

## POWELL AMARANTH AND REDROOT PIGWEED IN NORTHWEST MINNESOTA

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Powell amaranth and redroot pigweed are introduced weedy pests to Minnesota and North Dakota. Redroot pigweed is the most commonly found pigweed species in the region. Herbarium records indicate that this plant, native to central and eastern US, aggressively spread across the Upper Midwest and Prairie Provinces of Canada in the late 1800's. It is now present in every agricultural area in the US and Canada, except Newfoundland. Powell amaranth, a plant native to western North and South America, was a later introduction to the upper Midwest, and herbarium records indicate it spread across the region in the 1930's and 40's. Powell amaranth is larger in size than redroot pigweed, produces more seed and its seed germinates over a wider temperature range. In some areas, Powell amaranth appears to be replacing redroot pigweed as the more abundant species. Redroot pigweed and Powell amaranth are not easy to distinguish from one another in vegetative stages, and Powell amaranth is commonly misidentified as 'redroot pigweed'.

Surveys were conducted in September of 2001 and 2002 in response to severe infestations of these pigweed species in NW MN sugarbeet fields. The objective of these surveys was to determine the frequency and relative abundance of these two species in sugarbeet, soybean and corn fields. The second objective was to determine whether common waterhemp or smooth pigweed were present in the region.

**Methods:**

A total of 99 fields (50 sugarbeet and 49 soybean and corn fields) were surveyed in 2001 and 168 fields (49 sugarbeet, 62 soybean and 57 corn fields) were surveyed in 2002. In 2001, fields were selected at random from Clay, Becker, Norman, Mahanomen, Clearwater, Polk, Red Lake, Pennington, Marshall, Kittson and Roseau counties. In 2002, fields were selected from the same counties sampled in 2001, in addition, fields from West Otter Tail and Wilkin were also sampled. At each field site the pigweed species present were identified and ranked in order of their relative abundance to the other species. No estimates of plants /unit area were taken.

**Results and Discussion:**

The surveys were conducted in September, after individual field weed control measures had been applied. The results reflect the 'weed escapes' rather than the beginning level of pigweed species population differences in the field and are an indication of the effectiveness of pigweed weed control strategies within the individual crop systems.

During both years, Powell amaranth was more common in sugarbeet than in corn or soybean with approximately 75% of sugarbeet fields having both redroot pigweed and Powell amaranth at varying infestation levels. Powell amaranth was the most abundant pigweed species in two thirds of the sugarbeet fields surveyed. Redroot pigweed was present in a little more than 40% of soybean and corn fields and Powell amaranth was present in 20% of the fields. When averaged across the two surveys, redroot pigweed was the most abundant pigweed in 70% of the soybean and corn fields with a pigweed infestation. Smooth pigweed was not detected in the survey and it is believed that Wilkin and West Otter tail counties are at the northern boundary for this plant. Common waterhemp was present in a small number of sugarbeet fields in Norman and Clay counties, both years, and is an expansion of the known range for this plant.

Soybean and corn weed control systems have a wide selection of soil applied and postemergence herbicides that provide very good pigweed control. Under these management systems redroot pigweed is found in greater abundance and frequency and could be considered more 'successful' than Powell amaranth. Redroot pigweed should remain the most frequently observed species under these management systems.

Sugarbeet weed control systems have few herbicides that offer good pigweed control, particularly if pigweeds become large. Powell amaranth is found at the same frequency as redroot pigweed in sugarbeet fields, but is more abundant. The success of Powell amaranth in this system may be due to differences weed biology that allows plants to escape treatment, or differences in herbicide activity on the species. A weed shift to greater abundance of Powell amaranth would be expected in this crop management system.

Table 1. Survey results from 2001.

	Frequency in Sugarbeet <sup>1</sup>	Most Abundant <sup>2</sup>	Frequency in Soybean & Corn <sup>1</sup>	Most Abundant <sup>2</sup>
	-----%			
Redroot Pigweed	75	37	44	82
Powell Amaranth	71	63	20	18
Smooth Pigweed	0	0	0	-
Common Waterhemp	8	0	0	-

<sup>1</sup>Frequency = # of fields with pigweed species/ total # of fields surveyed

<sup>2</sup>Abundance = # of fields where pigweed species is most abundant/ # of fields where any pigweeds are present

Table 2. Survey results from 2002.

	Frequency in Sugarbeet <sup>1</sup>	Most Abundant <sup>2</sup>	Frequency in Soybean & Corn <sup>1</sup>	Most Abundant <sup>2</sup>
	-----%-----			
Redroot Pigweed	71	35	38	56
Powell Amaranth	87	64	26	44
Smooth Pigweed	0	0	0	-
Common Waterhemp	4	0	0	-

<sup>1</sup>Frequency = # of fields with pigweed species/ total # of fields surveyed

<sup>2</sup>Abundance = # of fields where pigweed species is most abundant/ # of fields where any pigweeds are present

#### References

Weaver, S. E., and McWilliams, E. L. 1980. The biology of Canadian weeds. 44. *Amaranthus retroflexus* L., *A. powellii* S. Wats. and *A. hybridus* L. Can. J. Plant Sci. 60: 1215-1234.

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