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Determination of Yield and Yield Components of Various Winter Lentil Genotypes (*Lens culinaris* Medic.) in Kahramanmaras Conditions

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Abstract

This study was aimed to determine of yield and yield compenents on 12 different red lentil genotypes which were grown in 2009-2011 growing seasons, repeating by two times, according to randomized block desing with four replication in Kahramanmaras conditions. In this study, the plant height (cm), ripening period (days), the first pod height (cm), the branch number (unit plant-1), number of pods per plant (unit plant-1), the number of grains per pod (unit pod-1) and grain yield (kg ha-1) were investigated. According to result of two-years combined the analysis, the plant height, ripening period, the first pod height, the branch number, number of pods per plant, and grain yield of genotypes were significant as statistically. It was found that the highest values of grain yield were obtained from FLIP 2007-106L (368 kg da-1), FLIP 2005-58L (310 kg da-1) and FLIP 2005-20L (298 kg da-1) respectively. The lowest of grain yield was 197 kg da-1 and FLIP 2007-133L genotype was obtained. In the ripening period was investigated, the shortest ripening periods were showed FLIP 2005-20L (145 day), FLIP 2005-58L (151 day) and FLIP2007-106L (152 day) genotypes respectively.

Key word: Lentil genotypes, yield and yield components.

Introduction

Researches for the improvement of production and consumption of food resources, particularly energy, protein, vitamin and mineral-rich foods, plays a decisive role in solving the problem hunger and nutrition. In the world, 22 % of vegetable protein in human nutrition, 7% of carbohydrates, 8% of proteins in animal nutrition and 5% of carbohydrates are provided from edible grain legumes (Wery et al., 1983). In edible grain legumes, lentil has an important place in human and animal nutrition which is one of the oldest cultivated plant (Pellet, 1988). Lentil is estimated to be first cultured in Southern Turkey and Mesopotamia called the fertile crescent (Özdemir, 2002). Lentil, which is one of the most important edible grain legumes has features which are very valuable in terms of nutritional value is capable of producing vegetable proteins up to 23 to 31 % and can be stored for a long time (Erkal, 1981). Lentil includes B, C, and K vitamins and is equal to soybean in terms of calories (Akçin, 1988). Lentil proteins, threonine and lycine aminoacids content is almost similar to those in beef (Aydoğan, 2001). Storing costs and selling prices and rapid deterioration of animal products and other difficulties leads developing countries to vegetable protein products which can be obtained more cheaply and can be stored for long periods (Erkal, 1981).

In our country green lentil is produced in 52, red lentil is produced in 29 provinces. Green lentil is grown mostly in Central Anatolia, with maximum planting area of our provinces Yozgat, Corum, Konya, Ankara and Aksaray. Red lentil which is widespread in Southeast Anatolia is extensive in Şanlurfa, Diyarbakır, Mardin, Gaziantep, Adıyaman provinces (Çiftçi, 2004). Lentil plant gene center of our country is, summer and winter planting can be made, can be cultivated in cold and dry conditions successfully, being a preferred product in foreign markets and contributing coming after plant in rotation, makes the plant has a great importance in our country.

Due to being in a passage zone, Kahramanmaras has Mediterranean and also continental climate. For this reason, lentil can be cultivated in summer at high regions, in winter

with base of barren land. Lentil is a good pre-plant which adds nitrogen to the soil for crops planted after itself. In addition, early harvest of wintery lentil offers adequate time for field preparation to the second product.

As with all breeding activities in a region to develop a good genotype, adaptation studies must be conducted in the area. Plant breeding and genotype improving is an important resource in the development of adaptation trials. Local genotypes in that area are adapted to the region they have grown for a long time. In particular, in self-fertilization plants, genetic features are protected and achievement of the research is carried out in a shorter time. Therefore, with 12 red lentil genotype adaptation study was conducted for two years in Kahramanmaras conditions.

Materials and Methods

This research was conducted between 2009-2011 for two years in Kahramanmaras conditions. In the experiment, genotypes Flip 2005-58L, Flip 2007-133L, Flip 2006-41L, Flip 2005-20L, Flip 2007-52L, Flip 2007-79L, Flip 2005-31L, Flip 2006-39L, Flip 2007-106L, Fırat 87 and Çağıl were used. 0-30 cm soil depth samples of the trial analyzed, respectively, first and second year (2009-2010 and 2010-2011) that the pH 7.76 and 7.32, lime ratio of 22.88 and 21.35, valuable phosphorus 4.70 and 4.33, valuable potassium levels 40.53 and 39.22, organic matter content 1.30 and 1.02 % were found to have a loamy texture (Anonymous 2012a). This study was established as randomized complete block design with four replications. Plot size is 5 x 1.2 = 6 m2. Each plot consisted of 6 lines. Distance between lines of 20 cm, so that every two years in November, digged with marker lines 4-5 cm depth, 350 plants per m2, were planted by hand. Attempts have been made for winter and rainfall is sufficient for the production because there has not been any watering during vegetation. Weed control during cultivation is mechanically done by hand. Harvest was made the first week of June. A few days after harvest, crops were dried, beans are separated from the beads by hand. In this study, plant height (cm), ripening time (days), the first pod height (cm), plant majors (number plant -1), pod number per plant (number plant-1), pod number per (unit pod-1) and grain yield (kg ha-1) were investigated. According to the analysis carried out in the investigation of properties, SAS program used for analyzing and Duncan test was used for grouping.

Kahramanmaras, has an altitude of 568 m. The first year of the experiment was conducted (2010), except January, February, March, April and May, the average temperature became higher according to next year. Rainfall during the months of February and May according to next year was higher, in January, March and April were lower. Total rainfall in the first 5 months of the second year than in the year 2010 with rainfall was 102 mm higher.

Results and Discussion

Plant Length (cm)

In a survey carried out for two years the plant height of lentil genotypes and the resulting average values and groups are given in Table1. Plant height of genotypes belonging to the research in the first year ranged between 65.10-76.45 cm, the average height of genotypes were found to be 70.70 cm. In the second year of the study, plant heights belonging to genotypes varied between 66.90-85.45 cm, the average plant height of the genotypes were found to be 74.33 cm. The average plant height of two years examined values ranged between 66.00-78.63 cm, 72.52 cm average of genotypes, respectively. Flip 2007-133L (78.63 cm) genotype, the highest plant height, while the Flip 2006-41L (66.00 cm) the lowest plant height owned, including statistically significant differences caused the other genotypes vary between these values, and formed transition groups was determined. Flip 2005-58L, Flip 2007-52L, Flip 2007-79L, Flip 2005-58L, the Fırat-87 and Çağıl in the same transition group, Flip 2005-31L and Flip 2006-39L is is involved in an other group of transition can be seen on Table 1. In studies conducted by researchers, lentil plant height was found; Kayan (2008) 5.5-21.50 cm, Sharma et al. (2014) 27 to 36 cm, and Gupta et al. (2012) 23.60-36.60 cm, Choudhury et al. (2014) 24.28-37.60 cm, Mekonnen (2014) 32.09-38,6 cm, Asghar et al. (2010) 23.56-45.63 cm, Çokkızgın et al. (2005) noted that ranged from 32.9-63.2 cm, respectively. Plant height varies with environmental conditions, and in a study conducted previously been observed in the findings. Karadavut and Kavurmacı (2013) has stated that phenotype has higher values than genotype variation, environment has the effect on plant height.

Table 1. The average values different genotypes of lentil plant height (cm) and ripening time (days) and groups.

Genotype	Plant Lenght			Ripening Time (Days)		
	2010	2011	Average	2010	2011	Average
FLIP 2005-58L	69.55 ^{b}	79,05 ^{ab}	74,3 ^{ab}	158,50 ^{a}	159,77 ^{a}	159,14 ^{a}
FLIP 2007-133L	71.80 ^{b}	85,45 ^{a}	78,63 ^{a}	157,25 ^{b}	158,51 ^{b}	157,88 ^{b}
FLIP 2006-41L	65.10 ^{c}	66,90 ^{de}	66,00 ^{c}	156,75 ^{b}	158,01 ^{b}	157,38 ^{b}
FLIP 2005-20L	70.85 ^{b}	70,30 ^{bcde}	70,58 ^{bc}	145,00 ^{e}	146,16 ^{e}	145,55 ^{e}
FLIP 2007-52L	76.45 ^{a}	72,35 ^{bcde}	74,4 ^{ab}	155,25 ^{c}	156,49 ^{c}	155,87 ^{c}
FLIP 2007-79L	74.60 ^{a}	74,75 ^{bcd}	74,68 ^{ab}	158,75 ^{a}	160,02 ^{a}	159,39 ^{a}
FLIP 2005-31L	70.25 ^{b}	68,35 ^{cde}	69,30 ^{bc}	158,50 ^{a}	159,77 ^{a}	159,14 ^{a}
FLIP 2006-39L	71.55 ^{b}	64,15 ^{e}	67,85 ^{bc}	158,50 ^{a}	159,77 ^{a}	159,14 ^{a}
2FLIP 2005-58L	65.20 ^{c}	84,75 ^{a}	74,98 ^{ab}	151,25 ^{d}	152,46 ^{d}	151,86 ^{d}
FLIP 2007-106L	71.85 ^{b}	71,50 ^{bcde}	71,68 ^{abc}	152,00 ^{d}	153,22 ^{d}	152,61 ^{d}
FIRAT-87	71.05 ^{b}	76,65 ^{abc}	73,85 ^{ab}	159,00 ^{a}	160,27 ^{a}	159,64 ^{a}
ÇAĞIL	70.10 ^{b}	77,70 ^{abc}	73,90 ^{ab}	158,75 ^{a}	160,02 ^{a}	159,39 ^{a}
Average	70,70 ^{b}	74,33 ^{a}	72,52 ^{ab}	155,79 ^{b}	157,04 ^{a}	156,42 ^{ab}

Ripening Time (Days)

A research conducted two-years of the ripening period in the lentil genotypes belonging to the group average values and are given in Table 1. 159.00-145.00 day ripening time in the first year of the study ranged between genotypes, the average duration of the ripening of genotypes was recorded as 155.79 days. Research in the second year, 160.27-146.16 days of ripening period varied between genotypes, the average duration of genotypes days to ripening was recorded as 157.04 days. Considering the average of two years of ripening time values ranged 159.64-145.55 days, they have been found to generate five different groups among themselves. The average duration of the ripening of genotype was found to be 156.42 days. Fırat-87 (159.64), has the latest ripening days, Çağıl, Flip 2007-79L, Flip 2005-58L, Flip2005-31L, Flip 2006-39L (159.39, 159.39, 159.14, 159.14 and 159.14 days) respectively, and followed genotypes statistically no significant differences among the groups between them, was determined. Most early-ripening genotype was Flip 2005-20L (145.55 days) and was statistically significant difference from the others, was determined. In studies conducted by researchers lentil ripening period, Choudhury et al. (2014) ranged 98-106 days, Gupta et al. (2012) 102-110 days, Mekonnen (2014) 87.74-116, Sharma et al. (2014) 113-123 days, Asghar et al. (2010) 137.50-141.67 days, was reported. Ripening time varies with the kinds of environment and genotypes can be clearly seeen on studies. Erskine et al. (1989) in order to clarify the difference between varieties, stated that one of the most important feature is ripening time.

First Pod Height (cm)

In research conducted for two years the first pod height of lentil genotypes, the average values and the groups are given in Table 2. The first pod height of genotypes in the first year of the study ranged from 14.50 to 22.20 cm and the average height was determined as 18.18 cm. In the second year of the study the first pod height ranged between 25.55-42.30 cm and average first pod height was recorded as 31.91 cm. Considering the average of two years of first pod height ranged between 29.70-21 cm, with two main groups of genotypes different from each other create the transition group, was observed. The average height of the first pod genotype was determined as 25.5 cm. Flip 2007-133L first pod height (29.70 cm), the highest genotype, and the Flip 2006-39L (21.00 cm) lowest genotype that has been formed and significant difference between each other. Flip 2006-41L (21.05 cm) genotype second lowest first pod height, followed by Flip 2006-39L genotype and has been found to create a statistical difference between them. Other genotypes switch between these major groups have formed transition groups. In these interconnected transition groups, Flip 2005-58L and 2Flip 2005-58L in the same group, Flip 2007-52L, Flip 2007-79L, Fırat-87 in another group, Flip 2005-20L, Flip 2005-31L and Flip 2007 -106L involving the same group,

can be seen from Table 2. Studies conducted by researchers of the lentil plant first pod height, Gupta et al. (2012) 5.6-14.20 cm, Çokkızgın et al. (2005) 9.1-22.1 cm, Kayan (2008) explained 8-24 cm. Karadavut and Kavurmacı (2013); Fırat 87, Winter Red-51 type and with 10 genotype, affect of phenotype and genotype correlations on the characters has been examined in the study, phenotype has higher values than genotype, stated that environment is effective on first pod height.

Table 2. The average values of different lentil genotypes' first pod height (cm) number of branches (branch plant^{-1}) and groups.

Genotype	First Pod Height			Number Of Branches (branch plant^{-1})		
	2010	**2011**	**Average**	**2010**	**2011**	**Average**
FLIP 2005-58L	20.05 ^{b}	35.00 ^{abc}	27,53 ^{ab}	4.25 ^{d}	8.20 ^{cde}	6,23 ^{c}
FLIP 2007-133L	17.30 ^{c}	42.10 ^{a}	29,70 ^{a}	6.00 ^{ab}	9.60 ^{abcd}	7,80 ^{abc}
FLIP 2006-41L	14.80 ^{ef}	27.30 ^{cd}	21,05 ^{c}	5.25 ^{abcd}	8.70 ^{bcde}	6,98 ^{bc}
FLIP 2005-20L	17.50 ^{c}	29.30 ^{bcd}	23,43 ^{bc}	6.25 ^{a}	6.75 ^{e}	6,50 ^{bc}
FLIP 2007-52L	20.80 ^{b}	29.95 ^{bcd}	25,38 ^{abc}	4.50 ^{cd}	8.00 ^{cde}	6,25 ^{c}
FLIP 2007-79L	22.2 ^{a}	29.80 ^{bcd}	26,00 ^{abc}	6.25 ^{a}	10.05 ^{abc}	8,15 ^{ab}
FLIP 2005-31L	20.85 ^{b}	26.00 ^{d}	23,43 ^{bc}	5.00 ^{bcd}	10.30 ^{abc}	7,65 ^{abc}
FLIP 2006-39L	16.45 ^{cd}	25.55 ^{d}	21,00 ^{c}	6.00 ^{ab}	7.00 ^{abc}	6,50 ^{bc}
2FLIP 2005-58L	14.50 ^{f}	40.30 ^{a}	27,40 ^{ab}	4.75 ^{cd}	11.30 ^{ab}	8,03 ^{abc}
FLIP 2007-106L	15.65 ^{de}	29.35 ^{bcd}	22,50 ^{bc}	5.50 ^{abc}	9.00 ^{bcde}	7,25 ^{abc}
FIRAT-87	20.90 ^{b}	32.25 ^{bcd}	26,58 ^{abc}	6.25 ^{a}	11.70 ^{a}	8,93 ^{a}
ÇAĞIL	17.20 ^{c}	35.95 ^{ab}	26,58 ^{abc}	5.50 ^{abc}	10.35 ^{abc}	7,93 ^{abc}
Average	18,18 ^{b}	31,91 ^{a}	25,05	5,46 ^{b}	9,25 ^{a}	7,36

Number of Branches (number plant^{-1})

In study conducted for two years, lentil genotypes and the number of branches belonging to the group average values are given in Table 2. In the first year of the study the number of branches belongs to genotypes' is 4.25 to 6.25 (number plant-1) and the average number of branches ranged from 5.46 (number plant-1) was determined. In the second year, genotypes' number of branches ranged between 11.70-6.75 respectively. Average total number of branches were 9.25 (branch plant -1)was recorded. Considering the two-year average number of branches 8.93-6.23 (branch plant-1) respectively. The highest number of branches of the Fırat-87 (branch plant-1) and lowest Flip 2005-58L (6.23 branch plant) -1 genotype occurred, which form two main groups different from each other were recorded. Genotype Flip 2007-52L, 6.25 (branch plant-1) number of branches followed the genotype Flip 2005-58L in second place, did not produce a statistically significant difference among themselves. Between the two main groups formed by other genotypes, was determined to create the transition group. The average number of branches belonging to genotypes was recorded as 7.36 (branch plant-1). The number of branches in lentil, Asghar et al. (2010) 2.00-3.89, Sharma et al. (2014) 2.39 to 4.06, Gupta et al. (2012) have identified between 3.20 to 8.20. Karadavut and Kavurmacı (2013), phenotype variation is higher than genotype, stated that the environment is effective on the number of branches of the plant.

Number of Pods Per Plant (units plant^{-1})

In study conducted for two years the number of pods per plant of lentil genotypes and the average value of the groups are given in Table 3. Total first year of genotypes number of pods ranged between 24.75-52.50, average number of pods per plant was determined to be 34.96 units. In the second year, numbers ranged between 44.30-101.70, total average number of pods were found to be 58.27 units.

Considering the two-year average number of pods per plant ranged between 42.33-69.60 units, were recorded. Flip 2007-106L (69.60 units plants-1) with a maximum number of pods significantly formed differ from the other genotypes. Number of pods per plant least at Fırat-

87 (42.33 branch plant-1) and the other 10 genotypes were obtained in the Fırat-87 genotype and located in the same group and that there is statistically no significant difference was observed. In other words, number of pods per plant of all genotypes are grouped under two main groups. 46.48 average number of pods per plant (branch plant-1) was found. The number of pods in lentil by Kayan (2008) 5-43, Mekonnen (2014) from 27.8 to 43.3, Çokkızgın et al. (2005) from 14.6 to 80.8, Sharma et al. (2014) from 50.70 to 127.89, Asghar et al. (2010) from 96.67 to 231.28 units, Gupta et al. (2012) 105- 288 units ranged was reported. Karadavut and Kavurmacı (2013) stated that the environment have effects on the number of pods on plant. Erskine et al. (1989) stated that the number of pods between genotypes is one of the most important feature to seperate each other.

Table 3. The average values of different lentil genotypes' number of pods (units plant^{-1}), seed per pod (units) and groups.

Genoype	Number of Pods (units plant^{-1})			Seed Per Pod (units pods^{-1})		
	2010	2011	Average	2010	2011	Average
FLIP 2005-58L	33.50 ^{bc}	65.95 ^{b}	49.73 ^{b}	0.75 ^{bc}	1.85	1.30
FLIP 2007-133L	28.00 ^{bc}	44.30 ^{c}	36.15 ^{b}	0.97 ^{b}	1.55^{a}	1.26
FLIP 2006-41L	36.50 ^{bc}	57.85 ^{bc}	47.18 ^{b}	1.25 ^{a}	1.45	1.35
FLIP 2005-20L	52.50 ^{a}	47.65 ^{c}	50.08 ^{b}	1.11 ^{a}	1.65	1.38
FLIP 2007-52L	28.00 ^{bc}	59.60 ^{bc}	43.8 ^{b}	0.83 ^{bc}	1.75	1.29
FLIP 2007-79L	37.50 ^{b}	48.25 ^{c}	42.88 ^{b}	0.90 ^{b}	1.80	1.35
FLIP 2005-31L	29.00 ^{bc}	60.95 ^{bc}	44.98 ^{b}	1.00 ^{ab}	1.90	1.45
FLIP 2006-39L	40.50 ^{b}	46.68 ^{c}	43.6 ^{b}	0.90 ^{b}	1.80	1.35
2FLIP 2005-58L	39.50 ^{b}	50.35 ^{bc}	44.93 ^{b}	0.91 ^{b}	1.85	1.38
FLIP 2007-106L	37.50 ^{b}	101.7 ^{a}	69.6 ^{a}	0.91 ^{b}	1.75	1.33
FIRAT-87	29.00 ^{bc}	55.65 ^{bc}	42.33 ^{b}	0.91 ^{b}	1.75	1.33
CAGIL	24.75 ^{c}	60.30 ^{bc}	42.55 ^{b}	0.66 ^{c}	1.80	1.23
Average	34.96 ^{b}	58.27 ^{a}	46.48	0.93 ^{b}	1.79	1.36

Number of Seeds Per Pod (units pods^{-1})

In study conducted for two years, lentil genotypes' by the number seeds per pods and the group average values are given in Table 3. Genotypes pod in the first year of the number of seeds ranged 0.66-1.25 (units pods-1), with the transition group consisted of three main groups of genotypes, were recorded. Most of the number of seeds per pod has Flip 2006-41L (1.25 unit plant-1) genotype, secondly followed by Flip 2005-20L genotype (1.11 units pods-1) and there is no statistical difference between them was detected. ÇAGIL (0.66 unit plant-1) genotype was identified as having least seed number in the pod. The average number of seeds per pod of genotypes' as 0.93 (units pods-1), found respectively.

In the second year of the genotypes', the number of seeds per pod ranged 1.90-1.45 (number plant-1) and there is no statistical difference between them, was recorded. Average genotype of 1.79 units pod-1, respectively. Considering the average of two years value of seed number in of pod ranged 1.45 to 1.23 (units plant-1) and there is no statistical difference between them, was recorded. The average number of seeds per pod was calculated 1.36 (unit plant-1). Flip 2005-31L (1.45 unit plant-1) has the maximum number of seeds per pod, the genotype CAGIL (1.23 unit plant-1) was identified as having least seeds per pods.

In earlier studies of the number of seeds per pod, Mekonnen (2014) 1.06 to 1.43, Gupta et al. (2012) 1.21-1.68, Sharma et al. (2014) 1.28-2.0, Choudhury et al. (2014) noted that ranged from 2 to 200 units. Karadavut and Kavurmacı (2013) expressed that environment has effects on the number of seeds per pod.

Grain Yield (kg ha^{-1})

In study conducted for two years, the average grain yield of lentil genotypes, groups and the resulting values are given in Table 4. In the first year of the study of genotypes grain yield ha-1 ranged 167.75-313.25 kg. Genotypes' average yield

was recorded as 219.35 kg ha-1. Second year's grain yield is ranged 226.46-422.89 kg ha-1, the genotypes' average yield as 296.13 kg ha-1, was recorded.

Analyzing of two years average grain yield values, 197.11-368.07 kg ha-1 to range between genotype's amongst two different main groups two different transition group, and these groups formed between the other transition groups appears to constitute. Flip 2007-106L maximum grain yield (368.07 kg ha-1), Flip 2007-133L at least grain yield (197.11 kg ha-1) and their genotype is obtained from the statistically significant differences, were recorded. Flip 2005-31L (211.79 kg ha-1), Fırat-87 (212.09 kg ha-1) and Çağıl (213.26 kg ha-1) genotype statistically creating the same transition group, 2Flip 2005-58L (310.49 kg ha) -1 genotype appears statistically constitute a different group. Grain yield of other transition groups (respectively; Flip 2005-58L, Flip 2007-79L, Flip 2007-52L, Flip 2006-39L, Flip 2006-41L, Flip 2005-20L, 226.48, 238.82, 263.20, 269.66, 283.18 and 298.74 kg ha-1) it is composed of two different transition groups. The genotypes average grain yield of 557.74 kg ha-1, respectively. Kayan (2008), Kayı 91 and Sazak 91 varieties of lentils under the conditions of Central Anatolia 170 and 150 kg ha-1 grain yield has been received and stated that the major lentil diseases are tolerated. Türk et al. (1999), which have studied with 25 lentil genotypes with the highest yield 247.4 kg ha-1 as noted. Türk and Atikyılmaz (2000) worked with 6 red lentil line with the highest yield 139.4 kg da-1 received. Çokkızgın et al. (2005), studied for three years with 81.3 to 269 kg of grain yield kg ha-1, ranged was reported. Lentil plant is to achieve outstanding success at cold, dry and arid conditions. These unstable conditions improved slightly, the yield strength is increased. Cause of the resulting yields are in high levels, lentil plants growing in the soil and climate of our desire.

Table 4. Average value of grain yield of different lentil genotypes (kg ha^{-1}) and groups.

Genotype	Grain Yield (kg ha^{-1})		
	2010	2011	Average
FLIP 2005-58L	192,75 ^{b}	260,21 ^{b}	226,48 ^{bcd}
FLIP 2007-133L	167,75 ^{b}	226,46 ^{b}	197,11 ^{d}
FLIP 2006-41L	241,00 ^{ab}	325,35 ^{ab}	283,18 ^{bcd}
FLIP 2005-20L	254,25 ^{ab}	343,24 ^{ab}	298,74 ^{abc}
FLIP 2007-52L	224,00 ^{ab}	302,40 ^{ab}	263,20 ^{bcd}
FLIP 2007-79L	203,25 ^{b}	274,39 ^{b}	238,82 ^{bcd}
FLIP 2005-31L	180,25 ^{b}	243,34 ^{b}	211,79 ^{cd}
FLIP 2006-39L	229,50 ^{ab}	309,83 ^{ab}	269,66 ^{bcd}
2FLIP 2005-58L	264,25 ^{ab}	356,74 ^{ab}	310,49 ^{ab}
FLIP 2007-106L	313,25 ^{a}	422,89 ^{a}	368,07 ^{a}
FIRAT-87	180,50 ^{b}	243,68 ^{b}	212,09 ^{cd}
ÇAĞIL	181,50 ^{b}	245,03 ^{b}	213,26 ^{cd}
Average	219,35 ^{b}	296,13 ^{a}	257,74

Result

This study is conducted in order to determine high efficiency and quality of lentil genotypes the that may be adapted to Kahramanmaras conditions, yield showed differences between genotypes. Continuous wheat planting in arid areas, lentil crop rotation should be applied to the soil for nitrogen-and organic matter enrichment of after planted plants to increase the efficiency besides economically contributing for farmers aspect is also important.

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