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Quality Evaluation of Wheat Varieties (*Triticum aestivum* L.) in Dhi-Qar Province, South Iraq

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Abstract: The current study was conducted to assess the quality of grain, flour and gluten of four wheat varieties (Ebaa99, Ebaa95, Spanish and Maxebak), by studying their chemical analysis during a season of 2017 in Dhi Qar province, southern of Iraq. The samples were harvested from two agricultural fields at Aldaway and Alrifai, Ebaa95 and Spanish variety produced high grain protein content as compared to Ebaa99 and Mexebak (15.1 and 14.81% respectively). Ebaa99 and Spanish gave highest flour protein content (14.1 and 13.86% respectively). The protein ratio considered as a good indicator used to determine flour quality. In addition, Ebaa95 and Spanish gave highest wet gluten (37.1 and 39.02% respectively) as compared to other varieties.

Keywords: Wheat, Grain, Flour, Gluten, Quality

Wheat (*Triticum aestivum* L.) is one of the most important food and wildly used due to good quality of protein, especially the gluten. Wheat gluten is economically important co-product, produced during wet processing of wheat flour and has special properties when hydrated and mixed. This forms a very extensible, elastic structure that is responsible for gas-holding ability of bread dough and then produces a suitable quality of bread (Alkildar et al 2010). Many studies indicated that by 2050 the population is estimated to be 9.8 billion people and global food demand will increase by 70-110% (Tilman et al 2011, Long et al 2015). The wheat production is considered essential for stability of food security in all wild countries. Gluten quality derived from its protein is an important issue for fermented bread production and many other productions. Gluten also used in fodder industry and animal feed, therefore, there is a significant chance to increase food and nonfood industrial uses of together wheat and gluten. This study aimed to estimate protein, gluten and some chemical properties for some varieties of wheat grown in Dhi-Qar province, south of Iraq.

MATERIAL AND METHODS

Four varieties (Ebaa99, Ebaa95, Spanish and Maxebak) were cultivated in Dhi-Qar province during winter 2017 at two cultivated fields at Aldaway and Alrifai. The harvested crop were cleaned and purified from impurities, after that they are kept in a paper bag at 64°C. The grains were milled by using a laboratory mill to obtain homogeneous flour. The flour kept in a paper bag at 6-7°C for laboratory tests. Humidity was determined by using the protocol of USA chemist's association number 19-44 for 1998. The protein was estimated by using standard Kjeldahl method number 12-46 (AACC) for 1998 and by using the constant (5.7XN). Similarly, ash was determined by using standard method number (01-0.8) AACC for 1998. Fat was determined by using Soxhlet device and by using the protocol of American oil chemical society number (44-3) A.O.C.S.A (1971) were the dry ethyl ether used. Carbohydrate determined as: Carbohydrate (%) = (Protein + Ash+ Fat + Fibers + Moisture) % - 100%.

Wet and dry gluten determined by using mechanical wishing for dough methods [(11-38) AACC (1998)] and by using Gluten Index device (Glutomatic) 2200/2100 to obtain wet gluten, thereafter the wet gluten dried (Glutork 2020 device) to obtain dry gluten discs. The test has been done on three replicates.

RESULTS AND DISCUSSION

Moisture contents (%): The moisture contents in grains were significantly high in Mexebak (9.00%) and Spanish (8.96 %) as compared to Ebaa 99 (8.15 %) and Ebaa 95 (8.70 %) (Table 1). In wheat flour the moisture content was significantly low in Mexebak (13.36 %) as compared to other varieties (13.96 -140%) which did not differ significantly among themselves (Table 2). Grain humidity depends on field and storage conditions and degree of grain hardness. Normally, low humidity is preferred in storage because low humidity reduced respiration seeds and pathogens infection (Alsabbagh 2006). The optimum range of flour humidity is 10.1-16.5%. Flour humidity is considered a determining

factor for flour quality (Alali 2003). The moisture in gluten revealed no significant differences (Table 3). Both varieties Ebaa95 and Spanish produced the highest protein rate by 15.10 and 14.81% respectively. Grain protein is considered as good indicator for grain quality. Ebaa99 and Spanish produced highest flour protein content reached to 14.1 and 13.86% respectively. In Ebaa95 and Spanish the grain protein were within permissible limit of 10-15% (Pomeranz 1971) (Table 1). The gluten content of Spanish has high protein content (89.80%). This rate is considered as a high percentage, especially after starch, soluble protein and water isolation as compared with the results of Alali (2003). In Medevac and Ebaa99 ash content was 2.12 and 2.06% respectively (Table 1). There were no significant differences between the varieties in flour ash content (Table 2). There were significant differences in gluten ash content among wheat varieties, both Spanish and Ebaa99 varieties, produced a high rate of gluten ash content by 1.90 and 1.70% respectively. Fat content in wheat flour is lower than its content in grains because of the greater part of fat is concentrated in the layers of the covers and the embryo. Both those parts were separated during grain milling. Spanish gave the highest content of fat in grain (2.06 %.) At the same time, Ebaa99 gave the highest content of fat in flour (1.60 %.). Fat content in gluten was very low as compared to grains and flour (Table 3). The Spanish gave the highest gluten fat content of 1.20%. The carbohydrate was high in both grain and flour for all wheat varieties. Ebaa99, Spanish and Ebaa95 produced the highest f carbohydrate in grain and flour (Table 1 and 2). The carbohydrate reduced in the gluten as compared to grain and flour (Table 3). These results consist with observations of; and Alali (2003) and Alsabbagh (2006). The flour dry gluten content considers as a reflection of flour protein content and quality. There was significant differences among wheat varieties in wet and dry gluten content. The variety of Ebaa95 and Mexebak gave the highest dry gluten content of 13.20 and 12.40%, respectively.

Table 1. Chemical compound of grains of wheat varieties

Varieties Parameters (%)	Ebaa 99	Spanish	Ebaa 95	Mexebak
Moisture	8.15c	8.96a	8.70b	9.0a
Protein	12.4c	14.81a	15.10a	13.95ab
Ash	2.06a	1.57b	1.95ab	2.12ab
Fat	1.61b	2.06a	1.53b	1.75b
Carbohydrate	73.29a	71.31a	71.45a	70.17b

Table 2. Chemical compound of flour of wheat varieties

Varieties Parameters (%)	Ebaa 99	Spanish	Ebaa 95	Mexebak
Humidity	14.11a	13.96a	14.05a	13.36b
Protein	14.1a	13.86a	13.22b	11.1c
Ash	0.92	0.6	0.71	0.69
Fat	1.60a	1.35c	1.50b	1.49b
Carbohydrate	73.36a	70.23ab	70.52ab	69.27b
Dry gluten	10.02c	11.10bc	12.40ab	13.20a
Wet gluten	26.2d	37.1b	39.02a	28.1c

Table 3. Chemical compound of gluten of wheat varieties

Varieties Gluten content (%)	Ebaa 99	Spanish	Ebaa 95	Mexebak
Humidity	4.07	4.37	4.10	3.98
Protein	88.81	89.80	87.70	86.05
Ash	1.70a	1.90a	1,03b	1.16b
Fat	0.70c	1.20a	0.91b	0.76c
Carbohydrate	4.72b	5.12b	3.87c	8.05a

CONCLUSION

The Ebaa95 variety produced the highest protein without any significant differences from the Spanish variety. Moreover, Spanish variety produced high flour protein content with no significant differences from Ebaa 99. Spanish is identified as the best quality among other wheat varieties.

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