



Seed Development on Weeds Controlled Prior to Maturity



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Introduction

- Each weed that escapes control can produce hundreds to thousands of seeds that will emerge over several growing seasons.
- Information is currently lacking on the appropriate time of late-season weed removal to prevent the after-ripening of weed seeds (i.e. immature seed maturing on dying plants) and inputs to the seed bank.

Objective

Determine the growth stage at which summer annual weeds can be terminated without producing viable seed.

Materials & Methods

- Location: East Lansing, MI
- Weed species examined:
 - Giant foxtail (*Setaria faberi*)
 - Velvetleaf (*Abutilon theophrasti*)
 - Common lambsquarters (*Chenopodium album*)
- Termination methods:
 - Pulled (root intact)
 - Cut at base of plant (no root)
- Termination timings (Table 1):
 - Open flowers
 - Immature seed formation (green/white seed)
 - Seeds beginning to mature (black/brown seed)
- Replications = 6
- Terminated plants were stored in residue bags in soybean field until November (Figure 1)
- Once collected in November, intact and immature/damaged seeds in the residue bags were separated and counted
- Seed viability of intact seeds was examined using tetrazolium chloride (Figure 2)
- Data were analyzed using SAS PROC MIXED ($p \leq 0.05$)



Figure 1- Residue bags used to store weeds.

Results

Table 1- Weed stages at the time of termination

	Giant foxtail	Velvetleaf	Common lambsquarters
Flowering			
Immature seed			
Mature seed			

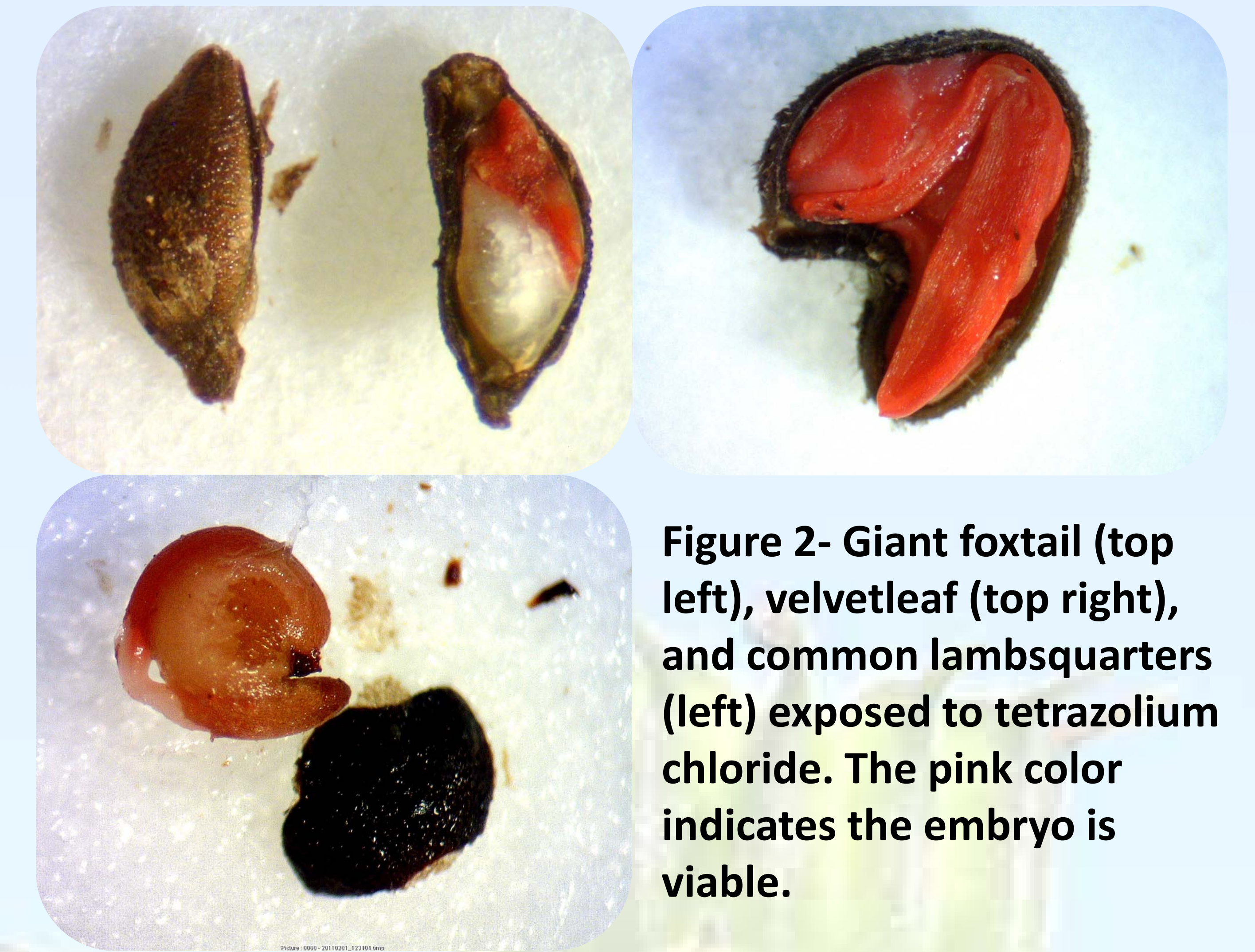


Table 2- Percentage of plants collected with viable seed

	Giant foxtail	Velvetleaf	Common lambsquarters
Flowering	0%	0%	25%
Immature	58%	100%	100%
Mature	100%	100%	100%

- There was no difference in viable seed production among weed termination method (i.e. pulled vs. cut)
- A high percentage of intact seed collected was found to be viable (Giant foxtail=76%, Velvetleaf=98%, Common lambsquarters=92%) (Figure 2)
- Common lambsquarters was the only weed to produce seed when terminated at the flowering stage; 25% of the plants produced viable seed (Table 2)
- All three weeds produced viable seed when terminated at the immature stage (Figure 3)
- Mature plants produced more viable seed than immature plants (Figure 3)

Viable Seed Production

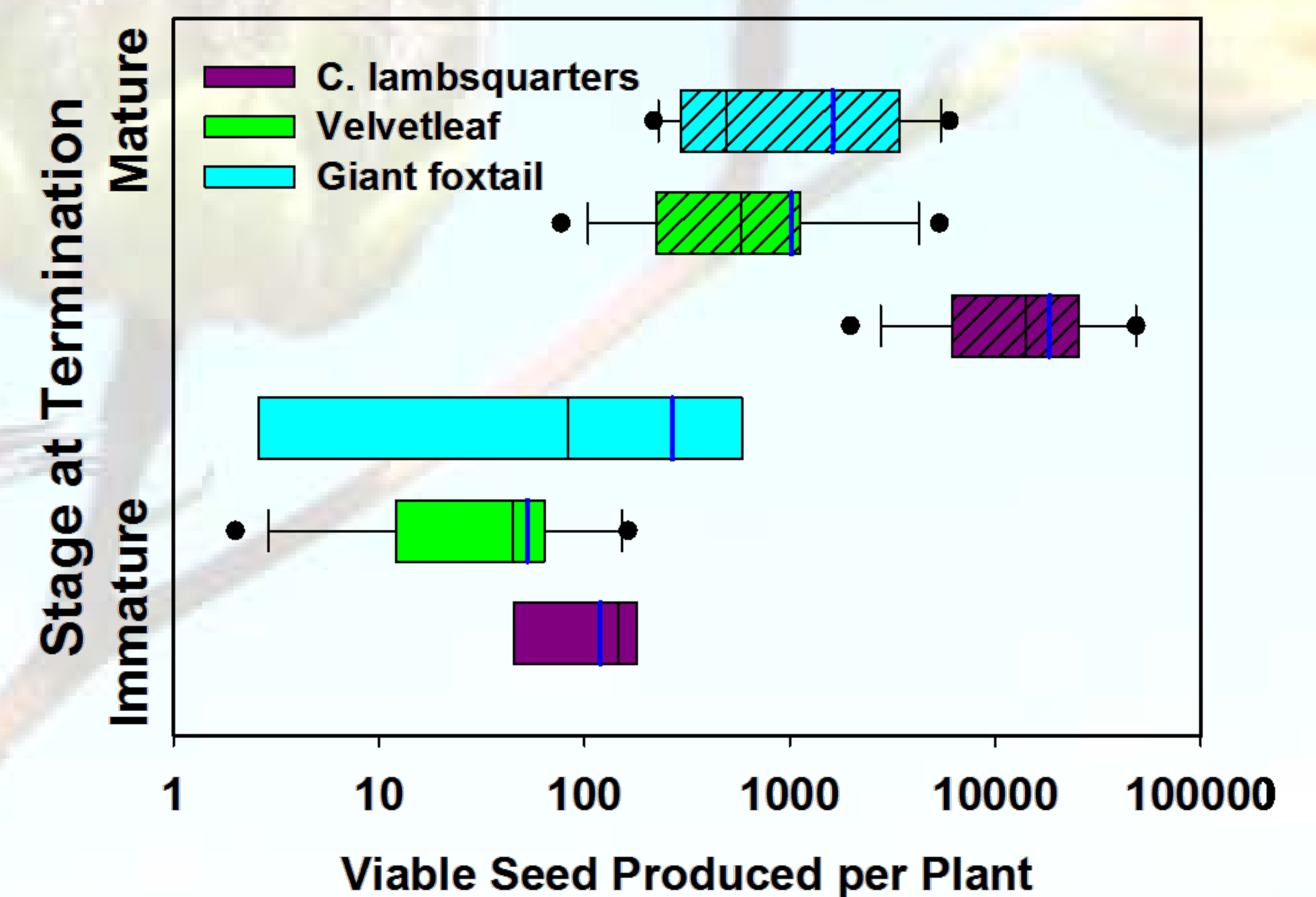


Figure 3- Viable seed produced by terminated immature (solid) and mature (hashed) common lambsquarters, velvetleaf, and giant foxtail. Plants not producing seed were removed before graphing. Dots represent outliers and solid blue lines represent means.

Conclusions

Common lambsquarters needs to be controlled prior to flowering to ensure no viable seed enters the weed seedbank, whereas giant foxtail and velvetleaf need to be controlled prior to green/white immature seed formation. If weeds have matured past these respective growth stages, weeds need to be physically removed from the field to prevent seed inputs. Understanding the time of seed maturation will allow growers to plan late-season labor and mechanical weed management to optimize their return on investment.