

Residual Weed Population Shifts in Saskatchewan - 1976 to 2021

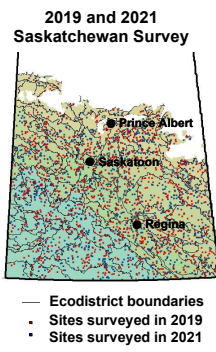
Julia Y. Leeson and Shane Hladun
Agriculture and Agri-Food Canada, Saskatoon, SK

Objectives

- Present the top twenty-five species in Saskatchewan based on provincial weed surveys of annual crops conducted in 2019 and 2021
- Compare the density and relative abundance of weeds in recent surveys with results from past provincial surveys

Methods

- Used a stratified random sampling procedure to select fields in ecodistricts shown on map
- In 2019 and 2021 surveyed a total of 2277 fields of common annual crops including: canola, spring wheat, barley, lentils, durum, oats, field peas, flax, chickpea, mustard and soybean
- Counted weeds in 20 quadrats (50 by 50 cm) per field in late summer
- Data weighted based on distribution of surveyed crops in 2016 census
- Summarized weed data using a relative abundance index based on frequency, field uniformity and density
- Frequency = Percent of fields in which species occurred
- Uniformity = Percent of quadrats in which species occurred
- Density = Average density of species in all fields
- Compared top twenty-five species from surveys of:
 - 2242 fields in 2014/15
 - 1149 fields in 1986
 - 2046 fields in 2003
 - 4423 fields in 1976-1979
 - 1178 fields in 1995

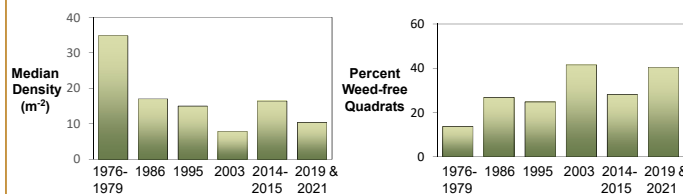


Top 25 Species in 2019 and 2021 Survey

Relative Abundance Index	Weed Species	Frequency (%)	Uniformity* (%)	Density* (m ⁻²)
60	Green foxtail	32.2	44.4	41.6
45	Canola	25.6	46.6	19.4
30	Wild oats	29.7	39.0	15.0
15	Wild buckwheat	37.9	27.6	3.2
0	Lamb's-quarters	29.2	26.6	6.4
	Kochia	27.9	26.6	7.5
	Spiny annual sow-thistle	15.7	32.3	10.2
	Canada thistle	25.3	17.7	2.1
	Wheat	15.7	34.2	6.9
	Stinkweed	10.9	29.3	12.2
	False cleavers	13.0	28.4	4.6
	Barnyard grass species	9.5	27.3	11.8
	Wild mustard	6.5	39.3	15.8
	Dandelion	12.9	18.3	2.2
	Perennial sow-thistle	10.9	21.6	3.0
	Narrow-leaved hawk's-beard	10.2	21.8	3.9
	Round-leaved mallow	9.2	20.5	3.3
	Lentils	5.6	44.0	7.9
	Redroot pigweed	8.1	22.2	5.1
	Russian thistle	6.4	24.7	9.8
	Shepherd's-purse	8.5	20.0	4.3
	Annual spurge species	7.8	22.3	3.9
	Foxtail barley	7.9	16.3	2.5
	Black medick	4.7	21.8	7.1
	Field horsetail	5.6	18.8	3.0

*Average uniformity and density in occurrence fields

Changes in Median Density and Weed-free Quadrats



Acknowledgements

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Sources

- Survey data are from the Agriculture and Agri-Food Canada Weed Survey Series Publications:
- 83-6 Weed surveys of Saskatchewan cereal and oilseed fields from 1976 to 1979
 - 87-1 Weed survey of Saskatchewan cereal and oilseed crops (1986)
 - 96-1 Saskatchewan weed survey of cereal, oilseed and pulse crops (1995)
 - 03-1 Saskatchewan weed survey of cereal, oilseed and pulse crops in 2003
 - 16-1 Saskatchewan weed survey cereal, oilseed and pulse crops in 2014/15

Species Shifts

Weed Species	Relative Abundance Rank					Change	
	1976-1979	1986	1995	2003	2014-2015		
Black medick	109	29	73	45	33	24	85
Low cudweed			121	86	19	42	79
Spiny annual sow-thistle		72	50	34	6	7	65
Lentils			48	38	51	18	30
False cleavers	40	25	15	13	7	11	29
Round-leaved mallow	44	37	38	31	22	17	27
Northern willowherb	99	95	86		25	73	26
Barnyard grass species	34	33	28	12	12	12	22
Canola	25	23	11	14	4	2	21
Foxtail barley	42	67	40	26	16	23	19
Broad-leaved plantain	52	55	60	65	20	34	18
Wheat	24	26	20	9	13	9	15
Kochia	17	28	13	8	15	6	11
Dandelion	23	36	14	11	10	14	9
Flax	38	16	24	19	26	30	8
Annual spurge species	29	19	17	32	34	22	7
Narrow-leaved hawk's-beard	20	32	29	20	9	16	4
Canada thistle	11	10	5	4	5	8	3
Green foxtail	1	1	1	1	1	1	0
Lamb's-quarters	5	6	6	5	8	5	0
Chickweed	28	21	26	29	18	28	0
Wild oats	2	2	2	2	2	3	-1
Wild buckwheat	3	3	3	3	3	4	-1
Wild mustard	9	11	9	15	21	13	-4
Perennial sow-thistle	10	13	7	17	17	15	-5
Shepherd's-purse	16	9	12	18	14	21	-5
Stinkweed	4	4	4	6	11	10	-6
Field horsetail	19	15	18	16	29	25	-6
Redroot pigweed	7	7	10	7	23	19	-12
Pale smartweed	14	12	22	23	24	26	-12
Russian thistle	6	5	8	10	30	20	-14
Hemp-nettle	21	18	25	22	27	36	-15
Night-flowering catchfly	15	24	36	33	31	31	-16
Quack grass	33	27	16	24	45	49	-16
Flixweed	13	20	23	21	50	33	-20
Prostrate pigweed	31	17	35	55	68	55	-24
Persian darnel	22	34	19	27	55	59	-37
Cow cockle	8	8	21	25	54	53	-45
Bluebur	12	14	27	30	74	71	-59
Rose species	18	22	31	49	92	83	-65

Summary

- Dry conditions in 2021, in contrast to wetter weather in 2014, resulted in lower median weed densities and more weed free quadrats in 2019 & 2021
- Eleven species have been in the top twenty-five since the 1970s
 - Green foxtail was the most abundant weed in all surveys
 - Canola ranked second in the current survey, displacing wild oats and wild buckwheat to third and fourth, respectively
- Black medic, round-leaved mallow and canola have steadily increased in recent surveys, despite varying weather conditions

- Volunteer lentil, wheat and kochia ranked highest in the dry conditions of the 2019 & 2021 survey, after a slight decline in the wet 2014/15 survey
- Low cudweed, spiny annual sow-thistle, false cleavers, northern willowherb, barnyard grass species, broad-leaved plantain and foxtail barley have increased in abundance since the 1970s; however, these species had similar or lower abundances in 2019 & 2021 compared to 2014/15
- Most of the species with largest declines in abundance had been previously identified as declining, except hemp-nettle



Weeds that have increased the most since the 1970s.
Left to right: Black medick, low cudweed, spiny annual sow-thistle, lentils, false cleavers, round-leaved mallow, northern willowherb, barnyard grass species, broad-leaved plantain, foxtail barley, wheat and kochia