Response of *Miscanthus* Species to Postemergence Herbicide Applications

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Introduction

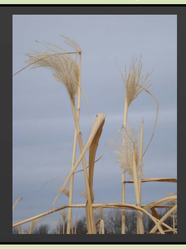
Miscanthus spp. have been purposed to be an ideal candidate for use as a cellulosic biofuel crop due to its high growth capacity and perennial habit. Researchers currently are developing management recommendations and guidelines for growers to integrate Miscanthus into their cropping system. However, Miscanthus is slow to establish and can take up to 5 years to achieve a solid stand. Grower's reception of a new crop that requires multiple years of low economic return will hinder its acceptance and adoption to offset current government demands for cellulosic biofuels. A hypothesis why Miscanthus is slow to establish is excessive competition with weeds. Few recommendations exist for weed control in Miscanthus however and are needed to increase its potential acceptance by growers as a new crop.

Objective

To evaluate current commercial herbicides as potential candidates for use as postemergence weed control in *Miscanthus*

Materials and Methods

- Greenhouse studies were conducted at Michigan State University and Texas Tech University
- RCBD design, 4 replications, 2 runs
- Each university evaluated a separate *Miscanthus* species
  - *Miscanthus giganteus* – Planted by Michigan State University
  - *Miscanthus sacchariflorus* – Planted by Texas Tech University
- *M. giganteus* rhizomes were planted into field soil and treated at 14 cm in height
- *M. sacchariflorus* was transplanted into field soil and treated at 14 cm in height
- 11 herbicide treatments were studied including a non-treated check (Table 1)
- Total injury (*M. giganteus*) and phytotoxicity (*M. sacchariflorus*) was assessed visually on a 0-100% scale 28 days after treatment
- Plants were harvested 28 days after application and dried for shoot and root biomass samples
- Means were separated with Fisher's Protected LSD at p=0.05



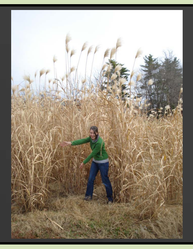


Table 1. Herbicide treatment list*

Herbicide	Rate (kg ai/ha)	Herbicide	Rate (kg ai/ha)
Non-treated		halosulfuron + NIS	0.04 + 1% v/v
bentazon + COC	1.12 + 1% v/v	imazomox + COC	0.04 + 1% v/v
bromoxynil	0.42	imazethapyr + COC	0.07 + 1% v/v
dicamba	0.56	mesotrione + COC	0.11 + 1% v/v
foramsulfuron + MSO	0.04 + 1% v/v	nicosulfuron + NIS	.004 + 0.25% v/v
glyphosate + AMS	0.84 + 2% v/v	rimsulfuron + NIS	0.002 + 0.25% v/v

* highlighted treatments were only applied to *M. giganteus*

Results

Fig. 1 *Miscanthus* spp. injury 28 days after application

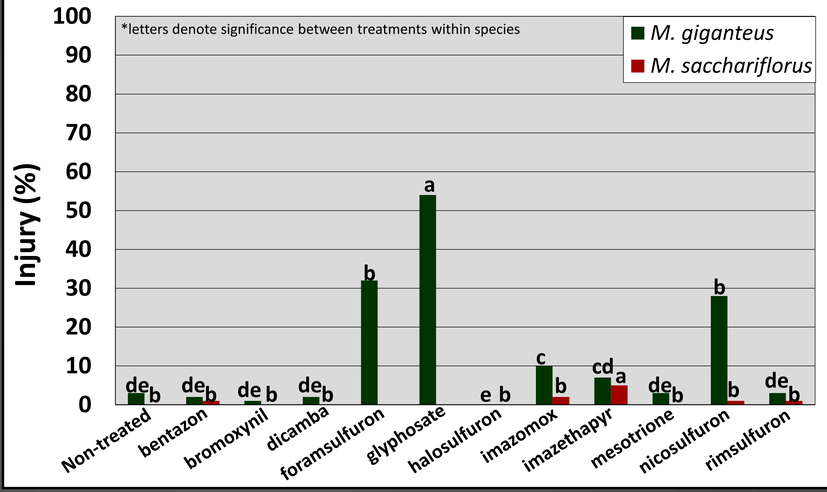


Fig. 2 Height of *M. giganteus* 28 days after application

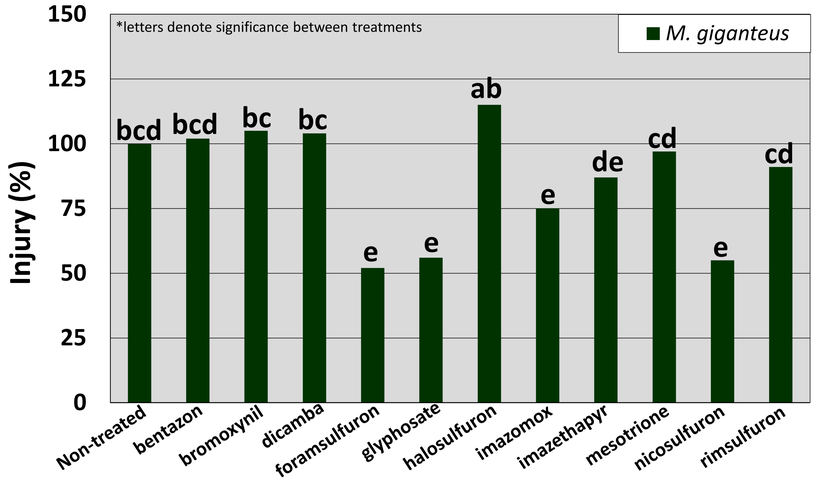


Fig. 3 Yield of *Miscanthus* spp. dry shoot matter relative to the check

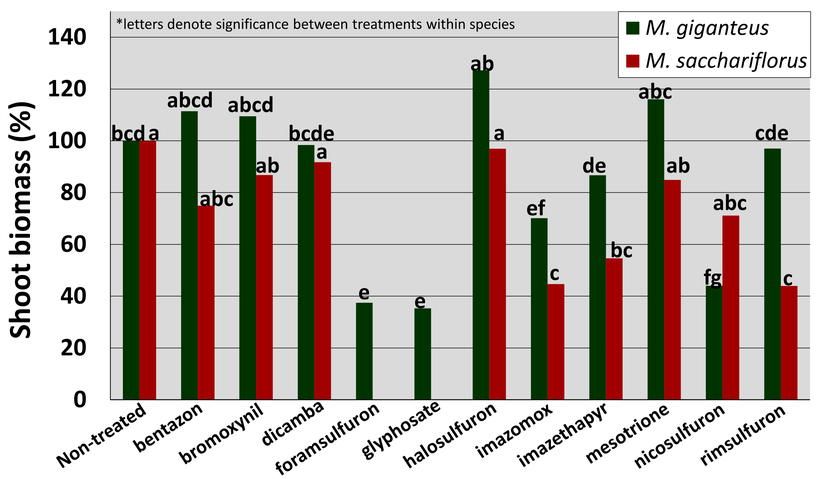
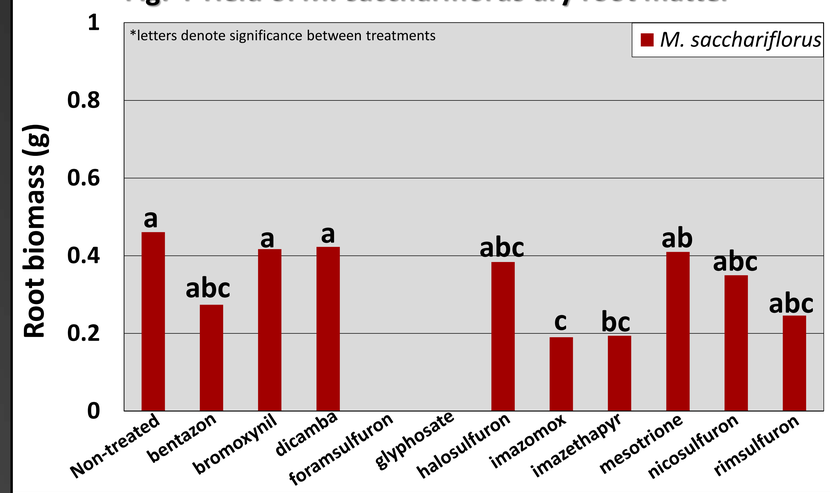


Fig. 4 Yield of *M. sacchariflorus* dry root matter



Discussion

- Runs from respective experiments/species were combined.
- Phytotoxicity observed on *M. sacchariflorus* was less than 5%, 28 days after postemergence application (Figure 1).
- Injury observed on *M. giganteus* was mainly attributed to reductions in plant height (Figure 2).
- Imazethapyr caused significant injury to both species of *Miscanthus,* while imazomox was found to only injure *M. giganteus.*
- Yield of shoot biomass of the check was 3.68 g and 0.46 g for *M. giganteus* and *M. sacchariflorus*, respectively.
- Imazomox reduced shoot biomass yield of both species (Figure 3).
- Shoot biomass of *M. giganteus* was reduced by treatments of nicosulfuron whereas *M. sacchariflorus* was not.
- Shoot biomass of *M. sacchariflorus* was reduced by treatments of imazethapyr and rimsulfuron however shoot biomass of *M. giganteus* was not.
- Root biomass yield of *M. giganteus* was not effected by treatment (data not shown).
- Imazethapyr and imazomox reduced root biomass yield of *M. sacchariflorus* (Figure 4).
- Treatments of bentazon, bromoxynil, dicamba, halosulfuron, and mesotrione did not injure either species.

Conclusion

- Imazethapyr can injure and reduce yields of *Miscanthus*
- Imazomox, nicosulfuron , and rimsulfuron have the potential to injure certain *Miscanthus* spp. and need to be further evaluated
- Bentazon, bromoxynil, dicamba, halosulfuron, and mesotrione were safe for application to both *Miscanthus* spp. and are potential candidates for postemergence weed control in *Miscanthus*

Acknowledgements

The authors would like to thank Travis Williams, Tyler Cooper and Mendel Biotechnology for their assistance in conducting this research.