Effect of sowing date upon yield. growth and development of weak- and strongly vernalizing wheat cultivars.

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In southern Australia correct matching of cultivar and sowing date (SD) is necessary for flowering to occur early enough to allow a long grain-filling period before the high evaporative demand and consequent soil water deficits of early summer, but late enough to avoid damage due to frosts in late winter(1). Balanced against this, is the need, also, for a vegetative growing period long enough to achieve maximum yield potential. Attempts to achieve this with early sowings of "spring" cultivars are likely to fail due to early flowering. The utilization of more strongly vernalizing, "winter" wheat cultivars may help to overcome this problem. This paper describes an experimental investigation of this proposition.

Methods

One strongly vernalizing and one weakly vernalizing wheat cultivar - quarrion (q) and banks (b) respectively - were sown on four dates (Table 1) between May and September on a duplex soil (Dr2.52) at Werribee, Victoria, in both 1984 and 1985. Measurements were made of crop development, dry-matter accumulation, yield, changes in soil water content and the meteorological conditions.

Results

Table 1. Final grain yield (t ha^{-1}) STE, ETFI, FITA and ATM (days) of QUARRION and BANKS for four sowing dates during 1984 and 1985. (For abbreviations, see text below)

1984			1985		
SD:	QUARRION	BANKS	SD:	QUARRION	BANKS
131	4.67 (12,78,72,49)	3.61 (10,48,94,55)	140	3.94 (14,81,60,45)	3.33 (11,61,76,50)
172	4.61 (18,65,50,45)	4.85 (17,46,65,45)	176	3.77 (14,67,49,41)	4.06 (11,55,56,44)
199	3.54 (16,54,41,43)	3.76 (14,33,56,46)	208	3.02 (15,50,37,39)	3.16 (13,34,49,41)
245	1.75 (13,68,36,38)	2.26 (11,25,34,45)	241	2.90 (12,59,28,39)	2.94 (11,26,34,39)

The period from sowing to emergence (STE) differed for Q and B for each time of sowing and the corresponding difference in thermal time was between 10 and 15% (Table 1). This is attributed to an inherent low developmental rate of Q during emergence. The period from emergence to floral intitation (ETFI) differed markedly between the two cultivars, due to the interaction of thermal, photoperiodic and vernalization sensitivity. The photothermal and thermal sums for the periods from floral initiation to anthesis f:ITA) and anthesis to maturity (ATM), respectively, displayed a similar trend in both the cultivars.

The patterns of growth of each sowing were adequately described by a logistic function (2). Early sown crops remained vegetative for a longer period than late sown crops, more so in Q than in B. Low temperatures (T) and levels of radiation (R) resulted in low dry-matter production of both Q and B during May and June. However, since early sowings were already established, they could immediately respond to the subsequent increase in T and R, progressing to higher levels of standing biomass. This difference was greater in Q than in B. Highest grain yields were produced by sowing Q in May and B in June. Adoption of cultivars with a "winter" growth habit for early sowings may be advantageous providing there is an adequate supply of soil moisture.

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