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Suitability of Different Wheat Varieties Grown in NWFP for Bread Making and Effect of Storage Time on Falling Number

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Abstract: Six commercial wheat varieties (2005-2006 harvest) viz Ghaznavi-98, Auqab, Fakhr-e-Sarhad, Saleem-2000, Khyber 87 and Pirsabak-2005 were tested for physicochemical characteristics and sensory evaluation of bread prepared from these varieties and effect of storage time on the falling number. Changes in the course of one-year storage were evaluated in terms of falling number. It was observed that the physiochemical characteristics of these cultivars were moisture% (14.166, 16.033, 14.93, 14.6, 12.6, 13), Ash% were (1.4, 2, 2, 1.9, 1.6, 1.59), protein % (11.5, 10.7, 11.9, 13.27, 14.5, 15), Gluten index % (8.9, 8.5, 8.4, 9.3, 7.8, 8.7), Fat % (1.9, 1.8, 2.1, 1.8, 1.6,1.6), Fiber % (3.2, 2.7, 2.8, 2.395, 2.8, 2.7) respectively. The overall acceptability of bread prepared from Khyber-87 and Pirsabak-2005 were obtained the highest score i.e. 7.52 and 6.88 as compared to other cultivars. The average falling number during storage for one year at room temperature the average falling numbers of Ghaznavi-98, Auqab, Fakhr-e-Sarhad, Saleem-2000, Khyber-87 and Pirsabak-2005 were 338.5, 267.0, 264.25, 302.6, 355.4 and 266.9 respectively.

Key words: Wheat varieties, physiochemical properties, bread making, falling number, storage

INTRODUCTION

Common wheat (*Triticum aestivum* L.em. Thell), the most important crop which grown through out the world. Wheat provides more nourishment than any other food grains (Reitz, 1967). In its natural state, wheat is a good source of vitamin B1, B2, B6, niacin as well as iron and zinc besides being a cheap source of process and calories. (Kent, 1983). In our country the major use of wheat is for the preparation of chapatti but it is also used for various other bakery products like bread, cookies, cakes, burger buns and pastries.

Wheat quality influenced both by genotype and growth environment (Kent and Evers, 1994; Quail, 1996). The physio-chemical, rheological and technological properties differ significantly among wheat varieties which have far reaching effects on the quality of end use products. Actual quality of wheat is the summarization of soil, climate and seed stock on the wheat plant and kernel components (Finney *et al.*, 1987). Wheat quality can be improved if both genetic as well as biochemical composition influencing technological properties are known. Both protein quantity and quality are considered important in estimating the potential of flour for its end use quality. The rheological characteristics of flour vary between varieties (Wrigley, 1993, 1994). A review of available information indicates some inadequacy in quality of the diet of the average Pakistani particularly with respect to protein, vitamins and minerals and serious nutritional problems for the most vulnerable sector of the population (Anonymous, 1972). In Pakistan, the most commonly consumed least expensive products are chapaties and rotis, using almost 80% of the total wheat production. These are the primary and cheapest source of protein and calories in the diet (Anjum *et al.* 1991). In Punjab and Sindh provinces chapatti and roti doughs are unleavened while in Baluchistan and Frontier provinces fermented roties are prepared.

The aim of this study was to evaluate different wheat varieties grown in NWFP to find out variability in their physicochemical attributes and sensory properties for the suitability of bread making and effects of storage time on falling number at room temperature.

MATERIALS AND METHODS

Procurement of raw materials: Wheat varieties Ghaznavi-98, Auqab, Fakhr-e-sarhad, Saleem-2000, Khyber 87 and Pirsabak-2005 were taken from Agriculture Research Institute, Tarnab Peshawar.

Physicochemical characteristic of wheat: Each wheat variety were tested for Moisture, Ash, Gluten index, falling number, fat and fiber according to the standard procedures given in AACC (1990) and protein was analyzed by grain analyzer. Wheat samples were milled using laboratory mill 3100 perton following the standard method (AACC, 1990).

Preparation of leavened flat bread (Naan): The traditional plain naan were baked in a tanoor (mud oven) by following the local method.

Sensory evaluation: The bread prepared from different wheat varieties were evaluated for Color, Taste, Flavour, Texture and Overall acceptability by the standard method (Kulp *et al.*, 1983).

Statistical analysis: All the data was statistically evaluated according to Steel and Torrie (1982). The data

Table 1: Physicochemical characteristic of different wheat varieties grown in NWFP

S.No	Wheat varieties	Moisture %	Ash %	Protein %	Gluten index %	Fat %	Fiber %
1	Ghaznavi-98	14.166	1.4539	11.5	8.9	1.921	3.209
2	Auqab	16.033	2.0018	10.7	8.5	1.878	2.75
3	Fakhr-e-sarhad	14.93	2.0198	11.9	8.4	2.19	2.85
4	Saleem-2000	14.6	1.9936	13.27	9.3	1.878	2.395
5	Khyber- 87	12.6	1.65	14.5	7.8	1.692	2.821
6	Pirsabak -2005	13	1.598	15	8.7	1.687	2.799

Table 2: Sensory evaluation of bread prepared from different wheat varieties grown in NWFP

Wheat varieties	Colour	Taste	Flavour	Texture	Overall Acceptability
Ghaznavi-98	7.2	7.62	7.37	7.5	6.24
Auqab	6.5	6.25	6.10	6.22	6.54
Fakhr-e-Sarhad	6.4	6.25	5.75	5.77	6.36
Saleem-2000	6.57	6.32	6.21	6.42	6.48
Khyber -87	7.4	6.25	6.33	6.11	7.52
Pirsabak -2005	7.71	6.50	6.87	7.34	6.88

Table 3: Effect of storage time on Falling Number of wheat flour

Storage Time	Ghaznavi -98	Auqab	Fakhr-e-Sarhad	Saleem -2000	Khyber -87	Pirsabak-2005
May	488	436	467	452	472	446
June	452	402	450	438	455	433
July	430	385	397	410	442	397
August	410	360	348	388	424	366
September	392	345	308	375	395	327
October	370	305	277	346	366	294
November	350	287	232	311	353	265
December	311	215	192	286	327	221
January	270	186	167	227	295	167
February	240	125	134	188	278	128
March	210	94	112	143	244	94
April	139	64	87	68	214	65
Average	338.5	267.0	264.25	302.66	355.4	266.9
S.D.*	106.2	127.15	131.28	122.95	85.4	132.4

S.D*. = Standard Deviation

obtained was statistically analyzed using SPSS 12 software.

RESULTS AND DISCUSSION

The wheat Flour was subjected for physiochemical analysis. The results obtained as shown in Table 1. The result showed that the highest moisture content was observed in Auqab i.e. 16.033%, moderate value of moisture 14.93%, 14.6%, 14.166% and 13% were calculated in Fakhr-e- Sarhad, Saleem-2000, Ghaznavi-98 and Pirsabak -2005 respectively and the lowest value 12.6% of moisture content was calculated in Khyber-87. Ash content of these cultivars showed that there were no significant differences between these values. The ash% content of Auqab, Fakhr-e-Sarhad and Saleem-2000 were 2.0018, 2.0018 and 1.9936 respectively which were nearly same. Similarly Khyber-87, Pisabak-2005 and Ghaznavi-98 were the same value of ash content i.e. 1.65%, 1.598% and 1.4539% respectively. Protein content of these cultivars showed that the highest protein content i.e. 15% were found in Pirsabak-2005, followed by Khyber-87 which was 14.5%. The other

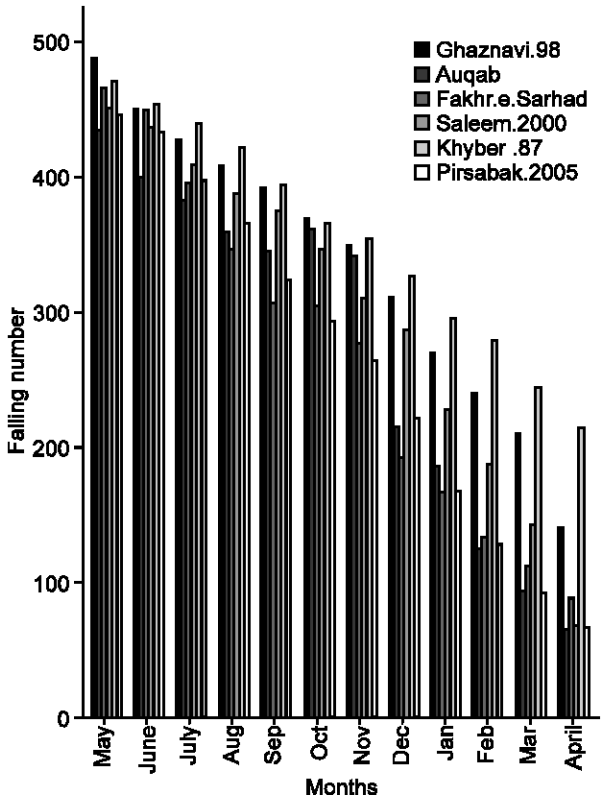

Fig. 1: Effect of wheat flour falling number (FN) on storage time.

values of protein content were 13.27%, 11.9%,11.5% and 10.7% observed in Saleem-2000, Fakhr-e-Sarhad, Ghaznavi-98 and Aquab respectively. The results of Gluten index showed that no significance differences were observed in between these cultivars. The Gluten index of Saleem-2000 was 9.3%, Ghaznavi-98 8.9%, Pirsabak-2005 8.7%, Auqab 8.5%, Fakhr-e- Sarhad 8.4% and Khyber-87 8.7%.The Fat content results indicated that Fakhr-e-Sarhad was 2.19%, followed by Ghaznavi-98 1.921%, Auqab 1.878%, Saleem-2000 1.878% Khyber-87 1.692%, Pirsabak -2005 1.687%. The fiber content of the different cultivars indicate that Ghaznavi-98 was 3.209%, Fakhr-e-Sarhad was 2.85%, Khyber -87 was 2.821%, Pirsabak -2005 was 2.799%, Auqab was 2.75% and Saleem-2000 was 2.395%.These results indicates that the Pirsabak-2005 and Khyber-87 are good quality of wheat according to protein contents

scores. But according to Gluten index Saleem-2000 and Ghaznavi-98 were best cultivars. The moisture, ash and fibers content in the studied wheat cultivars were greater as compared to the other wheat cultivars studied carried out by Zubair *et al*., 2001.

Texture of the bread was the main attribute of sensory evaluation. It was evaluated by a panel of five judges. The highest score for the texture was 7.6 of the variety Kyber-87 followed by 7.5 of the variety Ghaznavi-98. Wheat starch and gluten have limited effect on tortilla texture (Wang and Flores, 1999a,b). The results for the texture of the other varieties were 7.34, 6.42, 6.22 and 5.77 for Pisabak-2005, Saleem-2000, Aquab and Fakhr-e-Sarhad. The flour protein and water absorption affect tortilla texture (Wang and Flores, 1999a,b). Generally it was observed that wheat variety Khyber-87 was ranked at number one for the texture of the naans and the variety Ghaznavi-98 at number two (Table 2).Softness in chapatti texture is highly correlated with flour color and consequently bran content; this may be due to increase in water absorption (Navickis and Nelsen, 1992). The highest colour score was observed for Pirsabak-2005 which was 7.71, followed by Khyber-87 which was 7.4. The other colour score were 7.2, 6.57, 6.5 and 6.4 for Ghaznavi-98, Saleem-2000, Aquab and Fakhr-e-Sarhad. Their were no significant difference in the varieties in terms of taste score, but Khyber-87 and Pirsabak-2005 were get high score i.e. 7.62 and 6.50 respectively as compared to other cultivars. The flavour of bread were also evaluated the results indicated that again Khyber-87 and Pirsabak-2005 lead a score viz. 7.37 and 6.87 respectively as high as compared to other cultivars. The overall acceptability of the breads indicated that the Khyber-87 and Pirsabak-2005 were more acceptable as compared to other cultivars as shown in Table 2.

The effect of storage on falling number at room temperature were studied for one year, the results were shown in Table 3. The highest average falling number 355.4 was observed in Saleem-2000. The lowest falling number 264.25 was calculated in Fakhr-e-Sarhad. The falling number in Ghaznavi-98, Aquab, Khyber-87 and Pisabak-2005 were 338.5, 267.0, 302.66 and 266.9 respectively. Food wheat is a subject of biochemical changes during the storage time that also affect the values of technological quality indicators. Changes depend on time and storage conditions and especially on wheat moisture (Hruskova *et al*., 2004). The falling number of Ghaznavi-98 were calculated 488 at start (May) of storage time and at the end (April) were 139, similarly falling number at start of storage time of Aquab, Fakhr-e-Sarhad, Saleem-2000, Khyber-87 and Pirsabak-2005 were 436, 467, 452, 472 and 446 respectively and at the end of storage time the falling number of Aquab, Fakhr-e-Sarhad, Saleem-2000, Khyber-87 and Pirsabak-2005 were 64, 87, 68, 214 and 65 respectively. These results indicated a decrease in falling number at room temperature for a one year storage time, but this indicate a disagreement of the study in which after 15-month storage of 2 wheat varieties found a decrease of sedimentation value and an increase of falling number regardless of the temperature of storage boxes that ranged from -4° to 25°C (Lukow *et al*., 1995). But another study showed a closed agreement in which at long term wheat storage (4 years in closed containers at 20° C and RH 74%) the protein content decreases (from 12.5% to 12.0%) and falling number decrease (from 360s to 307s) were found, but wheat moisture (13.7%) did not change (Warchalewski *et al*.,1985). The study carried out by Hruskova *et al*., 2004 showed that the falling number of wheat 2001 increase during storage time, but in this study the falling number of other cultivars wheat 2002 showed a decrease decline in falling number during storage. The ambiguity of the influence of storage time on wheat quality in comparison with other studies may be related to the variety non-homogeneity of partial samples in single monthly taking, different storage conditions of wheat in agricultural operations, climatic condition, analysis procedures, wheat varieties differences and short-term study time.

Conclusion: Physicochemical and rheological characteristics of wheat varieties/lines affect the quality of the end product. Wheat variety Khyber-87 and Pirsabak-2005 was ranked high for the production of leavened flat bread (naan).

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