

CULTIVAR AND GROWTH STAGE EFFECTS ON THE NUTRITIVE VALUE OF SOYBEAN HAY

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High quality lucerne hay is difficult to produce in sub-tropical Australia due to high summer rainfall and acidic soils. Soybeans are well adapted and offer potential for hay made in spring before onset of the wet season. The requirement is for a cultivar that optimises yield and quality within three months from an early spring sowing and integrates into a rotation of soybean and maize. The feeding value of soybean hay exceeds that of lucerne (Ahlgren 1956). Peak hay yield occurs for soybean during the latter stages of seed maturation (Munoz et al. 1983), but quality declines with maturity (Gupta et al. 1973) and leaf and seed loss increase with cutting and curing after mid pod-fill.

Four cultivars (Williams, Valder, Forrest, Bossier) were sown at Grafton (29°37'S 152°58'E) on September 17, 1985 and harvested at each of three growth stages; R4 (early pod), R5 (early seed development) and R6 (full size green bean). Conventional analytical methods were used for determination of minerals, neutral detergent fibre (NDF), acid detergent fibre (ADF), lignin and in vitro digestibility (IVD). Results are presented for the earliest and latest maturing cultivars.

Table 1 - Yield and quality of two soybean cultivars at three growth stages

Cultivar	Stage	Yield (kg/ha)		Quality attributes (% DM)					
		DM	N	NDF	ADF	Lignin	IVD	N	P
Williams	R4	2225	75	38.5	29.7	6.25	67.8	3.38	0.20
	R5	2752	99	39.9	30.6	5.25	67.3	3.59	0.19
	R6	4356	159	39.5	28.1	5.57	67.1	3.66	0.16
Bossier	R4	5255	111	49.4	38.8	8.06	63.0	2.12	0.17
	R5	6099	146	52.1	39.1	8.48	56.3	2.39	0.16
	R6	9631	233	50.5	35.3	5.81	59.8	2.42	0.18

Dry matter and nitrogen yields were some 120% and 50% higher, respectively, for Bossier than Williams, reflecting the longer growing season for Bossier (90 vs 62 days to R5). Averaged across cultivars, nitrogen concentration increased from R4 to R6, corresponding to an increase of 1.3 percent crude protein. Furthermore, nitrogen yield doubled from R4 to R6 for each cultivar, without significant decline in hay quality. Digestibility was largely unaffected by advancing maturity and changes in structural constituents were small and inconsistent. These results agree with earlier work that the decline in quality of leaf, stem and pod-shell from flowering to maturity (Gupta et al. 1973) is offset by an increasing contribution from the higher quality seed component (Munoz et al. 1983). The data confirm soybean hay as a high quality forage due to low levels of structural constituents, high nitrogen and adequate phosphorus. Bossier best satisfied the defined yield, quality and timing requirements. New work seeks to find cultivars similar to Bossier in maturity, with superior yield and quality.

REFERENCES

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