NEW JERSEY GRAIN AND FORAGE JOURNAL

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

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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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Research Question

Application of Global Positioning System Geographic Information System (GPSGIS) technology is one of the newest areas of agricultural research. In agriculture, GPSGIS has been used primarily in the Mid-west grain belt for various data collection, yields, mapping, and soil sampling. There is a need to learn how to use and apply the technology to small field situations in New Jersey. One of the more useful applications may be in detailed analyses of soil conditions. This study investigated if spatial variation existed for various soil nutrients.

Literature Review

GPSGIS technology was first developed by the military and over time has been made available to the general public. The broadest use is probably in urban planning, but for several years now, it has been applied to agricultural situations including the development of yield monitors on combines and soil mapping. In New Jersey, projects in forestry, cranberry diseases, and field crops have already used GPSGIS.

Study Description

Four manured fields from two farms were selected for detailed soil analysis. Boundary maps were produced for each field, which could be overlaid with a computer-generated grid with random sampling sites, as follows:

Field	acreage	grid size	# of sample points
1	22.16	1 acre	26
2	5.52	¼ acre	23
3	10.56	½ acre	22
4	34.6	1 acre	34

Each of these sample points was geo-referenced with latitude and longitude coordinates so that any point could be relocated using GPS equipment.

After setting sample points, 150 cc of soil were collected at each site to a depth of 12 inches using a soil sampling probe. Soil was analyzed at the Rutgers Soil Testing Laboratory for pH, available phosphorus, and percent organic matter. The data from these tests were sent to the Remote Sensing Laboratory at Rutgers University for compilation.

Applied Questions

What was the nature of the maps?

Boundary maps indicating field borders were color-coded to show gradations in soil test values derived from the sample points. A computer extrapolated the data generating map zones and a color legend for each map.

How will these maps be useful to farmers?

Each field map shows great detail of nutrient levels, more so than traditional soil sampling would normally provide. Computer-generated, color-coded maps are very useful in pinpointing problem areas of fields that require adjustment of pH (Figure 1) or plant nutrient levels. Used in conjunction with variable rate applicators, GPS technology can be used to apply lime and fertilizer at variable rates based on the generated maps.

Determining herbicide rates based on soil organic matter (Figure 2) is another type of application. In field 1, the percent organic matter increased fourfold, from approximately 1.0 per cent to 4 per cent from north to south. Using one rate of an herbicide, whose effectiveness depends upon the amount of soil organic matter, would provide good weed control in some areas and poor control in others.

Also, as variable rate seeders become available, equipment technology combined with GIS can be used to seed at variable rates adjusting to soil type and topography.

Recommendations

Intensive sampling using GPS technology would be ideal for the problem field that never produces high yields, or for the farmer who wants to maintain the most optimal yields.

Intensive sampling of fields as done in this study is expensive. At research rates, the total bill for processing samples from all 4 fields was in excess of $600, approximately $8.30 per acre. The cost of a private consultant to provide this same service would be considerably higher. Nevertheless, the results will be informative. Whether the cost of sampling will be justified will depend upon farmers being able to use the information to their advantage.

Acknowledgements We would like to thank Marilyn Hughes of the Rutgers University Remote Sensing Laboratory for producing the maps for this article.

Soil pH Distribution on Four Study Fields

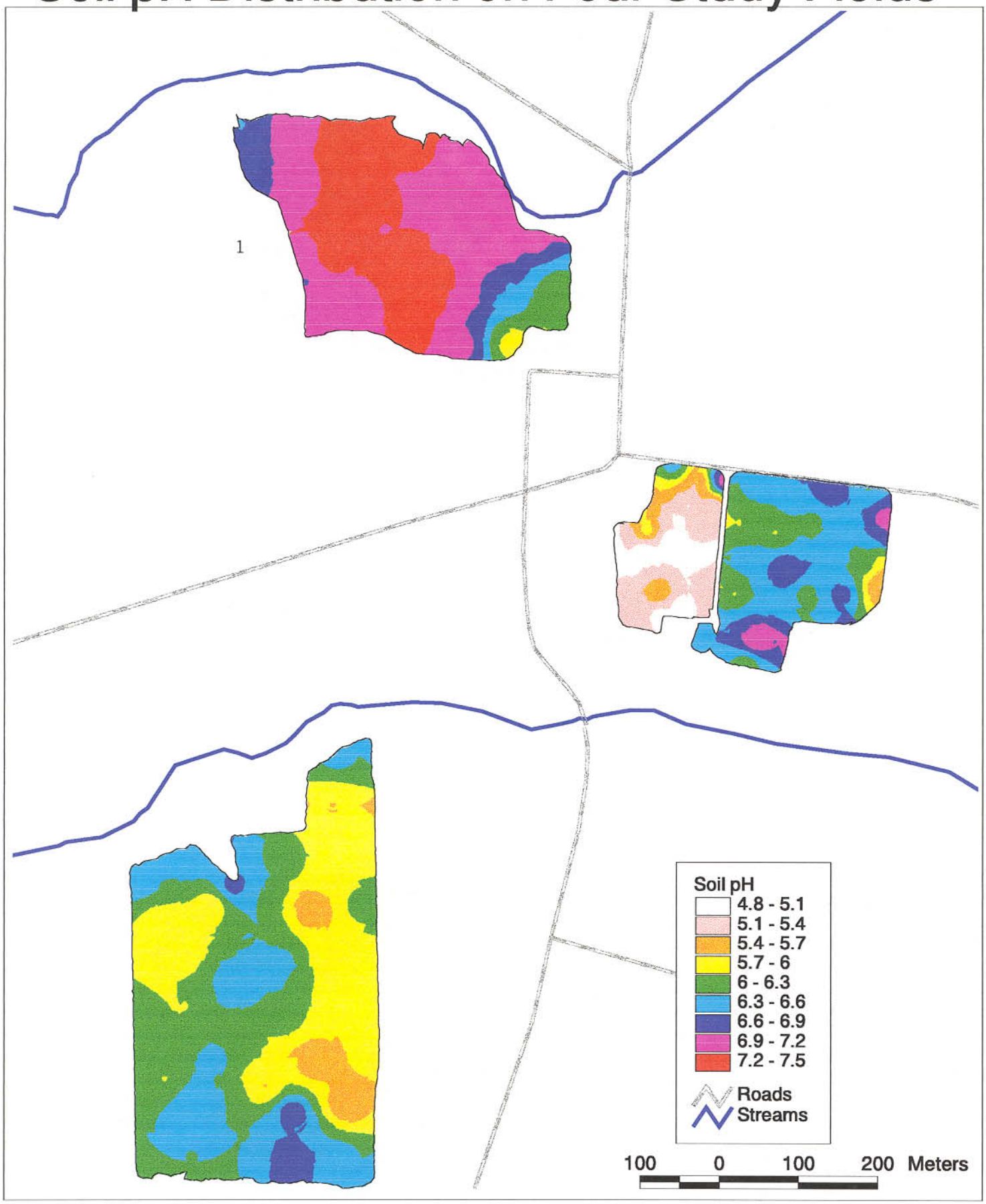

Figure 1

Organic Matter Distribution on Four Study Fields

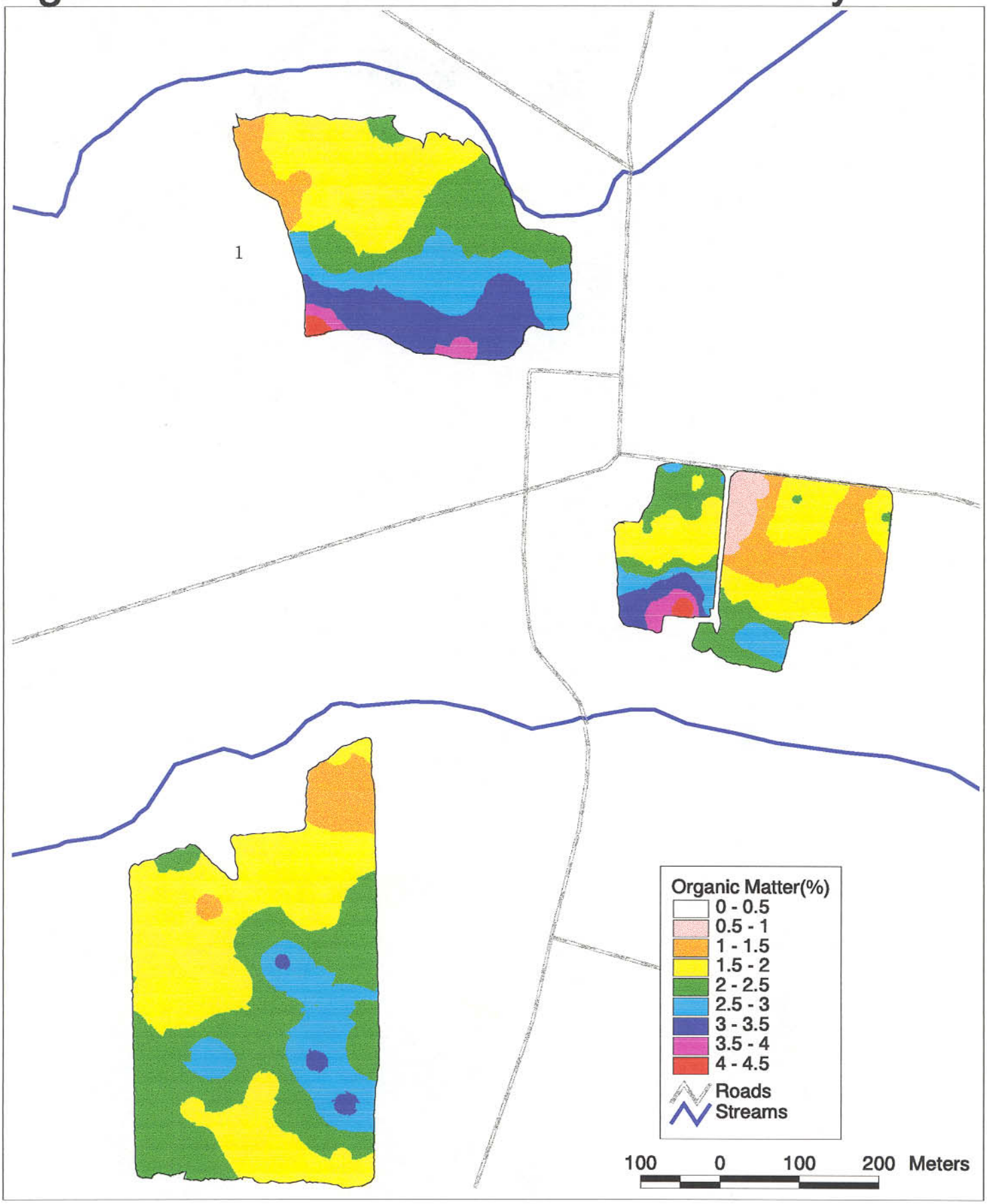

Figure 2

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