The use of early maturity to increase barley yields on light soils in low rainfall areas

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Balancing the risks of frost at anthesis and drought post-anthesis often determines the optimum flowering date for cereals (1). However, in short season environments (e.g. Sept. Evap. 150mm; Sept. Rainfall 25mm) yields may be improved by earlier flowering. This project examines this hypothesis in an environment of low frost risk at anthesis.

Methods

Early flowering (E) and recommended (R) barley varieties were compared in several trials involving many factors. Only the main effect of variety (flowering date) is reported here. Barley was used as a model system as this species is less susceptible to post-anthesis leaf diseases than wheat, and a wider range of adapted, early flowering genotypes is available for barley. Early varieties flowered some 10 days before the recommended varieties.

Results and Discussion

The mean yields of the varieties in the different trials are given in Table 1.

Table 1: Mean yield of barley varieties (t/ha.)

Site	ECRS	ECRS	ECRS	ECRS	ECRS	ECRS	NMRS
Year	'83	'84	'85	'86	'86	'86	'86
Clipper (R)	1.36						
Ketch (E)	1.34	.99	2.13	1.75		1.51	2.18
Stirling (R)		.99	1.53	1.75	1.60	1.63	2.24
IB 286 (E)					2.01	1.81	2.60

On average the early flowering lines yielded better (1.81 t/ha.) than the recommended lines (1.58 t/ha.) and were never significantly lower yielding. Similar results have been obtained with wheat and lupins. Grain filling of the earlier genotypes usually occurs under more favourable moisture and temperature conditions. A major requirement for high yields is to ensure high biomass at anthesis. This has been achieved by reducing limitations to early growth particularly by planting early, reducing soil compaction (Table 2) and by following lupins in rotation.

Table 2: Biological yield at anthesis (t/ha.)

	Planting Date					
	21-5-86		9-6-86		1-7-86	
	+Rip	-Rip	+Rip	-Rip	+Rip	-Rip
Stirling (R)	6.39	5.22	3.84	4.16	3.52	2.52
IB 286 (E)	7.97	4.10	5.63	3.74	4.23	3.70

There are considerable yield benefits from earlier flowering genotypes in low rainfall areas, provided that frost at anthesis is not a major problem and high biological yields can be maintained. These advantages will still apply in frost-prone areas, only the use of early varieties will be more risky. Early varieties will be preferable for late sowings in all low rainfall areas. Plant breeders should continue their search for frost tolerance and resistance to late-season leaf diseases (e.g. Septoria in wheat) confident that if such types can be identified, average yield and yield stability will be improved in low rainfall areas.

40. Fisher, R.A. 1979. J. Aust. Inst. Agric. Sci. 45, 83-94.