Spread of clubroot on canola in Canada, 2003-2014

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Canola in Canada

- Oilseed rape became a major crop in 1970s.
- Food quality standard (canola) added in 1980s.
- Production > 15 MT in 2013.
- Economic impact > $19 B.
- CCC goal for 2025 > 26 MT.
Clubroot on Canola

- Cause: *Plasmodiophora brassicae* (Woronin).
- Attacks mainly *Brassica* spp.
- Important almost anywhere Brassica crops are grown.
- Causes stunting, delayed maturity, yield loss, and plant death.
Resting spores

Secondary zoospore
D. Cumulative infestations confirmed from 2003 to 2014

Number of infested fields

Year

Clubroot survey

- Sampling focused on field entrance, after harvest.
- Since 2008, more than 400 commercial canola crops in central and southern Alberta were examined each year.
- Annual surveys of >100 canola crops in both Saskatchewan and Manitoba, 2009–2014.

Status

- Most severe in Alberta on heavy, acidic soils with abundant rainfall.
- Clubroot confirmed in >1850 fields in AB.
- Many fields with Pb in MB.
- Reported from N. Dakota in 2013 and confirmed in 2014.
Field assessments support the observations under controlled conditions; pH above 7.5 reduces clubroot, but otherwise the relationship is quite weak.
Clubroot is spreading across central Alberta at ~20 km / yr.

Common occurrence of severe clubroot at / near field entrance - infestations result from infested soil on field equipment.

Pathotype 3 across Alberta, P5 in south – separate introduction?

Pattern from 2008–2011 and a recent study (Rennie et al. 2015) indicate that the prevailing wind may spread resting spores.

Fields with substantial or even severe clubroot far from other infested fields - long-distance spread on infested equipment?

Low levels of pathogen DNA in fields across SK & MB - long-distance spread by wind?
MCRS, Holland Marsh, ON
One block heavily infested (90–100% severity) since 1990s. Moderate or even no clubroot in other blocks, despite no restrictions on movement.

In 2014, replicated trials of susceptible brassica vegetables were conducted 50 m from the infested block and at two nearby research sites.

Severity adjacent to the infested block was < 50%, < 20% at 1 km away, and 0% at 4 km away.

Little or no movement among regions in Germany, based on genetic similarity (Strehlow et al. 2014).
Factors Affecting Spread of Clubroot in AB

- The spread of clubroot was unexpectedly rapid relative to movement in vegetable production.
- Highly susceptible crop produced on > 8M ha each year, susceptible weeds also present.
- Large, contiguous fields & short crop rotations.
- Trillions of spores in heavily infested fields.
- Based on recent appearance in ND, it appears that the entire Great Plains region is at risk.
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