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THE INFLUENCE OF CLIPPING APPLICATION ON YIELD AND SOME YIELD PARAMETERS OF AEGEAN TYPES TOBACCOS

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ABSTRACT

The present study was carried out to determine the effects of clipping application on seedling and field performance of three tobacco varieties in 2014 and 2015. Akhisar-97, Izmir-Ozbas and Saribaglar-407 tobacco varieties were planted based on randomized complete block design with three replications. In the research, the effects of clipping application on lenght of the seedling, stem diameter, healthy seedlings per square, plant height, number of the leaves, leaf width, leaf lenght and cured leaf yield were evaluated. Average results of two years indicated that clipping application on lenght of seedling, stem diameter, plant height, leaf width, leaf lenght and cured leaf yield were higher than traditional method. Akhisar-97 had statistically high performance than the Izmir-Ozbas and Saribaglar-407 tobacco varieties. The highest lenght of the seedling was obtained in Akhisar-97 (21.0 cm) tobacco cultivar by using clipping application for both years. Cured leaf yield results indicated that Akhisar-97 tobacco variety was the highest yield as 1037 kg ha^{-1} at clipping application whereas the lowest yield was recorded as 717 kg ha^{-1} in traditional practice in the second year.

Key words: Aegean tobacco, clipping, seedling, yield

INTRODUCTION

Turkey is the biggest producer of aromatic oriental tobacco which is one of the major traditional crops. 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 chracteristics 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). This tobacco is also paramount importance to the agriculture sector and the economy of Turkey as it is one of the country biggest foreign currency earners (Anonymous, 2015).

Tobacco production in Turkey has been decreasing sharply in the recent years. Just like tobacco production, tobacco yield also followed decreasing. There are many factors causing the decline in production. Some of them are reduction in the number of families producing tobacco, 45 years and older consists of farmers, price policy, anti-smoking policy and the challenges of the agricultural practices. As well as, to grow tobacco in the same field every year and to use of low seed purity is among the main factors in the decrease of the yield. So, decreasing the tobacco production is the most important problems in terms of sustainability of the production (Celen et al., 2016).

The first stage in the production of a good quality and high-yielding crop begins in the seedbed. Good seedbed management is required in the seedbed period in order to obtain healty uniform seedlings with well-developed root and stem (Anonymous, 2012).

In the seedling stage, the average daily temperature and sunlight hours are major factors affecting the seedling age and quality (Jin et al., 2014). The clipping application, defined by Miner (1978) as removal of that portion of the plant's leaf tissue that can be raised above the apical meristem. This practice was first use in Zimbabwe to harden tobacco transplant (Kille, 1970). It is now practiced in a majority of tobacco producing countries around the world to create healthier, stronger seedlings and root systems. In this application, seedlings are cut at a height of 2.5 cm above the point at which the leaf joins the stem, at specific time intervals, in order to obtain healthier and homogeneous seedlings. (Anonymous, 2012). Furthermore, clipped plants are more uniform have a higher percentage of usability are hardier and are easier to mechanically transplant (Fisher et al., 2002).

In the light of these informations obtained by previous studies, to produce high quality tobacco, growers must begin with healthy seedlings. The ideal seedling is disease free, hardy enough to survive transplanting shock and available for transplanting in time. In general, earlier transplanted seedlings give better yield than late transplanted tobacco (Smith et al., 2003). The overlong growth period of tobacco seedlings and low temperature conditions is a major problem. The long growth period of seedlings will lead to less effective leaves, poor stress resistance and low economic benefit of tobacco production (Zhu and Sun, 2007). Light, temperature, water, fertilizer and other environmental factors are key factors of tobacco seedlings growth (Liu et al., 2003). Good tobacco seedlings lead to excellent tobacco leaf quality and high economic benefit.

For successful production and obtaining uniformity according to the morphological and biological characteristics of tobacco at yield, the quality of tobacco seedlings must be good (Kabranova et al., 2014). Agro-ecological conditions have strong influence on its biological, morphological and technological characteristics. Production of tobacco seedling has important role as regular measure of the tobacco production technology (Uzunovski, 1989).

Traditionally seedlings in Turkey, especially oriental type of tobacco, are produced at open field, in cold beds, covered with polyethylene. During the seedbed period, seedbed management is done by the tobacco growers such as irrigation, ventilation and weeding etc. But in the last years, clipping application have been used by the agronomist who work in tobacco factory to growers in our country.

To our knowledge, no similar study has been undertaken in Turkish oriental tobacco at the seedbed and field conditions. The primary objective of this study was to evaluate the influence of clipping application on the yield and some yield components of oriental tobacco. A secondary aim of the present research was to compared differences among the tobacco types at the seedbed and field period.

MATERIAL AND METHODS

Location of experiment

The experiment was carried out for two years in 2014 and 2015 in the research fields of the Ege University, Faculty of Agriculture, Department of Field Crops. The soil texture for the field experimental plots is clayey-loam. Some physical and chemical characteristics of the soil are shown in Table 1.

Table 1. Some soil physical and chemical characteristics at the experimental plot.

Depth (cm)	pH	Total Soluable Salt (%)	$CaCO_3$ %	Organik matter (%)	Total N (%)	Sand (%)	Silt (%)	Clay (%)	Texture
0 -30	7.61	0.074	23.98	2.82	0.129	28.60	39.40	32.00	Clayey loam
30 - 60	7.64	0.080	24.65	2.72	0.101	31.00	38.60	30.40	Clayey loam

Experimental area is 20 m above sea level with mild Mediterranean climate type. Average temperature and total precipitation are presented in Table 2 for the two years and long term period.

Table 2. Monthly average temperature and precipitation in Bornova

	Average Temperature (ºC)			Total precipitation (mm)		
	2014	2015	LYA	2014	2015	LYA
January	9.9	8.9	9.0	113.8	125.1	112.2
February	9.7	9.5	9.2	45.6	101.9	99.7
March	11.5	11.7	11.8	108.4	75.6	82.9
April	15.0	15.9	16.1	76.8	46.4	46.4
May	19.3	20.8	21.0	2.2	30.9	25.4
June	23.8	25.6	26.0	75.2	9.8	7.5
July	26.8	28.0	28.3	16.0	1.8	2.1
August	28.3	27.7	27.9	6.0	2.6	1.7
September	23.0	23.7	23.9	18.6	15.0	19.9
October	18.8	18.8	19.1	49.0	45.3	43.2
November	13.2	14.0	13.8	15.2	94.8	109.7
December	11.1	10.6	10.5	206.8	141.1	137.9
X-Σ	17.5	17.9	18.1	753.6	690.3	688.6

LYA: long year average X: mean Σ: total (Anonymous, 2016)

Seedbed management

Nicotiana tabacum L. cv Akhisar-97, Izmir-Ozbas and Sarıbaglar 6267 were used as the research material in this study. These registered tobacco cultivars are mostly used in Aegean Region tobacco farmers and prefered by the tobacco industry and trade companies. The seeds with ash mixture were sown (0.6 g m^{-2}) at the begining of March in 2014 and 2015 (Table 3) into a mixture of sand, manure, mulch (1:1:1). Following this, well fermented manure covering was placed, spread and leveled to 1 cm on top of the seedbed by compressing it. Then, seedbed was irrigated and covered with a plastic cover. During the seedbed management, some cultural practices such as irrigation, weed control and ventilation were performed regularly. Seedlings were clipped twice throughout the seedbed period. When the tobacco seedlings were reached 5 cm height first clipping was done. Second was applied one week later after the first clipping. At the clipping treatments, seedlings were cut at the height of 2.5 cm above the point.

Table 3. Seedling, setting and harvesting dates

	2014 season	**2015 seasson**
Seedbed	5th March	9th March
First clipping	9th April	7th April
Second clipping	16th April	15th April
Counts determined in seedbed	12th May	14th May
Set	22th May	20th May
Counts determined in field	21st June	24th June
Harvest 1st	30th June	26th June
Harvest 2nd	25th July	31st July
Harvest 3rd	18th August	14th August

Field period and experimental design

Experimental plot was ploughed deeply in autumn. Before the planting in the spring, the field was ploughed and harrowed shallowly. The field experiment was carried out according to randomized completely block design (RCBD) with three replications. Each plot consisted of three rows with 3 m lenght and 40x10 cm of plant spacing in traditional (non-clipping) and clipping application. Seedlings were transplanted to the experimental plot by hand. When the seedlings reached 15-20 cm plant height, they were transferred to the experimental plots in mid-May in both years. After the planting, the seedlings were irrigated with lifeline-water whereas there was no irrigation and hoeing was done twice in the vegetation period. Fertilization was not applied before and after planting. The leaves were harvested by hand when the tobacco leaves reached maturing stage. Harvesting done 1st, 2nd and 3rd stalk position hand and cured (Table 3).

Measurement at seedbed and field period

Observations at the seedbed period were made on the following traits:

Lenght of the seedling (cm): The seedling was measured from the bottom to the top level of the seedling before the transplanting

Stem diameter (mm): The seedling diameter was measured at the middle of the seedling

Healthy seedlings per square (pcs/m^2): The frame (seedling counting scale) is placed in a section of the seedbed. All seedlings within the inside borders of the frame are counted.

During the field period, after the side effects were eliminated, the remaining plants in each plot were used for the measurements set out below:

Plant height (cm): The plants were measured from the ground level to the point at which the inflorescence was removed

Number of leaves (per/plant): The number of harvested leaves were counted per plant

Leaf Length (cm): Leaf length was measured from the leaf top to the leaf base

Leaf Width (cm): The leaf was measured from edge to edge at the widest part of the leaf lamina

Cured leaf yield (kg ha^{-1}): The plants were harvested by hand according to the stalk position. Then the plot yield was converted to yield for a hectare

All measurements were performed by using the methods proposed by Anonymous, 2004.

Statistical analysis

Data from the experiment were subjected to analysis of variance (ANOVA) using TOTEM STAT statistical software (Acikgoz et al., 2004). The mean differences were compared by the least significant difference (LSD) test (Steel et al., 1997).

RESULTS AND DISCUSSION

Seedbed period

Lenght of the seedling

Significant differences were found among the genotypes for seedling length in both years.The highest lenght of the seedling was found in Akhisar-97 as 20.3 cm in 2014 and 20.2 cm in 2015 whereas the lowest lenght of

the seedling was obtained in Sarıbaglar as 18.2 cm in the first year and 18.5 cm in the second year (Table 4). The results indicated that clipping application was found statistically significant on lenght of the seedling in 2015 but not in 2014.

Table 4. Mean values at seedbed period for both cultivars and the applications

Lenght of the seedling (cm)

Cultivars	**2014**			**2015**		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	19.7	21.0	20.3[a]	19.3	21.0	20.2[a]
Izmir-Ozbas	18.3	19.3	18.8[b]	18.7	19.0	18.8[b]
Saribaglar-407	17.7	18.7	18.2[b]	17.7	19.3	18.5[b]
Mean	18.6	19.7	19.1	18.6[b]	19.8[a]	19.2
	LSDcul: 1.46**			LSDcul: 1.24**	LSDapp: 1.01**	
CV (%)		5.94			5.04	

Stem diameter (cm)

Cultivars	**2014**			**2015**		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	0.35[a]	0.41[a]	0.38	0.38	0.43	0.41[a]
Izmir-Ozbas	0.37[a]	0.37[b]	0.37	0.34	0.36	0.35[b]
Saribaglar-407	0.29[b]	0.34[b]	0.31	0.25	0.28	0.27[c]
Mean	0.33	0.37	0.35	0.32[b]	0.36[a]	0.34
	LSDculxapp: 0.03**			LSDcul: 0.033*,	LSDapp:0.027**	
CV (%)		4.74			7.58	

Healthy seedlings per square (pcs/m^2)

Cultivars	**2014**			**2015**		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	24.7	21.3	23.0[a]	23.3	21.0	22.2[a]
Izmir-Ozbas	20.3	18.0	19.2[b]	21.0	18.7	19.8[b]
Saribaglar-407	19.3	17.3	18.3[b]	20.0	18.7	19.3[b]
Mean	21.4[a]	18.9[b]	20.2	21.4[a]	19.4[b]	20.4
	LSDcul: 0.85*	LSDapp:0.69*		LSDcul: 1.09*	LSDapp: 0.89*	
CV (%)		3.26			4.16	

*p<0.05, ** p<0.01, ns: not significant

Lenght of the seedling mostly depends on living space for development of the plant, number of the plants per m^2, agro-technological measures as well as technology of seedlings production (Pearce et al., 2005). Kabranova et al. (2014) indicates that the lenght of stem is appropriate as well as number of leaves and if phosphate level kept lower, top and root growth present a better balance. 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). The results were consistent with these scientists.

Stem diameter

Stem diameter was affected by methods x variety interaction. It was determined between 0.29-0.41 mm and the highest stem diameter was obtained in Aksihar-97 tobacco variety at clipping practice in the first year of experiment. For the second year, stem diameter was significantly affected by both the tobacco cultivars and application methods. As seen from the average results, the highest results were determined in Akhisar-97 as 0.41 mm

and being in Izmir-Ozbas as 0.35 mm at clipping, respectively.

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 lower than these scientists because the stem diameter has been affected by the tobacco variety which was used.

Healthy seedlings per square

In our study, there were statistically significant differences for healty seedling per square area in terms of tobocco cultivars and applications in two years. The average results among the cultivars were changed between 18.3-23.0 pcs and healthy seedling per square at traditional practice (21.4 pcs) was higher than clipping treatment (18.9 pcs) in 2014. There is a similar results were obtained in the second year of the study. Clipping application (19.4 pcs) was lower than traditional method (21.4 pcs). The highest healthy seedling per square was recorded in Akhisar-97 as 22.2 pcs. To the author's knowledge, there is no previous study about healthy seedling per square at seedbed period of Aegean tobaccos.

Field period

Plant height

It was understood that the two different practise applied did not have any significant effect on plant height in both years. The average plant height in clipping application (76.0 cm) was higher than in traditional (72.8 cm). However, when we look at the mean values of the varieties in 2014, it is determined that the Akhisar is significantly higher than the other two varieties besides, this situation is maintained in 2015 as well. The values of plant height ranged from 70.7 cm to 78.7 cm depending on methods and average plant height was determined 74.2 cm (Table 5).

Table 5. Mean values of plant height for both cultivars and the applications (cm)

Cultivars	**2014**			**2015**		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	75.7	81.7	78.7[a]	76.7	78.7	77.7
Izmir-Ozbas	72.0	74.3	73.2[b]	70.7	72.0	71.3
Saribaglar-407	70.7	72.0	71.3[b]	73.3	74.0	73.7
Mean	72.8	76.0	74.4	73.6	74.9	74.2
LSDcul: 4.96**						
CV (%)	5.18			6.26		

*p<0.05, ** p<0.01, ns: not significant

Tobacco types and cultivars differed significantly in their growth rates and patterns after 60 days from transplanting. Cultivars within the same type were not significantly different. All of the measured growth characteristics followed the sigmoid growth curve with the period of rapid growth being from 30-60 days after transplanting. Aromatic or oriental cultivars were fast growing, early maturing and low in total dry matter (Tso, 1990). The differences in the plant height of Izmir type tobacco cultivars among the three years can be explained by the changes in the genotypes. The average plant height were determined between 53 and 63 cm reported by Kucukozden et al., (2002). Peksuslu et al. (2002) also studied 8 Izmir type tobacco genotypes at 6 location for two years, mean plant height was found as 62.1 cm. The plant height of Aegean tobaccos ranged from 40 to 100 cm depending on the genotypes (Ekren, 2007; Camas et al., 2009a; Cabadan et al., 2014; Harputlu et al., 2014; Kınay, 2014; Celen et al., 2016). In our study, the plant height are found to be higher than Kucukozden et al. (2002) and Peksuslu et al. (2002) but similar to other scientific studies.

Number of the leaf (per/plant)

As seen in Table 6, there was no statistically significant differences among the varieties and both applications for two years. The values of the first year, the highest average number of the leaf was obtained from Akhisar-97 and Izmir-Ozbas varieties being 27.8 per/plant whereas the lowest number of the leaf was found in Sarıbaglar being 27.0 per/plant. Number of the leaf at traditional and clipping practice was to similar results being as 27.6 per/plant.

In the study second year average results was shown that number of the leaf in Akhisar-97 (28.0 per/plant) was higher than the Izmir-Ozbas (27.0 per/plant) the lowest number of the leaf was obatained in Izmir-Ozbas (26.5 per/plant) tobacco cultivar. Number of the leaf at clipping (27.5 per/plant) was higher than traditional practice (26.8 per/plant).

Table 6. Mean values of number of the leaf for both cultivars and the applications (per/plant)

Cultivars	2014			2015		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	27.7	28.0	27.8	27.7	28.3	28.0
Izmir-Ozbas	27.7	28.0	27.8	26.7	27.3	27.0
Saribaglar-407	27.3	26.7	27.0	26.0	27.0	26.5
Mean	27.6	27.6	27.5	26.8	27.5	27.2
CV (%)		7.94			7.57	

*p<0.05, ** p<0.01, ns: not significant

Number of the leaf is related with crop quality. Leaf number ranged from 23 to 35 per/plant in local genotypes of Aegean Region. Some researchers stated that leaf number affected by genotypes, enviromental conditions and cultivation applications ranged from 17 to 50 per/plant (Otan and Apti, 1989; Gencer, 2001; Ekren, 2007; Camas et al., 2009b; Koseoglu et al., 2014). Number of the leaf which is determined increased or decreased of yield was found between 23-35 per/plant at local cultivar and was obtained from 35 to 50 per/plant at registered variety (Anonymous, 2002). Our results showed a similarity to the results given by other scientist.

Leaf width and leaf lenght (cm)

The values for leaf width and leaf lenght are presented in Table 7. According to the first year results, cultivar effect was statistically significant on leaf width, average value of Akhisar-97 (6.4 cm) was higher than Saribaglar (5.7 cm). The lowest leaf width was obtained from Izmir-Ozbas tobacco variety. Leaf width increased by clipping practice (6.0 cm) but decreased in traditional (5.7 cm). In the second year, applied two different applications have significantly effect on leaf width. The average leaf width of the varieties ranged from 5.3 cm to 6.5 cm. among the cultivars. Mean values of applying practise was similar to first year results. Traditional practice (5.8 cm) was lower than clipping (5.9 cm).

Table 7. Mean values of leaf width and leaf lenght for both cultivars and the applications

Leaf width (cm)

Cultivars	2014			2015		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	6.2	6.5	6.4[a]	6.5	6.6	6.5[a]
Izmir-Ozbas	5.3	5.5	5.4[b]	5.6	5.8	5.7[b]
Saribaglar-407	5.6	5.9	5.7[b]	5.2	5.4	5.3[c]
Mean	5.7	6,0	5.8	5.8	5.9	5.8
	LSDcul: 0.326**			LSDcul:0.316**		
CV (%)		4.34			4.2	

Leaf lenght (cm)

Cultivars	2014			2015		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	12.9	13.5	13.2[a]	13.1	13.5	13.3[a]
Izmir-Ozbas	11.3	11.7	11.5[b]	11.6	12.0	11.8[b]
Saribaglar-407	11.7	12.4	12.1[b]	10.7	11.0	10.9[c]
Mean	11.9[b]	12.5[a]	12.3	11.8	12.2	12.0
	LSDcul: 0.516** LSDapp:0.632**			LSDcul:0.815**		
CV (%)		4.01			5.28	

*p<0.05, ** p<0.01, ns: not significant

The finding indicated that applications and cultivars were found statistically significant on leaf lenght in 2014. Considering the varieties, leaf lenght was changed between 11.5 and 13.2 cm. Leaf lenght in Akhisar-97 cultivar was higher than others and this is similar to the leaf width. The average leaf lenght was found for 11.9 cm in traditional and 12.5 cm in clipping application in 2014. The results of the second year was presented in Table 6. Cultivar leaf lenght was ranged from 10.9 cm to 13.3 cm. Leaf lenght was increased with the clipping application (12.2 cm). Average leaf lenght was determined as 12.0 cm in 2015.

Leaf width and lenght is one of the most important quality criteria for Aegean tobaccos to determine the visual quality and market price of tobacco and characterized by their small leaves. The tobaccos have defined small and medium leaf size, slightly dense density by the Turkish Standart Organization (TSE) (Anonymous, 2004). Leaf lenght would be two or three times the width and large leaves are very poor quality. With little aroma and generally considered unsuitable for use as oriental tobaccos (Akehurst, 1970). In the Aegean tobaccos leaf width was determined between 5 and 8 cm; leaf lenght was ranged from 5 to 17 cm (Suben, 1976; Kucukozden et al., 2002; Peksuslu, et al., 2002; Camas et al., 2007; Celen et al., 2016). Our findings are in accordance with those researcher's results.

Crude Leaf Yield (kg ha^{-1})

Although cultivar x application interaction at first year results were significant in terms of cured leaf yield, LSD ranking of the cultivars two different practices did not changed. In addition, because of the fact that the yield performance of Izmir-Ozbas tobacco cultivar at traditional and clipping application in 2014 were not change vice versa, yield results of other two types of tobacco variety was considerably increased, interaction has become important.

According to the second year results, when we compared to the application performances, cured leaf yield was increased noticeably by using, clipping practices. Considering the both application average, the highest yield was obtained from Akhisar variety (997 kg ha^{-1}) whereas Saribaglar (750 kg ha^{-1}) was the lowest in 2015 (Table 8).

Table 8. Mean values of cured leaf yield for both cultivars and the applications (kg ha^{-1})

Cultivars	**2014**			**2015**		
	Traditional	**Clipping**	**Mean**	**Traditional**	**Clipping**	**Mean**
Akhisar -97	930^{a}	1000^{a}	965	957	1037	997^{a}
Izmir-Ozbas	850^{b}	850^{b}	850	800	860	830^{b}
Saribaglar-407	800^{c}	780^{c}	790	717	783	750^{c}
Mean	860^{b}	877^{a}	868	825^{b}	893^{a}	859
LSDapp:15.93**				LSDcul:4.765** LSDapp:38.91**		
CV (%)	1.01			4.31		

*p<0.05, ** p<0.01, ns: not significant

Morphological development of tobacco plants greatly affects the physical and chemical characteristics of tobacco leaf and thus its quality, usability and yield. Besides, there are a lot of factors effects on the tobacco yield such as environmental conditions, soil type, application practice. Shyu et al. (1975) and Peksuslu et al. (2002) indicates that yield is a complex character and greatly affected by environmental factors and tobacco cultivars. In tobacco production, yield and quality are the most important features of it. The quality of leaf is directly related with its compositon (Kurt and Ayan, 2014). Curing time and curing methods also effects on the tobacco yield when the curing time has increased, dry matter decreased reported by some researches (Sekin, 1986; Reddy and Sreeramanurthy, 1993; Yazan et al., 1993). Ekren et al. (2015) found that the tobacco yields were 1560 and 3130 kg ha^{-1} in traditional and double cross planting methods, respectively. Many researchers stated that mean yield of Aegean tobaccos ranged from 800 to 2500 kg ha^{-1} (Er, 1994; Uz, 1997; Ekren, 2007; Cabadan et al., 2014; Koseoglu et al., 2014). Similar results of cured leaf yield were reported by Er (1994), Uz (1997) and Ekren (2007). However, our datas were lower than Cabadan et al. (2014), Koseoglu et al. (2014) and Ekren et al. (2015). These research results revealed that applying different planting method and fertilizer were increased the cured leaf yield.

CONCLUSION

It can be said that there is a significant decrease in the Aegean Region in parallel with the total tobacco production of Turkey in the recent years. It is important to determine the increase of the some parameters on yield for oriental tobaccos when the tobacco production threat decreases. It should be emphasized that clipping application carried out on Aegean tobaccos that it is a positive effect on yield and yield parameters and therefore clipping should be a recommended practice. In this study

were as follows: lenght of seedlings 18.6-19.8 cm; stem diameter 0.32-0.37 cm; healthy seedling per square 18.9-21.4 pcs; plant height 72.8-76.0 cm; number of the leaves 26.8-27.6 per/plant; leaf width 5.7-6.0 cm; leaf lenght 11.8-12.5 cm; cured leaf yield 825-893 kg ha^{-1}. The results of Aegean tobaccos were in accordance with the data given in the previous studies and they are within the limits rate. Future experiments on clipping application should be conducted at different provinces with various agronomical treatments.

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