# DISEASES OF RAPE AND CRUCIFEROUS WEEDS IN SASKATCHEWAN IN 1965

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## Introduction

In 1965 approximately 555,000 acres were sown to rape in Saskatchewan, with an average yield of 20.5 bushels per acre now anticipated. Most of the major diseases were more prevalent than in 1964 both on rape and cruciferous weeds throughout the east-central and northern rape-growing areas.

Precipitation throughout the 1965 growing season was plentiful in the Prairie Provinces (2). May was generally wet and June extremely so. On June 12, a six-inch rainfall was recorded at Loon Lake in, northwestern Saskatchewan. For the month as a whole, precipitation was about double the normal. Rainfall in most areas remained above normal in July, decreasing in August. In September, however, thunderstorms and hail were unusually prevalent and again some areas received more than twice the normal rainfall. In much of May, the latter part of August, and most of September subnormal temperatures prevailed. Record lows were recorded at many points in September.

## Materials and methods

In the main surveys, made in late August and early September, a total of forty fields were visited in the **Humboldt-Melfort-Nipawin** and North Battleford - Meadow Lake - Turtleford areas and ratings made of the diseases present. Both the prevalence in the field and general severity of the diseases were included in the assessment in each case. Several more restricted surveys were also made throughout the year, mainly centered in the Anhaheim - Lake Lenore area in connection with Plenodomus (Phoma) lingam (Tode ex Fr.) Höhn. (1) and Mycosphaerella brassicicola (Duby) Lind.

Isolations were made on V-8 juice and potato dextrose agars and pathogenicity tests conducted in Petri dishes containing sterile water-moistened filter paper or test tubes containing filter paper platforms and 20 ml of Hoagland's nutrient solution. Inoculations were made by placing a uniform mycelial disc next to sterile day-old seedlings. The amount of disease was recorded at one week for plates and two weeks for tubes.

## Results and discussion

The ratings for the major diseases encountered in the principal late-season surveys are presented in Table 1. Alternaria stem and pod spots were surprisingly inconspicuous this year. An early build-up of inoculum apparently did not occur as a result of the heavy rains. Peronospora parasitica (Pers. ex Fr.) Fr. as part of the white rust-downy mildew disease complex, was strikingly severe in a few fields near Melfort and Nipawin, perhaps due to timeliness of rainfall. Bleached tops of rape plants suffering from sclerotinia stem rot were conspicuously scattered throughout many fields in these same areas. Peronospora, Sclerotinia and Albugo cruciferarum S. F. Gray were observed much more frequently in the northeastern region than around Glaslyn, St. Walburg and Meadow Lake. Aster yellows virus infections were more uniformly distributed, Diseased plants were noticeably taller and of a darker green color than the ripening healthy plants. Mycosphaerella brassicicola was present in over 80% of the fields in the Meadow Lake area.

The principal rape diseases were also collected on a number of hosts other than rape during 1965. Sclerotinia sclerotiorum (Lib.) de Barywas isolated from mustard (Brassica hirta Moench), stinkweed (Thlaspi arvense L.), sow thistle (Sonchus sp.) and garden beans (Phaseolus vulgaris L.). All these cultures were highly pathogenic to rape. Albugo cruciferarum (conidial stage) was obtained on Thlaspi arvense, Lepidium sp. and Rorippa sp., Mycosphaerella brassicicola on Capsella bursa-pastoris (L.) Medic. and aster yellows on Thlaspi arvense.

Rape seedlings suffering moderate to severe damping-off were obtained from a field near North Battleford and one at Melfort in June. Pellicularia praticola (Kotila) Flentje was largely responsible.

Damage due to 2,4-D drift was observed in at least six fields. Severe basal swellings were found on plants in three fields north of Meadow Lake. Spray drift was also confirmed as the cause of damage in a field near Birch Hills.

An interesting new record is the occurrence of Colletotrichum dematium (Pers. ex Fr.) Grove on Lepidium sp. and Descurainia sp. collected at Saskatoon. The isolates produced lunate spores and were moderately pathogenic to rape in laboratory tests. The organism has not yet, however, been isolated from naturally-infected rape plants.

Plenodomus (Phoma) lingam was first reported on rape in Canada by Vanterpool (3,4). The pathogen has subsequently been isolated from several cruciferous weeds from Saskatchewan and Alberta. It is definitely becoming more widespread in the east-central rape-growing area of Saskatchewan and is considered to be a potentially important pathogen on rape in the province. Approximately 60 separate isolations of P. lingam have been made from crucifers during the last three years, most of them in 1964 and 1965. Three main cultural types, the "rape", "Sisymbrium" and "Thlaspi" types, are recognizable, each being found primarily on its own particular host, but each having been isolated at least once from rape (Table 2). All three types are highly pathogenic to rape and several other crucifers tested, but Camelina sativa (L.) Crantz is highly resistant (Table 3). Evidence has been obtained which suggests that they represent different varieties or races of P. lingam. This and other data will be published at a later date. This is believed to be the first report of g. lingam on Thlaspi, Sisymbrium and Descurainia, at least in North America. The transmission of the "Thlaspi" type on seeds of T. arvense

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Table 1. Rape disease survey, 1965 (40 fields). Disease rating.

| Disease organism | Trace | Slight | Moderate | Severe | % of total fields infected |
|---|---|---|---|---|---|
| Albugo cruciferarum | 25.0* | 25.0 | 10.0 | 5.0 | 65.0 |
| Peronospora parasitica | 2.5 | 2.5 | 0.0 | 5.0 | 10.0 |
| Sclerotinia sclerotiorum | 12.5 | 5.0 | 5.0 | 5.0 | 27. 5 |
| Mycosphaerella brassicicola | 10.0 | 12.5 | 35.0 | 7.5 | 65. 0 |
| Aster yellows (callistephus virus 1) | 22.5 | 5. 0 | 2.5 | 0.0 | 30.0 |
| Plenodomus lingam "Thlaspi" type** | 22.5 | 0.0 | 0.0 | 0.0 | 22.5 |
| Plenodomus lingam "rape" type | 5.0 | 0.0 | 0.0 | 0.0 | 5.0 |

* Figures in each category are % of fields sampled.
** Collected on T. arvense in rape fields.

Table 2. Plenodomus lingam, 1963-65 surveys. Numbers of collections on cruciferous hosts.

| Type | Rape* | Mustard (B. hirta) | Sisymbrium altissimum | Sisymbrium loeselii | Thlaspi arvense | Descurainia sp. |
|---|---|---|---|---|---|---|
| "Rape" | 20 | 1 | 0 | 0 | 0 | 0 |
| "Sisymbrium" | 1 | 0 | 2 | 2 | 0 | 0 |
| "Thlaspi" | 1 | 0 | 0 | 0 | 2 | 8 | 1 |

* Brassica napus and B. campestris

Table 3. Disease ratings of Plenodomus lingam isolates on 'Nugget' rape (Brassica napus) and Camelina sativa, in test tube pathogenicity tests.

| Cultural type | Rating (0 - 5 scale) Brassica napus | Camelina sativa |
|---|---|---|
| "Rape" | 4.7 | 1.3 |
| "Sisymbrium" | 4.4 | 0. 7 |
| "Thlaspi" | 4.5 | *0.3* |

has been demonstrated on several occasions.

The "Thlaspi" type, as was found during the general survey, occurs throughout much of the province and in Alberta, while the "rape" type appears to be mostly restricted to the east-central region of Saskatchewan. Within this area, however, it has been found in approximately 60% of the fields examined in 1965, in contrast to less than 25% of the fields in the 1963-64 period. This year the "rape" type was found for the first time at Saslcatoon in plots of zero erucic acid rape belonging to the Canada Agriculture Research Station. As in most other cases observed, the disease was well-scattered throughout the crop but developed late and apparently caused only slight damage to individual plants.

During the past few years the importance of weed hosts in harboring rape disease organisms has come to be fully appreciated. Weed control should go hand-in-hand with crop rotation in any rape disease control program.

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