

Emergence Characteristics of Several Annual Weeds

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Introduction

No other event in the life cycle of weeds affects scouting and management timing as greatly as weed emergence. The timing and intensity of weed emergence affect everything from the effectiveness of burndown herbicides and preplant tillage, to timing of postplant tillage and herbicide application, to competitiveness of weeds that escape control, to seed production by surviving plants, to eventually population shifts. Given the importance of weed emergence to all forms of weed management, it seems logical that we should give greater attention to understanding and predicting weed emergence as affected by environmental factors, weed species, and management practices.

Materials and Methods

An area maintained in sod was tilled during the summer of 1997, and 12-inch diameter PVC pipes were buried vertically with one inch extending above the soil surface. Seeds from eleven weed species were collected in central Iowa during the 1997 growing season for use in these studies. In October, 1000 seeds of a single species were buried in the upper two inches of soil contained within a PVC pipe. Due to the large size of burs, only 50 cocklebur burs were buried within a pipe. Each treatment was replicated three times. During the 1998 and 1999 growing season the number of seedlings emerging within a pipe was determined weekly, and then seedlings were removed by hand. A second experiment using seed collected during 1998 was established in the fall of 1998.

Results and Discussion

There were larger differences in the speed and duration of emergence among the species in

1998 than in the initial dates of emergence (Table 1). For example, giant ragweed, lambsquarter, redroot pigweed and morningglory all initiated emergence on March 30. Giant ragweed and lambsquarter reached 50% of their total emergence for the summer in the first three days after emergence, whereas it took redroot pigweed, morningglory and giant foxtail more than 50 days to reach 50% emergence. Woolly cupgrass, giant ragweed and lambsquarter reached 90% emergence within 4 weeks of emergence. Redroot pigweed and morningglory did not reach 90% emergence until more than 100 days after initial emergence. The percent of buried seeds that emerged during the first two years following burial varied widely among species. Only 1% of redroot pigweed seed emerged in 1998, compared with 29% of velvetleaf seed. The percent of seed emerging during the second year decreased for all species except redroot pigweed and waterhemp.

Giant ragweed was the first species to initiate emergence (April 6) in the second experiment, and all species had begun emergence by April 20 (Table 2). Again, differences in the rates of emergence were greater than differences in initial emergence. Giant ragweed and woolly cupgrass were the quickest to reach 50% emergence, whereas morningglory was the slowest. Giant ragweed, woolly cupgrass and sunflower reached 90% emergence within 28 days of initial emergence, whereas it took redroot pigweed more than 100 days to reach this level. Emergence percentages ranged from 5% for morningglory to 50% for both giant ragweed and waterhemp.

Although initial emergence dates and the rate of emergence for individual species varied between the two experiments, the relationship among species was fairly consistent within experiments. Giant ragweed, woolly cupgrass

and lambsquarters were the first three species to reach 50% emergence in both experiments, whereas morningglory and redroot pigweed were the slowest to reach 90% emergence. Giant foxtail was among the most variable species in the study. In 1999 giant foxtail reached 50% emergence in 18 days, which ranked fifth among the weeds. In 1999 it took giant foxtail 63 days to reach 50% emergence, which was the slowest of the species. Similar experiments have been conducted at four other locations across

Iowa. This large database should help provide a better understanding of factors that influence weed emergence under a variety of environmental conditions.

Acknowledgments

This research was funded by the Leopold Center for Sustainable Agriculture. We appreciate the efforts of the farm staff in gathering data during the experiments.

Table 1. Emergence characteristics of weed seeds buried in the upper two inches of soil in October 1997.

Species	Initial date of emergence (1998)	Days to reach % emergence (1998)		% emergence	
		50%	90%	1998	1999
Common cocklebur	April 27	11	39	5	1
Common lambsquarter	March 30	3	27	3	0.7
Common sunflower	March 30	27	41	16	8
Fall panicum	May 18	52	62	4	2
Giant foxtail	April 27	63	76	9	5
Giant ragweed	March 30	3	20	14	4
Redroot pigweed	March 30	58	101	1	2
Tall morningglory	March 30	61	146	5	3
Waterhemp	April 27	48	69	3	3
Woolly cupgrass	April 27	10	21	15	0.6
Velvetleaf	March 30	37	56	29	15

Table 2. Emergence characteristics of weed seeds buried in the upper two inches of soil in October 1998.

Species	Initial date of emergence (1999)	Days to reach % emergence (1999)		% emergence	
		50%	90%	1999	2000
Common cocklebur	April 20	35	44	19	4
Common lambsquarter	April 13	14	50	12	10
Common sunflower	April 13	17	27	43	15
Fall panicum	April 13	48	67	29	13
Giant foxtail	April 20	18	45	24	3
Giant ragweed	April 6	4	17	50	23
Redroot pigweed	April 20	45	102	6	5
Tall morningglory	April 13	62	71	5	11
Waterhemp	April 20	35	44	50	2
Woolly cupgrass	April 20	4	12	72	4
Velvetleaf	April 13	24	45	23	11