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A survey on the determination of statues of mechanization of pistachio farming and its problems in Turkey

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SUMMARY – In Turkey, despite the fact that history of the pistachio nut has a great economic importance, especially in the GAP region, and extends to a long way back; the amount of production has not been achieved at the expected rate. Average yield per pistachio tree is 2 kg and the average pistachio production is 46,500 tons, currently. Because, in this region, the pistachio nut is grown under dry climate conditions and in barren soil. Additionally, pistachio growers are not trained well enough about mechanization. This research was conducted to determine mechanization possibilities of pistachio and the post harvest handlings. It consisted of two parts, first the compilation of survey results which were obtained from farmers dealing with pistachio and the second part includes the results of post harvest processing of pistachio. For this reasion, pistachio nut growing practices, general farm, soil cultivation, pest controls, fertilization, prunning, harvesting, drying, dehulling and storing methods have been examined.

Key words: Pistachio, mechanization.

RESUME – *"Etude pour déterminer la situation actuelle de la mécanisation de la culture de pistachiers et ses problèmes en Turquie". En Turquie, malgré le fait que l'histoire des pistaches revêt une grande importance économique, spécialement dans la région GAP, et remonte loin dans le temps, la production quantitative n'a pas été atteinte selon le rythme prévu. Le rendement moyen par pistachier est de 2 kg et la production moyenne de pistaches est de 46 500 tonnes actuellement. En effet, dans cette région, les pistaches sont cultivées en conditions de climat sec et de sol stérile. En plus, les cultivateurs de pistaches ne sont pas suffisamment formés en ce qui concerne la mécanisation. Cette étude a été menée pour déterminer les possibilités de mécanisation des pistachiers et la conduite post-récolte. Elle présente deux parties, la première est la compilation des résultats d'études qui ont été obtenus à partir des agriculteurs cultivant les pistachiers, et la deuxième partie inclut les résultats du conditionnement post-récolte des pistaches. C'est pour cette raison qu'ont été examinés les fruits, les pratiques culturales, les exploitations agricoles en général, les travaux du sol, la lutte contre les ravageurs, la fertilisation, la taille, la récolte, le séchage, le cassage et les méthodes de stockage.*

Mots-clés : *Pistachier, mécanisation.*

Introduction

Pistachio nut is one of the product which is well known is foreign market of Turkey. In Turkey is third country about pistachio production after Iran and USA (Polat *et al.*, 1997). Pistachio nut is intensively grown in _anlıurfa, Gaziantep and Adıyaman provinces in Turkey. These provinces are in the southeast Anatolia (GAP) region. The total pistachio production of these region consists of 87.88% of the total production of Turkey. Along with the competition of GAP Project, it is expected that pistachio growing areas will be irrigated and, consequently the production will increase significantly, in Turkey. The number of pistachio tree, production and yield states in Turkey and GAP region are shown in Table 1.

Mechanization application is limited in pistachio cultivations in Turkey. In pistachio cultivating that mechanization applications are limited or not available at all is this limitation decreases the production of pistachio and yields of trees, consequently the cost of production is increased. Total labour power at the harvest is 43.33%, annual maintenance 41.51%, post harvest processes consist of total labour power in the production (Yıldız, 1998).

In this study, mechanization possibilities of pistachio production, determination of problems and directing suggestion on the subject are aimed.

Table 1. The number of pistachio trees, production and yield station in GAP region and Turkey (Ak *et al.*, 1999)

Provinces	The number trees			Production		
	Total	At the crop	%	Tone	%	Yield (kg/tree)
_anlıurfa	14,845,660	8,125,210	54.73	21,439.8	46.11	2.639
Gaziantep	15,353,800	9,278,700	60.43	12,479.3	26.84	1.345
Adıyaman	5,490,300	3,305,000	60.20	3,817.5	8.21	1.155
Siirt	1,140,100	558,700	49.00	1,311.5	2.82	2.374
Diyarbakır	195,900	83,575	42.66	710.0	1.53	8.495
Batman	174,374	56,300	32.29	540.3	1.16	9.597
Mardin	598,996	156,150	26.07	522.5	1.12	3.346
_ırnak	60,555	21,845	36.11	42.5	0.09	1.944
Others	6,220,319	2,894,500	46.53	5,636.6	12.12	1.947
Turkey	44,080,000	24,480,000	55.44	46,500.0	100	1.9

Material and method

In this survey, 40 pistachio farms management were investigated in _anlıurfa and Gaziantep provinces. In this study, pistachio producers own pistachio plantation area more than 50 da or at least 200 trees. Four basic group question were asked to pistachio producers: (i) general information about pistachio farm; (ii) questions about the production of pistachio; (iii) mechanization usage and number of machines; and (iv) problems encountered at mechanization in pistachio cultivation.

Results and discussion

The age of 7.50% trees is under ten years; that is, young trees. 72.5% of the cultivation is made in barren soil and 27.5% in the fertile soil. Of all the pistachio land of 45.0% land is flat area, 55.0% is slope and hill.

The results showed that same mechanization practices can not be applicable to every farm. Because the topography of the land, the distance between the trees and the interval between the farm affect the pistachio mechanization directly.

In Turkey, pistachio cultivations is 37.5% under irrigated land and 62.5% is under dry conditions. And the ratio of male trees to females is rather low. Due to these unfavourable conditions consequently, yield of pistachio is low in Turkey.

General information on pistachio cultivation is given Table 2.

Maintenance characteristics and harvest mechanization of pistachio are given in Table 3.

42.5% of pistachio growers are performing tillage 5-6 times a year. 82.5% of pistachio growers are performing 9 or 11 footed cultivars for tillage. 17.5% of pistachio growers are performing plough with cultivars. 35% of pistachio growers aren't giving fertilizers but 65% of pistachio growers are applying fertilization. 90.0% of pistachio growers are using sprayer for pesticide application. Pest management is usually handled in March and June. Most of growers are pruning in November and December. 17.5% pistachio growers don't prune at all. All of the pistachio growers who prune by using hand hook and saw. In this region, processes of pistachio harvest and post harvest mechanization have investigated and given Table 4.

37.5% of pistachio growers are selling their crop immediately after harvest. 62.5% of pistachio growers storage their crop in sacks and in simple storage ways.

Table 2. General information on pistachio cultivation

Features of managements		Percent of investigated managements (%)
Number of trees (number)	0-500	37.5
	501-1000	35.0
	>1000	27.5
Bearing	Bearing	92.5
	Non-bearing	7.5
Space of plantation (m x m)	4 x 8	12.5
	6 x 6	70.0
	6 x 8	17.5
Age of trees (year)	<10	7.5
	10-20	15.0
	>20	77.5
Soil state	Barren soil	72.5
	Fertile soil	25.5
Growing conditions	Irrigated	37.5
	Non-irrigated	62.5
Topography conditions	Flat	45.0
	Hill or rugged	55.0
Subplant	No	82.5
	Vineyard and olive	17.5

Table 3. Maintenance characteristics and harvest mechanization of pistachio

Process	Used equipments	Percent of investigated managements (%)
Fertilization	Spreading on the soil with trailer	65.0
	–	35.0
Plant protection	Sprayer	72.5
	Atomizer	17.5
	–	10.0
Tillage	Only plough	0
	Only cultivator	82.5
	Plough + cultivator	17.5
Pruning	Pneumatic pruning machines	0
	Hand hook and saw	82.5
	–	17.5

In Turkey all harvesting operations are made manually. Some of growers harvest in August and sell their crops freshly. Other growers are harvesting their crop in September and October.

Drying of the pistachio after harvest is usually acquired on mats on the ground by laying harvested crops on the cloths for 7-10 days until they fully dry. None of the pistachio growers make roasting. The roasting process is done in the pistachio processing factory after the crops has been sold.

Separation of split nut and splitting is also done in the factory. The storage of the pistachio is done in sack and simple tanks.

Information on possession of farm machines and machines use of pistachio growers are given

Table 5.

Table 4. Process with pistachio harvest and post harvest mechanization

Process	Used equipments	Percent of investigated managements (%)
Harvesting	Hand and stake	100.0
	Shaker machine	0.0
Drying	Spreading on concrete and soil land	62.5
	Drying machine	0.0
	Not drying	37.5
Roasting	Roasting unit	0.0
	Not roasting	100.0
Separation of split nut and splitting	Hand	17.5
	Splitting machine	0.0
	Not splitting	82.5
Storage	Ordinary storage	62.5
	Cold storage	0.0
	Not storage	37.5
Classification	Hand	10.0
	Sieve	55.0
	Not classification	35.0

Table 5. State of farm machines and machines use of pistachio growers

Farm machinery	Possession percent of investigated managements (%)
Mouldboard plough	27.5
Disk plough	0.0
Furrow opener	10.0
Rotary tiller	0.0
Cultivator	37.5
Roller	10.0
Disk harrow	0.0
Manure spreader	0.0
Fertilizer spreader	0.0
Atomizer	10.0
Pesticide spreader	27.5
Tractor	37.5
Trailer	37.5
Water tank	20.0
Pruning equipments	42.5

47.5% of pistachio growers are renting to all of farm machinery and 52.5% of pistachio growers are renting to some of farm machinery.

47.5% of pistachio growers have no machine and they get benefit from the rental machines. 37.5% of pistachio growers have cultivators, 27.5% of growers have mouldboard plough, 10.0% of growers have atomizer, 37.5% of growers have tractor and trailer.

Conclusion and suggestion

In Turkey, the cultivation practices of the pistachio is not performed sufficiently and the yield is fairly low. This situation can be stated by following reasons: (i) approximately, all production is done under dry condition and barren land; (ii) fertilizer usage is very low or no application at all; and (iii) doing subplantation.

Pistachio harvesting is completely done by hand. Because of this reason harvesting costs comprise 43.33% of the total cost.

In this survey, 62.5% of the farmer want to pass over to harvesting mechanization as soon as possible, whilst 37.5% of pistachio growers believe that mechanic harvest may damage the branches and the trees. Irrigation of all the GAP region causes labour problems. The use of machinery in the production of pistachio is very poor in Turkey.

At the end of the this survey, we can conclude below suggestions:

(i) Mechanization must be adopted in all terms of the cultivation of pistachio. Distance between the trees must be 10 x 10 meter, because this distances is suitable to mechanization. The ratio of the male trees must be sufficient enough to the female trees.

(ii) Different tillage methods must be applied to the soil and results must be compared.

(iii) Fertilization must be done mechanically. Because digging the soil 20-30 cm below by hand and putting the fertilizer is very difficult and not practical.

(iv) Pruning is done by shears and saw. This is impossible or very expensive for farmers who have large farms. Because of this reason new technical pruning systems must be applied.

(v) Suitable shocking equipment must be developed and used at harvest for the mechanization of the pistachio. Because of the topography of the land at the harvest of the pistachio we need both branch and trunk shocking machines. With mechanical harvest the cost of production and labour will be diminished, and waste of time will be prevented.

(vi) The biggest problem we encountered after the harvest, separation of split nut and splitting.

In solving these problems, especially, unsplit crops, further researches must be done.

References

Ak, B.E., Ka_ka, N. and Açar, _. (1999). Dünyada ve GAP Bölgesinde Antepfıstı_ı (*Pistacia vera* L.) Üretimi, Yeti_tirme ve __leme Yöntemlerinin Kar_ıla_tırılması. GAP I. Tarım Kongresi 26-28 Mayıs 1999. _anlıurfa.

Polat, R., Ülger, P. and Sa_lam, R. (1997). Antepfıstı_ı Üretiminde Mekanizasyon Durumu ve Sorunları. Tarımsal Mekanizasyon 17. Ulusal Kongresi, 17-19 Eylül 1997, Bildiri Kitabı, Gaziosmanpa_a Üniv. Ziraat Fakültesi, Tarım Makinaları Bölümü, Tokat. s 111-119.

Yıldız, F. (1998). _anlıurfa ili Antepfıstı_ı i_letmelerinde Girdilerin Fiziki Miktarları ve Antepfıstı_ı Maliyetinin Tesbiti üzerine Bir Ara_tırma. Yüksek Lisans Tezi. Harrran Üniversitesi Fen Bilimleri Enstitüsü Tarım Ekonomisi Anabilim Dalı. _anlıurfa.