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Historic Insect Losses in Kansas Cotton and Observations from Finney County

A. Zukoff

Summary

Twenty years of insect data from Kansas cotton production illustrated the variety of pests that can cause significant yield loss. During a typical growing season, a producer can expect three to five species to need control measures. Thrips, cotton fleahoppers, and lygus bugs are of the most concern; however, losses due to bollworm are steadily increasing following years of control with Bt cotton. No control measures were needed during the 2021 growing season in cotton research plots in Finney County; however, most major pest species were observed along with some species of occasional concern.

Introduction

Cotton acres in Kansas have significantly increased in the last 20 years. Major cotton pests are limited here; however, there is potential for some occasional pests to become more of a concern. While there have been no major challenges from insects in Kansas cotton, as with most crops, insect pest pressure may increase as acreage increases. Producers and consultants should be aware of current pest trends and prepare for potential changes to those pest trends and behaviors while staying vigilant for novel pests of Kansas cotton. Cotton-producing states south of Kansas contend with almost two dozen cotton pests. Increasing cotton acreage, emerging resistance issues, and changing weather patterns may contribute to increased cotton pest pressure in Kansas.

Procedures

Insect loss data for Kansas were obtained from the Mississippi State University Archive of Beltwide Cotton Crop Loss. From this data, insect diversity was summarized and losses attributed to each insect were calculated for each growing season between 2000 and 2020. Standard scouting techniques were used to track cotton pest diversity and abundance in the field during the 2021 growing season.

Results and Discussion

Twenty Years of Insect Loss Data from Kansas

Data available from the Mississippi State University Archive of Beltwide Cotton Crop Loss shows that between 2000 and 2020, 11 species of insect pest have been responsible for losses in Kansas cotton (Table 1.). Pest pressure varied each year. Forty-five percent of the pests in the data set could be considered infrequent problems, needing to be chemically controlled only one season out of 20. Stinkbugs and spider mites, according to this data set, have not required frequent control, with treatment being needed in five

and two seasons out of twenty, respectively. Four pests appear to be frequent problems in Kansas cotton and required control measures in most years out of 20 (Table 1).

Pest diversity in Kansas cotton varied each year as well. The 2000 and 2001 growing seasons saw relatively minor pest problems, with only two species causing losses in 2000 and no species causing losses in 2001. During the 2007 growing season, however, a record high of eight species required chemical control. During the rest of the 20-year period, three to five pest species required chemical control during each growing season (Figure 1).

Average annual losses due to insect pests over the 20-year period were \$2.2 million per year, with a record high recorded in 2007 of almost \$21 million lost. More recently, between 2010 and 2020, average annual losses were approximately \$80 thousand per year. Despite the diversity of insect pests in cotton, only a handful of species are responsible for most losses in Kansas. Lygus bugs, cotton fleahoppers, and thrips account for most annual losses with a combined total of over \$3.5 million lost in 2020 alone (Figure 2). Historically, bollworm has been responsible for significant losses in Kansas cotton as well. With the introduction of Bt cotton hybrids, damage done by bollworm was greatly reduced for several years. In recent years, however, the percent of loss due to bollworm has been on the rise, potentially due to reduced effectiveness of currently used Bt hybrids (Figure 3).

Cotton Pest Observations During the 2021 Growing Season in Finney County

Beginning at seedling stage, cotton at the Finnup Farm of the Southwest Research-Extension Center in Garden City was scouted every 2 weeks between June and September. Scouting methods used were standard techniques according to pest species targeted and included sweep netting, direct plant inspections, and bucket shaking or drop cloths. Four main pests that historic data showed to be most damaging were targeted and notes were recorded on other potential pest species present during the season.

Thrips

Thrips are a pest of concern from late May until approximately the end of June. These insects migrate from wheat as it matures in the spring. If this occurs as cotton plants are emerging, seedlings can be stunted, and terminal buds or even entire plants may be killed. Tender leaves and terminal buds are rasped with sharp mouthparts, causing leaf edges to turn brown or silvery in color while whole leaves will become distorted and curl upward. Once cotton plants reach the six-leaf stage, they will outgrow thrips damage and resume normal growth. Populations above one thrip per true leaf up to the six-leaf stage may justify foliar treatment. Insecticidal seed treatments offer some protection during the first few weeks of growth following emergence.

2021 Thrips Observations – Thrips numbers did build up early in the season but did not warrant treatment, as most plants had reached the six-leaf stage. Some sporadic seedling death was observed as there were some areas where plant emergence was slower.

Cotton Fleahopper and Lygus Bug

Feeding damage from cotton fleahoppers (CF) and lygus bugs is similar and both cause squares (flower buds) to drop. These pests should be monitored from the six-leaf stage until square production stops. During the first three weeks of squaring, the economic threshold is 25 to 40 fleahoppers per 100 terminals with 10% to 15% blasted squares. Alternatively, using drop cloth counts, treatment should be considered when counts range between one bug per foot of row to one bug per 3 ft of row. With a sweep net, the threshold ranges between four and six bugs per 25 sweeps. Lygus bugs are bigger and can cause damage to small bolls, causing problems with opening. Treatment for lygus bug may be needed with one to two per 25 sweeps.

2021 CF and Lygus Observations – Treatment was not needed for either of these pests in 2021. Lygus bugs were uncommon in sweep net samples during the growing season. Cotton fleahopper abundance increased at the end of August and while they would have met threshold, due to plant growth stage, treatment was not warranted.

Bollworm

In the early years of Kansas cotton production, cotton bollworm was responsible for significant losses, and it still has the potential to be a serious pest. Producers should watch for developing infestations beginning at first bloom and during fruiting and boll development. Scouting consists of looking for eggs and newly hatched caterpillars. Treatment is recommended when five small worms per 100 plants are present during early bloom. Once bolls begin to form, treatment is warranted if 6% of squares and/or bolls are damaged and worms are present. Bollworm resistance to currently used Bt hybrids (Bollgard 2 and Widstrike) has been documented. Producers should monitor fields even if Bt products appear to be working in the area.

2021 Bollworm Observations – Treatment for bollworm was not needed during the 2021 season. Late-silking corn was adjacent to cotton plots and adult bollworms were spotted in the field, but caterpillars and bollworm damage were not observed.

Miscellaneous Pests

Aside from the major pests above, some pests that have occasionally caused significant losses in Kansas were detected in 2021. A few small colonies of cotton aphids were detected during the last week of August. Natural enemies in the field appeared to control these aphids relatively quickly and this should be the outcome in most Kansas fields unless insecticides targeting other pests reduce the beneficial insect populations. Stink bugs were occasional in sweep net samples. Stink bug feeding has been shown to reduce yield and lower fiber quality and can be a concern until bolls start to crack. Whiteflies were observed, but very sporadically in late August. These pests can be early and late season problems, causing plant stunting, defoliation, and their honeydew can cause lint problems and sooty mold.

References

- Don Cook, *Archive of Beltwide Cotton Crop Loss Data-Kansas*, Mississippi State University, 2000-2020
- J.P. Michaud et al., *Cotton Insect Pest Management 2021*, Kansas State University, January 2021
- Rex Friesen, *Cotton Development Benchmarks*, Southern Kansas Cotton Growers Cooperative, 2021
- Suhas S. Vyavhare et al., *Managing Cotton Insects in Texas*, Texas A&M University, 2018

Table 1. Pest species recorded causing losses in Kansas over a 20-year period along with the number of growing seasons that these pests needed chemical control

Pest	Total # of years causing losses
Lygus	16
Cotton fleahopper	15
Bollworm	13
Thrips	13
Stink bug	5
Spider mites	2
Cotton aphids	1
Fall armyworm	1
Whitefly	1
Leaf-footed bug	1
Saltmarsh caterpillar	1

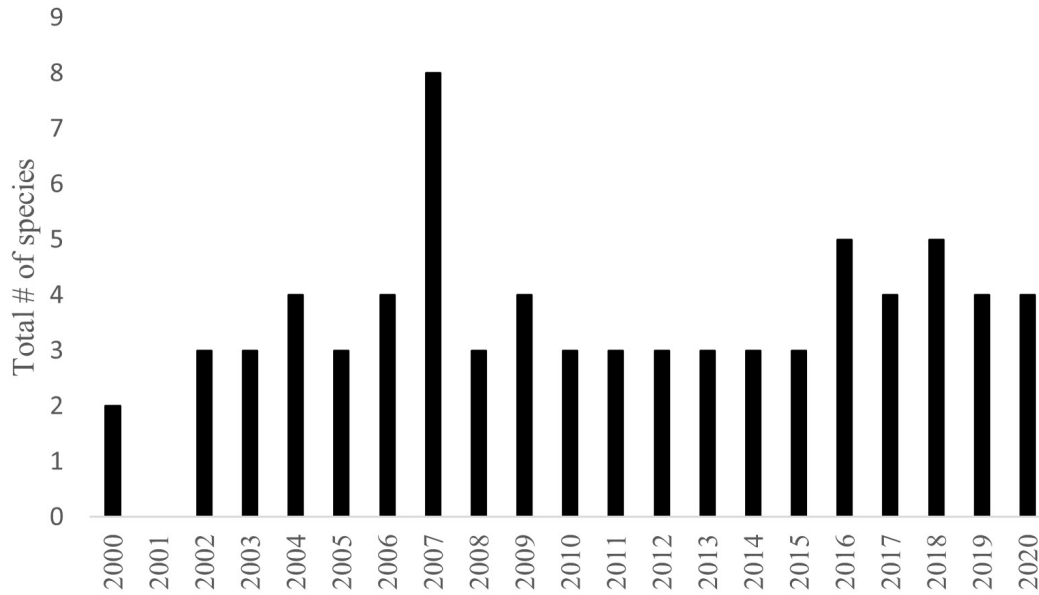


Figure 1. The total number of pest species causing losses each growing season in Kansas cotton over a 20-year period.

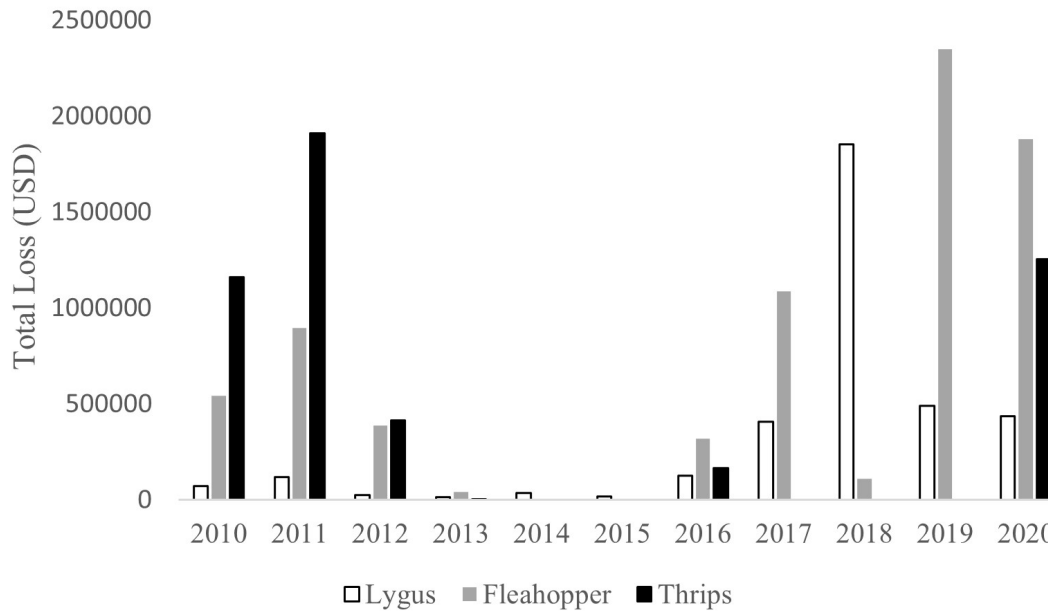


Figure 2. Total annual losses in Kansas cotton due to the most common pest species of Kansas cotton.

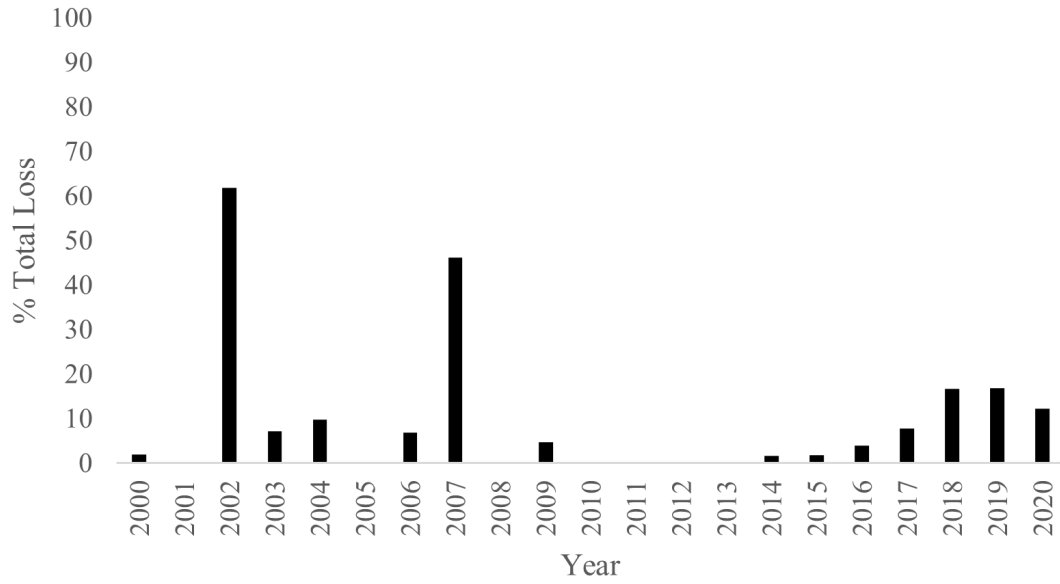


Figure 3. Percent of the annual total bales lost attributed to bollworm in Kansas cotton.