The optimum crop develoment pattern for South-West Victoria

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There is increasing interest in crop production in the predominantly pastoral area of south-west Victoria, a region characterised by a longer growing season with higher rainfall than the traditional wheat belt. Information was needed therefore to determine if the aims of the current breeding programmes adequately meet the climatic constraints of this region.

Methods

The climate of the region was analysed at four sites representing extremes of high rainfall, low frost incidence (Warrnambool and Colac) and low rainfall, high frost incidence (Ballarat and Hamilton). It was assumed that the optimum crop developmental pattern would maximise the length of the growing period without incurring substantial risk of loss from either frost or drought damage. Crop growth and water use were simulated by a model based on empirical relationships between dry matter production and pan evaporation, and potential evapotranspiration, crop growth stage and pan evaporation (1).

Results and Discussion

Effective rainfall (rain >I pan evaporation) could be expected at all sites with a probability of at least 80% by mid-April, rising to 100% in mid-May, and it was therefore concluded that mid-April was a reasonable time to commence sowing. This compares the current farmer practice of sowing in early June.

The risk of frost was significant at Ballarat and Hamilton until the end of October and flowering of cereal crops should not occur before this time. Risk of drought stress in spring was low given flowering in early November, and it was concluded that the optimum crop development pattern in this region would cause flowering to occur in early November given sowing in mid-April. This prediction was tested at Hamilton in 1983 by comparing the performance of Isis, a long season winter type, and Condor, a cultivar typical of those currently available, when sown in mid-April and mid-May. Dry matter production by anthesis was greater with earlier sowing, and in the case of the longer season type, Isis (Table 1). Crain yields did not, however, follow the pattern of dry matter production by anthesis. There was no significant effect of sowing time, however, Isis consistently outyielded Condor. Post-anthesis growth was much greater for the mid-May sowing, and the data suggests some factor may have limited grain set in the early sown crops. Current work is investigating this in detail.

Table 1

Cultivar	Sowing date	Days to anthesis	Dry matter at anthesis	Grain yield (t/ha)	Harvest index
Isis	18 iv	190	11.3	3.9	25.4
Condor	18 iv	161	7.1	1.7	19.6
Isis	13 v	172	8.0	3.6	24.7
Condor	13 v	144	3.9	2.2	30.4
Significance	Cultivar		1%	1%	1%
	Sowing date		1%	ns	1%
	cv. x sowing date		ns	ns	1%
LSD (1%)	Cultivar	2.6	2.6	1.1	8.9
	Sowing date		2.6	-	8.9
	cv. x sowing date		-	-	12.6

1. Gardner, W. G., Velthuis, R. G. and Amor, R. L. 1983. J. Aust. Inst. Agric. Sci. 50, 60-70.