

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY****DETERMINATION OF FALLING NUMBER AND EXTENSOGRAFICAL
PROPERTIES OF SOME BREAD WHEAT VARIETIES CULTIVATED IN
CENTRAL ANATOLIA REGION****İsmail Naneli*¹, Abdulkadir Tanrıkulu² & Mehmet Ali Sakin¹**^{*1}Gaziosmanpaşa University, Faculty of Agricultural, Field Crops, Tokat, Turkey.²Harran University, Ceylanpınar Vocational School, Şanlıurfa, Turkey.0

DOI: 10.5281/zenodo.1320846

ABSTRACT

In order to determine the rheological (extensograph and falling number) properties of some bread wheat varieties cultivated in Sivas, 4 cultivars (Esperia, Tosunbey, Flamura-85, Krasunia Odeska) were performed in the total of 600 samples, including replicates from 150 different locations. In the survey; FN (falling number) (sec), FFN (fungal falling number) (sec), Water absorption (%), Energy (cm²) (45', 90', 135'), Extensibility (mm) , 135'), Maximum resistance (BU) (45', 90', 135') as rheological properties were investigated. Significant differences were found between the varieties in terms of the characteristics examined. Maximum water absorption (54.1%) and extensibility (159 mm, 45') were observed in Flamura-85 cultivar while FN and FFN showed the highest values (358.8", 652.8") of Esperia variety. Maximum resistance and energy respectively; Esperia (766 BU, 135') and Tosunbey (135 cm², 90') varieties. In the direction of the results obtained from the parameters examined, Esperia and Tosunbey cultivars appeared in the foreground.

Keywords: Alpha-Amylase Activity, Bread Wheat, Quality, Variety.**I. INTRODUCTION**

Wheat is a very important nutrient especially for Anatolian people. The rich nutrient content (calorie, protein etc.) plays a role in meeting a significant amount of people's daily needs. It has been reported that 80% of cereal-produced foods are 319 g of bread and per-capita daily bread after an extraction of paste, bulgur, and other bakery products from the cereal products of approximately 60-65% of our daily caloric needs in our country [1,9]. In wheat, environmental and genotype interactions show differences in yield and quality parameters (physical, chemical and technological) [2,3]. Quality is variable, especially in the direction of demands of producers, consumers, and industrialists [4]. The quality of bread, which is consumed much in the world and especially in our country, has been identified with the country's traditional production techniques and palate tastes. Variable production techniques in different countries depend on bread quality production techniques, equipment, and basic materials. A large number of devices are used in order to determine the quality of wheat [5,10]. The most important factor that reveals the quality of bread is the analysis made with devices such as farinograph, extensograph, alveograph, mixograph which determine the pulp properties [6]. The researchers make use of the extensograph device in determining the strength, elasticity ability, and energy values of the dough. In addition to this research, they reported that the dough gave information about the fermentation period [2,7]. The Falling Number in terms of measuring the alpha-amylase enzyme activity under consideration is among the important quality criteria. If the activation of the amylase enzyme is undesirably high, it leads to quality problems. Especially in wheat, harvests during the harvesting period, storage in high humidity storage conditions increases the nemesis and leads to high amylase enzyme activation. This affects the quality of the dough and therefore some quality parameters such as bread internal texture, volume [8].

In this study, the number of extensographs and the number of drops made in one hundred fifty different samples taken from four different types of wheat cultivated under Sivas conditions were determined and the most suitable variety for the region was determined from the cultivars grown in the region.

II. MATERIAL-METHOD

This study was practiced in the province of Sivas in Central Anatolia region. Wheat samples tempered according to the research by the *AACC method 26-95* 14% moisture basis, and is ground in a roller mill. Extensograph analyzes (*AACC 54-10*), Falling number analyzes (*AACC 56-81B*) according to methods were done. *SPSS* program was used in the analysis of the samples. *Duncan* multiple comparison test was applied.

III. FINDINGS-DISCUSSION

Environmental factors as well as genetic factors have an very important influence on bread wheat varieties [10,11].

Many dough properties have been studied using basic rheological procedures [16,17,18]. The mechanical effect applied to the flour-water mixture is due to the ongoing effect of the protein networks, leading to a unique visco-elastic structure [16]. To understand the unique effect, dough reologists showed great interest. Experimental methods have generally been used to classify the rheological properties of dough. Classification of dough characteristics with traditional devices (Alveograph, Extensograph Farinograph, Mixograph) is important for industry [19]. The difference between the varieties was found to be significant at 1% and 5% in terms of all traits examined. In terms of Extensibility, the Flamura-85 variety is the highest value (45') and the Esperia variety (90') is in the highest group (Table 1). Dough energy value is an important quality parameter. While the Tosunbey variety 45-90 minutes at maximum energy is obtained, Esperia variety has the highest value at 135 minutes (Table 2). With regard to FN and FFN, the Esperia variety is in the highest value (Table 3). It is desirable that the number of FN between 220-250 s. In our country there are similar studies with different varieties [12]. The high FN is a negative condition for the bread quality. The maximum energy value is seen in the Tosunbey range (90 min), while the average value of 45 min is the lowest. When we examine the extensibility feature, all of the varieties in the 45 min and 90 min are statistically high among the groups. The Tosunbey variety is also the lowest to 135 min [13]. Dough resistance is a desirable parameter in terms of bread quality [14]. Table 4, in which the maximum resistance parameter is examined, is high in the Esperia and Tosunbey varieties for 45 min, 90 min, and 135 min. (Table 4). In the studies, researchers have reported that an important quality parameters of the desired extra dough to be strong [15,16].

Table 1. Some Bread Wheat Varieties for Extensograph Parameters (Extensibility)

Varieties	Extensibility					
	45'		90'		135'	
<i>Esperia</i> (SEM)	158	ab**	142	ab**	136	ab**
	0.005		0.003		0.006	
<i>Tosunbey</i> (SEM)	153	b	148	a	130	b
	0.006		0.005		0.007	
<i>Flamura-85</i> (SEM)	159	a	139	ab	138	a
	0.005		0.006		0.005	
<i>K. Odeska</i> (SEM)	158	ab	140	ab	139	a
	0.003		0.008		0.006	
Mean	157		142		136	

SEM: Standart Error Mean. **: It is important at 1%.

Table 2. Some Bread Wheat Varieties for Extensograph Parameters (Energy and Water Absorption)

Varieties	Energy						Water Absorption	
	45'		90'		135'			
<i>Esperia</i> (SEM)	105.0	a**	124.0	ab**	128.0	a**	53.8	ab**
	0.002		0.004		0.006		0.009	
<i>Tosunbey</i> (SEM)	107.0	a	135.0	a	117.0	ab	53.3	b
	0.004		0.007		0.007		0.004	
<i>Flamura-85</i> (SEM)	91.0	b	108.0	b	110.0	ab	54.1	a
	0.003		0.005		0.006		0.002	
<i>K. Odeska</i> (SEM)	97.0	ab	102.0	c	113.0	ab	52.5	bc
	0.005		0.001		0.008		0.004	
Mean	100.0		117.0		117.0		53.4	

SEM: Standart Error Mean;. **: It is important at 1%.

Table 3. Some Bread Wheat Varieties for FN, FFN Parameters

Varieties	FN		FFN	
<i>Esperia</i> (SEM)	358.8 0.003	a**	652.8 0.003	a*
<i>Tosunbey</i> (SEM)	315.4 0.004	b	512.6 0.004	b
<i>Flamura-85</i> (SEM)	353.1 0.006	a	487.2 0.003	c
<i>K. Odeska</i> (SEM)	288.1 0.005	c	492.4 0.002	c
Mean	328.9		536.3	

SEM: Standart Error Mean. *, **; It is important at 5%, 1%.

Table 4. Some Bread Wheat Varieties for Extensograph Parameters (Max Resistance)

Varieties	Max Resistance		
	45'	90'	135'
<i>Esperia</i> (SEM)	570 a** 0.005	690 b** 0.009	766 a** 0.007
<i>Tosunbey</i> (SEM)	535 ab 0.008	736 a 0.006	759 a 0.005
<i>Flamura-85</i> (SEM)	471 b 0.006	655 bc 0.007	698 b 0.006
<i>K. Odeska</i> (SEM)	464 bc 0.007	553 c 0.008	629 c 0.009
Mean	510	658.5	713

SEM: Standart Error Mean. **; It is important at 1%.

IV. RESULT

The quality of the wheat grown in the area is usually low. Quality is increased by forming the mixture with the imported wheat. For this reason, it is very important to determine the high quality varieties of my country. Producer, consumer and industrialists will help to fulfill the required demand.

According to the results obtained, among the varieties produced in Sivas *Esperia* and *Tosunbey* are known to perform much better in terms of many parameters examined according to the other varieties.

REFERENCES

- [1] Anonymous, 2013. Economical Dimension of Unnecessary Spending and Benefits Obtained Through Campaign (http://www.ekmekisrafetme.com/Pages/GenelBilgiler/IsrafinBoyutu_2013.aspx).
- [2] Aydoğan, S., Akçacık, A.G., Şahin, M., Önmez, H., Demir, B., Yakışır, E. 2013. Determination of Physicochemical and Rheological Properties of Bread Wheat Varieties. Journal of Field Crops Central Research Institute, 22 (2): 74-85.
- [3] Kuchel, H., Langridge, P., Mosionek, L., Williams, K., Jefferies, S.P., 2006. The Genetic Control of Milling Yield, Dough Rheology and Baking Quality of Wheat. Theor Appl Genet. 112: 1487–1495.
- [4] Mut, Z., Aydın, N., Özcan, H., Bayramoğlu, O., 2005. Determination of Yield and Some Quality Characteristics of Bread Wheat Genotypes In Central Black Sea Region. GOU. Journ. Agr. 22 (2), 85-93.
- [5] Faridi, H., Faubion, J.M., 1990. Dough Rheology and Baked Product Texture. AVI Book Softcover Reprint of The Hardcover 1 st edition.
- [6] Indrani, D., Rao, G.V., 2007. Rheological Characteristics of Wheat Flour Dough as Influenced by Ingredients of Parotta. Journal of Food Engineering. 79:100-105.
- [7] Elgün, A., Ertugay, Z., Certel, M., Kotancılar, H.G. 2002. Analytical Quality Control and Laboratory Practice Guide for Grain Products (Revised 3rd edition). Atatürk University Publ. no:867. Faculty of Agriculture Publ. no:335. Textbook Series No:82. pp.245.
- [8] Ünal, S., 2002. Importance of Wheat Quality and Methods In Wheat Quality Determination. Grain Products Technology Congress and Exhibition 3-4 Oct. 2002, pp 25-37, Gaziantep, Turkey.

- [9] Cook, R.J., Veseth, R.J. 1991. Wheat Health Management. The American Phytopathological Society. St. Paul, Minnesota 55121, USA.
- [10] Naneli, İ., Sakin, M.A., Kırıl, A.S. 2015. Determination of Yield and Quality Characteristics of Some Bread Wheat Varieties In Tokat-Kazova Conditions. *Gaziosmanpasa Univ. Journ. Agr.* 32 (1), 91-103.
- [11] Kün, E., Avcı, M., Uzunlu, V., Zencirci, N., 1995. Cool Climate Cereal Consumption Projections and Production Targets. TMMOB Chamber of Agricultural Engineers, 4. Turkey Agricultural Engineers Technical Conference 9-13 Jan., 417-429, Ankara.
- [12] Şahin, M., Aydoğan, S., Göçmen, A.A., Taner, S. 2009. Evaluation of Some Bread Wheat Genotypes Developed for Central Anatolia In Terms of Alveograph Analysis. *Bahri Dağdaş International Agricultural Research Institute Herbal Research Journal.* 2: 1-9. Konya.
- [13] Lazaridou, A., Duta, D., Papageorgiou, M., Belc, N., Biliaderis, C.G., 2007. Effect of Hydrocolloids on Dough Rheology and Bread Quality Parameters In Gluten-Free Formulations. *Journal of Food Engineering* 79 1033-1047.
- [14] Wrigley, C.W., Bekes, F. 2002. Grain-Protein Composition As a Document of Wheat-Quality Type: New Approaches to Varietal Identification. *Wheat Quality Elucidation The Bushuk Legacy.* Chapter:4, pp:65-86.
- [15] Ng, PKW., Steffe, JF. 2002. Exploring The Relationships Between Flour Protein Chemistry and Dough Rheological Properties. *Wheat Quality Elucidation.* pp:183-195.
- [16] Schofield, R.K., Scott Blair, G.W. 1932. The Relationship Between Viscosity, Elasticity and Plastic Strength of Soft Materials as Illustrated by Some Mechanical Properties of Flour Doughs. I. *Proc. R. Soc. (London)* A138, 707-718.
- [17] Sharma, N. 1990. Modeling Flow Behavior of Flour-Water Doughs. Ph.D. Dissertation. University of Nebraska: Lincoln, NE.
- [18] Amemiya, J.I., Menjivar, J.A. 1992. Comparison of Small and Large Deformation Measurements to Characterize The Rheology of Wheat Flour Doughs. *J. Food Eng.* 16, 91-108.
- [19] Campos, D.T., Steffe, J.F., Ng, PKW. 1997. Rheological Behavior of Undeveloped and Developed Wheat Dough. *Cereal Chem.* 74, 489-494.

CITE AN ARTICLE

Naneli, İ, Tanrıku, A., & Sakin, M. A. (2018). DETERMINATION OF FALLING NUMBER AND EXTENSOGRAPHICAL PROPERTIES OF SOME BREAD WHEAT VARIETIES CULTIVATED IN CENTRAL ANATOLIA REGION. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY*, 7(7), 223-226.