

Residual Weed Population Shifts in Manitoba - 1978 to 2022

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Objectives

- Present the top twenty species in Manitoba based on provincial weed survey of annual crops conducted in 2022
- Compare the density and relative abundance of weeds in recent surveys with results from past provincial surveys



Manitoba soybean field

Methods

- Used a stratified random sampling procedure to select fields in ecodistricts shown on map
- In 2022 surveyed a total of 704 fields of common annual crops including: canola, spring wheat, soybean, oat, corn, barley, field pea, pinto bean and sunflower
- 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 = % of fields with species
- Uniformity = % of quadrats with species
- Density = Average density of species in all fields
- Compared top twenty species from surveys of:
 - 659 fields in 2016 •452 fields in 1997 •1424 fields in 1978-81
 - 631 fields in 2002 •501 fields in 1986



2022 Manitoba Survey

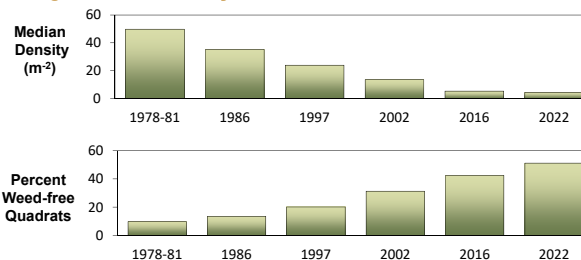
• Sites surveyed in 2022
— Ecodistrict boundaries

Top 20 Species in 2022 Survey

Relative Abundance Index	Weed Species	Frequency (%)	Uniformity* (%)	Density* (m ⁻²)
60	Green foxtail	38.8	33.8	15.3
45	Wild buckwheat	49.4	22.8	2.7
30	Canola/rapeseed	31.5	30.8	3.6
15	Lamb's-quarters	27.4	19.0	3.6
0	Redroot pigweed	28.7	18.1	1.8
	Yellow foxtail	7.2	26.6	18.6
	Barnyard grass species	17.7	17.7	3.0
	Wheat	14.4	27.0	3.4
	Wild oats	17.4	20.0	2.5
	Round-leaved mallow	17.0	14.2	1.1
	Foxtail barley	10.9	16.8	4.3
	Kochia	13.3	17.1	2.2
	Pale smartweed	9.8	16.8	4.4
	Canada thistle	16.9	11.2	0.8
	Broad-leaved plantain	12.5	17.0	1.8
	Dandelion	11.4	15.0	1.3
	Golden dock	7.8	18.0	2.3
	Biennial wormwood	9.9	12.6	0.9
	Green pigweed	5.1	22.8	5.0
	Thyme-leaved spurge	7.5	15.2	1.7

*Average uniformity and density in occurrence fields

Changes in Density and Weed-free Quadrats



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Sources

Survey data are from the Agriculture and Agri-Food Canada Weed Survey Series:
 84-1 Weed surveys of Manitoba cereal and oilseed crops in 1978, 1979 and 1981
 88-1 Weed survey of cereal and oilseed crops in Manitoba (1986)
 98-1 Manitoba survey of cereal and oilseed crops in 1997
 02-2 Weed survey of Manitoba cereal and oilseed crops in 2002
 17-2 Manitoba Weed Survey of Annual Crops in 2016

Species Shifts

Weed Species	Relative Abundance Rank					Change	
	1978-81	1986	1997	2002	2016		2022
Foxtail barley	81	54	83	64	22	11	70
Golden dock	85*	66*	55*	42*	26	17	68
Spiny annual sow-thistle	77	74	36	14	15	21	56
Yellow foxtail	48	40	27	30	6	6	42
Green pigweed					48	19	29
Biennial wormwood	45	55	44	49	20	18	27
Canola/rapeseed	29	28	19	9	5	3	26
Broad-leaved plantain	39	52	31	35	11	15	24
Kochia	31	30	24	17	30	12	19
Round-leaved mallow	25	23	21	16	10	10	15
Wheat	20	19	22	12	9	8	12
Dandelion	26	36	20	10	7	16	10
False cleavers	34	21	14	15	17	26	8
Barnyard grass species	13	27	11	4	3	7	6
Redroot pigweed	9	8	5	6	8	5	4
Lamb's-quarters	7	6	9	7	14	4	3
Wild buckwheat	3	3	3	3	2	2	1
Green foxtail	1	1	1	1	1	1	0
Thyme-leaved spurge	19	26	23	21	28	20	-1
Wild oats	2	2	2	2	4	9	-7
Canada thistle	5	9	4	5	13	14	-9
Pale smartweed	4	5	7	8	12	13	-9
Shepherd's-purse	21	17	13	27	27	30	-9
Field horsetail	18	18	26	23	21	29	-11
Night-flowering catchfly	10	13	15	18	16	22	-12
Chickweed	32	15	12	22	18	44	-12
Perennial sow-thistle	8	11	8	20	19	28	-20
Wild mustard	6	4	6	11	23	33	-27
Hemp-nettle	17	14	16	24	33	59	-42
Quack grass	12	12	10	13	38	57	-45
Flax	15	7	18	25	74	62	-47
Barley	22	16	29	26	69	72	-50
Stinkweed	11	10	17	19	34	76	-65
Russian thistle	14	24	33	57	96	86	-72
Dog mustard	30	20	37	41	62	66	-88
Bluebur	16	25	51	60	-	-	-102

* Golden dock was not distinguished from other dock species until 2016

Summary

- The spring of 2022 was extremely wet, leading to delayed seeding; however, weed control was good resulting in the lowest median weed density and the highest percent of weed-free quadrats ever recorded
- Seven species have been in the top 20 since the first surveys, of these:
 - Green foxtail was the most abundant weed in all surveys
 - Wild buckwheat, lamb's-quarters and redroot pigweed were found at their highest relative abundance in 2022
 - Wild oats, Canada thistle and pale smartweed ranked lowest in 2022

- Three species were found in the top twenty for the first time:
 - Foxtail barley had been increasing since 1997, while golden dock and green pigweed were first identified in the 2016 survey
- Canola, kochia, biennial wormwood, round-leaved mallow, wheat and yellow foxtail were found at their highest relative abundance in 2022
- Spiny annual sow-thistle, broad-leaved plantain, dandelion, false cleavers and barnyard grass species have increased overall, but declined in 2022 in comparison to 2016



Weeds that have increased the most since the 1978-81 survey. Left to right: Foxtail barley, golden dock, spiny annual sow-thistle, yellow foxtail, green pigweed, biennial wormwood, volunteer canola, broad-leaved plantain, kochia, round-leaved mallow, volunteer wheat and dandelion.