Non-target Herbicide Injury to Potato

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24-D

Ody

20%

Gly-Late

2022 Dec 14 -15, *MB Agronomy Conference*, Winnipeg, Manitoba

Background

· Non-target herbicide injury occurs frequently in many crops. High value and sensitive crops can have significant losses.

 Injury could occur from drift from use in neighbouring crops when too windy, no wind or thermal inversion, misapplication wrong product or crop, improper spray-tank cleaning, soil residual activity. Due to large acres of field crops, herbicides used on them often are in close proximity of sensitive crops. like potatoes and could lead to non-target drift injury.

· Demonstration trials were set up to showcase the injury and losses from non-target exposure of potatoes and know the injury symptoms. Trials were conducted in 2011 - 2012 and 2022

Trial set up

· Herbicides commonly used around potato crops in Manitoba were selected for the demonstrations in 2011-2012 and 2022.

 Four concentrations of the herbicide solutions (0.1.10 and 20%) of the recommended rates on a field crop were used in 2011 and 2012 at Winkler; and 0, 5, 10 and 20% in 2022 at Carberry off-site research plots (Fig 1).

· Herbicide solutions were sprayed on Russet Burbank (RB) field plants. 5 weeks after emergence (3+ weeks in 2022).

 Tubers were harvested from these treatments and observed for visual effects from the herbicides. Row yields were recorded.

· Daughter tubers were kept for planting in 2012 and 2023 to demonstrate impact herbicides on seed performance.

Year tested	Herbicide Trts	a.i.	Group	Crop
2022	1. Buctril – M	bromoxynil 280 g/L + MCPA 280 g/L	6 + 4	Cereals, Flax
2022	2. Engenia	dicamba 600 g/L	4	Cereals
2012, 2022	3. Infinity	bromoxynil 210 g/L pyrasulfotole 37.5 g/L	6 + 27	Timothy, barley, wheat, triticale
2011-12, 2022	4. Liberty 150 SN	glufosinate ammonium 150 g/L	10	Canola; Non-seed potato 14-21 day pre-Harvest
2011-12, 2022	5. Odyssey	35 % imazamox 35% imazethapyr	2	Clearfield sunflower, CL- lentils. pea, soybean
2011-12, 2022	6. Early - Roundup	glyphosate 540 g/L	9	RR crops
2012, 2022	7. Late – Roundup	glyphosate 540 g/L	9	RR crops
2012, 2022	8. Rustler	glyphosate 132 g/L + dicamba 60 g/L	9 + 4	Summerfallow, pre- seeding cereals



Results - 2011, 2012 and 2022

· Results of the performance of seed tubers from 2011 herbicide exposure at CMCDC Winkler showed significant reduction in emergence and yield in 2012 (Fig 2, 3). But 2,4-D had no impact. Sprouts from Odyssey, Liberty and glyphosate affected seed were malformed and reduced emergence (Figure 2, 4).







Fig 5: Foliar symptoms on plants by the herbicides were diagnostic. Yellowing by glyphosate; leaf curling by 2,4-D; yellow-elongated & deformed leaves by Odyssey; margin whitening by Infinity; chlorosis & necrosis by Liberty



Fig 2 & 3: Emergence from daughter tubers of 2011 drift affected plants in Winkler 2012.

Herbicides Odyssey. glyphosate and Liberty significantly reduced the emergence and vields, but 2.4-D had no negative affect even at 20% rate

Fig 4: Impact on emerging plants was diagnostic. Multiple sprouting by glyphosate, no apparent affect by 2.4-D (not shown) and deformed sprouts and typical elongation & deformed leaves due to Odyssey.

70 60 -2.4-D 50 Glynhosate-I - X- Liberty Glyphosate Augus Erontline- 2.4-D Infinit ٥% 1% 10% Harbicida C Fig 7 Vield per plant (% of control) 100 70 Gly-Late

Fia 6

120

110

100

90





Impact of Current season simulated spray drift

on yields of RB, Winkler 2012

· In 2012 and 2022 most herbicides used in the demo led to varving levels of current season vield losses, ranging from 5 to 60% at 20% rates. Losses generally increased with increasing herbicide concentrations.

· Early glyphosate drastically reduced current season yields, but not late glyphosate. Infinity, Odyssey and Buctril-M caused drastic vield reductions, but not 2.4-D and Engenia (Fig 6, 7).

Conclusions & Inference

· Herbicides used in the demo-trials generally produced foliar symptoms quite diagnostic for specific herbicide or group.

• The herbicides also affected seed performance and the injury increased with higher rates. 2,4-D was not detrimental up to 20%. Late season glyphosate affects seed performance (data not shown) due to significant uptake and accumulation in tubers.

· Often neighbouring field crops could be source of drift issues when spraying under adverse conditions. Inform neighbours about sensitive crops in the vicinity.

Prevention and Management of Non-Target Herbicides

 Avoid conditions that lead to increased drift – windy, no wind, thermal inversions, potato friendly herbicide 1-vr prior. Follow product label. Maintain detained spray records.

· If herbicide injury is suspected - collection and quick analysis of sample is important. Various labs in Canada do the analyses.

Acknowledgements

Field help from Leon Jarvis (Simplot), Tom Gonsalves (MB Ag), Curtis Cavers & AAFC staff Portage la Prairie, Zack Frederick, Andrea Hamilton (MHPEC) is greatly appreciated.