35th Annual Horticulture Industries Show

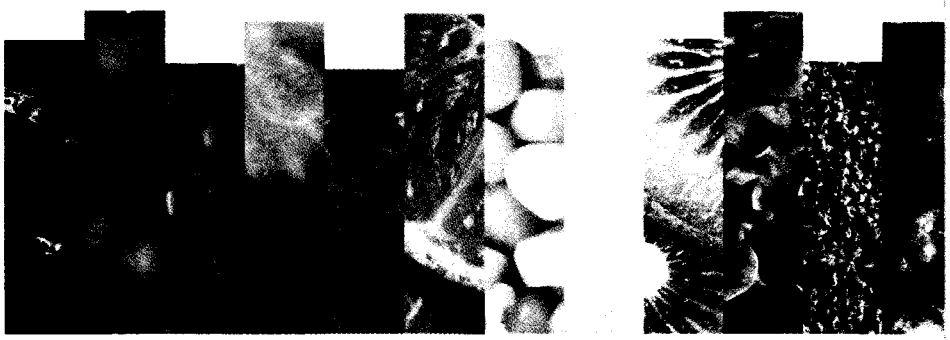
Building Soils for a Secure Future

OKLAHOMA & ARKANSAS HORTICULTURE INDUSTRIES SHOW

January 8-9, 20

2016 Horticulture
Show Proceedings

Tulsa Community
NE Campus
3727 E. Apache,



Row Cover Use for Insect Management on Summer Squash, year 1

George Driever, Jim Shrefler, Merritt Taylor, Eric Rebek, Kenda Woodburn and Jim Shrefler

Introduction

Vegetable producers continue to be challenged by insect pests that interfere with the successful production of cucurbit crops in Oklahoma. Summer squash is one crop that is commonly attacked by several insect pests. Control of these pests proves difficult for reasons such as a lack of effective insecticides that are suited to the grower's production system, the need to avoid injury to pollinator insects, and consumer demand for produce that is not treated with pesticides. Previous research showed a potential for managing insect pests in summer squash using row covers that exclude the insect from the crop. During the summer of 2015 we began a study that was designed to further evaluate this approach to pest control in summer squash. This presentation is a preliminary summary of the first year results of a two year study. The objective is to determine if row covers can be used to control squash bug and other insect pests on yellow squash.

Materials and Methods

Three sites in Oklahoma were chosen for the first year of this trial. Atoka (Atoka County), Shawnee (Pottawatomie County) and Bixby (Tulsa County). The Shawnee and Atoka sites used raised beds with black plastic mulch. The Bixby site has white plastic mulch. In each plot (treatment) six plants were placed two feet apart and two feet from the ends of hoops that were used to support row covers. There were 3 replications arranged in a randomized block design such that each row was a replication. Hoops made of electrical conduit and covered with a breathable poly fabric held in place with large binder clips. At all sites, the beds were irrigated by means of drip tape placed under the plastic mulch. All sites were planted with Enterprise hybrid yellow squash. All sites were planted later than the intended May first planting date due to excessive rains in May and early June.

Treatments:

1. No row cover. Plants were treated with an insecticide as needed.
2. Row cover applied after planting of seedlings. Cover remained in place until 50% of plants had female flowers. Row covers were then removed.
3. Row cover applied after planting of seedlings. Cover remained in place until 50% of plants had female flowers. Wait two more weeks, then row covers were removed.
4. Row cover applied after planting of seedlings. Cover remained in place until 50% of plants had female flowers. Row covers were then removed for two hours (approximately 8 a.m. to 10 a.m.), then row covers were replaced.
5. Row cover applied after planting of seedlings. Cover remained in place until 50% of plants had female flowers. Row covers were removed for five hours (approximately 8 a.m. to 1 p.m.), then row covers were replaced.

Details regarding the timing of treatment activities are provided below for the Shawnee and Atoka sites.

At the Atoka site, Treatments 2 through 5 were covered on July 9. Treatment 2 was uncovered on August 3. Treatments 4 and 5 were uncovered daily for the allotted times starting on August 3. Treatment 3 was uncovered on August 17.

At the Shawnee site, all treatments were covered on June 4. Treatment 2 was uncovered on July 27, Treatment 3 as uncovered on August 9 and Treatments 4 and 5 were uncovered daily for the allotted time starting on July 27 until the trial was terminated on August 20.

The Shawnee site had three applications of Pyrethrum applied to treatment 1 on June 28, August 12 and August 21 to control squash bugs. Sulfur in an aqueous solution was applied to all plants on June 28 and August 21 to control powdery mildew.

Results

The Atoka site had very different results from the Shawnee site. This may partly be explained by the lateness in planting at the Atoka site which was nearly a month behind the Shawnee site. The Atoka site has similar harvest totals for marketable squash in August with the exception of Treatment 5 which had half the number of harvested squash compared to Treatments 1 and 2. In September, Treatment 1 had two to three times the number of squash harvested compared to the other treatments. In October, Treatment 1 had over twice the number as Treatment 4. Over all, Treatment 1 had nearly twice the number of harvested squash compared to Treatment 4 and all other treatments had fewer squash harvested than Treatment 4. See Table 1 for details.

The Shawnee site had more than twice the number of squash harvested than the Atoka site. In contrast to the Atoka site, Treatment 1 at the Shawnee site had 9 times the number of harvestable squash as Treatments 2 and 4 in the month of July. In August, Treatments 1, 2 and 5 have similar numbers of squash harvested while Treatment 4 had 25% more than the others. In September, Treatment 1 rebounded with nearly twice as many squash as Treatment 4 while Treatments 3 and 5 were about 25% behind Treatment 1. At the end of the trial in Shawnee, Treatments 1 and 4 had similar numbers while Treatments 2, 3 sand 5 were about 20% less than Treatment 4. See Table 2 for details.

Insect pests that were observed included squash bugs, stink bugs, flea beetles, cucumber beetles, Cabbage moth larva and the Southern Corn Billbug (weevil). Squash bugs were the most commonly observed pests at these two locations. Beneficial organisms observed included different species of bees, moths, butterflies, parasitoid wasps, wheel bugs, assassin bugs, Eastern firefly (observed feeding on immature squash bugs). At the Shawnee site, possibly due to the extremely wet conditions, toads were also abundant.

Summary

At the Shawnee site, Treatment 1 had the largest number of harvestable squash in July and September. Treatment 4 had nearly a 40% greater harvest than Treatment 1 in August. By the end of the trial, Treatment 1 had more harvestable fruit than Treatment 4, but not significantly more. Treatments 2, 3 and 5 had similar numbers of harvestable squash.

A noteworthy observation was that in the early part of the trial, squash bugs did not get established in the covered treatments. At the Shawnee location, when immature squash bugs were recorded on a given date, there were always fewer or none on those beds the next day. Not until September did the numbers of squash bugs build up in the covered treatments. None of the covered treatments received insecticide applications.

Table 1. Monthly Totals of Harvestable Squash by Treatment at the Atoka site.

Trt	August	Sept	Oct	Ttl
1	31	58	8	97
2	29	18	1	48
3	22	22	0	44
4	26	29	3	58
5	16	18	0	34
				281

Table 2. Monthly Totals of Harvestable Squash by Treatment at the Shawnee site.

Trt	July	August	Sept	Ttl
1	36	79	47	162
2	4	81	21	106
3	1	72	32	105
4	4	109	26	139
5	1	82	34	117
				629

Acknowledgements

This work is supported in part by the southern SARE Program. This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number OS14-091.