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**Morphological Classification of Some Tir Wheat  
(*Triticum aestivum* Var. *Aestivum* L. ssp. *Leucospermum* Körn.)  
Accessions from the Lake Van Basin, Turkey**

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**Abstract:** T study was conducted to determine characteristics of Tir wheat (*Triticum aestivum* L.). For this purpose, 255 lines were collected from 7 different areas. Spike density, awnedness, glume glaucosity, grain colour, glume colour and vitreous characters were investigated in the lines. After the first year's observation, the number of lines was decreased to 90 lines. Glume colour had the greatest variation among investigated characters. The lines had 11 different glume colour groups. There were completely similar lines among the selected 90 lines, however, the vitreous characters of several lines were found to be different. It was concluded that there were different types of Tir wheat and these types might be a useful genetic resource. However, the lines have to be examined by new research for quality and yield.

**Key words:** Tir wheat, population, line, selection, morphological

## INTRODUCTION

Wheat is the most important crop in Lake Van Basin due to the climatic conditions and traditional agricultural system. However, grain yield per unit area is almost half of Turkey's average (Anonymous, 1998). In the Lake Van Basin, agricultural techniques are not used properly for wheat growing. Another problem is absence of high yielding wheat varieties in Van conditions and also it is not possible to enlarge the wheat growing area in order to increase wheat production in Van. Therefore, grain yield of wheat per unit area should be increased.

Many adaptation studies were done in the area. According to the these studies, Tir wheat was the only one recognizable type among the other varieties and lines (Doğan *et al.*, 1980; Yılmaz, 1989; Ülker *et al.*, 1994; Yılmaz *et al.*, 1994). Some varieties and lines were higher yielding than Tir wheat, but their yields were not stable (Ülker *et al.*, 1994).

The baking quality of Tir wheat is moderate, but people living in Van region mostly prefer this kind of wheat for baking products.

Tir wheat (*Triticum aestivum* L. ssp.) (Hoffmann *et al.*, 1985) is a population of bread wheat grown around The Lake Van Basin for centuries. It has a large variation concerning many traits and this is an advantage for breeding new varieties (Demir *et al.*, 1986), especially for

Van Region. Therefore, the primarily desired traits, such as drought and cold resistance, disease resistance, yield and quality should be taken into consideration for culture of Tir wheat in Van region.

There are no wheat breeding researches in Van, except wheat adaptation researches and this study was aimed to reveal some traits of Tir wheat and to help future researches about it.

## MATERIALS AND METHODS

Tir wheat types were collected from The Lake Van Basin (37°55'-39°24' N; 42°05'-44°22'). Altitude of this region is between 1600-2000 m and the region has surrounding mountains. Average annual precipitation is 300-600 mm.

In the present study, Tir wheat was used. It had a strong stem, was resistant to a lot of diseases and gives good yield in the location. However, these desired traits degenerated when it was out of the region (Yılmaz and Tahir, 1987). Tir wheat is locally named as "akbuğday", "kırmızı buğday" and "karakılıçık" etc., in the region.

The study was started by collecting spikes from farmers' fields in The Lake Van Basin in 1991. First, 255 spikes were selected in Van, Erciş, Muradiye, Özalp, Adilcevaz, Ahlat, Tatvan and Patnos provinces and grains from these were planted in autumn (September)

1992. Grain yield, yield components (unpresented data), spike density, awnedness, glume glaucosity, grain colour, glume colour and vitreousness were observed in following years (1993-94, 1994-95, 1995-96 and 1996-97). 105 high yielding lines were selected. 15 Lines were eliminated because of winter damage between 1993-94 and 1994-95. Afterwards, the investigation was carried out with 90 lines. Results of grain yield and yield components were presented in another paper (Sönmez and Ulker, 1998).

**RESULTS AND DISCUSSION**

One of 90 lines was obtained from Patnos, 12, 18, 14, 29, 11 and 5 of 90 lines were gathered from Van, Erciş, Özalp, Adilcevaz, Ahlat and Tatvan, respectively (Table 1)

The classification of lines in terms of traits is shown Table 2. Among 90 lines, 25 had dense spike, 41 had medium spike, 24 had lax spike. The results implied that environmental conditions affected spike density.

Among the lines, 30 lines had long awns, 4 had medium long awns, 55 had short awns, 1 line was awn less which was collected from Tatvan (Tatvan + 70/5). All of the lines except 3 had glaucous glume . Nonglaucous glume lines were obtained from Van (Table 1).

Grain colour and vitreousness are important quality factors. The lines had a large variation for these traits. 34 Lines had white grain colour, 29 had amber grain, 21 had yellow grain and 6 lines had red grain colour. 37 Lines had vitreous grain, 35 lines had soft grain and 18 lines had mixed vitreous and soft grains.

Table 1: Some traits of Tir wheat lines collected from The Lake Van Basin

Enter number	Location	Spike density	Awnedness	Glume glaucousness	Grain colour	Glume colour	Vitreousness
<b>Adilcevaz area</b>							
001 (2)	Adilcevaz Mrk./4	Dense	SA*	Glaucous	Amber	V-BI**	Vitreous
002 (3)	Adilcevaz Mrk./2	Dense	SA	Glaucous	White	B-Y	P. vitreous***
003 (4)	Adilcevaz Mrk./1	Medium	LA	Glaucous	White	V-BI	P. vitreous
004 (5)	Adilcevaz Mrk./3	Dense	LA	Glaucous	Amber	B-R	Soft
005 (29)	Adilcevaz +20/2	Lax	SA	Glaucous	White	W-BI	Vitreous
006 (30)	Adilcevaz +20/3	Lax	LA	Glaucous	White	V-BI	Soft
007 (34)	Adilcevaz +20/6	Lax	SA	Glaucous	Amber	White	Soft
008 (90)	Adilcevaz -10/1	Lax	LA	Glaucous	Yellow	BI-Y	Soft
009 (96)	Adilcevaz -10/6	Lax	SA	Glaucous	Yellow	Y-V	Vitreous
010 (110)	Adilcevaz -60/1	Medium	LA	Glaucous	Amber	BI-Y	Vitreous
011 (111)	Adilcevaz -60/2	Lax	LA	Glaucous	Yellow	B-Y	Soft
012 (115)	Adilcevaz -60/5	Lax	SA	Glaucous	White	Y-V	Soft
013 (116)	Adilcevaz -60/6	Medium	SA	Glaucous	White	White	Soft
014 (117)	Adilcevaz -60/7	Medium	SA	Glaucous	White	B-R	Soft
015 (212)	Adilcevaz -40/1	Medium	SA	Glaucous	White	V-BI	Vitreous
016 (213)	Adilcevaz -40/2	Medium	SA	Glaucous	White	B-R	Soft
017 (214)	Adilcevaz -40/3	Medium	SA	Glaucous	White	White	P. vitreous
018 (218)	Adilcevaz -40/6	Medium	SA	Glaucous	White	V-BI	Soft
019 (219)	Adilcevaz -40/7	Medium	SA	Glaucous	White	B-R	Soft
020(228)	Adilcevaz -30/1	Medium	SA	Glaucous	Yellow	B-Y	Soft
021 (229)	Adilcevaz -30/2	Medium	SA	Glaucous	Yellow	B-R	Soft
022 (231)	Adilcevaz -30/3	Medium	LA	Glaucous	Yellow	BI-Y	Soft
023 (232)	Adilcevaz -30/4	Medium	LA	Glaucous	White	White	P. vitreous
024 (271)	Adilcevaz +10/3	Dense	LA	Glaucous	Red	B-BI	Vitreous
025 (272)	Adilcevaz +10/4	Medium	SA	Glaucous	Yellow	V-BI	Vitreous
026 (274)	Adilcevaz +10/5	Dense	LA	Glaucous	White	White	P. vitreous
027 (276)	Adilcevaz +10/7	Medium	LA	Glaucous	Red	V-BI	Vitreous
028 (284)	Adilcevaz -20/4	Lax	SA	Glaucous	Yellow	B-Y	P. vitreous
029 (287)	Adilcevaz -50/3	Medium	LA	Glaucous	White	White	Soft
<b>Ahlat area</b>							
030 (60)	Ahlat Mrk./3	Dense	LA	Glaucous	Amber	V-BI	Vitreous
031 (61)	Ahlat Mrk./4	Dense	LA	Glaucous	Yellow	V-BI	Soft
032 (76)	Ahlat + 30/2	Dense	SA	Glaucous	Amber	V-BI	Vitreous
033 (80)	Ahlat + 30/5	Lax	LA	Glaucous	Yellow	BI-Y	Vitreous
034 (81)	Ahlat + 30/6	Lax	SA	Glaucous	Amber	Y-V	Vitreous
035 (98)	Ahlat + 10/1	Medium	LA	Glaucous	Yellow	B-R	P. vitreous
036 (99)	Ahlat + 10/2	Lax	SA	Glaucous	Amber	B-R	Vitreous
037 (104)	Ahlat + 10/6	Medium	SA	Glaucous	White	B-Y	Soft
038 (106)	Ahlat + 10/8	Dense	SA	Glaucous	White	B-Y	P. vitreous
039 (108)	Ahlat + 10/9	Medium	SA	Glaucous	White	B-Y	P. vitreous
040 (109)	Ahlat + 10/10	Lax	LA	Glaucous	Yellow	B-Y	P. vitreous

Table 1: Continued

Enter number	Location	Spike density	Awedness	Glume glaucousness	Grain colour	Glume colour	Vitreousness
Erciş area							
044 (66)	Erciş -30/1	Lax	LA	Glaucous	White	White	Soft
045 (68)	Erciş -30/2	Lax	LA	Glaucous	Yellow	Y-V	Vitreous
046 (69)	Erciş -30/3	Medium	LA	Glaucous	White	Y-V	Soft
047 (70)	Erciş -30/4	Medium	SA	Glaucous	Amber	B-Y	Soft
048 (73)	Erciş -30/6	Lax	SA	Glaucous	Yellow	B-Y	Soft
049 (164)	Erciş -60/1	Medium	LA	Glaucous	Amber	B-R	P. vitreous
050 (165)	Erciş -60/2	Medium	SA	Glaucous	Amber	V-BI	P. vitreous
051 (166)	Erciş -60/3	Dense	SA	Glaucous	Amber	White	Soft
052 (167)	Erciş -60/4	Medium	SA	Glaucous	Amber	Bl-Y	Vitreous
053 (169)	Erciş -60/5	Dense	SA	Glaucous	Amber	Bl-Y	Vitreous
054 (170)	Erciş -60/6	Medium	SA	Glaucous	Amber	Bl-Y	Vitreous
055 (171)	Erciş -60/7	Medium	SA	Glaucous	Yellow	B-R	Soft
056 (191)	Erciş -45/1	Lax	SA	Glaucous	White	Bl-Y	Vitreous
057 (192)	Erciş -45/2	Dense	SA	Glaucous	Amber	Bl-Y	Vitreous
058 (196)	Erciş -45/5	Dense	SA	Glaucous	White	White	Soft
059 (261)	Erciş -20/1	Medium	LA	Glaucous	Red	V-BI	Soft
060 (262)	Erciş -20/2	Dense	LA	Glaucous	Yellow	B-R	P. vitreous
061 (266)	Erciş -20/5	Medium	SA	Glaucous	White	V-BI	Vitreous
Özalp area							
065 (10)	Özalp +10/4	Medium	SA	Glaucous	Amber	V-BI	Vitreous
066 (12)	Özalp +10/5	Lax	LA	Glaucous	Amber	White	Vitreous
067 (15)	Özalp +10/8	Dense	SA	Glaucous	Amber	V-BI	Vitreous
068 (136)	Özalp -20/1	Dense	SA	Glaucous	White	B-Y	Soft
069 (139)	Özalp -20/3	Dense	SA	Glaucous	Amber	V-BI	Vitreous
070 (140)	Özalp -20/4	Dense	SA	Glaucous	Amber	Y-V	Vitreous
071 (141)	Özalp -20/5	Medium	SA	Glaucous	Amber	B-R	P. vitreous
072 (142)	Özalp -20/6	Dense	SA	Glaucous	Amber	V-BI	Vitreous
073 (246)	Özalp -5/1	Medium	LA	Glaucous	White	B-R	Soft
074 (247)	Özalp -5/2	Medium	SA	Glaucous	White	B-R	Soft
075 (248)	Özalp -5/3	Medium	SA	Glaucous	Yellow	Black	Vitreous
076 (255)	Özalp -5/8	Medium	LA	Glaucous	Red	V-BI	Soft
077 (258)	Özalp -5/11	Medium	SA	Glaucous	Amber	B-Y	P. vitreous
078 (260)	Özalp -5/12	Medium	SA	Glaucous	Amber	Bl-Y	Vitreous
Patnos area							
079 (316)	Patnos -35/10	Dense	SA	Glaucous	Amber	Black	Vitreous
Tatvan area							
080 (43)	Tatvan +20/4	Medium	SA	Glaucous	White	Bl-Y	Soft
081 (44)	Tatvan +20/5	Dense	SA	Glaucous	Amber	Black	Vitreous
082 (185)	Tatvan +70/1	Dense	SA	Glaucous	Amber	B-R	Vitreous
083 (187)	Tatvan +70/3	Dense	SA	Glaucous	Red	B-R	Soft
084 (189)	Tatvan +70/5	Dense	Awnless	Glaucous	White	Black	Soft
Van area							
085 (126)	Van Mrk./3	Medium	LA	Glaucous	Amber	Y-V	Vitreous
086 (175)	Van Mrk. Özalp/2	Lax	LA	Glaucous	Yellow	Yellow	Soft
087 (176)	Van Mrk. Edremit/1	Lax	MLA	Naked	White	R-V	P. vitreous
088 (177)	Van Mrk. Edremit/2	Lax	MLA	Glaucous	White	B-R	Soft
089 (179)	Van Mrk. Edremit/3	Medium	MLA	Glaucous	White	Black	Vitreous
090 (180)	Van Mrk. Edremit/4	Lax	MLA	Glaucous	White	Black	Vitreous
041 (49)	Amik Mrk./3	Lax	SA	Glaucous	Yellow	Y-V	Vitreous
042 (222)	Amik Mrk./2	Lax	LA	Naked	Yellow	B-Y	P. vitreous
043 (227)	Amik Mrk./6	Lax	SA	Glaucous	Yellow	Y-V	Vitreous
062 (26)	MesL.Kr.Tev./5	Medium	SA	Glaucous	White	Y-V	Soft
063 (207)	M.kasım Mrk./2	Dense	SA	Glaucous	White	V-BI	P. vitreous
064 (211)	M.kasım Mrk./5	Medium	LA	Naked	Red	B-R	Vitreous

\* LA: Long awned, SA: Short awned, MLA: Medium long awned

\*\* B-R: Brown-Red, B-Y: Brown-Yellow,  
Bl-Y: Black-Yellow, Y-V: Yellow-Violet,  
V-BI: Violet-Black, W-BI: White-Black,  
R-V: Red-Violet, B-BI: Brown-Black

\*\*\* P. vitreous: Partial vitreous

Table 2: Distribution of the lines according to the investigated traits

Spike density		Awnedness		Grain colour	
Lax	24	Long	30	White	34
Medium	41	Short	55	Red	6
Dense	25	Medium	4	Amber	29
		Awnless	1	Yellow	21
Glume glaucousness		Grain vitreousness		Glume colour	
Glaucous	87	Vitreous	37	B-R*	17
Non-Glaucous	3	Soft	35	B-Y	13
		Partial vitreous	18	Bl-Y	11
				Y-V	10
				V-Bl	19
				W-Bl	1
				Black	6
				R-V	1
				B-Bl	1
				White	10
				Yellow	1

\*B-R: Brown-Red, B-Y: Brown-Yellow, Bl-Y: Black-Yellow, Y-V: Yellow-Violet, V-Bl: Violet-Black, W-Bl: White-Black, R-V: Red-Violet, B-Bl: Brown-Black

Glume colour was the most variable among the investigated traits. Eleven different glume colours were determined. Violet-black glume colour lines were commonly observed.

Many different types of wheat were determined from Tir wheat, however, a few of them were of same type. For example, line 15, 139 and 142 from Özalp, Line 167 and 170 from Erciş had the same characters (Table 1). Line 96 (from Adilcevaz), line 49 and 227 (from Van) also had similar properties.

On the other hand, different glume colour and grain vitreousness were commonly observed traits among the lines, while spike density, glume glaucosity and grain colour were a few observed traits. In spite of the most of the lines were collected from Adilcevaz, there were no similar lines, except lines 232 and 287. Which only differed in grain vitreousness. It was observed that there was the same situation between line 3 (from Adilcevaz) and line 136 (from Özalp); between line 90 (from Adilcevaz) and line 80 (from Ahlat); between line 284 (from Adilcevaz) and line 73 (from Erciş). The differences between the lines for grain vitreousness probably depend on genetic and/or environmental factors (Kün, 1988; Sencar *et al.*, 1994).

Glume colour was the most variable character among the observed traits. It is not known whether the differences among the lines depend on genetic factors or not. Because variation of glume colour may be affected from extreme climatic conditions.

In the first evaluation, 90 lines were selected as promising among 255 lines. In addition 85 of 90 lines were found different from each other and it is not possible to say that these lines are different genetically or not. However, Yılmaz and Tahir (1987) determined that Tir wheat from Ahlat town contained 32 different types.

The result of this study indicates that Tir wheat population is a good potential resource for breeding new varieties, especially for Van ecological conditions. Further research should be focused on genetic differences for morphological characteristics, disease resistance and quality factors.

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