

Increased Spread of Clubroot to New Fields in Cavalier County

Project Title: Survey and Creating Awareness on Identification and Management Plan of Clubroot on Canola in Northeastern North Dakota

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A two-year survey program has been conducted in seven counties of northeastern North Dakota to determine the spread of clubroot on canola.

Survey Procedure: Clubroot scouting was done by visually inspecting canola crop roots. The disease survey was conducted in seven northeastern counties in North Dakota. Counties included were Pembina, Walsh, Nelson, Ramsey, Towner, Rolette and Cavalier. County selection was done on hypothesis of clubroot propagules movement in all directions through equipment, soil or water to neighboring counties of Cavalier. In each county, one field in every 2,500 acres was selected and scouted. GPS coordinates were gathered to identify the positive fields with intent to keep monitoring for future research. In all, a minimum of 5-10 fields per county were targeted for scouting. The survey was done in two phases.

1st phase:

In the growing season, stems were sampled from distinct patches of diseased or prematurely senescing plants in the field. Patches visible from the edge of the field were checked by digging out plants and observing the roots for symptoms of clubroot.

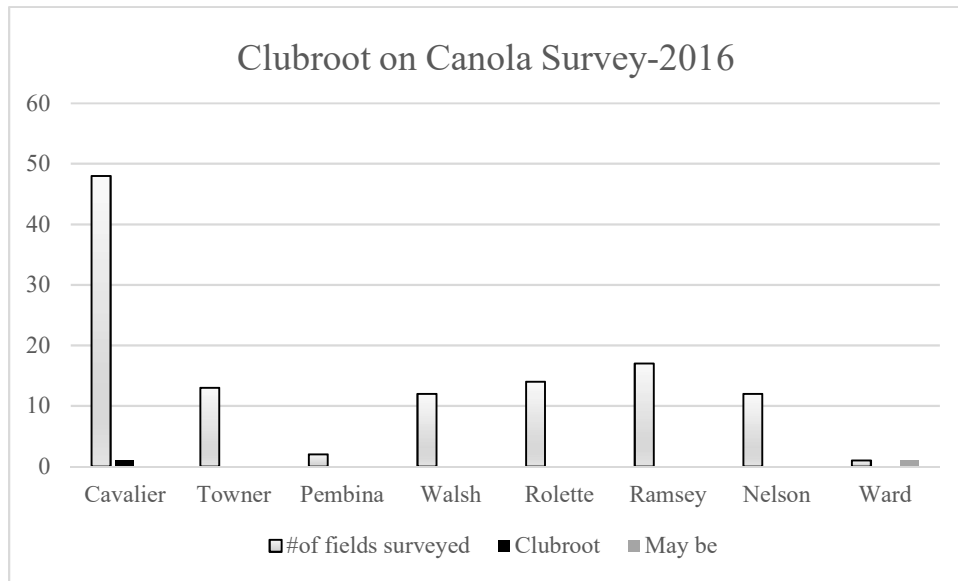
2nd phase:

After swathing:

The methodology of scouting at swathing was based on the methodology followed in Canada by the Alberta Agricultural and Rural Development (AARD) for clubroot disease survey. AARD indicated that the incidence of clubroot is more in the field entrances. The survey was done from the field main entrances. From the main entrance in the field, the survey group walked along in a “W” pattern by stopping at 10 spots and uprooting 10 consecutive stems from the ground at each spot. Excess soil was shaken off. Roots were visually examined for presence of galls. At sample sites where infection was observed or suspected, root specimens with galls, along with soil, were double bagged and labeled with the field location. Infected roots and soil samples from possible fields with clubroot were submitted to Dr. Luis Del Rio’s laboratory for molecular confirmation and pH determination, respectively. Each sampling point was separated by 100 meters. In all, roots of 100 stems were evaluated for the presence of clubroot and incidence was noted. Disease severity was done by using a rating scale.

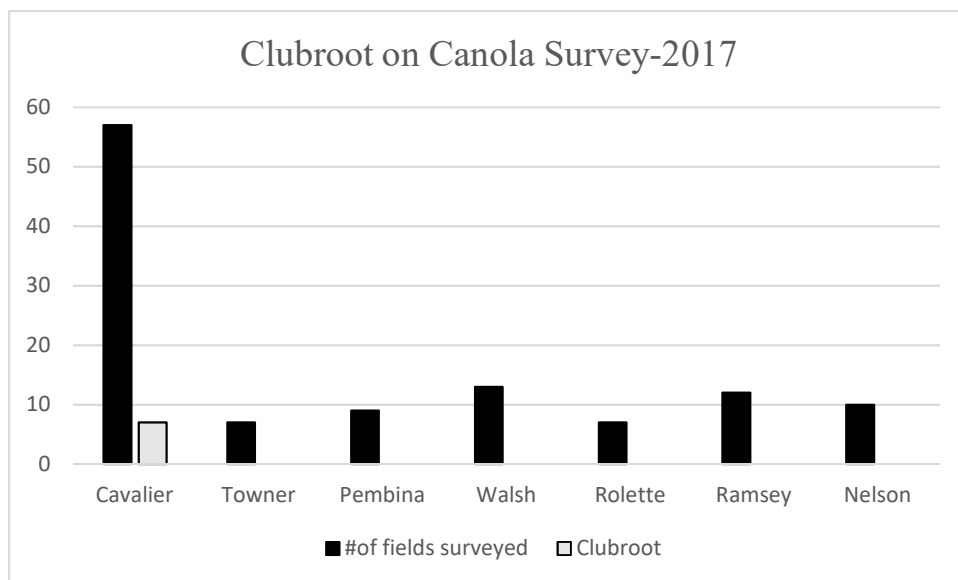
Clubroot Rating Scale: In fields where clubroot is found, roots within the 1 m² area at each sampling location were dug from the soil and rated on a four-point scale, where: 0 = no galls, 1 = a few small galls, 2 = moderate galling and 3 = severe galling.

Figure 1: Fields surveyed in 2016 for prevalence of clubroot over 8 counties.



In 2016, 119 fields in eight counties were surveyed by our research group (Figure 1). One positive clubroot field has been identified in Cavalier County. The level of clubroot incidence in the positive clubroot field was 99% with maximum severity of root galling (Rating Scale range 3). One field in Ward County (Figure 1) was found with severity rating of 2. The molecular analysis (Polymerase Chain Reaction) report from Dr. Luis Del Rio indicated negative to clubroot. The clubroot like symptoms on canola root can be attributed to root hybridization in canola, which is often confused with clubroot symptoms.

Figure 2: Fields surveyed in 2017 for prevalence of clubroot over 8 counties.



In 2017, 115 canola fields were surveyed and seven fields have been identified as potentially infected with clubroot. Samples were sent for molecular diagnosis to Dr. Luis Del Rio's laboratory in Fargo.

Determination of Soil pH: Soil samples from clubroot positive fields and from the clubroot suspected fields were collected as per the procedure described by the Manitoba Agriculture, Food and Rural Development (MAFRD), Canada. The soil samples were submitted to the NDSU soil-testing laboratory in Fargo and the soil pH is presented in Table 1.

Table 1: Latest pH of soil samples collected in each county from canola fields during the 2017 clubroot survey.

Depth of soil sample	pH	GPS Coordinates		County	Clubroot Response
		N	W		
0-6	6.46	48. 54. 612	98. 04. 805	Cavalier	Negative
0-6	6.96	48. 47. 405	98. 12. 758	Cavalier	Negative
0-6	7.12	48. 52. 560	97. 17. 661	Pembina	Negative
0-6	6.45	48. 57. 790	97. 36. 738	Pembina	Negative
0-6	7.18	48. 26. 733	98. 20. 928	Ramsey	Negative
0-6	7.06	48. 42. 256	99. 48. 990	Rolette	Negative
0-6	6.85	48. 53. 596	99. 39. 401	Rolette	Negative
0-6	6.97	48.48. 909	99. 18. 456	Towner	Negative
0-6	7.26	48. 50.908	99. 09. 096	Towner	Negative
0-6	7.19	48. 28. 808	97. 43. 905	Walsh	Negative
0-6	8.13	48. 34. 342	98. 12. 243	Walsh	Negative

*All the positive clubroot samples have soil pH ranging from 4.5 to 5.7.

Clubroot on Canola Awareness Meetings:

Clubroot on canola awareness meetings were conducted across the area; five in Cavalier, two in Pembina, two in Walsh, and one in Towner County during the growing season. The survey report were sent at the end of the season to growers and other commodity groups. Ramsey and Nelson counties were covered in the Lake Region Roundup meeting on January 4, 2017. One meeting in Rolette County was conducted the last week of March. The same number of meetings will be conducted in 2018-2019.

Outcome: Meetings on creating awareness of clubroot on canola and its management in various counties showed measurable improvement in growers understanding the disease clubroot on canola. Several growers came forward to cooperate in clubroot management research. Phone calls in the growing season and requests for personal visits to the grower's fields with clubroot concerns increased. Knowledge of crop rotation, planting resistant varieties and sanitation implementation were the major topics and will be considered for future canola production in the northeastern North Dakota region.

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