REDUCTIONS IN PALMER AMARANTH SEED VIABILITY OVER TIME

Lynn M. Sosnoskie[1], Theodore M. Webster[2] and A. Stanley Culpepper[1]
[1]Crop and Soil Sciences Department, University of Georgia, Tifton
[2]Crop Protection and Management, USDA-ARS, Tifton

Introduction

Palmer amaranth (*Amaranthus palmeri*) plants that become established in the field are likely germinating and emerging from relatively shallow depths within the soil profile. According to recent research conducted at the University of Georgia, the majority of Palmer amaranth seedlings are emerging from depths of 0.5 and 1 inch. Theoretically, a deep tillage event should bury a significant proportion of surface/near surface Palmer amaranth seeds to depths below their optimal germination and emergence zone. A reduction in the number of germinable seeds should reduce the number of individuals that will be subjected to chemical and cultural weed management, as well as the number of weed management survivors that can then replenish the seedbank. The success of this proposed strategy for reducing weed population sizes is dependent, in part, by the dormancy and longevity of seeds in the soil. It is currently unknown exactly how long Palmer amaranth seed persist once they enter the soil seedbank

Materials and Methods

Seed from glyphosate-susceptible (GLY-S) and glyphosate-resistant (GLY-R) parent plants were harvested in October of 2007 and 2008, cleaned, and divided into subsamples of 100 seed each. Each subsample was thoroughly mixed with 10 grams of sand and then sealed in individual 3 inch by 3 inch nylon mesh bags. Bags were buried at depths of 0.5, 1, 4 and 16 inches at the USDA/UGA Jones Farm in Tifton, GA. Four bags of seed for each biotype (GLY-S and GLY-R) were exhumed from each burial depth at 3, 6, and 9 months after burial for both the 2007 and 2008 collection periods. Additionally, four bags of seed for each biotype were exhumed from each burial depth at 12, 18 and 24 months after burial for the 2007 collection. Seed were recovered from the sand, placed on moist filter paper in Petri dishes and put in a germination chamber set to 86 F. Seed germination was monitored for 28 days; germinated seed were counted and removed. Seed that did not geminate after 28 days were evaluated to see if they were diseased or dormant. Freshly harvested seed from each collection were also evaluated for germinability, dormancy and disease to establish a baseline level of viability (0 months).

Results and Discussion

Freshly harvested seed of both biotypes were 96 to 98% viable. Differences in viability with respect to burial depth were not apparent (data not shown); therefore, data were combined over depths and years. Seed viability decreased as time of burial increased. At 12 months, viability was approximately 60%; after two years, viability had decreased to below 40%. Most of the seeds that did not germinate were diseased, not dormant

(data not shown). There did not appear to be anny differences in seed viability between the biotypes. Results from this study are in agreement with work conducted on other amaranth species.

Our goal is to develop a successful management program for GLY-R Palmer amaranth in cotton. To maximize the effectiveness of current best control practices, we believe that it is necessary to shrink the size of the Palmer amaranth seedbank in infested fields. Results from this study indicate that buried Palmer amaranth seeds will decay rapidly with time and that the seedbank is likely ephemeral.

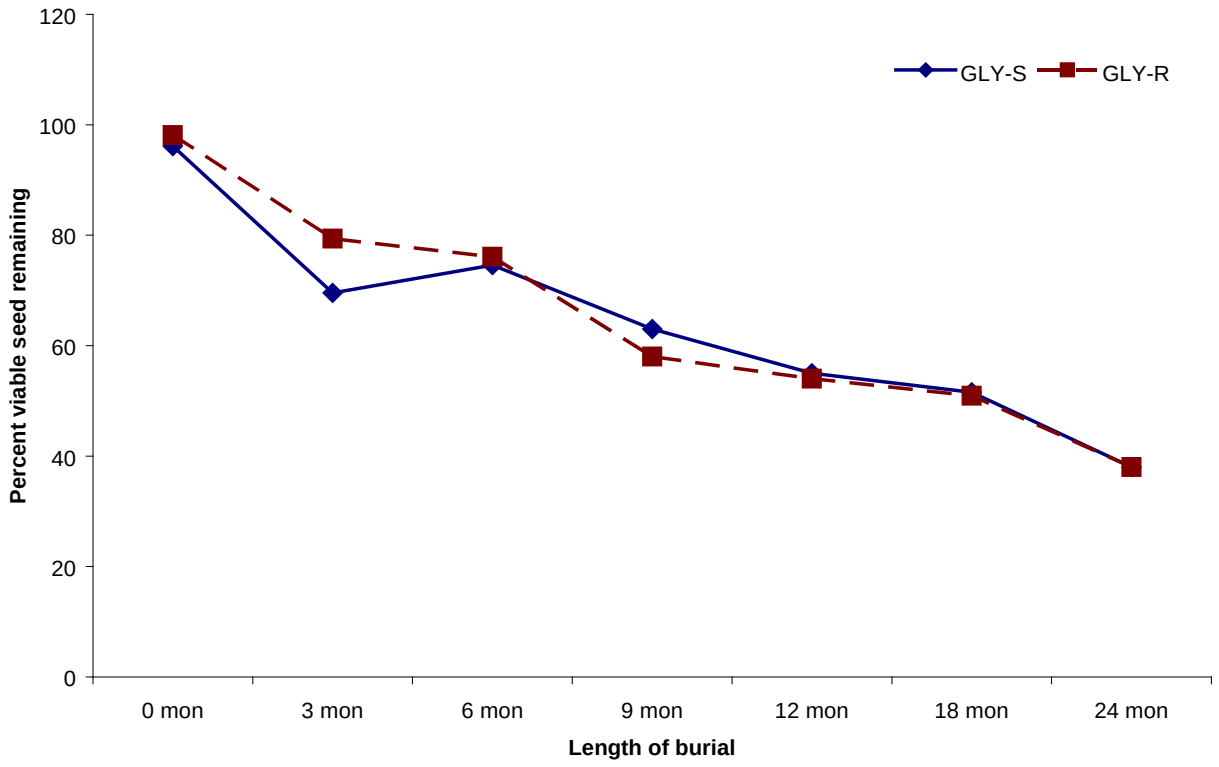

Figure 1. Palmer amaranth seed viability after 0 months to 24 months of burial.