DETERMINATION OF THE NUMBER OF WORKING DAYS AND ANNUAL WORKING TIME OF TRACTORS USED IN PLANT PRODUCTION PROCESSES IN KAYSERI PROVINCE

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Keywords
Workable days, annual working time, tractor, crop production, Kayseri

Abstract

As in Turkey, most of the agricultural enterprises are small-scale businesses in Kayseri. These enterprises own agricultural tools and machinery without considering the size of land, production type and techniques. This increases the costs of changing machinery as well as the fixed costs and causes the producers to lose their earnings without gaining. Therefore, agricultural producers have to take into account certain criteria such as working days and land size for the purchase of tractors and machinery for their farms.

The aim of this study is to determine the required number of working days and annual tractor working time in agricultural enterprises with more than 20 hectares of land in Kayseri conditions. As a result, the number of workable days was determined as 68.9, 105.8 and 137.3 days in 20-30 ha, 31-40 ha and 41-50 ha farms. In addition, annual tractor operating times were determined as 551.2, 864.4 and 1098.4 hours / year.

KAYSERİ İLİNDE BİTKİSEL ÜRETİM İŞLEMLERİ İÇİN ÇALIŞILABİLİR GÜN SAYILARI VE YILLIK TRAKTÖR ÇALIŞMA SÜRELERİNİN BELİRLENMESİ

Anahtar Kelimeler
Çalışılabilir gün, yıllık çalışma süresi, traktör, bitkisel üretim, Kayseri

Özet

Türkiye'de olduğu gibi, Kayseri'deki tarım işletmelerinin çoğu küçük ölçekli işletmelerden oluşmaktadır. Bu işletmeler arazinin büyüklüğünü, üretim türünü ve tekniklerini göz önünde bulundurmadan tarım aletlerine ve makinelerine sahip olmaktadır. Bu durumda, değişen makine maliyetlerinin yanı sıra sabit maliyetler de artmakta ve işletmelerin girdi masraflarını karşılamadan tarımsal üretim yapmalarına neden olmaktadır. Bu nedenle, tarım üreticilerinin işletmeleri için traktör ve makina satın alırken belirli kriterleri (çalışma günleri ve arazi büyüklüğü gibi) göz önünde bulundurmaları gerekir.

Bu çalışmada, Kayseri koşullarında bitkisel üretim yapan 20 hektardan büyük işletmeler için gerekli çalışılabilir gün sayıları ve yıllık traktör çalışma süreleri belirlenmiştir. Sonuç olarak, 20-30 ha, 31-40 ha ve 41-50 ha'lık işletme gruplarında, çalışılabilir gün sayıları, 68.9, 105.8 ve 137.3 gün olarak belirlenmiştir. Ayrıca, yıllık traktör çalışma süreleri, 551.2, 864.4 ve 1098.4 saat/yıl olarak belirlenmiştir.

1. INTRODUCTION

Meteorological factors are effective on agricultural work. As a result of the failure to carry out a certain agricultural work in a timely manner, economic losses occur. Therefore, it is necessary to know the characteristics of meteorological events affecting the field operations (Bolüloğlu, 1982; Vatandaş, 1987; Saglam, 2003). In this study, it is aimed to determine the number of working days of the tractors used by the enterprises having more than 50 hectares of land under Kayseri conditions. The responses of the 67 agricultural enterprises selected from the 10 districts, which are representative of the whole city of Kayseri, by means of sampling method, were evaluated. Agricultural enterprises are larger than 200 decares and have at least one tractor.

2. MATERIALS and METHODS

In the research area, the climate of Central Anatolia is dominated by cold and snowy winters and hot and dry continental in summer. There are very few closed days in Kayseri. The average number of closed days is 51.1, and the number of open and sunny days is around 120.3 days. The average relative humidity is 64%. The average rainfall is 397.4 kg per square meter. The province receives the most rainfall in April, May and June (Anonim, 2018).

The data of the study were determined based on observation, measurement and survey. The working hours of the production processes were determined by taking into consideration the production periods of different products. Climate data are from 2017 and include rainfall, average temperature and snow thickness (Anonim, 2017). Maximum, minimum and average temperature values of Kayseri province according to months are given in Table 1.

Tablo 1. Average temperature values of Kayseri Province by months

Months	Lowest Average Temp. (ºC)	Highest Average Temp. (ºC)	Avarage Temp. (ºC)
January	-6.9	4.0	-1.7
February	-5.3	6.0	0.1
March	-1.6	11.2	4.8
April	3.2	17.7	10.7
May	6.8	22.6	15.2
June	9.7	26.8	19.3
July	11.9	30.6	22.6
August	11.4	30.8	22.2
September	7.3	26.5	17.3
October	3.5	20.4	11.6
November	-0.9	13.0	5.3
December	-4.5	6.4	0.5

According to the size of the production area, the number of enterprises that are divided into 3 groups is determined as 38 in the group with 20-30 ha area, 16 in the group of 31-50 and 13 in the group of larger than 50 ha. According to the tractor power used in the field of production and agricultural machinery and machinery types, 4 different machine sets have been formed.

The following equation was used in determining the number and groups of enterprises (Yamane, 2001).

$$N = \frac{N.\sum N_h S_h{}^2}{N^2 D^2 + \sum N_h \, S_h{}^2}$$

n : Sample volume
N : Total number of enterprises in the main audience
Nh : h. number of units in layer
Sh : h. variance in the layer
D: Correction factor

In order to determine the working days, it is calculated by considering the following limit values depending on the climate data (Bölükoğlu, 1982; Vatandaş, 1987):
Rainfall on the calculated day <= 2.5 mm,
Rainfall on the previous day <= 5.1 mm,
Rainfall amount <= 7.6 mm two days ago
The rainfall of the week containing the calculated day <= 12.7 mm,
Amount of snow cover on the calculated day <= 0

3. RESULTS

3.1. Structures of The Agricultural Enterprises

The number and proportional distribution of the enterprises in the research area are given in Table 2.

Table 2. Agricultural enterprises and their proportional distribution

Groups (ha)	Tractor Power (kW)	Number of Enterprise		Land Size (ha)		
		No	(%)	Avr.	Total	(%)
20-30	60.78	38	56.72	23.55	894.8	42.93
31-50	62.20	16	23.88	36.20	579.2	27.79
> 50	62.40	13	19.40	46.96	610.5	29.29
Average	61.8	-	-	35.57	2084.5	-
Total	-	67	100	31.11	2084.5	100

3.2. Production Processes and Workable Days

The agricultural operation prosesses and working periods for each product are separately calculated. The production processes and workable days of sugar beet and potato products produced in the research area are given in Table 3.

Table 3. Production processes and times of sugar beet and potato products

Operations	Agricultural equipment	Dates	Workable days
Autumn tillage	Plow	30 Sept.-30 October	21
Land laveling	Doting	15-25 April	6
Sowing-fertilization	Pneumatic seed drill	25 April-10 May	9
Fertilization	Potato seed drill	1-25 May	14
Hoeing	Fertilizer machine	15-30 May	7
Spraying	Sprayer	15-25 May	8
Harvest	Sugar beet harvesting machine	30 Sept.-30 October	20
Transport	Potato seed drill machine	30 Sept.-30 October	20
Total	Trailer	-	105

Production processes and workable days of cereals produced in the research area are given in Table 4.

Table 4. Production processes and times of cereals

Operations	Agricultural equipment	Dates	Workable days
First tillage	Plow	1 October-1 November	12
Second tillage	Cultivator	5 October-25 October	9
Fertilizer	Fertilizer machine	10 October-30 October	11
Land leveling	Doting	10 October-30 October	11
Sowing	Sowing machine	10 October-30 October	11
Spray	Sprayer	30 March-20 April	12
Harvest	Combine	25 May-15 June	10
Shipment	Combine	25 May-15 June	10
Transport	Trailer	25 May-15 June	10
Total	-	-	96

Production processes and workable days of corn and sunflower products produced in the research area are given in Table 5.

Table 5. Production processes and times for corn and sunflower products

Operations	Agricultural equipment	Dates	Workable days
First tillage	Plow	10 -25 April	16
Second tillage	Cultivator	15 -25 April	13
Fertilizer	Fertilizer machine	10 October-30 October	11
Land leveling	Doting	10 October-30 October	11
Sowing	Sowing machine	10 October-30 October	11
Hoeing	Hoeing machine	1 March-20 March	7
Spray	Sprayer	30 March-20 April	12
Harvest	Combine	25 May-15 June	10
Shipment	Combine	25 May-15 June	10
Transport	Trailer	25 May-15 June	10
Total	-	-	111

Number of working days according to products are given in Table 6.

Table 6. Number of working days according to products

Products	Workable days	Workable time (hours)	Idle time capacity (%)
Sugarbeen-Potato	105	840	70-84
Cereals	96	768	64-76,8
Corn-Sunflower	111	888	74-88,8

Number of working days according to farm groups are given in Table 7.

Table 7. Number of working days according to farm groups

Farm groups (ha)	Workable days	Workable time (hours)	Idle time capacity (%)
20-30	68,9	551,2	45,9-55,1
31-50	105,8	864,4	70,5-86,4
> 50	137,3	1098,4	91,5-100,1

4. CONCLUSION

Sugar beet-potatoes, cereals and corn-sunflower products produced in 3 farms which are formed in enterprises larger than 20 hectares in the plant production area of Kayseri were examined in terms of working days. The following results are obtained.

- Considering 1000-1200 h/year, the average number of working days for the production of sugar beet and potatoes in 35.57 ha area was determined as 105 days and the annual working time was 840 hours.
- The average number of working days for cereal production in the 35.57-hectare area was 96 and the annual working time was 768 hours.
- In the 35.57 ha area for corn and sunflower, the number of working days is 111 and the annual working time is 888 hours.
- The number of working days for the group of 20-30 years is 68.9 and the annual working time is 551.2 hours.
- The number of working days for the group of 31-40 ha is 105.8 and the annual working time is 864.4 hours.
- The number of working days for the group of 41-50 hectares is 137.3 and the annual working time is 1098.4 hours.

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