




# Effects of Some Plant Nutrients Applied to Seedbed Compost On Seedling Quality

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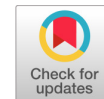
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## RESEARCH ARTICLE

# Effects of Some Plant Nutrients Applied to Seedbed Compost On Seedling Quality

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**ABSTRACT:** This study was carried out to determine the effects of some plant nutrients applied to seedbed compost on seedling quality in 2019 in the seedbed of Ege University, Faculty of Agriculture, Department of Field Crops, in Turkey. In the trial Izmir-Ozbas tobacco variety was used and experimental design was Randomized Complete Parcel Design with three replications. In the study, length of the seedling (cm), number of the leaf (per/plant), stem diameter (mm), healthy seedlings per square (pcs/m<sup>2</sup>), length of the root (cm), fresh stem and root weight (g/plant), dry stem and root weight (g/plant) were evaluated. According to the results, the longest length of seedling and stem diameter was found in K2 doses (potassium doses: 400 g/parcel) as 20.5 cm and 4.1 mm, respectively. Besides, number of the leaf, healthy seedling per square and length of the root were 7.8-8.4 per/plant, 2.1-3.3 pcs/m<sup>2</sup>, 2.6-2.8 cm, respectively. Considering the results, as the amount of potassium applied increased, the amount of length of the seedling, stem diameter and length of the root increased as well.

**Keywords:** tobacco, fertilizer, seedling, quality

## INTRODUCTION

Being an economically-important plant both in Turkey and abroad at present, tobacco provides certain groups of people with employment opportunities from growing to product and, because of complying with our country's ecological conditions and social structure, it has been produced in different regions of our country as a family farming for centuries (Ekren, 2007).

In Turkey, oriental tobaccos are grown in six regions in Turkey. Considering the tobacco production properties in these regions, approximately Aegean (75%), Black Sea (11%), South East Anatolia (10%), Marmara (3%), Meditterean (1%). In addition to this, Aegean Region has an important place in terms of foreign sales (Anonymous-a). Aegean tobaccos are grown in the region with the local name of Aegean Region tobaccos. The type has been cultivated in this region for more than 150 years (Wolf, 1962). This plant is compatible for growing on soil conditions, not suitable or profitable for growing other types of agricultural products. It is often grown in poorer soils and in areas with higher aridity. Turkey has favorable soil and climatic conditions and tradition for growing mostly small-leaf oriental or aromatic types of tobacco and very small quantities of big leaf types of tobaccos. The harvested leaves are mostly sun-cured and the characteristic golden-yellow leaf is widely famous for its quality characteristics oriental tobaccos are known by their high aroma from the small leaves, being low in nicotine. Most of the world largest cigarette makers use this tobacco to enrich the aroma and quality of their cigarettes (Gumus Guler, 2008). The sort of the leaf and the quantity of each in the blend also affect the smoking quality extensively. Minerals which are mainly in charge of promoting the growth and the development of plants have to responsibility to maintain or to increase the quality by controlling the growth in the production. When tobacco is smoked, parts of the mineral matters in different forms directly or indirectly are transferred to the smoke. Some of them are collected in the ash. Tobaccos having high percentage of alkali metals, e.g. Ca, K and Mg are responsible for high ash contents in tobacco types. The minerals directly or organic compound structures indirectly affect the smoking quality of tobaccos and also affect the physical, chemical and quality characteristics of the leaves either positively or negatively (Sekin et al., 2002). The aim of the study was to determine the effects of plant nutrients on seedling quality in tobacco cultivation.

## MATERIAL AND METHODS

The experiment was carried out in 2018-19 in the seedbed at the outdoor condition of Ege University, Faculty of Agriculture, Department of Field Crops. Izmir-Ozbas tobacco cultivar was used as the research material in this study. Experimental area is 20 m above sea level with mild Mediterranean climate type. Average temperature and total rainfall are presented in Figure 1 and 2. Seedbed oriented in an east-west direction. Seedbed dimension: width: 1.10m, length: 10m and height: 20 cm. The seeds with ash mixture were sown (1g m<sup>2</sup>) on the 7<sup>th</sup> December 2018 into a mixture of sand, manure and mulch (1:1:1). Some cultural practices such as irrigation, weed control and ventilation were performed regularly. The experiment was designed in a randomized complete parcel design with three replications. Each plot 35x110 cm. In the experiment, tobacco plants were treated with N, P, K fertilizers during seedbed (Table 1). Nitrogen and phosphorus doses were kept fixed but potassium doses K0 (control), K1 (200 g/parcel) and K2 (400 g/parcel) were applied.

When the seedling reached 15-20 cm plant height, observations were made on the following traits:

- *Length of the Seedling (cm):* The seedling were measured from the ground level to the point
- *Number of the Leaf (per/plant):* The number of leaves were counted per plant

- *Stem diameter (mm)*: The seedling diameter was measured at the middle of the seedling.
- *Healthy seedlings per square (pcs/m<sup>2</sup>)*: The frame (seedling counting scale) is placed in a section of the seedbed. All seedlings within the inside borders of the frame are counted.
- *Lenght of the root (cm)*: The seedling was measured from the bottom to the top level of the seedling before the transplanting.
- *Fresh Stem and Root weight (g/plant)*: The stem and roots of seedlings will be determined by weighing.
- *Dry Stem and Root weight (g/plant)*: The stem and roots of seedlings will be determined by weighing for 5-6 hours at 60°C.

## STATISTICAL ANALYSIS

Data from the experiment were subjected to analysis of variance (ANOVA) using TOTEM STAT statistical software (Acikgoz et al., 2004).

## RESULTS AND DISCUSSION

Tobacco plants can build up reserve of potassium in the early stages of growth. Tobacco quality may continue to improve as a results of additional rates of potassium beyond those needed for maximum yield. Potassium is the principal constituent of ash and is important in certain enzyme systems. Tobacco is known as a luxury user of potash (Tso, 1990).

It was understood that potassium doses applied did not have any significant effect on Lenght of the Seedling, Number of the Leaves, Stem diameter, Lenght of the root, Fresh and Dry Stem weight and Fresh and Dry Root weight. In our study, there were statistically significant differences for Healthy seedlings per square in terms of potassium doses.

The longest lenght of the seedling was found K2 doses as 20.5 cm. When we compared to the application doses, lenght of the seedling was increased by applying potassium (Figure 3). Pearce et al., (2005) indicates that lenght of the seedling mostly depends on number of the plants per m<sup>2</sup>, living space for development of the plant, agro-technological measures, as well as technology of seedlings production. The lenght of seedling is appropriate as well as number of leaves and if phosphate level kept lower, top and root growth present a better balance (Kabranova et al. 2014). In other studies, lenght of the seedling was found to be change from 6 cm to 21 cm (Turi et al., 2004; Ayan and Caliskan, 2006; Hou-Long et al., 2014, Ekren and Ilker, 2017). The results were consistent with these scientists. Number of the leaf was determined between 7.8-8.4 pcs/plant and average was 8.1 pcs/plant (Figure 4). The lowest stem diameter was obtained in K0, the highest was found in K2. Average stem diameter was measured 3.9 mm (Figure 5). According to the Kabranova et al. (2014) great stem diameter is a great potential for further plant development. Stem diameter was obtained between 4.1 mm and 5.7 mm in Prilep NS72 and Yaka 125/3 tobacco varieties. Turi et al. (2004) was found that stem diameter changed from 2.6 mm to 4.1 mm. Our results were higher than these scientists because the stem diameter has been affected by the tobacco variety which was used. In this study, healthy seedling per square were significant ( $p < 0.05$ ) in terms of potassium doses. The average results were ranged from 2.1 to 3.3 pcs/plant. The highest results were obtained in K1 as 3.3 pcs/plant (Figure 6). Ekren and Ilker (2017) was found to be 17.3-24.7 pcs/plant. Our results were lower than these scientists because healthy seedling per square has been affected by sowing time. As you seen in Figure 7. Lenght of the root was obtained between 2.6-2.8 cm. Average result was found in 2.7 cm.

The results of the fresh and dry stem weight were shown that Figure 8 and 9. The highest weight was found in K0, K1 and K2 potassium doses and average fresh and dry weigh was obtained in 4.4 and 0.31 g/plant, respectively. When we look at the mean values of the varieties in fresh and dry root weight was changed between 0.14-0.22 g/plant and 0.023-0.036 g/plant, respectively. The lowest results were obtained in K2 being 0.25 g/plant but in dry root weight as found in K1 potassium doses being 0.023 g/plant (Figure 10, 11). To the author's knowledge, there is no previous study about number of the leaves, lenght of the root, fresh and dry stem weight as well as fresh and dry root weight at seedbed period of Aegean Region tobaccos.

## CONCLUSION

In consideration of datas as the amount of potassium applied increased, the amount of length of the seedling, stem diameter and length of the root increased as well. I believe that it will be appropriate to interpret the yield, yield components and quality parameters in the field conditions of these plants determined by seedling performance.

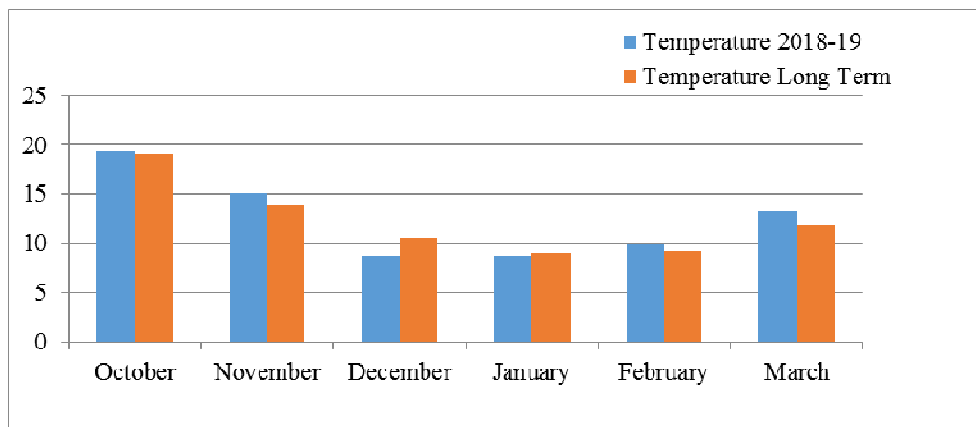
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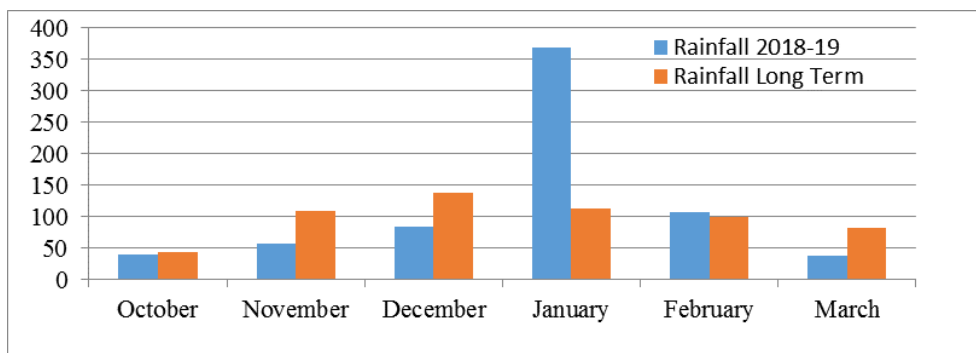


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**Figure 1.** Montly average temperature in Bornova location



**Figure 2.** Montly average rainfall in Bornova location



**Table 1.** Period of treatment with fertilizers.

Fertilizers	Seedbed Period
Ammonium sulfate	Added to the mixture before sowing (8 kg ha <sup>-1</sup> )
Di ammonium phosphate (DAP)	Added to the mixture before sowing (10 kg ha <sup>-1</sup> )
Potassium sulfate (K <sub>2</sub> SO <sub>4</sub> )	Added to the mixture before sowing (15 kg ha <sup>-1</sup> )

Figure 3. Effects of different potassium doses on length of the seedling (cm).

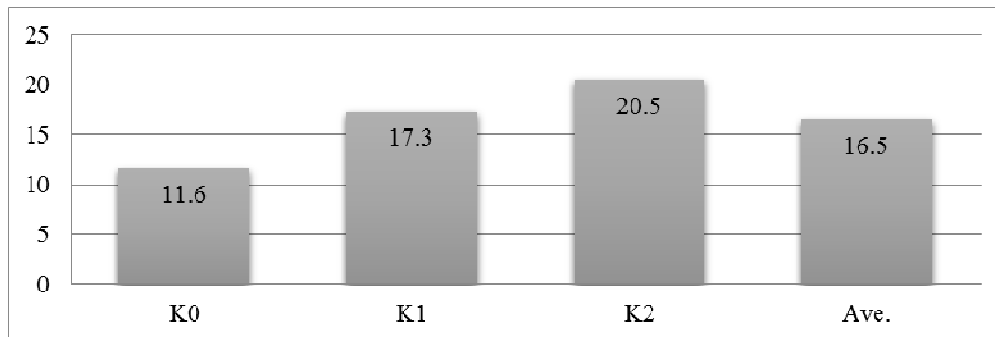


Figure 4. Effects of different potassium doses on number of the leaf (per/plant).

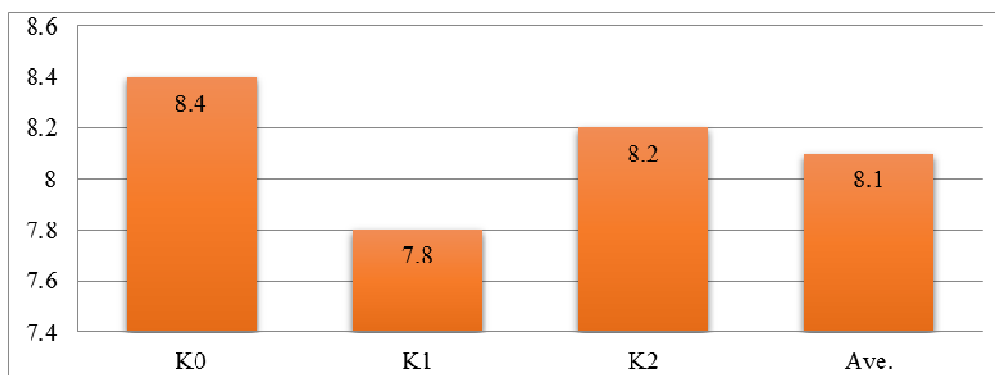
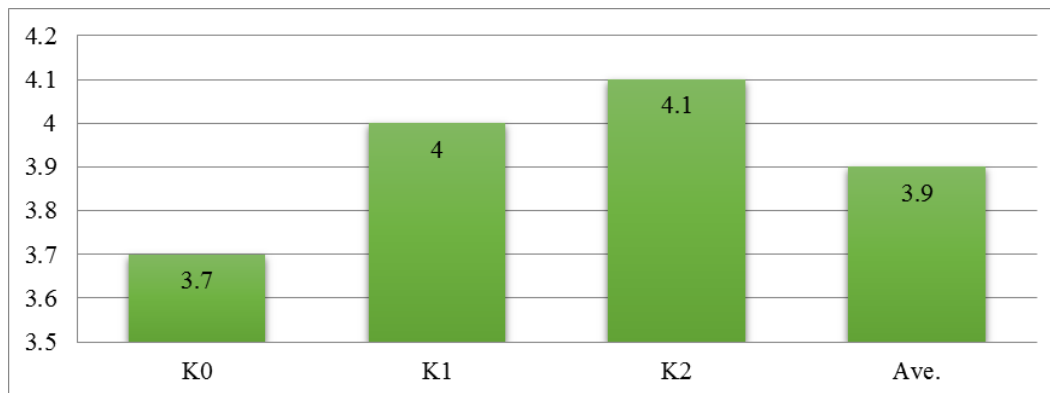
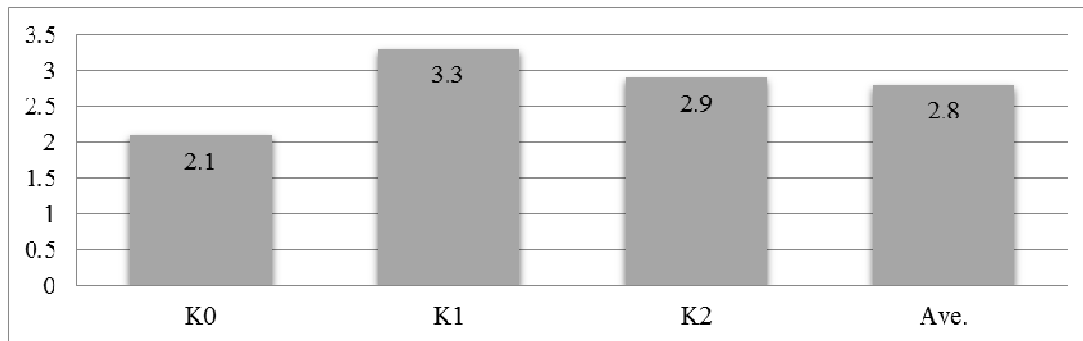


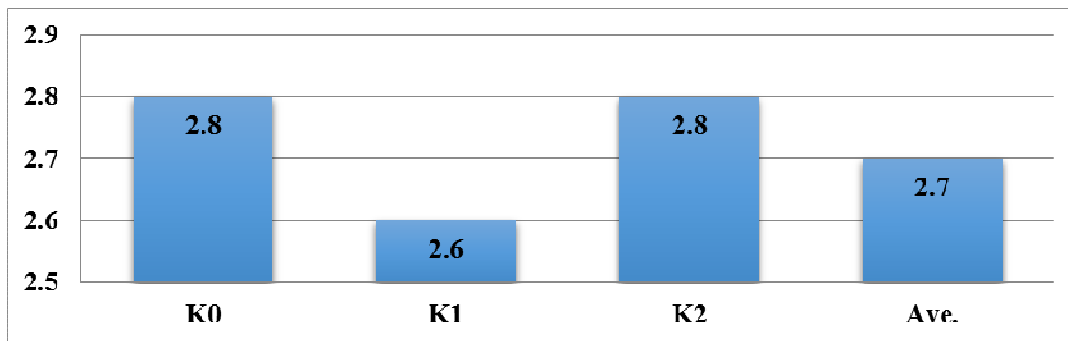
Figure 5. Effects of different potassium doses on stem diameter (mm).



**Figure 6.** Effects of different potassium doses on healthy seedlings per square (pcs/m<sup>2</sup>). p<0.05: 0.757



**Figure 7.** Effects of different potassium doses on length of the root (cm).



**Figure 8.** Effects of different potassium doses on fresh stem weight (g/plant).

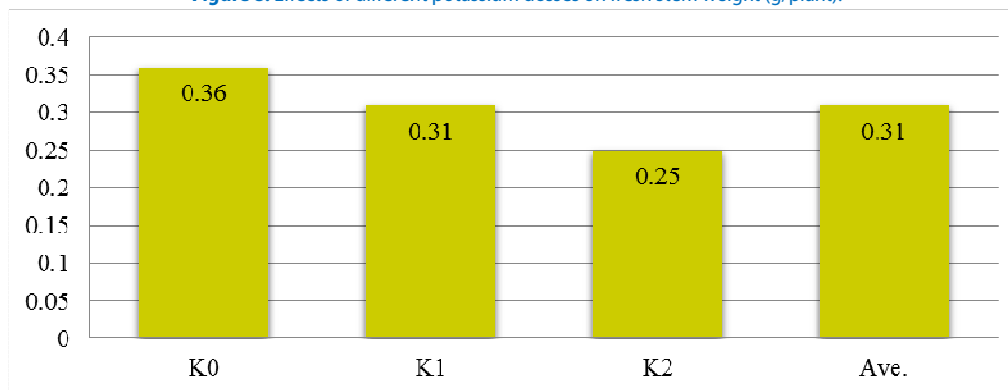


Figure 9. Effects of different potassium doses on dry stem weight (g/plant).

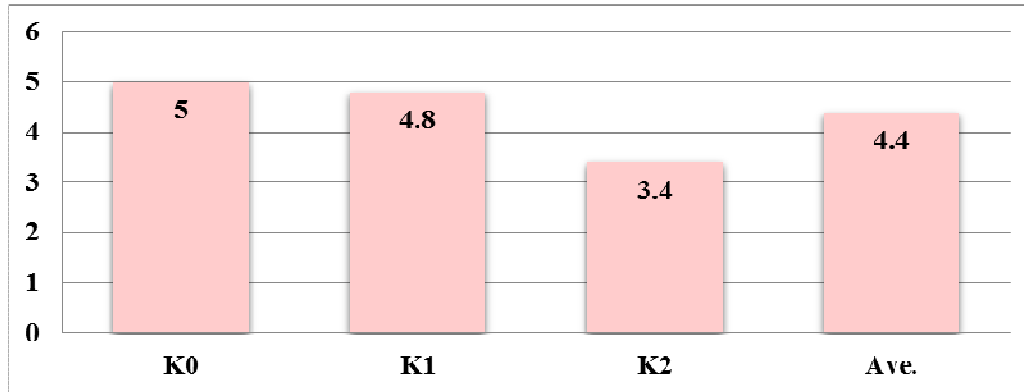


Figure 10. Effects of different potassium doses on fresh root weight (g/plant).

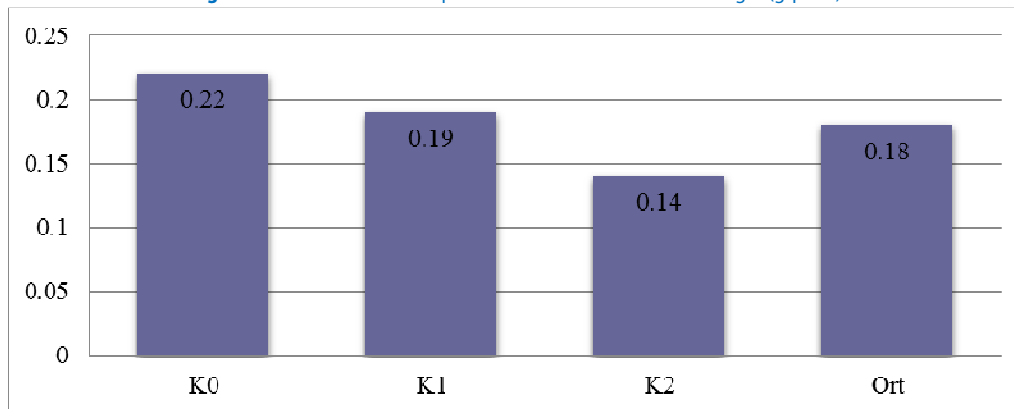
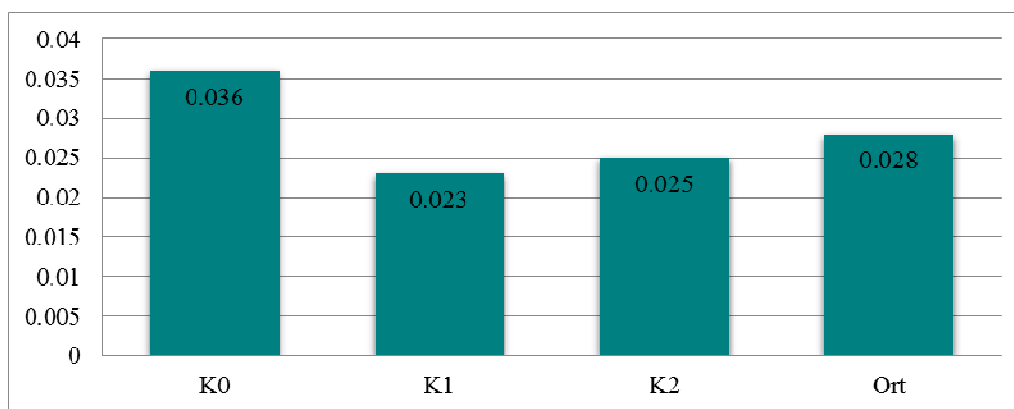


Figure 11. Effects of different potassium doses on dry root weight (g/plant).



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#### CONFLICTS OF INTEREST

"The authors declare no conflict of interest".

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