

# **Best Management Practices [BMPs] for Bioenergy Production and Harvest [DRAFT: 1/14/08]**

These suggested Best Management Practices [BMPs] reflect general recommendations to the Minnesota Board of Water & Soil Resources (BWSR) for consideration for use on private lands as they develop the RIM-Clean Energy easement program.

## **1. What to Plant**

Perennial, native plants will have a high potential to provide multiple resource benefits and improved net energy gain.

- Production input costs will be much lower for perennial bioenergy feedstocks versus annual crops.
- Perennial crops can provide habitat for wildlife during critical times of the year if managed with wildlife needs in mind.
- Little, if any, fertilizer may be required.
- Less use of pesticides should result in reduced runoff/leaching, and improved aquatic habitat.

Diverse plantings (many species) will be more sustainable, better for wildlife habitat, improve water quality, and reduce runoff.

- A diverse mix of local ecotype grasses/forbs or trees/shrubs on ecologically appropriate sites (e.g., plantings matched to ecotype region, soils, slope, rainfall) will provide the best habitat for native species and be more resistant to drought, invasive species, and other perturbations.
- Monocultures should be discouraged. However, monoculture plantings may be required by industry while the technology for processing mixed species crops is being developed. Monoculture grasses should be interplanted with legume forbs that could improve wildlife habitat and fix nitrogen to reduce fertilizer needs. Forbs/legumes will significantly improve wildlife habitat value such as nesting and brood-rearing cover.

The use of non-native, invasive, or genetically modified plants (that can do further harm to native ecosystems) should not be allowed in the RIM-CE program.

## **2. Where to Plant**

Energy crops will provide the most beneficial resource values when planted on lands that have been previously disturbed, including current cropland and pasture land planted to introduced grasses.

Converting native grasslands, forests, wetlands, or woodlands to monoculture energy crops will result in net losses of biodiversity, and must be avoided.

Enhance existing fragmented native grassland, forest, and woodland habitats by buffering with appropriate local ecotype bioenergy crops on surrounding cropland and marginal pastureland. These bioenergy buffers can provide additional habitat area and create potential corridors to assist in wildlife movement among habitat parcels.

Non-local ecotype seed could contaminate existing High Quality Native Prairie or Woodland/brushland if planted too close. Please refer to *Optimizing Native Prairie Seed Harvest and Replanting on State-owned Lands*, MN Department of Natural Resources for additional information.

Use plantings to maintain a well-managed, unfertilized buffer around all water resources.

### **3. How to Harvest**

Harvest of bioenergy feedstock should be completed outside of the primary nesting and brood-rearing season (generally identified as April 15-August 1). Benefits to harvesting native perennial feedstocks in late fall (after killing frost), winter, or early spring include allowing the translocating of nutrients back into the roots, less moisture in the feedstock, and providing valuable cover for wildlife.

There should be no more than one harvest per year (this does not include seed harvest).

A minimum of 4-inch stubble height should be required. Taller stubble can provide greater habitat value, however, leaving some areas unharvested can also mitigate this issue.

- Recommended harvest heights from USDA-NRCS typically only focus on how short plants can be harvested without negatively impacting plant survival; those heights should be viewed as an absolute minimum.
- Studies in Kansas showed that pheasant numbers increased approximately three times for every 5 inches of wheat stubble height above 8 inches.
- Taller stubble heights can improve soil moisture by catching snow, and provide shading to reduce evaporative loss of rains.
- In rough terrain, equipment mowing height adjustments should be made to reduce scalping.

Leaving portions of a field unharvested should be encouraged to provide for potential winter wildlife use for resident game birds such as pheasants, and spring nesting for a variety of game birds, waterfowl, and grassland songbirds.

- From a wildlife standpoint, for grasslands, leaving 25% or more of the field unharvested each year will provide winter refuge and spring nesting cover for species requiring taller cover than what would be provided by the stubble on fully harvested fields. Consideration should also be given to how neighboring lands are being managed.
- Rotating harvested areas on fields (e.g. harvest a different portion of the field every year) will help maintain wildlife benefits and should improve the yield of the crop.

- Having at least some portion of fields unharvested each year can serve as a biomass feedstock reserve in times of drought or other emergency.
- For forested sites, retaining small clumps, strips, or islands at a minimum of 5% of harvest area is recommended.
- Biomass cannot be stored on unharvested portions of the easement area.

Fields should be harvested when conditions prevent or minimize rutting and soil erosion (suggest frozen ground, dry conditions, etc).

Seed harvest, prior to biomass harvest, of local ecotype seed from native bioenergy plantings is acceptable. Growers should consider MN Crop Improvement Association (MCIA) standards for native seed production if intending to produce marketable prairie seed. Additional guidance can be found in *Optimizing Native Prairie Seed Harvest and Replanting on State-owned Lands* by the MN Department of Natural Resource.

Minimize the risk of introducing invasive species during seed harvest, transport, storage, cleaning of harvest equipment, etc. (see *Optimizing Native Prairie Seed Harvest and Replanting on State-owned Lands*, MN Department of Natural Resource, for guidance).

Grazing is only allowed if conducted in accordance with an approved rotational grazing plan.

#### **4. Other Considerations**

Benefits of planting diverse native plants on ecologically appropriate sites include:

- Adapted to local environment and soil
- Deep roots improve water infiltration and reduces runoff
- Restores natural heritage
- Reduced need for chemical inputs
- Excellent long-term carbon sequestration
- Improves soil quality
- Biologically diverse
- Competes well with noxious weeds
- Excellent wildlife food and cover
- Long lived perennials
- Improved aesthetics

A number of challenges must be met in order for the potential positive impacts projected for a mixed native prairie planting to be fulfilled. These challenges include:

- Local seed availability
- Seed cost
- Harvest/processing logistics
- Can public recreational use of private easement lands be encouraged with an augmented payment system?
- Potential prescribed burn management. Will it be allowed and if so, under what conditions?