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The effects of different organic fertilizers and reduced doses of chemical fertilizer applications on yield and quality traits in greenhouse melon cultivation

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Abstract: As a result of excessive use of chemical fertilizers in greenhouses, the yield and quality of the crop decreases over time. In the study carried out in two different locations; Arbuscular Mycorrhizal Fascicles (AMF), vermicompost (VC), seaweed (DY), bat manure (YG) and 30% reduced chemical fertilizer (KG) were applied. In the study, fruit length and diameter, fruit weight, fruit meat and Shell thickness, leaf fresh and dry weight, pH and total dry matter dissolved in water were measured. According to the measurements made in both greenhouses; best results in terms of fruit length, fruit diameter, fruit weight, fruit number; Taken from YG+AMF+KG application. YG+AMF+7/10 KG application, where the best efficiency was obtained in Greenhouse-A conditions, showed an increase of 44.8% compared to the control application and 10.4% compared to the KG application. YG+AMF+7/10 KG treatment, in which the best efficiency was achieved in the effect of applications on fruit weight in Greenhouse-B conditions, showed an increase of 41.3% compared to the 12.5% control application compared to the KG. In conclusion; It was determined that mycorrhizal inoculation, some organic fertilizers and 30% reduced chemical fertilizer combinations applied in melon cultivation increased the yield in both lotions more than the full dose chemical fertilizer.

Keywords: Different location, melon, organic fertilizer, yield and quality.

Os efeitos de diferentes fertilizantes orgânicos e doses reduzidas de aplicações de fertilizantes químicos sobre as características de rendimento e de qualidade no cultivo de melão em estufa

Resumo: Como resultado do uso excessivo de fertilizantes químicos em estufas, o rendimento e a qualidade da colheita diminuem com o tempo. No estudo realizado

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em dois locais distintos; foram aplicados Fascículos Micorrízicos Arbusculares (AMF), vermicomposto (VC), algas marinhas (DY), esterco de morcego (YG) e fertilizante químico reduzido a 30% (KG). No estudo, foram medidos: comprimento do fruto, diâmetro do fruto, peso do fruto, espessura da polpa do fruto, espessura da casca do fruto, peso fresco e seco da folha, pH e matéria seca total dissolvida em água. De acordo com as medições feitas em ambas as estufas, foram obtidos melhores resultados em tamanho de fruto, diâmetro de fruto, peso de fruto e número de fruto. Retirado do aplicativo YG+AMF+KG. A aplicação de YG+AMF+7/10 KG, onde foi obtida a melhor eficiência, apresentou o aumento de 44,8% em relação à aplicação controle e de 10,4% em relação à aplicação de KG. Na estufa B, a aplicação de YG+AMF+7/10KG, onde o melhor rendimento foi obtido com o efeito das aplicações no peso dos frutos, aumentou 41,3% e 12,5% em relação ao controle e KG. Foi determinado que, com a inoculação de micorrizas, alguns fertilizantes orgânicos e as combinações de fertilizantes químicos com redução de 30%, aplicados à planta de melão, aumentaram o rendimento em ambas as loções mais do que o fertilizante químico de dose completa.

Termos de indexação: Diferentes localidades, melão, adubação orgânica, rendimento e qualidade.

Introduction

Melon (*Cucumis melo* L.), which belongs to the *Cucurbitaceae* family, is among the commercially widely grown species in the world and in Turkey. In the world, 27.5 million tons of melon is produced in an area of 1 million 200 thousand hectares. China, which has the highest melon production in the world, ranks first with 13.5 million tons in an area of 479 thousand hectares. Iran and Turkey are the countries that produce the most melons after China. Turkey ranks second in the world in this context, with 1.8 million tons of melon production on an area of 81,700 hectares (FAO, 2019). The region with the highest melon production in Turkey is the Central Anatolia Region with 41%. This region is followed by Aegean (27%), Southeastern Anatolia (15%), Mediterranean (7%), Marmara (5%), Eastern Anatolia (4%) and Black Sea Region (1%). In Turkey, melon cultivation is carried out in field conditions as well as under cover in conditions where the climate is not suitable. Melon cultivation under cover is mostly done in coastal regions (TUIK, 2015). In sustainable agriculture, the yield obtained from the unit area should be high. The use of organic fertilizers is very important both for sustainable agriculture and for ensuring a safe and healthy production. Mycorrhiza describes a way of life based on mutual benefit between fungal mycelia and plant roots. The basis of this relationship is based on the fact that the plant provides carbon to the mycorrhizal fungus and the mycorrhizal fungus provides water and nutrients to the plant. While AMF hyphae form a continuous absorbing surface like a sponge layer on the plant root surface and absorb carbohydrates from the tissues in the roots, it makes the phosphorus in the soil available through the organic acids it contains, collects it on the root surface with the help of this absorbing surface and ensures that it is transported to the plant root with the help of hyphae. While mycorrhiza obtains carbohydrates necessary for its vital activities from plant roots, its hyphae act as capillary roots and are effective in the uptake of water and nutrients, especially phosphorus (P), zinc (Zn) and copper (Cu) from some nutrients (TİNKER, 1980; LI et al.,1991; MARSCHNER, 1995), mycorrhiza inoculated plants in their study on eggplant; They reported that it gave better results than mycorrhizal and fertilizer-free control and only fertilized plants and increased plant growth by 40% (KESKİN, 2009). It has been reported that arbuscular mycorrhizal fungi (AMF) and Trichoderma harzianum increase plant growth and resistance to diseases by providing both synthe-

sis and transport of phytohormones in the plant (MARTÍNEZ-MEDİNA et al., 2011). In a study investigating the effects of arbuscular mycorrhizal fungi on melon yield and quality in the greenhouse, they reported that AMF vaccine was effective in plant growth, increased chlorophyll content and photosynthesis rate in leaves, increased melon yield and increased nutrient conten (HE et al., 2010). Aleandri et al. (2015) According to the results of the study on melon; They concluded that Rhizophagus applications together with AMF are the most effective applications in improving growth, physiologically and biochemically.

As a result of a study conducted by Expósito, et al. (2020); the yield in the untreated melon was lower in spring (62%) and in summer (20%) than in grafted melon (2%). According to Cakmakci et al. (2017), vermicompost is one of the organic fertilizers that has been heard frequently in the world agricultural production system in recent years and can be applied with chemical fertilizers. They concluded that the physical, chemical and biological properties of the soil can be improved by the application of vermicompost, which is the result of enrichment by worms while metabolizing organic wastes, to the soil, and therefore better quality and productive plants can be grown (ARANCON et al., 2003; ALAM et al., 2007; ALİ et al., 2007; SİNGH et al., 2008). They stated that vermicompost increased the wet and dry weight of the pepper plant and had a positive effect on the nutrient content (ÖZKAN et al., 2016), on the other hand, they concluded that the vermicompost application had a significant positive effect on the yield and some morphological characteristics of the spinach plant and that it could be an alternative to synthetic chemical fertilizers (SRİDHAR et al., 2006). It has been reported that seaweed extract has been used as a yield-enhancing application material in plant cultivation for many years in the world. In the research of Yildirim et al. (2005); They concluded that soaking and seaweed extract applications significantly increased both the germination rate and germination rate index of leek seeds compared to the control. Bat guano typically contains 2-6% total nitrogen, 1.5-10 % usable phosphoric acid, and 1.5-10% soluble potassium (SİKAZWE et al., 2004). The N, P, and K concentrations in some bat guano meet the 5% NPK composition, which is the criterion for any material to qualify as fertilizer (ROY et al., 2006). One study reported that the high concentration of primary macronutrients in bat guano is a beneficial fertilizer especially for lawns. In addition to these essential nutrients, they concluded that bat guano is a source of secondary macro and micronutrients necessary for healthy plant growth. The bat guano in this study was 3.5-9% Ca, 1.5-8% Mg, 0.4- 0.8Mn, 0.2-0.5% Cu, 0.5-1.3% Fe and 0 % It has been stated that it contains.2-0.4 Zn (SRİDHAR et al., 2006). In their study with Serac F1 cauliflower (*Brassica oleracea var. botrytis* L) from the *Brassicaceae* (Cruciferae) family, liquid bat fertilizer obtained statistically better results in terms of root length than liquid vermicompost and chemical fertilizer applications in field conditions (ŞENER; ULUKAPI., 2018). As a result of excessive use of chemical fertilizers in monoculture agriculture and greenhouses; As a result of the decrease in the amount of organic matter in the soil, yield and quality losses occur in the product. In this study, the effects of Arbuscular Mycorrhizal Fungi (AMF), different organic fertilizers and 30% reduced chemical fertilizers on yield and quality in melon cultivation under glass greenhouse conditions in different locations were investigated.

Material and Methods

Materiel The plant material used in the experiment and its properties

The seedlings belonging to the *cucurbittaceae* (*Cucumis melo* L.) variety used as plant material in the experiment were obtained from a commercial company that produces ready-made seedlings. Features of this variety; Galia melon yield is quite high, its plant

structure is very strong and it is a medium early melon variety. Its fruits are around 2-2.5 kg on average and it is a variety with high sugar content. Galia melon type is suitable for open field and greenhouse. It has high storage capacity and is tolerant of powdery mildew. The liquid form of all fertilizer materials used in the study was used and the applications were carried out in the form of drip irrigation at recommended doses.

Determination of soil properties of greenhouses

Soil samples were analyzed for the trial area before planting (Table 1). In order to evaluate the physical and chemical properties of the soil, samples were taken from different places from 0-15 and 15-30 cm soil depths. Soil samples gravimetric soil moisture content, soil pH and saturation history with electrical conductivity, soil particle size distribution by hydrometer method, soil mass density by core method, phosphorus content using spectrophotometer (WANTANABE; OLSEN, 1965), potassium content using photoflame photometer metrically (CHAPMAN; PRATT, 1950). The physical and chemical properties of the soil were described by (PIPER, 1950; BLACK, 1969).

Table 1. Physical and chemical properties of soils belonging to greenhouses.

Parameters	Values	
	(Greenhouse-A)	(Greenhouse-B)
pH	7.42	7.22
Lime (%)	34.7	32.24
EC (mmhos cm)	0.46	0.42
Clay (%)	11.3	9.44
Sand (%)	44	38
Organic matter (%)	2.1	2.41
Total N (%)	0.116	0.194
P (mg kg^{-1})	2.01	2.14
K (mg kg^{-1})	397.2	439.7
Ca (mg kg^{-1})	3947	4129
Mg (mg kg^{-1})	382	416
Fe (mg kg^{-1})	3.87	4.29
Mn (mg kg^{-1})	3.12	3.43
Zn (mg kg^{-1})	3.92	4.24
Cu (mg kg^{-1})	1.78	2.11

Sources of chemical fertilizers used in the experiment

Chemical fertilizer; Nitrogen (N) fertilizer source $(NH_4)_2SO_4$ was used, phosphorus (P) source Triple super phosphate (P_2O_5) and potassium (K) fertilizer source K_2SO_4 were used.

The properties of the vermicompost used in the experiment are given in Table 2.

The characteristics of the seaweed used in the experiment are given in Table 3.

The characteristics of the bat fertilizer used in the experiment are given in Table 4.

Table 2. Properties of vermicompost used in the experiment.

pH (1:2.5)	7.80
EC(1:2.5)µS/cm	1450
Lime (%)	_1.7
Organic matter (%)	48.95
Total N(%)	1.90
C/N	14.94
P(%)	2.05
K(%)	2.83
Ca(%)	1.89
Mg(%)	0.92
Mn (mgkg^{-1})	500
Zn (mgkg^{-1})	100
Cu(mgkg^{-1})	0.25 44
Fe (mg kg^{-1})	1.20 157

Table 3. Nutrient contents of seaweed.

Mineral contents	% w/w	% w/w	Density g/l 20 °C	pH	EC(%1) µS/cm 20°C
Organic Matter (O.M)	15	16.4			
Organic Carbon (C)	7.9	8.6			
Total Nitrogen (N)	1.5	1.64	1080/1100	7.5+-0.1	
Organic nitrogen (N-CO)	1.5	1.64			
Water Soluble Potassium oxide (K_2O)	1.5	1.64			
Alginic Acid	0.07	0.4			

Table 4. Characteristics of bat fertilizer used in the experiment.

Organic Matter:	%15
Organic Nitrojen:	%2.5
Phosphorus:	%1
Potassium:	%4
Calcium:	%2
Humic+Fulvic Acid:	%5
Free Amino Acids:	%1.5
Ph:	%4.5-5.5
EC:	%18.5

Climate characteristics of greenhouses

In Greenhouse-A and Greenhouse-B, the climate environment, fertilizer applications and irrigation works were created in the same way. The humidity of the greenhouses was kept between 65% and 70%. During the growing period, the lowest night and day temperatures in the greenhouse were 10.6 ºC and 14.8 ºC, and the highest day and night temperature values 34.7 ºC and 26.2 ºC measured.

Designing the trial plan

The research was carried out in two different locations (Greenhouse-A and Greenhouse-B) in the Research and Application greenhouses of the Vocational School located at 36º 22' north latitude and 33º 55' east longitude in Silifke district of Mersin province. The greenhouses are located in the north-south direction, are 25 meters long and 30 meters wide, and have a surface area of 450 m2. The typical Mediterranean climate is observed in the region where the research was conducted. The summers are hot and dry, and the winters are warm and rainy. According to long-term meteorological data, the long-term average precipitation of the region is 532.6 mm. The long annual average temperature in the region is 19.1 o C, and the annual evaporation is 1608 mm (DMI, 2020). The experiment was carried out according to the Random Blocks experimental design with three replications. In the experiment, plots were prepared with 50x100 cm planting distance and 25 plant seedlings per plot.The hybrid seeds used in the study were sown manually in viols filled with peat + perlite + vermiculite at the ratio of 3:1:1, then control and irrigation studies were carried out in an environment suitable for production. Plant seedlings were planted on February 15. Vermicompost (VC), bat manure (YG), seaweed (DY) and Arbuscular Mycorrhizal Fungus (AMF) were used as fertilizer material in the research. Study subjects; control, AMF, KG (recommended dose), AMF+7/10 KG, (300ml/100L water/da VK + Mycorrhiza+ 7/10 KG), (300 ml/100L water/da DY+ AMF +7/10 KG) and (1000cc/100 L water/da HV + AMF+ 7/10 KG). According to the soil analysis results, the recommended amount of fertilizer was determined as 180 kg.ha-1 N, 120 kg.ha-1 P, 200 kg ha-1 K, but the applied chemical fertilizer (KG) amounts; were 30% NPK (7/10 KG) has been applied. The liquid form of all fertilizer materials used , and the applications were given in the form of drip irrigation at recommended doses.

Evaluation and statistical analysis of data

The data obtained at the end of the experiment were analyzed by analysis of variance according to the randomized plot design in the JUMP package program, and in the statistically significant results, Tukey's multiple comparison test was applied at 1% and 5% significance level to determine the difference between the applications.

Mycorrhizal applications

A single dose of arbscular mycorrhizal fungi (*Glomus mosseae* and *Glomus intraradices* Arbuscular) was applied. Seedlings were planted by dipping for 20 seconds into the solution prepared by mixing 5 g of mycorrhiza in 2 liters of distilled water.

The reduced nutrient levels with the mycorrhizal inoculation used in the experiment were as follows:

1) Control application (not applied)

2) Mycorrhizal inoculation only

3) 100 % chemical fertilizer has been applied (KG)

4) Bat manure (YG) + mycorrhiza (AMF) + 30% reduced chemical fertilizer (7/10 KG)

5) Vermicompost (VC)+mycorrhiza(AMF) + 30% reduced chemical fertilizer (7/10 KG)

6) Seaweed (DY) + mycorrhiza (AMF) + 30% reduced chemical fertilizer (7/10 KG)

7) Mycorrhiza (AMF) +30% reduced chemical fertilizer (7/10 KG)

Results and Discussion

The effects of different organic fertilizer and mycorrhiza applications on the differences in fruit height were found to be statistically significant at the P<0.05 level. According to the research results in Table 5; When the effect of different fertilizer and mycorrhiza correlations on fruit length was examined, the highest value was obtained from YG+AMF+7/10 KG (23.29 cm) application, and the lowest value was obtained from control (20.61 cm) application. In other applications, AMF (21.19cm), KG (22.32 cm), VC+AMF+7/10 KG (21.17 cm), DY+AMF+ 7/10 KG (22.26 cm), AMF +7 /10 KG (21.29 cm) values were obtained. As a result of the applications, the average fruit length was calculated as 21.82 cm. The effects of the applications on the differences in fruit diameter were found to be statistically significant at the P<0.05 level. As a result of the correlations of different organic fertilizer and mycorrhiza applications; the highest value obtained in fruit diameter was determined in the YG+AMF+7/10 KG (21.93 cm) treatment, while the lowest value was determined in the control (15cm) application. Results from other treatments; AMF (19.3 cm), KG (21.04 cm), VC+AMF+7/10 KG (20.37 cm), DY+AMF+7/10 KG (20.76 cm), AMF+7/10.KG (21.02 cm). As a result of the applications, the average fruit diameter was calculated as 19.92 cm. Dere et al. (2019), mycorrhiza and reduced doses of chemical fertilizers were used in melon cultivation in soilless environment. They reported that mycorrhiza increased the growth, yield, fruit quality and leaf nutrient concentrations of the melon plant. The effects of the treatments on the differences in fruit weight were found to be statistically significant at the P<0.05 level. The highest value obtained as a result of different fertilizer and mycorrhiza correlations was determined in YG + AMF + 7/10 KG (2175 g) treatment, and the lowest value was determined in control (1502 g). According to other application results; AMF (1876 g), KG (1971 g), VC+AF+7/10 KG (2023 g), DY + AMF+7/10 KG (2139 g) ve AMF+7/10 KG (1968 g)) values were obtained. As a result of the applications; Average fruit weight was calculated as 1950 g. Since the effects of the applications on the fruit flesh thickness were at the same level of importance, they were not found to be statistically significant, but an increase was achieved compared to the control application. As a result of the applications, the highest value was determined as DY+AMF+77/10 KG (5.7 cm), while the lowest value was obtained from the control (4.9 cm) application. As a result of the applications, the average fruit flesh thickness was found to be 5.34 cm. The effects of the applications on the average fruit skin thickness were found at the same level of importance and there was no statistically significant difference between them. Average fruit skin thickness was found to be 4.24 cm. The effects of different organic fertilizer and mycorrhiza applications on the differences between the average fruit number were found to be statistically significant at the P<0.05 level. As a result of different fertilizer and mycorrhiza correlations, the highest value was determined in the application of YG + AMF + 7/10 KG (2.7 peces/plant) and the lowest value was determined in the control (2.4 peces/plant). Calculated as AMF (2.6 peces/plant), DY+AMF+7/10 KG, VC+AMF+7/10 KG and KG (2.5 peces/plant). As a result of the applications, the average fruit number was found as 2.54 pieces/plant. They reported an increase in plant growth and yield as a result of the effective use of photoassimilation in AMF-

grafted tomato plants (DASGAN et al., 2008). Since the effects of the treatments on the fresh leaf weight were at the same level of importance, the difference between them was not statistically significant, but an increase was achieved compared to the control application. As a result of the applications, the highest value was determined in the YG+AMF+7/10 KG (334 g) application, while the lowest value was obtained in the control (315 gr) application. AMF (327 g), KG (332 g), VC+AMF+7/10 KG (331 g) ve DY + AMF+7/10 KG (328 g) and AMF+7/10 KG (332 g) results are obtained. The average of the aplications was calculated as 328.4 g. The effects of the applications on the differences between the average dry weight of the leaves were found to be statistically significant at the P<0.05 level. As a result of different fertilizer and mycorrhiza correlations, the highest value was determined in YG + AMF + 7/10 KG (10.36 g) application, while the lowest value was found in control (9.18 g) application. In other treatments; AMF (9.5 g), YG (9.1 g), VC+AMF+7/10 KG (9.03 g) ve DY+AMF+7/10 KG (9.4 g), AMF+ 7/10 KG (9.5 g) results have been obtained. As a result of the applications, the average dry weight of the leaves was found to be 9.44 g. The effect of applications on average fruit pH was not found to be statistically significant. As a result of the applications, the highest value was determined in YG+AMF+7/10 KG, DY +AMF+7/10 KG (6.66) applications, and the lowest value was determined in the control application (6.63). Since the effects of different organic fertilizer and mycorrhiza applications on the average water- soluble dry matter content were at the same level of importance, the difference between them was not statistically significant. As a result of the applications, the highest value was determined in the application of YG+AMF+7/10 KG (9.18) and the lowest value in the application of AMF (9.13). Others are between (9.13-9.18) values. The average of the application was calculated as 9.145. According to the data in Table 6, the effects of mycorrhiza applications at different organic fertilizer and reduced KG doses on the differences between average fruit height were found to be statistically significant at the P<0.05 level. As a result of different fertilizer and mycorrhiza correlations, the highest value in the effect on fruit height was obtained from YG + AMF + 7/10 KG (23.29 cm) application, while the lowest value was determined in the control application (18.36 cm) In other applications; AMF (20.87 cm), KG (22.34 cm), VC + AMF+7/10 KG (20.65 cm) DY+AMF + 7/10 KG (22.64 cm), DY (20.75 cm) ve AMF +7 /10 KG (22.81 cm) results were obtained.

Table 5 - The effects of applications and interactions on yield and quality factors in the results of the research conducted in greenhouse-A.

Applcations	Fruit					Number of Fruits (piece/ herb)	Leaf fresh weight (g)	Leaf dry weight (g)	PH	Amount of dry matter dissolved in water
	Length (cm)	Diameter of (cm)	weight (g)	meat thickness (cm)	Shell thickness (cm)					
Control	20.61c	15c	1502ab	4.9b	4.2a	2.4b	315b	9.18c	6.63a	9.14a
AMF	21.19b	19.34b	1876ab	5.3a	4.3a	2.6b	327a	9.5b	6.64a	9.13a
K.G(full dose)	22.32ab	21.04ab	1971ab	5.2a	4.1a	2.5b	332a	9.16c	6.65a	9.13a
YG+AMF+7/10.KG	23.29a	21.93a	2175a	5.6a	4.3a	2.7a	334a	10.36a	6.66a	9.18a
VC+AMF+7/10.KG	21.17b	20.37ab	2023ab	5.3a	4.2a	2.5b	331a	9.03c	6.64a	9.14a
DY+AMF+7/10.KG	22.26ab	20.76ab	2139a	5.4a	4.3a	2.5b	328a	9.4b	6.63a	9.16a
AMF+7/10.KG	21.96b	21.02ab	1968ab	5.7a	4.3a	2.6b	332a	9.5b	6.65a	9.14a
Average	21.82	19.92	1950	5.34	4.24	2.54	328.4	9.44	6.64	9.145

LSD 0.05 P<0.05. YG: Bat dung, VC: Vermicompost, SD: Seaweed
The averages followed by the same letters in the column do not differ according to the Tukey test (1% and 5%).

Table 6. The effects of applications and interactions on yield and quality factors in the results of the research conducted in greenhouse-B.

Applications	Fruit					Number of Fruits (piece/herb)	Leaf		PH	Amount of dry matter dissolved in water
	Length (cm)	Diameter of (cm)	weight (g)	meat thickness (cm)	Shell thickness (cm)		fresh weight (g)	dry weight (g)		
Control	18.36c	16.34c	1642ab	4.7b	4.32a	2.52b	311b	8.76c	6.4a	9.17a
AMF	20.87b	20.53b	1926ab	5.5a	4.38a	2.65a	334a	9.28b	6.63a	9.15a
K.G(full dose)	22.34a	20.76b	2061a	5.5a	4.24a	2.62a	336a	9.36b	6.66a	9.1a
Y.G+AMF+7/10.KG	23.36a	22.63a	2320a	5.6a	4.35a	2.76a	335a	10.17a	6.65a	9.21a
VC+AMF+7/10.KG	20.65b	21.77ab	2183a	5.4a	4.23a	2.55b	327a	9.13c	6.62a	9.18a
DY+AMF+7/10.KG	22.64a	20.76ab	2217a	5.4a	4.3a	2.66a	338a	9.41b	6.6a	9.12a
AMF+7/10.KG	22.81a	22.28a	1874ab	5.5a	4.36a	2.64a	334a	9.55b	6.64a	9.15a
Average	21.57	20.72	2031	5.37	4,31	2.62	330.7	9.38	6.6	9.15

LSD 0.05 P<0.05. YG: Bat dung, VC: Vermicompost, SD: Seaweed
The averages followed by the same letters in the column do not differ according to the Tukey test (1% and 5%).

The average fruit length of the applications was found to be 21.57 cm. The effects of the applications on the differences between the mean fruit diameter were found to be statistically significant at the P<0.05 level. As a result of different fertilizer and mycorrhiza correlations, the highest value was obtained from YG+ AMF + 7/10 KG (22.63 cm) application, and the lowest value was obtained in the control (16.34 cm) application. In other applications, AMF (20.53 cm), KG (20.76 cm), VC+AMF+7/10 KG (21.77 cm), DY+AMF+7/10 KG (20.76 cm), AMF+7/10 KG (22.28 cm) results were obtained. The average fruit diameter of the applications was found to be 20.72 cm. The effects of the applications on the differences between the average fruit weight were found to be statistically significant at the P<0.05 level. As a result of different fertilizer and mycorrhiza correlations, the highest value was determined in the application of YG + AMF+7/10.KG (2320 g), while the lowest value was obtained in the control (1642 g) application. AMF (1926 g), KG (2061 g), VC+AMF+7/10 KG (2183 g), DY+ AMF+7/10 KG (2217 g) and DY+7/10 KG (1874 g)) was measured. The average of the applications is calculated as 2031g. According to the results of the study on lettuce; As a result of AM inoculation, chlorophyll synthesis, root activity and absorption increased, so the efficiency of photosynthesis increased, resulting in an increase in plant growth and yield (BASLAM et al., 2013; CHEN et al., 2017). The effects of different organic fertilizer and mycorrhiza applications on the differences in fruit flesh thickness were found to be statistically significant at the P<0.05 level and increased compared to the control application. The highest value measured in applications was YG+AMF+7/10 KG (5.6 cm), and the lowest value was determined in the control (4.7cm) application. The average fruit flesh thickness of the treatments was found as (5.37 cm). The effects of the applications on the average fruit skin thickness were not found to be statistically significant since they were at the same level of importance. As a result of the applications, the highest value was obtained in the AMF (4.38 cm) application, while the lowest value was measured in the VC+AMF+7/10 KG (4.23 cm) application. Other applications are located between (4.23-4.38cm). Average fruit skin thickness was calculated as (4.31 cm). The difference between the effects of the treatments on the number of fruit per plant was found to be statistically significant at P<0.05. As a result of different fertilizer applications and mycorrhiza correlations, the highest value was determined in the application of YG + AMF + 7/10 KG (2.76 pieces/plant) and the lowest value

was determined in the control (2.52 pieces/plant). In other applications, AMF(2.65 pieces/plant), KG (2.62 pieces/plant), VC+AMF+7/10 KG (2.55 pieces/plant), DY + AMF+7/10 KG (2.66 pieces/plant) and AMF+7/10 KG (2.64 pieces/plant) results were obtained. The average of the applications was found to be 2.62 pieces/plant. Maboko et al. (2013), in tomato cultivation in heated tunnels, mycorrhizal applications at reduced nutrient levels increased yield and quality, but mycorrhizal inoculation in unheated tunnels had no effect on product quality.

The effects of different organic fertilizer and mycorrhiza applications on the fresh leaf weight were at the same level of importance because the difference between them was not statistically significant, but it increased compared to the control application. As a result of the applications, the highest value was determined in the DY+AMF+7/10 KG (338 g) application, and the lowest value was determined in the control (311 g) application. The average of the applications was found to be 330.7 g. Since the effects of the applications on the dry weight of the leaves were at the same level of importance, the difference between them was not statistically significant. As a result of the applications, the highest value was obtained from the YG+AMF+7/10 KG (10.17 g) application, while the lowest value was determined in the control (8.76 g) application. The average of applications was calculated as 9.38 g. Since the effects of the applications on fruit pH were at the same level of importance, the difference between them was not found to be statistically significant. As a result of the applications, the highest value was determined in the KG (6.66) application, and the lowest value was determined in the control (6.4) application. The average of the applications was calculated as 6.6. The effects of different organic fertilizer and mycorrhiza applications on the amount of water-soluble dry matter were not found statistically significant. As a result of the applications, the highest value was determined in the application of YG + AMF + 7/10 KG (9.21), while the lowest value was obtained in the application of KG (9.1). The average of the applications was found to be 9.15.

Conclusions

In herbal production, excessive and disproportionate amounts of chemical fertilizers are used to increase product yield. Much more chemical fertilizers are used in greenhouse agriculture than in field conditions. This situation causes problems such as food safety and environmental health. When the data obtained in the study according to the measurements made on the samples in melon cultivation carried out in two locations in the greenhouse system; The effects of treatments on fruit length, fruit diameter, fruit weight and fruit number were found to be positive. The better results obtained in some important yield parameters in Greenhouse-B can be explained by the fact that the greenhouse is exposed to less wind due to its location. While the best results were obtained from YG+ AMF+7/10 KG application in both greenhouse environments, a significant increase in yield was achieved in VC+ AMF+7/10 KG and DY+ AMF+7/10 KG applications. These three prominent treatments significantly increased yields compared to the recommended full-dose fertilizer (KG) application. In the study, as a result of the application of mycorrhiza, bat manure, vermicompost, seaweed and 30% reduced chemical fertilizer combinations in greenhouse melon cultivation, the organic content of the soil is constantly improved, and the product yield and quality are increased.

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