FIELD APPLICATION OF *VULPIA* PHYTOTOXICITY MANAGEMENT: A CASE STUDY

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Vulpia residues possess strong allelopathic potential on crop and pasture species. Laboratory studies have shown that the allelopathic effect of vulpia residues depends upon the ratio of residue:soil, with the impact decreasing as the ratio declined. After incorporation of residues into the soil, vulpia toxicity declined as decomposition proceeded (1). These findings were applied to a pasture establishment situation at Mangoplah in southern NSW where previous attempts at establishing pastures in a vulpia infested paddock had been unsuccessful. In August 1991 the farmer had applied *knockdown* herbicide SpraySeed? to the sward and direct drilled pasture seed into the soil following *brown-out*. Subsequent regeneration of vulpia effectively caused the sowing to fail. In 1992, knockdown herbicide was again used, but the area was then cultivated with a scarifier twice thus mixing the vulpia residues with surface soil layers. Sowing was delayed for three weeks. This paper reports on the effects of incorporation of residues and delaying sowing time on pasture establishment.

METHODS

Samples consisting of aboveground plant material and the top 5 cm soil were taken at random from the paddock in December 1991, 1992 and 1993 using 50x50 cm2 quadrats. The vulpia component was separated, dried, and weighed to estimate vulpia field biomass. Ten grams of the soil were used for the phytotoxicity test. The bioassay procedure was as described previously (1).

RESULTS AND DISCUSSION

In 1991, vulpia produced 1.57 t/ha dry matter, while the soil from beneath the dry matter caused inhibition of root growth of the test species by 76% (Table 1). A similar level of suppression on wheat yield caused by 1.5t/ha vulpia residues has been reported earlier (2). Incorporation of residues into the soil significantly reduced their phytotoxic effects. Reducing the ratio to 1:10 of residues to soil significantly alleviated the inhibition to wheat roots from 72% to 18% (1). Assuming the bulk density of the soil to be 1.33 g/cm3, and the cultivation depth to be 10 cm, then the ratio of vulpia to soil would be of the order of 1:830, a ratio far lower than that expected for inhibition to occur. The three weeks decomposition before sowing was long enough to avoid the peak phytotoxicity development of decomposed residues (1). Successful pasture establishment was achieved, the vulpia population being reduced to a low level. A productive sward has been in place for three years. Direct drilling into vulpia pastures would appear to be a poor option since decomposition needs to occur to allow allelochemicals leached out of residues to breakdown.

Table 1. Yearly vulpia biomass and associated soil phytotoxicity on wheat.

Year	Biomass dry matter	Phytotoxicity (% control)	
	(t/ha)	Root	Coleoptile
1991	1.57	76 b	77 b
1992	0.09	128 a	106 a

1993	0.10	111 a	99 a

* Means identified by the same letter are not significantly different at the 5% level.

REFERENCES

1. An, M. 1995. Ph.D thesis, Charles Sturt University, Wagga Wagga, NSW.

2. Pratley, J.E. 1989. Proc. 5th Aust. Agronomy Conf., Perth, WA. p. 472.