

# Canola disease situation in North Dakota, U.S.A., 1993-2004

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## ABSTRACT

Canola (*Brassica napus*) production in the United States (U.S.) has ranged from approximately 400,000 to 600,000 ha harvested annually in recent years. The state of North Dakota, located in the northern U.S., produces approximately 90% of the entire U.S. canola crop annually. Field surveys have been conducted annually since 1993 to determine the prevalence and distribution of canola diseases in the state. In general, diseases measured in the surveys were Sclerotinia stem rot (*Sclerotinia sclerotiorum*), blackleg (*Leptosphaeria maculans*), Alternaria black spot (*Alternaria brassicae*, *A. japonica*), and aster yellows. Through all of the years of the survey, Sclerotinia stem rot has been an important disease, especially in seasons with cool, wet weather during the flowering period; however, with the registration of efficacious fungicides in recent years (beginning 2001), the incidence of Sclerotinia stem rot has been reduced somewhat. Blackleg has also been an important disease of canola in North Dakota. The use of cultivars resistant to pathogenicity group (PG) 2 kept blackleg incidence low until 2003. In 2003, PG 3 and PG 4 isolates were found in North Dakota, and blackleg incidence in 2003 and 2004 have been the highest in the 1993 – 2004 period of the surveys.

**Key words:** canola, disease, survey

## INTRODUCTION

Canola production in the U.S. has ranged from approximately 400,000 to 600,000 ha harvested annually in recent years. The state of North Dakota, located in the northern U.S., produces approximately 90% of the entire U.S. canola crop annually. Only spring-type canola is planted in North Dakota, with the majority of the production near the Canadian border. Although canola yields can sometimes be near 3300 kg/ha in North Dakota, diseases, adverse weather, and other stresses often lower canola yields in the state, as the 10 year average yield for North Dakota is approximately 1500 kg/ha. Field surveys conducted annually since 1993 have been useful in determining the distribution and prevalence of canola diseases within the state. Results of canola surveys from 1993 to 2004 are reported in this paper; results of the 1993 survey has been published previously (Lamey, 1995).

## MATERIALS AND METHODS

Annual field surveys from 1993 to 2004 were conducted in the major canola – growing counties in North Dakota to determine the distribution and prevalence of canola diseases. Survey techniques were adapted from those used by Petri et al. (1985). Only recently swathed fields were surveyed. For determination of Sclerotinia stem rot and blackleg incidence, five stems were sequentially pulled from the soil at each of ten arbitrarily selected locations for a total of 50 stems examined in each field. The roots and lower stems of each plant were evaluated for symptoms. Sclerotinia stem rot was identified by the “bleached” stems, and shredded tissues. The presence of sclerotia inside the stems was an additional confirmation of Sclerotinia stem rot. Blackleg was identified by lesions, gray to white in color, with pycnidia present. Girdling cankers at the base of the stem were also attributed to blackleg. Additional confirmation of blackleg was done by cutting cross-sections in the lower stem and evaluating for darkening of the internal tissue. At each of the 10 locations within each field, five canola plants within the windrow were evaluated for aster yellows. Aster yellows was identified by “bladder-like” upper pods, proliferation of tissues on the upper portions of plants, and a purpling of upper tissues. Ten pods were also evaluated at each of the 10 locations within each field. Pod severity (% pod area affected) was assessed using a visual scale devised by Conn et al. (1990). An attempt to

evaluate 10 fields per county was made. In counties with a large canola production area, an attempt to survey one field per 2000 planted hectares was made.

## RESULTS

Since 2000, the total number of fields surveyed each year ranged from 200 to 250; the number of fields surveyed prior to 2000 was lower due to less canola production within the state. Incidence of Sclerotinia stem rot has ranged from 4 to 18.7% for the state averages each year (Fig. 1). Incidence of blackleg has ranged from 1 to 12.2% for the state averages each year (Fig. 2). Incidence of aster yellows has been low with an average incidence of less than 5% each year for the state. Average Alternaria black spot severity has always been low with average severity ratings for the state generally being less than 2%.

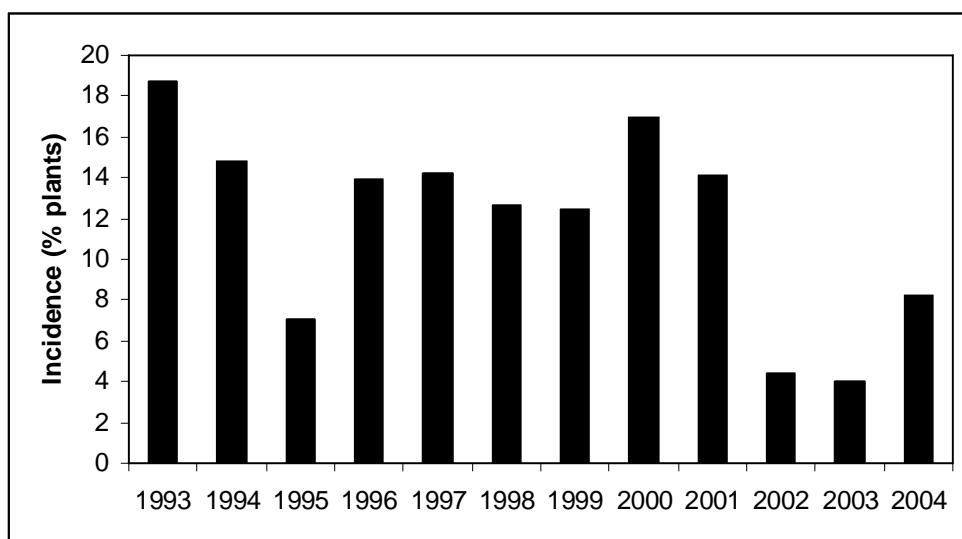


Fig. 1. Incidence of Sclerotinia stem rot of canola in North Dakota from 1993 to 2004.

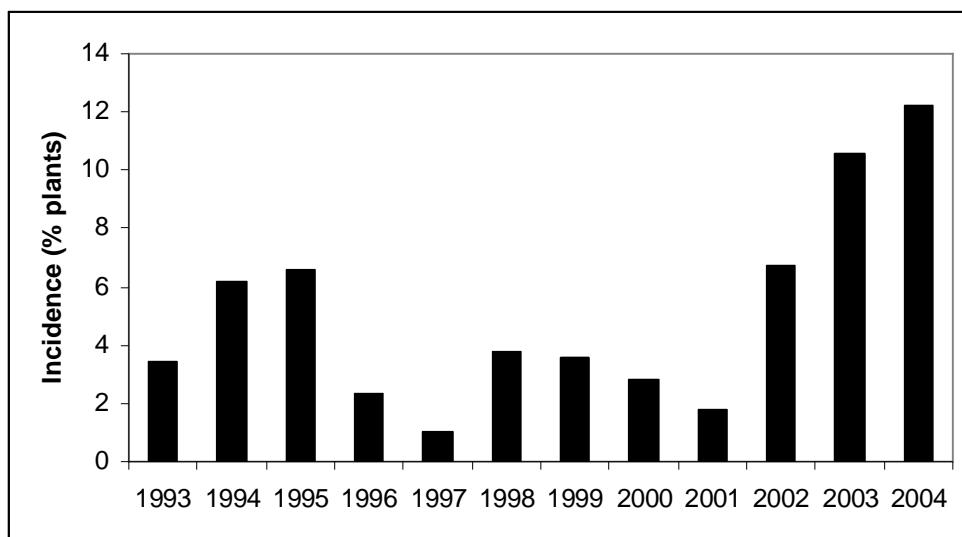


Fig. 2. Incidence of blackleg of canola in North Dakota from 1993 to 2004.

## DISCUSSION

From the results of the surveys, Sclerotinia stem rot and blackleg are the two major diseases of canola present in North Dakota. Sclerotinia was the most prevalent in years with cool, wet weather during the flowering period. Since 2002, the incidence of Sclerotinia stem rot has been

somewhat lower. The first efficacious foliar fungicide registered for Sclerotinia stem rot control (vinclozolin) became available in late in the season of 2001. Since 2001, the additional fungicides boscalid and thiophanate-methyl have also been registered for use on canola to control Sclerotinia stem rot. A Sclerotinia stem rot forecasting service available to North Dakota canola growers via the internet began in 2001 (McLaren et al., 2004). The combination of availability of fungicides with a disease forecasting service may have contributed to the reduction of Sclerotinia stem rot within the state in recent years.

Blackleg incidence has been on the increase since 2002. Although somewhat high incidences of blackleg were found in 1994 and 1995, these were due to some production of susceptible Polish-type canola (*B. rapa*) cultivars within the state. Prior to 2003, the only PG of *L. maculans* known to occur in North Dakota was PG 2 (Lamey and Hershman, 1993). In 2003, PGs 3 and 4 were discovered for the first time in North Dakota (Bradley et al., 2005). The combination of using canola cultivars with resistance to PG 2 *L. maculans* and tight rotations (e.g. every other year canola) may have contributed to the appearance of PG 3 and PG 4 isolates of *L. maculans* within the state. To slow down this increase of blackleg in the state, growers need to extend crop rotations and plant cultivars with a good spectrum of resistance to all PGs. As few cultivars available to North Dakota growers have good resistance to PG 4, the use of a foliar fungicide to combat blackleg may be needed.

#### ACKNOWLEDGEMENTS

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