GLYPHOSATE HINDERS NUTSEDGE TUBER PRODUCTION

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Purple nutsedge (*Cyperus rotundus* L.) and yellow nutsedge (*Cyperus esculentus*) are two of the most troublesome weeds in vegetable crops of the southeast US. Management of these species in vegetable crops can be difficult in the absence of methyl bromide. Many alternative fumigants have struggled to achieve nutsedge control equivalent to methyl bromide. Management of these perennial species must include diligent control programs that target these weeds between crops as well as in-crop. Tubers are the primary means of reproduction; effective management strategies will need to minimize tuber production. Glyphosate has been shown to reduce tuber production, but it is not clear what the minimum dose is to reduce tuber production.

Greenhouse studies were conducted to evaluate how glyphosate affected purple and yellow nutsedge tuber production. A single tuber was planted and allowed to grow for 8 weeks. Glyphosate was applied at 0, 0.41, 0.59, 0.74, 0.95, and 1.23 kg ae/ha. Tuber production in each plot was evaluated at 5 weeks after application. The study was arranged as a randomized complete block design with 4 replications and the study was repeated over time.

Tubers were classified based on their relative position to the initial planted tuber. Tubers that were directly attached to the initial tuber were considered 1st-order tubers. Second-order tubers were attached to 1st-order tubers, and 3rd-order tubers attached to 2nd-order tubers, etc. The 6th- and 3rd-order tubers were terminal for these experiments in purple and yellow nutsedge, respectively.

Purple nutsedge

- 1st-order: The lowest rate of glyphosate stimulated purple nutsedge tuber biomass accumulation. Glyphosate at 0.95 kg/ha reduced tuber biomass 80% relative to the nontreated control.

- 2nd-order: Glyphosate at 0.59 kg/ha reduced purple nutsedge tuber biomass 35% relative to the nontreated control.

- All rates of glyphosate reduced 3rd- and 4th-order purple nutsedge tuber biomass $\geq$67%.

- Glyphosate prevented 5th- and 6th-order purple nutsedge tubers.

- Total purple nutsedge tuber biomass was reduced 20% by the lowest rate of glyphosate (0.41 kg/ha), relative to the nontreated control. Tuber biomass was reduced >50% from glyphosate at 0.59 kg/ha, and >90% from glyphosate at 0.95 kg/ha.

Yellow nutsedge

- 1st-order: All rates of glyphosate reduced yellow nutsedge tuber biomass accumulation ≥37%. Glyphosate at 0.95 kg/ha reduced biomass 77% relative to the nontreated control.

- 2nd-order: Glyphosate at 0.59 kg/ha reduced yellow nutsedge tuber biomass 76% relative to the nontreated control.

- 3rd-order: Glypohsate 0.59 kg/ha reduced yellow nutsedge tuber biomass 81%.

- In spite of published reports which indicate that yellow nutsedge does not form tuber chains (i.e. only 1st-order tubers are produced), yellow nutsedge in this study did form 2nd and 3rd order tubers.

- Total yellow nutsedge tuber biomass was reduced 50% by the lowest rate of glyphosate (0.41 kg/ha), relative to the nontreated control. Tuber biomass was reduced 70% from glyphosate at 0.59 kg/ha, and 85% from glyphosate at 0.95 kg/ha.

Conclusions:

- Glyphosate is an effective means of reducing tuber production in both purple and yellow nutsedge.

- Yellow nutsedge appeared to be more sensitive to glyphosate than purple nutsedge.

- Tuber populations develop rapidly, producing 60 tubers in 13 weeks.

- Each purple nutsedge shoot represents approximately 4 tubers.

- Glyphosate will be an important component of effective long-term management nutsedge programs, allowing for repeated applications due to its relatively low cost and poses no soil residual herbicide carryover issues to vegetable crops.

- In Georgia, glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) has been documented in cotton fields. This species will likely become a more important weed in vegetables. Judicious use of glyphosate is warranted.