

CROP: Canola
LOCATION: Alberta

NAMES AND AGENCIES:

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TITLE: THE OCCURRENCE OF CLUBROOT ON CANOLA IN ALBERTA IN 2013

ABSTRACT: A survey of 459 commercial canola crops in 27 counties and municipalities in central and southern Alberta revealed 118 new cases of clubroot. Additional surveys by county and municipal personnel identified another 299 new records of the disease, for a total of 417 clubroot-infested fields in 2013. A grand total of 1482 clubroot-infested fields have been confirmed in Alberta since surveys began in 2003.

METHODS: A total of 459 commercial canola (*Brassica napus* L.) crops in 27 counties and municipalities in central and southern Alberta were surveyed for the incidence of clubroot disease caused by *Plasmodiophora brassicae* Woronin (Table 1). Of these crops, 456 were located in fields that had either not been previously surveyed for clubroot, or had been inspected in earlier surveys and found to be negative for the disease. The other three crops were sown in fields known to be *P. brassicae*-infested from earlier surveys, but which were inspected again to monitor the performance of clubroot-resistant canola hybrids. A total of 18 of the crops surveyed in 2013 were confirmed to be clubroot-resistant canola hybrids, with the remainder (441) being susceptible hybrids or hybrids of unknown resistance. Surveys were conducted mainly in September shortly after swathing. When inspecting fields, a 20 to 30 m² area was selected near the field entrance and a minimum of 50 roots were sampled randomly within that area. If no symptoms of clubroot were found, then no more sampling was performed. If clubroot was found, then the field was surveyed more extensively by examining the roots of all plants within a 1 m² area at each of 10 locations along the arms of a 'W' sampling pattern. This approach was taken because most clubroot infestations are known to be initiated at the field entrance (1). The severity of root infection on each sampled plant was assessed on a scale of 0 to 3, adapted from Kuginuki et al. (2), where 0 = no galling, 1 = a few small galls, 2 = moderate galling and 3 = severe galling. The individual ratings were then used to calculate an index of disease (ID) for each field, based on the method of Horiuchi and Hori (3) as modified by Strelkov et al. (4). Survey activities were coordinated with the agricultural fieldman in each municipality. In addition, data from independent clubroot inspections conducted by county and municipal staff were collected and combined with the data from the Alberta clubroot survey, to provide the most complete assessment possible of clubroot occurrence in the province.

RESULTS AND COMMENTS:

A total of 121 of the 459 canola crops inspected were found to have symptoms of clubroot, 118 of which represented new cases of the disease. Of these, 114 new cases were identified on susceptible canola hybrids or hybrids of unknown resistance, while four were found on resistant hybrids. Symptoms of clubroot were also identified on resistant hybrids growing in three fields previously confirmed to be *P. brassicae*-infested. In cases where clubroot was found on susceptible crops or crops of unknown resistance, disease severity ranged from mild to severe, with an average ID <10% in 51 fields, 10% - 60% in 34 fields, and >60% in 29 fields. Clubroot incidence and severity in most resistant canola crops

were generally very low (ID 0% - 6.2%), but ID values of 9.8% - 20.6% were detected in some resistant cultivars. It is not clear whether the relatively severe clubroot on the latter represents an erosion of resistance or some other confounding factor. Several of the fields were re-surveyed in an attempt to determine whether susceptible volunteers were contributing to clubroot severity. However, when roots were inspected only from within the seed row, so as to avoid the potential complicating effects of sampling susceptible volunteers, similar results were obtained. As such, these remain fields of concern and additional testing is planned.

In addition to the 118 new records of clubroot identified in the Alberta-wide survey, another 299 new cases of the disease were found in independent surveys conducted by municipal personnel in Barrhead, Camrose, Flagstaff, Lacombe, Lac Ste. Anne, Leduc, Minburn, Parkland, Red Deer, Strathcona, Westlock and Wetaskiwin counties (Table 1). Collectively, surveillance activities in 2013 revealed 417 new records of clubroot in Alberta, representing the largest single-year increase in the number of new cases of the disease. The increased prevalence and severity of clubroot in many areas likely reflected environmental conditions favorable for disease development early in the growing season. It appeared, however, that *P. brassicae* is also continuing to spread, given the fact that many infestations were observed in areas formerly considered to be peripheral to the main clubroot outbreak in central Alberta (Fig. 1). One new record of the disease was also identified in Newell County in the southern part of the province, in a field near the Bow River that had been flooded this spring. This field is approximately 30 km south of several confirmed clubroot-infested fields, and is located downstream, suggesting possible movement of inoculum in the flood waters. Another case of clubroot in Newell County, which had been detected by staff at Alberta Agriculture and Rural Development previously but had not been included in the clubroot database maintained at the University of Alberta, was also noted. Inclusion of this record, together with the new infestations identified in 2013, brings the total number of documented cases of clubroot in Alberta to 1482. Only seven of these *P. brassicae*-infestations are located south of Red Deer and Stettler counties (Fig. 1), indicating that the far south of Alberta remains largely free of the disease.

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Table 1. Distribution of *Plasmodiophora brassicae*-infested canola fields identified in Alberta in 2013

County or municipality ^a	Number of fields assessed in provincial survey	Number of new cases of <i>P. brassicae</i> -infested fields	Additional new cases identified by county/municipal staff ^b	Total new cases
Acadia	17	0	0	0
Barrhead	22	10	16	26
Beaver	22	6	0	6
Camrose	18	9	10	19
Cardston	10	0	0	0
Cypress	10	0	0	0
Flagstaff	0	0	7	7
Forty Mile	11	0	0	0
Leduc	0	0	163	163
Lethbridge	10	0	0	0
Lacombe	18	8	19	27
Lac Ste. Anne	30	7	3	10
Lamont	21	2	0	2
Minburn	21	5	2	7
Newell	10	1	0	1
Parkland	5	2	19	21
Ponoka	20	5	0	5
Red Deer	13	3	1	4
Starland	12	0	0	0
Stettler	17	0	0	0
Strathcona	1	0	45	45
Sturgeon	29	23	0	23
Taber	10	0	0	0
Thorhild	22	3	0	3
Vermillion River	19	0	0	0
Vulcan	10	0	0	0
Westlock	22	11	11	22
Wetaskiwin	38	16	3	19
Yellowhead	21	7	0	7
TOTAL	459	117	299	417

^a In the assessment of fields in the provincial survey, a 20 to 30 m² area was selected near the field entrance and a minimum of 50 roots were sampled randomly within that area. If no symptoms of clubroot were found, then no more sampling was performed. If clubroot was found, then the field was surveyed more extensively by examining the roots of all plants within a 1 m² area at each of 10 locations along the arms of a 'W' sampling pattern.

^b The protocol for surveys conducted by county or municipal staff varied by region; data from municipal surveys were cross-referenced with data from the provincial survey to remove any duplicate fields.

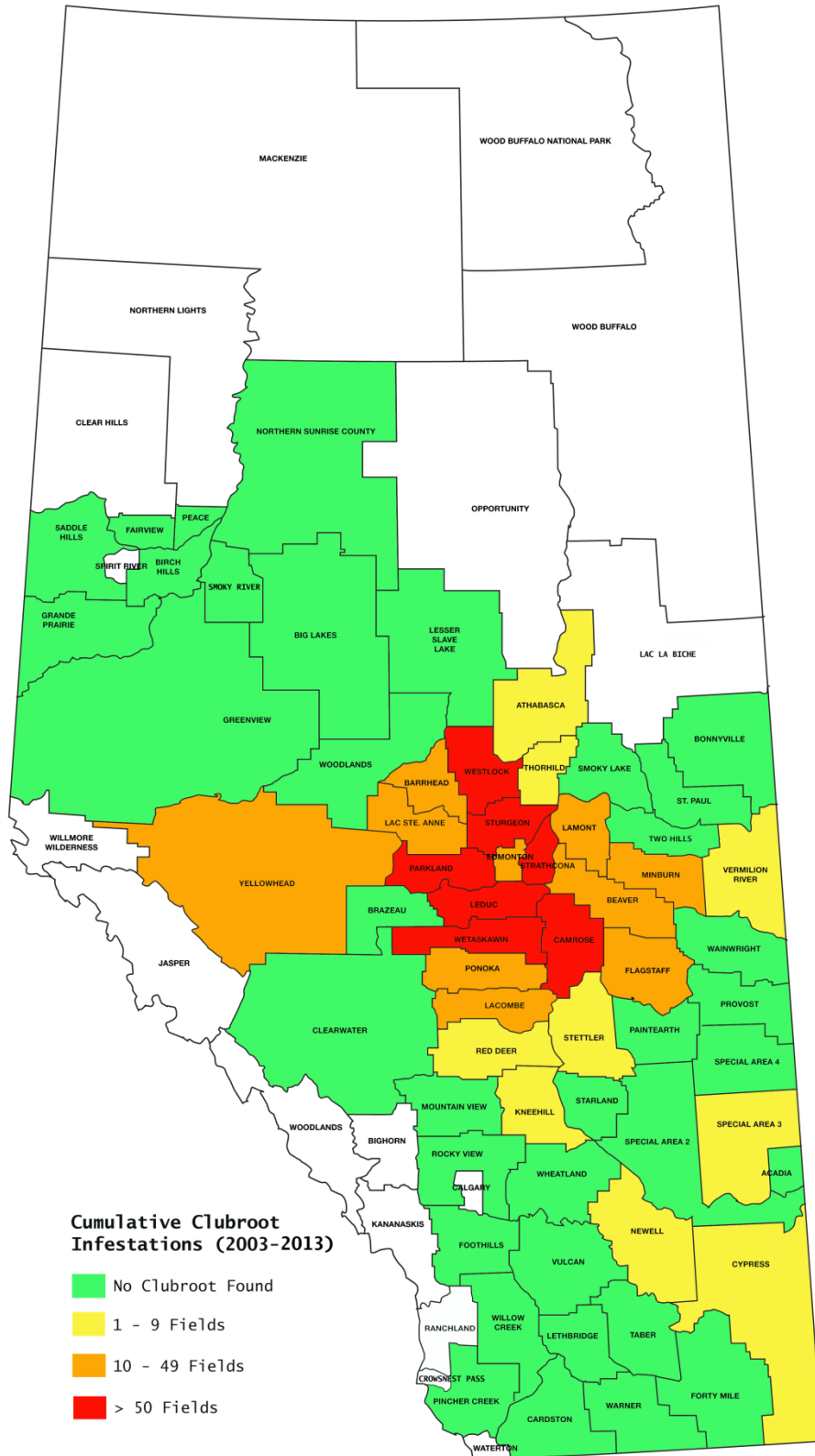


Figure 1. The occurrence of clubroot on canola in Alberta as of October 2013. Since clubroot surveys were initiated in 2003, the disease has been confirmed in a total of 1482 fields representing 24 counties and a rural area of the City of Edmonton.