

# **NEW JERSEY GRAIN AND FORAGE JOURNAL**

*A COMPILATION OF RESEARCH AND  
EXTENSION PROJECTS IN CORN, SOYBEAN, SMALL  
GRAIN AND FORAGE*

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# NEW JERSEY GRAIN AND FORAGE JOURNAL - 1999

## PREFACE

This is the sixth edition of the New Jersey Grain and Forage Journal, an annual journal highlighting research and extension projects in field crops. Traditionally the publication has presented work conducted in New Jersey. This year articles from Delaware and Pennsylvania are included as a result of collaborative efforts by field and forage crop agents, specialists and researchers from the Mid-Atlantic region.

Grain and forage production represents the largest agricultural acreage in the Mid-Atlantic States, adding significantly to and supporting related industries. Not only does this support the local and regional economy, but also provides the benefits of open space to the residents of the region.

We would like to acknowledge and thank the New Jersey Soybean Board and Grain and Forage Producers' Association for their financial support. The Soybean Board allocates soybean checkoff funds for research and promotional activities that benefit the soybean industry. The Grain and Forage Producers' Association promotes research, marketing, legislation and education related to the grain and forage industry.

We hope that these results will be helpful to you as you plant and produce crops in the 2000 growing season and beyond. Your suggestions for research and educational projects are always welcome, as it is our desire to develop programs that serve you most important needs.

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## Analysis of Wireworm Distribution in Two Salem County Corn Fields

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- Research Question** Soil organisms present special problems when trying to determine their in-field distribution. In the case of wireworms, which at times can cause substantial crop loss, it is important to learn as much as possible about their distribution and abundance. Having access to 2 fields with wireworm infestations, a study was conducted to determine their distribution using bait traps. Effective use and placement of bait traps can be useful to farmers in determining the need for soil insecticides. However, much work needs to be done on the timing, placement, and interpretation of results.
- Literature Review** Scouting data from New Jersey and Michigan shows that wireworm damage occurs most frequently in low areas of fields where there is increased soil moisture. *Melanotus communis*, the most troublesome wireworm in southern New Jersey, attacks corn seed or developing plants, usually killing them. Use of bait traps has shown that wireworms can be collected from both low and high ground. A literature review and our field observations indicate that manured fields and fields where no-till or minimum tillage practices are used are the most prone to wireworm damage.
- Study Description** Two infested fields, Field 1 (3 acres) and Field 2 (50 acres), were selected for intensive sampling from a previous study on wireworm baiting. Both fields sustained threshold populations of *Melanotus communis*, the most troublesome species in southern New Jersey cornfields. In the spring of 1998, insecticide treated seed was planted in Field 1, and a soil insecticide was applied for wireworm control in Field 2.
- Using a Trimble® Global Positioning System backpack unit, a lap top computer, satellite antenna and batteries, both fields were mapped. A boundary map was made of the fields' outline and then a grid map was generated, within which the computer randomly chose sampling sites for each grid square. The grid area for Field 1 was 0.25 acre and for Field 2 was 1 acre, resulting in 11 sample sites for Field 1

and 46 sites for Field 2. Certain random points fell outside the field boundary accounting for fewer sample points than the total number of grid squares.

Bait traps were placed at each sample point and flagged. Traps were collected 2 to 3 weeks later. Both fields were baited in the fall of 1998, Field 1 in October and Field 2 in November. Baits were not recovered until the seeds had germinated and grown to at least an inch in height. Since wireworms generally become inactive at temperatures lower than 50° F, traps normally are not collected unless soil temperatures are at least 50° F. Because of the length of time the traps had been in the ground and that it was the last week of November, all traps were collected from field 2 even though soil temperatures were 49° F in the afternoon. A soil thermometer was used to check temperature about 4 inches deep in the vicinity of the bait before the traps were dug up.

At the time of setting the bait traps, two sets of soil compaction readings, depth at 200 pounds per square inch (psi) and depth at 300 psi, were taken using a soil compaction meter to compare with the trap catch.

## Applied Questions

*What was the trap catch distribution in the two fields?*

In Field 1 (Figure 1), the wireworm threshold (1 wireworm per bait trap) was exceeded (12 wireworms, including *M. communis* and other species, from 11 traps). Field 2 (Figure 2) did not reach threshold (9 *M. communis* wireworms from 44 traps, two traps were lost in this field to cultivation).

Both fields indicated a clumped distribution of wireworms. That is, they were not evenly spread across either field. There was no apparent correlation between trap catch and field topography.

*Was there a relationship between soil compaction, soil temperatures and wireworm catch?*

Map layers of soil temperatures and compaction readings were overlaid with the bait trap catch, but there was no correlation between them for either Field 1 (Table 1) or Field 2 (Table 2). Much of the soil in Field 1 is silty clay, which intuitively would seem more difficult for the wireworms to penetrate. However, on close examination, numerous tunnels, apparently from the burrowing of wireworms, can be

easily seen. Wireworms may have a beneficial aspect in improving soil porosity.

Table 1. Field 1 data for 300-PSI oil compaction, soil temperature and wireworm counts.

	Soil Depth for Penetrometer (inches) 300 PSI <sup>1</sup>	Soil Temperature at 4 inch depth (°F)	WORM (# per sample)
Minimum	2	66	0
Maximum	27	70	4
Range	25	4	4
Median	10	68	1
Mean	10.46	67.73	1.09
SD	6.1	1.19	1.38
CV	0.59	0.2	1.26

<sup>1</sup> Depth in inches at which soil resists 300 PSI.

Table 2. Field 2 data for 300-PSI oil compaction, soil temperature and wireworm counts.

	Soil Depth for Penetrometer (inches) 300 PSI <sup>1</sup>	Soil Temperature at 4 inch depth (°F)	WORM (# per sample)
Minimum	1	49	0
Maximum	16	54	2
Range	15	5	2
Median	4	52	0
Mean	5	52.14	0.21
SD	3.08	1.21	0.51
CV	0.62	0.62	2.49

<sup>1</sup> Depth in inches at which soil resists 300 PSI

## Recommendations

It is clear that more work needs to be done before recommendation on bait trap placement can be made. However, it is evident that wireworms are not only found in low areas of fields but are distributed in a variety of slopes and soil conditions, therefore high ground should not be ignored in trap placement.

**Acknowledgements**

We would like to thank Marilyn Hughes of the Rutgers University Remote Sensing Laboratory for producing the maps used in the figures and the statistical analysis.

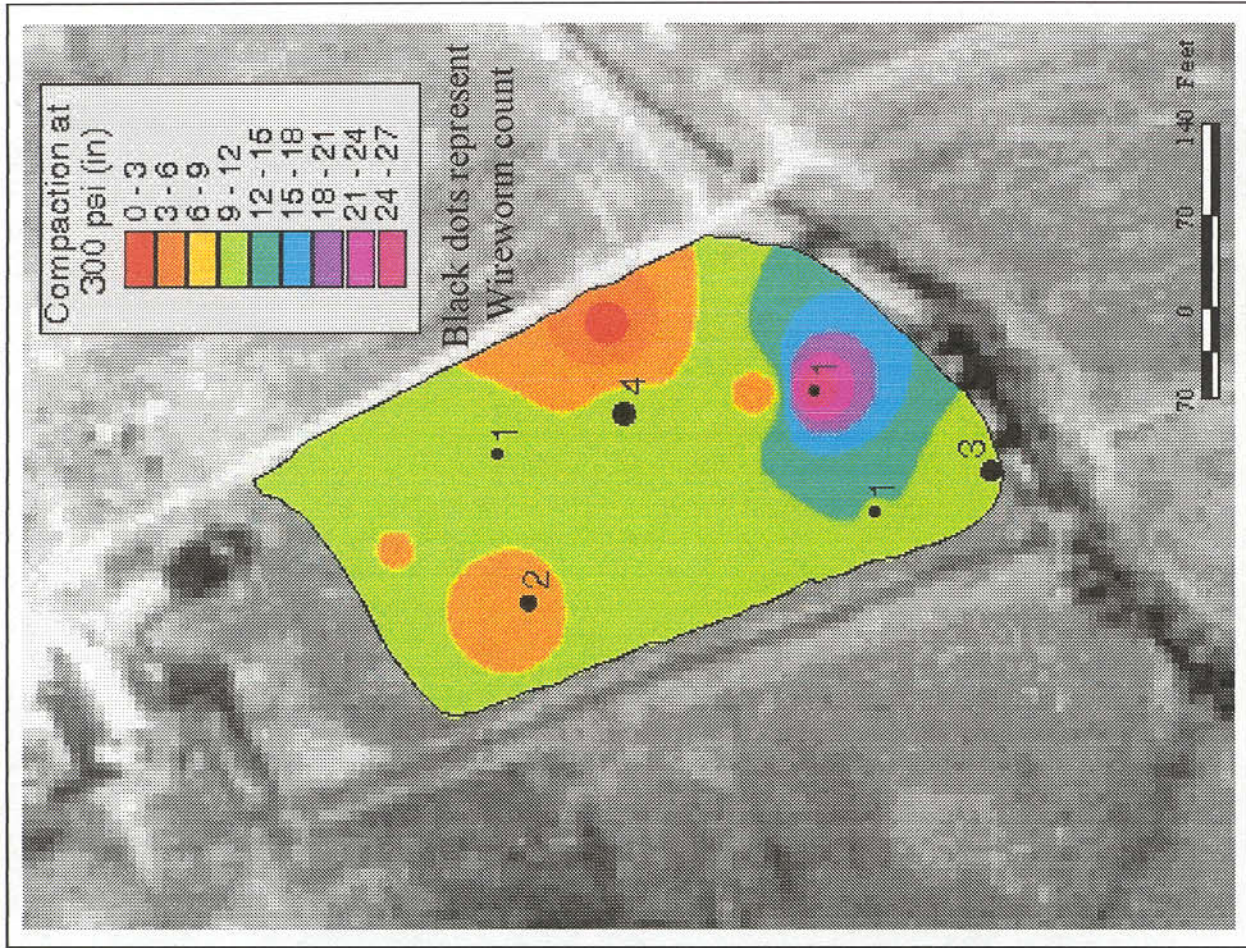
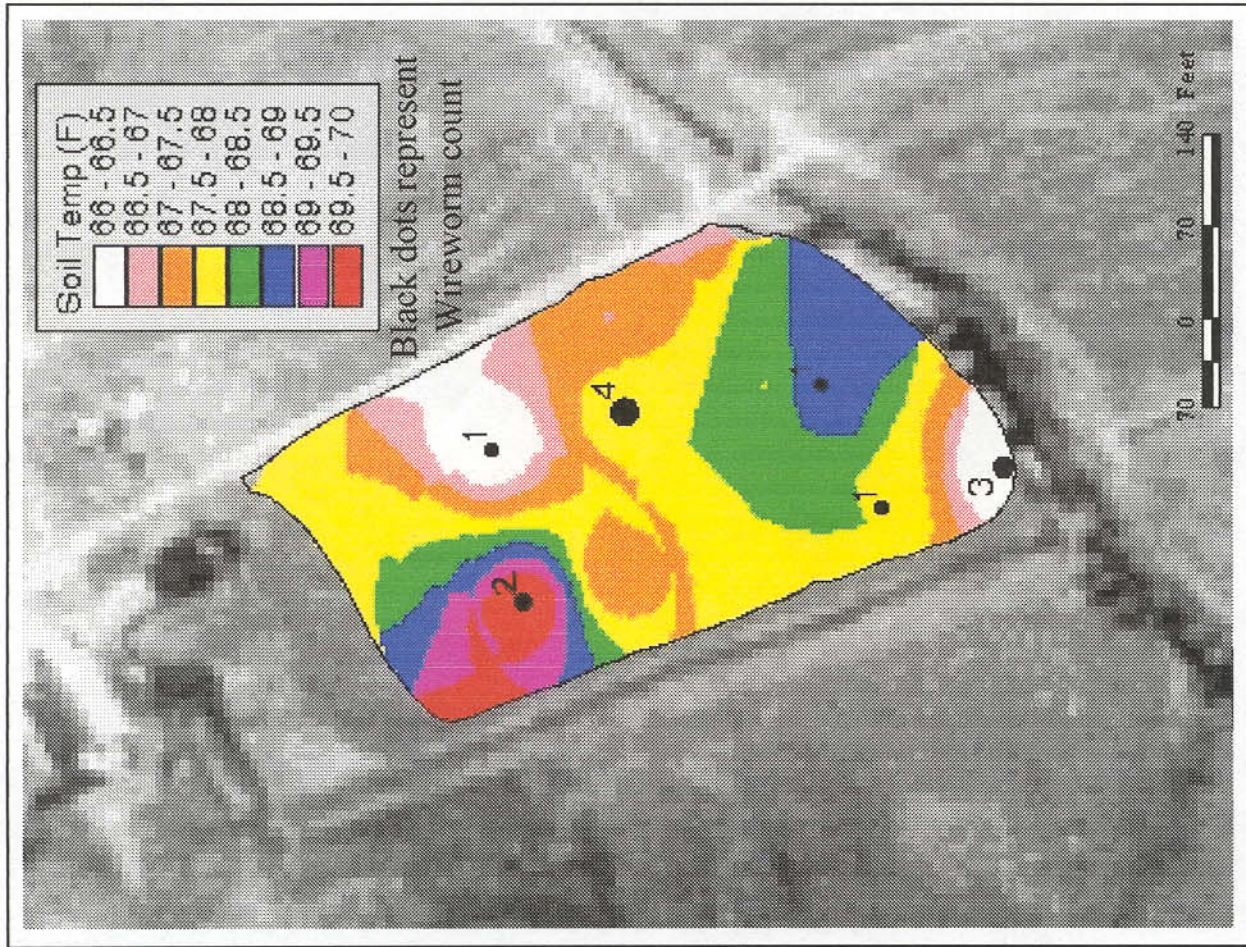


Figure 1. Field 1. Comparison between soil temperature, soil compaction depth at 300 psi and Wireworm count

Image source: USGS DOQQ, resampled to 2 meters  
 Data source: Ag122 Trimble GPS unit

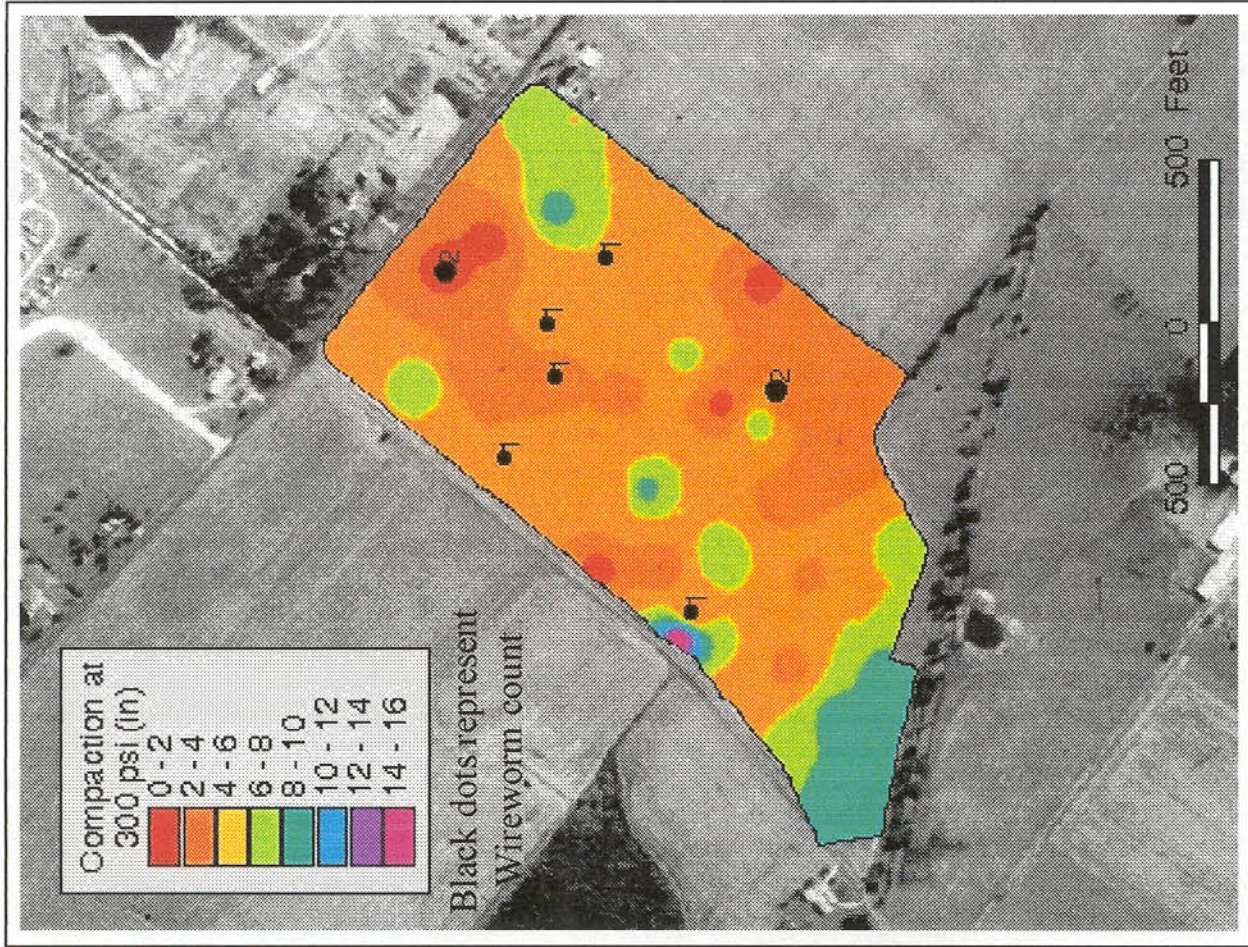
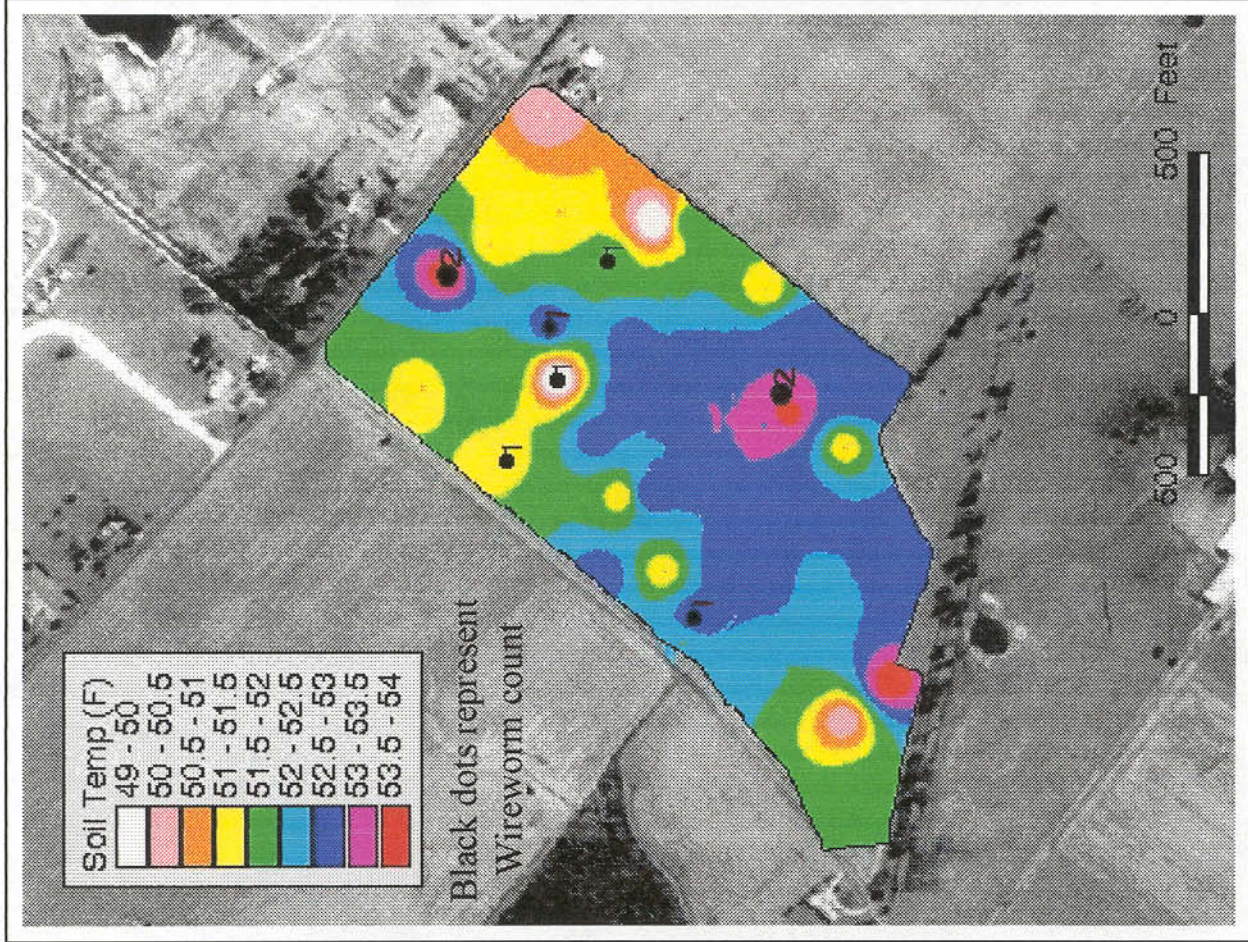


Figure 2. Field 2. Comparison between soil temperature, soil compaction depth at 300 psi and Wireworm count

Image source: USGS DOQQ, resampled to 2 meters  
 Data source: Ag122 Trimble GPS unit

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