SILVERLEAF WHITEFLY AND RENIFORM NEMATODE EFFECTS ON SEED QUALITY AND STAND ESTABLISHMENT

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Abstract

There is little information on the single and combined effects of reniform nematodes and silverleaf whiteflies on cottonseed quality. Whiteflies can be a serious pest in the Lower Rio Grande Valley (LRGV) of Texas, Arizona, and California, whereas, reniform nematodes are present in the LRGV and many other cotton producing areas in the Mid South and Southeast. Investigations were conducted to determine the singular and combined effects of the reniform nematode and silverleaf whitefly on seed quality. Field studies indicated that under high whitefly infestations seed quality could be significantly reduced. Seed quality was reduced but to a lesser extent by reniform nematodes. The investigations indicated that the presence of both pests could result in an increased reduction of reduce seed quality. It appears that seed produced under these constraints may require greater care in processing.

Introduction

In the Lower Rio Grande Valley (LRGV) of Texas, both reniform nematodes and silverleaf whiteflies can reduce lint yield and fiber quality of cotton (Cook et al., 1998). Previous studies have shown that reniform nematode parasitism of cotton may result in stunted, unhealthy appearing plants, and reduced lint yields (Birchfield, 1961; Jones et al., 1959). It is also known that silverleaf whitefly feeding can cause stunting, defoliation, and reduced yields (Toscano et al., 1994). With the exception of the LRGV, these pests are generally not found together. Since cottonseed production often occurs in the LRGV and the crop can be subject to simultaneous attack of both pests, studies were conducted to determine the single and combined effects of the reniform nematode and silverleaf whitefly on seed quality.

Materials and Methods

Seeds used in the studies were harvested from previous investigations (Cook et al., 1998). The cultivar used was 'DES 119', which is highly susceptible to whitefly parasitism. Seed to be tested for seed quality were harvested from the following four treatments: 1) nematode and whitefly chemical control (TL+IM); 2) reniform control and whitefly infested (TL+WF), 3) nematode infested and whitefly control (RN+IM); and 4) no chemical control or infestation by both pest (RN+WF). In 1997 and 1998, 100 seed of each treatment for each year were planted at two dates in a randomized complete block design. Plots were single-row and 30 ft long. Identical tests were planted on 24 April and 8 May 1997. Seedling emergence was counted at seven-day intervals, with final stands being calculated at 35 d after planting.

Results

Seven Days After Planting

The lowest emergence at 7 days after planting (DAP) with the 1995 seed lots occurred in the WF treatments, ie. seedlots produced under whitefliy infestation (Table 1). Using the 1996 seed, the least emergence at 7 DAP was observed from the seed lot produced under the RN+WF treatment, ie. both reniform nematode and silverleaf whitefly infestation. Averaged across years, emergence at 7 DAP was lowest for seed produced in the WF treatments, where no whitefly control was practiced.

35 Days After Planting

A similar trend to the 7 DAP emergence data was observed for plant stand at 35 DAP (Table 2). Seed from the 1995 lots showed the lowest stands in the WF treatments or where whitefly control was not practiced. The poorest stand establishment with the 1996 seed lots occurred in the RN+WF treatments, where seed were produced under both reniform nematode and silverleaf whitefly infestation. Across seed lots from both years, the worst stand establishment was observed with the RN+WF seed lot. The best stands were observed with seed that were produced when both pests were controlled.

Summary

Individually, reniform nematodes and silverleaf whiteflies have both been reported to reduce yields in cotton. Little to no information is available on their effect on seed to be used for planting. These results indicate that these pests have the potential to reduce the rate of seedling emergence and stand establishment. The silverleaf whitefly appeared to have the most deleterious effects on seed quality, as indicated by severe reductions in emergence and stand establishment. Without proper seed processing and removal of immature or light weight seed, growers and commercial seed company producers should be aware that the quality of seed produced under these stresses may be reduced and could result in poor seedling vigor, plant stand establishment, and possibly and lower yields.

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Table 1. Initial emergence (7 DAP) for 1995 and 1996 seed lots produced under four reniform nematode and silverleaf whitefly treatments.

Treatment	1995	1996	Mean
	%	%	%
TL+IM	73.6 a	71.9 a	72.8 a
RN+IM	74.8 a	72.5 a	73.6 a
TL+WF	52.1 b	65.9 a	59.0 b
RN+WF	32.2 c	50.2 b	41.2 c
LSD (0.05)	6.2	0.6	6.7

TL=Telone II treated; RN=Reniform nematode-infested;
IM=Imidacloprid treated ; WF=Silverleafwhitefly-infested

Table 2. Final stand (35 DAP) for 1995 and 1996 seed lots produced under four reniform nematode and silverleaf whitefly treatments.

Treatment	1995	1996	Mean
	%	%	%
TL+IM	84.0 a	85.4 a	84.7 a
RN+IM	83.2 a	73.9 bc	78.6 b
TL+WF	63.7 b	77.1 ab	70.4 c
RN+WF	43.8 c	66.2 c	55.0 d
LSD (0.05)	6.2	10.5	5.7

TL=Telone II treated; RN=Reniform nematode-infested;
IM=Imidacloprid treated; WF=Silverleaf whitefly-infested