

Late senescence oil losses in soybeans

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A net loss of oil (10% of maximum content) occurred during the final week of plant senescence in seed from the upper canopy of the soybean cultivar Lee grown at Camden, NSW (1). This paper reports on a subsequent field experiment carried out to determine whether oil was lost from the whole of the seed fraction and whether oil losses occurred in other cultivars and at different sites.

Methods

Pods were collected from a range of commercial cultivars grown at different sites in NSW (Table 1). At mid-senescence and at maturity, all pods from individual plants were removed and stored at -20°C. After thawing, the pods were shelled, the seed dried (75°C for 24 hrs) and analysed for oil using wide-line NMR spectroscopy.

Results and Discussion

Oil losses during late senescence occurred from the whole seed fraction of a range of commercial cultivars grown at different sites in NSW in 1979-80 (Table 1). The losses were similar in magnitude to the oil loss reported in seed of cv. Lee at Camden in 1977-78. Apart from the crop of Bragg at Tamworth, where severe moisture stress was encountered during late podfilling, the only cultivar not to lose oil was cv. Ruse, the earliest maturing cultivar in the study.

Table 1. Oil levels in soybean seed during plant senescence.

Location	Cultivar	Oil content per seed (mg)		
		mid-senescence	maturity	% change #
Camden	Lee	40.9	37.3	- 8.8**
	Forrest	38.9	33.9	-12.8***
	Dodds	41.6	37.5	- 9.8***
Darlington (Sydney)	Ruse	40.3	38.7	- 4.0 NS
	Bragg	53.5	46.5	-13.1**
Trangie	Lee	35.3	31.8	- 9.9*
Tamworth	Bragg	28.3	27.9	- 1.4 NS
Grafton	Bragg	35.8	31.8	-11.2**

Changes in content are expressed as % of the content at mid-senescence.

*, ** and *** indicate that means differed significantly at 5, 1 and 0.1% level.

Additional data suggest that neither seed respiration nor additional protein synthesis were responsible for the oil loss. However, respiratory losses, together with carbon requirements for the synthesis of phytate, cytoplasmic osmotica and additional protein could account for the carbon lost from the oil fraction.

The economic consequences of less oil being present in the seed are significant. The loss of more than 1/8 of the total oil produced by the crop of Forrest at Camden (Table 1) resulted in an equivalent loss of almost \$40 ha⁻¹ in crop value after crushing (based on a crop yield of 2500 kg ha⁻¹). The potential losses will affect the oil seed crusher, as payment to growers is based solely on crop weight.

1. Sale, P.W.G. and Campbell, L.C. 1980. Field Crops. Res. 3:147-155.