



Biomass Crops: Alternative Mulch Weed Barrier in Container Nursery Crops

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Purpose

- Weed control for Nursery growers in container nurseries are currently using saw dust, woodchips, coconut coir (compressed discs)
- Fluctuations in quality, supply and costs, nursery industry is always interested in trying alternative mulches



Basic Functions of Mulch

- Suppress Weeds
- Reduce soil water losses
- Protect against temperature extremes
- Aesthetics

Pilot Site Location- Verbinnen's Nursery



<http://www.verbinnens.com/>

Mulch for Container Crops

Standard:

- Wood/Bark
- Sawdust
- Coco discs (coir fibre)

New Trial:

- Switchgrass
- Miscanthus

Mulch for container crops- sawdust



Mulch for container crops- wood chips



Mulch for container crops- wood chips



Broadleaf weeds

Mulch for container crops- coco- single stem



Coconut
coir mats

Coco discs work well for crops that have only one stem

Biomass Crops - Mulch for Containers

2013 Trials- Switchgrass- Nott Farms



Mulch for container crops- switchgrass



Mulch for Container Crops- switchgrass



Switchgrass sprouting
(if not removed early \$\$\$)

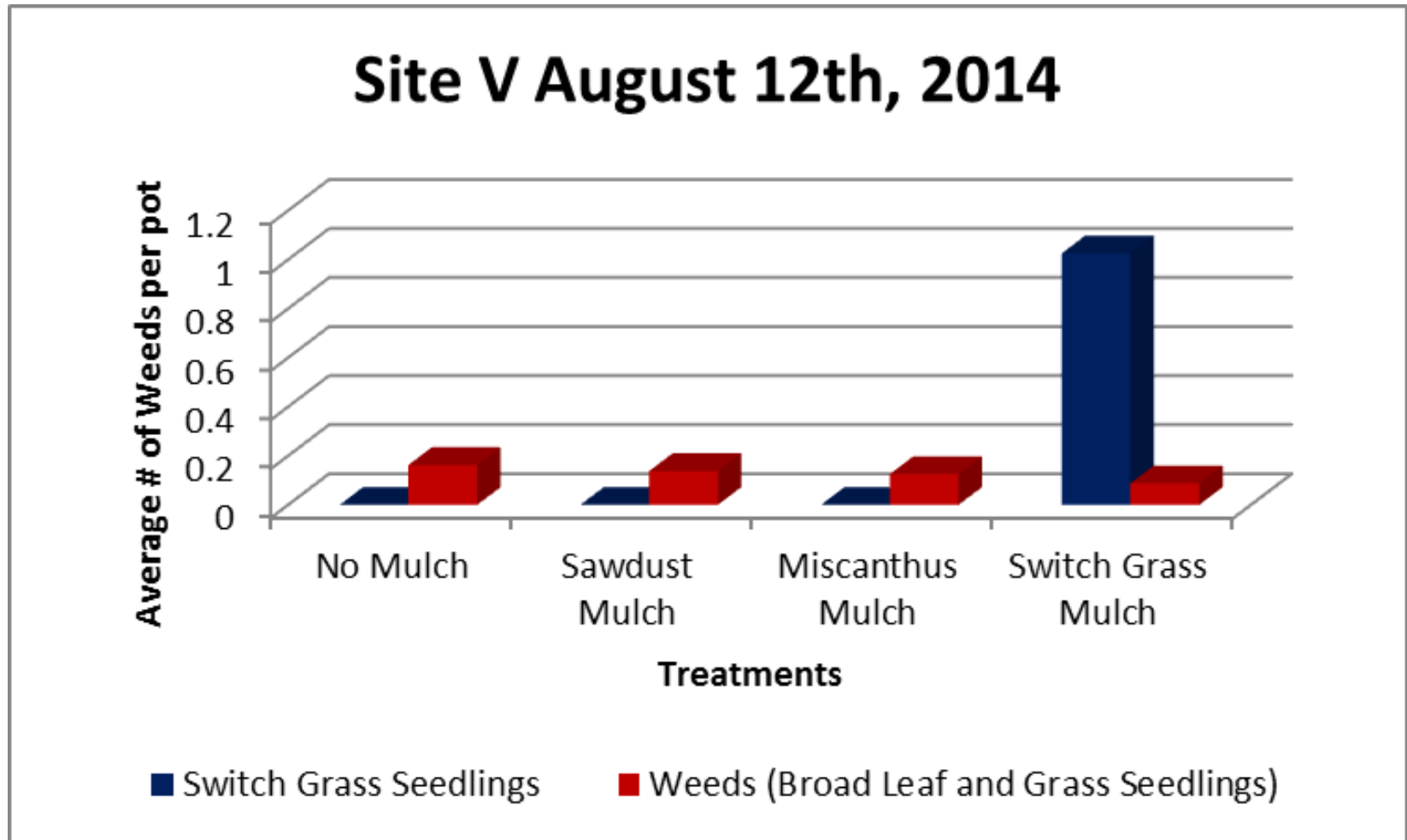
- Switchgrass and Miscanthus: From Gildale Farms
- Switchgrass- fall mowed and spring harvested & uniform grind of 1.5" in length.
- Dust
- Switchgrass seedlings required weeding after application (at least twice)

- Miscanthus- more variation in size, depending if it was the stalk or the leaf, range was probably 0 .5 to 3 inches
- Miscanthus dry and brittle. Dust
- Both applied to the pots, planted with *Cornus racemosa* and *Populus balsamifera* in May 2014.

Mulch for container crops- Miscanthus



Mulch for container crops



Overall: Comparable weeds in each mulch tested. Switchgrass sprouts are a problem.

Anecdotal Observations

- Problems with Fine particle sizes: nursery labour report mulch blows around very easily and in the eyes.
- Switchgrass seedlings germination in mulch: additional manual labour cost \$.
- Long fibre length (>3"): Large fibre sized mulch need to water it again after the mulch was applied to keep it from blowing off the pots.
- Preliminary observations with switchgrass & miscanthus (short fibre, 1 to 2"): mulch did not shrink, compacted and formed a thick weed barrier mat.

Switchgrass Pellets in Beans- Forman Farms



Other Observations

- Positive attributes for switchgrass & miscanthus, mulch maintained integrity over longer period.
- Screen for fine seeds in switchgrass, or to use from a plot where the seed had been harvested or through some sort of heat sterilization.
- For nursery mulch, the fibre size of 1 to 2 inches is ideal for application.
- Pelleting would be advantageous, as destroys the seed germ with heat, easy to apply and dust free. And also, gives a nice finished uniform appearance, but however, would increase the cost significantly.
- Low C:N ratio may be an advantage.

Chemical Composition of Mulch Materials

Parameter	Switchgrass	Miscanthus	Hardwood
N%	0.9	0.5	0.2
C%	45.5	47.9	48.3
C:N ratio	50.5	95.8	241.5
Cellulose %	37	43	45-50
Hemicellulose %	27	24	20-25
Lignin %	19	19	20-25

Wide C:N ratios, can temporarily immobilize soil N (nitrogen deficient)

Ref. <http://www.omafra.gov.on.ca/english/engineer/facts/11-033.htm>

<http://ncsungrant.sdstate.org/uploads/publications/SGINC1-07.pdf>

Market Estimate

For Container Nursery in ON

Total area in container nursery in ON	863 ha (ref. Stat. Canada)
average) number of 2 gallon pots per ha	80,000
So, total number of 2 gallon pots used in ON	70 million (868x 80,000)
Approximate price of saw dust	\$ 20/ cu. yard (range \$14 to 25)
Average volume covered by saw dust for mulch applications	2700, 1 gallon pots, requires 1 cu. yard
Total volume of saw dust required for container nursery in ON	33,700 cu. Yards (assuming, 1.3cu. yard is required to cover 2700,2 gallon pots; 70 million pots x1.3 cu. yard /2700, 2 gallon pots)
Total Potential saw dust value	\$674,000 (33,700 x \$20/cu. Yard)

Market Estimate

For Landscape mulch in ON

Total residue generated at Lumber mills in Ontario	2.25 M tonnes/ yr (ref.)
Total residue demand	1.69M tonnes/ yr
Residues demand for landscape applications	0.845 M tonne/yr (assuming 50% of the total residue demand)
Approximately, if 10% of the forestry biomass is replaced with ag. biomass	84,500 tonnes/ yr (10% of 0.845 M tonnes)
Number of acres required to meet with ag. biomass	16,900 acres (assuming @ 5 tonnes/ acre; 84,500/ 5)
Total Potential value of Ag. biomass (@10% replacement)	\$11.8 million/ yr (@7cents/ lb, 84,500 tonnes/ \$140/ tonne)

- Preliminary observations with switchgrass & miscanthus for container nursery mulch show the material didn't shrink, stayed well and compact and formed a thick weed barrier mat.
- Miscanthus chopped (no seed) or pelletized switchgrass.
- There is significant market opportunity for biomass crops for mulch in the nursery and landscape sector, but for other positive attributes need to be identified, to match with the price of the current materials used.

- Further research is required:
 - to identify the potential benefits of biomass crops on plant growth
 - longevity of the material in the containers without degradation
 - for any pest and disease prevention.
 - Protects roots from cold temperature injury
- Plans to engage Landscape sector more, Guelph Turf Grass Institute (GTI) trial in 2015?

Acknowledgments

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- Nott Farms, for providing switchgrass material free for 2013 trial.
- Gildale Farms for processing and delivery of switchgrass and miscanthus for 2014 trial.

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