New Mexico State University

Agricultural Science Center at Artesia

New Mexico State University
Agricultural Science Center at Artesia
67 E. Four Dinkus Road, Artesia, NM 88210

2017
Annual Progress Report

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Station Personnel

Robert Flynn, Superintendent, Agronomist

Jane Pierce, Entomologist

Stephanie Tilton, Administrative Assistant, Associate

Patricia Monk, Research Assistant

Ruben Pacheco, Research Assistant

Servando Bustillos, Farm Ranch Supervisor

Martin Lopez, Lab Tech, Research

Christopher Hill, Laborer, Sr.

NMSU Agricultural Science Center
67 E. Four Dinkus Rd.
Artesia, NM 88210
575-748-1228
Fax: 575-748-1229

http://artesiasc.nmsu.edu/

Facebook NMSU ASCArtesia

NOTICE TO USERS OF THIS REPORT

This report has been prepared to aid Science Center Staff in analyzing results of the various research Projects from the past year and to record data for future reference. These are not formal Agricultural Experiment Station Report research results.

Information in this report represents only one-year's research. The reader is cautioned against drawing conclusions or making recommendations as a result of data in this report. In many instances, data represents only one of several years' results that will constitute the final format. It should be pointed out, that staff members have made every effort to check the accuracy of the data presented.

Contents

Acknowledgements

Several individuals and companies donated products and service to the Artesia Agricultural Science Center during 2017. Appreciation is expressed to the following persons and organizations for their contribution.

Southeastern New Mexico Agricultural Research Association

Chaves County	Eddy County	Lea County
James Jones, Treasurer	David Torres	Bruno Bruelhart
Travis Gray	James Walterscheid	John Norris
Doug Whitney	Dean Calvani, Vice Chairman	Todd Roberson, Chairman
	Doug Lynn, Associate Board Member	
	Extension Agents	
Sandra Barraza	Woods Houghton	Wayne Cox

2017 HOWARD STROUP SCHOLARSHIP RECIPIENT
Jaime E. Grisalva, Roswell High School
Major in Turfgrass Management
Concentration in landscape design
Minor in Soil Science

INTRODUCTION

The New Mexico State University Agricultural Science Center at Artesia is located 7 miles south of Artesia just off of US 285 on County Road 229. The center is located in the Pecos Valley in the Artesian Conservancy District. The center is comprised of 150 acres of land located at 35.13N, -106.50W at an elevation of 3,700 feet above sea level. The Ag Science Center has several of the major soil types found in the Pecos Valley consisting of Harkey very fine sandy loam, Karro loam, Pima silt loam, Reagan loam, and Reeves loam. The farm utilizes Artesian water rights using flood, furrow, sideroll sprinklers, and linear move irrigation systems. There are currently 5 acres of Western Shley and 5 acres of Pawnee pecan trees. Perennial crops of alfalfa, grapes, blue grama, and a demonstration orchard of Jujube trees and Paulownia trees. Annual crops include cotton, small grains for silage, forage corn, sorghum and sudangrass.

Center Events, Activities and Outreach

Field Day is held every other even year as per SENMARA bylaws.

Introduction to Environmental Science class tour given on September 19 from NMSU-Carlsbad. Dr. Pierce and Patricia Monk participating.

Ag Day at Park Junior High school “Ag Day” May 3. Participation by Dr. Robert Flynn, Dr. Jane Breen Pierce, and Patricia Monk.

Extension Internship Mentor. (June 1, 2017 - June 30, 2017). Advised and taught Melody Martinez, an undergraduate student in the College of ACES, aspects of Extension and Research. She was exposed to extension specialist activities by participating in daily agronomic activities that included identifying crop growth stages, soil fertility, irrigation water scheduling, entomology, etc. The student also participated as a student attendee at the Western Region Crop Science Society of America in Parma, ID. While there she learned of other programs of study in the western region including hops production, drone use in research plots, and irrigation management trials.

Jane Pierce: Mentor for junior high student working on NM Science Fair honeybee foraging behavior project, 2017-2018.

Farm Walk in Santa Fe, NM by Jane Pierce and colleagues.

P. Monk and J. Pierce. Bugs, Bugs, Bugs. Hermosa Elementary School Artesia, NM (April 2017)

Pierce, J. B. and R.P. Flynn Earth Day/ Ag in the Classroom, Artesia, NM, "Ag in the Classroom" Park Junior High School, Artesia, NM. (May 2017).

Annual Weather Summary

Table 1. Historical monthly precipitation (in.) for the Agricultural Science Center at Artesia

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	0.68	0.00	0.00	0.63	0.00	1.32	0.00	0.89
February	1.36	0.18	0.17	0.00	0.21	0.23	0.31	0.41
March	0.20	0.00	0.06	0.00	0.42	0.12	0.00	0.02
April	0.28	0.00	0.02	0.00	0.80	0.92	0.53	1.09
May	1.26	0.00	3.19	0.73	0.85	2.47	0.98	0.30
June	1.05	0.70	0.18	0.10	1.12	0.83	1.02	1.83
July	3.64	0.53	2.33	3.20	2.21	1.19	0.43	1.49
August	1.31	0.12	0.97	0.06	1.09	0.38	4.17	3.15
September	1.85	2.13	1.38	3.65	7.37	0.93	5.93	1.92
October	0.06	0.50	0.26	0.06	0.50	4.49	1.42	0.43
November	0.00	0.00	0.11	0.80	1.63	0.35	0.73	0.31
December	0.04	0.68	0.01	0.46	0.22	0.50	0.76	0.07
Total	11.73	4.84	8.68	9.69	16.42	13.73	16.28	11.91

Table 2. Average monthly temperatures (ºF) for the Agricultural Science Center at Artesia.

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	38.2	39.1	43.9	40.0	38.8	36.5	37.7	43.9
February	41.7	41.2	44.5	43.6	45.1	44.4	46.9	50.4
March	49.3	56.1	55.4	52.6	51.4	50.8	55.0	57.7
April	60.4	64.1	64.6	59.4	59.7	59.8	60.6	62.8
May	67.9	68.4	70.9	70.0	68.7	65.6	67.3	68.0
June	81.1	81.3	81.0	81.4	80.7	78.1	79.1	68.0
July	7.77	84.1	80.2	78.1	80.7	81.7	85.2	79.6
August	79.7	84.9	80.4	79.9	77.8	80.6	78.0	77.9
September	74.7	72.6	71.7	72.2	69.9	76.0	71.8	73.4
October	62.5	61.7	61.0	58.8	62.2	62.7	64.6	61.6
November	48.2	49.6	52.3	46.7	45.5	49.1	52.1	53.2
December	44.4	32.0	41.0	38.9	42.6	41.6	41.9	43.2
Average	61.9	64.0	64.2	62.1	61.9	62.3	63.5	62.4

Table 3. Historical average monthly maximum temperatures (°F) for the Agricultural Science Center at Artesia.

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	55.1	60.0	62.9	56.9	59.0	50.0	53.3	59.4
February	56.7	61.3	61.7	61.9	61.6	60.6	66.8	69.4
March	67.4	78.5	77.0	72.8	71.7	68.0	74.4	78.3
April	77.2	84.4	85.2	77.9	78.5	77.4	79.7	80.1
May	85.8	87.5	87.7	88.2	86.8	81.7	83.9	86.1
June	99.3	101.5	98.4	98.3	97.7	93.2	102.0	96.2
July	89.2	100.3	94.4	90.9	95.0	96.7	85.2	95.4
August	95.7	101.1	96.4	95.2	90.9	96.7	91.4	90.9
September	89.2	89.3	88.4	86.1	79.8	91.5	84.8	88.9
October	80.8	80.9	78.5	77.5	79.1	75.7	83.0	78.3
November	68.8	67.5	72.0	62.2	61.1	65.4	67.3	69.5
December	63.8	46.4	61.6	53.6	57.8	58.0	56.8	61.1
Average	78.6	82.9	82.1	78.9	78.3	77.9	80.2	79.5

Table 4. Historical average monthly minimum temperatures (°F) for the Agricultural Science Center at Artesia.

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
January	21.4	18.2	25.0	23.1	18.5	23.1	22.2	28.4
February	26.7	21.1	27.3	25.4	28.7	28.3	27.0	31.4
March	31.1	34.8	33.7	32.5	31.2	33.5	35.7	37.1
April	43.5	43.7	44.1	40.8	40.8	42.2	41.5	45.4
May	50.1	49.4	54.0	51.8	50.6	49.5	50.8	49.9
June	62.9	61.0	63.6	64.6	63.6	62.9	62.1	62.9
July	66.2	67.9	65.9	65.3	66.4	66.6	68.3	66.8
August	63.8	68.7	64.4	64.5	64.6	64.6	64.7	64.8
September	60.2	55.9	54.9	58.3	60.1	60.5	58.8	58.0
October	44.3	42.4	43.5	40.2	45.3	49.6	46.2	44.8
November	27.6	31.7	32.5	31.2	29.8	32.8	36.9	36.9
December	25.0	23.5	20.4	24.3	27.4	25.2	27.0	25.4
Average	45.2	45.0	46.3	45.2	45.4	44.9	46.7	46.0

Financials

FY ('16-'17)	Sales	Operations Enhancement	Land Use	Tractors Vehicle	Grant	TOTAL
REVENUE		120939	18000		29072	168012
15-16 Carry Over	26010			7647		33658
Appropriation						0
Grants $ Gifts						0
Sales & Fees	15225					15225
Irrigation Usage						0
Tractor/Vehicle Usage				1162		1162
Lab Usage						0
Indirect Cost						0
TOTAL REVENUE	41235	120939	18000	1162	29072	210408
Travel Totals		4655		45	7432	12131
Supplies						0
Auto Repair						0
Fuel		6884		329.84	645.11	7859
Office		329				329
Other	203	11550			394	12147
Linen						0
Lab						0
Computer						0
Cleaning		1272				1272
Photo						0
Safety		800				800
Seed						0
Fertilizer	3601.69	661				4263
Business Meals		977				977
Publications/Media						0
Books						0
Newspapers						0

Equip, R &M	4315	13143				17459
Furnt/Eqpt lt 5000		5950			1422	7372
Parts R & M						0
Building R & M		234.50				235
Computer R & M						0
Vehicle R & M		1316.76		683.71	42.71	2043
Supplies Totals						0
SERVICES	8120	43118	0	1014	2504	54755
Training						0
Postage	453	644				1097
Phone/Cell Phone	4038	3699				7737
ADV fed exc	23					23
Insurance				825		825
Printing		14.00				14.00
General Services	13.03	1695				1708
Hardware Eqpt		4499				4499
Non-Building R&M		5473	6069			11543
Building R&M		2886				2886
Electric		7103				7103.4
Propane		3389				3389
Utilities Water		1521				1521
Dues, Fees, Tax		239				239
Memberships						0
Internet		5199				5199
Prof Contracted Ser					14470	14470
Medical Fees						0
Lab Analysis	4352	444				4797
Farm and Ranch						0
Freight						0

Software						0
Grant Overrun					956.50	956.5
SERVICE TOTALS	8879.22	36806	6070	825	15427	68007
Enter Dept. Transfers						-1830.6
Subcontract						0
Indirect General						0
Non Mand transfer						0
Furt/Equipt						0
Inter Dept. Transfers Total	0	0	0	0	0	0
TOTAL REVENUE	41235	120939	18000	1162	29072	210408
TOTAL EXPENSES	16999	84579	6069	1884	25362	13489

Variety Trials not including Cotton

Alfalfa: http://aces.nmsu.edu/pubs/variety_trials/AVT17.pdf
Corn and Sorghum Performance Trials
http://aces.nmsu.edu/pubs/variety_trials/AVT17.pdf

2017 Cotton Yield Trial at Artesia

Table 1. Pima lint yield and quality and economic data from the wastewater-irrigated commercial cotton performance test at NMSU's Agricultural Science Center at Artesia in 2017.

Brand/Company	Hybrid/Variety	seed-cotton	Lint		Turnout	bollwt	TrashCode	TrashArea	Trash Count
		lb/a	lb/a	bales/a	%	g			%
Delta Pine	DP 348 RFP	4617	1825	3.80	39.5	3.33	3	0.3	12
Phytogen	PHY 802 RF	3062	1196	2.49	39.0	3.59	3	0.3	10
Phytogen	PHY 805 RF	4431	1778	3.70	40.0	3.54	3	0.3	10
Phytogen	PHY 811 RF	4655	1797	3.74	38.6	3.47	3	0.3	11
Phytogen	PHY 841 RF	4929	2014	4.20	40.8	3.39	2	0.2	6
Phytogen	PHY 881 RF	4941	1941	4.04	39.3	3.72	3	0.3	11
	Trial Mean	4439	1758	3.66	39.5	3.51	2.78	0.3	9.94
	LSD, 0.05	668	324	0.67	NS	NS	NS	NS	NS
	CV	9.0	11.0		3.6	5.74	14.2	14.9	49.1
	Prob>F	0.0016	0.0053		0.516	0.34	0.29	0.16	0.71

Table 1 (cont.). Pima Lint yield and quality and economic data from the irrigated commercial cotton performance test Science Center at Artesia in at NMSU's Agricultural 2017.

Hybrid/Variety	Length	Unif	SFI	Str	Elg	Mic	Matr	Rd	Yellow	Gross returns	Loan price
	32/inch	%	Short Fiber Index	g/t						$/ac	Cents
DP 348 RFP	1.43	89.6	5.2	51.9	4.1	4.0	82.7	70.0	11.9	1666	77.17
PHY 802 RF	1.45	90.9	5.8	54.7	4.2	3.7	81.7	70.4	11.7	1100	77.50
PHY 805 RF	1.44	91.1	5.3	52.2	3.8	4.0	82.7	70.0	11.8	1657	78.85
PHY 811 RF	1.45	91.7	5.3	53.0	3.7	3.8	82.7	70.4	11.7	1651	77.70
PHY 841 RF	1.44	90.8	5.7	52.9	4.7	3.7	81.3	70.0	11.9	1885	79.63
PHY 881 RF	1.47	91.3	5.3	55.3	3.6	3.9	83.0	70.3	11.3	1804	78.75
Trial Mean	1.45	90.9	5.4	53.4	4.0	3.8	82.3	70.2	11.7	1379	78.27
LSD, 0.05	0.04	1.59	0.75	5.28	0.80	0.26	0.75	1.4	0.7	281	3.29
CV	1.67	1.05	8.24	5.91	11.9	4.00	0.54	1.2	3.7	12.16	2.51
Prob>F	0.18	0.22	0.56	0.72	0.14	0.14	0.006	0.95	0.59	0.0088	0.63

Table 2. Upland lint yield and quality and economic data from the wastewater-irrigated commercial cotton performance test at NMSU's Agricultural Science Center at Artesia in 2017.

Brand/Company	Hybrid/Variety	seed-cotton	Lint		Turnout	bollwt	TrashC	TrashA	TrashPrt
		lb/a	lb/a	bales/a	%	g			%
Bayer	FM 2334 GLT	2929	1244	2.9	42.5	4.84	2	0.2	8
Bayer	ST 4946 GLB2	2761	1072	2.74	38.9	5.89	2	0.2	6
Bayer	ST 5517 GLTP	2821	1148	2.81	40.6	5.69	3	0.3	7
DynaGro	DG 3385 B2*	2505	982	3.14	39.2	5.17	2	0.2	7
Monsanto Delta Pine	16R 341 B3XF	2750	1176	2.75	42.8	5.22	3	0.4	12
Monsanto Delta Pine	16R 346 B3XF	2957	1271	2.93	42.9	5.24	3	0.3	14
Monsanto Delta Pine	DP 1549 B2XF	3017	1212	2.81	40.3	5.58	3	0.3	9
Monsanto Delta Pine	DP 1612 B2XF	2842	1197	2.85	41.9	5.26	2	0.2	5
Monsanto Delta Pine	DP 1646 B2XF	2891	1223	2.87	42.3	5.04	3	0.3	8
Monsanto Delta Pine	DP 348RF PIMA	2723	1037	2.59	37.9	4.62	2	0.3	9
Phytogen	PHY 300 W3FE	3354	1402	3.28	41.8	5.07	3	0.3	12
Phytogen	PHY 330 W3FE	2684	1098	2.6	40.9	4.52	2	0.2	8
Phytogen	PHY 340 W3FE	3000	1208	2.87	40.2	4.86	2	0.3	9
Phytogen	PHY 444 WRF*	2298	890	2.28	38.5	4.19	3	0.3	7
Phytogen	PHY450 W3FE	2652	1071	2.6	40.3	5.05	2	0.2	6
Phytogen	PHY 490 W3FE	2630	1078	2.6	41.0	4.96	3	0.3	9
Phytogen	PX2A28 WFE	2733	1106	2.76	40.6	5.23	3	0.3	6
Phytogen	PX2A31 WFE	2859	1206	2.82	42.1	5.01	3	0.3	8
	Trial Mean	2800	1146	2.79	40.8	5.08	2.5	0.27	8.4
	LSD, 0.05	NS	260.7	NS	2.32	0.85	NS	NS	NS
	CV	12.5	13.7	15.5	3.4	10.1	20.7	28.2	42.8
	Prob>F	0.2774	0.1	0.71	0	0.05	0.639	0.611	0.2

NS signifies not significant at P < 0.0500 based on the Prob>F at the bottom of the column. Consequently, no LSD value is published. * Demarks varieties that were entered as a "local challenger" variety based on popularity in the 2016 season.

Table 2 (cont.). Upland lint yield and quality and economic data from irrigated commercial cotton performance test at NMSU's Agricultural Science Center at Artesia in 2017.

Hybrid/Variety	Length	Unif	SFI	Str	Elg	Mic	Matur	Rd	Yellowing	Color	Grade	Gross returns	Loan price
	32/in	%		g/t								$/ac	Cents
FM 2334 GLT	1.19	84.3	7.2	34.8	6.4	3.8	80.0	81.5	7.5	24	1	884	57.68
ST 4946 GLB2	1.16	81.9	9.0	33.3	5.4	3.7	80.0	82.1	7.5	24	1	753	56.80
ST 5517 GLTP	1.23	82.4	8.5	31.8	4.6	3.8	81.0	83.9	7.1	14	2	821	58.07
DG 3385 B2XF	1.17	83.0	9.0	30.1	6.5	3.3	78.3	82.2	7.5	21	2	681	55.73
16R 341 B3XF	1.23	82.8	8.9	34.8	6.9	3.4	78.3	81.4	7.5	24	1	825	56.57
16R 346 B3XF	1.25	84.1	8.0	34.2	8.1	3.6	78.0	82.6	7.4	18	2	903	57.57
DP 1549 B2XF	1.20	82.9	7.8	32.6	5.9	3.4	79.0	81.6	7.4	24	1	835	55.40
DP 1612 B2XF	1.19	83.1	8.7	34.7	5.7	3.7	80.0	81.4	8.0	18	2	855	58.00
DP 1646 B2XF	1.22	81.9	9.8	30.0	6.2	3.6	79.3	83.8	6.9	21	1	861	56.97
DP 348RF PIMA	1.21	82.6	8.7	37.1	5.8	3.5	79.3	78.7	8.9	25	1	697	53.43
PHY 300 W3FE	1.18	83.6	8.3	33.9	5.4	3.9	81.0	80.3	7.8	28	1	996	57.57
PHY 330 W3FE	1.17	82.3	9.2	30.8	4.8	3.4	79.7	80.3	7.8	24	2	755	55.22
PHY 340 W3FE	1.18	82.2	9.2	29.8	6.7	3.3	78.0	81.0	7.3	28	1	822	54.50
PHY 444 WRF*	1.31	87.0	7.2	45.7	4.2	3.6	81.0	75.4	10.5	22	2	587	52.28
PHY450 W3FE	1.18	83.6	8.6	33.4	4.7	3.7	80.7	81.7	7.6	21	1	761	57.63
PHY 490 W3FE	1.14	85.0	8.0	39.3	7.0	4.2	80.5	78.3	8.0	31	2	781	57.15
PX2A28 WFE	1.19	82.8	8.5	31.1	4.0	3.5	80.7	83.7	7.1	18	2	781	57.22
PX2A31 WFE	1.15	82.4	9.6	33.7	5.4	3.9	80.7	82.0	7.5	21	2	853	57.12
Trial Mean	1.20	83.2	8.6	33.8	5.7	3.6	79.7	81.3	7.7	22.4	1.5	803	56.37
LSD, 0.05	NS	NS	NS	7.5	1.8	0.4	1.6	3.5	1.7	NS	NS	199	149
CV	4.55	2.0	14.3	13.3	18.7	6.9	1.2	2.6	12.9	23.7	39.6	15.0	2.8
Prob>F	0.0944	0.1215	0.46	0.04	0	0.019	6E-04	0.005	0.039	0.091	0.386	0.0779	0.0024

ASC Artesia Annual Report: Entomology

Jane Breen Pierce
New Mexico State University
Email:japierce@nmsu.edu

EVALUATING EFFICACY OF SELECTED SEED TREATMENTS AGAINST THRIPS IN SEEDLING COTTON IN NEW MEXICO

Introduction

Early season control of thrips is important. Thrip feeding in the terminal bud of cotton cause leaves to have a crinkled, tattered appearance as they expand and heavily damaged foliage often is stunted and curls upward at the margins. Another characteristic of thrip damage is a silvery appearance of leaves at the feeding sites. Cotton damaged by thrips may have reduced photosynthesis capacity, attenuated growth, and plant death (Boyd et al. 2004). Reductions in stand density, poor early-season crop growth, and delayed crop maturity can reduce lint quality and cotton yields. These reductions have been observed to vary across cotton production regions, justifying a region-wide study. Historically, thrips and pink bollworm were considered the most significant insect pests of cotton in New Mexico and the vast majority of growers used Temik for thrip control. More recently growers in New Mexico have been using seed treatments to control thrips.

Early-season pest management in cotton was historically achieved with an in-furrow treatment of aldacarb (Temik®). In 2010, the Environmental Protection agency and Bayer CropScience reached an agreement to terminate production and use of aldacarb in the United States (EPA Newsroom, 2010). Consequently, alternative practices for early-season pest management were needed. Neonicotinoid insecticide seed treatments have become the primary solution to managing early-season pests of cotton in this region. Thiamethoxam and imidacloprid are two common systemic insecticide seed treatments applied to commercial cotton seed. Although the two insecticides belong to the same insecticide group, their physical and chemical properties vary and they may exhibit differential mortality among target pests.
A secondary objective is to identify thrips to document baseline species in NM compare to species composition in the rest of the region and over time document changing species composition.

Materials and Methods

Cotton seeds treated with two different neonicotinoid insecticides (imidacloprid and thiamethoxam) were used to evaluate their efficacy against thrips. Field plots were also checked routinely for whiteflies and cotton aphid populations. Similar trials were conducted in multiple locations in Texas. Seeds of FM2334GLT, a widely adapted cotton variety, were treated with imidacloprid and thiamethoxam. An additional seed treatment, the check, had no insecticide seed treatment, but did include a base fungicide for protection against fungal pathogens. The selected variety, FM2334GLT, has some level of inherent tolerance to rootknot nematodes. No nematicide was added to the seed treatment in order to avoid possible interactions with the insecticide seed treatments.

Five cotton producing locations in Texas and one location in New Mexico conducted similar trials. This report focuses on results from New Mexico. The New Mexico trial included three different treatments (two insecticide seed treatments and one untreated control), replicated four times. The main treatment plot size was eight rows by 50 feet. Each main plot was split into two four-row plots, with one plot scheduled to receiving foliar applications of Orthene if needed. Planting date and other agronomic management decisions were chosen in accordance with the conventional agronomic practices for the Pecos Valley in NM.

After planting and seedling emergence, thrips were recorded using a washing technique. Plants were also scouted for the presence of cotton aphid, whitefly so counts could be made if there was sufficient pressure using visual in-field assessments of 10 randomly selected plants per plot at different growth periods. The washing method was used to determine thrips populations instead of a visual sampling method in order to reduce sampling variability. Thrips were collected from plant samples at four different time period/growth periods; cotyledon, 2-leaf, 3-leaf, and 4-leaf stages. For each sampling date and experimental plot, 10 randomly selected cotton seedlings of each respective growth stage, were cut above the soil and preserved in a quart size glass jar, half-filled with 75% ethanol. The samples were brought to the laboratory and processed to extract thrips (both adults and immatures) for each sampling date. Adult and nymph counts were recorded separately for each plot. Fourth leaf stage cotton plant height was measured from 10 random plants per plot. Later in the season, delays in plant maturity were assessed by counting nodes above white flower (NAWF). Plots were harvested by cotton picker and seed cotton yield was compared among the treatments using Tukey's Comparison of Means (SAS JMP version 13).

Adult thrips from early season samples were held in order to determine species composition infesting cotton seedlings for comparison with different geographic regions of Texas and southeastern New Mexico.

<u>Results</u>

In 2017, there were significantly fewer thrips in the thiamethoxam plots on 5/26 the first reading with 0.25 thrips per plant compared to 3.5 thrips per plant in the check but there was no clear activity after the first date (Table 1). Part of the difficulty in discerning differences was due to relatively low thrip pressure. We have, in the past few years, recorded higher thrip pressure in Las Cruces so, in 2018, we will do this trial in both Artesia and Las Cruces NM.

Table 1. Efficacy of imidacloprid and thiamethoxam seed treatments for thrip control in New Mexico.

	Number of thrips per ten plants			
Seed Treatment	5/26/17	5/30/17	6/5/17	6/12/17
Check	3.5a	1.7a	1.2a	1.5a
Imidacloprid	1.7ab	2.0a	2.5a	1.5a
Thiamethoxam	0.25b	1.2a	2.0a	0.5a

Means with similar letters are not significantly different by Tukey (SAS-JMP)

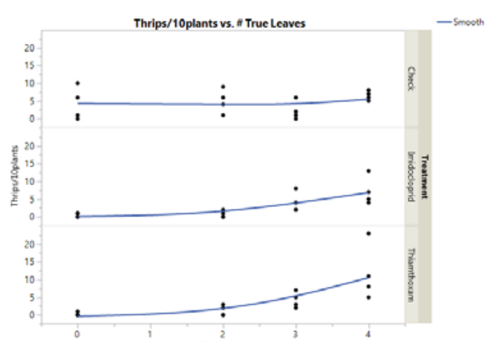

Figure 1. Thrip number per 10 plants by number of true leaves in seed treated plots.

In 2016, there were significantly more thrips in control plots compared to both imidacloprid and thiamethoxam seed treatment plots on two dates when plants had 0-2 true leaves (df 2,21 F=7.7 *P*<0.003) (Fig. 1). There was no significant difference among the seed treated plots or the control plots on two later dates when plants had 3-4 true leaves. There were significantly more thrips in older cotton plants compared to the younger plants with an average of 8.5 thrips per 10 plants with 4 true leaves vs.1.7-3.5 in plants with 0-3 true leaves.

There were significantly fewer nodes above white flower in the imidacloprid treatment with 4.3 NAWF on 8/1/16 compared to 4.8 and 4.9 for the check and thiomethoxam treatments in 2016. Plant height at 4 true leaves ranged from 6.2 to 6.8 inches and were not significantly different in 2016 (Table 2)

Table 2. Impact of imidacloprid and thiomethoxam on plant height and nodes above white flower in 2016 trial to evaluate seed treatments for early season thrip control.

Seed Treatment	Plant ht	s.e	Nodes Above White Flower			
			7/25/16	s.e	8/1/16	s.e
Check	6.2a	.28	6.8a	.15	4.8a	.09
Thiomethoxam	6.8a	.25	7.0a	.20	4.9a	.15
Imidacloprid	6.2a	.26	6.4a	.18	4.3b	.15

Means with similar letters are not significantly different by Tukey (SAS-JMP)

Unlike 2016, NAWF were not significantly different on any date or in any treatment in 2017 with NAWF 6.5-6.9 on 7/17/17 and 4.5-4.7 on 7/24/17 (Table 3). Plant height was also not significantly different in any treatment with plant height at 4 true leaves from 6.3 to 6.6 inches tall.

Yields in the 2016 seed treatment trial were not significantly different (df 2,47 F=1.2 *P*<0.30) (Table 4). Yields ranged from 1815-2175 lb/A or 3.8-4.5 bales/A.

Table 3. Impact of imidacloprid and thiomethoxam on plant height and nodes above white flower in 2017 trial to evaluate seed treatments for early season thrip control.

Seed Treatment	Plant ht	s.e	Nodes Above White Flower			
			7/17/17	s.e	7/24/17	s.e
Check	6.6a	.26	6.9a	.13	4.5a	.09
Thiomethoxam	6.3a	.24	6.7a	.12	4.7a	.15
Imidacloprid	6.3a	.28	6.5a	.13	4.5a	.15

Means with similar letters are not significantly different by Tukey (SAS-JMP)

Table 4. Yields in Seed Treatment Field Trial for Early-Season Thrip Control, Artesia, NM 2016

Treatment	Yield (lb seed cotton /A	s.e.	Yield (bales/A)	s.e.
Check	2175a	179	4.5a	.37
Imidacloprid	2130a	179	4.4a	.37
Thiomethoxam	1815a	172	3.8a	.36

Means followed by similar letters are not significantly different by Tukey's test (SAS-JMP)

Yields in the 2017 seed treatment trial were not significantly different (df 2.45 F=0.3 P<0.72) (Table 5). Yields ranged from 2615 to 2589 lb/A or 5.4 to 5.6 bales/A. Since thrip counts were very low in 2017 there was unlikely to be any impact of thrips on yield of untreated plants.

Table 5. Yields in Seed Treatment Field Trial for Early-Season Thrip Control, Artesia, NM 2017

Treatment	Yield (lb seed cotton /A	s.e.	Yield (bales/A)	s.e.
Check	2589a	108	5.4a	0.2
Imadicloprid	2707a	100	5.6a	0.2
Thiomethoxam	2615a	115	54a	0.2

Means followed by similar letters are not significantly different by Tukey's test (SAS-JMP)

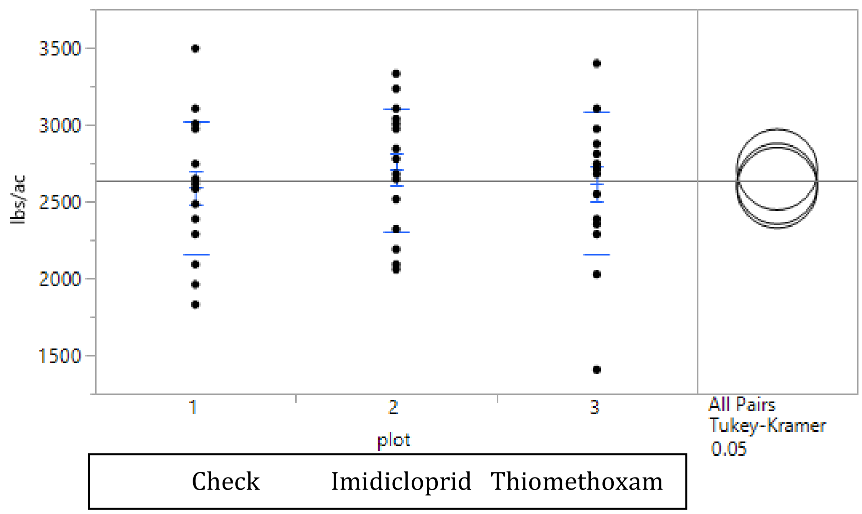

Figure 2. Yields in Seed Treatment Field Trial for Early-Season Thrip Control, Artesia, NM 2017

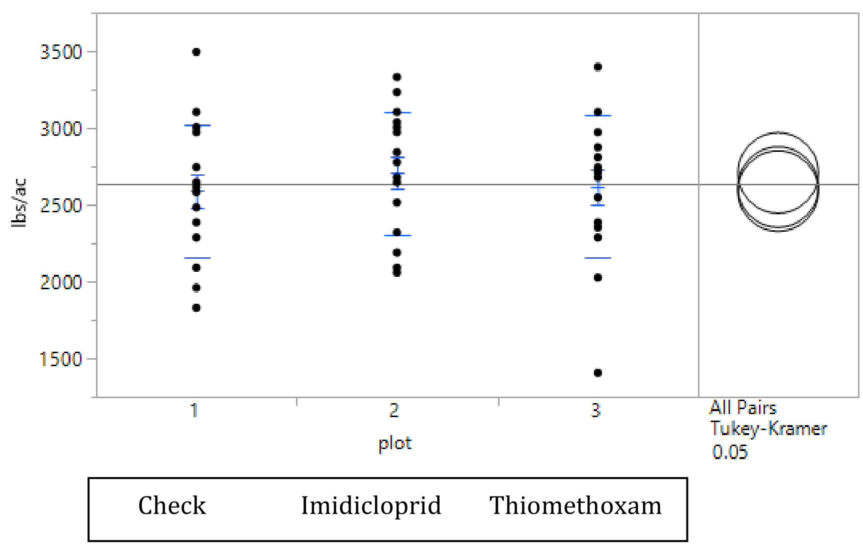

Figure 3. Yields in Seed Treatment Field Trial for Early-Season Thrip Control, Artesia, NM 2016.

IDENTIFYING CULTIVARS RESISTANT TO COTTON FLEAHOPPER
FOR PEST MANAGEMENT PROGRAMS IN TEXAS AND NEW MEXICO.

This project was being conducted in conjunction with Texas A & M University. Our trials for plant resistance to cotton fleahopper have been conducted at the New Mexico State University Agricultural Science Center farm near Artesia, NM

Introduction

The cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter) (Hemiptera: Miridae), can cause excessive loss of cotton squares, resulting in reduced yield and harvest delays. In nearby Texas, cotton fleahopper is a key insect pest of cotton causing estimated yield losses of up to 6 percent (Williams 2000). Damage to individual fields may vary from none to extremely high square loss when heavy populations develop and are left uncontrolled. The reason for variability in losses caused by the cotton fleahopper is not understood but may, in part, be associated with cultivar differences (Holtzer and Sterling 1980, Barman et al. 2012). Understanding cotton fleahopper response to cotton varieties will allow better management strategies for managing this pest on cotton. The primary objective of this study is to identify potential plant resistance to cotton fleahopper for use in pest management programs in the Southwest region (Texas, New Mexico, Oklahoma) and to allow for follow up determinations of the mechanisms of resistance to help breeders develop additional resistant varieties.

Materials and Methods:

In 2017, eight cotton varieties with unique genetic backgrounds were planted on May 4 in Artesia, NM. In 2016, four cotton varieties, DP1219, PHY333, PHY444 and Stoneville 4946GLB2 were planted on May 6. Procedures were similar both years. Cotton fleahoppers were sampled weekly beginning at pinhead square using the beat bucket technique. Samples were taken from the middle two rows of the plots by folding over 5 plants per sub-sample into a five-gallon bucket, beating the plants onto the side of the bucket, and immediately counting fleahoppers. After each subsample was collected the row was alternated with each sub-sample for a total of 5 samples of 5 plants each or 25 plants per plot. Fleahopper counts were divided into adults and nymphs. Sampling for fleahoppers was discontinued after plants began blooming. Yield was collected from 5 reps with 2 subplots of 50 feet. Data was analyzed using SAS JMP with LSMeans for fleahopper number and abcissed sites by variety nested within reps.

Results

In 2016, there were significantly more fleahoppers on 7/12 compared to 7/5 with 1.3 fleahoppers/sample on 7/12 compared to 0.7 fleahoppers per sample on 7/5 (Table 6). Adults and nymphs were combined in the analysis since there were the same number of adults and nymphs (21 vs 20) and insect numbers were low. There were no significant differences between the 4 varieties in either fleahopper number or abscission sites.

Table 6. Evaluation of Plant Resistance 7/12 to Fleahopper in Artesia, NM 2016

Variety	Abscised Sites	s.e.	# fleahoppers	s.e.
DP1219	1.0	0.2	1.2	0.7
PHY333	0.7	0.1	1.3	0.6
PHY444	1.3	0.2	0.8	0.6
Stoneville 4946GLB2	1.2	0.2	1.8	0.6

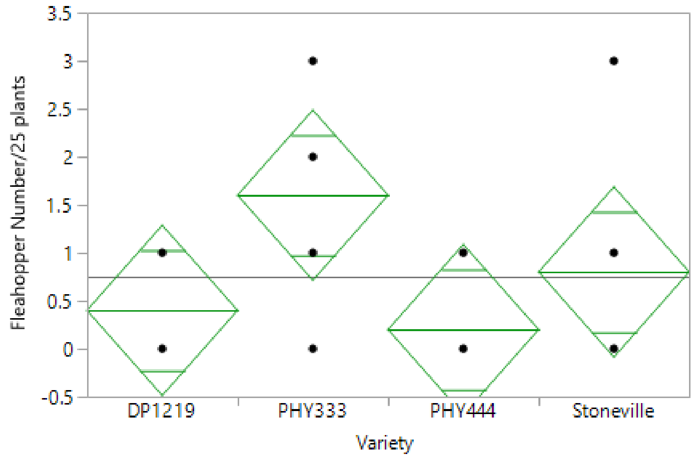

Figure 4. Fleahopper number July 5, 2016 in 4 cotton varieties in Artesia, NM

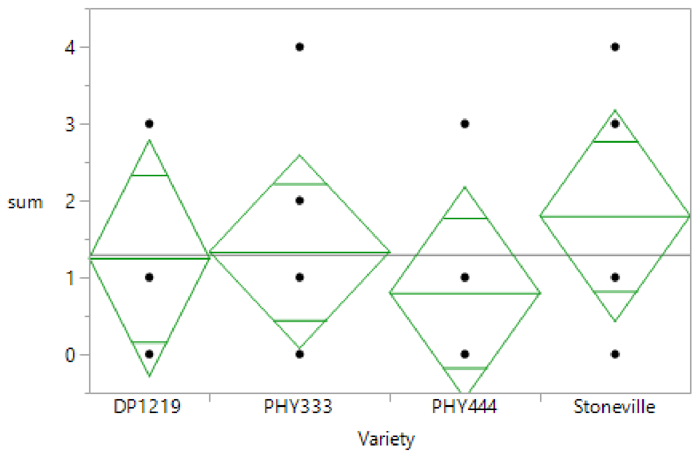

Figure 5. Mean fleahoppers across all dates, Artesia, NM

Table 7. Mean fleahoppers (adults and nymphs) per 25 plants

Variety	7/5	7/12
DP1219	0.4a	1.0a
PHY333	1.6a	1.6a
PHY444	0.2a	0.8a
Stoneville 4946GLB2	0.8a	1.8a

Means followed by similar letters are not significantly different by Tukey’s test (SAS-JMP)

Table 8. Yield of cotton cultivars evaluated for plant resistance to cotton fleahopper.

Variety	Yield (lb/A)	
	2016	2017
PHY333	1374a	1324a
Stoneville 4946GLB2	1427a	1262a
PHY444	1116a	1227ab
DP1219	1373a	1183ab
DP1522		1176ab
DP1518		1167ab
DP1649		1104ab
DP1725		880 b

In 2016 there were no significant differences in yield among the four cultivars with yield ranging from a high of 1427 lb/A in Stoneville 4946GLB2731 to 1116 lb/A in PHY444 (Table 8).

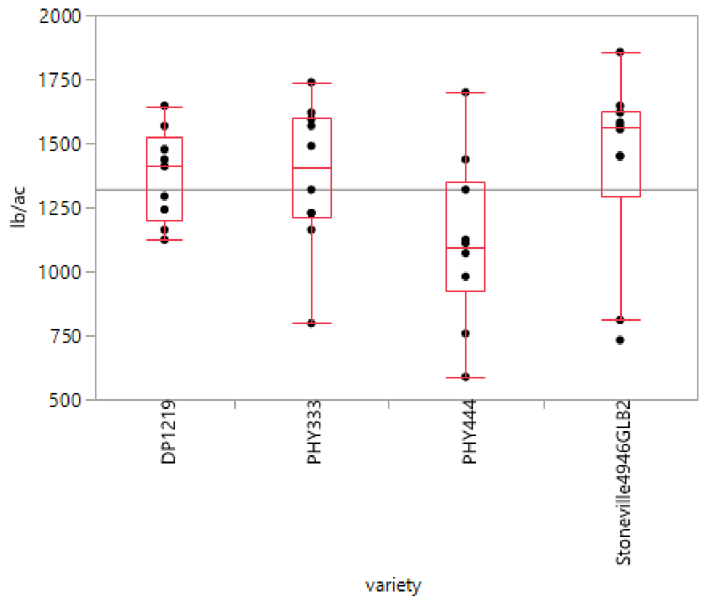

Figure 6. Yield of four varieties in fleahopper plant resistance 2016 trial

In 2017, PhytoGen 333 and Stoneville 4946GLB2 had significantly higher yields with 1324 and 1262 lb/A than DP 1725 with 880 lb/A (Table 8). Fleahopper populations were so low the differences are likely due to genetic differences in the cultivars**.** The performance of PhytoGen 333 and Stoneville 4946GLB2 are consistent with other locations. The performance of DP1725, a relatively new variety, was surprisingly low considering reported performance in other locations.

IMPACT OF REDUCED TILLAGE ON INSECT PESTS AND BENEFICIALS

Introduction

New recommendations being developed should be evaluated for their potential impact on insect pests. Tillage management is an issue worth considering since soil degradation is a major challenge associated with cotton production under conventional tillage practices in the Southwest. Reducing tillage in arid soils of southwestern USA is necessary, due to accelerated soil erosion, especially by wind and soil quality degradation prominent in conventionally tilled agricultural soils of this region. Conventional land preparation for cotton production in southern New Mexico is based on the plow-till system, which involves following practices - plowing, deep-ripping, multiple disking and shaping of soil into beds, to provide an optimum seedbed for emerging cotton seedlings.

Materials and Methods

A study was conducted in New Mexico in 2017, to evaluate the effects of different tillage systems on growth and yield of cotton. Tillage treatments tested included plow-till without beds (cotton planted on flat), plow-till with beds (cotton planted on beds) and strip-till systems. The strip tillage involved only one single pass to create about 10 inches zone for seed placement. NM 13P1117 a glandless cotton that is highly susceptible to insect pests was planted in May 2017.
Plots were sampled four times inspecting squares for damage for insect pests. In the first sample sweep net samples were also collected to determine if there were differences in either pests or beneficials.

Results

Square damage was recorded on 4 dates ranged from 0-5% with no significant differences among the three treatments. The sweep net samples of pests and beneficials are still being processed. A separate economic analysis of the net returns after deducting land preparation costs, indicated that the strip tillage system was more profitable than both conventional tillage treatments due to much lower land preparation cost. The lack of higher insect pressure in this more susceptible cultivar indicates that insect pressure should not be a problem with considering this option to reduce input costs and increase soil retention particularly since the cultivar used was highly susceptible to insect pests and was more likely to show if issues would develop.

YIELD PARTITIONING AND COMPENSATION IN A1517-08

Introduction

In 2000-2006, we did extensive work on yield partitioning and compensation with selected varieties of transgenic and conventional cotton varieties. Varieties have changed since that time so this year we revisited this concept evaluating a locally adapted variety 1517-08.

Materials and Methods

Cotton was planted in 4 row plots by 40 feet and managed by local agronomic standards. To mimic insect damage late season when we are most likely to see damage we removed 2 or 4 squares then 2 or 4 bolls for a total of 5 treatments including the control.

Results

The majority of yield from undisturbed plants was from the first position squares. In this trial 76.9% of bolls were from position 1 vs. 20.5%, 6.7%, 1.5 and 0.6% from positions 2, 3, 4, and 5 respectively (Fig. 7). The highest producing first position nodes were 7-10 which ranged from 6.9-7.3% of bolls and produced a total of 28.7% of bolls. The last four nodes including both first and second positions produced only 2.6% of total bolls. The last positions 4 and 5 produced only 1.1% of bolls.

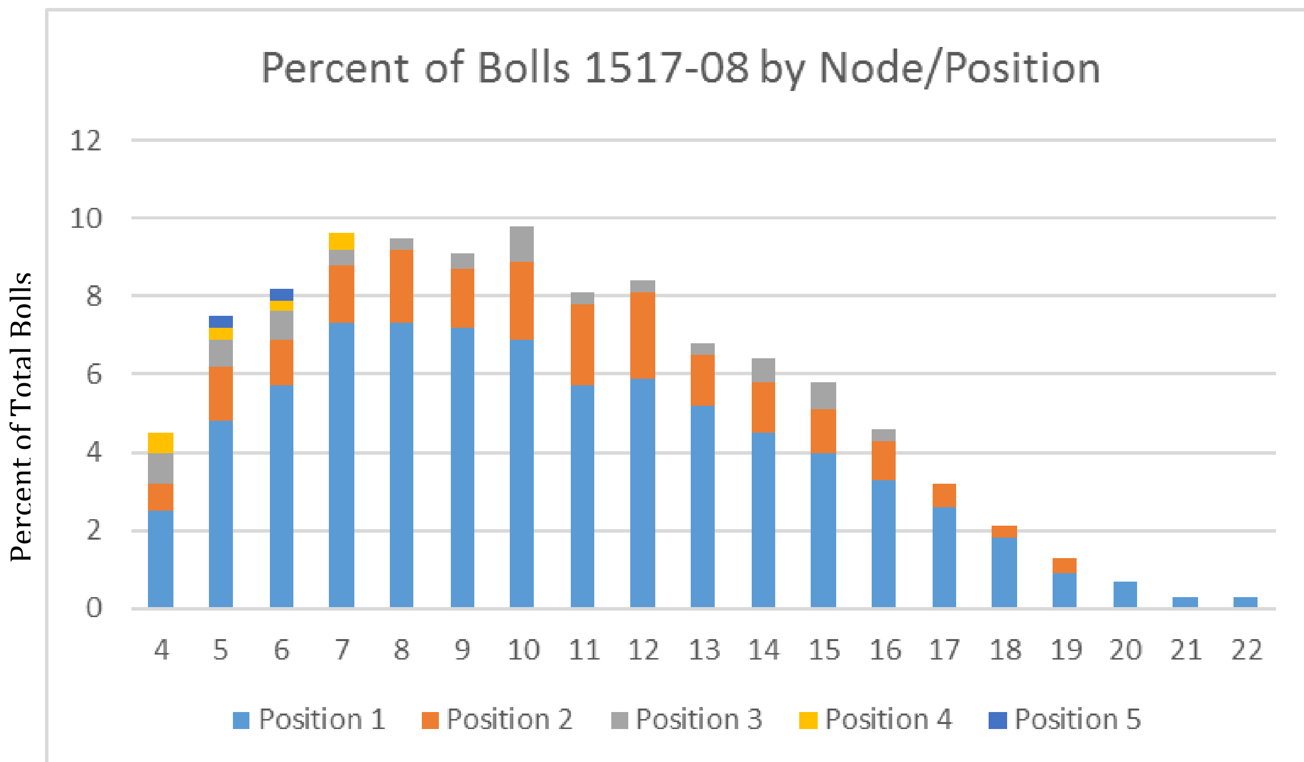

Figure 7. Production of bolls in 1517-08 by each node and position in Artesia field trial, 2017.

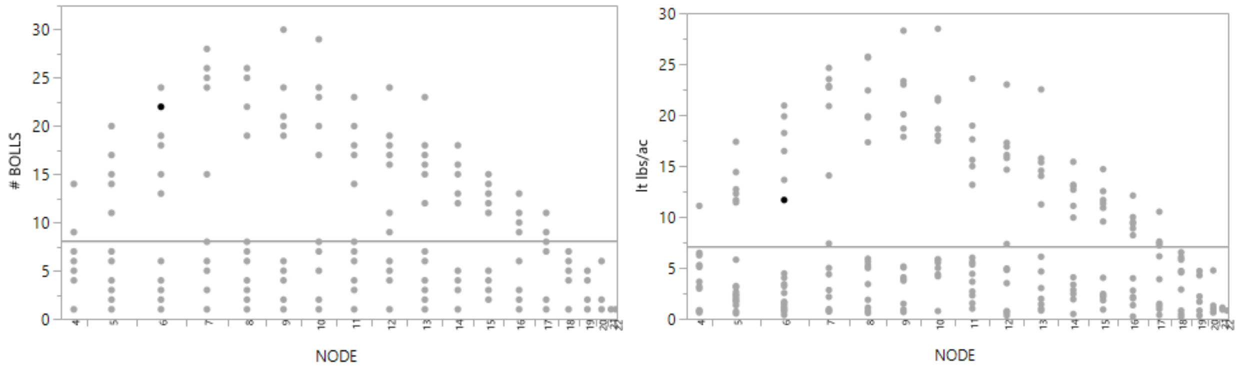

Figure 8. Influence of node on lint weight and lint weight per boll in 1517-08

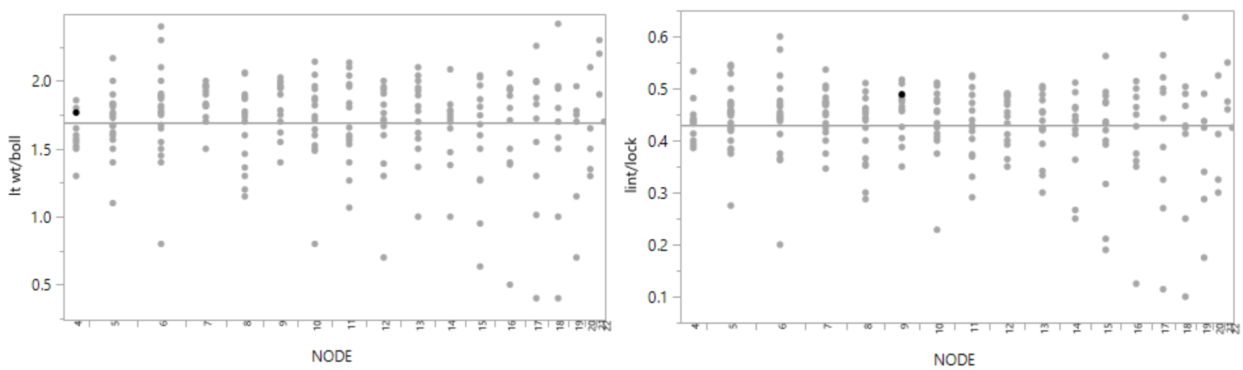

Figure 9. Influence of node on lint weight per boll and per lock in 1517-08 in 2017, Artesia, NM

The node location has a dramatic impact on number of bolls and yield. First position bolls have a curvilinear response with node while 2nd-5th postion bolls have far less impact and populate the lower third of the graphs. (Figure 8) There was no correlation between node and lint/boll or lint/lock (Figure 9). In previous trials there was often a significant correlation between node and lint/lock with reduced lint in bolls in the last few nodes. There were compensation trials about 2001 that had similar graphs where plants reallocated resources to the remaining squares increasing the size of the locks.

In the compensation trial removal of 4 or 8 squares did not result in significantly fewer bolls/A with 31.9 bolls /ft in the check and 28.5 and 26.2 in plots with 4 and 8 squares removed respectively (Table 9). Although losses were not significant there was a trend with numerical losses of 11-18%. Further data analysis of lint yield or lint yield per lock might have significant differences based on previous trials.

Plots with bolls removed did have significantly fewer bolls at harvest with 24.1 and 20.0 bolls/foot in plots with 4 and 8 bolls removed respectively. Losses from bolls were, not surprisingly much higher than losses from squares with 24-37% loss in boll yield compared to the check.

Table 9. Total number of bolls per plot after simulated late season injury.

Treatment	Bolls/ft	s.e.	% loss
check	31.9a	1.3	
4 squares removed	28.5ab	1.8	11
8 squares removed	26.2abc	0.7	18
4 bolls removed	24.1 bc	1.4	24
8 bolls removed	20.0 c	2.3	37

Means followed by similar letters are not significantly different by Tukey's test (SAS-JMP)

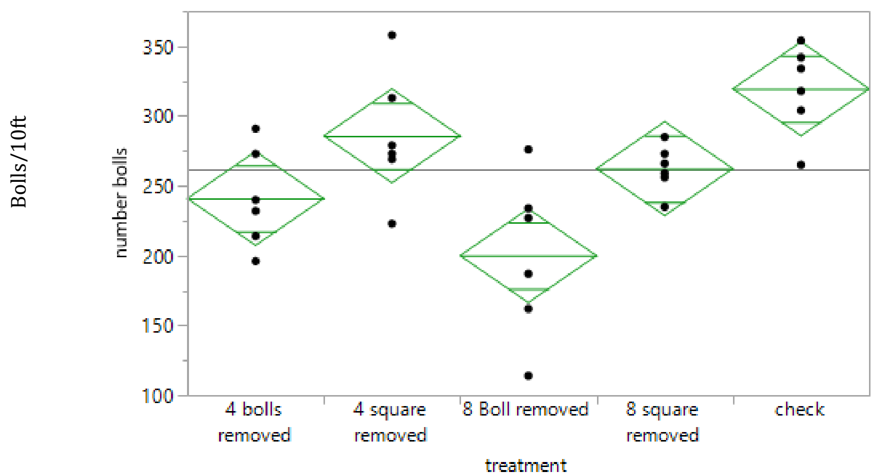

Figure 10. Number of bolls per 10feet after simulated late season injury.

SEASONAL ACTIVITY OF COTTON BOLLWORM AND TOBACCO BUDWORM DETECTED BY PHERMONE TRAPS

<u>Introduction</u>

Cotton bollworm, *Helicoverpa zea* Boddie and Tobacco budworm *Heliothis virescens* F. male moth activity was monitored in 2016-2017 in sex pheromone traps in Artesia, NM.

<u>Materials and Methods</u>

Two traps were set up for each species at the Agricultural Science Center near Artesia, NM. Each trap was checked weekly. Each trap was baited every other week with fresh lure (Alpha Scents Inc., West Linn, OR)

<u>Results</u>

Cotton bollworm are more prevalent than tobacco budworm with cotton bollworm representing 84-92% of total trap captures. Tobacco budworm were 8-14% of trap captures. Moths were active from early July to mid-September both years. Average trap captures were 7/week for bollworm vs 1/week for tobacco budworm between 6/22 to 9/20 in 2017. The highest trap capture was 37 per week for cotton bollworm on 8/8/17. The highest trap capture for tobacco budworm was 6/week on 8/8 in 2017.

Mean bollworm per night showed one peak in Artesia in 2016 and 2017 (Fig. 13, 14) with the majority of bollworm moths collected between 8/5-9/1, 2016 and 8/2-8/22, 2017.

The profile of activity overall is similar to that reported earlier in the Texas High and Rolling Plains. (Parajulee et al 1998, Parajulee at al 2004) However earlier trap captures reported that tobacco budworm represented 2-7% of trap captures which is at least half of the 14% collected in 2017 in Artesia, NM On the other hand tobacco budworm captures were 8% of the total moths collected in Artesia, NM in 2016. It is not yet clear if the tobacco budworm proportion of the complex is actually higher than in the High Plains or Rolling Plains of Texas.

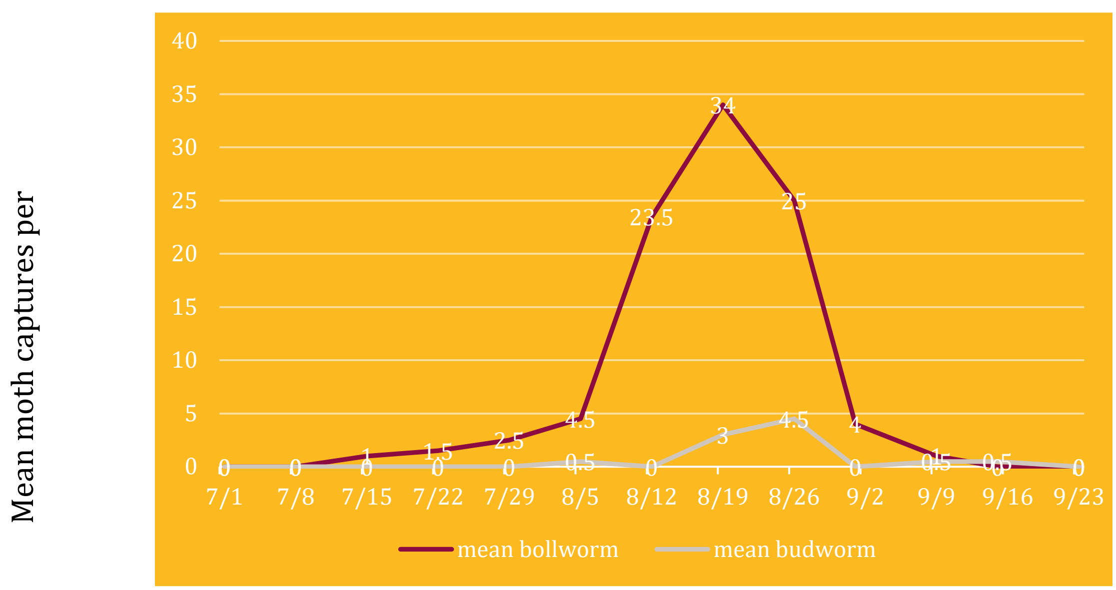

Figure 11. Cotton bollworm and tobacco budworm mean trap captures in 2016, Artesia, NM

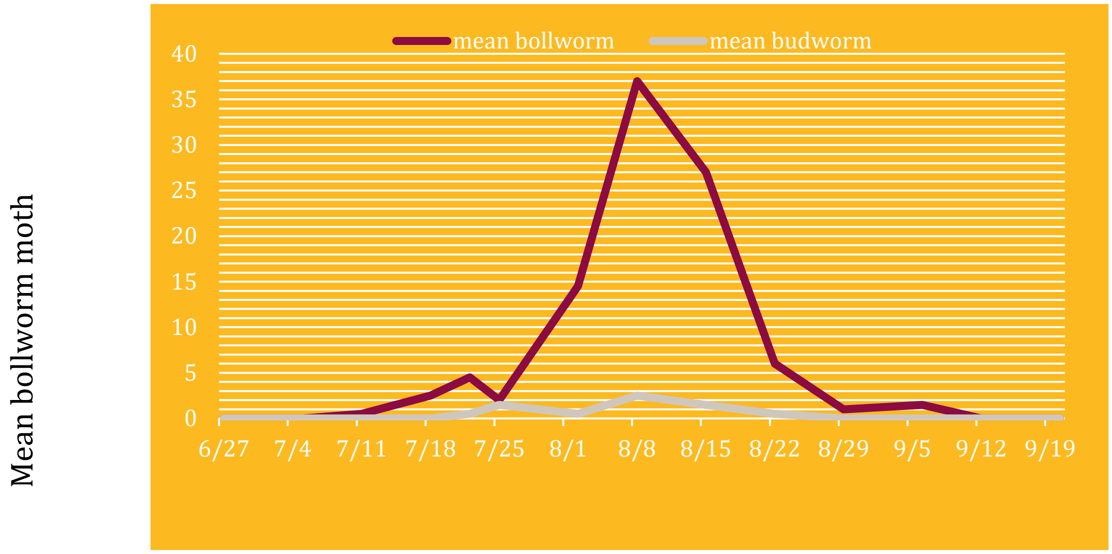

Figure 12. Cotton bollworm and tobacco budworm mean trap captures in 2017, Artesia, NM

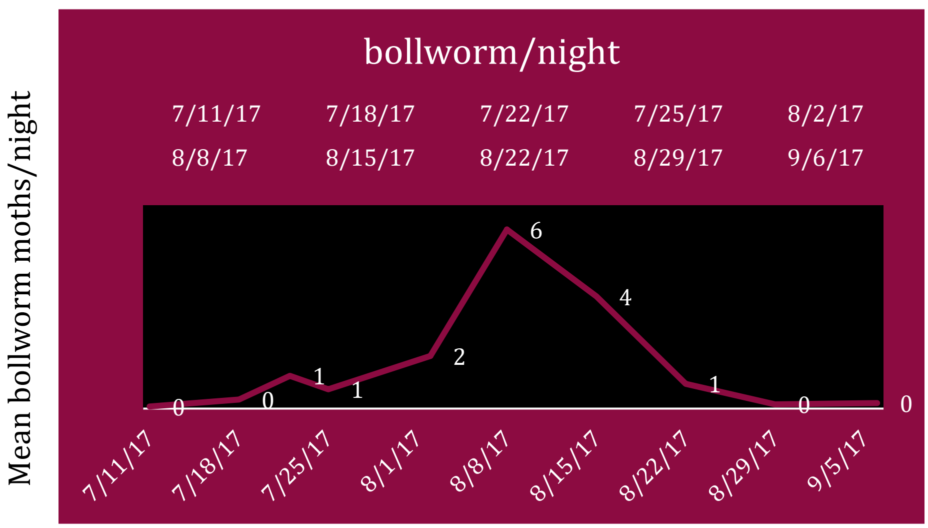

Figure 13. Bollworm pheromone trap captures in Artesia, NM 2017

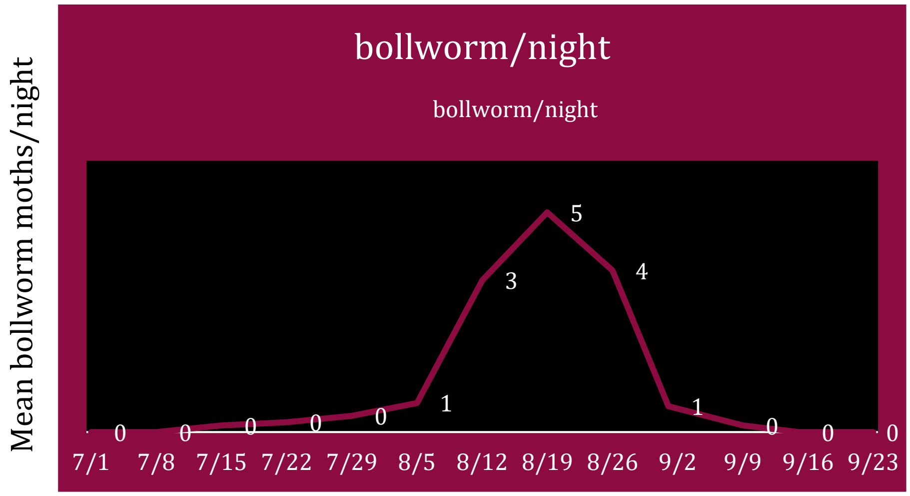

Figure 14. Bollworm moth pheromone trap captures in Artesia, NM 2016

SENTINEL BOLLWORM EGG PREDATION IN FOUR COTTON VARIETIES IN 2016 AND 2017

Abstract

In 2017, there were no significant differences in overall predation determined by microscopic examination of sentinel eggs after 48 hours in field plots. Predation ranged from 39-64% relatively low compared to other years and other crops in the same location where 70-90% predation is not uncommon. For a second year direct observations indicated that sweep net samples are not completely predictive of actual impact of predators since ants and hooded beetles were 50% of direct observations of predation but rarely represented in sweep samples in 2011-2016. (2017 samples in process). An understanding of the source of predation in this area with high levels of predation will help us develop techniques to optimize predation not only here but in areas where predation currently has less of an impact on control.

Introduction

Insect pest pressure is somewhat lower in NM than nearby areas of the High Plains of Texas. Past experiments have indicated that the prevalence of alfalfa hay is an important factor providing beneficial predators to cotton which help keep damage from insect pests low in many locations in southeast NM (Pierce et al. 2009, 2010)

Predation was often significantly higher in alfalfa compared to cotton. Mean predation in alfalfa in one commercial field trial was 78% compared to 48-58% in cotton. The primary predators were ladybug adults, nabids and various spiders. At very high predation rates, there was little difference in predation rates between adjacent alfalfa and cotton fields with 85-97% predation in alfalfa and up to 300 feet into cotton. However, there was significantly less predation 1000 feet into the cotton field with 67% predation on one date suggesting that close proximity may have the highest impact. After cutting and cooler weather, predation rates declined in the commercial field with a mean 65% predation in alfalfa but only 28% predation in the commercial cotton field. A reduction of hay acreage in NM and the opportunity to determine ways to enhance predation not only here but in other areas such as the nearby Texas High Plains justify evaluating predation. Our objective is to evaluate predation rates, the management practices and landscape impacts that can affect predation and the best methodology to evaluate predation. In 2017, field trials were conducted to evaluate predation of sentinel bollworm eggs in conventional and glandless cotton varieties. A variety of techniques were used in order to evaluate the best methods for evaluating and quantifying predation and determining key predators and their impact.

Material and Methods

In 2017, four varieties, A1517-08, PhytoGen 499, New GLS and AcalaGLS were planted in plots with 32 rows by 100 feet replicated 4-6 times. Predation was evaluated in 3 ways, with sweep net samples of predators through the season, with sentinel egg trials to determine total predation and by direct observation of predation for 24 hour periods.

Sweep net samples were collected weekly with the number of pests and predators recorded. Sentinel bollworm, *Heliocoverpa zea* (Boddie) eggs were attached to plants in each plot on three dates and examined after 48 hours to determine predation levels. Early flowering was recorded and direct observations of predation over 24 hours in 4 varieties were recorded in 2017 and compared to 2016 results.

Results and Discussion

Predation of sentinel eggs was generally similar in glanded and glandless cotton in 2016 and 2017. Predation levels were relatively low compared to previous trials however. Predation ranged from 39-59% in 2017 and 35-71% in 2016. (Table 10). There was no significant difference in predation among the four cultivars in 2017 including a comparison of glanded and glandless cultivars. There was also no significant difference in predation among dates in 2016 or 2017. Predation was significantly higher in glanded Acala 1517-08 on one date in 2016, but not significantly higher in the other glanded cultivar PhytoGen 499 in 2016 or 2017. This indicated that the higher predation is not due to the presence of glands.

Table 10. Sentinel Bollworm Egg Predation in Four Cotton Varieties in 2016 and 2017						
		2016			2017	
Variety	7/20	8/7	8/26	7/17	8/7	9/11
Acala 1517-08	52a	35a (3)	71a (6)	58a	55a	39a
Acala GLS	59a	55a (4)	55b (7)	51a	44a	46a
New GLS	55a	41a (4)	55b (7)	55a	60a	56a
PhytoGen 499	65a	44a (4)	56b (7)	59a	64a	50a

Direct Observations of Predation

Often the highest number of predators collected in sweep net samples is spiders, nabids and lacewings. Direct observations were not consistent with this expectation. In 2017, ants and hooded beetles alone produced 50% of observed predation. Ants and hooded beetle were with lady beetles the top three predators producing 75% of total observed predation. (Figure 15)

Surprisingly, no ladybugs were observed in the 2017 trial. Nabids represented 10-11% of predators while big eyed bugs were 4-8% in 2016-2017. Spiders were 3% of predator observations both years. Lacewings usually are a significant predator were not observed at all in 2016 but were 19% of observations in 2017. Collops beetles were observed 8% of the time in 2017 but not at all in 2016.

Observed predation was not completely consistent with expectations from sweep net samples. Ants were commonly observed feeding on sentinel eggs with 5-30% of total predation in the four cultivars (Fig. 16). Ants were rarely collected in sweep net samples from 2011-2016. Similarly, collops and hooded beetles were represented more frequently in direct observations than from previous sweep net collections. Collops were 6-20% of total predation in the four cultivars while hooded beetles were 21-35% of observations. Ladybugs represented 10-38% of observations consistent with both previous sweep net collections and examinations of egg debris after feeding. Nabids and spiders however were under-represented in direct observations with only 6-15% predation by Nabids and only 0-10% predation by spiders.

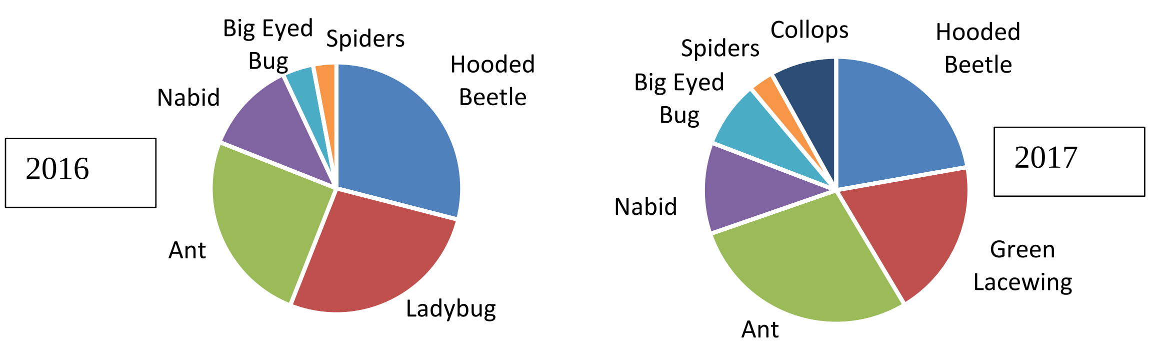

Figure 15. Percent of insects directly observed on Sentinel eggs.

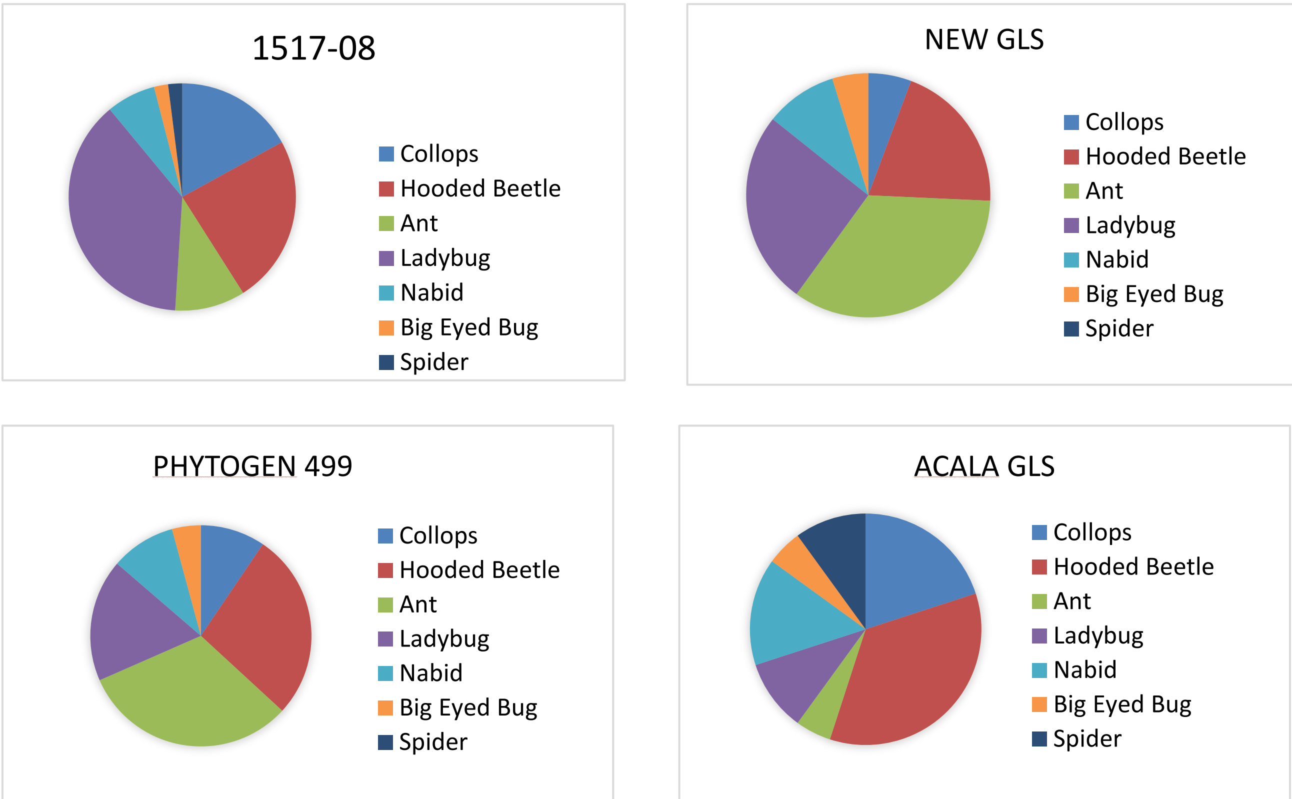

Figure 16. Percent of Insects Observed by Variety

Predation was observed directly for 24 hours with observations recorded every two hours. Acala 1517-08 had the highest predation representing 35% of the total (Fig 15). There was no apparent relationship to glands however as the other glanded cultivar PhytoGen 499 had only 19% of predation observations.

This was consistent with direct examination of sentinel eggs after 48 hours of feeding. There predation is evaluated by microscopic examination of egg debris after 48 hours in a separate trial the same day. In this examination of eggs, 30% of total predation was in Acala 1517-08 consistent with the 35% of total predation in direct field observations.

Conclusion

Direct observations of predation in 2016 and 2017 indicate that sweep net samples can underestimate predation by predators that are less likely to be collected in such samples. Collops, hooded beetle and ant predation is underestimated based on sweep net samples. Also, the presence of predators does not guarantee predation on pests or take into account the amount of predation by each predator.

Sentinel egg predation gives a better estimate of actual predation levels than both collections of predators and direct observation since higher numbers of eggs can be used. While we can narrow the source of such predation at least to chewing vs sucking predators and to some degree more characteristic damage by specific predators, it may not always be possible to identify the genus, let alone species, of predator though examination of the egg residue as damage by insects with similar feeding patterns appears similar. While it is unreasonable to direct observe large numbers of eggs, a combination of direct observations, collections of predators and microscopic examination of sentinel eggs provides a broader and more precise understanding of predation. However tremendous variation in predation among locations and over time even within a season mean these more accurate measures should not be too broadly interpreted.

There are some interesting differences at times in level of predation by specific predators in different cultivars. These differences however seem to be related to specific cultivar differences rather than to the presence of glands which was a concern in earlier field trials. Field and lab data suggests that glandless cotton will require close monitoring but that development of insect pest management strategies can make it a viable niche option in areas with lower insect pest pressure. Overall predation levels are not lower in glandless cotton, so predation will be a significant source of control of insect pests.

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Grants and Sponsored Activities

PUBLICATIONS, PRESENTATIONS and GRANTS

NMSU Agricultural Science Center at Artesia
Publications, Presentations and Grants, 2017

Peer Reviewed Journal Articles

Zhang, J., Idowu, O. J., Sanogo, S., **Flynn, R. P.**, Hughs, S. E., Jones, D. C. (in press). Registration of a Glandless 'Acala 1517-18 GLS' Cotton. *To appear in Journal of Plant Registrations*., Date Accepted: August 2017

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Editor Reviewed Conference Proceedings

Idowu, J. J. Zhang; **J Pierce**, M Omer, T Wedegaertner (2018) in press. In National Cotton Council of America (Ed) Impacts of Potassium fertilization on new glandless cotton cultivars developed for New Mexico. Beltwide Cotton Conferences. San Antonio, TX. Beltwide Cotton Conference.

Pierce, J. B., Monk, P., Idowu, O. J. (2017). In National Cotton Council of America (Ed.), *Predation of Sentinel Eggs in Cotton and Sorghum in New Mexico* (vol. 72, pp. 536-541). Dallas, TX: Beltwide Cotton Conferences.

Conference Proceedings (Not Refereed)

Pierce, J. B., Monk, P., Idowu, O. J. (2017). *Predation of Sentinel Eggs in Cotton and Sorghum in New Mexico*. Austin, TX: Entomological Society of America, Southwestern Branch Annual Meeting.

Experiment Station Publications

Pierce, J. B. (in press). *Pink Bollworm Distribution and Eradication in Southeastern New Mexico and adjacent areas of the TexasTrans Pecos and Edwards Plateau 2009-2013*. Las Cruces, NM: New Mexico State University Experiment Station.

Marsalis, M. A., **Flynn, R. P.**, Lauriault, L. M., Mesbah, A., O'Neill, M. K. (2017). *New Mexico 2016 Corn and Sorghum Performance Tests*. Las Cruces, NM: Agricultural Experiment Station and Cooperative Extension Service, New Mexico State University. http://aces.nmsu.edu/pubs/variety_trials/16CornSorghumRpt.pdf

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Peer Reviewed Extension Publications

J. Pierce. *Beet Armyworm in New Mexico Hay*. Circular A-334. Las Cruces, NM. New Mexico State University Cooperative Extension Service (in press)

J. Pierce. *Variegated Cutworm in New Mexico Hay*. Circular A-335. Las Cruces, NM. New Mexico State University Cooperative Extension Service (in press)

J. Pierce. Harlequin Bug (in review). New Mexico State University Cooperative Extension Service

Sutherland, C. A., **Pierce, J. B**., Lewis, B. E., Heerema, R. (2017). Circular 683. In Ana Henke, Frank Sholdice (Ed.), *Pecan Weevil: Wanted Dead, Not Alive* (pp. 8 pp.). Las Cruces, NM.,

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Flynn, R. P., Idowu, O. J. (2017). *CR687: Managing Organic Matter in Farm and Garden Soils*., Date Submitted: April 21, 2016,

Non Peer Reviewed Extension Publications

Idowu, O. J., Zhang, J., **Flynn, R. P**., **Pierce, J. B**., Beck, L. L., Sullivan, P. (2017). *Cotton Newsletter Volume 8, Number 3* (ed., vol. Volume 8). NMSU, Extension Plant Sciences.

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Other Publications Not Noted Above

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Pierce, J. B. (2017). Cotton Thrip Seed Treatment Efficacy in NM. Cotton Incorporated Regional Task Force.

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Research Presentations

Idowu, J. J. Zhang; **J Pierce**, M Omer, T Wedegaertner (2018) *in press*. In National Cotton Council of America (Ed) Impacts of Potassium fertilization on new glandless cotton cultivars developed for New Mexico. Beltwide Cotton Conferences. San Antonio, TX. Beltwide Cotton Conference.

Creeegan, E. (Presenter), Ulery, A. L., Brewer, C. E., Acharya, **R., Flynn, R. P.,** Idowu, O. J., Stringam, B., NM Sustainable Agriculture Conference, USDA Western SARE, Los Lunas NM, "Organic Waste to Farm Resource". (December 13, 2017).

Flynn, R. P., Walworth, J., Davenport, J., Ulery, A. L., Gleason, J. B., Bauder, T., SSSA Annual meeting, Tampa, FL, "Visualizing Soil Properties: A Multimedia Approach to Training Students and Practitioners". (October 23, 2017).

Pierce, J. B., Monk, P., Idowu, O. J. (2017). In National Cotton Council of America (Ed.), *Predation of Sentinel Eggs in Cotton and Sorghum in New Mexico* (vol. 72, pp. 536-541). Dallas, TX: Beltwide Cotton Conferences.

Pierce, J. B. (Discussant), Monk, P. (Other), Idowu, O. J., Entomological Society of America National Meeting, Entomological Society of America, Denver, CO, "Predation of Sentinel Eggs in Cotton and Sorghum in New Mexico", Scope: National, published in proceedings, published elsewhere, Invited or Accepted? Accepted. (November 2017)

Gleason, J. B., Chamberlin, B. A., White, L. M., Carroll, K. C., **Flynn, R. P**., Ulery, A. L., NACTA annual meeting, Purdue, IN, "Simulations and Interactive Tools for Agricultural Science Education". (June 29, 2017).

Flynn, R. P., Western Region Crop Science Society Conference, WCSA, Parma, ID, "Can Excel(TM) help understand climate change at the local level?",. (June 7, 2017).

Flynn, R. P., Western Nutrient Management Conference, WERA-103, Reno, NV, "Do 1:1

soil extracts for salinity UNDERESTIMATE leaching fractions?". (March 3, 2017).

Flynn, R. P., Western Nutrient Management Conference, WERA-103, Reno, NV, "Can Senteks "Diviner" Probe Help Train Irrigators?". (March 2, 2017).

Flynn, R. P., Western Nutrient Management Conference, WERA-103, Reno, NV, "Digital Tools for Sustainable Agriculture". (March 2, 2017).

Pierce, J.B. (Discussant) Sorghum-Sugarcane Aphid Regional Program Research Exchange Workshop. Sugarcane Aphid in New Mexico. Dallas, TX. January 2017.Scope: National, Invited or Accepted? Invited. (January 2017)

Extension Presentations

Grower Conference Presentations

Pierce, J. B., 8th Annual Forage Growers Workshop, New Mexico State University, Los Lunas,NM, "Alfalfa Weevil and White Fringed Beetle Control in New Mexico", Scope: Regional, Invited. (December 2017). NM CEU available

Flynn, R. P., Soil Fertility Workshop, La Semilla Food Cooperative, Anthony, NM, "Workbooks: NMSU Soil Test Interpretation and Water Quality", (October 31, 2017).

Flynn, R. P., Compost Operator Certification Course, NMORO/NMED, Raton, NM, "Aspects of Compost Quality and Contamination". (October 19, 2017

Flynn, R. P., New Mexico Comprehensive Nutrient Management Planning Course, NM NRCS, Las Cruces, NM, "Understanding the inputs and outputs from the NMSU CNMP Workbook",. (July 23, 2017.

Monk, P. and **Pierce, J. B**. Boll Weevil Eradication Program Meeting. Pink bollworm and boll weevil update. Artesia, NM. (April 2017)

Flynn, R. P., New Mexico Organic Farming Conference, Farm to Table, NMDA, Albuquerque, NM, "Interpreting Soil Sample Results", (February 17, 2017)

Flynn, R. P., New Mexico Organic Farming Conference, Farm to Table, Albuquerque, "Soil Samples". (February 17, 2017).

Field Day Presentations

Pierce, J. B. (Presenter), Clovis Field Day, ASC Clovis, "Sugarcane Aphid", Scope: Local, Invited or Accepted? Invited. (August 2017). NM and TX CEU available

Pesticide Applicator Training Presentations

Lopez, Bo (presenter) and **J.B. Pierce**. Catron County Pesticide Applicator Workshop. Catron County Extension Service, Reserve, NM. Grasshopper Biology and Control in New Mexico. Invited (2017) NM CEU available

Pierce, J. B. (Presenter), Roosevelt County Private Applicator Renewal Workshop, Roosevelt County Extension Service, Portales, NM, “Sugarcane Aphid Management in New Mexico Sorghum” (December 2017). NM and TX CEU available

Flynn, R. P., Pesticide Applicator CEU, DeBaca County CES, Fort Sumner, "Soil Factors and Pesticide Mgt and Losses Due to Erosion", (November 28, 2017).

Flynn, R. P., Pesticide Applicator CEU, Chaves County CES, Roswell, NM, "Compost contamination from herbicides" (November 8, 2017).

Pierce, J. B. (Presenter), Pesticide Applicators Workshop, NMSU, Hobbs, NM, "Emerging Insect Pests 2017

Flynn, R. P. (Presenter), Pesticide Applicators License CEU, NMDA/NMSU, Hobbs, NM, "Pesticides and the Environment", (January 19, 2017).

Master Gardner Presentations

Flynn, R. P., Otero County Master Gardener Training, CES/OTERO COUNTY, Alamogordo, "Climate and Water". (October 3, 2017).

Flynn, R. P., Master Gardener Program, CES/SF County, Santa Fe, NM, "Climate and Weather". (February 28, 2017).

Flynn, R. P., Santa Fe Master Gardener Program, Santa Fe, NM, "Climate and Weather". (February 28, 2017).

Flynn, R. P., Santa Fe Master Gardener program, NMSU CES, Santa Fe, NM, "Climate and Weather". (February 27, 2017).

Flynn, R. P., Santa Fe Master Gardener Program, CES, Santa Fe, NM, "Working with NM Soils and Soil Testing",(February 27, 2017).

Flynn, R. P., Bernalillo County Master Gardener Program, NMSU CES/Master Gardener, Albuquerque, NM, "Climate and Weather". (February 7, 2017).

Flynn, R. P., Chaves County Master Gardener, NMSU Chaves County CES, Roswell, NM, "Soils and Plant Nutrition". (February 3, 2017).

Other Extension Presentations

Flynn, R. P., Lions Club, Lions Club, Artesia, NM, "Weather and Climate at the Local Level", (September 27, 2017).

Flynn, R. P., City of Las Cruces Grounds Training, Dona Ana CES, Las Cruces, NM, "Soil Health as it affects Turfgrass". (May 25, 2017).

Flynn, R. P., Turfgrass Maintenance, Dona Ana CES, Las Cruces, NM, "Fertilizing Turfgrass". (May 25, 2017

Pierce, J. B. (Discussant), Earth Day/ Ag in the Classroom, Artesia, NM, "Ag in the Classroom",. (April 22, 2017).

Flynn, R. P., Compost Operator Certification Course, New Mexico Organics Recycling Coalition/NMED, Carlsbad, NM, "Aspects of Compost Quality and Contamination", (April 20, 2017).

Pierce, J. B., Pecos Valley Pink Bollworm Control Committee Annual Meeting, Artesia, NM, "Pink Bollworm Trapping Results" (April 2, 2017).

Newspaper Articles/Editorials

Pierce, J. B. (2017). *NMSU Cooperative Extension Service assists with pecan weevil identification, education*. NMSU News.

Media Contributions

Audio/Video Production, KSVP 990AM. (2017): Radio show to discuss Seed Exchange Catalog

Audio/Video Production, KCCC 930 AM. (2017)
Radio show to discuss Pecan Weevil in New Mexico

Publication Works in Progress (not included in determination of academic or professional qualification. Include description of progress made on this work during the past year.)

J. Pierce. *Conchuela Stink Bug in New Mexico Cotton*. Circular A-238. Las Cruces, NM. New Mexico State University Cooperative Extension Service

J. Pierce. *Biological Control of Pecan Nut Casebearer and Aphids in New Mexico Pecans.* Circular H-653. Las Cruces, NM. New Mexico State University Cooperative Extension Service

Pierce, J. B. and J. French. Extension Pesticide Applicator Training Series #1: Pest Identification. Guide A-610.

Pierce, J. B. and J. French. Extension Pesticide Applicator Training Series #2: Pest Management Practices. Guide A-611.

Pierce, J. B. and J. French. Extension Pesticide Applicator Training Series #3: Treatment Area Measurements. Guide A-612.

Flynn, R. P., Marsalis, M. A. *Guide A-128, Fertilizer Guide for New Mexico* (vol. Guide A-128). Las Cruces, NM: Agricultural Experiment Station and Cooperative Extension Service, New Mexico State University.

Flynn, R. P. *Analysis of Long-Term Alternative Uses of Treated Produced Water in Southeast New Mexico*. WRRI NM.

Pierce, J. B. *Fungal Endophytes in Turfgrasses*. New Mexico State University.

Pierce, J. B., Monk, P. Influence of alfalfa on predation of Lepidopterous eggs in southern New Mexico

Zhang, J., Idowu, O. J., **Flynn, R. P.,** Hughs, S. E. Registration of glandless 'NuMex COT 15 GLS' cotton. *Journal of Plant Registrations*

Flynn, R. P., Ulery, A. L. *Guide A-116: Irrigation Water Classification*.

Flynn, R. P. *Guide-A128: Fertilizer Guide for New Mexico*.

Pierce, J. B., Monk, P., Bendixsen, D., Bendixsen, D. Influence of Tree Size on Lepidopteran Egg Predation in New Mexico. *Environmental Entomology*.

Bundy, C. S., **Pierce, J. B**. Seasonal phenology of the alfalfa weevil in New Mexico. *Journal of Economic Entomology*.

Pierce, J. B., Monk, P. Yield Partitioning and Compensation for Simulated Square Losses in a New Mexico Acala Cotton. *Journal of Entomological Science*.

Sutherland, C. A., **Pierce, J. B**., Lewis, B. E., Heerema, R. In Ana Henke, Frank Sholdice (Ed.), *Pecan Weevil: Wanted Dead, Not Alive (update to review)* (pp. 8 pp.). Las Cruces, NM.,

Lauriault, L. M., Thompson, D. **Pierce, J. B**., Bennett, A., Schutte, B. J., Beck, L. L., Sutherland, C. A., Jimenez, D. D., Hamilton, W. V. *Circular Circular 600: Aceria malherbae gall mites for control of field bindweed*. Las Cruces, NM: NMSU Cooperative Extension Service

Flynn, R. P. *Soil Test Interpretations Guide A122* (revision)

Zhang, J., Idowu, O. J., **Flynn, R. P**., Wedegaertner, T., Hughs, S. E. Transgressive segregation in an Acala × Acala hybrid for the development of glandless cotton germplasm. *Journal of Cotton Science*.

Zhang, J., Idowu, O. J., **Flynn, R. P**., Wedegaertner, T., Hughs, S. E. Genetic variation and selection within glandless cotton germplasm. *Euphytica*.,

Contracts, Grants, and Sponsored Research

Flynn, R. P. (Principal), Sponsored Research, "Integration of Algae to Biodiesel into Southwestern Agricultural Systems", Sponsoring Organization: Center of Excellence for Hazardous Materials Management (CEHMM), Sponsoring Organization Is: Other, Research Credit: $180,000.00, PI Total Award: $180,000.00, Current Status: Funded. (December 1, 2010 - November 30, 2020).

Pierce, J. B. (Principal), Sponsored Research, "Input Optimization and Insect Pest Management in New Mexico-2018", Sponsoring Organization: Cotton Incorporated, Research Credit: $18,900, PI Total Award: $18,900, Current Status: Funded. (Under Review)

Bowling, C. Allen, C. Vyavhare, S, Kerns, D**. Pierce, J**. Evaluating Tools for Cotton Insect Pest Management in the Southwest Region. Sponsoring Organization: Cotton Incorporate, Sponsoring Organization Is: Private $42,000 (Under Review)

Pierce, J. Comparing potential resistance to seed treatments for thrips in the Mesilla and Pecos Valleys. Current Status: Funded January 1, 2018-December 31, 2018. Sponsoring Organization: Cotton Incorporated, (State Support Private. Research Credit: $6,000

Bowling, C. Allen, C. Vyavhare, S, Kerns, D**. Pierce, J**. Developing pest management strategies for thrips, cotton fleahoppers and boll sucking pests of cotton in the southwest region. Sponsoring Organization: Cotton Incorporate, Sponsoring Organization Is: Private $42,000

Pierce, J. B. (Principal), Sponsored Research, "Input Optimization and Insect Pest Management in New Mexico", Sponsoring Organization: Cotton Incorporated, Sponsoring Organization Is: Private, Research Credit: $37,800.25, PI Total Award: $37,800.25, Current Status: Funded. (January 1, 2016 - December 31, 2017).

Zhang, J. (Co-Principal), **Flynn, R. P**. (Co-Principal), Zhang, J. (Co-Principal), **Pierce, J. B.** (Co-Principal), Idowu, O. J. (Principal), Sponsored Research, "Yield Potential, Fiber Quality and Adaptability of Glandless Cotton in New Mexico", Sponsoring Organization: Cotton Incorporated, Private, Research Credit: $13,508.20, PI Total Award: $270,164.00, Current Status: Funded. (January 1, 2010 - December 31, 2017).

Ghimire, R. (Co-Principal), Lehnhoff, E. A. (Co-Principal), Idowu, O. J. (Co-Principal), Sanogo, S. (Co-Principal), **Pierce, J. B**. (Co-Principal), Schutte, B. J. (Principal), Sponsored Research, "Teaching Organic Farmers Effective Evaluation Techniques for Soil Fertility and Pest Management through Participation in Cover Crop Trials", Sponsoring Organization: USDA/NIFA/Organic Agriculture Research and Extension Initiative, Sponsoring Organization Is: Federal, Research Credit: $5,199.00, PI Total Award: $43,325.00, Current Status: Not Funded. (October 1, 2016 - January 31, 2017).

Johnson, D. C. (Co-Principal), Ghimire, R. (Co-Principal), Walker, S. (Co-Principal), **Flynn, R. P**. (Principal), Sponsored Research, "Securing the Future of Highly Productive Vegetable Cropping Systems in the Southwest US", Sponsoring Organization: University of California, Davis, Research Credit: $345,919.35, PI Total Award: $988,341.00, Current Status: Not Funded. (September 1, 2017 - December 31, 2017).

French, J. M. (Principal), Heerema, R. (Co-Principal), **Flynn, R. P.** (Co-Principal), French, J. (Principal), Sponsored Research, "Pecan Rootstock Cultivar: Implications for Nutrient Uptake and Growth in Alkaline Soils", Sponsoring Organization: US Department of Agriculture/ARS/National Plant Germplasm System, Sponsoring Organization Is: Other, Research Credit: $3,148.80, PI Total Award: $15,744.00, Current Status: Funded. (August 1, 2015 - July 31, 2017).

Gleason, J. B. (Co-Principal), Chamberlin, B. A. (Co-Principal), Ulery, A. L. (Co-Principal), **Flynn, R. P**. (Principal), Sponsored Research, "Developing Digital Tools to Improve Soil Sampling and Analysis for Sustainable Agriculture in the Western U.S.", Sponsoring Organization: Utah State University, Sponsoring Research Credit: $20,774.60, PI Total Award: $59,356.00, Current Status: Closed. (April 1, 2015 - March 31, 2017).

Uchanski, M. E. (Other), **Flynn, R. P.** (Co-Principal), Lombard, K. A. (Co-Principal), Sponsored Research, "Harnessing the Sun to Produce Fertilizer on Farm to Achieve Energy Conservation, Air Quality, and Water Quantity Goals", Sponsoring Organization: Colorado State University, Sponsoring Organization Is: Other, Research Credit: $52,635.00, PI Total Award: $159,500.00, Current Status: Not Funded. (September 30, 2015 - January 31, 2017).

Sponsorships, Other Funding - Non ARGIS

"Fee-based alfalfa variety testing, 2017," Multiple seed companies, $4,850.00, Description: Entry fees for alfalfa varieties planted in one year and compared for the next three years at various NMSU locations across the state, Status: Funded, Effective Start Date: April 1, 2017, Effective End Date: December 31, 2020.

"Fee-based alfalfa variety testing, 2016," Multiple seed companies, $4,850.00, Description: Entry fees for alfalfa varieties planted in one year and compared for the next three years at various NMSU locations across the state, Status: Funded, Effective Start Date: April 1, 2016, Effective End Date: December 31, 2019.

"Fee-based alfalfa variety testing, 2015," Multiple seed companies, $6,225.00, Description: Entry fees for alfalfa varieties planted in one year and compared for the next three years at various NMSU locations across the state, Status: Funded, Effective Start Date: April 1, 2015, Effective End Date: December 31, 2018.

"Fee-based corn variety testing, 2017," Multiple seed companies, $28,205.00, Description: Entry fees for corn forage and grain varieties planted annually and compared at various NMSU locations across the state., Effective Start Date: April 1, 2017, Effective End Date: December 31, 2017.

"Fee-based alfalfa variety testing, 2014," Multiple seed companies, $5,250.00, Description: Entry fees for alfalfa varieties planted in one year and compared for the next three years at various NMSU locations across the state, Status: Funded, Effective Start Date: April 1, 2014, Effective End Date: December 31, 2017.