Crop Rotation Planning

Previous crop in rotation can have a large effect on yield

Planting different crops in rotation can have a positive impact on yield through improvements to soil health, fertility, disease, insect and weed pressure. Harvest production report data from Manitoba Agricultural Services Corporation (MASC) consistently shows that some crops perform better when planted after others.

Consider the preceding stubble type when planning next years crop

The table below shows the average yield response of a crop sown on various preceding crops. This chart is useful to help with crop rotation planning, and can be a big asset when deciding how to work a new crop into rotation. The orange cells show yield potential of a crop planted on the same crop stubble. In most cases, a yield reduction results not only when a crop is planted on the same crop, but also from a crop planted after the same crop type. For example, spring wheat planted after a cereal crop resulted in 76-90 per cent of average yield, while spring wheat planted after an oilseed or pulse resulted in 95-111 per cent of average yield.

Table 1. Yield response of Manitoba crops sown on large (>120 acre) fields of various previous crops (stubble) in rotation (% of 2011-2020 average relative yields).

Previous Crop	Crop Planted											
	Spring Wheat	Winter Wheat	Oat	Barley	Canola	Flax	Pea	Soybean	Navy Bean	Sunflower	Corn	Potato
Spring Wheat	85	95	93	95	101	102	101	101	111	102	96	100
Winter Wheat	76	66	90	100	94	95	99	104	104	103	87	73
Oat	90	93	77	75	98	98	91	99	86	99	95	98
Barley	86	100	90	79	99	103	87	98	103	98	91	100
Canola	100	103	100	102	93	93	104	100	89	87	98	103
Flax	95	107	91	102	100	81	90	100	NSD	89	97	NSD
Pea	104	86	106	104	107	126	NSD	99	NSD	74	99	NSD
Soybean	107	100	109	110	102	106	106	95	NSD	108	102	89
Navy Bean	111	NSD	114	112	101	NSD	NSD	113	91	NSD	110	96
Sunflower	94	NSD	101	104	91	95	NSD	91	NSD	NSD	87	NSD
Corn	99	NSD	109	93	108	114	96	98	111	112	90	118
Potato	100	NSD	85	103	105	NSD	NSD	97	126	NSD	107	96

NSD = Not sufficient data to provide analysis.
Source: Manitoba Agricultural Services Corporation (MASC) Harvest Production Reports

Manitoba

Yield Limiting Rotation Factors

When a crop is planted on stubble of the same crop type, diseases can overwinter and affect the next year's crop. Examples include blackleg in canola, sclerotinia in sunflower and canola, fusarium head blight in wheat, barley, oat, and corn, and aphanomyces in pulse crops. Flax and corn yields can suffer when grown on canola stubble, due to lack of mycorrhizal fungi. Corn and flax, among other crops, form a symbiotic relationship with mycorrhizae for uptake of immobile nutrients, such as phosphorus. Non-host crops, such as canola, reduce mychorrhizae in the soil. Other factors that can influence yield include water use of previous crop, herbicide carryover, nutrient status of the soil, and plant residue from the previous crop affecting emergence and establishment.

Frequency of crops in rotation

When designing a crop rotation, it can be useful to gain an understanding of common crop sequences in Manitoba. The table below also gives Table 1 context. For example, navy beans planted on potato stubble showed 126 per cent of average yield. Table 2 shows that data was collected from 1,170 navy bean fields over the 10-year period and only three per cent of fields had that crop sequence. Caution should be used when looking at data collected from a small subset of fields.

Table 2. Frequency of major Manitoba crops sown on large (>120 acre) fields of previous crops (stubble) in rotation (2011-2020).

Previous Crop	Crop Planted											
	Spring Wheat	Winter Wheat	Oat	Barley	Canola	Flax	Pea	Soybean	Navy Bean	Sunflower	Corn	Potato
Spring Wheat	2%	1%	7%	9%	51%	48%	30%	27%	23%	24%	9%	26%
Winter Wheat	0%	0%	1%	3%	3%	5%	3%	5%	3%	7%	3%	2%
Oat	1%	1%	2%	2%	5%	8%	6%	7%	4%	16%	4%	2%
Barley	1%	1%	2%	3%	5%	4%	5%	3%	1%	5%	3%	3%
Canola	71%	70%	41%	51%	7%	9%	35%	22%	29%	3%	17%	44%
Flax	1%	0%	1%	1%	1%	1%	0%	0%	0%	1%	1%	0%
Pea	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	1%	0%
Soybean	16%	1%	27%	16%	10%	9%	4%	14%	0%	13%	31%	3%
Navy Bean	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	2%	1%
Sunflower	1%	0%	2%	3%	0%	1%	0%	1%	0%	0%	2%	0%
Corn	0%	0%	3%	1%	4%	0%	1%	4%	15%	10%	6%	1%
Potato	1%	0%	0%	0%	0%	0%	0%	0%	3%	0%	4%	0%
# of Fields	*91,924*	*7,565*	*13,533*	*11,099*	*123,900*	*2,182*	*3,013*	*51,318*	*1,170*	*2,863*	*9,747*	*1,783*

Source: Manitoba Agricultural Services Corporation (MASC) Harvest Production Reports

Contact Us

This fact sheet was developed by the Manitoba Agriculture and Resource Development Cereal Specialist with data from Manitoba Agricultural Services Corporation.
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