

FIELD AND LABORATORY DATA ON SOME PODZOLIC AND ASSOCIATED SOILS IN SOUTHEASTERN UNITED STATES pdf

1: SL/SS Developing a Soil Test Extractant: The Correlation and Calibration Processes

Excerpt from Field and Laboratory Data on Some Podzolic and Associated Soils in Southeastern United States Note.-this memorandum was prepared by the Soil Survey, Soil Conservation Service, United States Department of Agriculture Much of the work reported in this memorandum was done prior to the transfer of the Division of Soil Survey from the Bureau of Plant Industry, Soils, and Agricultural.

Population dynamics and ecology of insects across the farmscape will be investigated, with an aim to improve the impact of natural enemies of key pests and develop our understanding of insect dispersal. The work will quantify how commercial transgenic corn traits impact the development of the corn earworm, one of the key pests of corn in South Carolina. The work will include developing sampling plans in soybean for the invasive *Megacopta cribraria*, commonly known as the kudzu bug. Findings from this work will be included in extension programs for growers, agricultural consultants, and all others involved in agriculture. Project Methods Objective 1. Harmonic radar tags will be attached to stink bugs to monitor their movement to better understand dispersal of these key pests among crops. Laboratory studies will first assess how different types of glue needed to attach the diode impact stink bug survival. To develop an effective tagging method, antennae need to be designed that are both effective detectable at adequate distances in the field and non-intrusive for insect survival and movement. The length and thickness of wire will be tested. Tagged stink bugs will be evaluated for mobility in a tracking field made from two plastic specimen containers. Initial field trials will be performed to assess efficacy of the tagging method. Tagged and untagged stink bugs will be released in a fallow field or a grass that does not impose artificial movement constraints on stink bugs through row-cropping. Measuring flight and movement of stink bugs in the field using harmonic radar tagging will be an indicator of success. Jasmonic acid, a common plant volatile involved in plant defense and attraction of natural enemies, will be applied to stink bug eggs placed on cotton plants. Predation on eggs by natural enemies will be quantified with and without applications of jasmonic acid. Increased predation using jasmonic acid will indicate that this method has potential as an alternative to broad-spectrum insecticides. Field trials will assess the association in time and space of insect predators and key pests of wheat cereal leaf beetles and aphids. Geostatistical methods will be used to quantify the associations. Field trials will be planted with near isolines of Bt and non-Bt hybrids. Biweekly sampling of corn ears will be conducted to follow the development of corn earworm larvae. Differences in larvae numbers of size are expected to vary among Bt traits. Additional research projects will involve using several sampling methods in soybean fields for the kudzu bug *Megacopta cribraria*. The variance and mean of samples from several fields will be used to generate sequential sampling plans and sampling plans for population estimates. Sampling plans will be validated by comparing fixed and sequential plans used in additional soybean fields. Training for farmers and other industry leaders included presentations at numerous grower meetings, field days, training sessions for consultants and county agents. Results of studies were also presented at the southeastern branch and national meetings of the Entomological Society of America, industry meetings, and at the International Plant Protection Congress in Berlin. Nothing Reported What opportunities for training and professional development has the project provided? Training programs were given to County Extension Agents on sugarcane aphid management in grain sorghum, management of other pests in grain sorghum, and management of insects in corn. Training for farmers and other industry leaders included presentations at the Clemson University Pee Dee field days and at crop pest scouting field days. How have the results been disseminated to communities of interest? Presentations were made to the general public to increase understanding and interest in applied entomology and field crop IPM. Presentations are also made every year at the annual meetings of the Entomological Society of America and the southeastern branch meeting of the Entomological Society of America by PI and graduate students , in addition to a range of academic-industry meetings. What do you plan to do during the next reporting period to accomplish the goals? Nothing Reported Impacts What was accomplished under these

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goals? The overall goal of this program is to generate data and management recommendations that will ultimately lead to reduced yield losses from insect pests and more environmentally friendly control practices. Stink bugs are major pests of all row crops in SC and most cotton fields for instance are treated with insecticide for these pests. Remote sensing was investigated as a tool to improve both sampling and management in cotton. Field trials showed that cotton boll injury from stink bugs was spatially correlated with crop growth measured by a multispectral vegetation index. This information has potential to reduce insecticide inputs by targeting at-risk areas of field as determined by remote sensing. Since stink bugs are mobile insects and feed on all major row crops, understanding their dispersal can help to improve management practices. Harmonic radar tags were investigated as a method to monitor movement of the southern green stink bug. Tagged bugs were recovered in cotton and fallow fields and this method did not impair walking or flying in the laboratory, suggesting that this method has potential to further elucidate movement of key pests among crops. On corn, transgenic cultivars producing Bt toxins were evaluated for efficacy against key insect pests, and growers were informed of their performance in SC. Traits producing multiple toxins for above ground pests were effective in reducing injury from corn earworm and fall armyworm. Studies on the development of corn earworm in Bt and non-Bt corn hybrids provided information that can help to detect resistance and can also be used to improve resistance management models. On grain sorghum, the invasive sugarcane aphid was first detected in SC in the fall of Field trials have emphasized the value of using tolerant grain sorghum varieties and economic thresholds were developed as primary tools to manage the insect. To study the spatial ecology of key pests of field crops cotton, soybean, corn, wheat and develop environmentally friendly management practices. Trials were conducted to determine the degree of aggregation of stink bugs and boll injury in cotton, and their spatial association with NDVI. Boll injury from stink bug feeding was more frequently aggregated than stink bugs. Spatial stability in time determined by SADIE association indices showed that had the greatest stability, followed by boll injury and stink bugs densities. Combined with the highly variable soils in the southeastern coastal plains in the U. Work was initiated with an unmanned aerial vehicle UAV to collect NDVI data in cotton fields rather than using handheld or tractor mounted sensors. Analyses of aerial photos is on-going. Laboratory trials focused on selection of the optimal adhesive and design of harmonic radar tags. The distance dispersed in the field did not vary with crop, tagged status, or stink bug gender. This work suggested that harmonic radar tagging has potential in monitoring behavior of stink bugs. Plant volatiles have potential to reduce pest populations when applied to crops by enhancing the natural control of pests. Studies were conducted to evaluate whether the impact of natural enemies of stink bugs in cotton can be enhanced using applications of a jasmonic acid solution. Brown or southern green stink bug egg masses from lab colonies were stapled to cotton leaves. Only limited predation was observed. A possible reason is the unusual rainfall that occurred, with heavy rain occurring every week of the trial. Future work should continue to investigate the use of plant volatiles as alternatives to broad spectrum insecticides. Since its discovery in the southeastern U. A trial was conducted to characterize the dispersal of the kudzu bugs from kudzu using a mark-recapture method. Fluorescent powder was applied to a kudzu patch. Transects of sticky traps were deployed in four directions from the patch. We were able to increase the rate of marked kudzu bugs to 2. To improve kudzu bug sampling plans in soybean, sweep-net and beat-cloth sampling was conducted in soybean fields. Fewer sweep-net samples were required for population estimations compared with the number of beat-cloth samples. Sequential sampling reduced the sample size required to reach a management decision for the sweep net and beat cloth compared with a fixed sampling plan. Cost reliable estimates were also provided. These results can be used to improve sampling and reliability of kudzu bug estimates for research purposes and for pest management. A trial in wheat in assessed the spatial association of lady beetle predators and herbivores in wheat aphids and cereal leaf beetles. Data showed that cereal leaf beetles were sometimes spatially correlated with lady beetle predators. To assess the impact of transgenic Bt corn hybrids on the life cycle of target insects. Because corn earworm can complete development on some Bt traits in corn, work was conducted to determine the impact of Bt trait on the production of corn earworm

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pupae. Pupae were sampled by placing ears with late instar larvae in plastic boxes with soil to allow pupation. Larval weight, number of insect entering the pupal stadium, pupal weight, time to eclosion, and number of pupae able to eclose were not reduced in the hybrid expressing Cry1Ab compared with a non-Bt paired hybrid. As Cry1Ab affected these in , corn earworm may be developing resistance to Cry1Ab in corn. A follow-up study using similar methodology to collect pupae is also measuring fecundity and egg viability. Results showed inconsistent impacts of Bt toxins on these parameters. Objective 3 - To improve the management of other insect pests of field crops. The invasive sugarcane aphid was found for the first time in SC in October. In response to this invasion, insecticide trials were initially conducted to determine efficacy of different products. Two products flupyradifurone and sulfoxaflor provided good levels of control. Trials were expanded in with 8 varieties planted in insecticide treated and untreated plots. A threshold trial with a tolerant and a susceptible variety showed that aphids did not build up significantly on the tolerant variety DKS and yield was not affected. A threshold of 37 aphids per leaf was calculated. This research shows that the sugarcane aphid can be managed in grain sorghum and that the selection of a tolerant variety is a key decision to reduce yield loss and insecticide input. A host plant resistance project in soybean in and evaluated densities of insect herbivores and yield loss in different soybean lines at the Pee Dee REC in Florence, SC. The focus was to evaluate differences in numbers of kudzu bugs, which varied considerably among lines. Densities of kudzu bugs were too low in to draw conclusions; in , narrow leaf small seeded varieties had reduced numbers of kudzu bugs, and may be a good source of resistance to investigate. Journal of Economic Entomology. First report of a mermithid nematode infecting the invasive *Megacopta cribraria* Hemiptera: Plataspidae in the United States. Journal of Invertebrate Pathology. Spatial and temporal dynamics of stink bugs in southeastern farmscapes. Journal of Insect Science.

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2: Horticulture and Agroforestry Research Center // Research

Vol no Field and laboratory data on some podzolic and associated soils in Southeastern United States.

Environmental Fate and Effects Division P Office of Pesticide Programs The Environmental Fate Technology Team has revised the guidance for determining the acceptability of environmental fate studies conducted with foreign soils. The guidance document also includes information on the international and U. In the ideal case, the registrant would verify that a foreign test soil is representative of the intended use areas within the United States. If the registrant does not verify the foreign test soil, then the reviewer must determine if the tested soil is acceptable based on limited knowledge of the "soil taxonomy" or other soil data available in registrant-submitted studies. When there are sufficient data available, the reviewer should use the revised guidance document to determine if a foreign test soil is representative of U. This revised guidance is effective immediately and replaces the February 10, guidance document signed by Steven Bradbury, entitled "Guidance for Determining the Acceptability of Environmental Fate Studies Conducted with Foreign Soils. In the ideal case, the registrant verifies that the test soil is representative of the intended use areas within the United States. In most cases, though, this task is conducted by an EPA reviewer and is based on limited soil taxonomy or other soil data from registrant submitted studies. When sufficient data are available, the reviewer can verify the test soil by using the information in this guidance. The fate, transport, and transformation harmonized test guidelines of the Office of Chemical Safety and Pollution Prevention OCSPP Series , formerly Subdivision N state that test soils used in these studies should be collected from typical, intended pesticide use areas in the United States. Soils from foreign sources may be used in conducting these fate studies if the foreign soil has the same characteristics as a soil in the United States from a similar use area. Furthermore, complete information on the soil class, textural characterization, pH, organic matter content, and soil classification should be provided by the registrant so that the EPA reviewer can determine if the chosen soil is representative of U. To demonstrate comparability, data should be submitted that shows the lack of substantial or relevant differences between the selected material or test site and the U. Once comparability has been established, the Agency will assess the acceptability of the data as described in 40 CFR Part Although the EPA reviewer needs data on soil classification as well as physical and chemical properties of the soils, the Agency rarely receives information, particularly related to soil classification, when foreign soils are used to conduct fate and transport guideline studies. For example, many environmental fate and transport studies have been performed with German loamy sand Speyer 2. Since this soil was used as a benchmark soil in many other agricultural and environmental research projects, the Agency was able to obtain the description of this soil and its classification from the open literature such as Riepert and Felgentreu, and LUFA Speyer, Soil Taxonomy classification system and is representative of some agricultural soils of the United States. Top of Page Implication of Soil Classification for Foreign Soils Soil classification systems have been developed to provide scientists and resource managers with generalized information about the nature of a soil found in a particular location. Soil classification also provides information related to the nature of the parent material and the natural distribution of the soil based on soil properties, patterns, and their relationship to the underlying parent materials. In general, environments that share comparable soil forming factors produce similar types of soils globally. This phenomenon makes classification possible. Thus, information related to soil classification of foreign soils is critical in evaluating selected environmental fate studies and their spatial relevance to U. With soil classification and other pertinent information, the Agency will be able to evaluate whether the environmental fate studies conducted on foreign soils are appropriate for use in the U. Many classification systems are in use worldwide. Descriptions of the most commonly applied U. Soil Taxonomy and WRB soil classification systems are discussed below. Top of Page The World Resources Base WRB Soil Classification System The Food and Agriculture Organization FAO of the United Nations developed a supra-national classification, which conveys useful generalizations about the formation of soils in relation to the interactive

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effects of the main soil-forming factors such as parent material, climate, organisms, topography, and time. Since then, new materials have become available. The WRB is an international system that enables individual countries to accommodate their national classification system. Like the United States Soil Taxonomy, it makes class separations on the basis of diagnostic soil horizons as well as landforms. Some of the descriptive terminology, in simplified form, has been adopted from the United States Soil Taxonomy. Most soils can be accommodated in the system on the basis of their field descriptions. In , the incorporation of new materials has resulted in a number of basic changes in the updated version, where 30 RSGs were introduced Exit World Soil Resources [Figure 1]. The 2nd edition of the WRB has undergone a major revision. This system for classifying soils has undergone numerous changes since that time, and the eleventh edition was published in USDA, Keys to Soil Taxonomy. Soil Taxonomy remains one of the most widely used soil classification systems in the world. The current version of the system has six levels of classification in its hierarchical structure. The major divisions in this classification system, which are based on general characteristics and are refined to specific characteristics, are as follows:

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3: Ecological pest management and population dynamics of field crop insects in SC - CLEMSON UNIVERSITY

The "red clay" soils of the southeastern United States are examples of Ultisols. They are divided into five suborders: Aquults, Humults, Udults, Ustults and Xerults. Because of the favorable climate regimes in which they are typically found, Ultisols often support productive forests.

Download our guide to get started. Landowners may see a need for production alternatives to row crops and forage that offer potential for income and environmental benefits. This project seeks to identify poplar clones that are well-adapted to the climate of the lower Midwest and that produce substantial wood crops for fiber, chips or energy over short year rotations. The project also will provide estimates of total carbon sequestered by such plantations, data that will be useful in determining potential economic returns from carbon credit programs that may emerge. Cottonwood clones are being evaluated for their growth response and adaptability to Missouri conditions. The best cultivars will be used in agroforestry to produce biomass and for pulp and paper production. Cherrybark Oak Spacing Study: Cherrybark oak has market potential north of its native range, which extends south from the Missouri Bootheel and the USDA cold hardiness Zone 6. Seedlings have been planted at different spacings to establish uniform shade conditions for field testing promising agroforestry forages from the forage shade study laboratory. Researchers are investigating the similarities and differences in cattle performance between traditional open grazing and silvopastoral grazing practices. Factors also being evaluated include the success of electric fences as deterrents to protect young trees from grazing damage, and how grazing and forage production affect tree growth. Pine straw, the naturally shed needles of pine trees, is an excellent mulch material used extensively in the Southeastern United States in landscape plantings. The purpose of hybridizing these two pine species was to create a pine with the cold hardiness of a pitch pine and the fast growth rate and long needles of a loblolly. Fifteen different genotypes of this hybrid are being evaluated for cold hardiness, growth rate, needle length and needle yield. Results to date indicate that some of pitch x loblolly genotypes in the plantation are hardy, fast growing, long-needled pines, suitable for commercial pine straw in Missouri. Pot-in-Pot Nursery Stock Trial: Pine trees planted for pine straw production generally take at least ten years to begin producing a commercial yield of pine straw mulch. The purpose of this trial is to evaluate the potential for growing high value nursery stock between pines during plantation establishment using the Pot-in-Pot PIP production method. Although the initial cost of establishing a PIP nursery is relatively high, the socket pots can be used for several successive crops of nursery stock. Also, PIP eliminates the costs associated with winter protection of containers using conventional container production methods. The long-term goals of this project are to estimate the profit potential for PIP production during pine plantation establishment and to evaluate a series of increasingly shade tolerant ornamental species for PIP production between the pines as the plantation matures. Missouri Gravel Bed for Nursery Stock: Dormant, bare rooted trees and shrubs are set into a frequently irrigated mixture of pea gravel and sand. Plants can be removed from the gravel at any time during the summer and fall and field planted bare root, in full leaf with a survival rate equal to or greater than those expected for container-grown or balled and burlapped plants. The main objective of this project is to evaluate the potential of MGB to facilitate planting of trees and shrubs in agroforestry and landscape plantings. The purpose of this planting is to serve as a germplasm repository and evaluation site for newly introduced and rare woody plants with potential ornamental value. In , researchers began this project by examining 27 forage species native and exotic legumes, warm season and cool season grasses for the effect of shade on dry weight production and nutritional value. During the intervening years, additional species have been studied. All species are evaluated under 3 shade levels: The goal is to determine their growth and development under different shade levels when grown as companion crops in agroforestry practices or for savanna and woodland restoration. Evaluating the MDC quail cover bundle shrubs: Bare root seedlings of false indigo, wild plum, fragrant sumac and dogwood were established in These shrubs were chosen for their potential to provide quality escape cover and food for bobwhite quail. The main objective is to

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compare their growth and development with moderate management under field conditions. This facility provides a unique field laboratory for studying the response of plant species to the periodic flooding common to mid-western floodplains. The laboratory has 12 channels, each approximately ft wide by ft long. Each channel can be independently adjusted for water depth, standing or flowing water, and duration of flooding. Selected grasses, legumes, and tree species are being evaluated for flood tolerance. The flood tolerance of hardwood planting stock and genetic variation in ecotypes from seed collected from bottomland and upland stands is also being evaluated. This project demonstrates the value of bioterracing on highly erodible soils. Bioterraces are a combination of trees, shrubs and grasses planted in rows along the corridor to help trap soil and debris as they move down a slope in surface water flow. The tree improvement program focuses on identifying and testing selections of black walnut *Juglans nigra*, pecan *Carya illinoensis* and chestnut *Castanea mollissima* for incorporation into agroforestry plantings. Major components of this research include 1 testing cultivars on various sites; 2 identifying superior rootstocks for grafting; 3 developing improved vegetative propagation techniques; and 4 creating a breeding program to develop improved selections. A significant component of the tree improvement research program at HARC is nut tree repositories, which serve as germplasm collections to study the adaptation and commercial potential of various cultivars of nut bearing trees to Missouri. National ties A cooperative program begun in with the U. Designated the Midwest Plant Research and Education Site by the National Arboretum, the center serves as a germplasm repository for newly introduced and rare plant materials with commercial and ornamental value. It is also the Midwest site for evaluating ornamental trees and shrubs for cold hardiness and resistance to disease and insects, with particular emphasis on plant materials in the Missouri and Mississippi River bioregions. Extension role In addition to its traditional role as a teaching facility, the center supports University Extension programs such as field days and workshops for the general public and various commodity or industry groups. Local county or regional extension personnel use the center occasionally as a stop on Extension-sponsored tours for growers and producers. Interpretative trails throughout the site are planned.

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