Preemergence and postemergence weed control in sweet corn on organic soils

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INTRODUCTION

- Atrazine, has been the foundation of weed management in sweet corn in the region.
- It's low-cost and highly efficacious for control of broadleaf weeds but poor grass control (Williams et al. 2010).
- Reduced atrazine efficacy has resulted in weed persistence in the region.
- Grasses have become the predominant weeds compounding weed management.
- Therefore, highly efficacious broad-spectrum novel herbicides are needed to reduce over reliance on atrazine in the region.

OBJECTIVE

To evaluate preemergence and postemergence weed management programs for sweet corn using novel broad-spectrum herbicides and cultivation

MATERIALS AND METHODS

- Field experiments conducted on organic soil at the Everglades Research and Education Center in Belle Glade, FL in Spring 2020.
- **Herbicide application:** spray volume of 187 L/ha at 276 kPa.

  PRE herbicides: after planting prior to crop emergence (Table 1).

  POST herbicides: at the V4 stage of sweet corn (Table 2).
- **Mechanical cultivation:** at the V4 and V8 stages of sweet corn (Table 2).
- **Data collection:** visual estimation of sweet corn injury and weed control at 14 days after treatment (DAT) and thereafter every 14 days until canopy closure, weed control assessment conducted for each individual weed species, and weed densities.
- **Experimental design:** RCBD with four replications.
- **Data analysis:** data subjected to ANOVA, means separated using LSD test at 5% level of significance using R.

Table 1. Preemergence treatments.

Treatment	Rate (g ai ha^{-1})
Handweeded check	
Pyroxasulfone (P)	188
	237
	245
Pyroxasulfone + atrazine + fluthiacet-methyl (P+A+F)	170 + 1403 + 5
	272 + 2245 + 8
S-metolachlor (S)	1790
S-metolachlor + atrazine (S+A)	1790 + 3360
Atrazine (A)	3360

Table 2. Postemergence treatments.

Treatment	Rate (g ai ha^{-1})
Handweeded check	
Mesotrione (M)	105
Mesotrione + atrazine (M+A)	105 + 560
	105 + 2240
Topramezone (T)	25
Topramezone + atrazine (T+A)	25 + 560
	25 + 2240
Topramezone + bentazon (T+B)	25 + 1120
Tembotrione (TE)	92
Cultivation 1X (C1X)	
Cultivation 2X (C2X)	

RESULTS

Fall panicum (*Panicum dichotomiflorum*), common lambsquarters (*Chenopodium album*), spiny amaranth (*Amaranthus spinosus*), ragweed parthenium (*Parthenium hysterophorus*), and common purslane (*Portulaca oleracea*) were the predominant weed species with fall panicum being the most prevalent. There was no sweet corn injury from any herbicide treatment.

Preemergence study:

- Fall panicum control was >85% at 56 DAT for all treatments that included pyroxasulfone. In contrast, *S*-metolachlor applied alone or in combination with atrazine only provided 75% fall panicum control. Furthermore, atrazine alone did not control fall panicum at 56 DAT (Figure 1).
- Broadleaf weeds control was 5 to 56% when *S*-metolachlor was applied alone. However, *S*-metolachlor in combination with atrazine and all treatments that included pyroxasulfone provided >86% control of broadleaf weeds at 56 DAT (Figure 2).

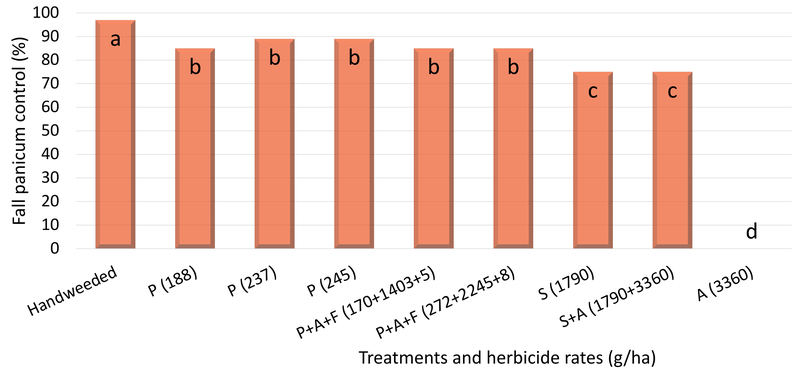

Figure 1. Fall panicum control at 56 DAT in response to preemergence herbicides on sweet corn on organic soil. Different letters within treatments indicate significant difference between weed control (P<0.05).

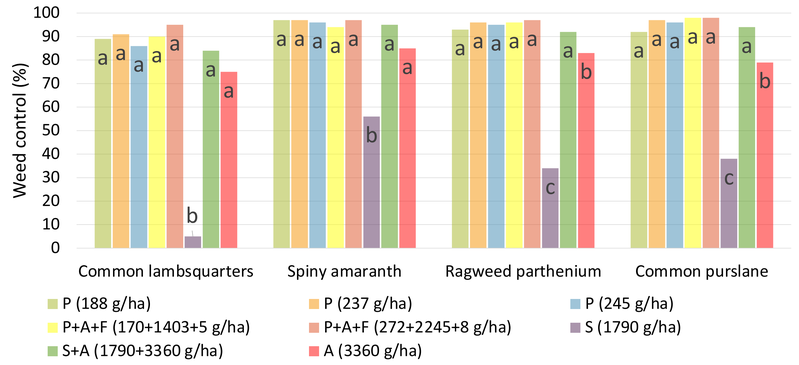

Figure 2. Broadleaf weeds control at 56 DAT in response to preemergence herbicides on sweet corn on organic soil. Different letters within treatments indicate significant difference between weed control (P<0.05).

Postemergence study:

- All treatments that included topramezone provided 71 to 94% fall panicum control and 89 to 100% control of broadleaf weed species at 42 DAT. Treatments with mesotrione and tembotrione provided poor fall panicum control (11 to 36%) at 42 DAT (Figure 3).
- All postemergence herbicides provided 89 to 100% broadleaf weeds control at 42 DAT with the exception of 70 and 75% common purslane control with mesotrione applied alone and tembotrione, respectively (Figure 4). Cultivation alone did not provide acceptable weed control (Figure 3 and 4).

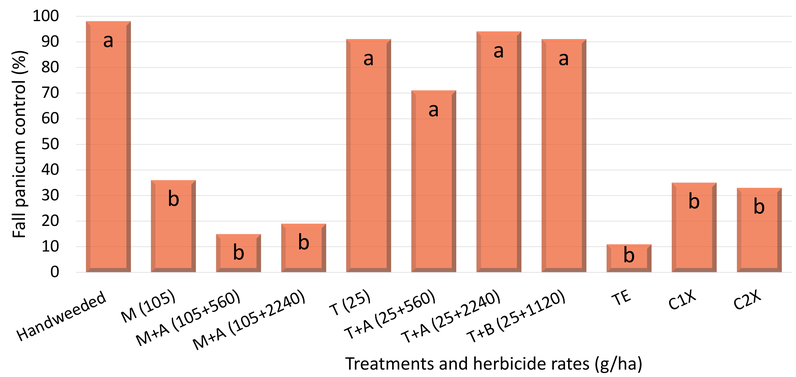

Figure 3. Fall panicum control at 42 DAT in response to postemergence herbicides and mechanical cultivation in sweet corn on organic soil. Different letters within treatments indicate significant difference between weed control (P<0.05).

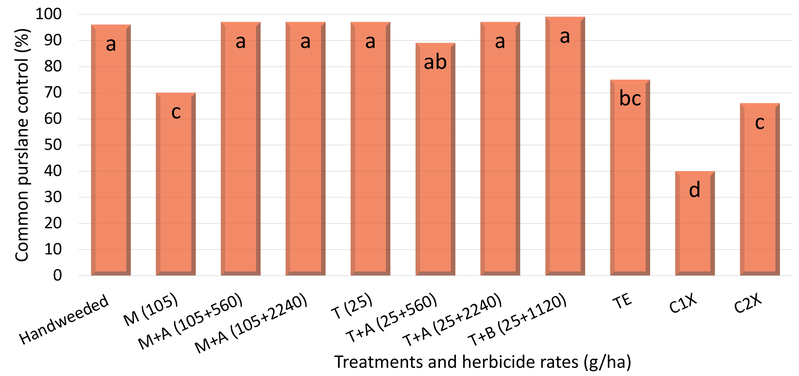

Figure 4. Common purslane control at 42 DAT in response to postemergence herbicides and mechanical cultivation in sweet corn on organic soil. Different letters within treatments indicate significant difference between weed control (P<0.05).

CONCLUSIONS

- The results suggest that pyroxasulfone can be used to provide efficacious residual control of problematic weeds on organic soils.
- Topramezone alone or in combination with atrazine or bentazon can be used for effective control of fall panicum and broadleaf weed species in sweet corn on organic soils.
- Further field studies are ongoing to corroborate these results.

REFERENCES

Williams MM II, Boerboom CM, Rabaey TL (2010) Significance of atrazine in sweet corn weed management systems. Weed Technol 24:139-142

ACKNOWLEDGEMENTS

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