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QUALITATIVE COMPARISON OF WHEAT CULTIVARS UNDER RAINFED CONDITIONS

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ABSTRACT

Quality is a Complex entity and refers to desirability of the product. It includes several physical and Chemical aspects, Protein, ash, fat, carbohydrates and gluten contents are the major quality parameters. The material for investigation comprised of twelve wheat cultivars viz., Margala, Suleman-96, Chakwal-86, Rawal-87, Bakhtawar, Kohsar- 95, Inqalab-91, Chakwal-97, Sariab-92, Wafaq-2001, Kohistan-97 and MH-97. The highest protein content (15.05%) was observed in MH-97, while Chakwal-97 gave the lowest value. The maximum crude fiber (4.95%) was recorded in Chakwal-97, but minimum (3.33%) in Rawal-87. The Margala gave the maximum fat content (2.50%) and Sariab-92 the minimum (1.54%). The highest ash content (2.91%) was recorded in MH-97 while Sariab-92 gave the lowest. In case of total carbohydrates, Bakhtawar over ruled the others with 71.485 while Kohistan-97 was at the bottom.

Key-words: Wheat cultivars, rainfed, wheat quality, protein content, ash, fat, carbohydrates, gluten content

INTRODUCTION

Food is the basic necessity of life and there are different sources of food such as the cereals, vegetables, fruits, milk and its products. All over the world, cereal grains are the cheapest source of energy and protein for human diet. Cereals are the crops belonging to the family Gramineae, grown for their edible starchy seeds. Wheat is the major crop all over the world and in Pakistan as well, where it is planted over 90% of the barani cropped area (Razzaq *et al.,* 1990). Quality is a complex entity and refers to desirability of the product. It includes several physical and chemical aspects. Protein, ash, fat, carbohydrates and gluten contents are the major quality parameters. Protein contents of the commercially grown wheat in Pakistan ranges between 6% to 14%. However, wheat germplasm with more than 18% protein contents has also been reported (Wu *et al*.,1998). The quality attributes are mainly considered to be under genetic control (Anjum *et al*., 1976), however the characteristics regarding grain quality are influenced by the non-genetic factors as well (Finney *et al*, 1987). The chemical composition of wheat grain is affected by factors like cultivars, climate, environment, soil management and Cultural practices (FAO, 1989). Quality characters particularly the protein contents has been reported to exhibit negative correlation with the yield (Burrows and Parwa, 1977).

Carbohydrates are source of energy on oxidation, fat and oil provides more than twice as much energy as the carbohydrates on weight basis (FAO, 1996). There might be strong influence of environment on milling and baking quality characteristics of wheat. The composition and nutritive value of wheat flour vary widely due to inherent factors such as variety and environmental factors like climate, soil and cultural practices (Stewart, 1984). The criteria of wheat quality comprises (1) yield of end product (2) ease of processing (3) chemical composition (4) nature of the end product; uniformity, palatability and appearance. The criteria of quality are dependent upon the variety of wheat grown and environmental conditions prevailing during growing period (climate, soil and, fertilizer treatment). Within the limits of environment, quality is influenced by harvesting, farm drying, transportation and storage (Kent and Evens, 1994). With the implementation of WTO regime it will not be possible to trade any produce without having all details of its quality. Present study was therefore contemplated to compare the quality characters of different cultivars being grown in the country.

MATERIALS AND METHODS

The experiment was conducted, at the research farm, University of Arid Agriculture, Rawalpindi.Twelve wheat cultivars, viz Margala-99, Suleman-96, Chakwal-86, Rawal-87, Bakhtawar, Kohsar-95, Inqalab-91, Chakwal-97, Sariab-92, Wafaq-2001, Kohistan-97 and MH-97 commonly grown in Pakistan were sown in a randomized complete block design with three replications. The seedbed was prepared by applying the recommended practices. The crop was planted in 3 m x 5 m plots with single row hand drill @ 125 kg/ha during rabi 2002-2003. Uniform doses of NPK i.e. 80:40:0 kg/ha were applied to all plots before sowing. At maturity central two rows were harvested. Harvested plants were sun dried for few days. Plants were thrashed manually. Seeds thus collected were analyzed for protein content, crude fiber, fat, ash and carbohydrates as described by AOAC method (AOAC, 1990).

Table 1. Quality traits of different wheat cultivars.

Cultivars	Protein contents (%)	Crude Fiber %	Fat %	Ash %	Total Carbohydrates (%)
Margala-99	14.90 abed	3.70cd	2.5 a	2.84 ab	68.78 cd
Suleman-96	14.87 abed	3.82 be	2.03 ab	2.67 ef	69.49 bed
Chakwal-86	14.58 bed	3.65 de	l.62de	2.72 de	70.42 abc
Rawal-87	14.86 abed	3.33 f	2.1 abed	2.80de	69.68 bed
Bakhtawar	13.99cd	3.69 e	1.73cde	2.83 abc	71.48 a
Kohsar-95	14.92 abed	3.55 e	2.37 ab	2.78 bed	68.54 cd
lnqalab-91	13.88 ab	3.77 bed	2.16abc	2.60 fg	69.54 abed
Chakwal- 97	13.70 d	4.95 abed	1.93 bcde	2.71 de	69.34 bed
Sariab-92	14.76 abed	3.96 a	1.54 e	2.57 g	68.19d
Wafaq -2001	14.85 abed	3.56 e	2.02 abcde	2.73 cde	69.46 bed
Kohistan -97	15.01 abc	3.72 cd	2.15 abc	2.66 efg	68.37 d
MH-97	15.05 a	3.65 de	2.3 ab	2.91 a	71.33ab

Any two means not sharing the similar letter differ significantly at 5% level of probability.

RESULTS AND DISCUSSION

The protein content in different cultivars ranged from 13.70 to 15.05%. The maximum (15.05%) protein contents were observed in MH 97, which was significantly different from Chakwal-97, which gave the minimum (13.70%) protein contents (table-1). Significant Variation among the cultivars for protein contents might be due to genetic make-up and prevailing environmental conditions during the developmental stages of crop. Ijaz *et al*,.(1993) reported significant differences in wheat for protein contents, which was concluded as the effect of genetic character. Significant variations in protein content due to genotype, environment and their interaction in wheat have also been reported by Subda, (1991). The highest (4.95%) crude fiber contents were found in Chakwal-97. The lowest (3.33%) crude fiber contents were observed in Rawal-87 (Table 1). Huebner *et al*. (1995) observed significant variations in fiber contents of wheat, which was concluded to be the effect of genotype and environment. The highest (2.50%) crude fat was observed in Margala-99 which was statistically at par with MH-97, Kohsar-95, Inqalab-91, Kohistan-7, Rawal-87, Suleman-96 and Wafaq-2001. The lowest crude fat (1.54%) was observed in Sariab-92 which was statistically at par with Chakwal-86, Bakhtawar, Suleman-96 and Wafaq-2001. The results of the present study are in line with the earlier findings reported by Ahmed *et al*. (1994) and Butt (1997) for Pakistani wheat. Davis *et al.*, (1981) reported that total fat contents varied significantly among cultivars. The ash contents ranged from 2.57 to 2.91%. The highest 2.91% ash was recorded in MH-97, which was statistically at par with Margala-99 and Bakhtawar but significantly different from rest of the cultivars. The lowest (2.57%) ash contents were observed in Sariab-92, those were statistically at par with Inqalab-91 and Kohistan-97 but significantly different from rest of all the cultivars. Ahmed *et al*., (1994) and Butt *et al*., (1997) observed significant differences for ash contents among different cultivars which was concluded to be the effect of environmental conditions. The maximum (71.48%) total carbohydrates were recorded in Bakhtawar, which was statistically at par with Chakwal

86, Inqalab 91 and MH-97 but significantly different from rest of the cultivars. The lowest (68.19%) carbohydrate was observed in Sariab-92, Aslam *et al*. (1995) reported a positive correlation between genotype and carbohydrate. Singh *et al.* (1989) reported that during all the stages of grain development carbohydrate contents increase and can be negatively disrupted by any adverse environmental conditions.

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