

## PRESENT CONDITION OF APPLE PRODUCTION IN UŞAK PROVINCE

Ercan YILDIZ<sup>1</sup>, AyşenMelda ÇOLAK<sup>1\*</sup>

<sup>1</sup>Department of Horticulture, Faculty of Agriculture and Natural Sciences, Uşak University, Uşak, Turkey

\*Corresponding author email:aysenmelda.colak@usak.edu.tr

### Abstract

Apple cultivation is carried out in all regions of Turkey. The highest apple production is provided from the Mediterranean (38.2%) and Central Anatolia (37.9%) Regions. These two regions are followed by the Marmara Region with a production rate of 8.1% and the Aegean Region with a production rate of 8.0%. This study was conducted by surveying with producers in order to determine the general status of apple culture, which is important species in terms of producers in Uşak province in Aegean Region. In this study, it was determined that 72% of the apple orchards were 1-15 years old. While the size of apple orchards was 11.5 decares, the rate of fewer orchards than 10 decares was found to be 67%. It was determined that the Starking Delicious, Amasya and Grany Smith cultivars were sharing about 64% of the orchards. While 83% of the apple producers stated that they irrigate the orchards, 60% of them is using drip irrigation system. Pruning was mentioned to be applied in the all orchards. While soil tillage was performed in the 94% of orchards, fertilization was applied in the 91% of orchards.

**Key words:**Apple, cultivation, potential, problems, solution suggestions

### INTRODUCTION

The apple is in the *Malus* genus of the Rosaceae family, and there are more than 30 species in the *Malus* genus that grow in different countries (Küden, 1993). The oldest cultivated crop in the *Malus* genus, which is also the most important soft-seeded fruit species, is the apple (*Malus comminus* L.). The apples are the most produced and consumed species among the temperate climate fruit species due to the high level of adaptability and the number of genotypes (Umur-Karaca, 2017). Approximately 12% of the total fruit industry in the world provides apple, while apple production ranks second after banana. According to FAO (2017), world's apple production was 89.3 million tons in 2016. China has a rate of 49.0% of the world production with a total production of 44.4 million tons. The USA (4.7 million tonnes, 5.3% share), Poland (3.6 million tons, 4.0% share), Turkey (2.9 million tonnes, 3.3% share) and India (2.8 million tons, 3.1% share) are followed.

The availability of suitable genotypes for different ecology, easy adaptability of the plants, and the comparative advantages of the profitable investment of apple production has played a major role in the increase of apple cultivation over large areas and in excess of production. As a matter of fact, Tekintaş et al. (2006) and Yaşasın et al. (2008) have reported that there are different apple genotypes can adapt to different ecologies of the world. Turkey, with its geographical location and ecological conditions in the world, has a very important place for the cultivation of subtropical and temperate fruit species. In this regard, Turkey is the birth place of fruit cultivation and gene bank of many species in the world (Ağaoğlu et al., 1997). In Anatolian geography, there is a great variety of soft seed fruit species such as apple, pear and quince (Uzun and Bayır, 2009). Almost every region in the Turkey is suitable for growing apples. However, the quality of the produced apples is not very good. It has been reported that apple fruits are produced better quality than traditional cultivation especially in dwarf apple cultivation. Previously established apple orchards with standard varieties in Turkey have left their place in the mid-dwarf (spur) variety since the 1970's, and today they are full dwarf apple cultivation (Aşkın et al., 2010).

Although the apple production has an important position and can be grown in different ecological parts of Turkey, there are some problems such as variety diversification deficit, growing techniques and input amounts used, additives and wastes. Improving apple production, and achieving the desired level in yield and quality, are possible with technical and cultural measures such as irrigation, diseases and pest management, and especially with correct and balanced fertilization (Kaygısız, 2004). Uşak province with its limited field of agriculture is not

much important for Turkey's fruit cultivation. However, the fruit culture of province shows improvement due to the increase in the possibilities of irrigation. Irrigation ponds have been established with projects in Uşak province and to increase the irrigated are to about 28-30% of agriculture areas in the near future. This situation can lead fruit cultivation in the province to an important position. Therefore, this study was conducted by surveying with producers in order to determine the general status of apple culture, identify the problems, and find solutions to these problems in Uşak province in Aegean Region.

## MATERIAL AND METHOD

The research was carried out in the existing apple orchards in the Uşak province. In 2017, individual interviews were conducted with the apple producers in the Uşak (Table 1), which have more than 5 decares orchards. The interviews questions included topics about current production patterns, technical and cultural processes required for cultivation, harvesting and subsequent forms of evaluation; and the answers of these questions were processed in questionnaire forms. In this study, the general status and problems of apple orchards have been determined and the solutions to these problems have been suggested.

**Table 1.** According to districts, number of apple producers and average orchard size

Districts	Number of Farmers Registration System (>5 da)	Average Orchard Size(da)
Center	21	27.2
Eşme	12	9.1
Ulubey	1	10.0
Karahallı	1	6.0
Sivaslı	16	8.1
Banaz	29	8.3
Total/Average	80	11.5

## RESULTS AND DISCUSSION

Findings obtained from the research on the general status of apple orchards are presented in Table 2. According to the survey results, only 20% of the producers were young people (18-40 years old) and majority of the fruit producers (45%) started farming after retiring. The young producers are very important in terms of following and accepting new developments and techniques in agriculture. In this study, it was determined that 67% of the orchards were smaller than 10 decares, 27% was between 10 and 25 decares, and only 6% was found to be larger than 25 decares. One of the main problems of the agriculture in Turkey is the division of the farm lands as a result of inheritance and this has also resulted in small fruit orchards in the Uşak province. Producers cannot carry out technical and cultural procedures in their orchards due to lack of required tools and equipments and as they think that the profit from these small orchards is very small. In present study, it was determined that 72% of the apple orchards were 1-15 years old, and 28% was higher than 15 years old. As a general evaluation, it can be said that apple cultivation in Uşak province is new. In apple orchards, 54% of the producers preferred clonal rootstocks whereas the percentage of using seedling rootstocks was 46%.

It was also determined that the producers are using very different planting distances in their orchards; at most 4/5 x 4 m spacing (43%) was preferred. Only 19% of the producers chose less than 4 meters of planting distance. Planting distances vary according to the cultural conditions/practices such as soil structure, cultivar, rootstock, pruning, etc (Özçağırın et al., 2011). It was determined that the Starking Delicious, Amasya and Granny Smith cultivars were representing about 64% of the orchards. In the orchard planting, 95% of the apple producers used the Golden Delicious cultivar as pollinizer. Cultivation in economic terms; taking into consideration the phenological, pomological and plant characteristics of the cultivars, it is possible to choose the most suitable cultivar for the ecological conditions. It is very important to determine the ability of cultivars to adapt to different ecological conditions in many fruit species. For this reason, adaptation works about apple cultivars continues in different ecological conditions of Turkey (Tekintaş et al., 2006; Yaşasın et al., 2008; Özongun et al., 2014).

**Table 2.** The general status of apple cultivation in the Uşak province

Characteristics	Spacing	Rate of orchard (%)	Characteristics	Spacing	Rate of orchard (%)
Ages of producers	18-45	20	Sapling planting spacing	< 4 m	19
	46-60	35		4/5 x 5 m	43
	> 60	45		6 x 6 m	24
Area of farming (da)	< 10	67		> 6 m	14
	10-25	27	Available main varieties	Starking Delicious	30
	> 25	6		Amasya	19
Tree age	1-4	36		Grany Smith	15
	5-15	36	Others	37	
	> 15	28	Pollinizer cultivar	Golden Delicious	95
Used rootstock	Seedling	46		Others	5
	Clonal	54			

The information on some cultural and technical processes applied in the orchards is given in Table 3. In this study, the producers stated that the most common diseases and pests in the apple orchards were apple scab (91%), codling moth (73%), apple aphid (59%) and apple powdery mildew (50%). 96% of the producers stated that they applied agricultural struggle in their orchards every year. Disease and pest control should be done frequently in orchards and cultural practices such as the removal of diseased plant tissues from apple orchards must be taken before the agricultural struggle. In the orchard management, agricultural struggle should be continued with suitable pesticide dose and application time. The ratio of irrigated orchards was 87%. While 60% of the orchards were irrigated by means of drip irrigation, 35% of them are irrigated through surface irrigation. Irrigation has positive effects on the vegetative growth of the trees and increases the quality of the fruit. Depending on climate and soil conditions, apple orchards in Turkey must be irrigated from June to September. In order to prepare a correct irrigation program, soil water should be measured with soil moisture sensor due to useful in terms of water saving. In this respect, the use of modern irrigation techniques such as drip irrigation and mini sprinkler irrigation in apple orchards is very important (Kaygısız, 2004).

The pruning was applied in the all apple orchards, while 74% of producers explained that they are pruning apple trees every year. In terms of training system, while the rate of producers applying the goblet system was 48%, the rate of those using the modified central leader system was 40%. Only 12% of the producers applied modern systems for high density plantations. Generally, in the apple orchards, shape-pruning is very important in 3-4 years after planting. While traditional goblet or central leader systems are used in planting orchards with wide spacing, modern systems are applied to frequent planting trees on dwarfing rootstocks. The yield-pruning must be performed as conscious in order to get regular and high quality products in the following years (Soylu, 2006). Fruit thinning, which is an important cultural process in terms of providing a high quality fruit rate, was not applied in 65% of the orchards. In order to get regular yield every year, fruit thinning must be done after the June drop according to fruit set (Kaçal, 2009; Ekinci, 2010).

The soil tillage was performed in the 94% of orchards. 26% of the producers applied soil tillage only once (in spring) in a year, 48% of the producers 2 times (in spring-autumn or spring-summer), and 26% of the producers 3 times (in spring-summer-autumn). Soil tillage processing provides benefits such as removal of weeds, ventilation of roots, and access of irrigation water to the lower layers of soil (Özçağırın et al., 2011). In apple orchards, the rate of producers who do not perform leaf analysis was 96%, while the rate of producers who do not perform soil analysis was 67%. 71% of the producers determined that they analyze their soils once in two years. Fertilization was applied in the 91% of the orchards. It was determined that the ratio of producer using fertilizer as farm manure and commercial fertilizer together (52%) was high. The ratio of producer using organic fertilizer in the apple orchards was only 9%. When determining the amount of fertilizer needed for the trees, 52% of the producers considered randomly, and only 28% of them considered the suggestions of the technical consultants. 71% of the producers used mixed fertilization method. While only 29% of the fertilizers were made from soil, there was no producer who only fertilize through the leaf. Due to the weakness of fruit cultivation in Uşak province, it seems that technical support is needed for use of fertilizer in the orchards. As the agricultural soils of the province are calcareous, especially phosphor and micro elements such as iron, mangan and zinc are lacking in the soils. Yıldız and Uygur (2017) reported that for the reduction of the soil reaction, dust sulfur should be used, and while selecting fertilization material, physiologically acid-based fertilizers should be preferred. Moreover, for the improvement of soil structure and especially for increasing the amount of organic matters, green fertilization applications should be promoted. However, application of micro elements through leaves would be better.

**Table 3.** Some cultural and technical processes applied in apple orchards

Characteristics	Spacing	Rate of orchard (%)	Characteristics	Spacing	Rate of orchard (%)
Common diseases and pests*	Apple scab	91	Soil tillage time	Spring	26
	Codling moth	73		Spring-summer	4
	Apple aphid	59		Spring-autumn	44
	Powdery mildew	50		Spr.-summer-aut.	26
Agricultural struggle	Yes	96	Leaf analysis	Yes	4
	No	4		No	96
Irrigation status	Yes	87	Soil analysis	Yes	33
	No	13		No	67
Irrigation system	Drip irrigation	60	Soil analysis frequency	Once in year	14
	Surface irrigation	35		Once in two years	71
	Others	5		Once in three years	14
Pruning of trees	Yes	100	Fertilization status	Yes	91
	No	0		No	9
Pruning frequency	Once in year	74	Fertilizer type	Farm manure	26
	Once in two years	22		Commercial fertilizer	13
	Once in three years	4		Farm+Commercial	52
Training system	Goblet	48		Organic fertilizer	9
	Modif. central leader	40	Size and age of tree	20	
	Modern systems	12	Randomly	52	
Fruit thinning	Yes	35	Fertilization criterion	The suggestions of a technical expert	28
	No	65		From soil	29
Soil tillage	Yes	96	Fertilization method	From leaf	-
	No	4		Mixed	71

\*More than one disease and pest have been detected in the orchards.

## CONCLUSIONS

As a conclusion, in the following few years, with the completion of dam ponds in Uşak province, the irrigable agricultural area will increase and this will contribute to the fruit growing in the area. Since fruit quality and yield in the region are low, the producers cannot gain the expected benefits from their production efforts. Therefore, to improve both quality and yield, selection of the apple cultivars should be done according to the needs of the local and regional markets, high density planting system should be preferred more, and cultural and technical management practices should be conducted regularly and accurately.

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