Thrips on cotton in South Africa

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ABSTRACT

The susceptibility of different cotton cultivars to thrips, the number of thrips and the identity of the different thrips species were determined in four cotton-production areas during the first six weeks after emergence. No consistent differences in the number of thrips on, or damage done to the seedlings were found between the cotton cultivars Sabie, Palala, CA223, DeltaOPAL, CS8S, Tetra, Sicala and NuCOTN 37B. At about six weeks after emergence, thrips damage had mostly disappeared on cotton planted in about the middle of October. The prevalent thrips species found were Frankliniella schultzei *(Trybom) and* Thrips tabaci *Lindeman at Rustenburg (North-West Province), F. occidentalis (Pergande) at Vaalharts Irrigation Scheme (North-West Province) and* T. tabaci *at Loskop Irrigation Scheme (Mpumalanga Province). At Weipe (Limpopo Province),* T. tabaci *occurred and less damage was done to cotton seedlings. The current problem of thrips damage to cotton seedlings cannot be attributed to the cotton cultivars, the production sites (except Weipe which had less damage) or the species of thrips involved in the damage at the different sites.*

Introduction

During the last number of seasons, damage by thrips to cotton seedlings became frequent and intense. Chemical control was difficult and often not effective. Although various reasons for the problem were advanced, none could satisfactorily explain the problem. In order to clarify some questions, the susceptibility of different cotton cultivars to damage, the amount of damage caused, the population numbers and the identity of the species involved in different areas, were determined.

Experimental procedure

The investigations were done at Rustenburg and the Vaalharts Irrigation Scheme in the Northwest-Province, Loskop Irrigation Scheme in the Mpumalanga Province and Weipe in the Limpopo Province. The investigations were carried out over a three-year period from the 1998-99 to the 2000-2001 season. The experiments were laid out in a randomized block design with eight cotton cultivars (treatments), four replicates, and plots of five rows of ten meters each. The experiments were planted from the fifteenth to the twenty-first of October each year and were irrigated. At certain times after emergence, ten plants per plot were assessed for thrips damage. To determine the number of thrips in the different treatments at different times after emergence, ten plants per plot were sampled by taking the apical point and first two leaves below the apical tip as a sample. These cuttings were placed in 70% alcohol in 500 ml bottles immediately after cutting and were taken to the laboratory. In the laboratory, the alcohol was filtered through a 38 micron sieve. The thrips, which remained on the sieve, were washed into a counting dish and counted under a microscope. Mature individuals were identified to species level for the species *F. schultzei* (Trybom), *Thrips tabaci* Lindeman and *F. occidentalis* (Pergande) and the number of identified individuals of each species were counted. Individuals of other species were not identified, but counted as a group.

Results

For thrips damage to cotton seedlings and the number of thrips on the cotton seedlings, the results of the 1999-2000 season are reported here. In some instances large coefficient of variances are associated with sets of data. For the species distribution of the different thrips species, the average for three seasons from 1998-99 to 2000-2001 is reported.

Thrips damage to cotton seedlings at the different sites is shown in Tables 1 to 4. At Rustenburg (Table 1), five to ten plants out of ten showed thrips damage two weeks after emergence and some cultivars differed significantly from others. Three weeks after emergence, all the plants of all the cultivars had thrips damage. Six weeks after emergence, the damage had diminished to six or fewer plants out of ten with no differences between the different cultivars. At Vaalharts and Loskop (Tables 2 and 3), four or more plants out of ten showed thrips damage three weeks after emergence and some cultivars differed significantly from others. However, at both sites thrips damage had disappeared six weeks after emergence. At Weipe (Table 4), one to three plants out of ten showed thrips damage three weeks after emergence with no significant differences between cultivars. Thrips damage had disappeared six weeks after emergence.

The number of thrips on the cotton seedlings at the different sites is shown in Tables 5 to 8. At Rustenburg (Table 5), large numbers of thrips, ranging from 18 to 72 per ten plants, occurred on the cotton seedlings two and three weeks after emergence of the seedlings. Six weeks after emergence, the number of thrips on the seedlings had decreased to ten or less per ten plants. Two weeks after emergence, significantly more thrips occurred on the cultivar Sabie than on the cultivar NuCOTN 37B. However, three weeks after emergence, significantly more thrips occurred on the cultivar Tetra than on the cultivar DeltaOPAL. Six weeks after emergence, no significant differences in the number of thrips per plant were found between the different cultivars. At Vaalharts (Table 6), the number of thrips on the seedlings ranged from 17 to 29 per ten plants three weeks after emergence. Six weeks after

emergence, the number of thrips had decreased to some extent and the number ranged from five to twenty-two per ten plants. Three weeks after emergence, no significant differences in the number of thrips per plant were found between the different cultivars. Six weeks after emergence, significant differences in the number of thrips per plant were observed between some of the cultivars. At Loskop (Table 7), the number of thrips on the seedlings ranged from five to thirteen per ten plants three weeks after emergence. Six weeks after emergence, the number of thrips had decreased and the number ranged from one to three per ten plants. No significant differences in the number of thrips per plant were found between the different cultivars three or six weeks after emergence. At Weipe (Table 8), the number of thrips on the seedlings ranged from four to seventeen per ten plants three weeks after emergence. Six weeks after emergence, the number of thrips had decreased and the number ranged from none to two per ten plants. No significant differences in the number of thrips per plant were found between the different cultivars three or six weeks after emergence.

The species distribution of the identified mature thrips at the different sites is shown in Tables 9 and 10. Three weeks after emergence (Table 9), *F. schultzei* was the most numerous species at Rustenburg, *F. occidentalis* the most numerous species at Vaalharts and Thrips tabaci the most numerous species at Loskop and Weipe. Six weeks after emergence (Table 10), *F. schultzei* and *T. tabaci* were the most numerous species at Rustenburg, *F. occidentalis* was the most numerous species at Vaalharts and *T. tabaci* the most numerous species at Loskop while very few mature individuals of the identified species occurred at Weipe.

Discussion

In data on insect numbers or numbers of damaged plants coefficient of variances larger than would normally be expected, are often found in practice. This is probably the result of the insect populations or the damage measured being very variable in itself. The coefficient of variances associated with the present data was, however, below 40% in all cases where significant differences were found. Coefficient of variances exceeding 40% was found only in cases where the differences were not significant.

Cotton seedlings were damaged by thrips at all the sites two to three weeks after emergence. At Rustenburg, Vaalharts and Loskop significant differences were observed between different cultivars. However, no cultivar consistently showed more or less damage than the other cultivars. At Weipe, less damage was found than at the other sites and no differences were found between the different cultivars. This indicates that no cultivar is more prone to thrips damage and that cultivar choice has no bearing on the amount of damage caused. Furthermore, except for Weipe, the different sites had little effect on the amount of damage caused. Six weeks after emergence, the damage to the seedlings was much less at Rustenburg and had completely disappeared at the other sites which indicates that the damage will disappear by itself as the season progresses.

At all the sites, more thrips were found on the cotton seedlings two or three weeks after emergence than six weeks after emergence indicating that the thrips numbers decreased as the season progressed. At Rustenburg and Vaalharts, the number of thrips differed significantly between different cultivars at certain observation periods. However, these differences between cultivars were not consistent for any cultivar and changed at Rustenburg between two and three weeks after emergence. This indicates that the thrips has no preference for any cotton cultivar. The choice of cotton cultivar can thus not be a reason for the problem of thrips damage to the cotton seedlings.

The species distribution of identified thrips adults at the different sites shows the prevalent thrips species found on the cotton seedlings to be *F. occidentalis*, *F. schultzei* and *T. tabaci*. There is also a clear pattern in the distribution of these species among the different sites, with mostly one species dominant per site. As the cotton seedlings were damaged by thrips at all the sites, no particular species is responsible for thrips damage experienced recently.

Conclusion

The current problem experienced with thrips damage cannot be attributed to the cotton cultivars, the production sites (except Weipe which had less damage), or the species of thrips involved in the damage at the different sites.

Table 1. *Thrips damage[1] to cotton seedlings at Rustenburg.*

	Weeks after emergence[2]		
Cultivar	2	3	6
Sabie	9 ab	10	6
Palala	8 ab	10	5
CA 223	8 ab	10	2
DeltaOPAL	7 a	10	2
CS8S	5 a	10	2
Tetra	10 b	10	4
Sicala	6 a	10	4
NuCOTN 37B	7 a	10	3
LSD $_{Tukey}$ (P < 0,05)	3,7	NS	NS
CV %	20,8	4,7	67,7

[1] Number of plants damaged per 10 plants, average of 4 replicates, 1999/2000 season.

[2] Values in a column followed by the same character do not differ significantly at the 5% level according to Tukey's variation width test.

Table 2. *Thrips damage[1] to cotton seedlings at Loskop.*

	Weeks after emergence[2]	
Cultivar	3	6
Sabie	6 abcd	0
Palala	8 cd	0
CA 223	7 bcd	0
DeltaOPAL	5 ab	0
CS8S	4 a	0
Tetra	9 d	0
Sicala	7 abcd	0
NuCOTN 37B	6 abc	0
LSD $_{Tukey}$ (P < 0,05)	2,7	-

[1] Number of plants damaged per 10 plants, average of four replicates, 1999/2000 season.

[2] Values in a column followed by the same character do not differ significantly at the 5% level according to Tukey's variation width test.

Table 3. *Thrips damage[1] to cotton seedlings at Vaalharts.*

	Weeks after emergence[2]	
Cultivar	3	6
Sabie	9 ab	0
Palala	10 ab	0
CA 223	9 ab	0
DeltaOPAL	7 ab	0
CS8S	6 a	0
Tetra	10 b	0
Sicala	7 ab	0
NuCOTN 37B	8 ab	0
LSD $_{Tukey}$ (P < 0,05)	3,2	-
CV %	16,4	-

[1] Number of plants damaged per 10 plants, average of 4 replicates, 1999/2000 season.

[2] Values in a column followed by the same character do not differ significantly at the 5% level according to Tukey's variation width test.

Table 4. *Thrips damage[1] to cotton seedlings at Weipe.*

Cultivar	Weeks after emergence	
	3	6
Sabie	2	0
Palala	1	0
CA 223	1	0
DeltaOPAL	3	0
CS8S	1	0
Tetra	2	0
Sicala	2	0
NuCOTN 37B	2	0
LSD_{Tukey} ($P < 0,05$)	NS	-
CV %	91,2	-

[1] Number of plants damaged per 10 plants, average of 4 replicates, 1999/2000 season.

Table 5. *The number[1] of thrips on cotton seedlings at Rustenburg.*

Cultivar	Weeks after emergence[2]		
	2	3	6
Sabie	72 b	31 ab	8
Palala	41 ab	26 ab	10
CA 223	57 ab	29 ab	5
DeltaOPAL	63 ab	18 a	4
S8S	53 ab	23 ab	4
Tetra	43 ab	49 b	7
Sicala	50 ab	36 ab	5
NuCOTN 37B	35 a	23 ab	3
LSD_{Tukey} ($P < 0,05$)	34,3	27,6	NS
CV %	28,0	39,6	50,7

[1] Per 10 plants, average of 4 replicates, 1999/2000 season.

[2] Values in a column followed by the same character do not differ significantly at the 5% level according to Tukey's variation width test.

Table 6. *The number[1] of thrips on cotton seedlings at Loskop.*

	Weeks after emergence	
Cultivar	3	6
Sabie	13	3
Palala	9	1
CA 223	9	2
DeltaOPAL	8	2
CS8S	11	3
Tetra	12	1
Sicala	13	3
NuCOTN 37B	5	3
LSD_{Tukey} ($P < 0,05$)	NS	NS
CV %	43,8	77,2

[1] Per 10 plants, average of 4 replicates, 1999/2000 season.

Table 7. *The number[1] of thrips on cotton seedlings at Vaalharts.*

Cultivar	Weeks after emergence[2]	
	3	6
Sabie	17	8 ab
Palala	29	5 a
CA 223	22	8 abc
DeltaOPAL	22	22 d
CS8S	20	20 cd
Tetra	29	12 abcd
Sicala	18	18 bcd
NuCOTN 37B	8	21 d
LSD_{Tukey} ($P < 0,05$)	NS	11,6
CV %	46,7	34,4

[1] Per 10 plants, average of 4 replicates, 1999/2000 season.

[2] Values in a column followed by the same character do not differ significantly at the 5% level according to Tukey's variation width test.

Table 8. *The number[1] of thrips on cotton seedlings at Weipe.*

Cultivar	Weeks after emergence	
	3	6
Sabie	14	2
Palala	12	1
CA 223	7	0
DeltaOPAL	17	1
CS8S	8	1
Tetra	10	1
Sicala	4	1
NuCOTN 37B	9	1
LSD_{Tukey} ($P < 0,05$)	NS	NS
CV %	53,9	113,6

[1] Per 10 plants, average of 4 replicates, 1999/2000 season.

Table 9. *The species distribution of thrips on cotton seedlings three weeks after emergence.*

Species	Number[1] of adult thrips			
	Rustenburg	Vaalharts	Loskop	Weipe
F. occidentalis	0	39	2	1
F. schultzei	37	3	3	2
T. tabaci	22	7	22	1
Other	7	3	1	9

[1] Per 320 plants per area, average of three seasons 1998-99 to 2000-2001.

Table 10. *The species distribution of thrips on cotton seedlings six weeks after emergence.*

Species	Number[1] of adult thrips			
	Rustenburg	Vaalharts	Loskop	Weipe
F. occidentalis	0	39	2	1
F. schultzei	37	3	3	2
T. tabaci	22	7	22	1
Other	7	3	1	9

[1] Per 320 plants per area, average of three seasons 1998-99 to 2000-2001.