# NATIVE PLANTS AND AGRICULTURE – CAN THEY CO-EXIST?

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My name is Helen and I'm a farmer—a confession when discussing my other passion, native plants, with conservation biologists. One calls my 30-acre organic farm a "sacrifice area!" Indeed, many conservationists have uncritically accepted the idea that land must be sacrificed to "feed the world." Clearly, it would be selfish to starve millions in order to preserve biodiversity. But cropland, pasture, and rangeland make up about half the surface of the United States. What happens on these lands impacts native habitat and to some extent even the most well managed nature preserves. What if we could modify the design of agriculture to more closely mimic and work in concert with the natural ecosystems of which individual farms are a part? Recently there has been increased interest in ways to reconnect agriculture with the preservation of natural habitats. The 2002 Farm Bill provides some major financial incentives to enhance on-farm habitat for native plants, insects, birds, fish, and other wildlife. Montana implemented programs through the Environmental Quality Incentives Program (EQUIP) that pay producers to transition to organic farming. Comments are now being taken on the Conservation Security Program (CSP). Dave White, NRCS in Bozeman, and Senator Conrad Burns need to hear that we wholeheartedly support the CSP with its incentives to reduce pesticides, practice organic soil management, and enhance wildlife habitat. But they also need to hear that we do not want farmers/ranchers to receive CSP payments to plow up native grasslands in Montana (this is not an issue in most states since they have little native grassland left). For more information on the Conservation Security Program and other organic farm promoting and native plant and wildlife enhancing programs in the 2002 Farm Bill, visit

www.nrcs.gov/programs/farmbill/2002/products.html (Editor's note: link no longer active)

Why the new interest in combining agriculture and conservation?
Agriculture is changing. Organic production acreage is on the rise. Organic farms do not use synthetic pesticides. Reduction in pesticide use has been shown to improve native habitat on-farm and in areas impacted by agriculture. Several studies report greater numbers of upland birds on organic compared to conventional farms. However, some farmers and researchers are looking beyond organic for a more ecological "systems approach" to conventional farming methods. The goal is agriculture that more closely mimics natural systems, including reduced tillage, increased species and genetic diversity, closed nutrient cycles, and more complex habitat.

When farmers till up native grasslands to produce crops, soil organic matter levels and microbial populations decrease. In grassland soils, huge drops in soil organic matter (from 9% to 4%) have been recorded during the first years following sod busting. Once soils have been brought into cultivation, exposed bare soil between crop plants and between cropping seasons (winter fallow) creates nutrient leaks, or leaching of mobile nutrients (like nitrate-nitrogen) that were formerly recycled by permanent vegetative cover. This nitrate can end up in surface water and riparian areas. Addition of organic residues helps overcome some of the negative effects of tillage. However, in a central California study, cultivation and cropping significantly reduced soil organic matter when compared to an unfarmed grassland, even with high inputs of organic residues from winter cover crops and composts.

Tillage diminishes habitat for many organisms beneficial to soil and crop health, including earthworms, spiders, insects, and soil microorganisms. Permanent groundcovers (specifically perennial grasses forming thick sod layers) support higher densities of ground-dwelling predators such as spiders and beetles.

Undisturbed, perennial grass habitats provide stable microclimates for beetles and spiders and improve their ability to survive winter. “Beetle banks” are raised beds of mixed perennial grasses created on agricultural borders that increase predator carabid beetle populations within cropping systems. Unfortunately, they do not decrease crop pest populations (even though predator beetle populations increase), except in areas of the cropping system that are closest to the perennial grass-covered beetle banks. Why not design native grasslands into and throughout cropland systems?

Parasitoid populations also increase with vegetation diversity and reduced tillage. Parasitic wasps and flies lay eggs in crop pests and their young feed on the pest after hatching, a little like invasion of the body snatchers. Populations of fly and wasp parasitoids increase in more diverse habitats because they provide season-long pollen and nectar sources. The availability of season-long parasitoid food plants translates into higher parasitism rates in crop systems. The closer pollen and nectar plants are to crops, the higher the parasitism of crop pests. Researchers have begun to study how “islands” or “alleyways” of native plant communities can bring predators and parasitoids into cropping systems. There is also evidence that providing habitat for native bees within cropping systems can significantly enhance crop pollination. Increasing populations of predators, parasitods, and pollinators may be one way that preserving native plant borders alongside and within cropping systems can provide economic benefit for farmers.

Permanent soil cover and reduced tillage are also associated with disease suppression in agriculture. Pythium root rot suppression was compared in undisturbed and cultivated soils. Undisturbed forest soils were 82% Pythium suppressive. Newly cultivated soils were only 31% suppressive. In soils that had been intensely cultivated for annual cropping over an extended period, Pythium suppression dropped to 7%. Minimum tillage and borders of undisturbed native vegetation might help to suppress diseases as well as insect pests.

Managing permanent soil cover without a large yield reduction is the challenge, especially for farms that produce annual grains and vegetables and rely on extensive and repeated tillage to diminish weeds and manage water. As soil organic matter levels increase, so does soil water-holding capacity. Studies at Montana State University indicate that after years of drought, better wheat yields are coming from no-till fields. However, soil building takes time and permanent vegetation may “steal” water from crops in the short term.

One way to mimic natural systems in annual crops is to design in a semi-permanent vegetative cover within the crop. “Living mulches” have been used successfully in vegetable production to control weeds and provide organic matter and nitrogen to the soil. Living mulches are also used in perennial crops such as orchards and vineyards. Another way to mimic natural systems is being evaluated at the Land Institute in Salina, Kansas. The Land Institute is using tall-grass prairie as the genetic starting point from which to select for perennial grains to be part of a “perennial polyculture” production system. This system is 50 or more years away from economic practicality. But creative farmers and ranchers, working with people who care about native plants and the organisms they support, can look at native plant communities to find plants and patterns for agriculture that can be implemented now.

...REFERENCES available by request.