Effect of dairy effluent on turnip yields

J.L. Jacobs, G.N. Ward and F.R. McKenzie
Department of Primary Industries, 78 Henna Street, Warrnambool, Vic 3280, Australia, Email: joe.jacobs@dpi.vic.gov.au

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Introduction Dairy effluent is a significant point source in the pollution of waterways. Only 50% of dairy farms in the dryland regions of Victoria, Australia, have suitable dairy effluent systems of which only 25% are managed effectively (IRIS Research 2000). Despite many farmers viewing effluent as an undesirable waste, it contains relatively large amounts of agronomically valuable nutrients especially nitrogen (N) and potassium (K). Results are reported from the first two years of a three year study comparing turnip leaf and root dry matter (DM) responses to a range of dairy effluent rates.

Materials and methods This study was conducted on a commercial dairy farm (38°14'S, 142°55'E) in western Victoria on a Mottled-Sodic, Eutrophic, Brown Chromosol (Isbell 1996) soil. In both years (2002, 2003) following silage harvesting, the experimental area was grazed and ploughed. Within a week, the area was power harrowed and sown to turnips (*Brassica rapa* cv Barkant) at a rate of 2 kg/ha. From 6–8 weeks after sowing, effluent was applied at 15 mm/ha/d, providing six treatment levels of 0, 15, 30, 45, 60 and 75 mm to random plots (12 m x 12 m) replicated six times in a randomised block design. DM yield was estimated 14 weeks after sowing, (6 quadrats [1.0 m^2]/plot were weighed individually and sub sampled for DM determination). An analysis of variance (ANOVA) (GenStat Committee 2000) with significance declared if $P<0.05$ was conducted.

Results Dairy effluent composition (Table 1) shows that whilst total N content remained relatively constant, the proportion as ammonia-N altered markedly with 89% being in this form in year 1 and 62% in year 2. Other nutrients, (P, Na, K) increased in year 2. In Year 1, effluent at 45 mm and higher increased ($P<0.05$) turnip leaf DM yield compared to the control, whilst at 60 mm and above it also increased ($P<0.05$) leaf DM yield compared to 15 and 30 mm (Figure 1). At 30 mm or higher there was an increase ($P<0.05$) in root DM yield compared to the control. In year 2, effluent increased ($P<0.05$) leaf and root DM yields compared to the control.

Table 1 Effluent composition

	Year 1		Year 2	
	Mean	s.d	Mean	s.d
pH	8.0	0.0	8.1	0.16
P (mg/l)	23.3	1.	34.3	3.14
N (mg/l)	155	10.	157	5.16
NH_3-N (mg N/l)	137.5	5.	97.8	11.57
Na (mg/l)	507.5	17.	581.7	40.21
K (mg/l)	445	12.	480	42.4

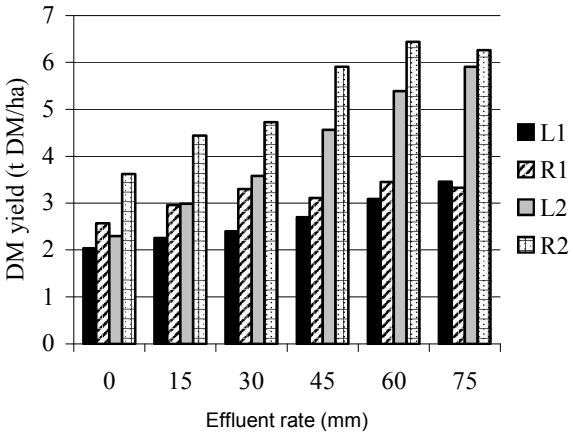

Figure 1 Effect of dairy effluent on turnip leaf (L)and root (R) DM yields (t DM/ha) in year 1 and 2

Conclusions Results indicate that application of dairy effluent can have a marked effect on turnip leaf and root DM yields. Responses in year 2 are likely to have been higher due to extensive damage caused by cabbage moth (*Plutella xylostella* (L.) in year 1. This work will continue for a further year.

References

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