

PHYTOPATHOLOGICAL PROBLEMS OF RAPESEED IN ANDALUSIA

(SOUTHERN OF SPAIN)

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ABSTRACT

Incidence and some general aspects of the main phytopathological problems of rapeseed in Andalusia are discussed. Black leg (Leptosphaeria maculans) is an important disease of rapeseed (Brassica napus var. oleifera) present every year in most fields with a variable severity. Severe black spot infection (Alternaria brassicae) has also been detected in many fields but only in one year. Other diseases such as white rust (Albugo candida) and downy mildew (Peronospora parasitica) have been identified in a few fields, but with minor incidence. Broomrape (Orobanche ramosa spp. ramosa) has heavily parasited a few rapeseed fields, presenting a potential problem in the future.

INTRODUCTION

Rapeseed (Brassica napus var. oleifera) began to be grown in Spain in 1976. Over 25.000 Ha. are presently dedicated to this crop, most of them located in western Andalusia (southern of Spain).

Rapeseed in Spain is a winter crop, sown in the fall and harvested late May or June. European spring cultivars are normally grown in this country because of the mild climatological conditions of its winter season. Since 1978 rapeseed fields have been regularly surveyed to detect phytopathological problems. In addition several laboratory, greenhouse and field studies were conducted. The objective of this report is to summarize these works.

FIELD SURVEY

From 1978 to 1982, 65 rapeseed fields of Andalusia were surveyed two times: at the 4-6 leaf growth stage and 4-5 weeks before harvesting. In each fields, if there was any disease present an estimation of the percentage of plant affected was carried out in 3-4 different areas. When necessary, plants and soil samples from the fields were taken for subsequent disease and pathogen studies in the laboratory and greenhouse.

Alternaria black spot (Alternaria brassicae (Breck.) Sacc. was first observed in 1980 only, but in a high percentage, 66%, of the visited fields. In about 60% of the affected fields, damage by A. brassicae was severe, with abundant black spots on pods in over 70% of the plants. In the rest of the fields this symptoms were only observed on leaves.

Black leg (Leptosphaeria maculans (Desm.) Ces. 8 de Not.) has been observed every year in all the fields surveyed. Disease severity varied widely, from 2% of plants dead, in the less affected fields, to a 21% plants dead, in the most affected.

Parasitism of Orobanche ramosa L. subsp. ramosa in rapeseed was observed in 2 fields, one in 1978 and other in 1981. In one of them the infection was so severe and extended that the crop had to be abandoned.

White rust (Albugo candida (Pers ex Lev.) Ktze) and downy mildew (Peronospora parasitica (Pers. ex Fr.) Fr.) diseases on rapeseed were negligible, since they were found in few fields and affected only very low percentages of plants.

ALTERNARIA BLACK SPOT

Observations in the fields and futher investigations in the laboratory and greenhouse led to the identification of the unique causal agent of this disease as Alternaria brassicae (Berk) Sacc. This was first reported in Spain by Romero-Muñoz and Jimenez-Diaz (1979). Previously, Chagsri and Weber (1963) and Chupp and Sherf (1960) reported that black spot diseases in crucifers can be caused by three species of Alternaria: A. brassicae (Berk.) Sacc., A. brassicola (Schw.) Wiltsh and A. raphani Growes et Skolko, although commonly only two of them A. brassicae and A. raphani are found associated as pathogens of the rapeseed under field conditions (Petri, 1973).

Alternaria black spot disease in Spain was severe. It was characterized by necrotic spots in stem and pods. Spots were elongated, having a grayish center raised over black margins, and varying in size, the largest being 5-8 mm X 4-5 mm. Mature leaf spots were dark brown, round zonate and up to 1 cm in diameter.

The optimum temperature for growth of A. brassicae was studied on PDA, V-8 agar juice (VA-8) and Alfalfa agar (AA), and at the temperature of 15, 20, 24, 28 and 32°C. Our isolate grew better on PDA and VA-8 than on AA. On PDA and VA-8 it grew between 15-28°C with maximum at 24°C. On AA maximum growth occurred at 24°C

but it grew neither at 15°C nor at 28°C.

The susceptibility to the pathogen of several Brassica campestris and B. napus cultivars was evaluated by artificial inoculations of seedlings in the 4th leaf stage. As inoculum served a suspension of conidia. Inoculated plants were enclosed in plastic bags and placed either inside a plastic greenhouse or in a growth chamber under artificial illumination (12.000 lux, 16hr/day). Results suggest that among cultivars evaluated Span was the most susceptible and Midas and Primor the least susceptible. In general, it may be concluded that cultivars of B. napus tested (Erra, Midas, Primor, Raposa and Tower) do not differ significantly in susceptibility, and that as a group they show a level of susceptibility lower than B. campestris cultivars (Span and Torch). The differences in susceptibility between Span and Midas and Primor, detectable with 10^4 conidia/ml as inoculum, was more definite using 5×10^4 conidia/ml, suggesting that the last might be the threshold concentration to be used in future test for susceptibility carried out under our experimental conditions.

BLACK LEG

Black leg (Leptosphaeria maculans (Desm.) Ces 8 de Not.) on rapeseed in Spain was first identified by Romero-Muñoz (1981). Previously, Benlloch (1942) reported this disease in Spain on cabbage (Brassica oleracea L.), although only identified the asexual state of the pathogen Phoma lingam (Tode) Desm.

Our observations coincide with the symptoms described by some authors (Brunin, 1970; Alabouvette, 1969; Petri, 1975). However we also have frequently observed necrotic spots on pods. This spots were irregular, 3-8 mm length, gray colour, with tiny black points which were the picnidies. The latter symptoms are very frequent (Alabouvette, 1969), although has also been previously described by Van Bakel (1968).

The asexual state Phoma lingam (Tode) Desm. is characterized by black picnidia with a well define globose ostiole and unicellular oval and hyaline conidies.

The sexual state, L. maculans has been described by Smith and Sutton (1964). In addition we have observed globose ascocarps in the fall on blackened woody stem tissues with asci butinicate containing 8 ascospores, each with 6 cells. Dimensions of the sexual and asexual of the pathogen are indicated in Table 1.

states

We could not separate strains of the causal organism L. maculans

on the basis of virulence, as McGee and Petri (1978) and Petri (1975) did since our inoculations of rapeseed cv. Primor at the cotyledons and 3 leaf growth stages with ascospores and pycnidiospores from different regions were always virulent (Romero-Muñoz, 1981).

TABLE 1

SIZE OF THE SEXUAL AND ASEQUAL STATE OF THE PATHOGEN

<u>Phoma lingam</u>	Pycnidia 160-225 (μ diam.)	Pycnidiospores 1-2 x 3-5 (μ)	
<u>Leptosphaeria maculans</u>	Ascocarps 320-430 (μ diam.)	Asci 90-110 x 15-19 (μ)	Ascospores 42-54 x 6-7 (μ)

An epidemiologic study of black leg on rapeseed was conducted at Cordoba in 1982 and 1983 (only the first year's data are available) under field conditions. In this study the susceptibility for five cultivars: Jumbo, Wetway, Cresor, Gulliver and Duplo. Ascospore emission was measured daily with a Burcard collector.

The number of ascospores collected, cultivar susceptibility and climatological data along the course of the study are shown in Fig. 1. The first ascospore emissions were registered in January. In this month the precipitation was high and mean temperature ranged from 7 to 14°C. The first symptoms of the disease on leaves were observed at the end of January. Although ascospore emissions with those occurring in April, in fact than were enough to cause the observed high percentages of dead plants. Nevertheless we also may consider the possible coadjuvant effects of the picnidiospores in causing the plant dead (Romero-Muñoz, 1981). Jumbo was a cultivar more susceptible and Cresor and Wetway mor resistant to this disease.

BROOMRAPE

The broomrape that parasitised rapeseed in Andalusia was identified as the species Orobanche ramosa according with the criteria of Chater and Webb (1972). Greenhouse studies growing tomato (Lycopersicon esculentum Mill.) rapeseed (B. napus var. oleifera) and sunflower (Helianthus annuus L.) in broomrape infested soil led to the identification of the subspecies as ramosa according to the criteria of Hepper (1973), since also was able to parasitize sunflower. The parasitism of broomrape (Orobanche ramosa subsp.

ramosa) in rapeseed was first reported by Romero-Muñoz and Gonzalez-Torres (1982 a).

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Figure 1.- Correlation between meteorological date, ascospore discharge of *L. maculans* and rapeseed cultivars with blackleg.

