



# Evaluation of some quality parameters of durum wheat landrace varieties in Turkey

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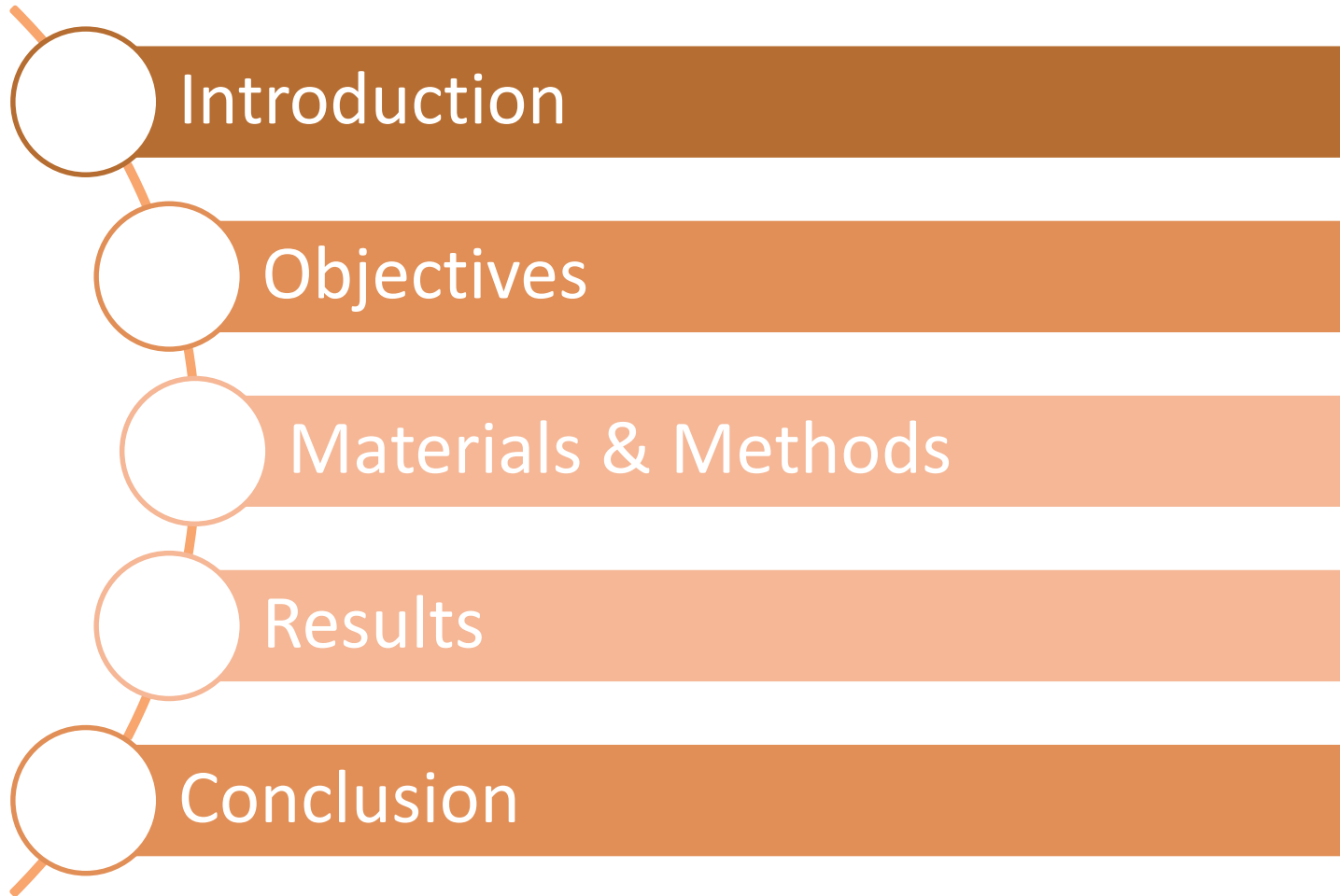
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4<sup>th</sup> ICC Latin American Cereals Conference

13<sup>th</sup> International Gluten Workshop

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Cereals and cereal products were among the most important foods for ancient civilizations.



İvriz Monument (~800 y.. BC). photographed by Kenan SİNANOĞLU

- Wheat is a culture plant, used to meet people's nutritional needs and has major strategic importance.
- Our country is ranked first in terms of wheat genetic resources and it is accepted that wheat spreads to the world from this geographical region where our country is located.
- Wheat are grown all geographical region in Turkey. Its rank is first among the all field crops.
- Wheat and wheat based industry plays an important role in Turkish economy because of yield, consumption, export, and additivity to general economy.

- Turkey is a gene and diversity center of cultivated wheat varieties and wild species that are the parents of these species.
- These species are also the main source of genetic progress that results in the adaptation, spreading, evolution of wheat to various conditions, and the development of modern varieties.



- Einkorn wheat (Siyez (*Triticum monococcum*)) grows in Turkey, Yugoslavia, Morocco and France in the world. It is known that it is a kind of wheat cultured in early periods (at least 10,000 years).
- It is for the first time in the world that the culture is taken in Southeastern Anatolia.



- Einkorn wheat has 2n chromosomes.



- In recent studies, it has been stated that the cultivation areas of local wheat varieties are gradually decreasing.
- The reason is that they can not compete with modern culture varieties in terms of yield and profit.



World Durum Wheat Production and Major Producer Countries (Million Tons)

Countries	2013/14	2014/15	2015/16	2016/17
EU (28)	8.1	7.6	8.5	9.5
Canada	6.5	5.2	5.4	7.8
Italy	3.9	3.9	4.2	5.0
Turkey**	4.1	3.3	4.1	3.6
USA	1.6	1.5	2.3	2.8
Mexico	2.3	2.3	2.3	2.5
Kazakhstan	2.0	2.0	2.1	2.1
France	1.8	1.5	1.8	1.6
Spain	0.9	0.8	0.9	1.0
World	38.8	34.5	39.1	40.7

Source : International Grains Council





## Durum Wheat in TURKEY

	Cultivated Area (decare)	Harvested Area (Decare)	Yield (Kg/Decare )	Production Amount (Ton)
2015	12.737.734	12.722.052	322	4.100.000
2016	12.386.724	12.184.076	297	3.620.000
2017	12.369.119	12.361.227	316	3.900.000

Source: Turkish Statistical Institute

- Pasta and bulgur are obtained from durum wheat in our country.
- According to the Turkish Food Codex, bulgur is a product obtained by cleaning the wheat according to the technique, cooking / scalding, drying and breaking the crust by separating it.



Years	Pasta Production ( 1000 tons)	Bulgur Production ( 1000 tons)
2012	976.6	277.5
2013	1,026.4	490.0
2014	1,202.5	428.2
2015	1,158.1	438.2



- Our country is rich in landrace wheat populations. However, these genetic resources have not been used enough in national wheat breeding program in our country until recently.
- it is necessary to characterize their quality properties to use them effectively in national wheat breeding program.

- Wheat is grown in almost all regions in Turkey. but especially in Central Anatolia region is the most important cultivation areas. In addition to this, Turkey is known as a major center of wheat and barley variety.
- In particular, durum wheat has a significant genetic diversity in the east of Anatolia and has spread to other countries from Anatolia.



- Using the genetic diversity of durum wheat will be effective in the development of new varieties. In particular, the increase in global warming will increase the importance of biotic and abiotic stress tolerant varieties. Local varieties need to be used in breeding programs to ensure food safety and sustainability in a possible global warming in the future.

### **The aim of this study:**

- The aim of this study was to determine the quality of durum wheat local populations are maintained in gene banks in Turkey.



## **Materials:**

In this study, The material was obtained from Turkish Seed Gene Bank (TSGB).

A hundred landrace durum wheat genotypes were selected for this research.

A hundred samples were selected on field observation and spike properties from 2000 population.





## Methods:

SDS (sodium dodecyl sulphate) sedimentation (Williams et al.. 1988).



Brabender  
Shaking Unit

Protein (AACC method no:46–30).



Velp-NDA Dumas Protein  
Analyse Equipment

Kernel hardness (AACC metod no:55-31 (skcs – single kernel characterization system).

Gluten parameters (AACC method no : 38-12a).



Perten Glutomatic  
System

Ash content (AACC method no: 08-01).

Yellowness (b)(Anonymous.2002 )



BYK Gardner Color-  
View Color Equipment

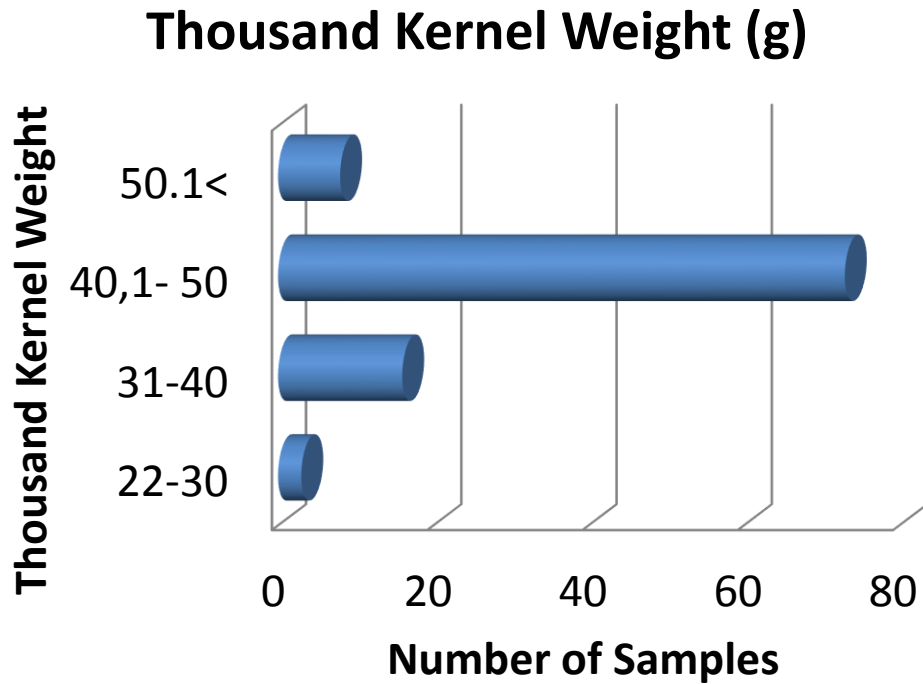
Thousand kernel weight (Ozkaya and Ozkaya. 2005)



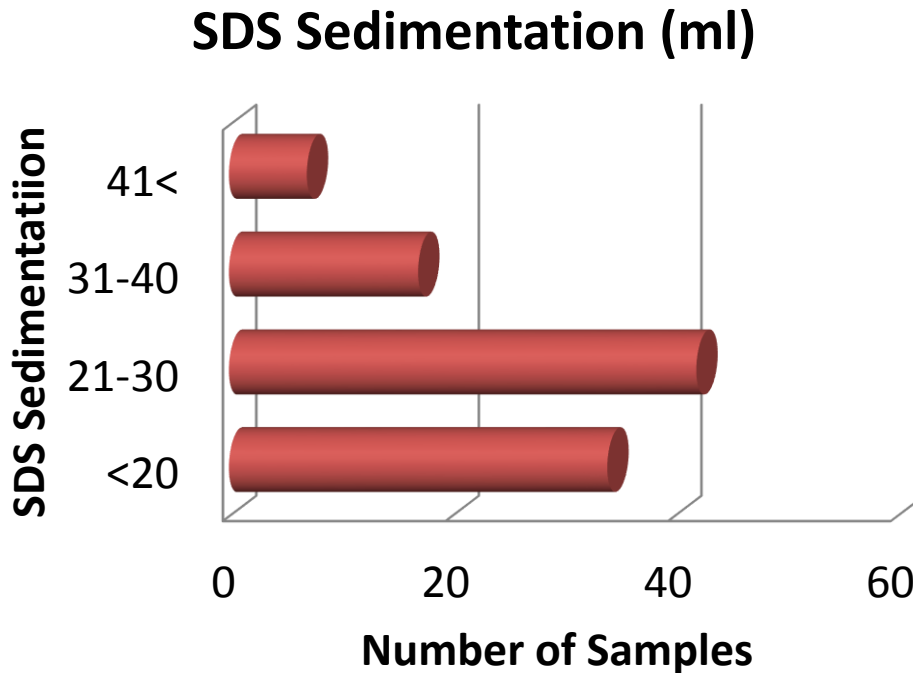
Numigral II 1000 Kernel Weight

### **Statistical Analysis:**

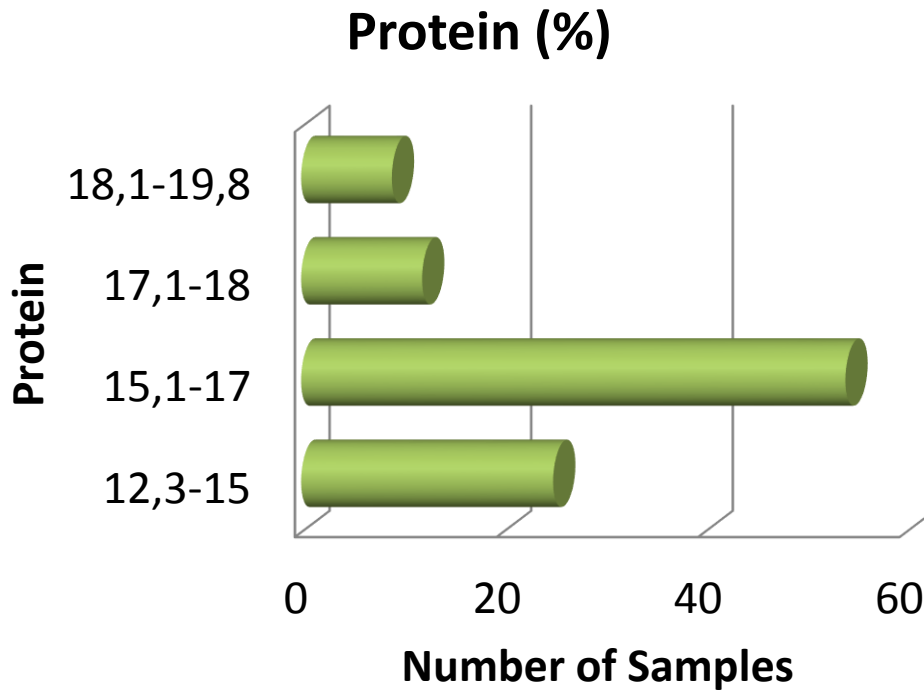
- All experiments were performed **duplicate** and mean values were recorded.
- Data were analyzed using JMP 7.0 statistical software (SAS Institute Inc.).



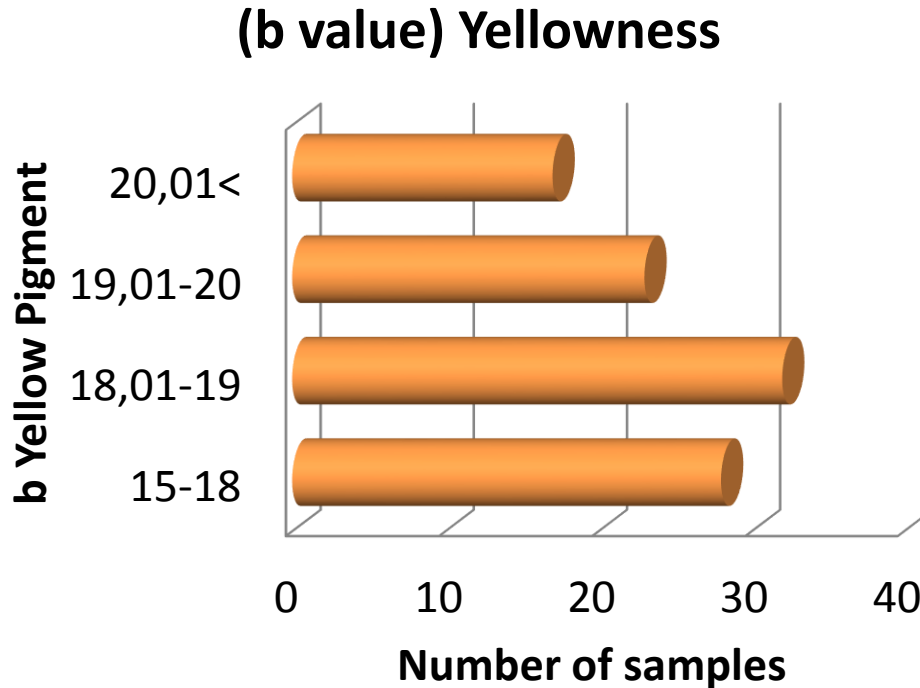
SOME COMMERCIAL/ LANDRACE VARIETIES	
POPULATION/VARIETY	TKW
Sarı buğday	32,5
Gacer	29,2
İza buğday	32,8
Sarı gıdak	31,3
Yerel makarnalık	31,9
Sarı Bursa	33,1
Eminbey	46,5
Mirzabey	41,7
Kızıltan91	40,7
Ç-1252	40,6
Çakmak 79	35,7



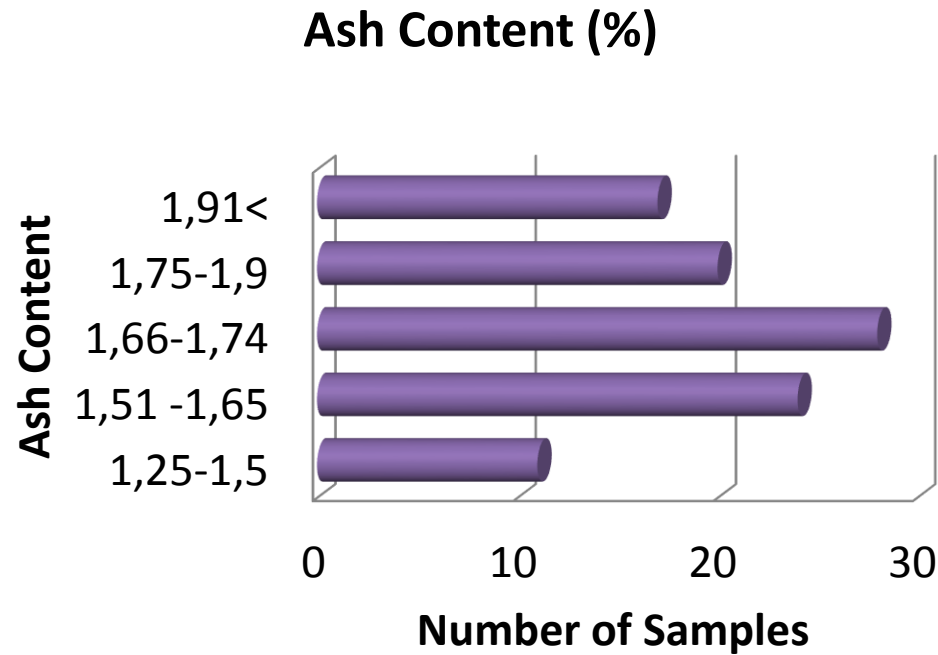
SOME COMMERCIAL/ LANDRACE VARIETIES	
POPULATION/VARIETY	SDS
Sarı buğday	16
Gacer	26
İza buğday	26
Sarı gıdak	34
Yerel makarnalık	20
Sarı Bursa	26
Eminbey	26
Mirzabey	9
Kızıltan91	14
Ç-1252	19
Çakmak 79	14



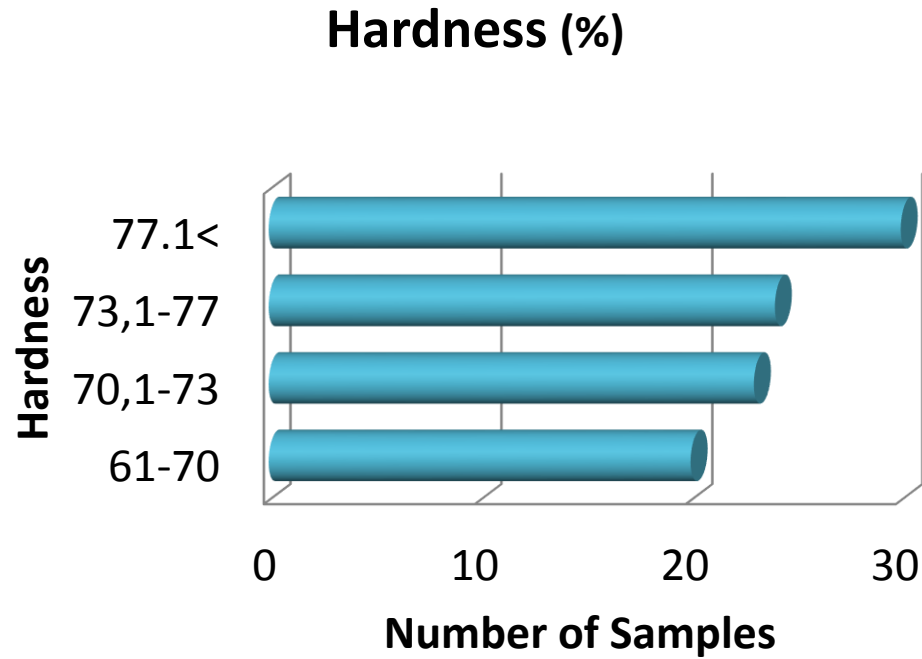
SOME COMMERCIAL/ LANDRACE VARIETIES	
POPULATION/VARIETY	Protein
Sarı buğday	13,1
Gacer	12,83
İza buğday	11,5
Sarı gıdak	11,41
Yerel makarnalık	11,66
Sarı Bursa	13,93
Eminbey	13,16
Mirzabey	13,86
Kızıltan91	13,06
Ç-1252	13,47
Çakmak 79	12,67

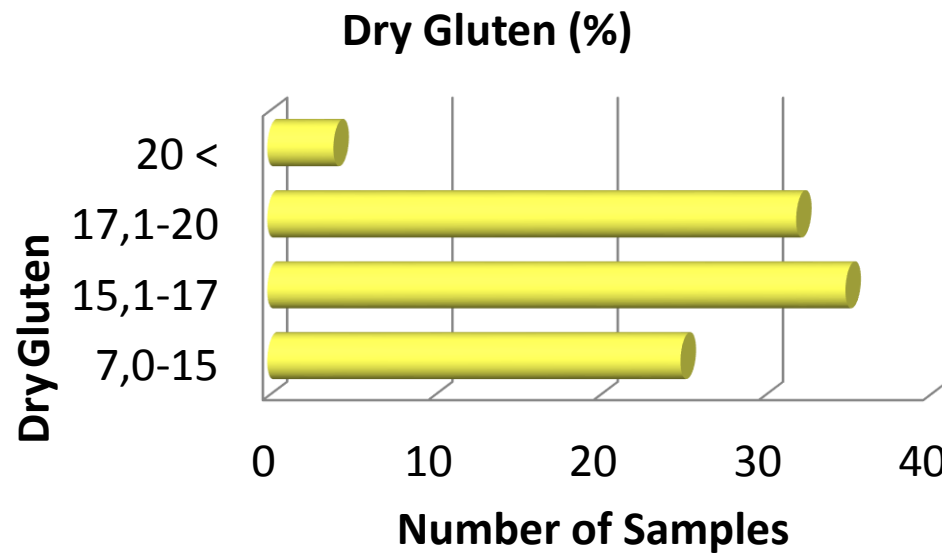


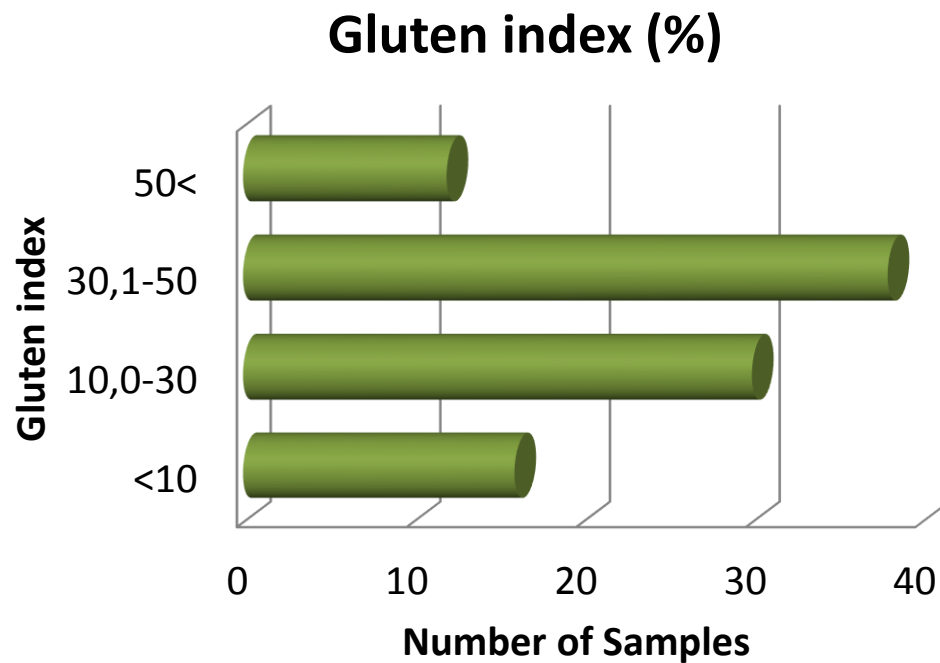
SOME COMMERCIAL/ LANDRACE VARIETIES	
POPULATION/VARIETY	b* value
Sarı buğday	12,36
Gacer	11,58
İza buğday	13,48
Sarı gıdak	15,42
Yerel makarnalık	11,71
Sarı Bursa	13,43
Eminbey	21,01
Mirzabey	20,91
Kızıltan91	21,25
Ç-1252	19,05
Çakmak 79	20,24











Quality Analysis	Average	Standard Deviation	Minimum	Maximum
<b>b Yellowness (b*)</b>	18,8	1,3	15,0	22,4
<b>Hardness (%)</b>	73,6	8,4	7,2	87,3
<b>Thousand KW</b>	44,1	5,3	24,2	55,5
<b>Protein (%)</b>	16,0	1,4	12,3	19,8
<b>Ash</b>	1,7	0,2	1,2	2,2
<b>SDS Sedim. (ml)</b>	26,3	11,0	8,0	62,5
<b>Dry Gluten (%)</b>	16,2	2,2	7,4	21,3
<b>Gluten Index (%)</b>	31,0	17,7	0,5	64,2

Variable	by Variable	Correlation	Count	Signif Prob
Ash	Protein	0.592	100	<.0001**
Wet Gluten %	Protein	0.764	96	<.0001**
	SDS Sedimentation	0.273	96	0.0072**
	Ash	0.405	96	<.0001**
Dry Gluten %	Protein	0.751	96	<.0001**
	Ash	0.442	96	<.0001**
	Wet Gluten %	0.956	96	<.0001**
	Thousand Kernel Weight	-0.293	96	0.0038**
	Yellowness (b)	-0.272	96	0.0073**
Gluten index %	SDS Sedimentation	0.677	96	<.0001**
Protein	Thousand Kernel Weight	-0.338	100	0.0006**

Variable	by Variable	Correlation	Count	Signif Prob
<b>Wet Gluten %</b>	Yellowness (b)	-0.260	96	0.0105*
	Thousand Kernel Weight	-0.229	96	0.0251*
<b>Gluten Index %</b>	Yellowness (b)	-0.240	96	0.0187*
<b>Yellowness (b)</b>	Protein	-0.232	100	0.0201*
	SDS Sedimentation	-0.223	100	0.0261*
<b>Ash</b>	Thousand Kernel Weight	-0.202	100	0.0439*
<b>Dry Gluten %</b>	SDS Sedimentation	0.202	96	0.0489*



In durum wheat breeding program especially at early generation stage, semolina b value (yellowness), gluten and SDS analysis can be done with a small amount of the sample for predicting durum wheat quality.



# THANK YOU

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