

## Selection for, and characteristics of, wheat with determinate tillering

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The ideotype concept proposed by Donald (1), a futuristic goal for wheat breeders, includes amongst its features the characteristic of producing but a single culm. At that time (1968), appropriate germplasm was available in barley, but not wheat. Subsequently, Atsmon and Jacobs (2) reported the selection of uni-culm wheat exhibiting "gigas" features. Such wheats proved to be thermoperiodic sensitive, with progeny phenotypes developing as stunted dwarfs, uni-culms, or as plants with 2-5 tillers (oligoculms), depending on temperature and photoperiodic conditions.

In 1978 seed of a uni-culm line (Hazera 492), introduced from Israel, was planted in the field at Perth and each of the three possible phenotypes were observed. Following two generations of pedigree selection two main types have emerged:

**Type 1** - Selections which continue to segregate for the uni-culm habit and lethal dwarfism.

**Type 2** - Selections which develop a limited number of fertile tillers under spaced planting.

Both types exhibit "gigas" characteristics. The essential features of Type 2 selections planted as spaced single plants in 1981 are shown below, together with equivalent data from control plantings of Gamenya -

	<u>Tillers/plant</u>	<u>Spikelets/ear</u>	<u>Grain/Spikelet</u>	<u>100 kernel wt.</u>
Type 2	4.30 (1.38)	21.60 (0.89)	5.48 (0.55)	53.66 (4.37)
Gamenya	12.32 (1.30)	18.31 (0.95)	2.31 (0.29)	41.05 (2.22)

Under similar conditions varieties such as Olympic, Egret and Condor develop more than 20 tillers. Relative to Olympic, the restricted tillering of Gamenya is also characteristic of other commercial wheats adapted to the lower rainfall areas of Western Australia (such as Madden, Halbard, Falcon). Under sward conditions such varieties seldom develop more than 2 tillers/ plant, each tiller bearing a well-developed ear. The type 2 selections represent an even more extreme expression of determinate tillering, but with the added advantage of greater spikelet and floret development and higher 1000-kernel weight.

Variations in tiller development are readily observed in space plantings. Selection for restricted or unrestricted tiller number in crosses between Olympic x Gamenya, Olympic x Falcon, Olympic x Pitic have indicated an adaptive advantage in favour of the restricted developers.

Genetic studies with both Type 1 and Type 2 selections are now under way.

1. Donald C.M. 1968. Euphytica 17:385-403.
2. Atsmon D. and Jacobs E. 1977. Crop Sci. 17:31-35.