LABOR USE IN GREENHOUSE TOMATO PRODUCTION: A CASE STUDY FROM KUMLUCA DISTRICT OF ANTALYA PROVINCE, TURKEY

Vecdi DEMIRCAN[1], Ayse TURAN[1], Asli DALGIC[1]

e-mail: vecdidemircan@isparta.edu.tr

Abstract

Purpose of this study was to determine labor use by gender in greenhouse tomato production in Antalya province, Turkey. The main material of the study consisted of data obtained from surveys, which were conducted by face-to face interviews with tomato farmers in Kumluca district in Antalya province. Simple Random Sampling Method was used to determine the number of farms to be included in the survey. The number of samples representing the population was calculated as 106. Results showed that family labor use per decare in tomato production was 242.63 hours/year. It was determined that 49.87% of family labor was male and 50.13% was female. Foreign labor use per decare was 35.02 hours/year. It was found that 20.36% of foreign labor was male and 79.64% was female. It was found that male and female in the 15-49 age group worked more than other age groups. In family labor use, it was found that males worked more in plowing, irrigation, pesticide application and fertilizing activities, whereas women worked with men in many activities but mostly worked in pruning, rope tying, harvesting and classification. It was found that foreign labor was mostly women and they worked in pruning (disbudding), rope tying, harvesting and classification activities.

Key words: greenhouse, tomato, labor use, gender, age

There is a close relationship between economic growth and labor which is one of the production factors and the population that makes up the resource of the entrepreneur. The effectiveness of use of labor is also important as an indication of the quality as well as quantity of the population in the social, political and economic lives of countries. Natural resources cannot be used directly. Labor which is one of the production factors is required in order to benefit from these resources and to generate capital. Hence, labor is accepted among the active elements of production (Şahin and Miran, 2008).

Agriculture is an important sector in Turkey with regard to the employment opportunities it provides. The share of agriculture in employment is about 18.43% as of 2018 and about 5 million 297 people are employed in this sector (TUIK, 2019). Population makes up the source of family labor in farms as family businesses. Labor in family businesses includes physical and mental activities from production to marketing (Hardwick *et al*, 1999).

Greenhouse production that enables the marginal utilization of small areas by way of high yield per unit area is also one of the important agricultural activities in Turkey since it provides regular labor use throughout the year. Greenhouse production in Turkey started with the establishment of greenhouses in the Antalya province during the 1940's. Greenhouse activities had a slow development until the 1960's. However, greenhouse production increased rapidly afterwards with the use of plastic cover materials. Greenhouse production is carried out extensively in the Mediterranean, Aegean and Marmara coasts of Turkey (Miran, 2005). Of the greenhouse areas in the Antalya province, 63.585 decares (22.45%) is glass greenhouse, 193.443 decares (68.29%) is plastic greenhouse, 13.535 decares (4.78%) is high tunnel and 12.721 decares (4.49%) is low tunnel. Tomato production is ranked first with a share of 51.60% in Antalya province greenhouse production.

The purpose of the present study was to determine was to determine labor use by gender in greenhouse tomato production in Kumluca district of Antalya province, Turkey.

MATERIAL AND METHOD

The main material of the study consisted of data obtained from surveys, which were conducted by face-to face interviews with tomato farmers in Kumluca district of Antalya province. In addition, similar studies carried out on the subject by various

[1] Isparta University of Applied Sciences, Department of Agricultural Economics, Isparta-Turkey

individuals and institutions, reports and statistics were also used. Survey data cover the 2018-2019 production period. Simple Random Sampling Method was used to determine the number of farms to be included in the survey (Oğuz and Karakayacı, 2017).

$$n = \frac{N * S^2 * t^2}{(N-1) * d^2 + (S^2 * t^2)}$$

$$= \frac{815 * 7818065.98 * 2.7225}{814 * 175105.2364 + (7818065.98 * 2.7225)}$$

$$= \frac{17347017975}{163820347.1} = 106$$

Here; n: sample size (106 farms), S: Standard deviation (2796.08), t: t table value corresponding to the confidence interval (1.65 for a confidence interval of 90%), d: Acceptable error margin (arithmetic mean*margin for error=4184.56*0.1=418.46), N: Total number of units for the sampling framework (815 farms).

It was determined as a result of the calculation using the formula given above that it is required to carry out surveys with 106 farms with reliability limits of 90% and error margin of 10% and the farms subject to the survey were selected randomly. The data obtained from the farms via survey method were tabulated via Microsoft Excel after which the tables were analyzed and interpreted.

RESULTS AND DISCUSSIONS

Table 1 presents an overview of the data related with farms carrying out greenhouse tomato production. The age average of the greenhouse tomato production farmers was 47.55 years, their education level average was 6.44 years and the average number of individuals in their family was determined as 3.76. The average greenhouse land size of the farms was 3.26 decares with full irrigation. Whereas the land averages of the farms that are owned, rented and shared were determined as 2.43, 0.49 and 0.34 decares respectively. Average tomato yield per decare for the farms was 15.80 tons.

The number of individuals in the family, age and gender distributions is effective on the labor input in production (Handayani *et al*,1993). Family population and labor use in farms according to age groups are presented in Table 2. Average working population per farm was 2.25 with 47.48% male and 52.52% female population. It was determined that majority of the working family population was between the age group of 15-49 (68.07%). Family labor use per decare for farms was determined as 242.63 hours/year with 49.87% male and 50.13% female labor. Highest family labor use was obtained for the 15-49 age group (65.10%). Tanrıvermiş *et al*, (2001) carried out a study in which it was put forth that tomato cultivating farms use 213.72 hours/year labor per decare.

Foreign labor use according to age groups and gender are presented in *table 3*. Foreign labor use in farms by age groups was determined as 1.58 individuals with 38.92% males and 61.08% females. Majority of the foreign labor use was determined to be in the 15-49 age group (94.61%). Foreign labor use per decare was 35.02 hours/year with male labor share of 20.36% and female labor share of 79.64%. Highest foreign labor use ratio was determined in the 15-49 age group (91.26%).

Table 1

General characteristics of farms

Features	Average
Farmer's age (years)	47.55
Farmer's education level (years)	6.44
Family population (person)	3.76
Greenhouse land (da)	3.26
Irrigated land (da) (greenhouse)	3.26
Property land (da) (greenhouse)	2.43
Rent land (da) (greenhouse)	0.49
Shared land (da) (greenhouse)	0.34
Average tomato yield (ton/da)	15.80

Table 4 presents the family labor use in tomato production by activity and gender. Greenhouse tomato production activities include giving manure to soil, plough, laying of drip irrigation pipes, irrigation of soil, planting seedling and giving life water, pesticide application for root rot, fertilizer application for rooting, fertilization with drip irrigation, foliar fertilization, irrigation, pruning (disbudding), tie up, pesticide application with drip irrigation, pesticide application to foliar, harvest and classification. Average family labor use per decare in farms was determined as 242.63 hours/year with 49.87% male and 50.13% female labor. Harvest and classification share in total family labor use as 48.69%, irrigation as 10.90%, foliar fertilization as 10.61% and pesticide application to foliar as 10.51%. Activities in farms for which male labor is more dominant were determined as giving manure to soil (51.69%),

plough (94.33%), laying of drip irrigation pipes (56.69%), irrigation of soil (62.28%), pesticide application for root rot (71.76%), fertilizer application for rooting (73.02%), fertilization with drip irrigation (51.78%), foliar fertilization (51.25%), irrigation (67.48%) and pesticide application with drip irrigation (76.21%). Whereas activities in farms for which female labor is more dominant were determined as planting seedling and giving life water (50.74%), pruning (disbudding) (54.04%), tie up (52.56%), pesticide application to foliar (51.71%), harvest and classification (54.71%). Tanrıvermiş *et al* (2001) carried out a study in which it was determined that 47.14% of the labor used per decare in tomato production is spent on harvesting activity (Tanrıvermiş et al, 2001).

Table 5 presents foreign labor use by activities and gender in tomato production. The share of female labor in total foreign labor use per decare was determined as 79.64% and the share of male labor use was determined as 20.36%. It was determined that females work more in activities of planting seedling and giving life water (91.69%), pruning (disbudding) (95.51%), tie up (96.15%), harvest and classification (81.97%).

CONCLUSIONS

In conclusion, it was determined that the total labor use per decare in tomato production is 277.65 hours with 87.39% comprised of family labor and 12.61% of foreign labor. It was also determined that 53.86% (149.53 hours/year/da) of labor use per decare was female labor and that 46.14% (128.12 hours/year/da) was male labor. Average family labor use per decare in farms was determined as 242.63 hours/year with 49.87% male labor and 50.13% female labor. It was set forth that 79.64% of the foreign labor use in greenhouse tomato production activities is female labor while 20.36% is male labor. Accordingly, it was determined that female labor is used more extensively during greenhouse tomato production activities. Hence, it is considered that female labor should be taken into consideration during agricultural research and development projects on tomato production.

Table 2

Family labor use by age groups and gender

Age groups	Working family population by age groups (person)						Family labor use by age groups (hour/year/da)					
	Male		Female		Total		Male		Female		Total	
	P	%	P	%	P	%	P	%	P	%	P	%
7-14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15-49	0.71	46.30	0.82	53.70	1.53	68.07	77.51	49.07	80.43	50.93	157.95	65.10
50-64	0.34	50.00	0.34	50.00	0.68	30.25	41.69	51.36	39.49	48.64	81.18	33.46
65+	0.02	50.00	0.02	50.00	0.04	1.68	1.78	50.95	1.72	49.05	3.50	1.44
Total/Average	1.07	47.48	1.18	52.52	2.25	100.00	120.99	49.87	121.64	50.13	242.63	100.00

P: Person

Table 3

Foreign labor use by age groups and gender

Age groups	Working foreign population by age groups (person)						Foreign labor use by age groups (hour/year/da)					
	Male		Female		Total		Male		Female		Total	
	P	%	P	%	P	%	P	%	P	%	P	%
7-14	0.00	0.00	0.01	100.00	0.01	0.60	0.00	0.00	0.46	100.00	0.46	1.32
15-49	0.58	39.24	0.91	60.76	1.49	94.61	7.08	22.15	24.88	77.85	31.96	91.26
50-64	0.03	37.50	0.05	62.50	0.08	4.79	0.05	1.93	2.55	98.07	2.60	7.42
65+	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00
Total/Average	0.61	38.92	0.96	61.08	1.58	100.00	7.13	20.36	27.89	79.64	35.02	100.00

P:Person

Table 4

Distribution of family labor use by activity and gender (da)

Activities	Male		Female		Total	
	Hour/year/da	%	Hour/year/da	%	Hour/year/da	%
Giving manure to soil	0.27	51.69	0.25	48.31	0.52	0.21
Plough	1.15	94.33	0.07	5.67	1.22	0.50
Laying of drip irrigation pipes	1.09	56.69	0.83	43.31	1.92	0.79
Irrigation of soil	1.04	62.28	0.63	37.72	1.67	0.69
Planting seedling and giving life water	2.02	49.26	2.08	50.74	4.11	1.69
Pesticide application for root rot	0.71	71.76	0.28	28.24	0.98	0.41
Fertilizer application for rooting	0.67	73.02	0.25	26.98	0.91	0.38
Fertilization with drip irrigation	4.91	51.78	4.58	48.22	9.49	3.91
Foliar fertilization	13.19	51.25	12.55	48.75	25.74	10.61
Irrigation	17.85	67.48	8.60	32.52	26.46	10.90
Pruning (disbudding)	9.07	45.96	10.66	54.04	19.73	8.13
Tie up	2.57	47.44	2.85	52.56	5.42	2.23
Pesticide application with drip irrigation	0.64	76.21	0.20	23.79	0.84	0.35
Pesticide application to foliar	12.31	48.29	13.18	51.71	25.49	10.51
Harvest and classification	53.50	45.29	64.63	54.71	118.13	48.69
Total	120.99	49.87	121.64	50.13	242.63	100.00

Table 5

Distribution of foreign labor use by activity and gender (da)

Activities	Male		Female		Total	
	Hour/year/da	%	Hour/year/da	%	Hour/year/da	%
Giving manure to soil	0.10	100.00	0.00	0.00	0.10	0.30
Plough	0.64	100.00	0.00	0.00	0.64	1.83
Laying of drip irrigation pipes	0.02	100.00	0.00	0.00	0.02	0.07
Irrigation of soil	0.09	100.00	0.00	0.00	0.09	0.26
Planting seedling and giving life water	0.09	8.31	1.02	91.69	1.11	3.18
Pesticide application for root rot	0.01	100.00	0.00	0.00	0.01	0.02
Fertilizer application for rooting	0.01	100.00	0.00	0.00	0.01	0.02
Fertilization with drip irrigation	0.43	100.00	0.00	0.00	0.43	1.24
Foliar fertilization	0.52	100.00	0.00	0.00	0.52	1.49
Irrigation	0.52	100.00	0.00	0.00	0.52	1.49
Pruning (disbudding)	0.63	4.49	13.29	95.51	13.91	39.74
Tie up	0.07	3.85	1.74	96.15	1.81	5.16
Pesticide application with drip irrigation	0.00	0.00	0.00	0.00	0.00	0.00
Pesticide application to foliar	1.39	100.00	0.00	0.00	1.39	3.97
Harvest and classification	2.60	18.03	11.84	81.97	14.45	41.26
Total	7.13	20.36	27.89	79.64	35.02	100.00

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