Agronomy Technical Note

United States Department of Agriculture
Natural Resources Conservation Service
200 North High Street, Room 522
Columbus Ohio 43215

TECHNICAL NOTE: – AGRONOMY – OH-3 April 2007

Converting Sod to Grain

The Big Decision…

Converting grassland to cropland is a decision that should not be taken lightly, especially if the land is considered Highly Erodible Land (HEL).

Keeping rolling land under a grass cover has many benefits. Soil erosion is significantly reduced, which consequently reduces sediment, nutrient, and chemical runoff. A diverse stand of grass also provides food, shelter and habitat for a variety of upland wildlife species. Healthy stands of grass with large root systems reduce atmospheric carbon dioxide, commonly known as carbon sequestration.

These environmental improvements should be considered when trying to decide whether to convert grassland to cropland. If you decide to make the conversion, utilizing good stewardship principles and conservation practices can reduce the environmental impact.

When converting grassland to cropland, producers should consider:

- The impacts this decision will have on all natural resources - soil erosion, soil quality, water quality, wildlife habitat, and air quality.
- The economic impacts of land returned to crop production – costs as well as profits.
- The impacts of cropping on time, labor, equipment, and other management needs.
- Maintaining critical areas of the field in grass, such as waterways, filter strips, field borders, odd areas, and severely sloping or eroded areas.
- The crop rotation you will utilize and its impact on resources – utilizing rotations that include small grain and hay will minimize impacts on natural resources.
- The tillage system you will use to plant the crops – utilizing no-tillage or direct seeding technology will minimize impacts on natural resources.
- Developing a nutrient management plan that takes into account soil test values, crop nutrient needs as well as the form, timing, and placement of nutrients.
- Utilizing an integrated system of pest management that reduces the need for pesticides.
- The importance of grass stands in maintaining populations of beneficial birds and insects which reduce crop pests or are important pollinators.

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Management Considerations

Crop and Rotation Options
Maintaining a grass cover is the best land use for land subject to erosion. A grass/legume mix improves soil quality by reducing erosion, increasing soil organic matter, fixing nitrogen and carbon from the atmosphere into the soil, improving soil structure, and increasing water infiltration into the soil.

If rolling land is converted from grassland to cropland, consider a rotation that includes small grain or hay. Crops that quickly form a canopy or produce large amounts of crop residue like corn or small grain help protect the soil surface from sheet and rill erosion. Corn is a good crop to follow grass or idle land if nutrient and pH levels are adequate.

Consult with local NRCS/SWCD staff to find a crop rotation that controls soil erosion and maintains the benefits of increased organic matter, soil structure, and water infiltration.

Tillage
No-till or direct seeding is the preferred method of planting when converting grassland to cropland. No-tillage will help take advantage of the soil quality improvements gained by the previous grass/legume cover. Plowing can eliminate soil quality improvements in as little as one year. Tillage oxidizes organic matter quickly and reduces the soil structure. The loss of organic matter also reduces the water infiltration and the availability of plant nutrients.

Fertility
It's crucial to know the current soil fertility levels before planting. Soil sample cores should be taken at a depth of 0-8 inches on idle land or grassland well in advance of converting it to cropland. If possible, take soil tests a year in advance of cropping in order to provide ample time to apply the lime and fertilizer required for new crops. In areas where soil test levels are low, consider applying starter fertilizer in the row when planting corn.

pH
Check the soil pH and lime requirements from your soil test. An early soil test allows application of limestone to adjust pH levels prior to cropping. Once you have established a no-till cropping system, it is recommended that two separate soil samples be taken. One at a depth of 0-8 inches to determine fertility requirements and another at a depth of 0-4 inches to monitor soil pH on the surface and lime requirements. Very high or low surface pH can affect herbicide performance or cause carry-over damage to crops. Lime should be applied in the fall if possible to allow time for reaction with the soil. Lime should be lightly incorporated to increase the soil reaction. If the field is sloping enough to cause soil erosion, then do not incorporate at all.

Soil pH should be adjusted so that it falls in the range of 6.0-6.5 for corn, soybeans, and small grains and 6.0-6.8 for alfalfa and other forage legumes. Consult the Ohio Agronomy Guide or the Tri-State Fertility Guide for additional information.

Nitrogen
The form of nitrogen used, the timing of nitrogen application, and the placement of nitrogen fertilizer are all important considerations. In a no-till cropping system, volatilization of nitrogen can be significant if surface broadcasting fertilizer containing urea. Do not

broadcast urea based fertilizer on recently limed fields if the lime was not incorporated. Consider knifing in anhydrous ammonia or using other forms of nitrogen. Using a urease inhibitor or timing the application of urea based nitrogen prior to rain can reduce volatilization and help move the nitrogen into the soil. Timing the application of nitrogen fertilizer as closely to the crop's need for N will reduce nitrogen loss from leaching and denitrification. Consult the Ohio Agronomy Guide or the Tri-State Fertility Guide for additional information.

Phosphorus and Potassium

Generally in idle grassland, phosphorus and potassium levels will not have changed much from when the grass was established if no grass was harvested. A small amount of P and K will be tied up in the vegetation as a duff layer. For pasture or hayland, it is possible the phosphorus and potassium levels have dropped significantly if no fertilizer was applied during the period the forage was harvested.

In Ohio, phosphorus and potassium recommendations are based on keeping soil test levels at, or slightly above a "critical level." The critical level is the soil test value at which the soil can supply adequate quantities of P and K to support optimum economic growth. When soil test values are below the critical level, the soil is not able to supply the P and K requirements of the crop. Placement techniques such as banding or stripping can enhance nutrient availability on nutrient-deficient soils. Consult the Ohio Agronomy Guide or the Tri-State Fertility Guide for additional information.

Pest Management

When bringing grassland into crop production, landowners must manage for a variety of weeds and insects. Utilizing an integrated system of pest management reduces the need for pesticides.

Weeds

In Ohio, fields which have been idle or in grass pasture for a significant period of time will likely contain of a high percentage of tall fescue. Not only will the established fescue need to be killed and controlled, but there will be a lot of fescue seed that has been deposited on the soil surface over the years. When the established fescue is killed, allowing sunlight down to the soil surface, the fescue seed will germinate and become a secondary problem.

To control tough grasses when converting to crops, spray the grass with a broad spectrum, translocated herbicide such as glyphosate (Roundup or equivalent) while it is still actively growing the fall before planting the crop. Fall is the best time of the year to control perennial grasses with herbicide. The most effective control is a secondary treatment in the spring once the grass has broken dormancy and the grass seed on the soil surface has germinated. Normally this will occur in mid April.

Scout fields the previous fall for invading broadleaf weeds such as milkweed, ironweed, hemp dogbane, trumpet creeper, multiflora rose, and/or trees/shrubs. Treat perennial broadleaf weeds in the fall. Adding a growth regulator herbicide such as 2,4-D or dicamba to the glyphosate improves control of perennial broadleaf weeds.

Any mention of trade names, does not constitute an endorsement of those products. Consult your farm product supplier for equivalent herbicides. Always read and follow label directions.

Insects
Regardless of your tillage system, army worm, wireworms, slugs, seed corn maggot, and common stalk borer may present a problem when planting corn after sod. Corn rootworm is a common pest when planting corn after corn. Rotating crops is an effective means to reduce pests. Consult OSU Extension Bulletin 827 for cultural and chemical control methods.

Non-Crop Areas
Many agricultural areas were enrolled in Federal set-aside programs or used as pasture because they were not suitable for crop production. They may be areas that are rocky, steep, severely eroded, or have other conditions that make crop production unprofitable or impractical. These areas should be identified and left in sod, planted to trees, or managed for wildlife. Other areas that should remain in sod include steep areas, waterways that prevent gully erosion, and filter strips along streams which filter sediment, nutrient and pesticide pollutants.

Ramifications of converting Conservation Reserve Program (CRP) acres to crop production.
The Farm Service Agency (FSA) administers the CRP and converting those lands to crop production prior to the expiration date violates the terms of the contract. If the contract is terminated, substantial penalties may apply. These penalties include repayment of annual payments already received, repayment of cost share for cover establishment, interest on those payments, and liquidated damages. Consult your local FSA office for specific information prior to making the decision to convert CRP land into cropland.

Natural Resource Impacts
Over the years, significant benefits to our natural resources have been achieved by producers who practice good stewardship and conservation principles. A reduction in soil erosion and an improvement of soil quality, water quality, air quality, and wildlife habitat have all been achieved by planting waterways, filter strips, grasses, trees, and shrubs promoted by State and Federal conservation programs. Converting these fields back into crop production will impact all of these resources. It is important to consider these impacts before you decide to convert grasslands to cropland.

Soil Erosion
Soil erosion rates will increase when sloping or Highly Erodible Land (HEL) fields are cropped compared to being maintained in sod. The erosion can be severe. The level of soil loss depends upon the crops grown, the type of tillage used, the direction of tillage compared to the direction of slope, and the amount of residue left on the soil surface. Longer rotations that include small grain and hay should be considered. Utilize no-till or direct seeding technology to plant crops and farm across the slope where possible. Check with your local NRCS/SWCD office for specific erosion estimates for different cropping systems. Leave waterways or grass strips in areas where water is concentrated to prevent gully erosion.

Soil Quality
Valuable soil quality benefits can be attributed to maintaining a grass cover which increases organic matter, pore space for air and water movement, and improves soil structure and stability. Generally, soil quality will decrease when converting grassland to cropland. In order to maintain as many of these improvements as possible, utilize no-till or direct seeding technology and rotations that include small grain and hay.

Water Quality
Over the years, converting marginal cropland to grassland and installing conservation practices such as filter strips and grassed waterways has significantly reduced the amount sediment and chemical runoff getting to waters of the state. Converting grassland to crop production exposes the field to the potential for increased nonpoint source pollution. Utilizing rotations that include small grain and hay, as well as no-till or direct seeding technology can help control erosion and the nutrients and chemicals that are attached to the sediment. Developing a nutrient management plan based on current soil tests and crop needs will also reduce the potential for nutrient runoff. Consult the Ohio Agronomy Guide or the Tri-State Fertility Guide for additional information. Developing an integrated approach to pest management will reduce the need for pesticides. Consult OSU Extension Bulletin 827 for cultural and chemical control methods.

Wildlife Habitat
Converting grassland to cropland will eliminate wildlife species which depend on grassland for nesting, food or shelter. Conservation practices which reduce impacts on wildlife are the same as those that reduce soil erosion and improve water quality. They include:

- Utilizing rotations that include small grain and hay.
- Utilizing no-till or direct seeding technology.
- Leaving grass filter strips along streams and field borders.

Additional measures to help minimize impact on wildlife include:

- Consider planting warm season grasses or other grasses/legumes that are beneficial to wildlife in filter strips and field borders.
- Consider leaving odd areas or hard to crop areas in grass.
- Do not mow field borders or odd areas unless spot mowing is needed to control noxious weeds (especially during the nesting season).
- Leave strips of unharvested crops along filter strips, field borders, and odd areas for winter food and cover.

Air Quality
Healthy stands of grass with large root systems reduce atmospheric carbon dioxide. Carbon from the atmosphere is converted to organic carbon and stored in the soil. This is referred to as carbon sequestration. When an established grass sod is tilled, the organic matter in the soil is exposed to air and oxidizes back into the atmosphere. This can happen in as little as one year if the soil is plowed. One way to minimize this impact is to utilize no-till or direct seeding technology to keep as much organic matter in the soil as possible.

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References:

Extension Bulletin 472, Ohio Agronomy Guide, 14th addition
Extension Bulletin E-2567, Tri-State Fertilizer Guide