

SHORT COMMUNICATION

IDENTIFICATION AND FREQUENCY OF ASCOCHYTA DISEASES OF GREEN AND DRY PEAS IN MOROCCO

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ABSTRACT

A survey of incidence and severity of *Ascochyta* diseases on peas in Morocco was carried out in 1992. All the three *Ascochyta* species of peas are found in the country. Their incidence and severity were higher on the green peas than on the dry peas. This is mainly due to the dry conditions prevailing during the dry pea growing season. *Ascochyta pisi* Lib. was isolated only from leaves and stem, *Mycosphaerella pinodes* (Berk. and Blot) Vesterg. more frequently from the leaves and stem than from the foot region, and *Phoma medicaginis* var. *pinodella* (Jones) Boerema mainly from the foot region.

Key Words: *Ascochyta* spp., peas, Morocco

RÉSUMÉ

Une enquête sur l'incidence et la sévérité de pathogènes d'*ascochyta* sur le pois a été effectuée au Maroc en 1992. Les trois espèces connues d'*Ascochyta* ont été rencontrées sur le pois au Maroc. L'incidence et la sévérité de ces agents pathogènes sont plus élevées sur le pois vert que sur le pois sec. Cette situation est principalement due aux conditions de sécheresse rencontrées pendant la saison de culture du pois sec. *Ascochyta pisi* Lib. a été isolé uniquement de feuilles et de tiges, *Mycosphaerella pinodes* (Berk. and Blot) Vesterg. est plus fréquent sur feuilles et tiges que sur collet, enfin, *Phoma medicaginis* var. *pinodella* (Jones) Boerema a principalement été isolé du collet des plantes.

Mots Clés: *Ascochyta* spp., petit pois, Maroc

INTRODUCTION

The three *Ascochyta* pathogens which attack peas were first described by Jones (1927). *Ascochyta pisi* Lib. causes leaf and pod spots, *Mycosphaerella pinodes* (Berk. and Blot) Vesterg., the perfect stage of *A. pinodes* causes blight, and *A. pinodella* which is now called *Phoma medicaginis* var. *pinodella* (Jones)

Boerema produces mainly foot rot in the affected plants (Lawyer, 1985). In Morocco, peas (*Pisum sativum* L.) are grown for fresh consumption and processing (green peas), as well as for dry consumption and seed (dry peas). Previous surveys have shown that *Ascochyta* diseases are very important in Morocco and are widely distributed in the country (Hidan, 1985; El Guilli, 1987). Losses caused by these pathogens can be as high

as 100%, particularly during wet seasons (El Guilli, 1987).

Although the three *Ascochyta* species have been reported in Morocco, their relative frequency on the green and dry peas has not been established. A survey was therefore undertaken in 1992 and the results are presented in this paper.

MATERIAL AND METHODS

Twenty five fields of green pea crop and 25 of dry pea crop were chosen in the main growing areas of the country. All the fields were visited during the flowering time, February-March 1992 for the green peas, and May-June of the same year for the dry peas. The flowering time was chosen because, at that stage, the plants are more susceptible to the *Ascochyta* spp. infection (Allard *et al.*, 1993).

Ten quadrants of 1 m² were randomly chosen in each field for recording *Ascochyta* incidence and severity. The incidence of the disease was calculated on the basis of percent plants attacked. Disease severity was evaluated using the disease severity index described by Gilpatrick and Bush (1950) as:

$$\text{Disease severity (\%)} = \frac{\text{Sum of disease severity on each plant}}{\text{No. of plants observed} \times 5 \text{ (highest disease index)}} \times 100$$

After evaluation of disease incidence and severity, 5 to 10 diseased plants were brought to the laboratory for pathogen identification because symptoms produced by these pathogens are almost impossible to distinguish from each other in the field (Lawyer, 1974).

Isolation of *Ascochyta* spp. was made from the foot region, spotted leaves and pods on Potato Dextrose Agar (PDA) medium. Pieces of infected leaves, stem and collar were surface-disinfected by dipping in 1% sodium hypochlorite for 30 seconds, and plated on PDA in 9 cm diameter petri dishes. The petri dishes were then incubated at 21-22°C in alternating cycles of 12 hr near ultra violet light and 12 hr darkness for 8 days. Pathogen identification was mainly done on the basis of colony characters on the medium (El Guilli, 1986), and in some cases, on the conidial morphology (Punithalingam and Halliday, 1972a, b; Punithalingam and Gibson, 1976).

RESULTS

Incidence and severity of *Ascochyta* spp.

Incidence and severity of *Ascochyta* spp. varied greatly with the pea crop. Disease severity was moderate to severe on green peas and was slight to moderate on dry peas (Table 1). Disease incidence both on the foot and on the leaves and stem was also higher on the green peas.

Identification of *Ascochyta* spp. On PDA, *A. pisi*, *P. medicaginis* and *M. pinodes* are easily recognizable by their colony characters, and by their conidial morphology. The colonies of *A. pisi* are light in colour, with light brown pycnidia scattered uniformly within the colony. The pycnidiospores are hyaline, straight or slightly curved and constricted at the septum, one septate, and stout and cylindrical, with rounded ends (Punithalingam and Holliday, 1972a). The

TABLE 1. Mean disease incidence and severity on foot, leaves and stem of green and dry peas in Morocco in 1992

Crop	Number of infected fields	Incidence (%)			Severity (%)	
		Foot rot	Leaf spot	Foot rot, and leaf spot	Foot rot	Leaf spot
Green peas	25	12.5	41.2	6.2	3.5	3.2
Dry peas	5	6.5	9.3	0.8	2.4	2.1

a) 25 fields were observed per crop at flowering time, February- March for the green peas, and May- June for dry peas.

b) Disease severity index: 0-no disease; 1-trace infection; 2-slight infection; 3-moderate infection; 4-severe infection, and 5- dead plant (Gilpatrick and Bush, 1950).

pycnidia of *M. pinodes* are darker, normally arranged in concentric rings. The pycnidiospores are larger than those of *A. pisi*, having 1-3 septa (Punithalingam and Holliday, 1972b). *P. medicaginis* has dark brown to black pycnidia, but not arranged in concentric rings as for *M. pinodes*. The pycnidiospores are smaller and usually without septation (Punithalingam and Gibson, 1976).

Isolation of *Ascochyta* spp. from diseased parts. *A. pisi* was isolated only from the leaves and stem while *M. pinodes* and *P. medicaginis* were isolated from leaves, stem and foot (Table 2). *M. pinodes* was frequently present on leaves

TABLE 2: Percentage occurrence of *Ascochyta pisi*, *Mycosphaerella pinodes* and *Phoma medicaginis* var. *pinodella* on foot, leaves and stem of peas

Pathogen	Foot	Leaves	Stem
<i>Ascochyta pisi</i>	0	32	32
<i>Mycosphaerella pinodes</i>	15	58	58
<i>Phoma medicaginis</i> var. <i>pinodella</i>	25	5	5

* 112 plants were analysed for foot rot, and 158 for leaf and stem lesions

and stems, while *P. medicaginis* occurred mainly in the foot.

DISCUSSION

Dixon (1985) reported that severity of *Ascochyta* spp. is higher in humid areas than in dry areas, and that *Ascochyta* diseases could be controlled by production of pathogen-free seeds in dry areas. Lawyer (1985) also reported that before pea seed production was moved from high rainfall areas, the *Ascochyta* spp. were carried internally in the seeds; but with the seed production in dry areas, most of the inoculum has become external as dust or small particles. From the present survey, it was evident that under Moroccan conditions, the *Ascochyta* disease incidence and severity are higher on green peas than on the dry peas. Green peas are commonly sown during the wet season, between October and January, and the dry peas in dryer conditions between February and May. The

sowing time and prevalent humidity during the growing season explain the differences observed in the disease incidence and severity on the two crops.

A. pisi, *M. pinodes* and *P. medicaginis* are widespread throughout the world (Allard *et al.*, 1993). They cause significant losses when the cropping systems and the environmental conditions are favourable for their development (Tu, 1987; Allard *et al.*, 1993). However, *M. pinodes* is the most damaging of the three pathogens (Lawyer, 1985). The disease syndrome incited by this pathogen embraces most of the symptoms produced by *A. pisi* and *P. medicaginis*. Consequently, field identification of the three pathogens is difficult. Under Moroccan conditions, occurrence of the three *Ascochyta* spp. is confirmed. *M. pinodes* and *P. medicaginis* were isolated from foot, stems and leaves. These results confirm those previously reported (Lawyer, 1985; Allard *et al.*, 1987). *M. pinodes* was the more frequent pathogen on the above ground parts. However, although this study has quantified the relative frequency of the *Ascochyta* spp. on pea organs, the effects of the pathogens on pea yield are not yet known. Wallen (1965) has reported 50% yield losses in fields inoculated with *P. medicaginis* and *M. pinodes*. In fields inoculated with *A. pisi*, the yield losses were insignificant.

Up to now, no resistance against *M. pinodes* and *P. medicaginis* has been obtained although pea cultivars have been extensively screened for resistance (Allard *et al.*, 1993). Lawyer (1985) reported that some pea varieties which are resistant to *A. pisi* in Britain are susceptible in Australia. Races of the pathogen have been reported in Canada (Wallen, 1957), France (Cousin, 1972) and England (Hubbeling, 1972). Therefore, in the absence of resistant varieties, it is necessary to control the *Ascochyta* spp. complex, and particularly *M. pinodes* and *P. medicaginis*, by other control methods (Tu, 1987). Raising of pathogen-free seeds can help to reduce epidemics of *Ascochyta* diseases.

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