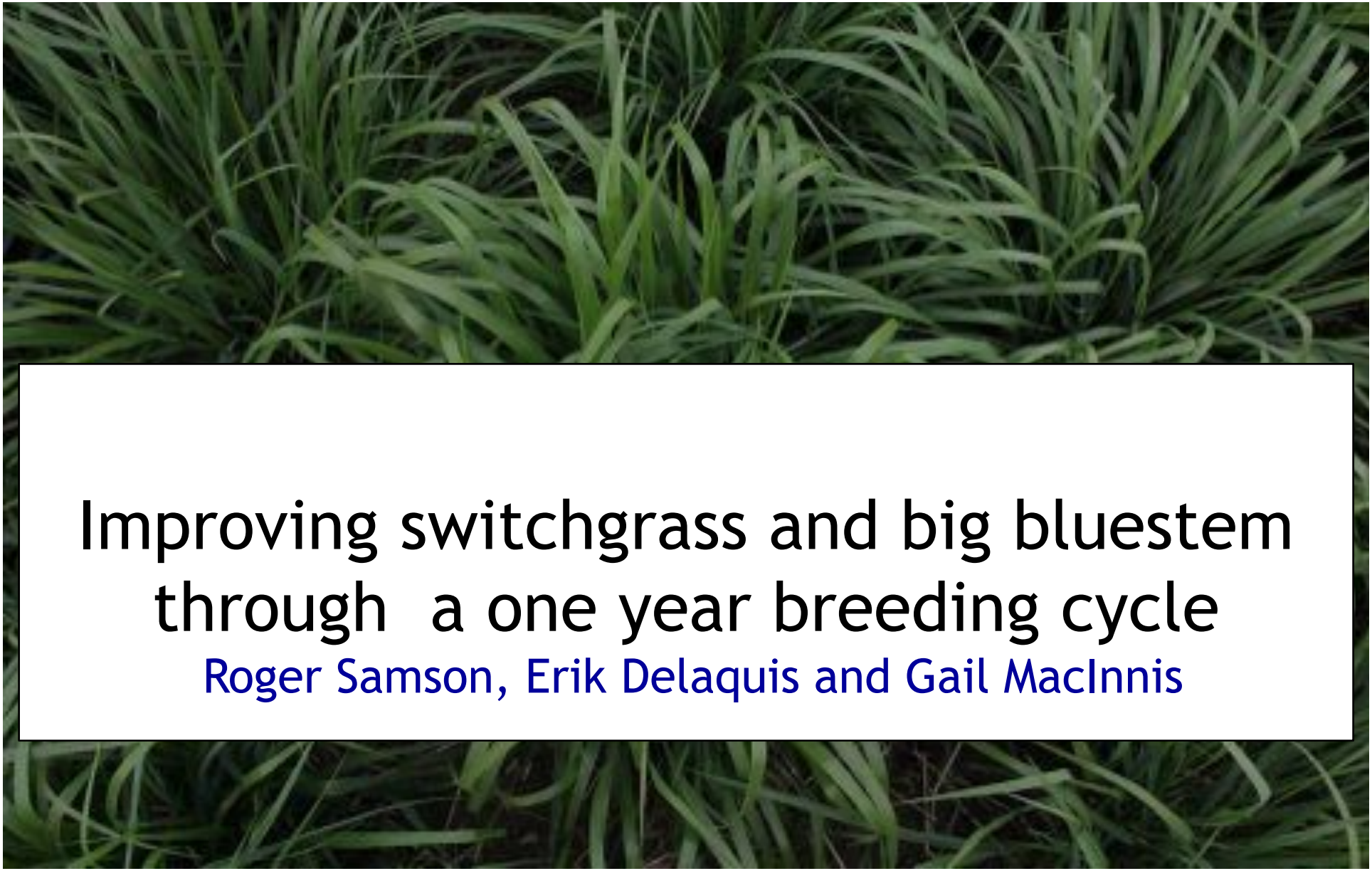


Improving switchgrass and big bluestem through a one year breeding cycle

Roger Samson, Erik Delaquis and Gail MacInnis

REAP-Canada

Resource Efficient Agricultural Production

REAP-Canada Breeding Objectives

To reduce

- Seed dormancy
- Tiller number and mortality
- Lodging
- Length and cost of breeding cycles

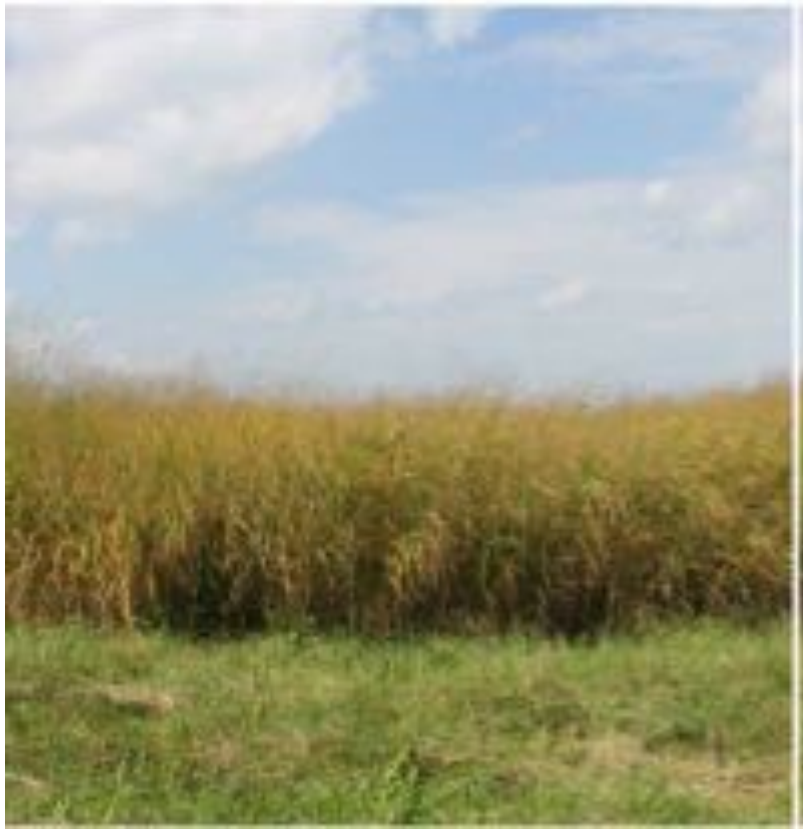
To increase

- Seed size
- Seedling vigor
- Weight per tiller
- Height
- Upright leaves in the top of canopy

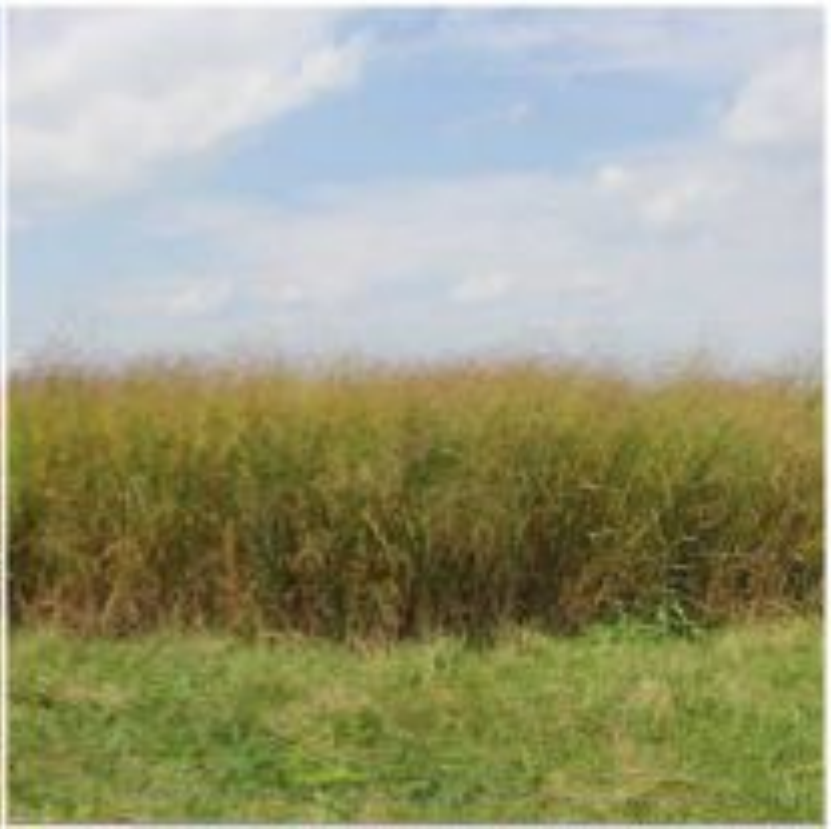
Stop Tiller mortality!

- Carbon loss from the bottom of the canopy is lost solar energy
- Especially a problem with vegetative tillers
- Selecting for single-tiller in the seedling stage to reduce tiller mortality and increase reproductive tillers

Photos from Sept 11, 2013
Ste Anne de Bellevue Quebec



Sunburst



Blue Jacket II
(selection made in 2009)

Ideotype Breeding of Native Grasses

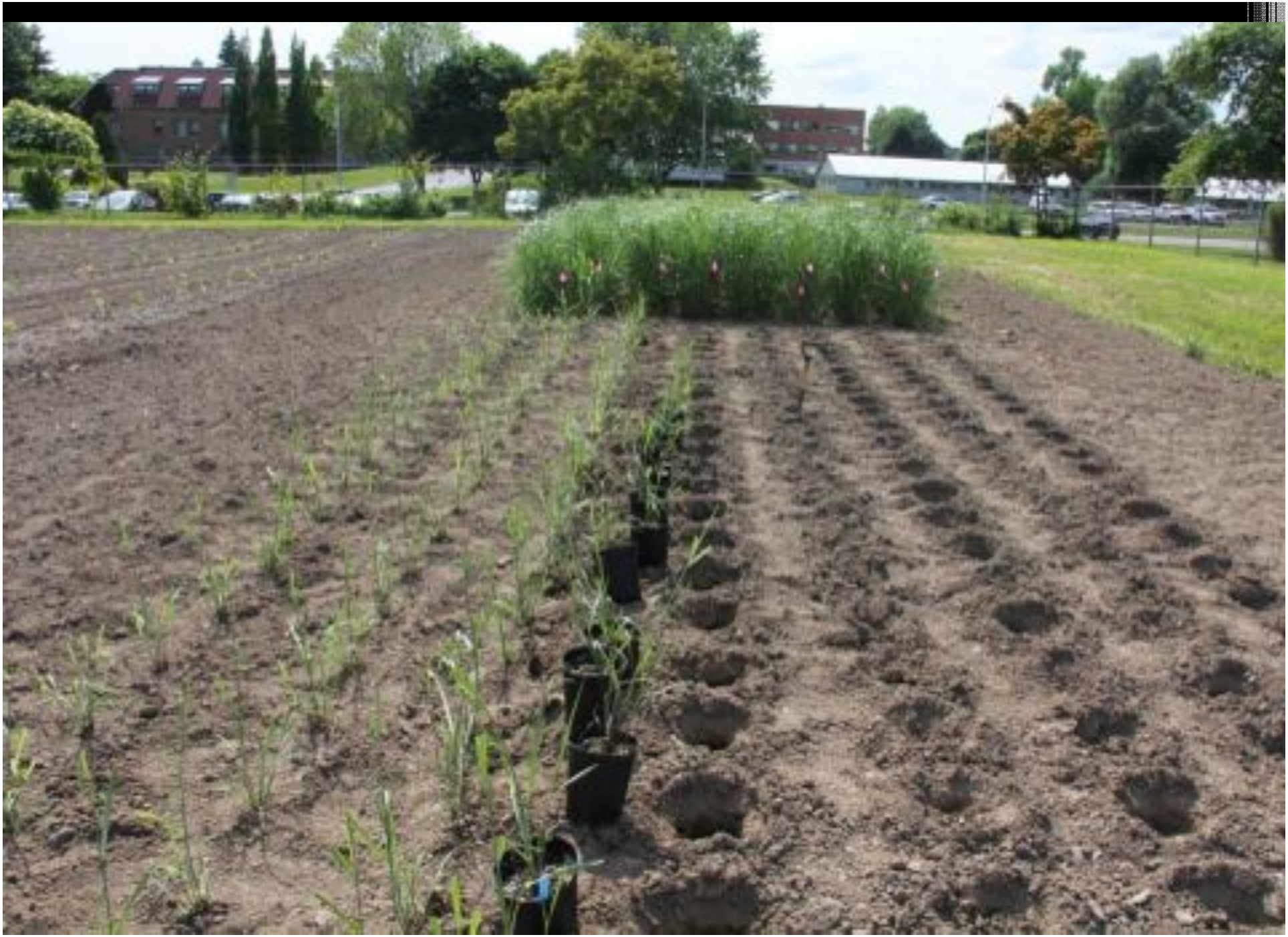
- Seed harvested from 30-50 superior plants chosen from older (10 year+) switchgrass fields
- Seed collected and largest seed derived through air-column separation of parent seed (Boe and Johnson, 1987)

Breeding Methods - Steps

- ~15 seeds planted in each pot of a 38-pot tray with 1000 pots per population (15000 seeds)
- Each pot thinned to the three fastest seedling s to emerge after 5-10 days to reduce dormancy (3000 plants)
- After 3 weeks, single strongest plant of the three left (1000 plants)
- After 6 weeks, population undergoes single tiller selection to reduce tiller number in mature plants(200 plants)

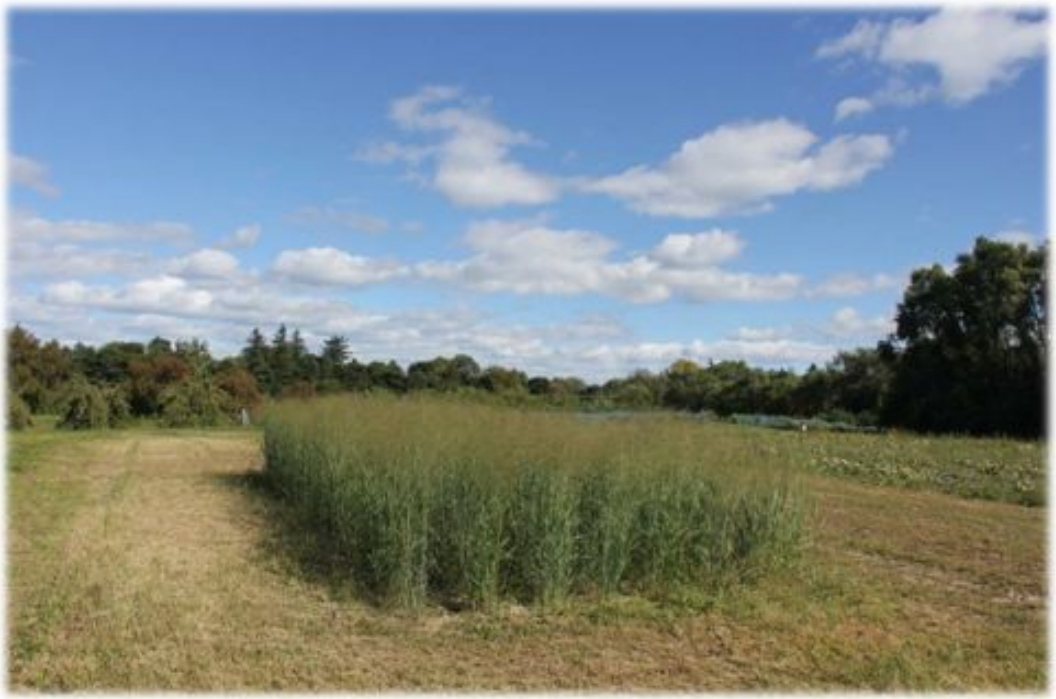
Breeding Methods - Steps

- Single-Tiller Selection:
  - Less tillers overall
  - Aim for less tiller mortality and greater % reproductive tillers
- At 6 weeks:
  - transplanted into larger pots to allow rapid growth in greenhouse to create bigger plants to reduce field transplant shock (200 plants)
- At 8 weeks field planting



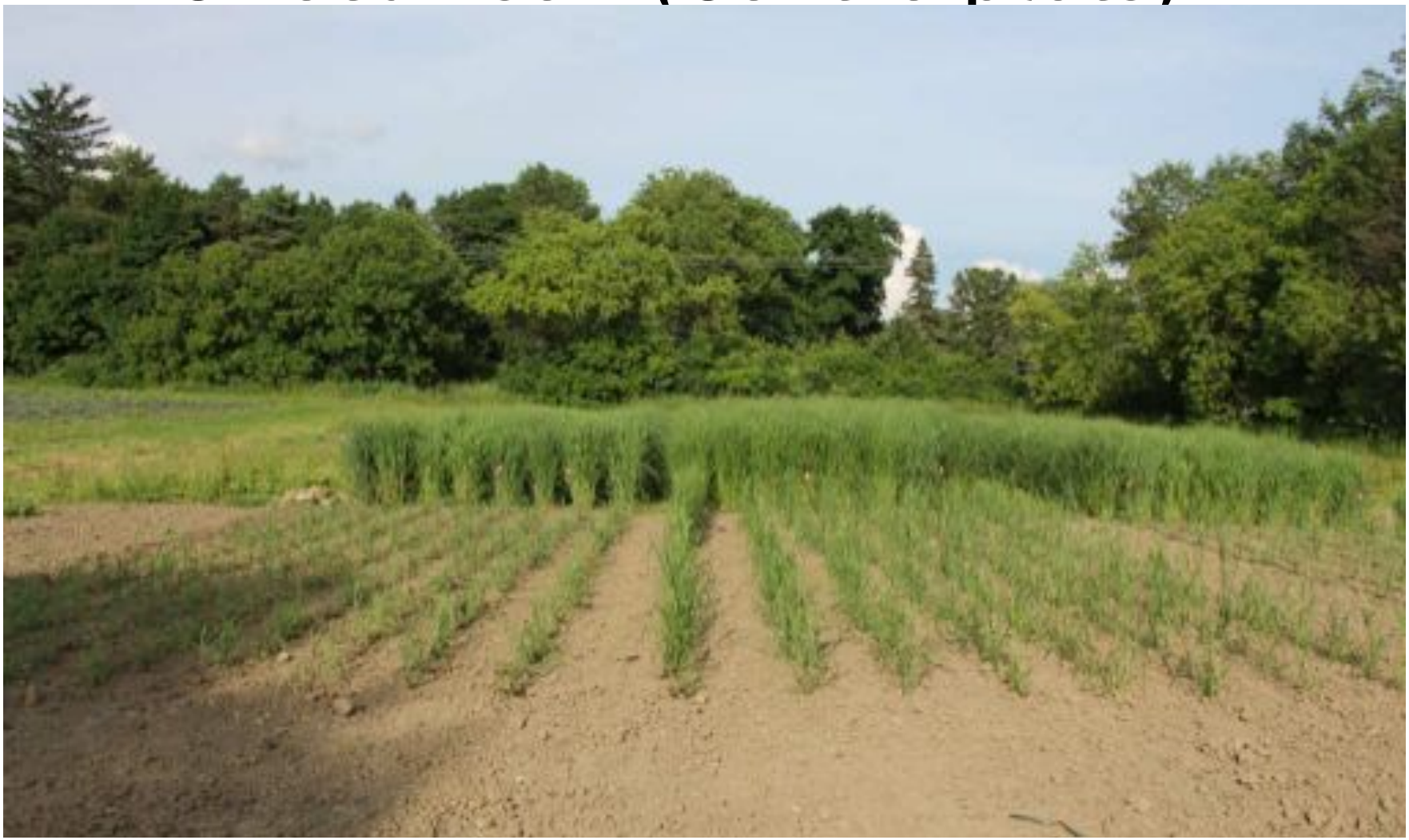
Spaced-Plant Nurseries

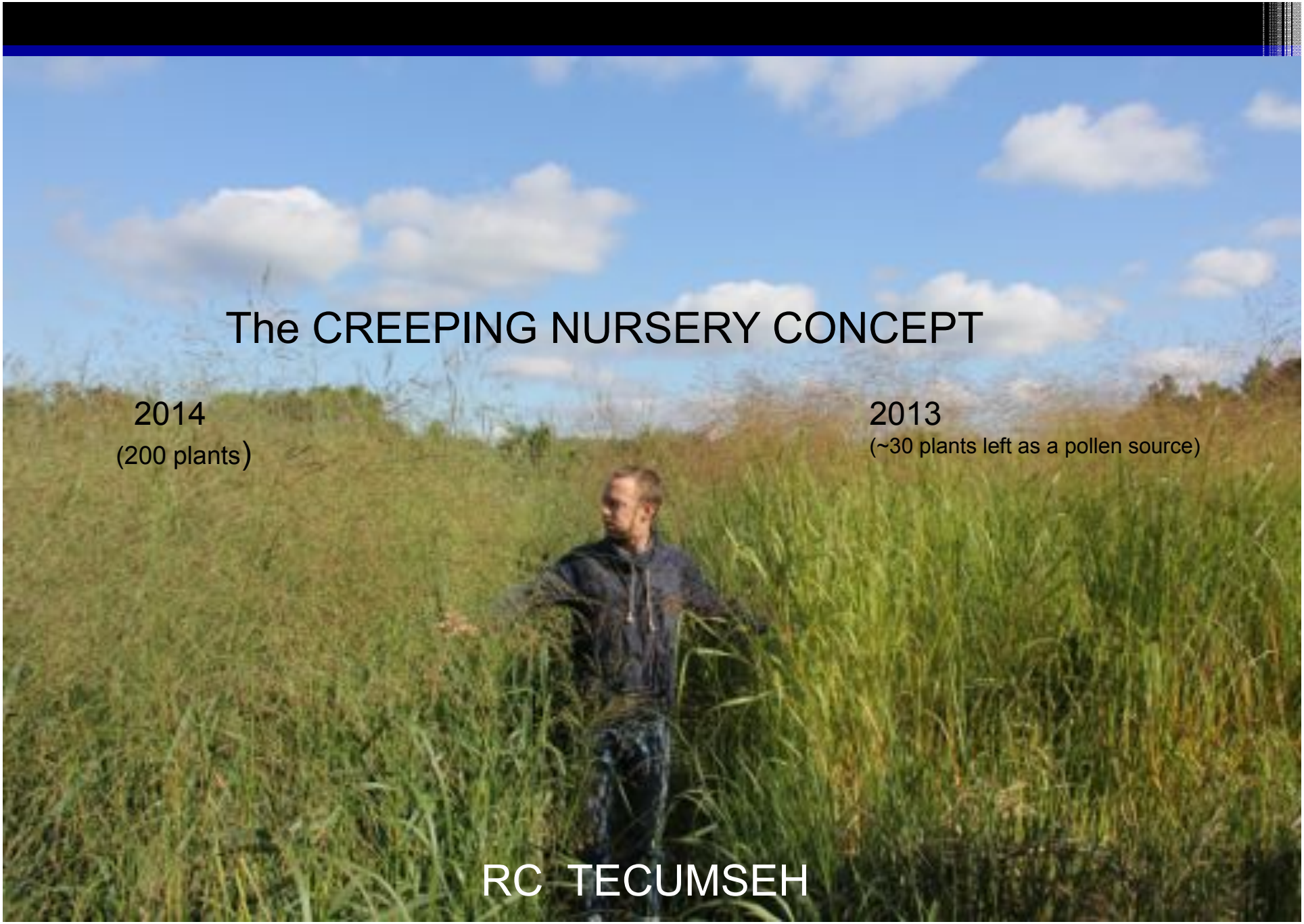
- 200 plants of each population are then planted in isolated nurseries
- Recycling the best ~10% of plants from each generation to the next cycle
- Collect seed to repeat cycle annually
- Planting at 40 cm spacing in row and 55 cm between rows to enhance competition

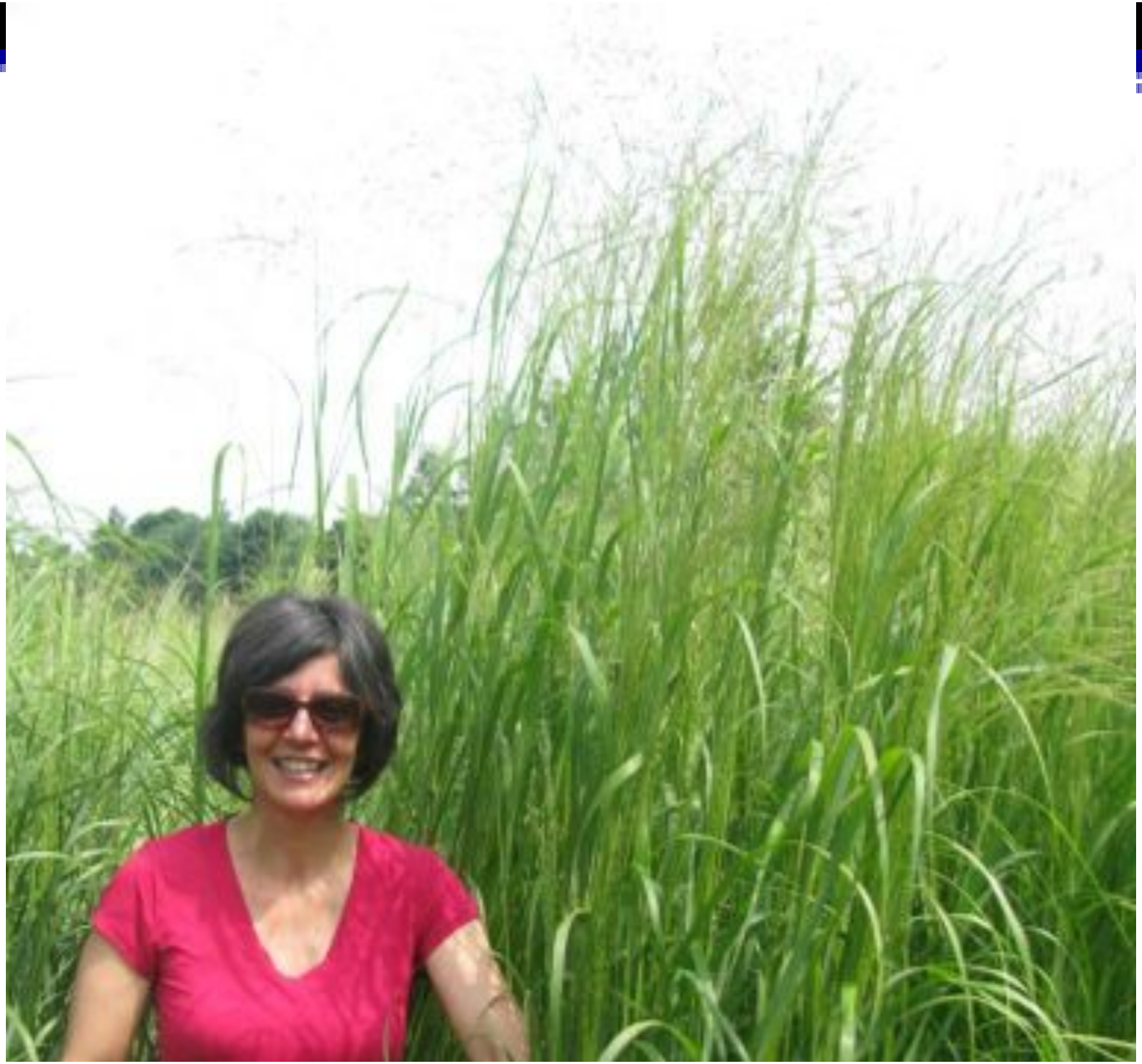


1st year transplant of 5th cycle selection of sunburst in Sept 2013

RC Tecumseh-(Centre plots)

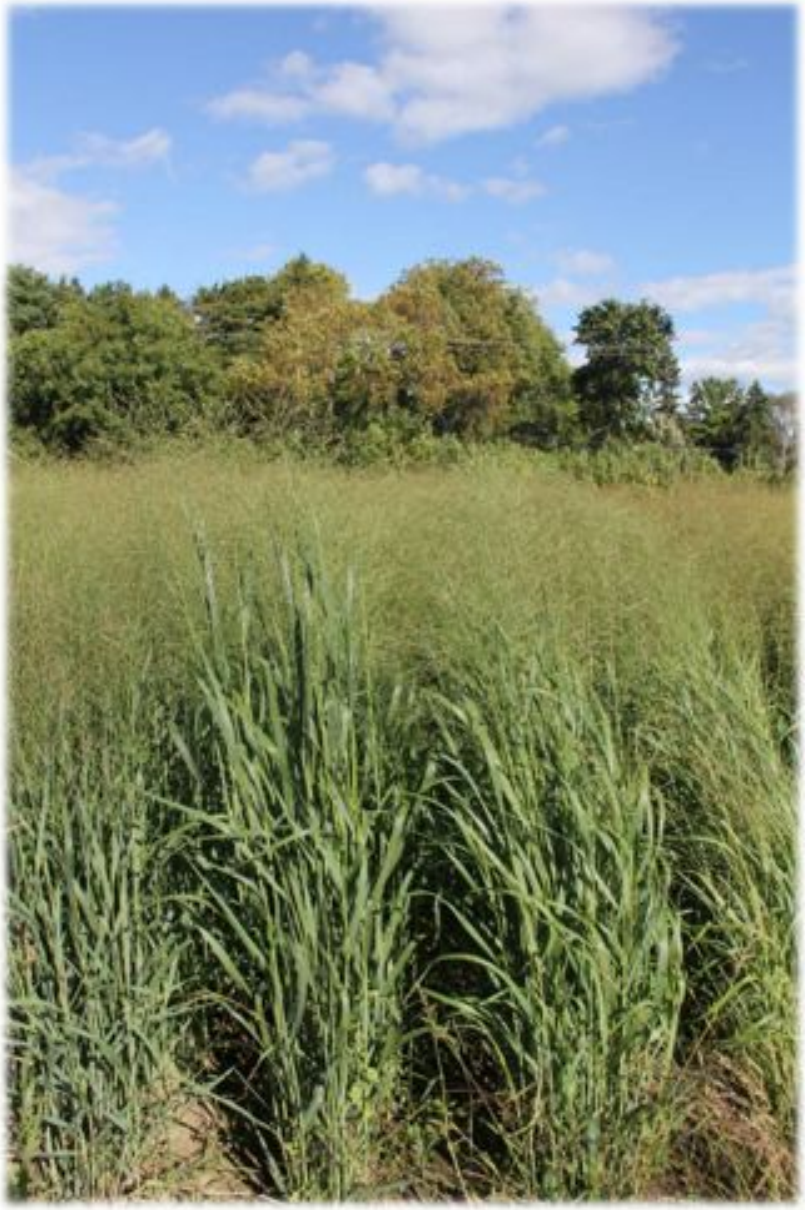



The CREEPING NURSERY CONCEPT
2014
(200 plants)
2013
(~30 plants left as a pollen source)
RC TECUMSEH




RC HIAWATHA

- *A 4th cycle of selection of the upland cultivar cave in rock approximately 9'tall in September 2013. It may be possible to achieve the biomass productivity of lowland ecotypes without the establishment and hardiness issues of lowland ecotypes.*

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1 Year Cycle
Big Bluestem

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