Establishing and Maintaining Perennial Grass Crops for Energy: *Emphasis on Switchgrass*

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Opportunities for Perennial Grasses as Feedstock

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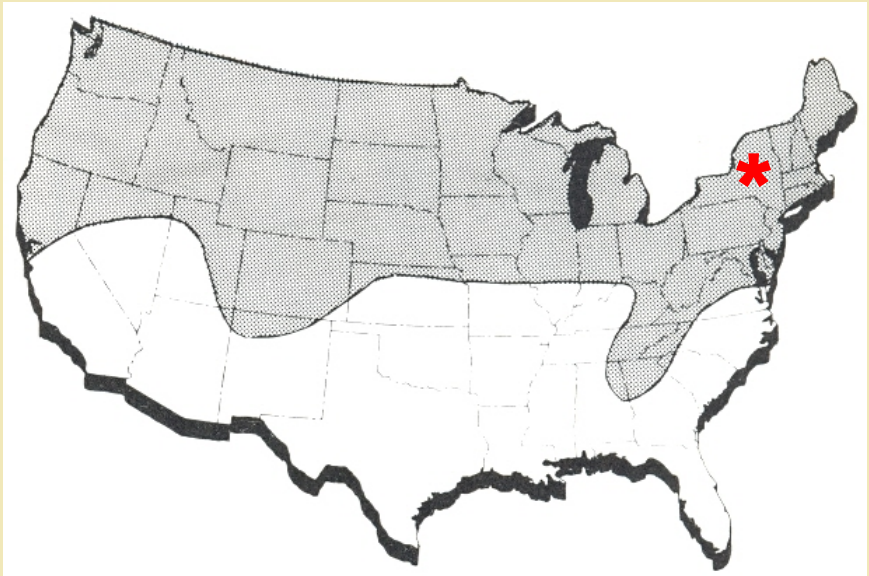
- **Choices of species to match climates - cool temperate to tropical; humid to semiarid**
- **Wide soil tolerances – spatially and seasonally**
- **Environmental benefits:**
  - **C sequestration**
  - **erosion control**
  - **wildlife habitat**

SPECIES

Reed canarygrass – cool-season grass



Grass pellets for heating

Cornell Univ.

SPECIES

Switchgrass – temperate warm-season

SPECIES

Miscanthus – temperate warm-season
Giant miscanthus
Hybrid miscanthus

Miscanthus

Good soil water-holding capacity, lowlands, cool to warm humid zone.

Switchgrass

Very wide adaptation to upland and most lowland, extend to semi-arid zone.

SPECIES

Other tall-growing perennials, tropical origin

Energy cane – subtropical to tropic

Giant reed – warm temperate to subtropical

Bamboo – warm termperate to tropical

Guineagrass – tropical

Elephantgrass – tropical

Energy cane **Giant reed (arundo)**

USDA-ARS, Booneville, AR

Switchgrass Establishment

Challenges to achieving a uniform, competitive stand the first year:

1) dormancy of seeds

2) small, slow-growing seedlings

3) weed competition

Where Will Switchgrass Be Productive?

Soil conditions – Class I, II, III

Slope: 8% or less

Rooting depth: at least 3 ft.

Runoff potential: low to medium

Permeability: moderate to fast

Available H_2O: moderate to high

Erosion hazard: low to moderate

Drainage: moderate to better

Surface texture: silt-loam or finer

Subsoil texture: wide range as long as roots can penetrate

Establishment

Germination rate – prefer > 65%
Dormancy rate – not listed, varies

Seeding rate – 6 to 7 lbs/acre of PLS
% Pure Live Seed = germination × purity

Exa. – seeding rate of 6 lbs/acre PLS
% Pure Live Seed is 75
Seed to plant = 6 / 0.75 = 8 lbs

Planting

Conventional tillage - fine, firm seedbed

- Settle soil by rolling or rain.
- Burn-down herbicide to kill weed seedling
- ¼ to ½ inch deep planting.
- OR broadcast and roll.

Drawbacks

- Numerous field trips
- Timing of field operations around weather
- Depth control


Seedling rows
2-ft. spacing

No-till Planting

No-till planting into row-crop residue

Burndown herbicide in spring

Drill with small seedbox

No-till planting into pasture/hay field

Previous year – reduce thatch by haying, grazing, burning.

Spring – glyphosate to kill perennials.

Repeat glyphosate on perennials.

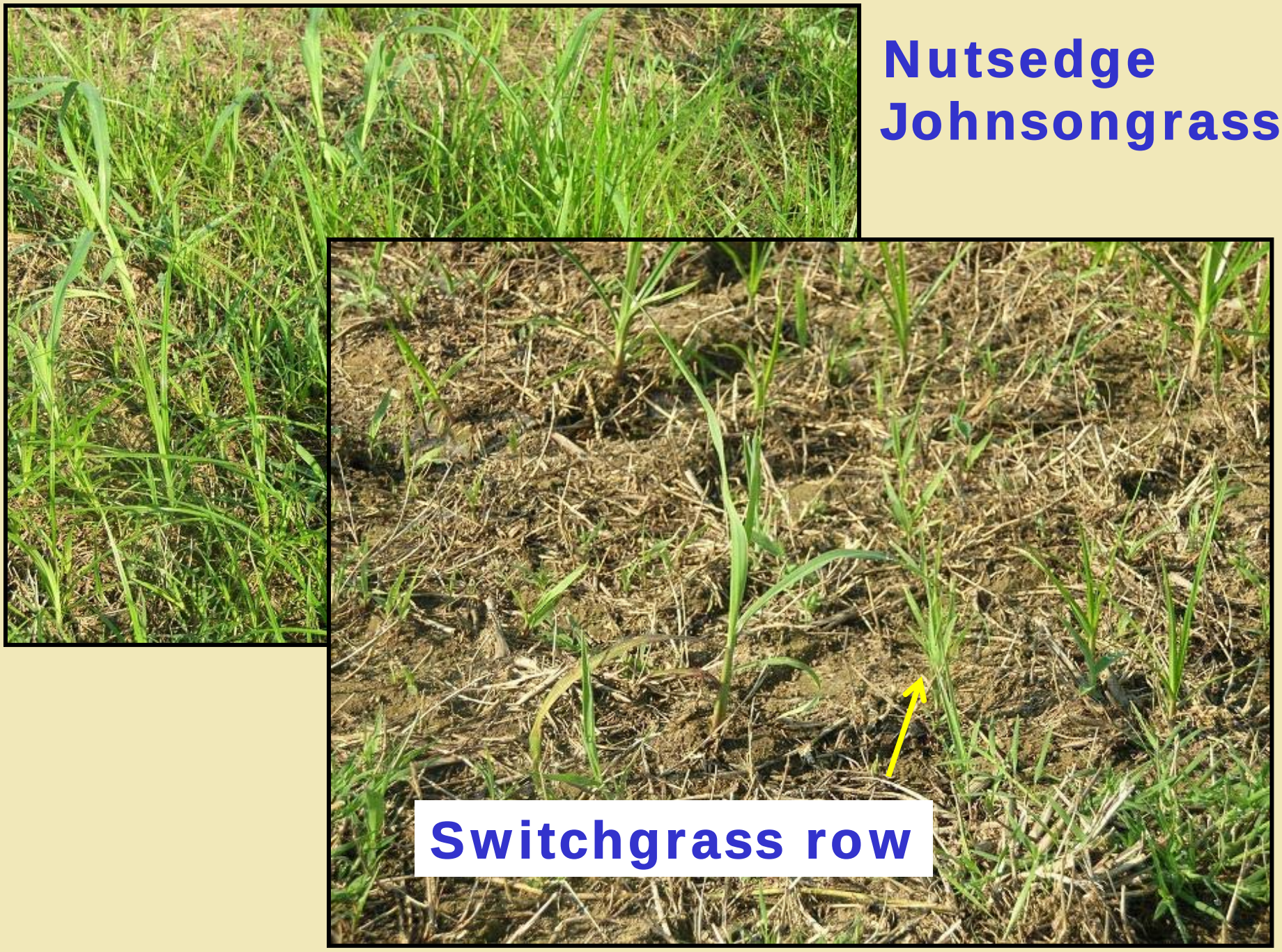
Burn down annuals

No-till drill, sod-drill


tye
tye

Crabgrass

Bermudagrass


Nutsedge
Johnsongrass
Switchgrass row

Weed Control

Glyphosate for control of perennials
Glyphosate, glufosinate, paraquat for annuals

Stale seedbed –
- **firm, fine seedbed**
- **burndown herbicide, then drill**

Preemergence –
- **imazethapyr Pursuit, Newpath 1 oz/acre**

Postemergence –
- **Broadleaves – atrazine, metsulfuron, basagra**
- **Grasses – nicosulfuron, sulfosulfuron**

Weed Control

Notes on weed control:

Delay planting and do multiple burndowns into late spring, esp. in johnsongrass and broadleaf signalgrass areas.

Don’t worry about thin stands of annual grasses. In Year 2, switchgrass will outcompete.

Not all these herbicides have label clearance, so be careful about recommendations. Some states have special use label.

Miscanthus Establishment

Sterile hybrid produces no seeds, so planting is by cuttings (sprigs, rhizomes).

Miscanthus Establishment

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Burning Questions?