

# **BUNDEY - POOR GROWTH and PAGRIA FLEA BEETLES, 1988**

by Rob Wesley-Smith

## **SUMMARY**

A crop of the fodder legume Bunday was found to be growing poorly. A brief investigation suggested both nutritional and insect problems. *Pagria signata*, now known as the Pagria flea beetle, was identified, a first record for the NT.

## **INTRODUCTION**

**Bunday** (*Centrosema pascuorum*) is a palatable twining legume which tolerates reasonably wet conditions and needs a long wet season to do well. It was released by the NT in 1984, as was the similar cultivar Cavalcade, (Stockwell 1985), and three farmers agreed to increase the seed to secure supplies.

Adelaide River farmer, Don Roebuck, planted 8 ha on a red upland soil (probably a relic levee) which previously had been farmed for other small crops and seed increase. However the Bunday did not thrive, despite receiving annual fertiliser at 125 kg/ha/yr triple superphosphate, with addition of sulphur in 1987/8, and initial potash.

The 1987/8 Wet season was characterised by long dry spells, and the Bunday was apparently being attacked by insects. It was sprayed with endosulfan insecticide to little effect early in the season. Fusilade® had been applied to control grass weed competition with some benefit; the grass was mowed mid-season and urea was applied as a foliar spray to lift the crop, with little benefit. Assistance was sought at this stage to resolve the problems.

## **METHOD**

On 24/3/88, with rain pending, five treatments were applied as single reps of 0.01 ha plots (5x20)m. While digging out some plant samples it was clear that the ground was very hard

and dry. This led to two other sets of treatments including dolomite being applied on 27/3/88, along with first treatment observations. Details were as follows:

Plot/date applied	Treatment
1 24/3/88	<b>Trace elements, +K +S (= plot 2)</b>
2 ...	<b>NPKS (13.5.16.10) at 285 kg/ha</b>
3 ...	<b>Urea only, at 80 kg/ha (= plot 2)</b>
4 ...	<b>Carbofuran 10% insecticide at 15 kg/ha</b>
5 ...	<b>Carbofuran (= plot 4) + NPKS (= plot 2)</b>
6 a 27/3/88	<b>Dolomite only, at 4 t/ha</b>
6 b ...	<b>Dolomite (= plot 6a) + NPKS (= plot 2) + trace elements</b>
7 a ...	<b>Dolomite only, at 1 t/ha</b>
7 b ...	<b>Dolomite (= plot 7a) + NPKS (= plot 2) + trace elements</b>

- NB. NPKS is mixed fertiliser containing nitrogen, phosphorus, potassium and sulphur in the percentages shown.  
 Urea is a nitrogen only fertiliser.  
 Dolomite contains calcium, magnesium and sulphur, and can function, like gypsum, as a soil conditioner.  
 Carbofuran is a broad spectrum insecticide applied as 10% granules

Plant samples taken on 24/3/88 were found to contain mites in the fold between leaf and stem, leading to speculation that the emerging leaf was being damaged. The crop then was sprayed by the farmer on 3/4/88 with the miticide Kelthane®, using a boom spray and avoiding the treated plots.

On 14/4/88 further observations were recorded. Preliminary water infiltration tests were done on dolomite treated and untreated areas. Small beetles were observed feeding on Centro leaf, and samples were collected, although with some difficulty as the insects jumped off when disturbed.

As a result of the insect collection and type identification, a separate preliminary insecticide trial was done (21-26/4/88) by entomology staff (Strickland and Neal pers. comm.).

Plant samples for chemical analyses were taken on 9/3/88 from this site, and on 20/4/88 from a nearby crop ("M") from good and poor growth areas.

Further observations were made on 14/4/88 and 16/5/88.

## RESULTS

Drizzling rain followed the treatment applications of 24/3/88 and 27/3/88 and continued for a few days, with recordings 1 km away showing 23 mm to 26/3/88, and a further 96 mm to 5/4/88.

**Initial observations** of treatments on 27/3/88 indicated that the first and main response of the Bunday was to the application of carbofuran (plots 4 and 5), with additional response to NPKS (plot 5).

**Observations on 14/4/88** (3 weeks after treatment applications) were as follows:

The whole paddock (control)	markedly improved
Plot 1 (trace +K+S)	somewhat better than control
2 (NPKS)	excellent
3 (urea)	similar to control
4 (insecticide)	somewhat better than control
5 (insecticide + NPKS)	excellent
6a (dolomite only 4 t/ha)	similar to control
6b (dolomite + NPKS+trace)	excellent
7a (dolomite only 1 t/ha)	similar to control
7b (dolomite + NPKS+trace)	somewhat better than control

**Observations on 16/5/88** indicated great variability and differences were not so obvious. Plot 3 (urea) was most dominated by grass, whilst the treatment that was clearly the greenest and best was plot 6a with dolomite 4t/ha + NPKS + trace.

A **water infiltration** demonstration on 14/4/88 showed a dramatic improvement in infiltration where dolomite had been applied.

**Chemical analyses** of Bunday were as follows:

Site	% N	% P	% K	% S	% Ca	% Mg	Cu-Zn-Mn(ppm)
Roebucks	2.1	.23	2.3	.09	.04	.33	7 23 176
"M" healthy	2.2	.20	2.1	.18	.9	.35	9 29 101
"M" unhealthy	1.9	.17	1.4	.08	1.1	.31	6 28 146

**The flea beetle collection** was a first record for the Northern Territory, but full identification was only confirmed in August 1991, (Chris Reid, pers. comm.). It is *Pagria signata*, formerly described as *Rhyparida variipennis* or *Pagria australis*. It is a common pest of the bean family in various parts of the world, and also known on *Centrosema* sp. and *Gossypium* sp., and is now recognised across north Australia. The leaf damage identified in this case was of small holes chewed through the leaf tissue between the veins but without destroying the epidermis. However the larvae are also known to be root feeders and may cause more damage to the plants underground prior to or apart from the appearance of the adult beetles above ground.

The preliminary insecticide trial used carbaryl at 5 rates of application, with counts before spraying, after 18 hours and after 4 days. After 18 hours even the lowest rate used (0.5 l/ha of 50% a.i.) had effectively reduced numbers of flea beetles, but after 4 days they were markedly increasing again.

## DISCUSSION

The causes of the ill thrift of the studied crop of Bunday would appear to have been of **both nutritional and insect origin**, and these factors probably interacted with each other.

**Carbofuran insecticide treatment** provided a response in 3 days, with added response to NPKS. However, after nearly 3 weeks only plots with NPKS were rated excellent, with carbofuran alone being of only slight benefit. This supports the findings of the insecticide trial which suggested reinvasion of plots by flea beetles after a few days.

If the whole paddock had been effectively treated it is possible that the benefit would have lasted longer. However, reinvasion could have occurred from emergence of larvae in the soil which had survived the above ground spray. A treatment which kills the larvae too, or repeated sprayings, is indicated.

Don Roebuck reported flea beetle possibly using the native legume *Alysicarpus vaginalis* as a host. Thus where attack is severe, it may be necessary to spray outside the paddock as well. Use of rotations such as fodder sorghum may help, or possibly try another legume such as Maldonado.

In a trial in 1979 at Tortilla Flats about 15 km from this site, in an attempt to increase seed yields of Calopo, the author and others achieved a doubling of yield with one late irrigation and the application of Lannate® (methomyl) insecticide at flowering (mentioned Wesley-Smith 1987). This suggests that even better responses could similarly be achieved with the much more palatable Bunday.

**Dolomite** applied at 4 t/ha apparently was useful, and this could have been due both to nutritional and soil amelioration effects. Better soil moisture and also aeration will allow more efficient use of nutrients by the plants. The rain which fell after dolomite application may have been able to soak in and be more effectively used by the plants. This was demonstrated by the more rapid infiltration of water into the soil in the dolomite treated area.

On a similar hard red levee soil, 5 km down the Adelaide River from the present site, and being used for irrigated horticulture, the author in August 1978 applied rates of gypsum and dolomite primarily to promote enhanced water penetration. Two weeks after treatment a test showed dolomite application had more than doubled water infiltration rate.

**Applied NPKS** markedly improved the Bunday. Urea alone and dolomite alone gave negligible response, while trace elements + K + S gave slight response. This suggests that several major nutrients were needed together to overcome the deficiencies, including P, even though this had been applied previously. It would seem that unnoticed root damage by flea beetle larvae was putting high demands on the available P.

**Chemical analysis** indicated a deficiency of S in the poorly performing Bunday crops, whilst Ca was low at Roebuck's farm. Both of these elements are well supplied by dolomite and gypsum.

**Flea beetles** were found in other *Centrosema pascuorum* crops about that time, but do not appear to have been a major problem since. Perhaps certain seasonal conditions both enhance their numbers and perhaps weaken the resistance of the plants.

**In conclusion**, this work consisted mostly of observations or single samplings, and was not expected to be definitive. However it has provided credible and quick answers to particular problems of relevance to currently used crops, and resulted in discovery in the NT of *Pagria signata* - the Pagria flea beetle.

## ACKNOWLEDGEMENTS

I wish to thank Don Roebuck for his cheerful cooperation and expert assistance; my colleague Robyn Rann for persistent crawling in the Bunday and coming up with the *Pagria*; various entomological colleagues and friends, including Geoff Strickland and Mike Neal for early discussions and access to their unpublished report, Murray Upton for facilitating beetle identification and discussions, and to Chris Reid (A.N.U.) for the actual identification; colleagues Barbara Ross and Narelle Thomas and chemistry section for the chemical analyses; Dick Staples for earlier levee studies; and Arthur Cameron for assistance with the paper.

## FURTHER READING

Stockwell T.G.H. (1985) **Bunday**: a twining tropical legume for the Northern Territory.  
Agnote 85/5 NTDPIF

Stockwell T.G.H. (1985) **Cavalcade**: a twining tropical legume bred for the Territory.  
Agnote 85/4 NTDPIF

Wesley-Smith R.N. (1987) **Calopo** in the Northern Territory. Agnote 243 NTDPIF

Cameron A.G. (1990) **Maldonado**: a new pasture legume for the Top End) Agnote 429  
NTDPIF