BIOMASS OVERVIEW

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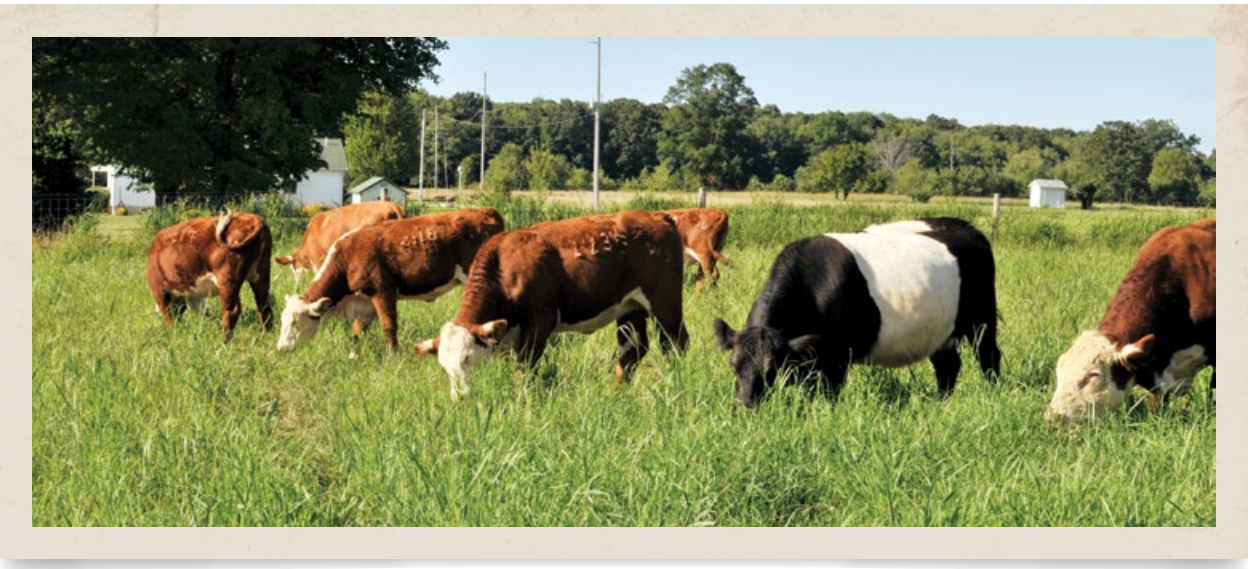
Ernst Seeds is one of the largest switchgrass seed producers in the country, having more than 35 years' experience in the establishment, management, and harvest of native warm season grass seed and biomass. Switchgrass, as well as other native warm season grasses, has attracted much attention as a potential source of alternative energy and sustainable fiber due to the following:

- Native warm season grasses are perennial.
- Native warm season grasses thrive in marginal soil conditions too wet or dry for traditional crops.
- Native warm season grasses require minimal nutrient input.
- Native warm season grasses are efficient in converting sunlight to usable biomass.
- Native warm season grasses have proven soil, water, air, and wildlife benefits.

Biomass production from switchgrass can vary greatly from one region to another. It is important to select switchgrass varieties well-suited to the growing conditions of your area. Please contact us and we will be happy to make recommendations.

A mix of switchgrass varieties adapted to your area can better acclimate to seasonal variation and soil conditions than a single variety. Diverse genetic material will allow the overall stand to thrive in a wider range of moistures, soil types, disease pressures, and weather.

Commonly, mixes that include other native grasses, such as *Andropogon gerardii* (Big Bluestem), *Sorghastrum nutans* (Indiangrass), *Schizachyrium scoparium* (Little Bluestem), *Panicum amarum* (Coastal Panicgrass), and *Spartina spp.* (Cordgrass spp.), may create a biomass product that will satisfy many conservation program requirements while also being able to be marketed.



Switchgrass makes a highly effective livestock forage and is increasingly used as a stand-alone grazing stock and in diverse native grazing seed mixes.

SELECTING THE RIGHT BIOMASS VARIETIES

Our supply of switchgrass seed comes from various sources, including our licensing of the varieties produced by intensive breeding programs at numerous institutions and regional populations made available from USDA plant materials centers. The regional populations have minimal genetic improvement for general physical characteristics and have been adequate for decades for erosion control, wildlife plantings, and in the Conservation Reserve Program (CRP). The new varieties, including 'Mt. Airy', 'BoMaster', 'Timber', 'Liberty', 'Independence', 'Shawnee', and RC Chippewa, have significant yield improvements and were bred with a focus on forage and biomass production.

FORAGE

As with several other native warm season grasses, switchgrass can produce high-quality forage. Used in a system of rotational grazing, switchgrass allows for robust growth during hot summer months. University of Tennessee findings suggest that the crude protein of this forage can be as high as 16%-17%.

Ground switchgrass straw has been used as a forage extender in livestock feeds in that it works to increase bulk and dilute protein in operations with sources of high-protein feed.

NUTRIENT RUN-OFF PREVENTION

Switchgrass has extensive roots, growing as deep as 5'-6'. In addition to serving as a superior soil stabilizer in erosion control, switchgrass and its root system form a tremendous ecological filter, soaking up such nutrients as nitrogen and sequestering carbon dioxide. One of the best methods for protecting streams from sedimentation and nutrient runoff from agricultural activity is the planting of switchgrass buffers.

Calvin Ernst with a mature stand of Switchgrass *(Panicum virgatum)*.

As a riparian buffer, the extensive root system and nutrient-filtering qualities of switchgrass make it a powerful option.

POULTRY AND DAIRY BEDDING

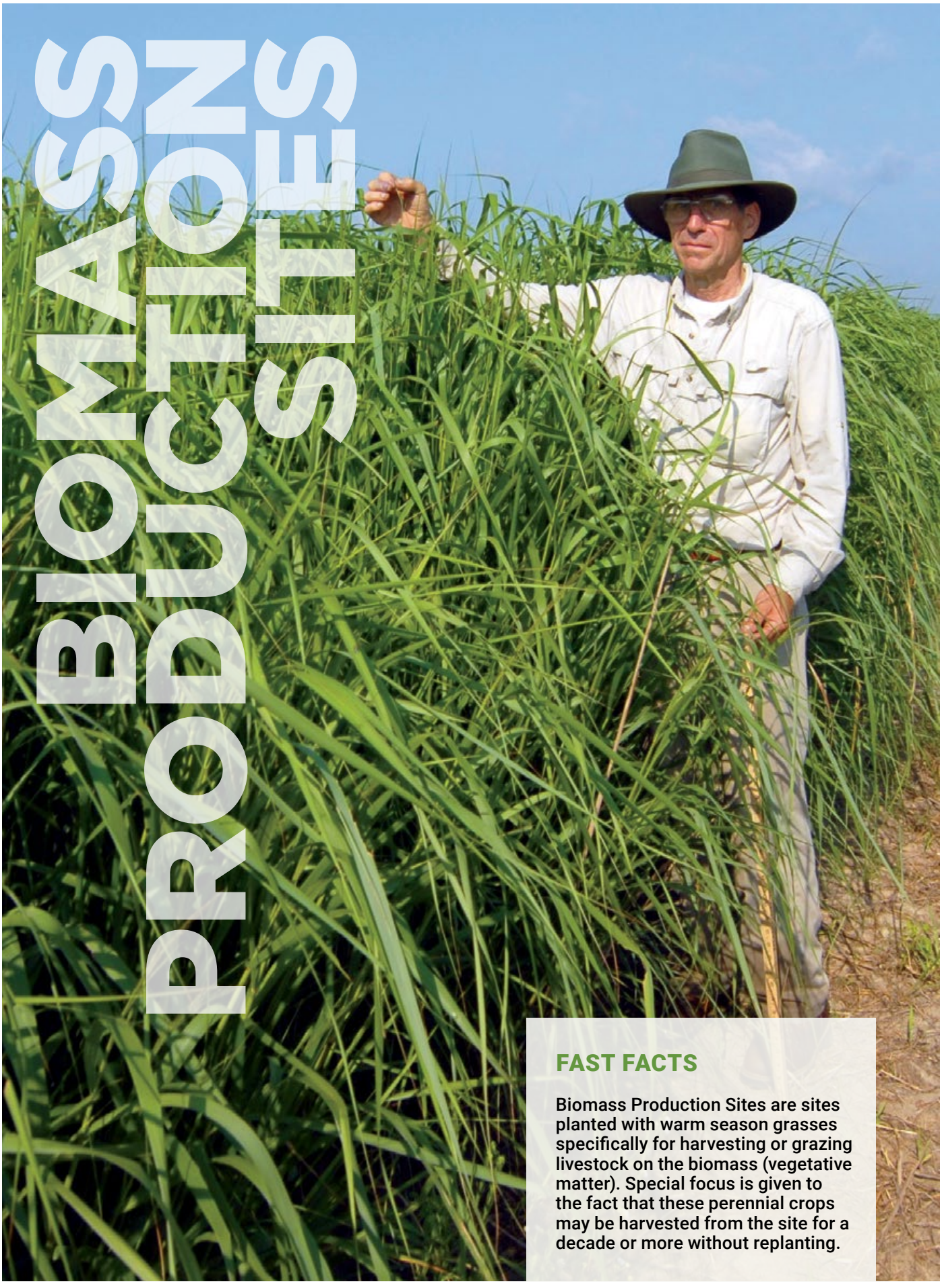
Numerous studies have shown ground switchgrass to be easy on the pads of chicken feet, highly absorbent, and may represent a benefit over other beddings in the reduction of ammonia. From a cost perspective, producers can grow switchgrass on their own marginal land, then harvest and process it for their own bedding uses. In addition to helping to control noise and water pollution, switchgrass can aid in making areas of marginal ground productive by supplying sustainable bedding.

Chick nestled in ground Switchgrass bedding.

Ground switchgrass is gaining popularity as an effective, readily accessible, and inexpensive livestock and poultry bedding material.

For information on preparing a field for the establishment and production of native biomass, please visit the following pages. For more information, please consult the Native Biomass FAQs at www.ernstseed.com.

BIOMASS PRODUCTION SITES



FAST FACTS

Biomass Production Sites are sites planted with warm season grasses specifically for harvesting or grazing livestock on the biomass (vegetative matter). Special focus is given to the fact that these perennial crops may be harvested from the site for a decade or more without replanting.

ADAPTING A FIELD FOR BIOMASS PRODUCTION

Every field has unique characteristics to be considered when establishing perennial native biomass species. These include soil type, hydrology, pH, fertility, erosion/run-off potential, compaction, existing vegetative cover, previous crop history, and harvest methods.

While natural soil type cannot be changed, native warm season species can tolerate virtually any soil type. Switchgrass can survive in a wide range of soil moisture. As is the case with row crops or alfalfa, biomass productivity will be directly related to soil quality.

Switchgrass can tolerate soil pH of 5.0-8.0 but will produce well at 6.0. Soil pH below 6.0 should be corrected with the addition of lime according to soil test recommendations.

Soil fertility is a function of the available nutrients that can be used by the plant. Warm season grasses (switchgrass in particular) can be more productive at lower fertility levels than row crops or alfalfa. Soil tests are required to determine soil fertility levels. Fertility levels referred to as moderate are generally adequate for biomass production. Fertilizer is not recommended for soils with moderate fertility levels. Adding nitrogen in the second and subsequent years is recommended based on expected yields.

Switchgrass grows through corn stubble, reducing its need for weed control.

Fields having a history of good weed control are the easiest to convert to native warm season grasses, such as those planted in corn or soybeans. Fields in conventional hay or pasture are somewhat more difficult to seed and require Roundup® to kill the cool season grasses as well as minimum tillage to work thatch into the subsoil.

No till or minimum till are the most effective means of seeding new warm season grasses. A limiting factor of no till is surface crop residue that prevents proper seed-to-soil contact, shades the germinating seedlings, and/or creates a nitrogen deficiency during decomposition. Each situation requires customized tillage and herbicide considerations.

Tilling a field going to warm season grasses corrects surface roughness and incorporates crop residue before planting. The field surface must be smooth enough to spray, plant, mow, and bale.

Fields with perennial or invasive weeds that have not been mowed during previous growing seasons are the most difficult to prepare for native grass establishment.

Perennial vegetation of grasses and broadleaf weeds must be controlled prior to planting. Mowing or burning existing vegetation will produce new vegetative growth. Roundup® and a systemic broadleaf herbicide can then be sprayed to effectively kill undesirable species. Identify weeds present and use label rates to control weeds with one or more applications. Once controlled, seeding like a conventional hayfield may proceed.

Planting switchgrass in rows makes it easier to identify the plant in emerging stands.

A prescribed burn of existing vegetation prior to establishment of warm season grasses.

Application of Roundup® and systemic broadleaf herbicides is an important step in controlling weeds.

NATIVE SEEDLING GALLERY

Identify native seedlings with this photo guide.

Seedling images of easily recognized species in our:

- **Upland Meadow Mixes**
- **Riparian Meadow Mixes**
- **Wetland Mixes**