Effects of Vermicompost Extract on Growth and Development of 0900 Ziraat Sweet Cherry Cultivar (*Prunus avium* L.) Sapling

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Abstract: The areas where sweet cherries can be grown economically in the world are limited. Sweet cherry production varies according to years and climatic conditions. The climate of Turkey is quite suitable for sweet cherry growing. It has been determined that vermicompost contains a high percentage of organic matter and increases the growth of the plants. In this context, it is aimed to obtain quality nursery trees for new orchards to be established by considering of the effect of vermicompost on maintaining proper soil structure and enhanced nutrient availability to the plants. In this study, the effects of vermicompost application on growth and development of sweet cherry saplings were investigated. In the research, 0900 Ziraat sweet cherry variety nursery trees were used, which are widely grown in Türkiye. 2.5, 5, 10, and 20% vermicompost applied to the saplings. According to the results of the study, the highest sapling diameter (10.07 mm); highest sapling length (33.18 cm); highest root fresh weight (146.50 g); highest root dry weight (46.47 g); highest stem fresh weight (88.80 g); highest trunk dry weight (46.47 g); highest root length (40.80 cm); the highest number of rootstocks (9.30 pcs.); highest shoot length (10.64 cm); highest shoot diameter (4.12 mm); the highest number of shoot leaves (8.86 pieces) was determined from 10% vermicompost application, and the highest leaf area (33.80 cm2 tree-1) and highest rootstock diameter (16.73 mm) from 5% vermicompost application. According to the results, 5% and 10% vermicompost application can be recommended in the production of sweet cherry saplings.

Keywords: Vermicompost, sweet cherry sapling, 0900 Ziraat cultivar, growth and development

Sıvı Solucan Gübresinin 0900 Ziraat Kiraz Çeşidi (Prunus avium L.) Fidanlarında Büyüme ve Gelişme Üzerine Etkileri

Öz: *Kirazın, dünyada ekonomik olarak yetiştirilebileceği alanlar sınırlıdır. Kiraz üretim miktarı iklim şartlarına ve yıllara bağlı olarak değişmektedir. Türkiye'de iklim şartları kiraz yetiştiriciliği için son derece uygundur. Solucan gübresinin yüksek oranda organik madde içerdiği ve bitkilerin gelişimini artırdığı tespit edilmiştir. Bu kapsamda solucan gübresinin, toprak yapısını düzenleyici etkisi ve bitkilere besin elementleri sağlama özelliğinden faydalanılarak kurulacak yeni bahçeler için kaliteli fidan elde edilmesi amaçlanmıştır. Bu çalışmada kiraz fidanlarında solucan gübresi uygulamasının büyüme ve gelişme üzerine etkileri araştırılmıştır. Araştırmada Türkiye'de yetiştiriciliği yaygın bir şekilde yapılan ve önemli ihraç ürünlerinden biri olan 0900 Ziraat kiraz çeşidi fidanları kullanılmıştır. Fidanlara %2.5, 5, 10 ve 20 oranlarında vermikompost uygulanmıştır. Çalışma sonuçlarına göre, en yüksek kalem çapı (10.07 mm); en yüksek kalem boyu (33.18 cm); en yüksek kök yaş ağırlığı (146.75 g); en yüksek kök kuru ağırlığı (46.47 g); en yüksek gövde yaş ağırlığı (88.80 g); en yüksek gövde kuru ağırlığı (46.47 g); en yüksek kök uzunluğu (40.80 cm); en yüksek ana kök sayısı (9.30 adet); en yüksek sürgün boyu (10.64 cm); en yüksek sürgün çapı (4.12 mm); en yüksek sürgün yaprak sayısı (8.86 adet) vermikompost % 10 uygulamasından ve en yüksek yaprak alanı (33.80 cm2) ve en yüksek anaç çapı (16.73 mm) vermikompost % 5 uygulamalarında tespit edilmiştir. Elde edilen bulgulara göre kiraz fidanı üretiminde %5 ve %10'luk vermikompost uygulaması tavsiye edilebilir.*

Anahtar kelimeler: *Solucan gübresi, kiraz fidanı, 0900 Ziraat çeşidi, büyüme ve gelişme*

INTRODUCTION

Sweet cherry (Prunus avium L.) is in the Prunus genus of the Rosaceae family and is defined as all the edible fruits and species belonging to this genus (Özbek, 1978). Its homeland is the Caspian Sea, South Caucasus and North East Anatolia, and the area-spread out Southern and Central Europe, North-West Iran and the Caucasus (Davis, 1972).

The fact that the sweet cherry is a flamboyant fruit that is consumed with pleasure and sweet cherry orchards have being expanded depending on the increasing demand in the international markets (Tamdoğan, 2006). Despite sweet cherry has a wide distribution area in the world, harvestable amounts is largeley dependent on the climatic conditions, espacially late spring frost. Turkey's climatic conditions are extremely suitable for sweet cherry growing therefore Turkey ranks the first in the world in sweet cherry production. The important sweet cherry producing countries in the world are respectively; Turkey, USA, Uzbekistan, Chile, and Iran. Turkey produces about a quarter of the cherry produced in the world (FAO, 2019).

The requirement of modern sweet cherry growing is that the trees bear fruit in the early period, the yield per unit area is increased, cultural activities can be carried out more comfortably and economically, and quality and regular

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products are obtained every year. In order to achieve these goals, first of all, it is necessary to use the right and high quality saplings (Soylu et al., 2003).

Due to rapid product increase, during the World War II, the movement based on the principles of the use of pesticides and chemical fertilizers, called the "Green Revolution" in agriculture, gained quite a reputation (Schuman and Simpson, 1997). However, it has been determined that the residues left by the intensified use of chemical fertilizers and pesticides accumulate in plants and soil, and as a result of mixing with underground water resources, they put human and animal health at risk, and the residues cause the emergence of teratogen, mutagenic and carcinogenic effects (Baier-Anderson and Anderson, 2000). Chemicals used extensively in agriculture; It is stated that it causes negative effects on agricultural areas, infertility of the soil and deterioration in soil structure (Chen et al., 2010).

Today, it is recommended to use organic and chemical fertilizers together in order to preserve the fertility of the soil and improve the properties of the soil. Among the studies carried out for this purpose, the use of vermicompost, which has an effect on increasing the nutrient and organic matter content of the soil, is also included (Huang et al., 2013; Emperor and Kumar, 2015).

The process of composting the organic matter consumed by some special earthworm species that feed on animal and vegetable wastes and turning them into a high-value fertilizer is called 'vermicomposting'. The final product formed as a result of this process is called 'Vermicompost' or 'Biohumus' (Karaçal and Tüfenkçi, 2010). Vermicompost, also called 'vermicest', is earthworm excrement in which the rich organic material produced by earthworms is turned into a fertilizer that improves soil structure. Vermicompost has a homogeneous, odorless and granular structure and is a slow-release fertilizer. Worms leave the important nutrients in the organic materials in the nutrients they take in order to digest them with a higher solubility. Vermicompost is a nutrient source that plants can benefit from for a long time due to its readily soluble and slow release properties (Buchanan et al., 1988). Humic substances obtained from vermicompost also contain substances of hormonal nature that are effective on plant growth (Atiyeh et al., 2002; Arancon et al., 2006)

Organic matter; has great importance in terms of sustainable agriculture and soil fertility. Almost all of Turkey's soils are poor in terms of organic matter. For this reason, organic fertilizers are very important for the enhancing soil structure. The fact that soils are poor in organic matter and nutrients, increases the importance of applying both farmyard manure and all other organic fertilizers to the soil. More than 75% of Turkey's soils contain low amounts of nitrogen and organic matter. Soil with sufficient and rich organic matter content are as low as 6%. In 75%, the amount of plant available phosphorus is very little or less. Only in 14% of Turkish soils have a phosphorus concentration above the sufficiency treshold, potassium concentration in the soils are generally sufficient and rich (80%) only 1.3% of the poor (Yetgin, 2010).

Vermicompost is easily applied to all plants and has effects on conditioning soil structure and supplying plant nutrients in readily and potantially avaliable plant nutrients. However, the accumulation of urban wastes, which is one of the environmental problems, in certain places pollutes the environment in terms of both solid matter and odor. Instead, a two-sided advantage can be achieved by producing vermicompost from city waste. As it is known, when city wastes are accumulated on top of each other, they can explode due to gas compression, and when burned, they pollute the air. The importance of vermicompost will be understood as a result of the awareness that nature conservation should be one of the basic social goals and a significant contribution will be made to organic agriculture in the coming years (Demir et al., 2010).

Vermicompost increases the plant available nutrients required for growth and develoment in seedlings (Edwards, 1995). It has been reported that the addition of 10-40% vermicompost to the growth media was the most beneficial for plant growth and development. It has been stated that plant growth regulators such as gibberellin, auxin and cytokinin are found in vermicompost (Tomati et al., 1988) accordingly with. The high levels of humic matter and humus (Atiyeh et al., 2002).

In this study, the effects of liquid vermicompost application at different doses on growth and development of 0900 Ziraat sweet cherry cultivars were investigated.

MATERIAL AND METHODS

Material

0900 Ziraat sweet cherry cultivar saplings grafted on one mazzard were used. The saplings were planted in 20 liter pots with a mixture of peat, soil and perlite (1:1:1) and grown under greenhouse conditions.

0900 Ziraat: It is of Anatolian origin. The trees show semi-upright and vigorous growth, forming a wide crown. Fruit properties are; large, broad heart-shaped, very hard textured, crunchy, long-stemmed and pinkish-red. The fruit is juicy and resistant to transport and cracking. It is resistant to bacterial cancer and its core is attached to fruit flesh. Ripening is in the last week of June (Akgül et al., 2005).

Mazzard (Prunus avium): It is a rootstock widely used in cherry varieties. It has a strong structure and has a late fruiting feature. It shows well matches in terms of rootstock-scion relations or many varieties. Loamy, permeable and fertile soils is more suitable. Because it is difficult to

propagate by vegetative methods, nurseries generally prefer seedling rootstocks grown from seed (Demirtas and Sarisu, 2011).

Vermicompost: Generally preferred materials for vermicompost production are vegetable wastes, industrial wastes, domestic wastes and cattle manure. The most preferred material is cattle manure (Pamir, 1985). The species, also known as "California Red Worm", is commonly used, but in areas where it is produced for commercial purposes, the most commonly used species is Esensia spp. (Bansal and Kapoor, 2000) and Lumbricus spp. types (Dickerson, 2004).

Table 1 - The composition of the vermicompost used in the research

Total Organic Matter	%67.94
Total Humic-Fulvic Acid	%4.47
Nitrate Nitrogen (NO_3-N)	%0.56
Water-Soluble Potassium Oxide (K_2O)	%5.26
EC (ms/cm)	2.22
pH	7.36

Methods

In the research, 1-year-old saplings were pruned without planting, and the tops were cut from 25 -30 cm to 7 buds in order to avoid any difference between the sapling used. After planting, liquid vermicompost was applied once a month until the shoot growth stopped. Irrigation processes of the saplings were carried out in pots as in normal nursery conditions. After the saplings were planted, fertilization was made 4 times and 5 g of pure nitrogen, phosphorus and potassium composed fertilizer (15-15-15). Properly describe whole fertilization procedure was given per sapling in each application.

Experiment applications were control, 2.5%, 5%, 10%, 20% vermicompost. Vermicompost commercial formulation was diluted at the specified rates and applied are the total amounts the same.

In the study, morphological measurements such as leaf area, plant fresh and dry weight, root fresh and dry weight, number of branches and length were performed.

The experiment was set-up in completely randomized design with 5 replications and 10 plants in each replication, with a total of 50 plants for each treatment.

The following observations and measurements were made at the end of the growth period of the saplings:

Rootstock diameter (cm): Just above the root collar, by means of a caliper (Şahin, 2015).

Scion diameter (cm): Just above the graft point, by means of a caliper (Şahin, 2015).

Scion length (cm): The part from the graft point to the tip of the longest shoot was measured with the help of a tape measure (Şahin, 2015)..

Root fresh and dry weight (g): The roots of the seedlings that were removed without damaging the roots were separated from their stems and placed in bags, and first the fresh weight and then the oven-dry (72 hours at 80oC) weight were determined on a balance sensitive to ±0.01 g (Şahin, 2015).

Stem fresh and dry weight (g): The stems of the uprooted saplings were placed in a paper bag and first the fresh weight and then the oven-dry weight (72 hours at 80oC) were determined balance sensitive to ±0.01 g (Şahin, 2015).

Root length (cm): It was removed without damaging the roots and the part from the root collar to the tip of the longest root was determined with the help of a tape measure (Şahin, 2015).

Number of primary roots: It was determined by counting the primary roots by removing them without damaging the roots (Şahin, 2015).

Number of shoots: Number of shoots was determined (Şahin, 2015).

Shoot length (cm): The part of the shoots formed in the sapling up to the tip was determined with the help of a tape measure (Şahin, 2015).

Shoot diameter (cm): It was measured 2 cm above the growth point of the shoot by means of a caliper (Şahin, 2015).

The number of shoot leaves (pieces): It was determined by counting the leaves in the shoot before the leaves fall (Şahin, 2015).

Dickson quality index (DQI): In order to determine the sapling quality, the formula developed by Dickson et al., (1960) for saplings of forest trees was used for fruit saplings. In cases where the quality index is close to 1 or higher, the saplings are considered as high quality (Aslan, 1986).

$$\text{Dickson Quality Index} = \frac{\text{Sapling Dry Weight (g)}}{\frac{\text{Sapling Length (cm)}}{\text{Root Collar Diameter(mm)}} + \frac{\text{Stem Dry Weight (g)}}{\text{Root Dry Weight(g)}}}$$

Nowadays, it is essential to develop a classification system suitable for this, when it is desired to have many well- which the length and number of side branches are added as a multiplier to the Dickson Quality Index (Şahin, 2015).

The formula is as follows:

NB = Number of Branches

LBL = Lateral Branch Length (m)

Leaf area: Leaf area was measured in mature leaves from plants using the Winfolia leaf area meter. Measurements were made on 10 leaves selected randomly from plants belonging to all treatments.

developed branches in the saplings to be used in fruit growing. Accordingly, a formula has been developed in

FSQI = DQI x NB x (1 + LBL)

FSQI = Fruit Sapling Quality Index

DQI = Dickson Quality Index

Statistical Analysis

ANOVA analysis was performed in completely randomised design in SPSS 25 package program. Duncan multiple range test was used for mean separation at $p<0.05$ (Düzgüneş et al., 1987).

RESULTS and DISCUSSION

The effect of vermicompost applications on rootstock diameter was found to be statistically significant (Table 2). The highest rootstock diameter among vermicompost applications was obtained from 10% application (16.74 mm) and followed by 5% (16.31 mm), 2.5% (15.47 mm) and control (15.38 mm) respectively. The lowest result was obtained from the application of 20% vermicompost with 14.90 mm.

Table 2. The effect of vermicompost applications on rootstock diameter, scion diameter and scion length

Applications	Rootstock diameter (mm)*	Scion diameter (mm)	Scion length (cm)
Control	15.38 b	8.31 b	28.49 b
Vermicompost 2.5%	15.47 b	8.72 b	31.55 a
Vermicompost 5%	16.31 ab	9.75 a	32.47 a
Vermicompost 10%	16.74 a	10.07 a	33.18 a
Vermicompost 20%	14.90 c	8.32 b	29.71 b

*Different letter in the same column indicate difference between mean values at $p<0.05$

Plants can directly take and use 97% of the plant nutrients (especially N, P and K) contained in vermicompost. Therefore, a rich vermicompost, the amount of nitrogen that can be used directly in the soil is 5 times higher and the amount of potassium 7 times higher (Barley, 1961).

The effect of vermicompost applications on scion diameter was found to be statistically significant. Among the vermicompost applications, the highest values were obtained from 10% (10.07 mm) and 5% (9.75 mm) applications, while the lowest values were found in control (8.31 mm), 20% (8.32 mm) and 2.5% (8.72 mm) applications (Table 2).

The results obtained regarding the scion diameter are similar to the results of a study examining the effects of vermicompost on olive saplings (Bellitürk et al., 2012). In addition, the richness of the nutrient content of vermicompost is thought to be effective on the increase in the diameter of the saplings.

The effect of vermicompost applications on scion length was found to be statistically significant (Table 2). Among the vermicompost applications, the highest scion size was determined from 10% (33.18 cm), 5% (32.47 cm) and 2.5% (31.55 cm) vermicompost applications. The lowest scion length was obtained from control (28.49 cm) and 20% (29.71 cm) vermicompost applications.

Our results regarding scion size are similar to the results of a study on olive saplings (Bellitürk et al., 2012). Again, in a study on tomato plants, it was determined that vermicompost applications increased plant height (Abafita et al., 2014).

The effect of vermicompost applications on root fresh weight was found to be statistically significant (Table 3). While the highest value in root fresh weight was obtained from 10% vermicompost (146.50 g), the lowest value was obtained from the control treatment (117.20 g). It was determined that 10% application of vermicompost increased the root fresh weight by as much as 25% compared to the control.

The root weight increasing effect of vermicompost is also a result of its rich nutritional and growth-regulating substance content. In the study conducted by Flores (2014) on grapevine cuttings, it was determined that vermicompost increased root development.

Table 3. The effects of vermicompost applications on root fresh weight, root dry weight, stem fresh weight and stem dry weight

Applications	Root fresh weight (g)	Root dry weight (g)	Stem fresh weight (g)	Stem dry weight (g)
Control	117.20 d	49.76 d	72.00 e	34.14 d
Vermicompost 2.5%	142.00 b	53.16 c	80.40 c	39.71 b
Vermicompost 5%	142.00 b	63.44 b	84.20 b	44.02 a
Vermicompost 10%	146.50 a	69.19 a	88.80 a	46.47 a
Vermicompost 20%	133.40 c	51.21 c	76.30 d	36.50 c

*Different letter in the same column indicate difference between mean values at p<0.05

The effect of vermicompost applications on root dry weight was found to be statistically significant and the highest root dry weight among applications was obtained from 10% vermicompost application (69.19 g) and followed by 5% (63.44 g), 2.5% (53.16 g) and 20% vermicompost treatments (51.21 g) followed this, respectively. The lowest result of root dry weight was determined in the control application (49.76 g).

Root dry weight increase with vermicompost application is also associated with rich nutrient and growth regulator content. Similarly, in a study on the subject, an increase in root dry weight of vermicompost application was found in curly lettuce compared to the control (Yıldız, 2018).

The effect of vermicompost applications on stem fresh weight was found to be statistically significant. Among the applications, the highest result was found in 10% vermicompost application (88.80 g). When the effect on stem fresh weight was examined, the lowest result was determined from the control application with 72.00 g.

The effect of vermicompost applications on stem dry weight was found to be statistically significant. Among the doses applied, the highest dry weight of the trunk was obtained from 10% (46.47 g) vermicompost and 5% (44.02 g) vermicompost applications. When the effect on trunk dry weight was examined, the lowest result was obtained from the control application (34.14 g) (Table 3).

Rapid development in sapling production is a desirable feature. In this way, it is possible to obtain saplings ready for sale as soon as possible. Various applications are made to achieve this aim. Body weight increase in saplings is an indicator of rapid development. In our study, vermicompost applications increased the stem fresh and dry weight of sweet cherry saplings. Similar studies also support this result. In the study carried out on summer rice, it was determined that vermicompost applications increased vegetative growth in plants as a result of comparing chemical fertilizer applications with vermicompost applications (Kale and Bano, 1986). Again, Küçükyumuk et al. (2014), it was determined that mycorrhiza and vermicompost applications had a positive effect on the fresh and dry weight of pepper plants.

The effect of vermicompost applications on root length was found to be statistically significant. While the highest root length was obtained from the 10% vermicompost application (40.80 cm), the lowest root length was obtained from the control treatment (34.30 cm) (Table 4)

Table 4. The effect of vermicompost applications on root length and primer root number

Applications	Root length (cm)	Number of Primer root
Control	34.30 e	6.60 d
Vermicompost 2.5%	37.10 c	7.30 c
Vermicompost 5%	38.50 b	8.50 b
Vermicompost 10%	40.80 a	9.30 a
Vermicompost 20%	36.10 d	7.10 d

*Different letter in the same column indicate difference between mean values at p<0.05

The effect of vermicompost applications on the number of primer roots in sapling was found to be statistically significant. Among the applications, the highest primer root number was determined in the vermicompost 10% application (9.30), while the lowest primer root number was determined as 6.60 and 7.10 in the control and vermicompost 20% applications, respectively (Table 4).

Vermicompost increases the useful nutrients required for the plant for growth and development (Edwards, 1995) and contains plant growth regulators such as gibberellin, auxin and cytokinin (Tomati et al., 1988). For this reason, increasing doses of vermicompost applications in sweet cherry saplings also increased root development.

The effect of vermicompost applications on shoot length was found to be statistically significant. The highest shoot length is from 10% (10.64 cm) and 5% (10.39 cm) vermicompost applications.

The effect of vermicompost applications on shoot diameter was found to be statistically significant. The highest shoot diameter values were obtained from 10% (4.12 mm) and the lowest control treatment (3.74 mm) (Table 5).

Table 5**.** The effect of vermicompost applications on shoot length, shoot diameter and shoot leaf number

Applications	Shoot length (cm)	Shoot diameter (mm)	Leaf number on shoot	Leaf area (cm²)
Control	8.85 b	3.74 b	7.66 b	30.41 b
Vermicompost 2.5%	8.67 c	3.95 a	7.96 a	32.26 a
Vermicompost 5%	10.39 a	4.09 a	8.28 a	33.80 a
Vermicompost 10%	10.64 a	4.12 a	8.86 a	33.07 a
Vermicompost 20%	9.16 b	3.94 a	7.77 b	30.73 b

*Different letter in the same column indicate difference between mean values at p<0.05

The effect of the applications on the number of shoot leaves was found to be statistically significant. The highest number of shoot leaves was determined in 10% (8.86 units) and 5% (8.28 units). The lowest results among vermicompost applications were obtained from control (7.66 units) treatments (Table 5).

The applications were found to be statistically significant on the leaf area. The highest results were observed in the application of 5% (33.80 cm2) and 10% (33.07 cm2). The applications with the lowest leaf area average were the control group with 30.41 cm2. Healthy leaf development in plants is extremely important in terms of providing an effective photosynthetic surface and performing the plant's assimilation activity in the best way. In this respect, the increase in leaf area in plants can be considered as a positive indicator. In our study, it was determined that all vermicompost doses in cherry sapings increased the leaf area significantly compared to the control. This effect is thought to be related to the rich content of vermicompost, as in other parameters. Studies on the subject also support this idea. Arancon et al. (2003) vermicompost application significantly increased the leaf area in pepper and tomato, giving results close to chemical fertilizer applications. Significant increases in leaf area were detected with increasing doses of vermicompost in potatoes (Alam et al., 2007).

Vermicompost applications were found to have positive effects on shoot growth in sweet cherry saplings. It is thought that this effect is due to the improvement of the nutrition of the plants. Different studies on the subject also support this view. It has been determined that vermicompost significantly increases vegetative growth in Trakya İlkeren grape saplings (Açıkbaş, 2016). Arancon et al. (2003) vermicompost application significantly increased shoot length in pepper and tomato. In a study examining the effects of vermicompost applications on lettuce, it was determined that the applications increased the number of leaves to the control (Karademir, 2019).

The effect of vermicompost applications on Dickson quality index in seedlings is given in table 6. The effect of the applications on the Dickson quality index was found to be statistically significant. Among the vermicompost applications, the highest Dickson quality index was found in 10% (27.22) and 5% vermicompost applications (26.00). The lowest results among vermicompost applications were obtained from 20% (18.85), 2.5% (20.38) vermicompost and control (20.40).

Dickson Quality Index, Dickson et al. (1960) to determine the quality of saplings of forest trees. However, as there is no feature related to the formation of side branches in the quality index, it is insufficient for fruit trees. Therefore, the Fruit Sapling Quality Index, which takes into account the formation of side branches, has been developed.

Table 6. The effect of vermicompost applications on Dickson quality and fruit sapling quality index

Applications	Dikcson quality index	Fruit sapling quality index
Control	20.40 b	133.23 c
Vermicompost 2.5%	20.38 b	132.88 c
Vermicompost 5%	26.00 a	172.21 b
Vermicompost 10%	27.22 a	180.67 a
Vermicompost 20%	18.85 b	123.43 d

*Different letter in the same column indicate difference between mean values at p<0.05

When the Dickson Quality Index value is equal to 1 or higher in forest saplings, the saplings are considered to be of good quality. As can be seen in Table 6, all of the obtained values above the value 1. However, as seen in the control group, where the quality index value was high, shoot length values quite low. For this reason, it has become necessary to regulate the index in accordance with fruit saplings. Nowadays, it is essential to develop a classification system suitable for this, when it is desired to have many well-developed branches in the saplings to be used in fruit growing. Accordingly, a formula has been developed in which the length and number of side branches are added as a multiplier to the Dickson Quality Index. The effect of vermicompost applications on fruit sapling quality index was found to be statistically significant. The highest fruit sapling quality index among the applications was determined from 10% (180.67) vermicompost application. The lowest result among vermicompost applications was obtained from 20% (123.43) vermicompost application (Table 6).

CONCLUSION

In vermicompost applications, the highest rootstock diameter, stem fresh weight, root fresh weight, root dry weight, root length, main root number, scion length, shoot leaf number and fruit sapling quality index results were 10%; the highest scion diameter, stem dry weight, shoot length and Dickson quality index were determined at 5% and 10% and the highest leaf area at 5% doses.

As a result of increasing doses of vermicompost to 0900 Ziraat sweet cherry saplings, shoot diameters increased compared to the control. Intense synthetic fertilizers are used in order to save time due to rapid development in the production of fruit saplings. This causes significant environmental problems and agricultural lands are seriously damaged. Vermicompost, which contains high organic matter, is important both for the evaluation of environmental wastes and for sustainable agriculture. Considering that the human population is increasing day by day, that the basic need of these people is nutrition and that the main source of nutrition is agriculture, the necessity and importance of protecting agricultural lands for the future of humanity can be better understood. In this respect, it is important to determine and use applications that will increase plant growth and not harm the nature. Vermicompost is also a material with these properties and its use is becoming more and more common.

In addition to the growth and development effect of vermicompost, it is at least 25% more cost-effective in economic terms compared to feeding using only synthetic fertilizers. It is recommended to use vermicompost together with organic and chemical fertilizers in order to preserve the fertile structure of the soil and improve the properties of the soil.

Due to the low organic matter ratio in the soils of Turkey, the usage areas of vermicompost containing organic matter for the plant should be increased. Studies are needed to determine the required doses for different plant species and conditions. Although permanent results are not expected in the short term for the soils of our country, it is thought that it will be very useful in the long term.

Intense synthetic fertilizers are used in order to save time due to rapid development in the production of fruit saplings. This causes significant environmental problems and agricultural lands are seriously damaged. Vermicompost, which contains high organic matter, is important both for the evaluation of environmental wastes and for sustainable agriculture. Considering that the human population is increasing day by day, that the basic need of these people is nutrition and that the main source of nutrition is agriculture, the necessity and importance of protecting agricultural lands for the future of humanity can be better understood. In this respect, it is important to determine and use applications that will increase plant growth and not harm the nature. Vermicompost is also a material with these properties and its use is becoming more and more common.

As a result of this study, it can be recommended to apply 5% and 10% vermicompost to increase growth and development in 0900 Ziraat sweet cherry saplings.

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