The apetalous flower character in rapeseed and its interaction with irrigation

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A line of rapeseed (Brassica napus) bearing apetalous flowers, i.e. without the normal yellow petals, has been shown to give a better distribution of solar radiation over leaves and pods and hence greater seed number and weight (1). An experiment to compare the productivity of this line with that of a standard and related cultivar, Marnoo, was conducted at Cambridge, Tasmania, in 1986. Irrigation treatments were also imposed as rapeseed has been shown to respond to supplemental irrigation during the post-flowering stage when drought induced seed abortion is most likely (2).

Methods

Marnoo (C1) and Apetalous (C2) were sown on 10 June 1986 in plots 10 m x 1.36 m and subjected to either no irrigation (10), one irrigation at flowering (I1) or three irrigations at and after flowering (12). Irrigations were of 50 mm each, applied by agrodrip tubing. Soil moisture use was monitored with a neutron probe. Yield and its components were estimated from two 0.5 m^2 samples taken from each plot.

Table 1: Top dry weight, seed yield and its components.

Treatments	Top dry wt. (g/m^2)	Seed yield (t/ha)	Number of pods/m^2 Product-ive	Unprod-uctive	Seeds per pod	Mean seed wt (mg)	Harvest index
C1I0	1131	3.4	7467	2724	14	3.47	.30
C1I1	1278	3.7	8551	2424	17	3.42	.29
C1I2	1373	4.0	7698	2520	19	3.75	.29
C2I0	1302	5.0	7337	2239	19	3.70	.39
C2I0	1233	5.2	7395	2283	19	3.87	.42
C2I2	1349	5.6	7538	2877	22	4.14	.42
LSD (lines)	210	0.63	898	1768	2.6	0.399	.04

Results and discussion

Adequate rainfall totalling 240 mm up to the flowering stage resulted in similar top dry weights and numbers of pods in all treatments. Dry conditions from late October caused seed abortion in unirrigated Marnoo, but had little effect on Apetalous. Increasing irrigation improved seed retention in Marnoo and may have increased seed size. In Apetalous, more and heavier seeds were retained per pod even without irrigation and only the full treatment further boosted numbers. Seed yields and harvest indices were therefore very high in the apetalous line and demonstrate its commercial potential. The numbers of established plants were lower in Apetalous (90 compared to 115/m^2 for Marnoo) and the less dense canopy may have enhanced the effect of the apetalous character in distribution of radiation. Experiments are planned for 1987 to compare the apetalous character in near isogenic lines under uniform plant populations.

1. Rao, M.S.S. and Mendham, N.J. 1985. Proc. of the Australian Rapeseed Agronomists and Breeders, Fifth Res. Workshop, Uni. of W.A. 126-130.

2. Mendham, N.J., Russell, J. and Buzza, G.C. 1984. J. Agric. Sci. Camb. 103 303-316.