

## Effect of some wheat genotype on quality characteristics of wheat flour

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### ABSTRACT

Quality characteristics of 12 wheat (6 *aestivum* and 6 *durum*) strains /genotypes were carried out in the laboratories of Home Science and Department of Agricultural Biochemistry of Chandra Shekhar Azad University of Agriculture and Technology Kanpur. In order to determine the quality of wheat flour from different genotype of *aestivum* and *durum* were analysed for grain hardness, test weight, phenol colour reaction, protein content, gluten content, sedimentation value and ash content. In grain hardness, *durum* wheat exhibited higher grain hardness than *aestivum* wheat while test weight was observed higher in the latter. In phenol colour reaction, only one genotype of *Triticum aestivum* namely NW-1014 showed desirable colour of dough on keeping. However in *durum* wheat, cultivars IDYN – 71, IDYN – 81, EDUTY – 90 and EDUTY – 76 showed desirable phenol colour reaction indicating better dough keeping quality. From the nutritional point of view *aestivum* genotype showed higher protein, gluten and ash content as compared to *durum* cultivars. Moreover *durum* genotype showed higher sedimentation value than the *aestivum* group. It was concluded from the present studies that among *Triticum aestivum* genotypes PBW-343 appeared superior in most of the quality parameters and in *Triticum durum* group, EDUTY-76 genotype showed superior dough keeping quality.

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**Key words :** *Aestivum* wheat, *Durum* wheat, Genotypes, Quality characteristics

### INTRODUCTION

Wheat quality is a relative concept and is usually judged by its suitability for a particular end use. Wheat suitable for one type of product may be quite unsuitable for another. The quality of wheat depends upon a number of factors. The grower, processor and consumer have different concept of quality characteristics of wheat. The grower considers wheat as of good quality if the plant mature properly, it gives good yield of clean wheat and the harvested grains have good marketing qualities like appearance, colour, high density, test weight etc. The processor looks wheat as of good quality in case big and uniform size of kernel, clean, free from admixture, desirable moisture content, protein content to suit particular end product while consumers require a wheat product having palatability, good appearance, high nutritive value and reasonable price.

*Triticum aestivum* is the most predominant species and grown in most part of the world. It is most suitable for the manufacture of bread. In India it is used for the preparation of Chapati bread and its culinary variations like tundoori non-paratha and puri etc. *Triticum durum* had hard texture and high protein content. It is mostly used for the production of semolina macaroni and pasta products. In certain areas wheat flour is mixed with

certain pulses to make more nutritious, palatable and digestible chapati.

In wheat, albumin, globulin, prolamin and glutelin which constitute the total proteins influence the quality of the product. Keeping this in view, the present study was conducted to identify wheat genotype suitable for the production of good quality flour.

### MATERIALS AND METHODS

Twelve wheat genotype, six each from *Triticum aestivum* (K-9006, K-9466, K-9107 (Deva), K6330, PBW-343, NW-1014) and six from *Triticum durum* (IDYN-71, IDYN – 3, IDYN-81, EDUTY90, EDUTY-76 and EDUTY-1) were obtained from wheat breeder of Economic Botanist, Rabi Cereals, Section of the Department of Genetics and Plant Breeding, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. Quality characteristics of wheat genotype/cultivars were studied for grain and flour quality characteristics. In grain characteristics, 1000 grain weight, phenol colour reaction and grain hardness were determined and in flour, protein, gluten, sedimentation test and ash contents were estimated. 200 seeds of each strains was weighed on a chemical balance and multiplied by five for the assessment of weight. Phenol colour

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reaction was determined by the method described by Abrol *et al.* (1971). Grain hardness was determined by OSK-201 grain hardness tester, type – E Capacity 50 kg. Protein was estimated by biurete method. Gluten content in the flour of wheat was determined by the method described by Austin and Ram (1971). Sedimentation test was done according to the procedure given by Pickney *et al.* (1957). Ash content was estimated in the dried samples of flour by ignition (550°C±2°C) method.

## RESULTS AND DISCUSSION

The results on test weight of grain from different strains of wheat are presented in Table 1. It is observed that *Triticum aestivum* gave significantly higher test weight (39.13 g) as compared to *Triticum durum* (35.05 g). In case of *Triticum aestivum* group, genotype PBW-343 was found significantly higher in test weight (41.50 g). Test weight of grain is not only a yield attributing character but it also influences the market value. Genotypic differences were observed in test weight. The finding is well supported by the result obtained by Sanieel *et al.* (1984). Grain hardness data shown in Table 1 revealed that *Triticum durum* group had significantly higher values than *Triticum aestivum* group. Among

*aestivum* varieties, variety PBW-343 showed significantly higher grain hardness (8.00 kg) and among durum wheat varieties, genotype EDUTY-90 showed more grain hardness. Grain kernel hardness is a characteristic very often used in wheat classification. Hardness is believed to be due to the degree of adhesion between starch and protein (Simmonds *et al.*, 1973).

The observation on phenol colour reaction as influenced in different varieties of *aestivum* and *durum* wheats is presented in Table 1. In *aestivum* wheat, only one genotype namely NW-1014 showed light brown colour of the seeds while rest of the varieties were found unsuitable for dough keeping quality. In *Triticum durum*, wheat, genotype IDYN-71, IDYN-81, EDUTY-90 and EDUTY-76 showed desirable phenol colour reaction for dough keeping quality.

The results of protein content of different varieties of *Triticum aestivum* and *Triticum durum* are presented in Table 1. Mean value of protein content of *Triticum aestivum* (12.53%) was significantly higher than *Triticum durum* (11.77%). In *Triticum aestivum* group, genotype PBW-343 appeared significantly best in protein content (13.11%) but in *Triticum Durum* group variety EDUTY-76 was identified best in protein content (13.63%). The finding of present investigation is in accordance with the

**Table 1 : Quality characteristics of wheat varieties/ strains**

Variety/ Strain	Test weight (g)	Grain hardness (kg)	Phenol colour	Protein content (%)	Gluten content (g)	Sedimentation value (ml)	Ash content (%)
<i>T. aestivum</i> (G1)	39.13	7.06		12.53	11.16	38.13	1.63
<i>T. durum</i> (G2)	35.05	7.87		11.77	10.52	39.53	1.47
S.E. ±	0.57	0.21		0.04	0.042	0.04	0.045
C.D. (P=0.05)	1.17	0.42		0.08	0.085	0.08	0.093
<b><i>T. aestivum</i></b>							
K-9006	39.28	6.33	+++	12.60	11.50	38.47	1.60
K-6330	39.20	6.67	++++	12.53	11.17	37.70	1.43
K-9466	38.60	7.33	+++	12.37	11.17	37.70	1.43
K-9107	36.53	7.00	+++	12.60	11.30	38.13	1.83
PBW-343	41.50	8.00	+++	13.11	11.80	39.27	1.63
NW-1014	39.70	7.00	++	12.00	11.53	37.77	1.70
<b><i>T. durum</i></b>							
IDYN-71	31.32	7.87	+	10.70	9.47	39.03	1.47
IDYN-3	35.23	7.03	+++	9.87	8.70	37.50	1.40
IDYN-81	31.20	8.13	+	13.50	12.17	41.50	1.37
EDUTY-90	37.59	9.00	+	10.40	9.27	38.60	1.37
EDUTY-76	32.53	7.00	+	13.63	12.33	42.23	1.70
EDUTY-1	42.31	8.77	++++	12.50	11.17	40.70	1.50
S.E. ±	1.39	0.50		0.10	0.01	0.10	0.11
C.D. (P=0.05)	2.88	1.04		2.20	2.21	0.21	0.23

++++ =Black

+++ = Brown to dark brown

++ = Light brown

+ = Slight colour on the edge

result obtained by Kerkhi (1983) who reported the variability in protein content in large number of *durum* and *aestivum* cultivars.

About gluten content (Table1) it was observed that *Triticum aestivum* group had higher gluten content than *Triticum durum* group. In *Triticum aestivum* wheat variety PBW – 343 had significantly higher gluten content of 11.80% followed by varieties K-9006, K-9107 and K-9330 having the values 11.5, 11.30 and 11.17 per cent, respectively. In *durum* wheat, variety EDUTY-76 appeared significantly best in gluten content (12.33%). Gluten has unique property of retaining gases and making the leavened products possible. The perusal of results on gluten indicated that the genetical variability was observed in different varieties of *aestivum* and *durum* wheats. Perten *et al.* (1992), Majewska and Formal (1992) and Kaldy *et al.* (1993) also found the variability in gluten content of different wheats varieties.

Data on sedimentation value measured in different varieties/genotypes are shown in Table1. *Triticum durum* group of varieties had significantly higher sedimentation value than *Triticum aestivum* group of varieties. In *Triticum aestivum*, variety PBW-343 showed significantly highest value (39.27 ml). Among *durum* group of varieties, highest sedimentation value 42.23 ml was obtained by variety EDUTY – 76 while lowest value of 37.50 ml was obtained by the variety IDYN – 3. This test is based on the fact that gluten protein absorbs water and swells considerably when treated with lactic acid under certain condition and the amount of water absorbed and consequently extent of swelling depends upon the quality and quantity of gluten. The test therefore, gives an idea of both quantity and quality of gluten which are the principal factors involved in flour strength. Austin and Ram (1971) also reported sedimentation values in different varieties. It is evident from the result that the ash content of *Triticum aestivum* 1.63% was significantly higher than *Triticum durum* 1.47%. In *Triticum aestivum* group, variety K-9107 showed significantly highest ash content of 1.83% followed by NW-1014 (1.70%) and PBW-343 (1.63%). Lowest value of ash content was observed in the variety K- 6330 (1.43%). In *Triticum durum* wheat varieties, variety EDUTY – 76 gave significantly highest ash content of 1.70% and varieties EDUTY – 90 and IDYN-81 appeared lowest in ash content (1.37%). The main sources of minerals for poor as well as average Indian are cereals. Thus in wheat flour, sufficient quantity of these minerals must exist. Kent Jones and Amos (1957) also recorded (1.5-2.0%) ash content in whole wheat meal

(Atta). The endosperm contains minimum (0.3-0.6%) ash while germ and bran contains maximum quantity (4-6%) of ash.

It was concluded that among *Triticum aestivum* group, variety PBW-343 appeared most superior in most of the quality characters and in *Triticum durum* group, variety EDUTY – 76 showed most desirable quality characteristics.

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