



Sunflower Disease Situation in Manitoba

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Monitoring the crop disease situation for the development of new races and new pathogens is essential for disease management strategy

Introduction

Sunflower (*Helianthus annuus* L.) is grown in Manitoba on ~40 thousands ha equally split between confections and oilseeds. Four major and eight minor diseases are common in Canada and USA (Table 1). The four major diseases often cause local epidemics and high yield losses. The objective of this study was to identify new pathogens or changes in the races of existing ones, and provide the information to sunflower industry at large to support the disease management in sunflower.

Material and Methods

Sunflower fields have been annually surveyed in most of the crop growing areas in Manitoba (40 fields in 2016). Data collected included the prevalence of each disease, the incidence and severity. Isolates of rust and downy mildew were collected from all affected fields and tested under controlled indoor conditions using the international sets of sunflower differential lines to identify the races of these pathogens, nine differentials for rust and nine for downy mildew.

Results and Discussion

Sunflower diseases were at moderate levels in 2016 except for the sclerotinia wilt/basal-stem rot which was present in 94% of the fields at low levels (Figures 2-5). The most prevalent rust races are presented in Figure 3 and downy mildew races in Figure 4). Leaf spots caused by *Septoria* spp. and *Alternaria* spp. Were observed in several fields. Stem infections by *Phoma* were observed in 41% of the fields while only 16% fields had *Phomopsis* stem lesions.

Table 1. Major and minor sunflower diseases

MAJOR SUNFLOWER DISEASES

- * SCLEROTINIA WILT, HEAD ROT, MID-STEM
- * VERTICILLIUM WILT
- * RUST
- * DOWNY MILDEW

MINOR SUNFLOWER DISEASES

- * Stem lesions: PHOMA and PHOMOPSIS
- * Leaf Spots: SEPTORIA and ALTERNARIA
- * Charcoal rot, *Macrophomina*
- * White rust, *Albugo* spp.
- * Botrytis Head rot
- * Rhizopus head rot
- * Bacterial stem / head rot, *Erwinia* spp.
- * Phytoplasma / Viruses, AY, CMV, SMV, SRSV, SYBLC

Figure 2. Sclerotinia head and mid-stem rot

Head Rot and Mid-stem Infections

Carpogenic germination of sclerotia produces apothecia and ascospores which infect the heads and stems causing head rot and mid-stem rot

No of Crops	% of Crops	Disease Incid./Severity	
		Mean	Range
20	63%	3%	T - 5%



Figure 3. Sunflower Rust

SUNFLOWER RUST *Puccinia helianthi*

- * Very destructive, Explosive, New Races.
- * Five spore stages on sunflower

- * Overwinters locally on stubble

No of Crops	% of Crops	Disease Severity (LAA)	
		Mean	Range
18	56%	8%	T - 40%

Races:

777	64%
727	9%
735	9%
735	9%
737	9%



Figure 4. Downy mildew

DOWNY MILDEW *Plasmopara halstedii*

Soil-, and seed-borne, systemic Favored by wet soil, < 18 °C Several races, fungicide resistant races

No of Crops	% of Crops	Disease Incid./Severity	
		Mean	Range
10	31%	3%	T - 5%
Races:			
776	38%		
732	21%		
772	17%		
702	8%		
766	4%		

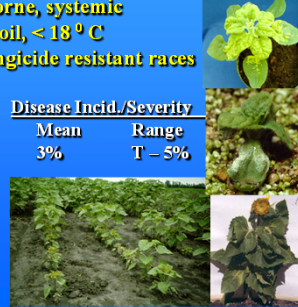


Figure 5. Verticillium wilt

VERTICILLIUM WILT, LEAF MOTTLE

V. dahliae, *V. albo-atrum*

Soil-borne, seed-borne, systemic

No of Crops	% of Crops	Disease Incid./Severity	
		Mean	Range
25	78%	8%	T - 40%



Table 2. Prevalent rust races 2003-2016

Prevalent Sunflower Rust Races in Manitoba 2010-16				
Year	Race 100 (1)	Race 300 (3)	Race 510 (1)	Race 700 (4)
2010	0	7%	0	93%
Prevalent Races	-	334	-	734, 736, 746, 774
2011	0	0	0	100%
Prevalent Races	-	-	-	724
2012	0	0	6	94%
Prevalent Races	-	-	564	777, 736, 736
2013	0	0	5%	95%
Prevalent Races	-	-	540	776, 726, 736, 777
2014	0	49%	0	49%
Prevalent Races	-	377, 375, 347, 355, 345	-	77, 737, 747, 757
2015	0	35%	0	65%
Prevalent Races	-	336, 326, 338, 324, 337	-	777, 775
2016	0	32%	0	68%
Prevalent Races	-	351, 377	-	777, 735, 737

Table 3. Prevalent downy mildew races 2010-2016

DM race changes 2010-2016				
Year	Race 100 (1)	Race 300 (3)	Race 500 (1)	Race 700 (4)
2010	8%	13%	2%	78%
Races	110, 120	320, 330	500	700, 730, 770
2011	0	17%	2%	81%
Races	-	304, 320	500	700, 730, 750
2012	0	33%	0	67%
Races	-	351, 334	-	732, 730, 730
2013	9%	10%	2%	79%
Races	100, 120	300, 310, 320	500	700, 730, 730
2014	-	2%	2	94
Races	-	322	502	720, 732, 730, 775
2015	-	12%	-	88%
Races	-	322, 330	-	732, 742, 730, 740
2016	2%	3%	3%	92%
Races	120	376	530	774, 732, 730, 730, 746

Conclusions

- Low disease incidences /severities.
- except for sclerotinia wilt 94%.
- Low Downy mildew.
- High frequency of Rust races 700. In 2009: 700 = 52%, 777 = 23%. In 2010-11: 700 = 100%. In 2012-13: 700 = 90%, 777 = 5%. In 2014: 700 = 40%, 777 = 10%. In 2015: 700 = 85%, 777 = 75%. In 2016: 700=82%, 777=64%

The new Races are virulent on most commercial sunflower hybrids

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