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FIELD STUDIES OF A SCHIZAPHIS ON PANGOLA
GRASS IN NORTH QUEENSLAND

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SUMMARY

Studies were conducted in 1971 and 1972 on the aphid *Schizaphis* sp. of the *graminum* group attacking pangola grass (*Digitaria decumbens*) on the wet tropical coast of North Queensland.

In a small plot trial, populations of the aphid were found to significantly reduce yields of pangola grass.

A screening trial showed that dimethoate, omethoate and methidathion applied at 280 g a.c./ha and demeton-s-methyl at 140 g a.c./ha were effective treatments. Diazinon, maldison and carbaryl at 280 g a.c./ha were much less effective.

A comparison of aphid numbers on six pasture grasses showed that pangola grass carried the largest populations.

I. INTRODUCTION

Large populations of aphids (*Schizaphis* sp. of the *graminum* group) were found attacking pangola grass (*Digitaria decumbens*) pastures on the wet tropical coast of North Queensland in 1971 and continuing into 1972. Although this insect had previously been observed in pangola grass it had never been recorded in damaging numbers.

No studies on the aphid had been carried out previously in Australia. Because of the potential economic significance of the species, investigations were commenced in 1971 and have covered a yield trial, an insecticide screening trial and a host preference trial.

II. YIELD TRIAL

The pastures in the coastal area of North Queensland during 1971 were subject to adverse weather conditions and it was desirable to determine if the presence of the aphid itself produced a reduction in yield.

(a) Materials and Methods

A trial was laid out in a pangola grass pasture at the South Johnstone Research Station. A 6 x 3 randomized block layout was used with plot size of 4.3 m x 6.7 m. Plots were mown to a constant level on June 10. Sprays were applied by knapsack sprayer on June 18 at the rate of approximately 539 litres/ha.

The following materials were used:

Parathion—An emulsifiable concentrate containing 50% w/v active constituent; used at 0.026%.

Demeton-s-methyl—An emulsifiable concentrate containing 25% w/v active constituent; used at 0.05%.

Aphid presence was assessed on June 16 (pretreatment), June 21 (3 days post-treatment), July 2 (14 days post-treatment) and July 19 (31 days post-treatment) in five quadrats each 30 cm x 30 cm taken at random in each plot. In each quadrat, counts were made of the number of aphids on 20 green leaves and 20 leaves which the counter judged as showing the necrotic or chlorotic symptoms of aphid attack.

Nitrogen was applied to all plots at 28 kg/ha on June 25. Cuts of grass for assessing dry-matter yields were taken with a Jari mower on July 20, 32 days after treatment.

The sprays as previously applied were repeated on July 23, 35 days after the first, using approximately 563 litres/ha of spray. Cuts were made again on July 30, 42 days from the time of the first spray application.

(b) Results and Discussion

A summary of the data on the assessment of aphid presence is shown in Table 1. Dry-matter yield data are shown in Table 2.

TABLE 1
MEAN APHID NUMBERS PER 20 AFFECTED LEAVES

Treatment	Pre-treatment	Post-treatment		
		3 days	14 days	31 days
Parathion 140 g a.c./ha ..	27.43	0.10	0.67	2.87
Demeton-s-methyl 280 g a.c./ha ..	28.17	0.0	0.0	0.70
Untreated	21.67	16.70	26.87	14.13

TABLE 2
DRY-MATTER YIELDS (kg/ha)

Treatment	20.vii.71	30.vii.71
Parathion 140 g a.c./ha	1,164.3	1,393.3
Demeton-s-methyl 280 g a.c./ha	1,304.7	1,681.6
Untreated	882.2	1,154.0
Necessary differences for { 5% ..	304.1	364.3
significance { 1% ..	432.5	518.2

The numbers of aphids on green leaves are not shown in Table 1 because of low numbers in every sample. The mean number of aphids on 20 green leaves for all untreated samples was 0.86, compared with 22.49 for 20 affected untreated leaves.

The data presented in Tables 1 and 2 show that an application of demeton-s-methyl to the aphid-infested pasture produced a significant increase in dry-matter yield after 32 days. An increase in yield occurred after the application of parathion but did not reach statistical significance.

The aphid population in all plots rapidly declined soon after the second spray, due mainly to the action of predaceous Coccinellids (mainly *Coccinella transversalis* F. and *C. arcuata* F.).

The large difference between aphid numbers on green leaves and on those exhibiting necrosis or chlorosis indicate that these effects are symptomatic of aphid attack in pangola grass. Symptoms are characterized by a general chlorosis and necrosis localized toward the leaf tip. Aphid colonies are generally concentrated under the leaf at the base of the dead area.

III. SCREENING TRIAL

A screening trial was undertaken at Kurrimine Beach in 1971 to test the effect of seven different insecticides on the control of this aphid.

(a) Materials and Methods

The following materials were used:

- Carbaryl—A dispersible powder containing 80% w/w active constituent.
- Demeton-s-methyl—An emulsifiable concentrate containing 25% w/v active constituent.
- Diazinon—An emulsifiable concentrate containing 80% w/v active constituent.
- Dimethoate—An emulsifiable concentrate containing 30% w/v active constituent.
- Maldison—An emulsifiable concentrate containing 103% w/v active constituent.
- Methidathion—An emulsifiable concentrate containing 40% w/v active constituent.
- Omethoate—An emulsified concentrate containing 80% w/v active constituent.

All of the insecticides except demeton-s-methyl were used at 0.5% spray strength; demeton-s-methyl was used at 0.25%.

An 8 x 3 randomized block layout was used with plot size 5.1 m x 8.1 m. Sprays were applied by knapsack sprayer on August 17 at a rate calculated to be 563 litres/ha.

Aphid numbers in the plots were assessed on August 16 (pretreatment), August 19 (2 days post-treatment) and August 23 (6 days post-treatment). These were determined by taking 100 positions on a 20 cm x 81 cm grid within the central 31 m² area of each plot. At each position the number of aphids was counted on the 1st, 2nd and 3rd fully expanded leaves from the growing point. Plots were checked on August 31 but very few aphids were found in the untreated areas and the trial was terminated.

(b) Results and Discussion

A summary of the data on the effect of treatments is given in Table 3.

TABLE 3
MEAN APHID SAMPLE PER PLOT

Treatment	Pre-treatment		Post-treatment			
	—		2 days		6 days	
	Trans. Mean*	Equiv. Mean	Trans. Mean†	Equiv. Mean	Trans. Mean†	Equiv. Mean
Dimethoate 280 g a.c./ha	10.43	108.82	0.0	0.0	0.0	0.0
Diazinon 280 g a.c./ha	12.55	157.50	1.85	2.92	1.10	0.70
Maldison 280 g a.c./ha	11.73	137.64	3.25	10.03	2.61	6.30
Carbaryl 280 g a.c./ha	9.51	90.34	3.11	9.14	3.28	10.26
Methidathion 280 g a.c./ha	6.43	41.31	1.00	0.50	1.27	1.11
Omethoate 280 g a.c./ha	11.81	139.54	0.0	0.0	1.10	0.70
Demeton-s-methyl 140 g a.c./ha	9.07	82.18	0.88	0.27	0.0	0.0
Untreated	10.77	116.09	7.52	56.12	5.77	32.84
Necessary differences for { 5% ..	7.46		4.47		2.65	
significance { 1% ..	10.35		6.36		3.76	

* Transformation used— \sqrt{x} .

† Transformation used— $\sqrt{x + \frac{1}{2}}$.

Dimethoate, methidathion, omethoate and demeton-s-methyl at the rates applied were in the best control group at both sampling dates. Any of these insecticides, however, might also give significant control at lower rates of application. Compared with the other insecticides, diazinon, maldison and carbaryl were unsatisfactory.

IV. HOST PREFERENCE TRIAL

Six pasture grasses were included in the host preference trial. All are of potential use in the wet tropics of North Queensland. The trial area was on a mixed alluvial soil at Silkwood.

(a) Methods

Layout was a 6 x 4 randomized block with plot size 4 m x 10.2 m. On August 10, 1972, aphids were sampled from 100 positions on a 100 cm x 4 cm grid from the central 38.7 m² area of each plot. At each position the number of aphids was counted on the first three fully expanded leaves from the growing point.

(b) Results and Discussion

Results are given in Table 4. These show that the aphid has a preference for *Digitaria*, particularly pangola grass.

TABLE 4
APHIDS PER 100 SAMPLE POINTS

Species or Cultivar	Block			
	A	B	C	D
<i>Setaria splendida</i> CPI15899	0	0	0	0
<i>Brachiaria decumbens</i> (signal grass)	0	0	0	0
<i>Panicum maximum</i> cv. Hamil	0	0	1	0
<i>Digitaria</i> sp. CQ911	13	2	1	3
<i>Digitaria decumbens</i> CPI18385	9	1	15	8
<i>Digitaria decumbens</i> (pangola grass)	6	497	410	320

The amount of damage produced in pangola grass by the aphid in terms of percentage of leaves showing symptoms of attack, paralleled the numbers per unit sample. In contrast, the other two *Digitaria* grasses had few affected leaves and can be considered resistant to this aphid when compared with pangola grass.

Pangola grass has been the species of *Digitaria* grown on the wet tropical coast but its relative susceptibility to the aphid must be taken into account in any further consideration of these grasses in the ecological conditions as occurring in the areas represented by these studies.

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