

## Grain mass variation in wheat

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Grain size affects both wheat yield and quality. Small grains may be lost during harvesting or may contribute to the screenings fraction which reduces quality. Some varieties have a high screenings fraction which has caused concern to farmers. Variation in grain size amongst varieties was investigated.

### Methods

Nine varieties used were from a set of 'historical varieties' and ranged from the old variety Purple Straw to Kulin, a modern semi-dwarf variety (1). Main shoot ears were sampled at maturity from an experiment at Merredin in 1988. Each spikelet and floret position was inspected and the occurrence of a grain, and when present, its mass, was recorded.

### Results and discussion

The greatest range in grain mass was in Kulin which varied from 5 to 60 mg compared to Purple Straw which ranged from 4 to 40 mg. The standard deviation in mass per grain varied from 5.5 to 10.1. The frequency of grains in each mass class did not follow a normal distribution. The biggest grains were in the middle of the ear and mass declined to about 40% of the biggest towards the base and tip. Within a spikelet, grain 2 was usually the heaviest ( $2 > 1 > 3 > 4 > 5$ ). Florets 1 and 2 in the mid part of the ear always bore a grain but the frequency of occurrence fell in the basal and distal spikelets and in the distal florets.

Variation in mass is related to ear ontogeny. At terminal spikelet stage the biggest spikelets with most floret primordia are found in the mid part of the ear. From that stage the relative growth rate was similar in all spikelets so that mass proportions were maintained to maturity. Floret survival was determined by the relation of stem to ear growth (1).

Thus there are distinct sub-populations of grains within the ear, with similar variances but with different means and contributing varying proportions of grains to the total number. A major source of variation is floret position and there was a strong correlation between number of grains per spikelet and the variance of grain mass ( $r^2=0.84$ ). In 3 years of experiments there were varietal differences in the stability of mean grain mass, which was more variable than number of grains per spikelet.

The size aspect of grain quality may be improved by increasing grain mean grain mass, improving stability or reducing the variation of grain mass. Because the latter two characters are apparently related to spikelet fertility, they may be inversely correlated with yield.

1. Siddique, K.H.M., Kirby, E.J.M. and Perry, M.W. (1989) Field Crops Research, 21 (in press).