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Investigating poor pasture productivity.

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TITLE: Investigating Poor Pasture Productivity

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Objectives: To determine the reason for poor pasture productivity in medium rainfall zone. Specifically why the pastures are dominated by the poorly productive species Trifolium suffocatum and why there was a large response to phosphorous fertilizer at 50 ppm P in the soil.

Background: A multi factor trial in 1989 showed that the main factors affecting pasture production were phosphorous level and insect control. Dominance of T. suffocatum resulted from high grazing pastures at the beginning of the season causing selection in favour of the minute T. suffocatum seedlings. A high response to phosphate fertilizer with a background soil test of 50 ppm P was a worry. The 1990 trial was designed to see if trace elements and sulphur were important in the fertilizer response (though there was no evidence for such response in 1989).

Soil Type: Very gravelly loam, Jarrah, Marri and powder bark Wandoo.

Trial Design: Five rates of phosphorus as TSP plus two treatments with additional sulphur (40 kg) were crossed with a trace element treatment (Cu, Zn and Mo) and Nemacur and Lemat treatments.

Timing: 6/4/90 fertilizer treatments were top-dressed onto pasture with a small proportion of surviving seedlings from an early germination Nemacur (40 kg/ha) applied on 20/4/90. Lemat (7 mL/plot) applied on 20/4, 3/5, 15/5 and 31/5. One half of each plot was mowed on 3/7 and again on 20/8/90. Plots were assessed by rating, calibrated rating and plate meter.

Results. The main effects are summarized in the following table:

Main treats kg P/ha	31/5 Rating	3/7 t/ha	1/8 t/ha UG	1/8 t/ha MOW	20/8 t/ha UG	20/8 t/ha MOW	18/9 t/ha UG	18/9 t/ha MOW
Nil	1.9	1.1	1.2	0.9	2.5	2.1	3.9	3.0
13	2.9	1.5	1.7	1.0	2.9	2.3	4.7	3.1
26	3.2	1.7	1.8	1.0	3.0	2.4	4.8	3.1
52	4.0	2.1	2.1	1.2	3.5	2.7	5.5	3.3
104	4.7	2.2	2.3	1.2	3.6	2.6	5.6	3.2
26 + S	4.3	2.2	2.2	1.0	3.4	2.4	5.6	3.3
104 + S	4.7	2.6	2.6	1.3	3.9	2.7	6.1	3.2
LSD	1.13	-	0.55	0.28	-	-	-	
Cross treats								
Nil	2.6	1.3	1.4	0.9	2.6	2.2	4.3	3.1
RLEM Spray	4.2	2.4	2.4	1.2	3.6	2.6	5.6	3.1
Nemacur	3.7	1.8	1.8	1.0	3.1	2.3	5.0	3.3
RLEM & NEM	4.6	2.7	2.6	1.3	3.8	2.7	5.9	3.2
+ TE	3.3	1.4	1.7	1.0	3.0	2.4	5.5	3.2
LSD	0.54	-	0.50	0.25	-	-		

Comment: There are obvious responses to phosphorus and insect controls and some response for early growth. These responses are not evident in the incremental growth later in the season.

There was an obvious interaction of response to applied phosphorus and insect control early in the season and exemplified by the measurements on 3/7/90.

90N06. Pasture production (t/ha) on 3/7/90

Treatment kg P/ha	Cross treatments Nil	+TE	Nemacur	Lemat	Nem + LEM
Nil	0.7	0.7	1.0	1.2	1.8
13	0.8	1.2	1.3	2.1	2.2
26	0.8	1.4	1.4	2.1	2.8
52	1.4	1.4	2.1	2.8	2.8
104	1.7	1.7	2.0	2.8	2.8
26 + S	1.7	1.6	2.0	2.8	2.8
104 + S	1.8	2.0	2.8	3.0	3.5

Comment: Early in the season (15/5) only rutherglen bugs were obvious on the plots. Later in the season, red legged earth mite became obvious on the unsprayed plots.

In the absence of insect control, there was a response to (104 kg/ha) the top level of phosphorus addition. In the absence of insects there was a phosphorus response to 26 kg P/ha.

Conclusions:

1. Productivity of the pasture which was grazed heavily, early in 1989 was low (2.5 t/ha) and T. suffocatum dominated the legume component. In 1990, ungrazed pasture produced 6 t/ha and very little T. suffocatum was present on the plots, i.e. autumn/winter deferred grazing should reduce the levels of this unproductive pasture species.

2. Cultivation treatments in 1989 showed no response in that year but marked responses in early pasture growth in 1990. The variable micro relief allowed harvesting of phosphorus, water and seeds into the furrows. Early "fake breaks" became "real" breaks to the season for the furrows. Pasture which averaged about 200-300 kg/ha on 15/5/90 was running at about 1000 kg/ha in the furrows.

3. Insect control was a very cheap method of getting early pasture production. For an outlay of about $5 to $7 on LEMAT, the same effect was obtained as spending about $45 on phosphate fertilizer.

4. There were hints of a sulphur response above and beyond the phosphorus response.

5. The large and surprising phosphorus response at 50 ppm soil P was less surprising when we discovered that the 0-10 cm soil sample averaged about 25 ppm P. The pogo method was sampling only the 0-2 cm depth on this site. A profile sample showed a marked concentratiuon of phosphorus in the top 2 cm of soil - probably because of the lack of recent cultivation and the high phosphorus buffering of this site. Care must be taken in sampling such situations.

Soil depth cm	0-2	2-4	4-6	6-8	8-10
Soil P ppm	52	20	21	13	9