International Journal of Plant Sciences (2006) **1** (2) : 361-362

A Review:

Wheat genetics for grain quality traits

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(Accepted : June, 2006)

SUMMARY

Wheat is second most important cereal stable food crop consumed by nearly 35 per cent of world population (Gautam *et al.,* 1998). India produced about 70 million tones of wheat per year or about 12 per cent of world production. India has an ever growing population needing food and also the growing urban middle class with higher standards of living is on the look out for better quality product. The Maida using baking industry is growing at 5 per cent per annum mainly due the increasing urban and peri urban population. The industry need good quality wheat flour in time and at competitive rates. There is a need to increase the grain quality of wheat of wheat so that various high value good quality bakery product could be made (Nagarajan 1998). Today wheat plays an increasing important role in the management of India's food economy. A wide range of food, including various type of, bread, pasta, noodles, biscuits, cake, cookies, chapattis as well as confectioneries and many other are prepared from wheat. Hence information related to genetic control of these characters is useful for increasing breeding efficiency.

Key words: Wheat, Grain quality, Genetics.

QUALITY PARAMETER:

1. Grain hardness.

The variation in grain hardness is the single most important determines end-use quality of wheat. Grain hardness is associated with the milling properties of wheat. Milling time, milling energy requirement, and the level of starch damage produced in the milled flour are all influenced by grain hardness (Pen 1999). The genetic control of grain hardness is still unknown, although grain hardness has been associated with a 15 KD protein to the surface of the starch granule. The actual role of the 15 KD proteins, which is controlled by gene on chromosome 5DS, in determining grain hardness, still to be elucidated (Rahaman *et al.,* 1991). Nelson et al (1995) tagged gene *ha* responsible for kernel hardness using RFLP marker. Morris (2002) reported that the puroindolin protein a and b form the molecular basis of wheat grain hardness or texture. When both puroindolins are in their 'functional' wild stage, grain texture. In the case of durum wheat that lacks puroindolins, the texture is very hard. Puroindolins represent the molecular genetic basis of the hardness locus on chromosome 5DS. The soft (*Ha*) and hard (*ha*) alleles are present in hexaploid bread wheat varieties.

2. Bread making quality:

There are three general types of bread *viz*., leavened, flat and steamed. Bread within these types is made with viscoelestic flour dough's. Each general bread type however differs from one another on specific end product properties, processing condition and grain quality needs. Hard to medium- hard wheat that yields strong flour dough's is more suitable for the mechanized production of leveled bread (Fraidi and Foubion 1995). Those yielding medium to strong dough are suitable for the production of French type and flat type bread (Qarooni 1996). Composition of the grain storage protein, grain protein content increase within a bread wheat variety, it's water absorption capacity and loaf volume also increases. Through the effect of specific high molecular weight glutenin subunits on bread making performance is well characterized, they usually accounted for less then 50 per cent of the inter-cultivar variation in gluten strength. Bred making quality (BMQ) depends not only on the quality but also on the composition of the grain storage protein. Since the composition of the grain storage protein is less affected by the environment than the protein content, it is easier to manipulation in wheat breeding programs. The composition of gliadins and glutenines is particularly important for BMQ because they impart the viscoelesticity to dough's. Gliadins are monomeric protein with intermolecular disulfide bond to and have a relative lower effect on quality than glutenins. The reported association grain quality and present of gliadin alleles was generally explained by the tight genetic linkage between the *Gli-1* locus encoding for gliadin and the *Glu-3* locus encoding for LMr-GS (Pogna *et al.,* 1990). Glutenins, on the other hand have a polymeric structure, determined by the presence of intermolecular disulfide bonds that allow retention of CO_2 and have a major effect on BMQ. D'Ovidio and Anderson (1994) tagged *Glu-D1* gene responsible for BMQ using allele specific PCR marker.

3. Grain weight:

The end quality of wheat is greatly influenced by seed size (Campbell *et al.,* 1999) which can be measured by 1000- kernel weight (TKW). TKW is positively correlated with agronomic yield and flour yield. Dondh *et al.* (2000) found thousand grain weights as very important yield contributing character and hence should be given more emphasis during selection. Gill and Brar (1973) found high genetic coefficient of variability and high estimates of

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