Alternative Mulches: For Landscape Plants

Landscape Ontario- Trial Garden Open House
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Purpose

- Landscaping is a never ending battle against weeds, and new tools in that fight are always of interest to Home owners, Businesses, and Landscaping Professionals

- Three alternative Mulches including Switchgrass Pellets, Chopped Miscanthus and Liquid Cellulose-based Mulch (AMP) were tested against Wood mulch and Composted Sawdust, for efficacy in **weed suppression** and effect on **plant vigor**

Basic Mulch Requirements

- Must sufficiently suppress weeds germinating in soil beneath the mulch surface
- Must prevent drifting weed seeds from germinating on the surface and establishing a root system
- Must preserve and/or improve plant health regarding water and nutrient availability, protection from physical factors (heat or wind) and discourage harmful pests

Trial Design: Plant Species Selected

- The plant species selected was purple **Angelonia** (*A. angustifolia),* chosen for availability, but also because it does not expand or sprawl, shading out the ground, leaving the Mulches unassisted in the fight for weed suppression.

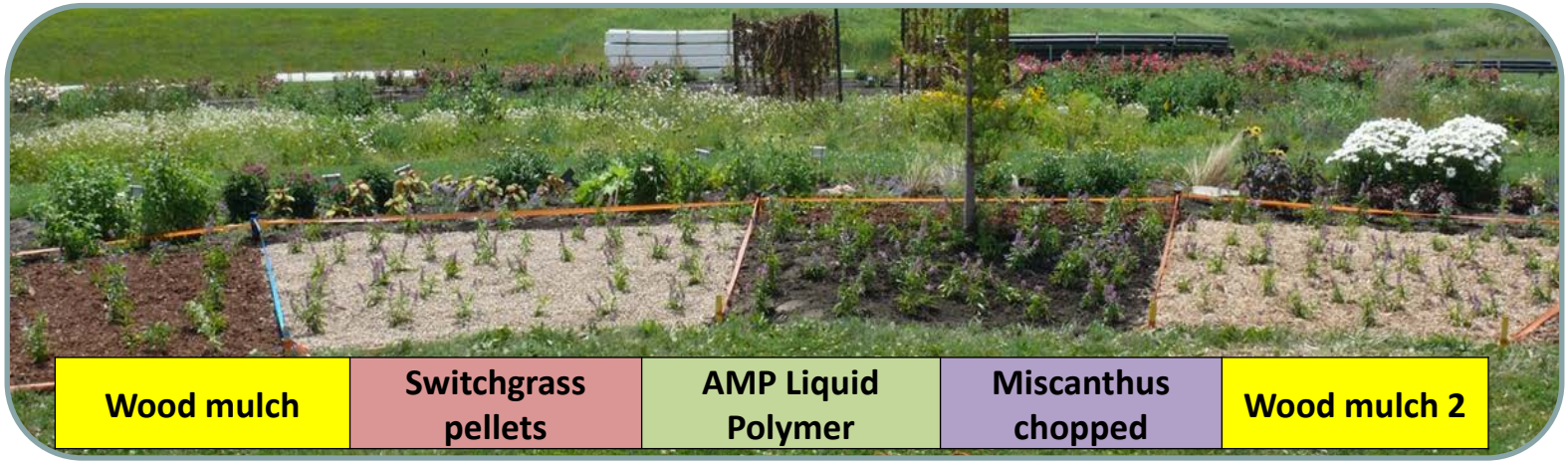
- A single species was selected, as opposed to varieties, to make observation regarding plant health directly comparable.

Trial Design: Guelph Turf Grass Institute (GTI)

Row 1	Row 2	Row 6
Control (Normal Practice- Wood mulch)	Composted Saw Dust	Control (Normal Practice- Wood mulch)
Switchgrass pellets	AMP Liquid Polymer	Miscanthus chopped
Miscanthus chopped	Control (Normal Practice- Wood mulch)	Switchgrass pellets
AMP Liquid Polymer	Miscanthus chopped	Composted Saw Dust
Composted Saw Dust	Switchgrass pellets	AMP liquid Polymer

- Plot Size: 1.5 x 2= 3m2
- Net Plot Size: 1.6 x1.3 =2.08m2
- Plant Species : Angelonia
- Number of plants per plot: 6
- Planting Date: 18th June
- Mulch treatments: 5
- Mulch application dates: June 29th & July 2nd (AMP)

Trial Design: Landscape Ontario, Milton



- Plot Size: 8m2
- Plant Species : Angelonia
- Planting Date: 18th June
- Mulch treatments: 4
- Mulch application dates: June 29th & July 21st (AMP)

Trial Design: Mulch Application Rates

GUELPH TURFGRASS INSTITUTE		LANDSCAPE ONTARIO	
Composted Sawdust	14L /m²	Wood Mulch	11L /m²
Wood Mulch	15L /m²	Wood Mulch 2	16L /m²
Switchgrass Pellets	14L /m²	Switchgrass Pellets	11L /m²
Chopped Miscanthus	20L /m²	Chopped Miscanthus	16L /m²
AMP Liquid Polymer	2kg/m²	AMP Liquid Polymer	2kg/m²

Standard mulch application is generally recommended at 25.5 litres per square metre, clearly above what was applied for these trials

Trial Design: Weed Counts

- Each Week, starting with the second week after the Mulches were applied, three sample areas of 0.15 m^2 were randomly selected using a quadrant and weed counts were taken, pulling out all individuals counted

- At GTI, all weeds (even those outside the areas sampled) were removed so that each week the weed count indicated only new weeds, with the exception of the second count

- At LO, only the weeds counted were removed, because of the large flowerbed size and the extremely high weed numbers

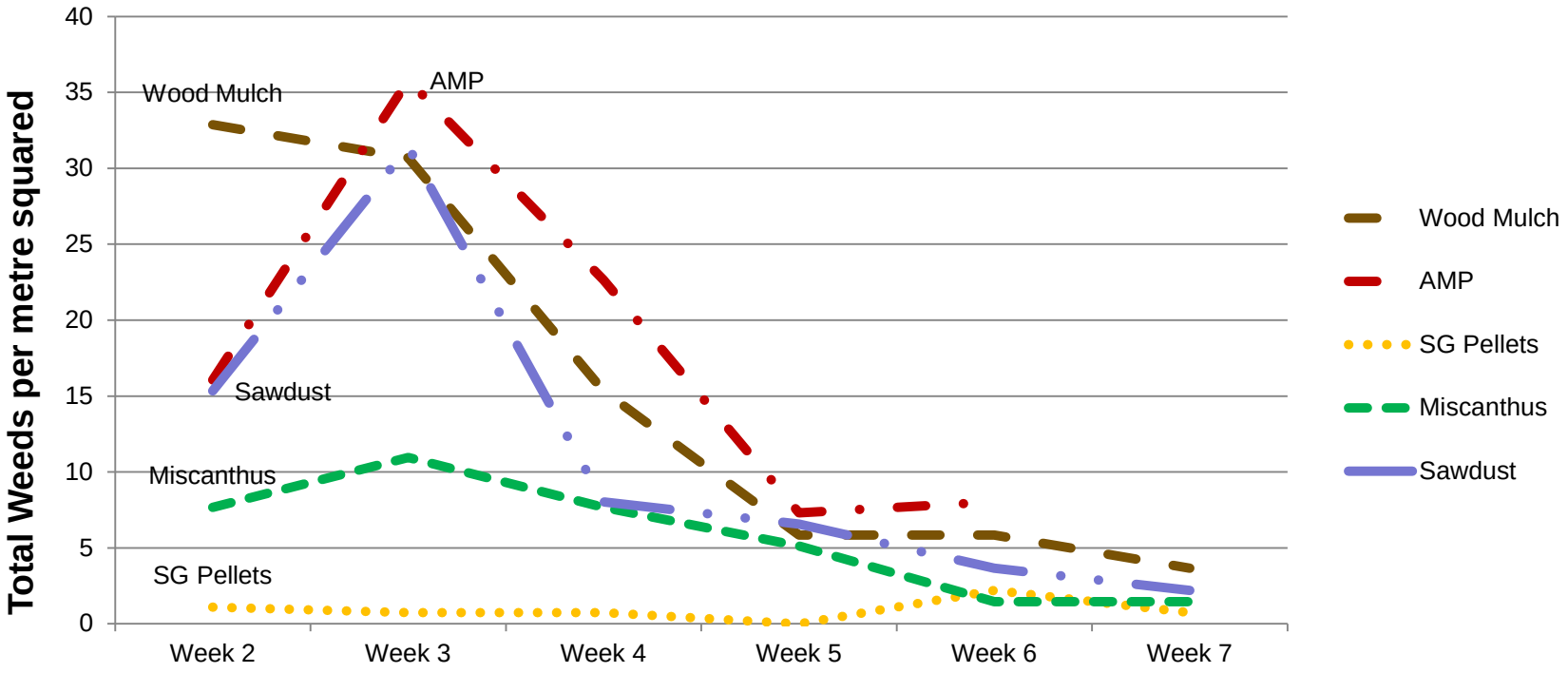
Trial Analysis: Material Price Points GTI

	Price per cubic yard (delivered)	Application Rate	Price /m²
Wood Mulch	$95.00 / yd³	15 L/m²	1.86$ per m2
Switchgrass pellets	$137.00 / yd³	14 L/m²	2.50$ per m2
Miscanthus	$53.50 / yd³	20 L/m²	1.40$ per m2
AMP Liquid Mulch	$2.00 / Kg	2 Kg/m²	4.00$ per m2

It should be noted that differences in application times and the associated labour costs would adjust the price points beyond simply the material costs for each product

NOTE – 1 Cubic Yard is equivalent to 765 litres

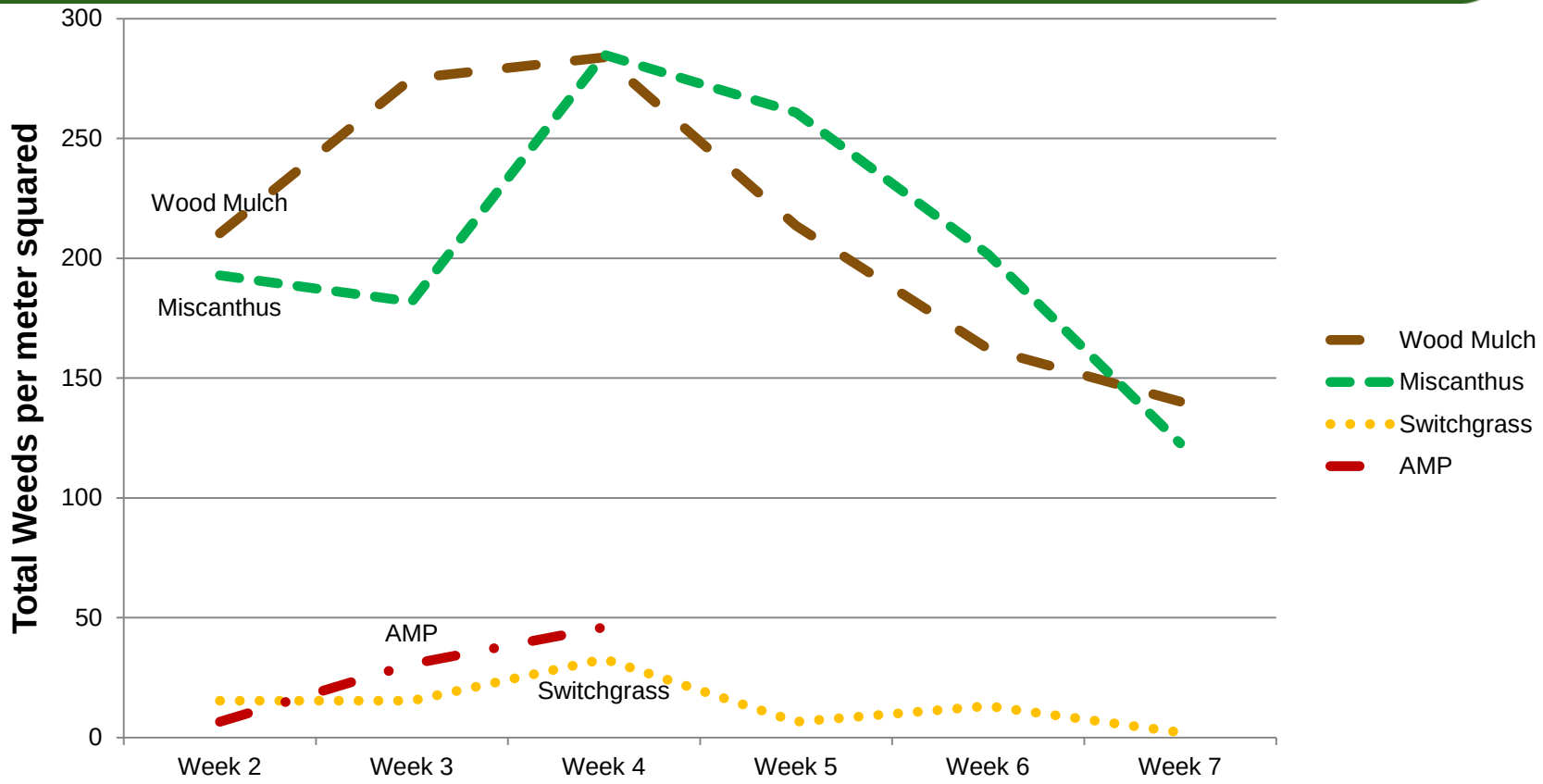
Trial Results: GTI



Total Number of weeds, counted and then removed, on a weekly basis. After each count, the plots were completely weeded.

The most consistent and favourable results belonged to the Switchgrass pellets and chopped Miscanthus.

Trial Results: Landscape Ontario



Total Number of weeds, counted and then removed, on a weekly basis.

The most consistent and favourable results belonged to the Switchgrass pellets, and despite limited data the LO liquid mulch application seems to be doing very well (Data was limited due to later application date)

Trial Results: Assessment Approach

- The Guelph Turfgrass Institute Trial and Landscape Ontario Trial required separate assessment because on the number of replications GTI allowed and the exclusion of the Sawdust Compost treatment at LO
- Furthermore, the application rates were generally lower, accounting for some of the increase in weed numbers, with the exception of AMP Liquid mulch, which at a slightly higher application rate is thus far performing much better than its GTI counter part.
- Because the GTI allowed for replications of identical treatments, dollar value analysis was performed on the numbers that the GTI trials generated

Trial Results: Assessment of Plant Health

- Plant health and vigor, which was generally better at LO than at GTI despite the increased weed competition, was so varied between replications, that no conclusion can yet be reached regarding the mulches affect on the plant health.

- It was generally observed that the Sawdust Compost, though varying across replications in vigor, provided sufficient nutrients to prevent any yellowing of the leaves likely caused by a nitrogen deficiency.

Anecdotal Observations

- The first consideration of these results, is that with the likely exception of the Switchgrass pellets, all of the other mulches would be applied at higher rates than in this trial. The trial showed results on mulch layers that were sufficient to cover the soil surface, but not to provide an especially thick barrier

- The Switchgrass pellets achieved a thick barrier because of the naturally expanding properties it exhibits when exposed to water

- Furthermore, the nature of Mulch is such that when applied, the upkeep should not entail intensive weekly weeding. As the GTI numbers reveal, weekly weeding eventually equalized all the mulches to a weed level of 0-10/m^2

- These numbers do however yield valuable information about each Mulch's responsiveness to weeding, and expectation of how many weeds will still penetrate a base layer of each Mulch

Recommendations for Further Study

- A trial should be conducted in which the mulch is applied at more standard 25-30 L/m2 rather than the 14-20 L/m2 applied in this trial (with the exception of the Switchgrass because of expansion)

- After which point no weeds should be pulled, with weekly cumulative counts taken over the course of the growing season

- Though logistically difficult, the tilling of the bed, planting of the flowers, and application of the mulch should all occur on the exact same day unlike in this trial. This minimizes weed seed access to the soil, and insures reasonable comparison of the mulches

Recommendations for Further Study

- A hardier species than Angelonia would be preferable; because of its fragility it became difficult to attribute variations in plant vigor to the mulch rather that environmental factors such as wind exposure, physical damage or heat damage

- Assessment of nutrient content of the soil over time, as well as longevity of the material in landscape and container scenarios should be investigated, as well as any pest and disease prevention potentials and the quality of protection for roots from cold temperature injury

Conclusions

- As a per dollar unit of efficacy for weed suppression, the Switchgrass pellets were the most effective, letting through **0.06** weeds/m²/$ when applied at 14 dry litres per metre squared

- In pure weed suppression numbers the Switchgrass pellets were also the most effective, on average letting through **0.14** weeds/m², followed by the chopped Miscanthus at 0.87 weeds/m². The Switchgrass pellets performance is very likely related to its expanding properties. As dry pellets it was comparable in quantity to the other mulch applications but swiftly expanded to 3-4 times the volume, giving 3-4 times the material for weeds to contend with

Conclusions

- The AMP liquid mulch seemed to have suffered from expansions and contractions at the GTI, causing cracks, but applied with sufficient thickness, it appears to mitigate this issue. The University of Guelph is currently examining the liquid mulch in the context of containers and have so far observed that the expansion-contraction issues are also mitigated in a container setting and it appears to provide excellent moisture retention and drought protection for the plants.

Appreciations

- Thank you to the donators of the Trial Materials

- And a tremendous thank you to Rodger Tschanz, Landscape Ontario and the Guelph Turfgrass Institute with the University of Guelph for their assistance and donation of the space in which this trial was performed

THANK YOU

Mulch Material Contacts

SWITCHGRASS & MISCANTHUS PRODUCTS

- **Ontario Biomass Producers Co-op**, can be reached at 519-986-7544 or 1-844-986-7545 or info@ontariobiomass.com

- **Gildale Farms**, of St. Mary's Ontario, can be reached at 519-284-0960 or info@gildalefarms.ca
- **Forman Farms**, of Seeley's Bay, Ontario, can be reached at 613-382-4949 or info@formanfarms.ca
- **Switch Energy Corp**, of Clinton, Ontario can be reached at 519-233-7579 or dnott@switchenergycorp.com
- **All Weather Farming**, of Simcoe, Ontario, can be reached at 519-428-2390 or allweather@xplornet.com

Mulch Material Contacts

AMP LIQUID MULCH

- Advanced Micro Polymers Incorporated, of Milton Ontario, can be reached at 905-878-2742 or lenz@ampolymers.com

WOOD MULCH

- Gro-Bark, serving Southern Ontario, can be reached at 1-888-GRO-BARK, or www.gro-bark.com

Trial Supervisor Contacts

- Mahendra Thimmanagari of OMAFRA (Contact for Patrick Huber-Kidby as well) can be reached at mahendra.thimmanagari@ontario.ca
- Jen Llewellyn of OMAFRA can be reached at jennifer.llewellyn@ontario.ca
- Rodger Tschanz of the University of Guelph can be reached at rtschanz@uoguelph.ca