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THE EFFECT OF VITREOUSNESS ON 3-DURUM WHEATS (T. durum Desf.) OUALITY IN KAHRAMANMARAS REGION OF TURKEY

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ABSTRACT : *In this research, quality differences between samples which have vitreous and nonvitreous kernels of varieties Balcalı-85, Mexicali-75 and Diyarbakır-81 were investigated. In the study, vitreous and nonvitreous kernels were seperated and added to each other at the proportion of 20%, 40%, 60% and 80% prior to milling. The results of the study showed that as the vitreousnes percentage increased the protein content was increased. At the same time the thousand kernel weight, hectoliter and above 2.5mm sieve were decreased statistically.*

Keywords : Triticum durum*, vitreousnes, nonvitreous, hectolitre, thousand kernel weight, protein content and above 2.5 mm sieve.*

INTRODUCTION

Durum wheat grain is used to prepare various products in different part of the world and in our country. Durum wheat is cultivated on approximatelly 17 million hectares worlwide, which represents 12 % of the total wheat area (Anon.,1993).

The quality characteristics of durum wheat cultivars are greatly effected by environmental conditions. Therefore, the major production from durum wheat needs normally qualitative characters as well as the quality requirement of various products of durum wheat. These products generally require large vitreous kernels and high protein contents. Further detail information on the characters can be used, such as high yellow pigment and high quality of protein etc. (Dexter and et al., 1987 and Genç et al.,1993). Also, thousand kernel weight, hectoliter and above 2.5 mm sieve kernel were used (Genç et al.,1993). Kernel size is very important and best index for vitreousness (Matsuo and Dexter, 1980). However, there is high correlation between vitreousness and kernel size, because with large kernel a great milling yield is expected due to a greater ratio of endosperm to bran. Also, thousand kernel weight is a measure of average kernel size. Beside, Menger (1973), Dexter and et al., (1987), Amaya and Pena (1992) reported that the kernel vitrousness is considered an

important criteria of quality factor. Dexter and Matsuo (1981) and Budak and Veli (1996) found that as the kernel nonvitreousness percentages increased the protein content was decreased. However, Aktan and Atlı (1993), reported that the kernel vitreousness had positive relationships with protein content and above 2.5 mm sieve. Dexter and et al., (1989), reported that the vitreous durum wheat kernel had the highest protein content between 1.4% and 3.8% than nonvitreous kernel. The main quality characteristics necessary to produce durum end-products are kernel vitreousness, kernel size, 1000 kernel weight and protein content. Turkey is considered one of the important Mediterranen region produced durum wheat which is used in making bread, burghul, pasta, etc. Therefore, our object of the study was to evaluate the 3 varieties (Balcalı-85, Mexicali-75 and Diyarbakır-81) for vitreousness and nonvitreousness effect on thousand kernel weight, hectoliter, above 2.5 mm sieve and protein content under Kahramanmaraş region.

MATERIAL AND METHODS

The field experiment was carried out at Agriculture Experiment Station of Kahramanmaraş, during 1994-95 season at one place. The experimental design which was a randomized complete block with four replicants was used in this study. Some characters and sources of three seed lots are shown in Table 1. The samples preparation treatments of vitreousnes and nonvitreousnes kernel percentages are represented in Table 2.

Table 1. Some characters and sources of seed lots of 3 durum wheats.

Varieties	Sources	Short Characteritics
Balcalı-85	Univ. of Çukurova, Faculty of Agriculture (Adana)	Winter and Spring var. awn, seed color yellowish.
Mexicali-75	CIMMYT (Mexica)	Winter and Spring var. awn, seed color yellowish.
Diyarbakır-81	Wheat Exp. Research Sta. (Diyarbakır)	Winter and Spring var. awn, seed color white.

Table 2. Characters of vitreousnes and nonvitreousnes percentages of three durum wheat treatments.

Samples	Treatments

Numbers	
1	100 % vitreous kernel + 0 % nonvitreous kernel
2	80 % vitreous kernel + 20 % nonvitreous kernel
3	60 % vitreous kernel + 40 % nonvitreous kernel
4	40 % vitreous kernel + 60 % nonvitreous kernel
5	20 % vitreous kernel + 80 % nonvitreous kernel
6	0 % vitreous kernel + 100 % nonvitreous kernel

RESULTS AND DISCUSSION

Balcalı-85

The results of our data are shown in Tables 3. There are significant differences among the treatments and the highest hectoliter values of 83.6 and 83.2 kg which were found with treatments five and six (20% vitreous + 80% nonvitreous and 0% vitreous + 100 % nonvitreous) respectively. The lowest value of 80.0 kg of hectoliter was seen with treatment 1. The similar results were obtained by Aktan and Atlı (1993) and Budak and Veli (1996). Among the treatments, thousand kernel weight and above 2.5 mm sieve were the highest values of 43.6 g and 81.1% with treatment six respectively, whereas the lowest values of 38.2 g and 76.0 % were with treatment 1 respectively. Also, as the vitreousness percentages increased the thousand kernel weight and the hectoliter percentages were decreased. The protein content of Balcalı-85 cultivar was significantly different among the treatments as noted in Table 3. The highest protein value of 12.8% was obtained with 0 % nonvitreous kernel whereas, the lowest value of 8.6% of protein was noted with 100% nonvitreous kernel. The similar results were observed by Matsuo et al. (1982), Aktan (1992), Aktan and Atlı (1993) and Budak and Veli (1996).

Table 3. Effect of vitreous kernel on quality characteristics of Balcalı-85 cultivar.

Samples	Hectoliter	Thousand Kernel Weight	Above 2.5 mm Sieve	Protein Content %

Numbers	kg	g	%	
1	80.0 d	38.2 c	76.0 e	12.8 a
2	81.0 c	38.9 c	78.1 d	12.0 ab
3	81.4 bc	39.1 c	78.6 cd	11.0 bc
4	82.2 b	41.7 b	79.2 bc	10.1 cd
5	83.6 a	42.4 b	80.1 ab	9.4 de
6	83.2 a	43.6 a	81.1 a	8.6 e
Means	81.7	40.6	78.8	10.6
LSD %1	0.90	0.93	1.0	1.24

*All treatments data were means of four replications
*Mean, within each column followed by same letters, are not significantly different at 0.05 level probability.

Mexicali-75

As we noted on the data of our results, there are significant differences existed among Mexicali-75 treatments and which are shown in Table 4. The highest values of hectoliter of 83.8 kg was found with treatment 5. 1000 kernel weight of 42.6 g and above 2.5 mm sieve of 79.8% had the highest values with treatment 6 respectively. Meanwhile, the lowest values of hectoliter of 80.7 kg, 1000 kernel weight of 39.4 g and above 2.5 mm sieve of 76.7% were obtained with treatment 1 respectively. The similar results were noted by Aktan and Atlı (1993), Budak (1996) and Budak and Veli (1996). The lowest value of protein content was 9.7% with treatment 6 however, the highest value of protein content was 12.9% with treatment 1 (Budak and Veli, 1996 and Aktan and Atlı, 1993).

Table 4. Effect of vitreous kernel on quality characteristics of Mexicali-75 cultivar.

Samples Numbers	Hectoliter kg	Thousand Kernel Weight (g)	Above 2.5 mm Sieve (%)	Protein Content (%)
1	80.7 d	39.4 c	76.7 c	12.9 a
2	81.4 cd	40.9 b	77.2 bc	12.1 ab
3	82.1 bc	41.0 b	78.0 abc	11.7 bc
4	82.9 ab	41.5 ab	78.7 ab	11.1 cd
5	83.8 a	42.1 ab	79.1 a	10.4 de
6	83.2 ab	42.6 a	79.8 a	9.7 e
Means	82.3	41.2	78.2	11.3
LSD %1	1.24	1.22	1.54	0.94

*All treatments data were means of four replications.
*Mean, within each column followed by same letters, are not significantly different at 0.05 level probability.

Diyarbakır-81

The data suggests that under the conditions of this treatment the hectoliter, 1000 kernel weight, above 2.5 mm sieve and protein content in Diyarbakır-81 durum wheat cultivar were effected by kernel vitreousness percentages. Also, these differences in quality characters among the treatments were noted clearly. However, greater hectoliter of 81.8 kg, 1000 kernel weight of 42.0 g and above 2.5 mm sieve of 79.3% were found significantly with treatment 6 due to the effect of kernel vitreous (0% vitreous kernel + 100% nonvitreous kernel). A number of investigators have reported the similar results (Budak and Veli, 1996; Aktan and Atlı, 1993 and Aktan, 1992).

Additionally, there were different responds to protein content. The highest value of protein content of 12.0% was obtained with treatment 1 whereas, the lowest value of protein content of 8.7 % was obtained with treatment 6. The amount of protein contents decreased as the treatment percentages were changed (Budak and Veli, 1996; Aktan and Atlı, 1993 and Dexter et al.,1989).

Table 5. Effect of vitreous kernel on quality characteristics of Diyarbakı-81 cultivar.

Samples Numbers	Hectoliter kg	Thousand Kernel Weight g	Above 2.5 mm Sieve %	Protein Content %
1	78.1 d	37.2 e	75.5 d	12.0 a
2	79.2 cd	38.6 d	76.6 cd	11.1 ab
3	79.9 c	39.4 cd	77.1 bc	10.2 bc
4	80.4 bc	40.4 bc	78.2 ab	9.4 cd
5	81.4 ab	41.6 ab	78.9 a	9.0 d
6	81.8 a	42.0 a	79.3 a	8.7 d
Means	80.1	39.8	77.6	10.0
LSD %1	1.21	1.25	1.47	0.98

*All treatments data were means of four replications

*Mean, within each column followed by same letters, are not significantly different at 0.05 level probability.

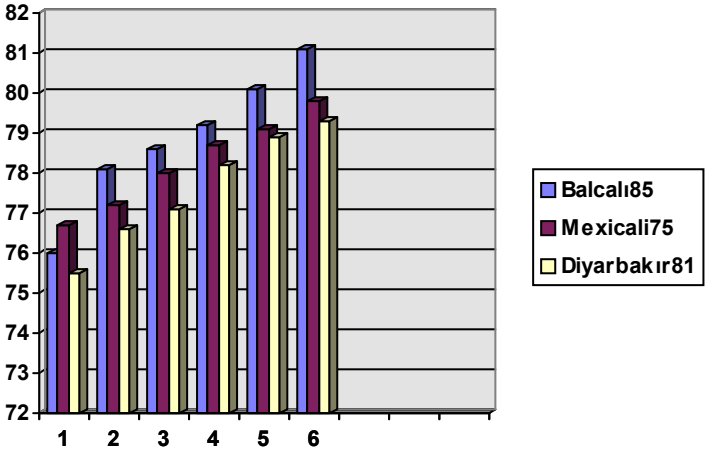

Figure 1. The effect of treatments on hectoliter.

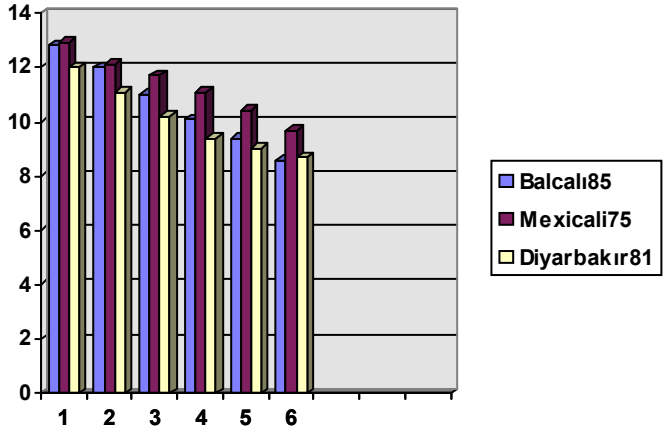

Figure 2. The effect of treatments on protein content.

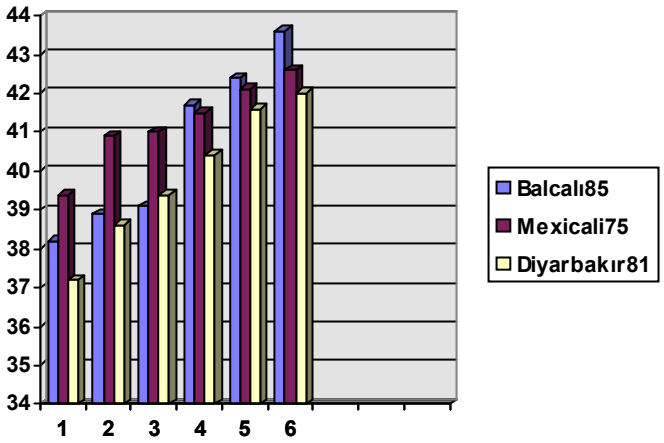

Figure 3. The effect of treatments on thousand kernel weight.

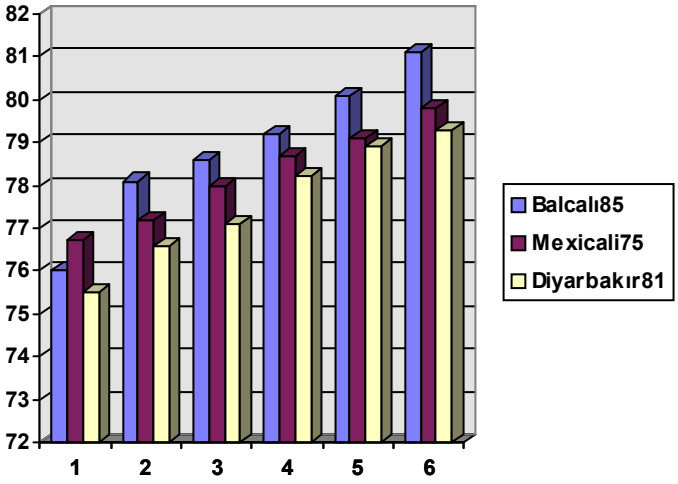

Figure 4. The effect of treatments on above 2.5 mm sieve.

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