1975

1975 Drought responses of wheat cultivars - environment responses of subterranean clover.

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EXPERIMENTAL SUMMARY - FEBRUARY 1976

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1. Drought Responses of Wheat Cultivars.

2. Environment Responses of Subterranean Clover.

1. DROUGHT RESPONSES OF WHEAT CULTIVARS

Aim

The trials were aimed at identifying any drought tolerance differences between Insignia and Gamenya. Darkan and Gambee were included for contrast.

(a) Controlled Temperature glasshouse trials

Method

Two identical trials were carried out in 1974 and 1975 in which four wheat cultivars were grown in 2 gal. buckets of salmon gum soil from Merredin Research Station. Three levels of watering were used in a randomised block design of five replications. The control treatment (T_1) was maintained at field capacity throughout, while (T_2) and (T_3) received 50% and 25% of the water given to (T_1). The latter treatments were applied just before anthesis.

Results

Yields (g/pot)

	1975			1974		
	T1	T2	T3	T1	T2	T3
Darkan	19.07	14.45	11.60	14.47	11.06	7.73
Gamenya	16.65	13.68	9.60	12.86	10.30	6.82
Insignia	16.74	15.79	12.15	12.61	11.79	8.35
Gambee	14.78	11.82	9.49	11.87	9.54	6.81

LSD not available 5% LSD 1.035

Drought response

	1975		1974	
	T_2/T_1	T_3/T_1	T_2/T_1	T_3/T_1
Darkan	0.761	0.614	0.764	0.533
Gamenya	0.828	0.580	0.866	0.611
Insignia	0.945	0.738	0.935	0.662
Gambee	0.803	0.652	0.794	0.563
5% LSD	0.087	0.066	0.084	0.061

Conclusion

In terms of absolute yields Darkan gave the highest yield per pot under the control treatment for both years. Insignia gave the highest yield under the water stress treatments T_2 and T_3 in both years. It was not significantly better than Darkan in 1974.

The table of drought response shows Insignia to be more drought tolerant in both years except for Gamenya in 1974. The difference in results for both years may be associated with stress being applied about one week earlier in 1975. These results should also be viewed in conjunction with those from the field trial.

(b) Irrigation trial at Merredin Research Station

Method

A field trial was set up in 1975 consisting of the same four cultivars sown in 12 row drill runs on flat Salmon Gum soil. Randomised split plots were used in which one end of the plot was trickle irrigated over 6 rows, the outer rows being guards. Three of the irrigated rows were used for sampling and three inner rows were hand harvested over 8 metres. Two planting times were used, a normal and one month later. A dry period at the end of September occurred just as the normal planting was earing. This resulted in a higher yield for the late planted treatment.

A similar trial using only a late planting was done with only 2 replications in 1974 but an irrigation accident virtually ruined it. From the salvaged data of that year no varietal differences were obtained.

Results

1975 Field Experiment

Yields g/24m row

	Normal planting		Late planting	
	N	D	N	D
Darkan	1089.1	311.7	1303.3	527.0
Gamenya	1008.7	501.5	1336.4	548.6
Insignia	1158.1	370.6	1306.8	530.9
Gambee	965.9	434.3	1137.4	529.3
5% LSD	NS	NS	137.7	NS

All cultivars	Yield kg/ha	Response	Grains per head	Response
Normal planted irrigated	2438.0		24.3	
" " unirrigated	934.5	0.38	13.7	0.56
Late " irrigated	2936.0		26.5	
" " unirrigated	1233.3	0.42	19.5	0.74

Conclusion

Analysis of variance of varietal responses failed to show any significant differences between cultivars in drought response. Although yields differed between planting times little difference can be seen in overall drought response.

Grain densities (kg/hl) were measured and suggested a tendency for Insignia to lower its density rather than to maintain it as has been suggested.

Proportions of grain passing through a 2 mm sieve were also determined. Under dry conditions Insignia gave a higher proportion of small grain (12.6% in late planting). In terms of average kernel weight Insignia was the smallest grain under drought but not under irrigation. It also showed a greater reduction in average kernel weight than Darkan or Gambee when early planted but only greater than Gambee when late planted.

Grain number per head was reduced by drought, but to a greater extent in the early planting. This was associated with a long dry period before anthesis of the early planting. About 39 mm of rain fell in the week prior to anthesis of the late planting.

The difference in results between the field and glasshouse trials may lie in the fact that isolated pots of Insignia in the glasshouse were able to tiller more freely than in the field crop situation.

2. ENVIRONMENT RESPONSES OF SUBTERRANEAN CLOVER

Aim

To clarify the responses of four cultivars to temperature, vernalisation and photoperiod.

Method

Dinninup, Midland B, Geraldton and Blackwood sub clover was grown in phytotron cabinets under 14 hour and 10 hour photoperiods and temperatures 10°C day/5°C night, 15/10°C, 20/15°C, 25/20°C. A seed vernalisation treatment of 6 weeks refrigeration of swelled seed was included. Dissections were made to observe first floral initiation and first flower production was noted.

Results

Some checking of the higher temperature data obtained for Midland B and Geraldton is to be completed before detailed figures can be given.

Geraldton

Photoperiod response was the dominant effect with a strong delaying effect of short days and high temperatures. A moderate to strong vernalisation effect was seen.

Midland B

Similar to Geraldton with variable but often stronger delaying effect of high temperature.

Dinninup

Less response to temperature, photoperiod and vernalisation.

Blackwood

Similar vernalisation but little temperature or photoperiod response.

Conclusions

Higher temperatures either had no effect or delayed floral initiation, but accelerated flower development greatly from initiation to anthesis.

Photoperiod and vernalisation responses were in floral initiation with little evidence of subsequent effects.