Results of a CRP Survey in Kentucky

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Introduction

Fields enrolled in the Conservation Reserve Program (CRP) are often viewed as being troublesome with several problems. Some of this perception is based on the fact these fields were generally highly eroded and had a low yield potential at the onset of the program. There is concern that these fields have numerous weeds since the only requirement for maintaining weed control is to mow fields once per year by August 15. Having a wide variety of sod and weedy species may be a favorable environment for soil insects such as white grubs *(Scaraaeidae:Melolonthinae)* and wireworms *(Elateridae)* and possibly soybean cyst nematode *[(Heteroderaglycines* (SCN)].

A field survey was conducted in 1995 to help identify potential problems with soil fertility and pests that might affect the management of these fields after the CRP contracts expire. A number of factors were evaluated including the levels of soil pH, phosphorus, potassium, vegetative cover, soil insects, and SCN.

Methods

A survey of 50 fields enrolled in the Conservation Reservation Program (CRP) was conducted in 1995. Fields were located in ten counties in west and central Kentucky where most of the CRP fields occur. Each field was surveyed at five to ten random sites depending on size of field. Scouts collected and combined ten soil cores at each site for laboratory analysis of phosphorus, potassium, pH, organic matter, and SCN. A cube of soil of 216 in^3 volume was dug and sifted at each site for collecting certain soil insects. Vegetative ground cover of individual plant species occurring within a I00 ft by 100 ft area at each site was estimated as: light (up to 10%, medium (11 to 30%), or heavy (> 30% ground cover). The first field visit was done in the spring when scouts collected soil and recorded information concerning vegetative cover. The vegetative cover was also recorded during the summer to determine shifts from cool-season species to warm-season species.

Results and Discussion

Soil Fertility

The organic matter content was greater than expected in most fields and averaged 2.3% (Table 1). Slightly more than one-third of the fields (36%) had the lowest O.M. content (1.5 to 2.0%), and usually occurred where fescue stands were poor. Nearly 90% of the fields had a pH between 6.0 to 7.0 (Table I), therefore, the amount of lime that will be needed to return these fields back to production will not be great. The level of soil phosphorus appeared to be the most limiting nutrient food in most CRP fields. The level of phosphorus was in the low range for 62% of the fields and 28 % in the medium range (Table 2). Soil test results for potassium indicated that only 10% of the fields tested in the low range and that 42% of the fields were in the high range (Table 2). The fact that several fields had a high potassium content may be due to potassium being deposited at the soil surface by growing plants over time without any removal.

Soil fertility records prior to the CRP enrollment were available for 34 of the 50 fields and were used to compare with the survey results to determine if changes in soil pH or nutrient levels occurred during the CRP. Comparisons indicated an increase in pH in 50% of the fields and a decrease in 41% of the fields. The average soil test phosphorus level decreased approximately 41 lb/A whereas the average soil test level of potassium increased about 12 lb/A while in the CRP.

The soil test results of the 1995 survey indicate that the fields in the CRP program had a reasonable fertility status when placed into the program and the changes have not been great. The soil pH has been maintained under these conditions and the need for lime will not be great for most fields. The phosphorus level is low on most fields and has decreased over the time of the program. This will be one of the most limiting nutrients on most fields and will require a significant amount of phosphorus fertilizer to be placed back into production. The potassium content of most fields is medium or high and most fields will require none or only moderate amounts of potassium fertilizer for production purposes. There are high amounts of variability between fields: so each field must be tested and treated separately to assure adequate fertilization and liming for good production.

Vegetative Cover

A total of 75 species or groups of species were identified and included 28 annuals, 2 biennials, 29 herbaceous perennials, and 16 woody perennials. The number of species reported for the spring survey was 66 compared with 62 for the summer survey.

Tall fescue *(Festuca araundinaceu)* was obviously the dominant species during the spring visit and was present in all fields (Table *3)*. Orchardgrass *(Dactylus glomerara)* ranked as the second most common species in the spring and was found in 76% of the fields. Examples of other species that frequently occurred in the spring included white clover *(Trifolium repens),* broomsedge *(Andropogon virginicus),* hairy vetch *(Vicia villosa),* common milkweed *(Asclepias syriaca),* fleabanes *(Erigeron* spp.), wild garlic *(Allium, vineale),* ragweeds *(Ambrosia* spp.), and docks *(Rumex* spp.).

The spring survey was delayed because of wet weather, therefore, the data from this portion of the survey may not accurately reflect the presence of certain cool-season species. Less than ten percent of fields had cool-season annuals such as common chickweed *(Stellaria media),* henbit *(Lamium amplexicaule),* and cheat *(Bromus secalinus).* The low incidence reported for these species may be attributed to their maturing before the spring visits were completed. However, the spring survey seemed to accurately reflect the presence of cool-season species that usually mature in late spring to early summer [e.g. hairy vetch, docks, musk thistle *(Carduus nutans),* mustards *(Brassica* spp.), and wild garlic].

Results of the summer survey indicated an increased emergence of warm-season weeds (Table 3). The fields having ragweeds increased in number and ranked second after tall fescue. Several other warm-season species emerged in CRP fields in the summer and included such weeds as johnsongrass *(Sorghum halepense),* marestail *(Conyza canadensis),* Korean lespedeza (Lespedeza stipulacea), and foxtails *(Setaria* spp.).

Growers who elect to grow to row crops in CRP fields will need to develop control strategies for managing fescue sod. There may be certain cases where special attention is needed to control orchardgrass or white clover. A few fields may have woody perennials such as blackberry *(Rubus* spp.), eastern redcedar *(Juniperus virginiana),* or trumpetcreeper *(Campsis radicans)* These species are extremely difficult to control and will require a combination of several strategies to manage them effectively after CRP. Certain cool-season weeds such as docks, fleabanes, hairy vetch, musk thistle, mustards, and wild garlic may be a problem in fields that are planted to a fall-seeded crop. Examples of weed species that are most likely to occur in corn or soybeans after CRP include ragweeds, johnsongrass, marestail, common milkweed, Korean lespedeza, broomsedge, and foxtails.

It *is* important to recognize that some weed species may be suppressed by sod and other weeds: therefore, current survey results may not provide a complete inventory of potential weed problems that may be encountered in CRP. Once the vegetative cover is killed, pigweeds and other weeds may emerge in large numbers. Tillage can also encourage a shift to different spectrum of weeds by bringing buried dormant weed seed near the soil surface where they germinate. These types of scenarios emphasize the importance of maintaining a long-term weed inventory to help plan for future weed control programs. Without the historical record of weeds growers will need on the lookout for unexpected problems during the process of converting CPR land back to row crop production.

Soil insects

Soil insects were found in 22% of the fields. The white grub complex accounted for the majority of soil insects surveyed. Samples from 18% of the fields had white grubs only, while 2% had a sample containing a white grub and a wireworm. The remaining 2% had a sample with a wireworm only.

The survey results for soil insects were both surprising and important. It has been the general recommendation when bringing "new ground", especially sod ground, into corn production to apply a granular soil applied insecticide during the first and even second season. The potential for damage has been perceived to be high and farmers typically have no information on soil insect numbers to use as a guideline. Since stand loss in some fields has been severe, at least in spots, the tendency is to use a preventive approach rather than having to replant if damage develops. However, the most important of these pests. the wireworm was found in only 2 of 275 samples! In the most conservative case, if detection of a single wireworm in a sample warranted control, a soil insecticide treatment would have been recommended in only 2 of the 50 fields that were examined. This survey indicates a blanket recommendation, to use a soil insecticide on fields that have been held out of production and covered with a mixture of grass or broadleaf cover, may not be justified. If possible, during the first season plant soybeans instead of corn. If corn is planted, use wireworm traps or soil core sampling to determine the presence of wireworms and/or white grubs before planting.

Soybean Cyst Nematode

SCN was detected in 20 of the survey sites that occurred in 8 of the 50 fields. Approximately half of these sites had less than 10 cysts per pint of soil. Two fields had at least one site with more than 100 cysts per pint of soil. Weed species reported in the spring survey did not account for the greater than expected SCN populations.

It appears as though CRP fields with a prior history of soybean production may be at some risk of having damaging levels of SCN at the end of the CRP period. Weeds in existence at the end of the period cannot be used to estimate SCN populations. It is possible that weeds present in years and seasons prior to surveying may have been responsible for maintaining SCN populations. The surveying technique in relation to soil sampling may have also resulted in poor ap-

Table 1 **Soil organic matter content and pH for *50* CRP fields in Kentucky (1995).**

Organic Matter [1]		pH [2]	
O.M. Content	Percent *of* Fields	pH Range	Percent of Fields
1.5 - 2%	36	< 6.0	8
21 - 2.5%	40	*6.0 - 6.5*	60
3.6 - 3.0%	16	6.6 - 7.0	28
> 3.0%	8	> 7.0	4

[1] **Soil organic matter content ranged from** 1.5 to 3.8% **with an average of** 2.3%

[2] **Soil** pH **range was from** 5.3 **to** 7.5.

Table 2. **Soil phosphorus and potassium for 50 CRP fields in** Kentucky ***(1995).***

Phosphorus [1]		Potassium [2]	
Range (lb/A)	Percent of Fields	pH Range	Percent of Fields
Low (0 - 30)	62	Low (0 - 199)	10
Medium (31 - 59)	28	Medium (200 -299)	48
High (60+)	10	High (300+)	42

[1] **Soil phosphorus ranged from 3 to 187 lb/A.**

[2] **Soil** potassium **ranged** from **139 to 493 lb/A.**

Table 3. Ten most common species in 50 CRP fields in Kentucky during spring and Summer (1995).

SPRING		SUMMER	
Species	Percent of Fields	Species	Percent of Fields
Tall fescue	100	Tall fescue	96
Orchardgrass	74	Ragweeds	78
White clover	54	Orchardgrass	76
Broomsedge	36	Johnsongrass	70
Common milkweed	34	White clover	54
Hairy vetch.	30	Marestail	26
Annual Fleabane	26	Common milkweed	48
Wild garlic	26	Broomsedge	28
Ragweeds	11	Korean lespedeza	28
Docks	20	Foxtails	24

parent relationships between weeds present and SCN levels. Past experience tells us that it is unlikely that populations >*50* cysts/pint of soil could be maintained in a field without some low level reproduction. Failure to pick up SCN in 254 sites suggests that damaging levels of SCN in CRP acreage is not widespread. This was expected since the bulk of CRP fields was in predominately tall fescue (an SCN non-host) for the past 10 years. Nonetheless, without an SCN soil analysis it will be impossible for farmers to know the potential for damage due to SCN in fields planted to soybeans the first year following CRP.

A general recommendation would be to test fields for SCN prior to planting former CRP fields to soybeans. Do not assume that fields will not be affected by SCN simply because the fields have been out of soybean production for the last 10 years. Do not use existing weed composition in a field to estimate the potential for SCN related problems.

Summary

Based on these results a high level of management may be required to convert certain CRP fields back into production. Growers who anticipate utilizing CRP land for grain production may want to collect soil for pH and nutrient analysis, especially phosphorus. Controlling the perennial sod and other vegetation will be difficult for some fields. In order to achieve the best possible control of the sod and weedy vegetation may require implementing a control strategy in the summer or fall before converting the land back into production. Although the results indicate that a blanket treatment of a soil insecticide may not be warranted in most instances following CRP, the use of wireworm traps or soil core sampling may help verify the insecticide needs for a particular field. The fact that SCN was present in damaging levels in some fields makes it necessary to consider testing for SCN in fields to be converted to soybean production.