

MU Guide

Converting CRP Fields to Grain Crop Production

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Since 1986 more than 36 million acres of American cropland have been idled by farmers in the Conservation Reserve Program (CRP). The impact on the environment has been significant, reducing soil erosion by an average of 19 tons per acre per year and saving more than 600 million tons of topsoil. During the past 10 years, 2.4 million erodible acres have been planted into trees, and another 2 million acres are being managed to benefit wildlife. Over 400,000 acres are now preserved as wetlands and 5,200 miles of filter strips have been developed to protect lakes, rivers and streams. The result has been significant improvement in soil quality, water quality, wildlife populations and habitat.

As CRP contracts expire, farmers face the decision of re-enrolling into CRP or bringing those acres back into production. The purpose of this publication is to outline various considerations in converting CRP land back to grain crop production.

Soil quality

Undisturbed growth of annual and perennial plants on CRP fields increases soil organic matter and

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Figure 1. Appropriate herbicide application rates and timing are keys to successful conversion from forage to cropland.

improves soil tilth, which in turn increases water infiltration and internal drainage. Soils in CRP fields also tend to have more total pore space than cropped soils. These changes in soil structure result in improved water availability for plant growth and a concurrent reduction in water runoff and soil erosion.

Crop root growth can be increased by the presence of earthworm burrows. Earthworms flourish in the abundant organic matter and high-moisture conditions of CRP fields. Research at the Knox County CRP Research Plots in northeast Missouri showed that no-till plots have 50 to 120 percent more earthworms than tilled plots.

Because CRP fields have not been tilled for several years, it is also highly likely that compaction has been reduced. Tillage rapidly changes the physical state of a soil that has been in sod. The first change that occurs with tillage is the breaking of established soil pores. This results in less water infiltration and higher water runoff. Organic carbon and nitrogen content in the soil declines rapidly after tillage. No-till crop production maintains the soil structure and organic matter benefits gained during the establishment of CRP grassland. Restricting cropping practices to no-till has the advantage of slowing the rapid min-

eralization of carbon and nitrogen that occurs when the sod is killed.

Crop selection and cultural practices

Selection of the crop to be produced on a CRP field depends on personal preference, price outlook, fertility levels, potential pest problems (weeds, diseases, insects, voles) and the amount of vegetative cover. Each crop has advantages and disadvantages that will influence the producer's choice.

Soybeans

Soybeans allow for more flexibility in planting date than corn. There are also a large number of postemergence herbicides such as Select, Assure, Poast Plus, Fusion, Roundup and Liberty for post-emergence grass sod control. Using Roundup in conjunction with Roundup Ready soybeans also offers opportunities to control the sod and manage perennial broadleaf weeds in the crop. Growing soybeans immediately after CRP allows more time for organic matter to decompose and increases the amount of organic nitrogen available to a succeeding corn crop. Soybeans may also be the preferred crop to grow if presence of soil insects is unknown.

Other considerations when growing soybeans are soil pH, presence of soybean pathogens, including soybean cyst nematode (SCN), and inoculation for nitrogen fixation. Soybeans are less well suited to low-pH soils than corn, and liming may be required to raise soil pH to desirable levels. Soil samples should be taken to determine pH, fertility levels and presence of SCN. Inoculation of soybean seed is necessary because naturally occurring, nitrogen-fixing soil rhizobia may not be present after several years of grass sod.

Planting soybeans on CRP fields should not influence the incidence or severity of most soybean diseases. Most of the soil fungi that cause early-season diseases and root rots of soybeans can survive for long periods in the soil in the absence of soybean crops. Seedbed conditions and weather conditions at planting and just after will significantly influence the severity of these problems. If the field has had a history of Phytophthora root rot or has heavy soils or poorly drained areas, soybean varieties with resistance and tolerance to Phytophthora root rot should be used. Planting should be delayed until soil temperatures are above 55 degrees F to avoid Pythium damping off and seedling blight. Seed treatment fungicides containing metalaxyl or mefenoxam (Apron formulations) reduce losses from Pythium and Phytophthora. Seed treatment fungicides containing captan, thiram, thiabendazole, carboxin, PCNB, or similar labeled fungicides are effective against Rhizoctonia and Fusarium. Planting



Figure 2. Advances in no-till planting equipment ease the conversion of CRP land to grain crop production.

good-quality seed under the best possible conditions and avoiding stress to germinating seed and seedlings will also help reduce losses due to early season soybean diseases.

Whether SCN becomes a problem in a specific field depends on the local conditions. Research data from Arkansas indicate that whether other legume hosts are present or not, SCN eggs can persist within cysts for at least 9 years. As a rule of thumb, if SCN was present before the land went into CRP, it is likely that the nematode is still present, and therefore the field should be sampled before planting soybeans. An egg count will help the producer decide which soybean variety to plant or whether an SCN-nonhost crop will be more profitable. If the field has never been tested for SCN, sampling before planting soybeans may prevent yield loss.

No insecticide treatments are necessary in soybeans because there are few serious insect pests affecting seedling plants in Missouri.

Corn

Corn may be a good crop to plant because seed placement and depth are not as critical as with other crops. Corn also allows the producer to use atrazine to both control the sod and provide residual control of annual weed species. Corn is the best choice if there are heavy infestations of perennial broadleaf weeds because Banvel/Clarity, 2,4-D and Stinger, or Roundup in Roundup Ready corn can be used in the crop. Corn is also better suited to low-pH soils than soybeans.

Other considerations include planting date, nitrogen requirements and soil insects. Corn requires an early planting date to avoid yield loss. An early planting date implies limited time for spring sod control operations and planting into cool, wet soils. Sod control treatments result in a layer of dead residue that can keep soils cool and wet and result in stand loss. Planting dates may have to be delayed until soils warm to 50 degrees F. No-till corn will require more

nitrogen in the first year after CRP because of slow decomposition of the sod residue and because of microbial tie-up of residual nitrogen.

Two major insects, white grubs and wireworms, can be expected to inhabit sod fields and multiply. When the sod is killed for grain production, the larvae of these two insects are forced to feed on grain seed, roots and stems. However, CRP insect research in Kentucky and Nebraska has found relatively few corn soil insect problems. Solar bait traps at the Knox County CRP Research Plots in 1995 and 1996 found no wireworms.

White grub and wireworm surveys in 50 CRP Kentucky fields comprising 275 samples yielded only 11 samples with either white grubs or wireworms. A similar survey of 86 fields in Iowa found wireworms in 30 percent and white grubs in 23 percent of the fields.

Solar bait traps can be set out 3 weeks before corn planting and checked just before planting time. If the traps average one wireworm per trap, then the use of a recommended granular soil insecticide is warranted.

The best seed treatment for corn is one that contains a diazinon-lindane insecticide for protection against white grubs and wireworms. Examples include Kernel-Gard, Agrox D-L, and Germate Plus.

Other potential insect pests of corn are the glassy and bronzed cutworm, common stalk borers (not a problem if the CRP field was pure grass), sod webworms and seedcorn maggots.

Corn diseases are not likely to be more prevalent or severe in corn planted into CRP converted land than in corn planted into previously tilled fields. Early-season seedling blights can be avoided if planting is delayed until soil temperatures are above 50 degrees F.

Grain sorghum

Grain sorghum can be planted later in the spring than corn. At the later planting dates, the soil should be warmer and drier for optimum germination and stand establishment. Atrazine can be used for both weed and sod control. Atrazine is effective on most of the perennial grass sods in Missouri CRP fields.

The challenges of grain sorghum production are associated with seed size and grassy weed management. First, because grain sorghum seed is smaller than soybean or corn seed, the crop is more difficult to plant at the proper depth in heavy residue. Second, there are fewer postemergence grass herbicides available for grain sorghum than for corn and soybeans. Atrazine provides some suppression of many small (less than 1.5 inches) grasses, but not complete control in heavy infestations. Gramoxone Extra as a directed treatment is effective as long as the weeds are small and a height differential exists between the crop and the weeds.

Wheat

For various reasons, winter wheat is probably not a wise choice as a first crop in converted CRP acres. Insects such as wireworms can pose significant problems in wheat after CRP. Weed control can be a second major challenge in that there are no selective herbicides available to control or suppress perennial grasses in wheat. Establishing a wheat stand will be more difficult than establishing other field crops because the heavy residues associated with CRP plantings interfere with proper seed placement, particularly under no-till conditions. Wheat is more sensitive to improper seed placement than most other field crops grown in Missouri.

Certain pathogens of winter wheat have the ability to attack other grass species, including weed grasses. Thus, there is a possibility that either forage grasses or weed grasses in CRP acres could serve as inoculum sources for pathogens that could damage winter wheat planted into CRP land.

For example, take-all, a disease of roots, crowns and basal stems of wheat, is caused by the soil-borne fungus *Gaeumannomyces graminis* var. *tritici*. The take-all fungus shows a preference for wheat but can also colonize barley, brome grass (*Bromus* spp.), wheat grass, and quackgrass (*Agropyron* spp.). Volunteer wheat and grassy weeds can harbor the fungus and serve as sources of inoculum for future wheat crops. There is a possibility that take-all may be present in CRP plantings and could cause damage in wheat planted on land coming out of CRP. Since most of the weedy grasses are not as favorable hosts as wheat is, the levels of take-all fungus should not have built up as much as they would on a wheat crop. It is unlikely that levels would be high enough to wipe out an entire wheat planting. Take-all is frequently associated with infertile soils, poorly drained soils, wet areas in fields or wet years. Damage is more likely to occur in low, poorly drained areas within the field than across an entire field. If take-all was confirmed as a problem in the CRP planting, management practices before planting wheat can reduce the potential risk. Destroying the CRP planting as far as possible ahead of the wheat helps reduce the amount of inoculum present in the field. Tillage breaks up crowns and roots and accelerates decomposition of infested plant material. Proper fertilization of wheat helps reduce losses.

Other diseases that might present a problem in wheat after CRP include some of the Helminthosporium and Fusarium diseases as well as other foliage diseases and virus diseases. Incidence of any of these diseases, including take-all, in the wheat crop will also depend on weather conditions during the season wheat is grown. If winter wheat is to be planted into converted CRP land, select varieties with resistance to wheat diseases likely to occur in that area.

Maintain good plant vigor through the growing season with proper fertilization and good weed control.

If wheat is to be included in the rotation of covered CRP land, it is best to delay wheat planting until 2 or 3 years after the initial cropping year.

Strategies for killing perennial grass sod and managing weeds

Since many CRP fields have a high potential for soil erosion, no-tillage practices are preferred over methods that use tillage to control vegetation. Only in rare situations should tillage be used to manage vegetation in these fields. If mounds or grass clumps are higher than a few inches, shallow tillage may be needed to smooth these areas. Use a tillage implement that does not turn the soil and works only the top few inches.

One of the major concerns for producers will be the diverse and abundant vegetation growing on CRP fields. In addition to cool-season and warm-season grasses, there will be thistles, tree sprouts and perennial broadleaf weeds such as goldenrod, daisy fleabane, hedge bindweed, hemp dogbane and milkweed growing in the CRP sod.

Vegetation management during the year before row crop production

The most effective vegetation management practice for killing the sod and many of the weeds is a combination of mowing and application of herbicides during the summer and fall before the cropping season. Mowing will help deplete food reserves in the roots, stimulate active regrowth, and by removing abundant broadleaf cover, promote herbicide penetration into the canopy.

Mowing also helps a producer become familiar with the field and detect rough areas. Waterways and border strips that are not to be sprayed can be left unmowed for the benefit of the person applying the herbicides. A more uniform herbicide application can be made in a mowed field than in a field that has not been mowed.

The time interval between mowing and fall herbicide application to cool- or warm-season grasses should be at least 4–6 weeks to allow at least 8 inches of perennial grass and broadleaf weed regrowth. Mow cool-season grass fields with a flail chopper from mid-July through August. Allow 8–12 inches of regrowth, and apply the herbicide in mid to late September. Mow warm-season grass fields in June, allow 8–12 inches of regrowth and make the herbicide application in mid-July to mid-August.

The fall herbicide application to cool-season grasses should be made at least 2 weeks before a killing freeze. Perennial grass and broadleaf plants are much easier to kill in the fall because plant sugars

and the herbicide will be translocated to underground plant parts.

Recommended rates for fall herbicide application are as follows:

- Cool-season grasses
Roundup Ultra at 1 to 1.5 qt/acre or Touchdown at 0.8 to 1.2 qt/acre. Use the higher rate for orchardgrass and brome grass.
- Warm-season grasses
Roundup Ultra at 2 qt/acre or Touchdown at 1.6 qt/acre.

In either case, the addition of 2,4-D ester or Banvel at 1 pt/acre is highly recommended for controlling broadleaf weeds or woody species such as tree sprouts and brambles. The addition of ammonium sulfate in either dry or liquid form assists in the control of perennial grasses, particularly where Roundup or Touchdown is tank mixed with 2,4-D ester or Banvel. Consult MU publications MP 581, *Weed and Brush Control Guide for Forages, Pastures and Non-cropland*, and G 4875, *Control of Perennial Broadleaf Weeds in Missouri Field Crops*, for additional information.

Vegetation management in the spring before row crop production

There are two situations to consider when deciding on the spring vegetation management on CRP land: (1) fields that have had fall mowing or herbicide applications, and (2) fields that have received no vegetation management treatment during the summer or fall before spring planting. See Table 1 for herbicide treatments before spring planting of corn and soybeans in fields with and without prior treatment of vegetation.

On level claypan soils with poor surface drainage, a fall-killed sod plus a wet spring results in slow-drying soils and planting delays. For these fields as well as for fields that for other reasons have received no mowing or herbicide treatment, it may be best to use spring sod management techniques. Spring mowing will aid in the control of perennial cool-season grasses and help establish better corn and soybean stands by removing prairie vole habitats.

If soybeans are to be grown on a CRP field that received no vegetation treatment the previous fall or summer, apply a mix as shown in Table 1. If additional vegetation control is needed, apply Gramoxone Extra (2.5 pt/acre) just before planting.

If corn is to be grown, consider using one of the two herbicide programs shown in Table 1. The second option allows more flexibility in atrazine use for control of annual grasses and broadleaf weeds and perennial sod control. Atrazine is an effective herbicide for control of tall fescue.

Cool-season grasses are more effectively controlled in the spring with Roundup or Touchdown

Table 1. Vegetation management options for spring planting on CRP land.

Crop	Herbicide	Application rate	Timing
Fields with fall mowing or herbicide treatment			
Soybeans	Roundup	1 qt/acre	1 week before planting
	or Touchdown	0.8 qt/acre	
	+		
	2,4-D ester	1 pt/acre	
Corn	Roundup	1 qt/acre	2 weeks before planting
	or Touchdown	0.8 qt/acre	
	+		
	2,4-D ester	1.5 pt/acre	
	or Banvel	1 pt/acre	
or	Gramoxone Extra	2.25 pt/acre	2 weeks before planting
	+		
	atrazine	1.5 lb ai/acre	
or	Roundup	1 qt/acre	2 weeks before planting
	or Touchdown	0.8 qt/acre	
	+		
	atrazine	1.5 lb ai/acre	
Fields with no fall treatment			
Soybeans	Roundup	2 qt/acre	2–4 weeks before planting
	or Touchdown	1.6 qt/acre	
	+		
	2,4-D ester	1 pt/acre	
Corn	Gramoxone Extra	2.5 pt/acre	2 weeks before planting
	+		
	2,4-D ester	1–1.5 pt/acre	
	+		
		atrazine	1.5 pt ai/acre
or	Roundup	2 qt/acre	2 weeks before planting
	or Touchdown	1.6 qt/acre	
	+		
	2,4-D ester	1.5 pt/acre	
	or Banvel/Clarity	1 pt/acre	
	followed by		post-emergence
	atrazine	max. 2 lb ai/acre	

when average air temperatures are between 59 and 77 degrees F. This typically occurs during the first 2 weeks of May. Applications of 2,4-D ester before soybean production must be made at least 7 days (up to 1 pt/acre) or 30 days (1–2 pt/acre) before planting. Plan to apply herbicide during the first week of May and plant in mid-May.

Sod control with spring applications may be a greater challenge in soybeans than in corn or grain sorghum. It is important to recognize that control of cool-season grasses with Roundup or Touchdown may require several weeks to achieve maximum

response. If rapid control is needed, consider using Gramoxone as the initial treatment followed by another treatment 10 to 21 days later.

Postemergence weed control in fields coming out of CRP will be much the same as in traditional row crop production. Select herbicides and cultural practices based on scouting and weed species present. For heavy infestations of goldenrod, hemp dogbane and milkweed, use postemergence applications of 2,4-D and Banvel in grain sorghum and non-herbicide-tolerant corn, 2,4-D, Banvel or Roundup in Roundup Ready corn, and Roundup in Roundup Ready soybeans. Consult other MU publications for additional information on weed control.

Managing vegetation with fire

If the field has not been mowed since its enrollment in the CRP program, then burning with fire may be a viable option for removal of old top growth and stimulation of new regrowth. Prepare fields for a fire burn by mowing or disking a width at least two times the height of the existing vegetation around the area to be burned. One can also drill winter wheat and bluegrass in this area to reduce soil erosion and serve as a green barrier to retard the fire.

Burn in late February through early April before spring green-up when the soil is moist. Most fire burns should be done with the following weather restrictions: (1) wind speed less than 15 mph, (2) relative humidity 30–60 percent, (3) air temperature 45–75 degrees F, and cloud cover less than 70 percent. For more information, contact your local Missouri Department of Conservation office and ask for the publication titled *Planning and Conducting Prescribed Burns in Missouri*.

Soil fertility

Phosphorous and potassium

The best way to manage soil nutrient status is to conduct a soil test before planting and then to fertilize or apply lime accordingly. In University of Kentucky CRP research, soil pH and potassium (K) levels remained relatively constant during 10 years of CRP while phosphorous (P) dropped considerably. Attention to soil P levels will be important to successful grain crop production.

Nitrogen requirements

Soil tests of fields before and after CRP show a 0.5 to 1.0 percent increase in soil organic matter. Organic matter contains about 5 percent nitrogen (N), which is equivalent to 1,000 lb nitrogen/acre for each 1 percent organic matter in the top 6 inches of soil. This means that CRP ground has gained 500 to 1,000 lb N/acre if organic matter increased 0.5 to 1.0 percent. Up to half of this nitrogen may be released over several years.

High rates of release will occur during the summer under optimal soil moisture conditions, but in many cases the nitrogen is released too late to be used effectively by a first-year corn crop. If soybeans are planted the first year out of CRP and the winter is dry, nitrogen released during the previous summer and fall will be available to the second-year corn crop. A deep (2-foot) soil sample in April will indicate how much N is available. Subtract 50 lb/acre from the result and credit that amount against the normal N rate.

The accumulation of plant residue from dead vegetation may lead to higher than normal carbon:nitrogen ratios and tie-up of residual nitrogen. Residual nitrogen for first-year corn after CRP may be lacking, and extra nitrogen (30–50 lb/acre) may be needed. The second year after sod, where soybeans were the first crop, more nitrogen is available which aids in the decomposition of organic matter and release of even more nitrogen.

Tie-up of fertilizer nitrogen on residue and ammonia volatilization are both concerns with no-tilling into CRP. Broadcast urea ammonium nitrate (UAN) solution will cover the residue evenly and tend to be tied up. On heavy residue, even granular nitrogen forms may be tied up because the granules cannot fall through the residue to the soil surface. Up to half of broadcast urea-nitrogen can be lost to ammonia volatilization, so if used it is preferable to inject or work the nitrogen in with tillage. Broadcast ammonium nitrate or any nitrogen source injected or incorporated will work best.

Yield results from a nitrogen rate study at the Knox County CRP Research Plots indicated that the optimum nitrogen rate for corn following soybeans after CRP was 110 lb/acre versus an optimum nitrogen rate of 180 lb/acre for corn grown in the first year after CRP.

Prairie voles

Prairie voles, also called field mice, may be the number one potential pest for corn production on first-year CRP fields. The perennial grass and broadleaf weeds have provided an ideal habitat for large prairie vole populations. These compact rodents have stocky bodies, short legs, and short tails and are usually brown or gray. They are active feeders both day and night. They will burrow or dig into the planter slot to eat the germinating seed and small seedling. Once the seedling reaches 8–10 inches in height, the feeding usually stops.

All fields must be scouted at least 30 days before planting. If five or more colonies per acre are detected, some type of control measure must be taken, particularly if corn is to be planted.

Habitat modifications

Reducing the amount of cover or food available to the vole forces the population to move from the field before the crop is planted. The following habitat techniques are aimed at reducing cover, food, or both.

- Close mowing — reduces cover to allow exposure to predators.
- Hay removal — removes cover, do this 2–3 weeks before planting.
- Controlled burning — removes/reduces cover and food. Burning is usually done in the late winter or early spring.
- Applying early preplant herbicides — removes/reduces cover. This should be done at least 30 days before planting.
- Tillage is very effective in destroying food, cover and vole colonies.

Alternative feeding

Alternative feeding can be used where prior scouting was not done. The objective is to provide sufficient food for the voles for at least 3 to 4 weeks. Ideally the alternative feeding should be implemented a few days ahead of planting.

- Broadcast whole kernel corn at 2 bushels/acre.
- Broadcast cracked corn at 4 bushels/acre for large populations and 2 bushels/acre of cracked corn for small populations.

Zinc phosphide pellets

Zinc phosphide pellets (PROZAP Agri-brand) in a 2 percent formulation were approved for use in Missouri for prairie vole control in March 1997. The use rate is 4–6 lb/acre to be applied in-furrow at a rate of about three pellets per linear foot of row. The pellets are applied with a “Positive Pellet Placement Kit” designed to fit on the bottom of insecticide boxes. This kit will fit John Deere planters (7000–7300 series) and Case/IH planters (800–955 series). Check yearly to determine if label registration and clearance for use still exist for Missouri.

Research for this project was funded in part by the Missouri Department of Natural Resources.



■ Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Ronald J. Turner, Director, Cooperative Extension, University of Missouri and Lincoln University, Columbia, MO 65211. ■ University Outreach and Extension does not discriminate on the basis of race, color, national origin, sex, religion, age, disability or status as a Vietnam era veteran in employment or programs. ■ If you have special needs as addressed by the Americans with Disabilities Act and need this publication in an alternative format, write ADA Officer, Extension and Agricultural Information, 1-98 Agriculture Building, Columbia, MO 65211, or call (573) 882-7216. Reasonable efforts will be made to accommodate your special needs.