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## Determination of Some Yield Characters of Grain Corn in Eastern Anatolia Region of Turkey

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**Abstract:** This study was conducted in Van, located in Eastern Anatolia Region of Turkey, in 2000 and 2001 year to determine some yield characters of grain corn cultivars. In the experiment eleven (C-955, DK-626, Antbey, LG-60, Flash, LG-55, TTM-8119, Vero, TTM-813, Ant-90 and Akpınar) corn cultivars were used and experimental design was Randomized Complete Block. Corn cultivars had the lowest 711.2 kg da<sup>-1</sup> and the highest 1062.5 kg da<sup>-1</sup> grain yield. DK-626 (1062.5 kg da<sup>-1</sup>), LG-55 (1027.4 kg da<sup>-1</sup>) and C-955 (1005.4 kg da<sup>-1</sup>) cultivars produced the highest grain yield had better performance while TTM-8119 and Vero cultivars having the lowest grain yield. Grain yield of corn cultivars in van were found sufficient compare to other region of Turkey. So, Van region can be a new corn grain production area in future.

**Key words:** Corn, cultivars, grain production, corn cultivation

### INTRODUCTION

Corn has a remarkable place among cereals and it is used as human food, animal feeding and industry. Turkey's corn production is used 35% as human food, 30% animal feeding and 20% fodder industry<sup>[1]</sup>. Besides, importance of corn is increasing year to year because of cultivation as second crop and appropriate silage material.

Corn has 600,000 ha planting area, 2, 500,000 ton production and 416.7 kg da<sup>-1</sup> yield in Turkey, according to FAO statistics. It ranks third, following wheat and barley in the Turkey's production of cereal crops<sup>[2]</sup>. Corn production of Turkey insufficient therefore, significant amount corn is imported.

Corn has a great adaptation ability. It can grow from latitude 58°N to latitude 35-40°S. The region of greatest production of corn in the world has a mean summer temperature of 21 to 27°C, a mean night temperature exceeding 13°C and a frost-free season of over 140 days. An average June-July-August temperature of 20 to 21°C, seems to be most favorable for maximum yield. The minimum temperature for the germination and growth of corn is 10°C or slightly below. Corn is grown extensively in hot climates, but yields are reduced where the mean summer temperature are above about 27°C<sup>[3]</sup>. Mean summer temperature in Van region is about 20°C and there

is enough frost-free season of over 160 days, therefore, climatic conditions of Van region seems to be favorable to reach maximum yield.

The most important agricultural progress in East Anatolia region is stockbreeding, but forage production in the region is pretty low. Therefore, forage production as well as grain production from cereals has great importance in the region.

Even though climatic conditions of Van region is most favorable for corn production, there is no corn cultivation in the region, except our researches.

The aim of this research was to determine proper corn cultivars for grain production in the Van region.

### MATERIALS AND METHODS

This research is conducted in 2000-2001 year in Van. Some climatic values during growing period of corn were given at Table 1. Main temperature during growing season of corn was 20.0 and 19.6°C in 2000 and 2001 years, respectively. In same season of 2000-2001 years, precipitation was 29.1 and 40.8 mm and humidity was 47.08 and 49.24%, respectively.

Soils of research area have clay-loam texture, slightly alkali, salt less. Also, soils has medium organic matter (2.66%) and lime (8.0%) levels and high potassium (1.434 ppm) and phosphorous (29.2 ppm) levels.

**Table 1: Some climatic values during experiment period**

Months	Average temperature (°C)		Total rainfall (mm)		Average humidity (%)	
	2000	2001	2000	2001	2000	2001
May	14.3	12.5	23.9	28.0	53.20	63.20
June	19.4	19.6	3.3	4.5	48.10	49.10
July	25.4	23.1	0.2	6.8	41.30	52.60
August	22.9	24.0	-	-	42.30	41.30
September	17.9	18.9	1.7	1.5	50.50	40.00
Tot./Ave.	20.0	19.6	29.1	40.8	47.08	49.24

Source: Van meteorology district records (2000-2001)

The experimental design was Completely Randomized Blocks with three replication. In the research, eleven corn cultivars (C-955, DK-626, Antbey, LG-60, Flash, LG-55, TTM-8119, Vero, TTM-813, Ant-90 and Akpınar), were used. Each experimental unit was 17.5 m<sup>2</sup> with 5 m length and 3.5 m width and row spacing was 70 cm. Planting was made in first week of May each year (2000-2001) by hand. Planting density was 16.000 seed da<sup>-1</sup>, 8 kg da<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> and 8 kg da<sup>-1</sup> N was applied during planting as fertilizers. Besides, 8 kg da<sup>-1</sup> nitrogen was applied when plants reach 30-35 cm length. Plants were irrigated orderly, once a week or ten days intervals. Row spaces were hoe up when plants reach to 30-35 cm length.

Three rows in each parcel, except edge rows, were harvested when completely mature stage of grains. First of all, plant length was determined in harvested plants, lather ears removed from plants. Grain yield, ear number, ear length, ear weight, 1000 grain weight, crude protein rate were determined by using harvested ears. Datas were analyzed by using SAS statistic program and means were compared with Duncan Test<sup>[4,5]</sup>.

## RESULTS AND DISCUSSION

Average grain yield of cultivars changed between 711.2 and 1062.5 kg da<sup>-1</sup> (Table 2). DK-626 (1062.5 kg da<sup>-1</sup>), LG-55 (1027.4 kg da<sup>-1</sup>) and C-955 (1005.4 kg da<sup>-1</sup>) cultivars had greatest grain yield. While TTM-8119 cultivars having the lowest (711.2 kg da<sup>-1</sup>) grain yield. Grain yield of different corn cultivars in Turkey changes depend on region. Some researchers<sup>[6-8]</sup> reported grain yield of corn is less than 1000 kg da<sup>-1</sup>, but the other researchers<sup>[9-13]</sup> reported more than 1000 kg da<sup>-1</sup> grain yield. However, average corn grain yield in Turkey is 416.7 kg da<sup>-1</sup> (FAO, 2003). Present results indicates that Van region can be important corn cultivation area in future.

Average plant height of cultivars was found between 172.1 and 228.6 cm (Table 2). Flash, LG-60, C-955 and DK-626 cultivars had highest plant height while TTM-813

and Akpınar cultivars had the lowest plant height. Plant height values of corn cultivars were pretty similar to reports of many other researchers<sup>[6-13]</sup>. Besides, average plant height in 2001 year was greater than average plant height of 2000 year. Better emergence rate in 2001 year may cause of that results.

LG-55 cultivar had the greatest ear number per plant (1.35 ear/plant). Therefore, LG-55 cultivar also had the greatest average grain yield per decar (1027.4 kg da<sup>-1</sup>). On the other hand ear number of the other cultivars was pretty similar. Besides, average ear number in 2000 year was slightly higher than of average ear number of 2001 year (Table 3).

1000 grain weight of corn cultivars changes between 178.9 and 269.7 g. Akpınar cultivar had the highest 1000 grain weight and Flash cultivar had the lowest 1000 grain weight. 1000 grain weights of cultivars were pretty similar to findings of some other researchers<sup>[6,10]</sup>.

Ear length of cultivars changed between 14.5 and 17.1 cm. LG-55, Ant-90, Antbey, TTM-8119 and LG-60 cultivars had the highest ear length while Akpınar cultivar having the lowest value (Table 4). Many researchers reported that ear length changes depend on cultivars<sup>[9,11,13]</sup>.

LG-55, DK-626 and TTM-8119 cultivars had the greatest ear weight, on the other hand, Vero, Flash, Antbey and Akpınar cultivars had the lowest ear weight. Ear weights of corn cultivars were found lower compared to findings of some other researchers<sup>[7,11]</sup>. In the experiment, pretty high planting density (16.000 plant da<sup>-1</sup>) was used, therefore, ear weight might be decreased. Sağlamtimur *et al.*<sup>[7]</sup> reported that ear weight of corn decreases with increasing planting density.

Crude protein (CP) of corn cultivars (Table 5) changed between 10.1 to 15.1%. TTM-813 cultivars had the highest crude protein rate and LG-60, Akpınar, DK-626, Ant-90 and TTM-8119 followed it. Vero cultivars had the lowest crude protein rate. Besides, average crude protein rate in 2001 year was slightly lower than 2000 year average CP rate.

Table 2: Grain yield (kg da<sup>-1</sup>) and plant height of corn cultivars in 2000 and 2001 years

Cultivars	Grain yield (kg da <sup>-1</sup> )			Plant height (cm)		
	2000	2001	Average	2000	2001	Average
C-955	1047.3ab	963.5ab	1005.4ab	216.4ab	233.3a	224.8ab
DK-626	1095.8ab	1029.1a	1062.5a	213.5ab	230.6ab	222.1ab
Antbey	864.1d	783.7cd	823.9cd	182.6cde	219.6cd	201.1c
LG-60	884.7cd	853.0bc	868.9c	217.6ab	233.7a	225.7ab
Flash	863.2d	796.2cd	829.7cd	222.8a	234.4a	228.6a
LG-55	1110.7a	944.1ab	1027.4ab	194.2bcd	216.4d	205.3c
TTM-8119	727.8e	694.5d	711.2e	184.6cde	219.2cd	202.1c
Vero	792.1de	725.4cd	758.8de	202.3abc	225.7bc	214.0bc
TTM-813	844.1d	794.8cd	819.5cd	163.5e	180.5f	172.1e
Ant-90	983.7bc	949.7ab	966.7b	174.9de	199.3e	187.1d
Akpınar	906.0cd	850.4bc	878.3c	169.4de	176.1f	172.8e
Average	920.0a	853.2b		194.8b	215.4a	

Table 3: Ear number (ear/plant) and 1000 grain weights of corn cultivars in 2000-2001 years

Cultivars	Ear number (ear/plant)			1000 Grain weight (g)		
	2000	2001	Average	2000	2001	Average
C-955	1.1b	1.03bc	1.06bc	216.5cd	210.0de	213.3cd
DK-626	1.13b	1.06bc	1.1bc	251.3ab	243.9b	247.6b
Antbey	1.16b	1.06bc	1.11bc	202.9de	202.4e	202.7de
LG-60	1.03b	1.03bc	1.03c	244.9ab	230.6bc	237.8b
Flash	1.1b	1.1bc	1.1bc	182.3e	175.6f	178.9f
LG-55	1.4a	1.3a	1.35a	199.6de	194.3e	196.9e
TTM-8119	1.13b	1.1bc	1.11bc	191.7de	194.3e	193.0e
Vero	1.13b	1.16b	1.15b	213.9cd	222.0cd	218.0c
TTM-813	1.16b	1.03bc	1.03bc	235.0bc	244.7b	239.9b
Ant-90	1.06b	1.0c	1.03c	234.4bc	234.7bc	234.6b
Akpınar	1.13b	1.06bc	1.1bc	265.5a	273.8a	269.7a
Average	1.14a	1.08b		221.6	220.6	

Table 4: Ear length (cm) and ear weights (g) of corn cultivars in 2000-2001 years

Cultivars	Ear length (cm)			Ear weight (g)		
	2000	2001	Average	2000	2001	Average
C-955	15.6	15.2ab	15.4bc	125.5cd	115.6bcde	120.6bc
DK-626	14.8	14.6b	14.7bc	150.9a	137.6ab	144.2a
Antbey	16.6	16.0ab	16.3ab	102.8e	97.5de	100.2e
LG-60	16.2	15.9ab	16.0abc	121.9cde	129.9abc	125.9bc
Flash	15.1	14.4b	14.8bc	105.6de	92.6e	99.1e
LG-55	16.8	17.4a	17.1a	146.0ab	152.1a	149.1a
TTM-8119	16.5	16.1ab	16.3ab	131.7bc	138.1ab	135.0ab
Vero	15.2	15.3ab	15.3bc	105.8de	89.2e	97.5e
TTM-813	15.0	14.8b	14.9bc	122.5cde	110.1cde	116.4cd
Ant-90	16.7	17.4a	17.1a	130.6bc	122.3bcd	126.5bc
Akpınar	14.5	14.5b	14.5c	109.2de	99.9de	104.6de
Average	15.7	15.6		123.0	116.8	

Table 5: Crude protein rate of corn cultivars in 2000-2001 years

Cultivars	Crude protein rate (%)		
	2000	2001	Average
C-955	12.5ab	11.2cd	11.8cd
DK-626	14.4a	13.0bc	13.7abc
Antbey	12.4ab	13.0bc	12.7bc
LG-60	15.6a	13.8ab	14.7ab
Flash	13.2ab	12.6bc	13.0abc
LG-55	13.0ab	12.1bc	12.5bc
TTM-8119	13.4ab	12.8bc	13.1abc
Vero	10.3b	9.8d	10.1d
TTM-813	15.3a	14.9a	15.1a
Ant-90	13.7ab	13.3ab	13.5abc
Akpınar	15.3a	13.3ab	14.3ab
Average	13.6a	12.7b	

Mean value with the same letter(s) are not significantly different at 5% as per DMRT

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