

## Determination of Structural Properties of Agriculture in Çanakkale Province

Sakine ÖZPINAR<sup>1\*</sup>

Ünal ÜRKMEZ<sup>1</sup>

<sup>1</sup> Çanakkale Onsekiz Mart University, Agriculture Faculty, Department of Agricultural Machinery and Technologies Engineering, Çanakkale, Turkey, 17020

\*Corresponding author: E-mail: sozpinar@comu.edu.tr

Geliş Tarihi (Received): 02.09.2016

Kabul Tarihi (Accepted): 26.10.2016

In order to have a more precise description of agricultural farm structure which has significant affect on agricultural mechanization properties and characteristics of crop production systems, as well as to assess possibilities for improving production and farming conditions in which crop production is organized, a survey based research was directed at selected group of farms the Çanakkale province. 570 questionnaires have been used to determine structural properties of the agricultural farms registered to farmer registration system in 2012-2013 years. Questionnaire was divided into four sections: general information of the farm, agricultural and structural information, education and the perspectives of future farming.

In results, average age in the most of analysed farms was 45 years, and person in each family was 3.72, but 2 persons of them were contributed to the agricultural production. The most of family persons have primary education while the rate of graduates from the university were quite low with 5%. The distribution of the rate of owned and hired agriculture land was the same. The main crops was wheat, tomatoes, olive and horticulture production. 58% of the total agricultural land was irrigated by ground-water, the rest of the land with 43% was non-irrigated, especially under cereal production. The most of farmers have expressed a positive expectation from future due to appropriate agricultural policies such as grant of mechanization equipments.

**Key words:** Agriculture, agricultural structure, agriculture crops, questionnaire, Çanakkale

### Çanakkale İlinde Tarımsal Yapının Belirlenmesi

Çanakkale’de tarımsal mekanizasyon üzerine etkisi olan tarımsal yapının geliştirilmesi ve gerekli olanakların yaratılması için mevcut verilerin belirlenmesi amacıyla bir anket çalışması yapılmıştır. Bu amaçla 2012-2013 üretim döneminde çiftçi kayıt sistemine kayıtlı 570 işletme sahibi ile görüşmeler yapılmıştır. Görüşme sırasında üreticilere yöneltilen sorular dört ana başlık altında toplanmıştır. Bunlar, işletme hakkındaki genel durum, işletmelerin tarımsal yapı özellikleri, üreticilerin eğitim durumu ve tarımda geleceğe yönelik bilgi yoklaması olmuştur.

Sonuç olarak, ele alınan işletmelerdeki üreticilerin ortalama yaşı 45 ve ailedeki kişi sayısının ise 3.72 olduğu ancak, bunların ikisinin tarımsal üretimde faaliyet gösterdiği saptanmıştır. İşletmelerdeki kişilerin çoğunun ilkökul mezunu ve özellikle üniversite mezunu olanların %5’lik oranla oldukça düşük olduğu belirlenmiştir. Ele alınan işletmelerde kullanılan tarımsal alanın kiralama ve kendi arazisi olma özelliğine bakıldığında, oransal olarak aynı düzeyde bulunmuştur. İşletmelerde yetiştirilen başlıca ürünlerin buğday, domates, zeytin ve diğer bahçe ürünleri şeklinde olduğu saptanmıştır. İncelenen işletmelerdeki toplam arazinin %58’i yer altı suyu ile sulanırken, geri kalan %43’ünde ise özellikle tahılların üretildiği kuru tarım alanlarından oluşmaktadır. Ayrıca, görüşülen üreticiler geleceğe yönelik olarak özellikle mekanizasyona verilen destekler gibi tarımsal politikalarından umutlu olduklarını belirtmişlerdir.

**Anahtar kelimeler:** Tarım, tarımsal yapı, tarım ürünleri, anket, Çanakkale

#### Introduction

The importance of agricultural production is increasing gradually due to the growing population in the world. In terms of agricultural lands, Turkey is one of country which has an important role on agricultural production in the world-wide and trade in terms of products both grown and exported. Majority of the population directly or indirectly depends on agriculture and it employs roughly 25.5% of the country’s labour

force (Anonymous, 2013), but it is decreasing related to the increasing mechanization in the agriculture sector. About 35.5% of the country are arable lands and 15.0% consists of forests. Around 18.4% of the cultivated land is irrigated. Vegetable products account for 76.0% of total agricultural production when wheat being the leading crop. The cultivated agricultural lands cover around 24 million hectares, meadow and pasture areas cover approximately 15 million hectares (Anonymous,

2013). Crop farming, fruits and vegetable products account for biggest share of total agricultural production. Farm structure in Turkey is very complex, consisting of small subsistence agricultural farms, small-semi-subsistence farms, small family farms, as well as privatized large enterprises with a mixed ownership structure although the main characteristic is being small family farms. A major structural problem in Turkish agriculture is that a typical farm is divided up into several distinct parcels of land. This structure limits the opportunities for mechanization and the adoption of intensive grazing systems, and involves increased losses and higher production costs. The farm structure also shows similarities with some of the new member states. According to the last census, there are approximately 3 million agricultural farms in Turkey (compared to approximately 12 million in the EU-28), most of which are family farms employing family labour. Farms are smaller than EU average (the average farm size 6.5 hectare, compared to an EU-28 average of 13 hectare). Over 90% of the farms and over 60% of total land fell into the 0-20 hectare size group (Dellal, 2009). In Turkey, Aegean, Marmara and Mediterranean regions take the lead in agricultural production because of conscious production and grown mechanization application in agriculture. West Marmara region comprises 6.67% total agricultural land in Turkey. Çanakkale is one of the province in this region which has approximately 993 thousand hectares which includes 34.0% arable land with 330 thousand hectares, 2.3% meadows and pastures, 53.8% woodland and heathland, 10.8% residential areas without agricultural lands and others agricultural area (Table 1). 23.0% of the arable land is irrigated, while the large part of the remaining land is non-irrigated and under rainfed conditions. Agricultural production is assumed as heading source of

income together with tourism for this province and has approximately 51 thousand agricultural farms and only 24 thousand farms is registered to farmer registration system (Anonymous, 2013). In Çanakkale province, there is no sound industrial base and population residing in rural areas is engaged directly or indirectly in agriculture. Field crops production area comprises the most part of arable land followed by olive, vegetable, horticulture and vineyard, while vineyard are increasingly reduced from 2011 to 2013 (Table 1). Wheat constitutes the largest share in cereal production followed by barley and maize. Tomatoes, pepper and bean constitute almost all of the production value of vegetables crops, while sunflower and olive are the two important oil crops. Fruit such as peach, apple and vegetable production, which is a leading sector of province agriculture, together accounted for more than half of the total value of production. Vegetable farms are small (about 0.4 hectare on average), but it is highly labour-intensive. Due to the important role of agricultural production in the province requires a research such as agricultural structural properties of the city. Determining and development of the structural properties in province causes sustainability and productivity on the agricultural production. Sustainability is defined as the high yields for current and future production despite the possible major shocks (Tilman et al., 2002). In general, yields have increased over time, but still remain low, in comparison with OECD averages (OECD, 2016). In this study, a questionnaire was conducted in Çanakkale province which includes city center and all districts. In the questionnaire, it was aimed to determine data such as the number of labour, age of labour, area ownership status, production area, grown products, etc., evaluated with the aim of determining the agricultural structure.

Table 1. Distribution of arable land according to agricultural branches in Çanakkale province

Agricultural branches	2011		2013	
	Area (1000 ha)	Rate (%)	Area (1000 ha)	Rate (%)
Field crops*	265.9	80.5	258.3	78.2
Olive	30.4	9.2	31.9	9.7
Vegetable	19.1	5.8	20.6	6.2
Horticulture	9.8	3.0	14.7	4.5
Vineyard	5.2	1.5	4.9	1.4
Total	330.4	100.0	330.4	100.0

\*Including fallow

## Material and Methods

This study was conducted in the Çanakkale province including city center and districts of Biga, Bozcaada, Bayramiç, Ayvacık, Çan, Ezine, Eceabat, Lapseki, Gökçeada, Gelibolu and Yenice during 2012-2013 growing season. 102 villages among total 587 villages in province were selected while agriculture is the main occupation of the people in these villages. In 587 villages in province, approximately 51 thousand farms are engaged in agriculture activities (Table 2), but only 24 thousand farms is registered to farmer registration system (Anonymous, 2013). From 102 villages, about 2.4% of the farms (i.e. 570) under registration system were randomly selected on proportionate sampling basis. A well-structured questionnaire was prepared for the collection of data. Efforts were made to keep it simple and understandable so as to capture all the necessary information on family activities, farm composition, age groups, participation of men and women in agriculture, properties of agriculture land, etc.

In all farms, farmers were interviewed face to face, researchers used the questionnaires to conduct personal interviews with a sample of usually 570 farmers or workers known to use mechanization equipments intensively. Individuals were selected according to the branch of farmer registration under Çanakkale Directorate of Provincial Food Agriculture and Livestock which knows who was interviewed and the individual identity of record is kept confidential. Questionnaire was conducted to determine the

agricultural structure and properties of labours. Questions concentrated especially on the agricultural land, production pattern, total parcel of agriculture land, field size in owned or hired type, farmer numbers as labour, their age and education level of farmers.

Data analysis was conducted to find out the required results of the study. All data obtained from the questionnaire were evaluated in Excel programme, and Minitab package programme for statistical analyses.

## Results and Discussions

### Characteristics of Social Structure of Farms

The socio-economics characteristics of the sampled respondents including age, family population, the role of family person in agricultural production and educational status are outlined in the following paragraph (Table 3). The number and quality of human labour has significant importance to maintain the quality of farms and crops by doing physical labour of agricultural operations and operating an agricultural machinery.

The average family population was found as 3.72 persons per agricultural farm which is over average of Turkey with 2.65 persons (Anonymous, 2013) when the number of men and women working in agriculture have been identified approximately one person, However, the 2.09 persons of all family population were working in the farm activities.

Table 2. The number of villages, farms and production area under questionnaire in Çanakkale province

Districts	Total villages (number)	The questionnaire villages (number)	Rate of total villages(%)	Total farms (number)	Total questionnaire farms (number)	Rate of farms(%)	Total production area	
							(1000 ha)	(%)
Center	53	12	22.6	4535	64	11.2	24.3	7.4
Ayvacık	65	10	15.4	4057	45	7.9	33.1	10.0
Bayramiç	75	10	13.3	6082	49	8.6	31.6	9.6
Biga	112	14	12.5	10523	105	18.4	60.1	18.2
Çan	66	9	13.6	262	5	6.8	26.5	8.02
Eceabat	12	6	50.0	4294	39	7.2	18.5	5.6
Ezine	49	9	18.4	1164	41	6.7	26.9	8.1
Gelibolu	28	8	28.6	4663	38	8.1	39.7	12.0
Lapseki	42	9	21.4	4578	46	9.3	36.1	10.9
Yenice	75	13	17.3	581	8	13.5	28.2	8.5
Gökçeada	9	1	11.1	4533	53	1.4	3.4	1.0
Bozcaada	1	1	100.0	5448	77	0.9	2.1	0.6
Çanakkale	587	102	17.4	50720	570	100.0	330.4	100.0

The questionnaire results presented in Table 3 clearly shows that the role of men in agricultural activities predominantly. The majority of labour were men in considering agricultural farms with 61.41%, while women contribution were found as 35.59% of the labour in agricultural production. Women are active partners in farming and undertake management along with men in the region. Women are involved in different operations of the crop production, planting, transplanting, weeding, harvesting in horticulture and vegetables, etc. because women make essential contributions to agriculture and rural economic activities in all developing country regions (FAO, 2011). Similar results were also reported by Özpinar (2002a) who conducted in the same area, and found 3.0 persons to activate in each farm. The labour rate in the family was determined as 57.0% which is including over one half percentage of all family members. In 2012, women labour contribution to agricultural production in Turkey was found 36.9% (Anonymous, 2012). There was huge similarity between our results and whole country data on women contribution to agriculture production. Furthermore, the women labour makes up averagely 43.0% of the agricultural labour force (FAO, 2011). In comparison with the world average, about 6.0% less women labour exist in agriculture in Çanakkale and Turkey.

In Turkey or Çanakkale province agriculture, hired labour is the most important type of employment while self-employed and unpaid family labour constitute the two main types of employment. Unpaid family labour is more dominant in Turkish agriculture as well as in Çanakkale. In studied in all farms during questionnaire, average person number for each family found 3.72 which is over Turkey with 2.65 persons (Anonymous, 2013) when the number of men and women working in agriculture have been identified approximately one person (Table 3). This is clearly seen in the results given in Table 4, the rate of labour between three and four persons was the highest with 70.88% in 404 of the 570 farms. As it can be seen more than half of the families of the population works in farms with the rate of 56.37% (Table 3), while the rest of the population can be said to represent family child age who can not be able to work in agriculture. After interviewing respondents in the farms, it was found that majority of the respondents were in the age group of 40-50 years (Table 3). In an other study, it was

presented that person per farm was around two, but one of the two people are employed in farms which it corresponds to the 46% of all farms (Gücüyen, 2007) who found lower rate than our results with the rate of 56.37%. It can be interpreted as the result of low use of mechanization equipments and tools in such as operations like hand hoeing, fertilizer application, hand harvest in vegetables and horticulture farms in our study area. In the same study area, it was conducted a questionnaire ten years ago by Özpinar (2002a) who found slightly lower than our results person per family with the rate of 3.9 when it presented men and women labour were higher with 1.6 and 1.4, respectively. It also found higher labour rate for all families with 70.19% compared to our results by 56.37% (Table 3).

The period from 2002 to 2012 which represents 10 years, it said that the increased use of mechanization equipments or tools instead of human labour in the same area. In addition, another result of the increased use of mechanization is to be the result of an increase in the level of mechanization of agricultural farms (Ürkmez and Özpinar, 2014), and developing in machine technology, for example, such as combine, planting and fertilizing machines in all crops, planting machine for vegetable farming and harvesting machine fruit such as olive.

Person age who worked for each farm is a significant indicator for qualified and conscious production. Perusal of data clearly indicate that majority of the farmer are belonging to middle age group (26-50 years), while age under 25 years and over 50 years is comparable very low. The farmers covered a narrow of age groups with the least under 42 years in Bayramiç district (Table 3).

The oldest person were in Bozcaada, followed by Eceabat and Ezine. In considering all districts, the average age of farmers was found 45 years (Table 3). Farmers specified at this age, they trust on their health and experiences and this effects the quality and the productivity. In addition, the reasons behind this age might be due to the health of old people and affected by climatic condition and engagement of young in other personal affairs. The results of this study are in agreement with the findings as reported by Özpinar (2002a) who conducted ten years ago reported that most studied of crop farmers in the same area were in the group of middle age with the average farmer age as 44 years.

Table 3. General characteristics of farmers in considering questionnaire

Districts	Age of labour (years)	Family population (person)	Number of labour in agricultura farms				Education level (%)				
			Men (person)	Women (person)	Total (person)	Rate of labour (%)	No-formal education	Primary	Secondery	High school	University
Centre	46.94±9.78	3.56±1.21	1.28± 0.55	0.75± 0.53	2.03± 0.78	57.02	-	57.81	25.00	10.94	6.25
Ayvacık	49.76±9.77	3.24±0.93	1.11± 0.32	0.51± 0.59	1.62± 0.68	50.00	-	71.11	28.89	-	-
Bayramiç	42.90±11.5	3.71±0.96	1.51± 0.62	0.96± 0.45	2.47± 0.84	66.48	-	48.98	16.33	18.37	16.33-
Biga	43.40±10.0	3.76±1.07	1.30±0.54	0.95±0.71	2.25±1.00	60.00.	-	59.05	29.52	9.52	1.90
Bozcaada	62.00±8.97	2.80±1.10	1.40±0.89	0.60±0.55	2.00±1.22	71.42	-	60.00	20.00	20.00	-
Çan	47.23±8.09	4.18±1.21	1.23±0.54	0.54±0.55	1.77±0.71	42.33	2.56	56.41	20.51	17.95	2.56
Eceabat	47.71±11.2	3.54±1.14	1.39±0.59	0.95±0.71	2.34±1.02	66.21	2.44	58.54	14.63	17.07	7.32
Ezine	47.02±10.0	3.79±1.02	1.24±0.54	0.58±0.55	1.82±0.73	47.92	-	50.00	15.79	23.68	10.53
Gelibolu	44.65±8.83	3.72±1.00	1.37±0.57	0.63±0.68	2.00±1.03	53.80	-	63.04	30.43	2.17	4.35
Gökçeada	47.87± 9.52	3.50±0.76	1.50±0.76	0.75±0.70	2.25±1.16	64.29	-	62.5	25.00	12.50	-
Lapseki	42.09±14.2	3.83±1.04	1.62±0.68	0.89±0.74	2.61±1.09	65.53	1.89	47.17	18.87	22.64	9.43
Yenice	44.19±8.62	3.88±0.93	1.16±0.38	0.74±0.75	1.90±0.81	48.96	-	70.13	24.68	5.19	-
Total/Ave.	45.44±10.6	3.72±1.07	1.34±0.56	0.78±0.66	2.09±0.93	56.37	0.53	58.95	23.51	11.93	5.09

Table 4. The distribution of family population according to the number of person in farms

Labour distribution	Family population range (person)				
	1-2	3-4	5-6	7-8	Total
Labour in farm (number)	65	404	92	9	570
Labour in farm (%)	11.40	70.88	16.14	1.58	100.00

In consideration of both studies results, there was no significant change according to age of farmers since 2002 in the same agricultural area. In addition, an other study conducted in Europe, Asia, Africa continents where were observed similar results that the labour of age in agriculture was stated to be between 40 and 45 years (Matthews, 2008). Author found that 40-49 years old were more popular in the European countries agriculture when the least farmers were under 40 years. Further, the results of this study are also in agreement with the findings as reported by George et al. (2009) who reported that farmers in their area were in the age group of 26-55 years while the participants of young and high age group in agriculture production activities were found to be very low with 28.3% and 11.7%, respectively.

Despite a significant improvement over the last two decades, no-formal education or illiteracy rates among Turkish agricultural labours remain as high as 15.2%, compared to less than 2.0% for those employed in agriculture of European countries (TurkStat, 2009), but it is over in some world side by 65.8% of farmers having no any education level. In this study, the majority (95%) of farmers had some education level, although for the majority this only included attendance at a primary school (Table 3). The least educated were in Eceabat and Çan, while some in Ayvacık, Bozcaada and Yenice had received no higher education. In considering different levels of education in all districts, the 59.0% of farmers were graduated from primary school followed by seconder and high school with the rate of 23.5% and 11.9%, respectively (Table 3). The rate of farmers who graduated from university was found very low with 5.1% compared to other education level, but this rate was lower than in Turkish level with 5.7% (Anonymous, 2015). In rural areas, where the agricultural population dominates, only 1.0% of the village (rural) population has received university level, or higher education. The rate of farmers who have no-formal education or illiteracy with 0.5% was lower than in the education level of the Turkish agriculture with

15.2% (TurkStat, 2009). Despite a significant improvement over the last two decades, Turkish education, illiteracy rates among agricultural labours are very high when the major contributor to this high rate of illiteracy is the female sector of the agricultural workforce (with an illiteracy rate of 25%) which represents 60% of the total agricultural workforce. In similar, a research conducted under different countries resulted that 84% of farmers had some education level while the rest of them had no-formal education (Matthews, 2008). In another research which was carried out in Manisa by questionnaire for vineyard farmers (Gücüyen, 2007) who found all farmers have different level of education when university graduation rate was 40% which is over our results. However, in Turkey, this rate is the lowest with 5.7% (Anonymous, 2015) when compared with Manisa.

### Production Branches and Crop Pattern

There are many crops determined in 570 farms which are under questionnaire (Table 5). In Table 5, many farms were carried out to grow one or more crops together in their production area. Wheat is mainly grown in all districts with 53.86% due to growing under rainfed conditions. The other field crops are pepper and tomatoes which are grown at the same rate with 32% in Biga and Yenice, while many fruits are the other main crops in especially in Lapseki and Bayramiç such as ceherry and apple. Olives are also grown extensively in south of districts such as Ezine, Ayvacık, with the rate of 18.77%. The other most grown crops were rice, peach and barley which are produced with the rate of 14.39%. Vineyard was growm mostly in Bozcaada in particullary under conventional systems in terms of mechanization. However, each crop of production areas regardless of horticulture and vineyard production varies from year to year due to crop rotation in both irrigation and non-irrigation conditions. In Table 5, yield was found higher for each crops than average of Turkey because of optimum growing conditions under this regions provides high yield. In addition, farmers were

used good quality seed and seedling to achieve high crop yield, and prepare optimum seedbed conditions. In considering the agriculture farms which were under the questionnaire, total

Table 5. Distribution of agricultural farms and their rate for each crop regardless of districts

Crops	Farms			Crops	Farms		
	(number)	(%)	Yield (kg da <sup>-1</sup> )		(number)	(%)	Yield (kg da <sup>-1</sup> )
Wheat	307	53.86	399 ±70	Sunflower	41	7.19	292±74
Pepper	185	32.46	2311±660	Melon	27	4.74	2800±1302
Tomatoes	183	32.11	7376±1696	Plum	22	3.86	1650±669
Maize	139	24.39	4374±1522	Vineyard	19	3.33	1734±551
Olive	107	18.77	981±481	Vetch	17	2.98	582±133
Rice	82	14.39	707±128	Field Bean	15	2.63	281±35
Peach	82	14.39	3447±732	Watermelon	14	2.46	3558±1327
Barley	82	14.39	368±87	Strawberry	12	2.11	3875±245
Cherry	57	10.00	2000±1060	Apricot	11	1.93	1382±435
Oat	57	10.00	355±81	Cotton	10	1.75	402±88
Apple	50	9.12	1650±669	Trifolium	8	1.40	2800±1180
Bean	41	7.19	1212±546				

agricultural area was found as 6843 hectares. The most of this area was consisted of field crop areas with 5054 hectares (Table 6). The rest of the total agricultural area was consisted of vegetable and fruits areas with 861 and 928 hectares,

respectively. In Table 6, it shows that wheat was determined as the major crop grown in all farms which are under questionnaire with 35.22% of the total agricultural area.

Table 6. Production area related to production branches and basic crop pattern under questionnaire

Crop	Crops	Crop production under questionnaire		Crop production rate in all branches (%)	Total agriculture area in Çanakkale (B)		A/B (%)
		Area (ha) (A)	(%)		Area (ha) (B)	(%)	
Branches	Wheat	2410	47.69	35.22	265902	80.49	1.90
	Rice	1032	20.41	15.08			
	Maize	498	9.85	7.28			
	Barley	370	7.33	5.41			
	Sunflower	285	5.64	4.17			
	Oat	204	4.04	2.99			
	Canola	92	10.65	1.34			
	Bean	42	0.83	0.61			
	Field bean	33	27.81	0.48			
	Vetch	32	0.63	0.46			
	Cotton	27	0.52	0.39			
	Chickpea	20	0.40	0.29			
	Trifolium	10	0.19	0.14			
	Total	5054	100.00	73.86			
Vegetables	Pepper	369	42.87	5.39	19154	5.80	4.49
	Tomatoes	413	48.03	6.04			
	Melon	28	3.21	0.40			
	Rocket	12	1.39	0.18			
	Other vegetable	39	4.51	0.57			
	Total	861	100.00	12.58			
Fruit	Peach	217	23.39	3.17	45281	13.71	2.05
	Apple	118	12.67	1.72			
	Cherry	57	6.13	0.83			
	Plum	29	3.16	0.43			
	Vineyard	29	3.07	0.42			
	Nectar	13	1.4	0.19			
	Apricot	11	1.17	0.16			
	Olive	455	49.01	6.65			
Total	928	100	13.56				
Total		6843	100.00	100.00	330337	100.00	2.07

Tomatoes grown areas take the lead in the all vegetable grown areas with the rate of 48.03%, while olive grown areas have the largest production area by 49.01% in fruit production. However, total agricultural area consist of field crop production area with the rate of 73.86% followed by fruit production area by the rate of 13.56% and vegetable production area by the rate of 12.58%. Olive is one of the most grown crops as wild olive with the rate of 6.65% in fruit production (Table 6) under rainfed conditions of south districts such as Ayvacık, Ezine. In another study, it was carried out in Malatya province that field crops area had occurred the largest part of arable agriculture area with 43% and wheat had the largest area with the rate of 30% (Gezer et al., 2002). They also state that in the same study, it was found that apricot remarkably had the largest production area in horticulture production with 14.8%.

Distribution of crop patterns were presented in Table 7 according to farm size (Gücüyen, 2007). Wheat production was found higher with 43.97% under 2-4.9 hectare than other farm size. Similarly, the rest of crops under questionnaire had the highest production area at the same farm size, for example, pepper, tomatoes, olive, peach, barley, oat, plum, vineyard, cotton with 37.84%, 32.24%, 36.45%, 37.80%, 45.12%, 50.88%, 42.31%, 47.37%, 70.00%, respectively (Table 7). In general, crops such as cereals produced more under 2-4.9 hectare farm size compared with other farms, while some vegetables and fruits produced smaller farms. In addition, yield of some crops were given in Table 7. Although mechanization level are increasingly developing in recent years, operations take important part of their time at production season as well. In considering farmers time, they spent averagely 880 hours per year for the agricultural operations which were tillage, seed bed preparation, sowing, fertilizing, hoeing, spraying, irrigation, harvesting, transporting (Table 8). It was determined that each agricultural operation required differences

time during the growing season. Tillage and seed bed preparation require more time with 21.42% annual time rate than the other annual operations (Table 8)

The second time required were found for harvesting due to hand harvesting operations were common in this area for particularly orchards and vegetables while field crops were usually harvest with combine (Ürkmez and Özpinar, 2014). Under questionnaire agriculture farms, the most of land were irrigated by water source supplied from underground with the rate of 57.6, but the rest of land were comprised of non-irrigated with 42.4% (Table 9). In Turkey, the proportion of irrigated land was 75.9% that the share of irrigated land is higher in the west of Turkey under specialise in the production of fruit and vegetables compared to other side of country. It was determined that hired under non-irrigated land with the rate of 43.0% were more common than irrigated lands. The land with the absence of irrigation in province, dry-land crops such as cereals (particularly wheat and barley) or legumes can be grown with low-yielding (Özpinar and Baytekin, 2006). In comparison with the other studies, irrigated land was found as 59.0% and rainfed rate was found as 41.0% (Gezer et al., 2002) who found similar results to ours. In contrast, a research was conducted in Diyarbakır province which determined higher non-irrigated agriculture lands with 61.0% than in irrigated with 39.0% (Sessiz et al., 2006).

On the other hand, the type of agriculture lands were obtained different rate according to owned or hired. Under irrigated area, owned area was higher than hired while it was higher than owned under non-irrigated conditions. Farmers usually hired agriculture farms to grow legumes during winter season for feeding animal because animal farming was widespread in all districts of province (Özpinar, 2002b).

Table 7. Distribution of some crops in farms according to farm size under questionnaire

Crops	< 0.5 ha		0.5-0.9 ha		1-1.9 ha		2-4.9 ha		5-9.9 ha		10-14.9 ha		≥ 15 ha		Total < 0.5-≥ 15 ha	
	(number)	(%)	(number)	(%)	(number)	(%)	(number)	(%)	(number)	(%)	(number)	(%)	(number)	(%)	(number)	(%)
Wheat	5	1.63	9	2.93	35	11.40	135	43.97	66	21.50	32	10.42	25	8.14	307	100.00
Peper	14	7.57	30	16.22	64	34.59	70	37.84	2	1.08	3	1.62	2	1.08	185	100.00
Tomatoes	24	13.11	36	19.67	46	25.14	59	32.24	13	7.10	4	2.19	1	0.55	183	100.00
Maize	1	0.75	14	10.45	50	37.31	45	33.58	14	10.45	5	3.73	5	3.73	134	100.00
Olive	6	5.61	14	13.08	17	15.89	39	36.45	17	15.89	12	11.21	2	1.87	107	100.00
Rice	0	0.00	2	2.44	10	12.20	17	20.73	36	43.90	1	1.22	16	19.51	82	100.00
Peach	2	2.44	12	14.63	23	28.05	31	37.80	14	17.07	0	0.00	0	0.00	82	100.00
Barley	0	0.00	7	8.54	13	15.85	37	45.12	14	17.07	9	10.98	2	2.44	82	100.00
Cherry	9	15.79	22	38.60	15	26.32	11	19.30	0	0.00	0	0.00	0	0.00	57	100.00
Oat	2	3.51	6	10.53	5	8.77	29	50.88	13	22.81	1	1.75	1	1.75	57	100.00
Apple	4	7.69	10	19.23	11	21.15	22	42.31	5	9.62	0	0.00	0	0.00	52	100.00
Bean	7	17.07	10	24.39	19	46.34	5	12.20	0	0.00	0	0.00	0	0.00	41	100.00
Sunflower	0	0.00	4	10.00	8	20.00	8	20.00	7	17.50	9	22.50	4	10.00	40	100.00
Melon	3	11.11	8	29.63	12	44.44	4	14.81	0	0.00	0	0.00	0	0.00	27	100.00
Plum	6	27.27	3	13.64	9	40.91	4	18.18	0	0.00	0	0.00	0	0.00	22	100.00
Vineyard	8	42.11	2	10.53	0	0.00	9	47.37	0	0.00	0	0.00	0	0	19	100.01
Vetch	0	0.00	2	11.76	8	47.06	7	41.18	0	0.00	0	0.00	0	0	17	100.00
Field bean	3	20.00	1	6.67	5	33.33	4	26.67	2	13.33	0	0.00	0	0	15	100.00
Watermelon	1	7.14	77	50.00	6	42.86	0	0.00	0	0.00	0	0.00	0	0	14	100.00
Strawberry	2	16.67	6	50.00	4	33.33	0	0.00	0	0.00	0	0.00	0	0	12	100.00
Apricot	4	36.36	0	0.00	5	45.45	2	18.18	0	0.00	0	0.00	0	0	11	100.00
Cotton	0	0.00	2	20.00	0	0.00	7	70.00	1	10.00	0	0.00	0	0	10	100.00
Trifolium	0	0.00	2	25.00	6	75.00	0	0.00	0	0.00	0.00	0.00	0	0	8	100.00
Total	101	6.46	209	13.36	371	23.72	545	34.85	204	13.04	76	4.86	58	3.71	1564	100.00

Table 8. Distribution of annual time required for farms of each cultural operation under all districts

Agricultural operations	Total annual time (hour)	Annual time rate (%)
Tillage and seedbed preparation	188	21.4
Sowing and planting	69	7.9
Fertilizing	68	7.7
Hoeing	58	6.6
Spraying	99	11.3
Irrigation	68	7.7
Harvesting	163	18.6
Transporting	165	18.8
Total	878	100.0

Table 9. The type of agriculture area under irrigated and rainfed conditions

Land type	Owned		Hired		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)
Irrigated	2446	66.0	918	43.0	3364	57.6
Non-irrigated	1260	34.0	1217	57.0	2478	42.4
Total	3706	100.0	2135	100.0	5842	100.0

In considering agricultural area in regarding to districts, the largest land per farm was in Ezine with the rate of 17.8 hectare followed by Gelibolu, Biga, Centre, Çan, Gökçeada with 16.0. 13.9. 13.2. 10.2. 9.2 hectare, respectively (Table 10). In these districts, farm size was large because of field crops

production were more common than other districts which have smaller orchards or vegetable areas (Table 10). In addition, forage crops are grown widely because of animal farming (Özpinar, 2002b) in these districts

Table 10. Distribution of crop production farms according to farm area (owned+hired land) in each district

District	Farm number	Size of owned area		Size of hired area		Size of total area			
		(ha)	(%)	(ha)	(%)	(ha)	(%)		
Eceabat	41	226.0	65.8	5.5	117.4	34.2	2.9	343.4	8.4
Gökçeada	8	59.4	81.1	7.4	13.9	19.0	1.7	73.3	9.2
Ayvacık	45	231.1	88.7	5.1	29.5	11.3	0.7	260.6	5.8
Bayramiç	49	186.0	83.2	3.8	37.5	16.8	0.8	223.5	4.6
Biga	105	757.2	53.1	7.4	669.6	46.9	6.4	1426.8	13.6
Bozcaada	5	11.5	100.0	2.3	0.00	0.0	0.0	11.5	2.3
Çan	39	196.6	49.72	5.0	198.8	50.3	5.1	395.4	10.1
Centre	64	534.7	63.2	8.4	311.6	36.8	4.9	846.3	13.2
Ezine	38	417.7	61.7	11.0	258.8	38.3	6.8	676.5	17.8
Gelibolu	46	463	63.1	10.1	271.8	37.0	5.9	734.8	16.0
Lapseki	53	404.8	77.3	7.6	118.9	22.7	2.2	523.7	9.9
Yenice	77	218.8	67.1	2.8	107.5	32.9	1.4	326.3	4.2
Total/Ave.	570	3706.8	63.4	6.5	2135.3	36.6	3.7	5842.1	10.2

\*It states agriculture areas per farm.

In Table 10, it is seen that 63.4% of all agricultural land are owned type and the rest of 36.6% is the type of hired land the regardless of districts. Average farm size determined in the study area was small when considering to apply for mechanization operations (Özpinar, 2002a). Parsel size of farm for owned land was 6.5 hectare, while it was as 3.8 hectare for hired land. In addition, agricultural land for each type land was consisted of many parcels and average farm parcel size was about 10 hectare (owned and hired 6.5 and 3.7 hectare, respectively) and higher when compared with 6.1 hectare per farm for Turkey (TurkState, 2009). According to briefing report of Ministry of Food Agriculture and Livestock, the same parameter in Çanakkale was expressed as 7 parcels for each farm. On the other hand, it was found parcel number as 3 per farm (Gezer et al., 2002) while it was smaller than our results. It can be said that farm size in our province is more suitable for mechanization applications when compared with others (e.g., Gezer et al., 2002).

## Conclusion

Land agriculture, horticulture and vegetable production are carried out together even in the same districts in Çanakkale province. Wheat was found as the most widely grown crop. The other top 5 grown agricultural crops were found pepper, tomatoes, maize and olive. Average agricultural land or parcel size per farm was 10.2 hectare which can be assumed as a large area however each parcel size was determined as small area. In terms of productivity, enlarging size areas per parcel is necessity. Most of the farmers choose to have their own lands instead of hired that causes farmers to have small size of parcel. Education level for farmers was determined as insufficient. Furthermore, encouraging young farmers to contribute agricultural production and increasing the number of labour in the family are needed for sustainable agriculture and transferring the experinces to the next generation.

## Acknowledgements

This study was conducted as a part of Project No. 2011/60 funded by the Research Foundation of

COMU, and including a part of Ms thesis of Ünal Ürkmez.

## References

- Anonymous, 2012. Turkish Statistic Institute, Ankara. (<http://www.tuik.gov.tr>, date of access: December, 2012)
- Anonymous, 2013. Turkish Statistic Institute, Ankara. (<http://www.tuik.gov.tr>, date of access: December, 2013).
- Anonymous, 2015. Turkish Statistic Institute, Ankara. (<http://www.tuik.gov.tr>, date of access: December, 2015).
- Dellal, I. 2009. The Role of Small Farms in Turkey, 111th Seminar of the European Association of Agricultural Economists and the International Association of Agricultural Economists (EAAE-IAAE), Small Farms: Decline or Persistence University of Kent, Canterbury, UK, 26-27 June.
- FAO, 2011. Food and Agriculture Organization. [www.fao.org/economics/esc/](http://www.fao.org/economics/esc/) the role of women in agriculture.
- Gezer, İ., S. Atay and E. Aydemir, 2002. Determination of agricultural structure and mechanization properties in the Malatya region. Oct. 15-17 Kuşadası. Türkiye. p:442-446.
- Gücüyen, A., 2007. Manisa ili ve çevresinde bağcılıkta mekanizasyon durumları, sorunları ve iyi tarım uygulamalarına yönelik çözüm önerileri (Yayımlanmamış Yüksek Lisans Tezi). Ege Üniversitesi. İzmir. Türkiye.
- Matthews, G.A. 2008. Attitudes and behaviours regarding use of crop protection products-A survey of more than 8500 smallholders in 26 countries. *Crop Protection*. 27:834-846.
- OECD, 2016. OECD Economic Survey of Turkey. Removing productivity bottlenecks. Gaziantep, July 15th.
- Özpinar, S. 2002a. A research on determination of agricultural structure and mechanization characteristics of farms in Çanakkale province. 8th International Congress on Mechanization and Energy in Agriculture. Oct. 15-17 Kuşadası. Türkiye. p:436- 441
- Özpinar, S. 2002b. A research on structural situation and mechanisation properties of dairy farms in Çanakkale. 8th International Congress on Mechanization and Energy in Agriculture. Oct. 15-17. Kusadası. Turkey. p: 424-428.
- Ozpinar, S. and H. Baytekin, 2006. Effects of tillage on biomass, roots, N-accumulation of vetch (*Vicia sativa* L.) on a clay loam soil in semi-arid conditions. *Field Crops Research*, 96(2-3):235-242.
- Sessiz, A., M.M. Turgut, F.G. Pekitkan and R. Eskici, 2006. Diyarbakır ilindeki tarım işletmelerinin tarımsal yapı ve mekanizasyon özellikleri. *Tarım Makinaları Bilimi Dergisi*. 2(1): 87-93.
- Tilman, D., K.G. Cassm, P.A. Matson, R. Naylor and S. Polasky, 2002. Agricultural sustainability and intensive production practices. *Nature*. 418: 671-677.
- TurkStat, 2009. The Summary of Agricultural Statistics, Office of the Prime Minister, Ankara, November.
- Ürkmez, Ü. and S. Özpinar, 2014. Determination of mechanization level of agricultural holdings in Çanakkale province. 12th International Congress on Mechanization and Energy in Agriculture. 3-6 Sept. 2014 Cappadocia. Turkey.