

AGRONOMIC FACTORS AFFECTING PROTEIN CONTENT OF IRRIGATED SOYBEANS IN NORTHERN VICTORIA

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The protein content of irrigated soybeans in northern Victoria has recently been shown to be variable and often below standards required by industry, but the causes are to date not known. In 1994/95 experiments were conducted at Kyabram and Numurkah to investigate agronomic factors affecting protein content of irrigated soybeans.

MATERIALS AND METHODS

The trials were conducted on laser-graded sites of red-brown earth soil (slope 0.13%), irrigated at maximum cumulative evaporation of 65 mm. Inoculated seed was planted in mid November with 35 kg P/ha and 2.0 L/ha of trifluralin was applied pre-planting. Experiment 1 (Kyabram): A randomised block design with 4 replicates, compared 6 rates of N fertiliser from 0 to 250 kg/ha on cv. Stevens, at a seeding rate of 350,000/ha. Experiment 2 (Numurkah): A split plot design with 3 replicates comparing 3 irrigation methods (flood, furrow and continuous trickle), 2 plant populations (20/m², 40/m²) and 2 row spacings (15 cm, 75 cm), cv. Lorna. Seed protein content was measured using the Kjeldahl method.

RESULTS AND DISCUSSION

Table 1. Experiment 1 (Kyabram): Protein content and seed yield for flood irrigated soybean with 6 rates of N fertiliser.

Treatment	Timing	Protein (% DM)	Yield (kg/ha)
N (kg/ha)			
0	-	41.45	3525
50 (1 x 50)*	Early pod fill	41.28	3828
50 (1 x 50)	Mid pod fill	42.40	3621
100 (2 x 50)	Early & mid pod fill	41.57	3847
200 (4 x 50)	To mid pod fill	41.15	3923
250 (5 x 50)	Alternate irrigations	42.43	3652
		I.s.d.(P=0.05)nsd c.v. 1.8	I.s.d(P=0.05)nsd c.v. 8.9

* The numbers in brackets refer to the number of applications and rate of each application.

Nitrogen fertiliser had no significant effect on protein content at Kyabram (Table 1). Similarly there was no significant difference between treatments in seed yield. This indicates that nodules alone were able to

maintain both protein content and seed yield at this site where the previous crop had been inoculated soybean.

The second experiment at Numurkah showed no effect of plant population on protein content. Flood irrigation produced a higher mean protein content (39.0%) than furrow irrigation (35.4%), but a lower mean yield (flood 3804 kg/ha, furrow 4445 kg/ha), but these could not be separated statistically due to the limitations of the split plot design. At Numurkah, where soybeans had not been grown previously, mean protein content (39.0%) under flood irrigation was somewhat lower than at Kyabram (41.7%) indicating a possible benefit of higher rhizobia populations in soils with a soybean history.

These results indicate that the general practice of flood irrigation in northern Victoria does not cause low seed protein on well-watered, well-drained sites. Instead nodule number and vigour are important in achieving high seed protein.