental Plants (A Review)

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ABSTRACT

Increasing plant productivity requires great attention to the soil and the nutrients it contains for the plant. Therefore, organic fertilizers have been used as an alternative to chemical fertilizers in improve the properties of the soil. Organic fertilizers are defined as fertilizers prepared from plant remains and animal wastes. There are two types of organic fertilizers, the first type is natural organic fertilizer used in very large quantities, but its nutrient content is low, such as animal manure, garbage compost, and vermicompost. The second type is concentrated organic fertilizer and contains a high percentage of plant nutrients, such as humic acid fertilizer, the most important characteristic of organic fertilizers is their conversion into humus in the soil by microorganisms, therefore they are applied to all types of soils, contributing to reducing the acidity of the soil improving its porosity, and increasing the soil's ability to retain water. The slow decomposition also distinguishes them in providing nutrients to plants for a period of time. long period of time.

INTRODUCTION

Organic agriculture is a modern and sustainable agricultural method that contributes to the use of natural resources through sound environmental use, natural resources, human health, and refrains from using organic technology such as radiation (Gamage et al., 2023). The total organically cultivated areas in the world amounted to more than 50.9 million hectares at the end of 2015, which represents 1% of the total agricultural land in 179 countries. (Masaka and Ndhlown, 2007). Organic fertilizers play a major role in plant growth as source of all required macro *et al*., 2022). A cytoplasmic protein belonging to a highly conserved family also known as PA26 gene relatives involved in growth arrest and DNA repair, including SESN1, is responsible for responding to DNA damage. All human tissues contain SESN1, but it's particularly abundant in the skeletal muscle, the heart, the liver, and the brain (Y. Chen *et al*., 2022). By regulating complexes 1 and 2 of the mammalian target of rapamycin kinases, SESTRINs regulate cellular homeostasis (Ding *et al*., 2019). Sestrin deficiency was found to

speed up several processes, including mTORC1 activation, redox dysfunction, aging, fat storage, insulin resistance, muscle deterioration, cardiac failure, mitochondrial diseases, and cancer (M. Kim *et al*., 2021). Anovulatory

and micronutrients in available forms released during mineralization applying organic fertilizers to soil increases the organic matter content that in reality not only improves soil health but also output mineral fertilizers and increase agricultural production (Abou El-Magd et al., 2006). Organic agriculture is a comprehensive production management system that promotes and enhances the integrity, cycles and biological activity in the soil, focuses on the use of management methods as an alternative to the use of non-agricultural inputs. Then new artificial fertilizer technology had a beneficial in the short term, had serious longer term side effect such as soil compaction erosion and declines in overall soil fertility, along with health concerns about toxic chemicals entering the food supply. In the late 1800s and early 1900s soil biologist began to seek ways to remedy there side-effects. while still maintaining higher production (Fadhil et al., 2015)

The accumulation and decomposition of organic matter into the humus layer heavily depend on climatic conditions such as low soil temperature and high humidity. Moreover, these two factors, along with the nature of the terrain, contribute to the formation of organic soil. There are three types of bacteria responsible for the decomposition process: Secriphilic, which operates in low-temperature conditions; Mesophilic, which functions in moderate temperatures; and Thermophilic, which thrives in high-temperature conditions, organic fertilizer is rich in carbon derived from organic materials, including both treated and untreated animal manure, agricultural residues, such as tree remains, can be recycled and locally fermented on farmland. Additionally, castor, sesame, and cotton seed husks, which contain 6.5–7% nitrogen, can also be utilized (Yusra, 2021), Soil organic matters were enhanced microbial activity and the fact that they're slow release fertilizers but store them longer and support rapid root development, witness which enhanced leaf growth, the use of mineral fertilizers are accompanied by problems which are harmful to human health as it causes an increase of nitrate and oxalate, ground water pollution, decrease organic matter and profitable microbiology (Sowmya and prasad, 2017). The use of organic fertilizers which emphasizes maximum reliance on renewable local or farm resource, the advantage this fertilizer was cheap, improving soil arrangement, texture and increasing the soil water preservation abilities and stimulating healthy root development, and improves the use of sustainable and environmentally friendly techniques for growing plants, it's a critical component of sustainable agriculture since it lessens the need for chemical fertilizers (Mosaad et al., 2024). Organic fertilizers are used in clean agriculture to reduce pollution as well as raise the soil's organic matter content, which is reflected in plant growth (Dominguez, 2004). Organic Fertilizers subtend plant or animal waste, livestock manure, dried blood powder, green fertilizers, farmyard manure and compost, poultry manure, bone meal, animal feathers (Sarhan et al., 2011). Vermicompost (worm fertilizer) is a fertilizer rich in nutrients and results from the accelerated biological deterioration of organic waste and agricultural waste such as rice straw, wheat, field pistachio shells, coffee peels, and cotton plant stalks, by earthworms and microorganisms, it includes the white worm Eisenia fetida or the real worm Eisenia Andrei, the earthworm consumes and breaks down organic waste by passing it through its intestines and grinding it (Dominguez, 2004). It is characterized as a material with porosity, aeration, and good water drainage, as well as its ability to retain nutrients, it's contains hormones growth, humic acid 17-36%, fulvic acid, 30-37% of the total amount of organic matter and improves the activity of beneficial microbial organisms which work to protect the plant from pathogens in the soil and insect infestations (Arancon et al., 2005). It also enhances the solubility of minerals, particularly phosphorus, and potassium (Celikcan et al., 2021). The compost increase ion exchange capacity of the soil,

buffering capacity and adsorbs essential nutrients against leaching, increased vegetive, flowering growth traits and corns, cormels productivity of gladiolus (Abdou et al., 2021).

In recent years, the interest in the use of organic fertilizers, including humic acid, has increased which from the decomposition of organic matter (Al-Naemi, 1999). And also organic fertilizers (humate) have an effect role in improving the physical and chemical properties of the soil by interacting with soil minerals and then improving the aerobic peculiarity properties as well as the absorption capacity of nutrients and humic acid may benefit plant growth by chelating nutrients are not available and modify the PH medium (Mataroiev, 2002). It has long been known that the humus substances have a beneficial effect in the soil and plant growth (Chen and Aviad 1990; Garcia -mina et al., 2004). Humic substances consist of complex hydrophilic chemicals with a black color liquid or powder, which is a relatively stable product of the breakdown of organic matter and thus accumulates in the ecosystem and stimulates growth through increased absorption of macro and micro nutrients, especially when exposed to drought (Sanchez et al., 1994 and Mackowiak et al., 2001).

The addition of vermicompost fertilizer produced from cattle waste using Eisenia foetida worms to the growing medium of Lilium asiatic var. Navona by (0,10,20,30)% it was found that the addition of vermicompost fertilizer, especially at 30%, has led to a significant increase of accumulation of potassium, calcium, zinc and iron in both stems and roots, the addition of vermicompost fertilizer led to obtaining the best results in the growth and development of treated plants by increasing the number of leaves and dry weight of the leaves and stem, stem diameter, number of roots and their length, as well as the content of gibberellic acid in the root tissues, the researchers indicated that the rate of 30% Vermicompost fertilizer was suitable for obtaining the best number and diameter of flowers, also reducing the duration of flowering (Moghadam et al., 2012). Al-Shuwaili (2013) explained that spraying Lathyrus odoratus L. with marine algae (seaweed) extract at (0, 40, 60 ml L^{-1}) improved the plant height and number of main branches. In the study of Singh et al., (2015) which addressed the importance of some organic fertilizers in the growth of Tagetes erecta, the results explained that vermicompost at 5 ton ha-1 had significant effect compared with FYM (farmyard manure) at 24 ton ha^{-1} and poultry manure 3.16 ton ha^{-1} or NADEP compost 14.6 ton ha^{-1}, the maximum vegetative growth characters are plant height (65.17)cm, branches number 17.10, branches length (55.27)cm as well as the flowering duration (24.51) days, flowers number (23.03), flowers yield plant (263.54)g, vase life of flowers (9.92) days. Poultry waste fertilizer was used sprayed on plants at a concentration of (0,10,15,20) ml L-1 liters with four batches, the first batch after 15 days of individualization, and the concentration of 20 ml L-1 liters showed significant superiority in the number of leaves that reached 41.6 leaf plant-1 and the leaves content appointments of chlorophyll 38.6 Spad compared to control, and that the least days required for the emergence of flower buds 82.4 days compared to 91 days for control and the flowers number reached 9.5 flower plant-1 compared to 6.4 for control (Ibrahim, 2015). In a study (Al-Zubaidi and Hussein, 2021) about the use of humic acid at a concentration of (0, 3, 6) ml L-1 to the soil every 20 days for the Calendula officinalis plant, the concentration of 6 ml L-1 liters showed significant superiority and gave the highest average of plant height, leaf area, number and diameter of flowers, diameter of the flower stalk, and the number of leaves amounted to 4.72 cm, 15.41 cm2, 4.88 flower plant-1, 7.32 cm, 11.45 cm and 61.33 leaf plant-1 respectively.

Samah et al., (2023) mentioned that three types of organic fertilizers were used to treat Althea rosa like chicken manure (CHM) at 10 ton fed^{-1}, mixture, CHM with vermicompost (VC) at 5 ton fed^{-1} plus 3 ton fed-1, mixture CHM with compost (C) at the same levels. These treatments of organic fertilizers were added during the preparation of soil and three different sowing dates as 1th October, 15th October, and 15th November. The results presented show that VC at 3 ton fed^{-1} mixed with CHM at 5 t fed^{-1} noticeable increase in plant height (213.30 cm), leaves

number (64.33), fresh and dry weight of leaves (149.56 and 45.24)g respectively during the sowing date at 15th October. Bairam et al., (2023) found in an experiment conducted by planting the plots in an unheated plastic tunnel during the autumn season on the November 2021 to study the effect of organic fertilizer (farmyard) manure at (200, 400) g m^{-2} on the growth of Tulipa gesneriana which affected significantly on the diameter of spike and flower days taken for flowering, diameter and weight of bulbs. This result is similar with Tripathi et al., (2013) who indicated that the perfect implementation of organic fertilization to the soil enhanced the growth and productivity of gladiolus and reduce flowering time. The use of organic fertilization as broiler poultry manure at (47.60, 71.40 and 95.20) m^3 ha^{-1} were added to the soil before planting of Calendula officinalis, the results showed that the third level (95.20) m^3 ha^{-1} was recorded the highest significantly values of plant height (103.50) cm, branches number (100.53), plant dry weight (440.51) g $plant^{-1}$, flowering start (39.33) day, flowering period (16.67) day, and flowers number (89.67) (Ramy et al., 2024).

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