A disease assessment key for Alternaria blackspot in rapeseed and mustard

K.L. Conn[1], J.P. Tewari[1] and R.P. Awasthi[2]

Alternaria blackspot is an important disease of rapeseed and mustard around the world. Whereas disease assessment keys have been prepared for many diseases, none are available for this disease. Keys for assessment of disease on both leaves and siliques have been prepared. This should allow for consistent assessment of Alternaria blackspot.

Can. Plant Dis. Surv. 70:1, 19-22, 1990.

La tache noire due a ***Alternaria*** est une maladie redoutable du colza et de la moutarde partout dans le monde. Bien que des cles d'evaluation aient ete preparees pour de nombreuses maladies, il n'en existe aucune pour celle-ci. Des cles d'evaluation des dégâts causes aux feuilles et aux siliques ont ete preparees. Cela devrait permettre une evaluation uniforme de la tache noire.

Introduction

Alternaria brassicae, causal agent of the blackspot of rapeseed, is an economically important pathogen in western Canada and around the world (7,8,9). In several countries of Europe and southeast Asia this disease imposes a major constraint on optimum yields of this oilseed crop. During certain years it is the most economically important disease of rapeseed (canola) in western Canada. Estimated yield losses in western Canada in 1987 were up to 30% in heavily infected fields, with significantly more than normal dockage (9). The losses and dockage levels were higher in 1989 (2).

Alternaria brassicae causes lesions on leaves which have necrotic centers surrounded by chlorotic areas (Fig. 1). This leads to reduction in photosynthetic area, defoliation and accelerated senescence. The pathogen synthesizes abscisic acid (3) which would aid in the accelerated senescence. Disease levels on leaves, through inoculum production, affect the disease severity on siliques. Lesions on siliques consist of necrotic spots with limited chlorotic areas in the early stages of lesion development (Fig. 2). Photosynthates from siliques are known to contribute significantly to the development of seeds in rapeseed (1). Also, the blackspot lesions on siliques cause increased fruit shattering and often a direct infection of seeds through siliques walls (Fig. 3).

[1] *Department of Plant Science, University of Alberta, Edmonton, Alberta, Canada T6G 2P5.*

[2] *Department of Plant Pathology, G.B. Pant University of Agriculture and Technology, Pantnagar 263145, India.*

Accepted for publication November 28, 1989.

Disease assessment keys, based on the host area affected, have been prepared for many diseases (5,6). However, so far as the authors are aware, none is available for assessing blackspot of rapeseed and mustard. Charts for rating the different growth stages of rapeseed are available (4). Based on the aforesaid considerations, disease assessment keys were developed for both leaves and siliques of rapeseed and are presented in this paper.

Materials and methods

Leaves and siliques of rapeseed with Alternaria blackspot were collected from the field and the symptoms studied. Drawings of leaves and siliques with lesions were prepared. The necrotic centers of lesions were colored black and the surrounding chlorotic areas were indicated by dotted lines. Both necrotic and chlorotic areas were included in calculation of the diseased area. Percent area covered with lesions was calculated using a CalComp 9000 digitizer. The digitizer calculated the area of a simple closed polygon when the boundary of the polygon was digitized by tracing it with a cursor. Drawings of 1, 5, 10, 20, 30 and 50% areas covered by lesions were prepared.

Results and discussion

Disease assessment keys for rapeseed leaves and siliques are given in Figures 4 and 5, respectively. In some cases, siliques collected from the field have lesions mainly on the upper side. Proper adjustment should be made if such is the case. The overall shape of leaves and siliques are similar in rapeseed and mustard, therefore these keys should permit blackspot assessment in both these crops. Also, these keys should be usable for assessing some other diseases of rapeseed and mustard as well, such as white rust caused by ***Albugo candida*** and white leaf spot caused by ***Pseudocercosporella capsellae.***

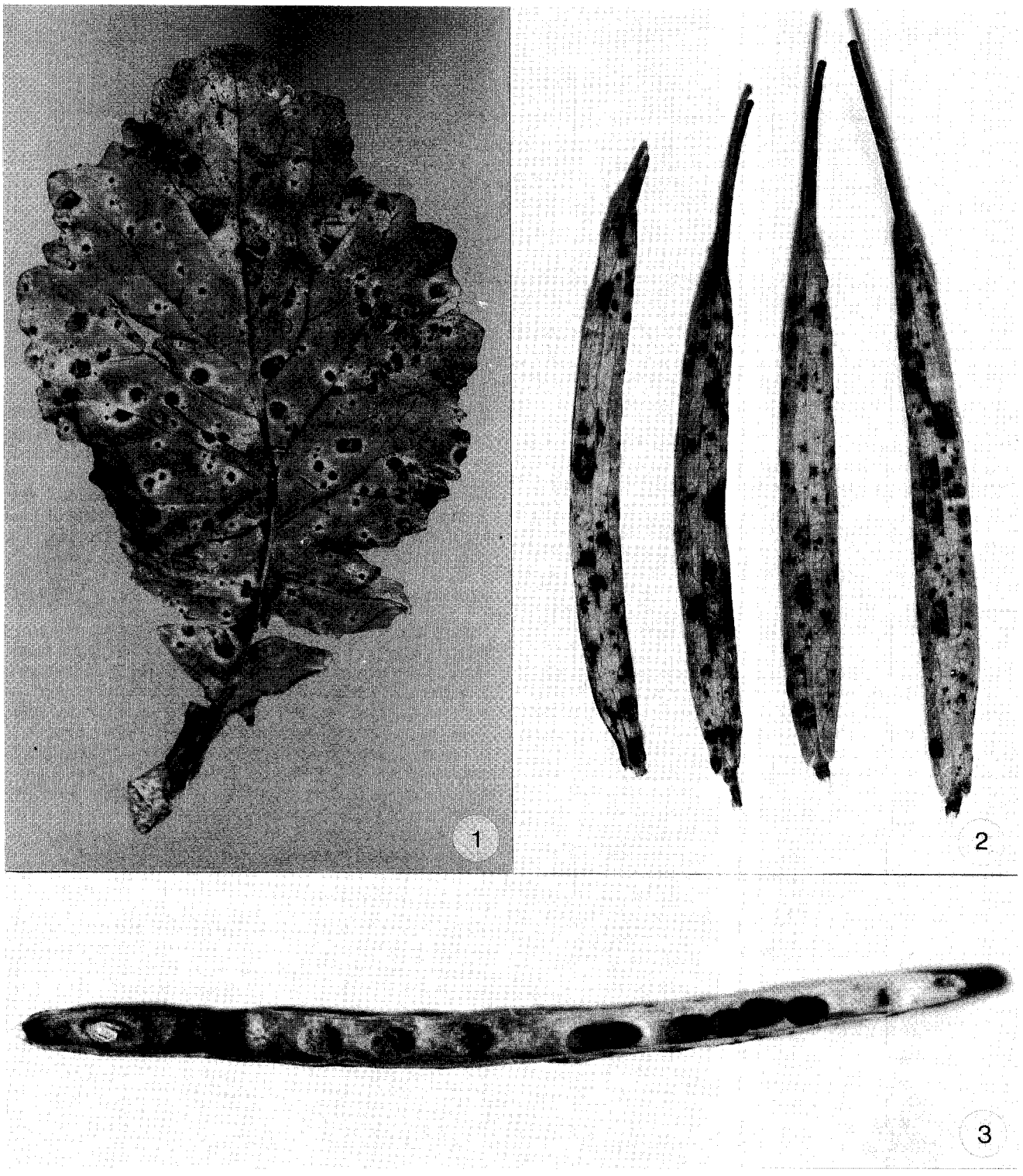

Figure 1. Leaf of *B. campestris* with Alternaria blackspot. The lesions consist of necrotic areas surrounded by chlorotic areas.

Figure 2. Siliques of *B. campestris* with Alternaria blackspot. The lesions consist of necrotic spots generally with limited chlorotic areas in the early stages of lesion development.

Figure 3. A silique of B. *campestris* with seeds colonized by A. *brassicae*.

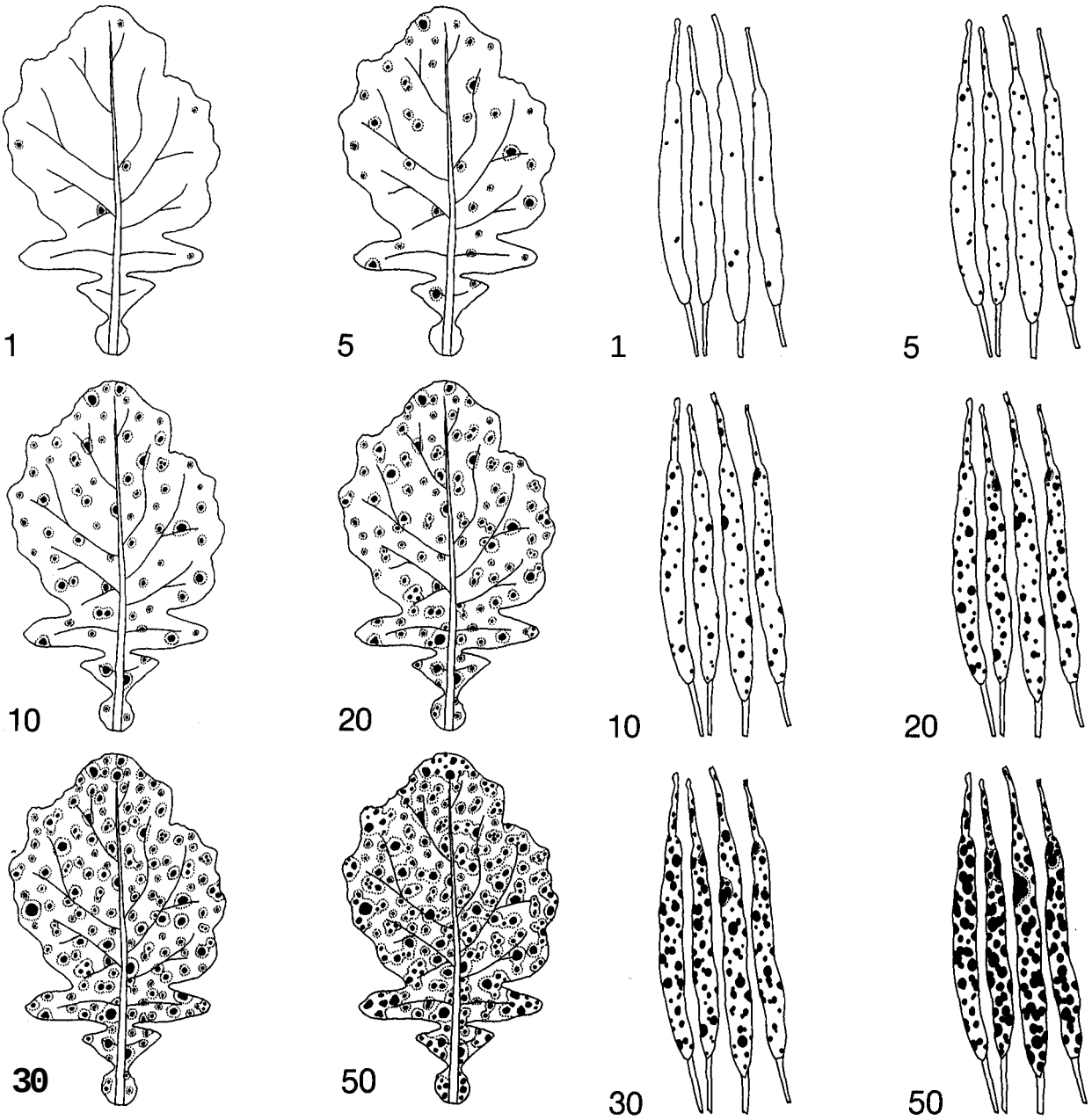

Figure 4. Drawings of leaves showing 1, 5, 10, 20, 30 and 50% of the surface areas covered with blackspot lesions. The dotted lines represent chlorotic areas surrounding the necrotic areas and are included as part of the diseased areas.

Figure 5. Drawings of siliques showing 1, 5, 10, 20, 30 and 50% of the surface areas covered with blackspot lesions. The dotted lines represent chlorotic areas surrounding the necrotic areas and are included as part of the diseased areas. The lesions on siliques generally did not have chlorotic areas in the early stages of lesion development.

Acknowledgement

This work was financed through grants from the Natural Sciences and Engineering Research Council of Canada and from the International Development Research Centre, Ottawa.

Literature cited

1. Allen, E.J., D.G. Morgan and W.J. Ridgman. 1971. A physiological analysis of the growth of oilseed rape. J. Ag. Sci. 77:339-341.
2. Conn, K.L., and J.P. Tewari. 1990. Survey of Alternaria blackspot and Sclerotinia stem rot in central Alberta in 1989. Can. Plant Dis. Surv. 70(1) (submitted).
3. Dahiya, J.S., J.P. Tewari and D.L. Woods. 1988. Abscisic acid from ***Alternaria brassicae.*** Phytochemistry 27:2983-2984.
4. Harper, F.R., and B. Berkenkamp. 1975. Revised growth-stage key for ***Brassica campestris*** and ***B. napus***. Can. J. Plant Sci. 55:657-658.
5. James, W.C. 1971. An illustrated series of assessment keys for plant diseases, their preparation and usage. Can. Plant Dis. Surv. 51:39-65.
6. James, W.C. 1974. Assessment of plant diseases and losses. Ann. Rev. Phytopath. 12:27-48.
7. Kolte, S.J. 1985. Diseases of annual edible oilseed crops. Vol. II, CRC Press, Inc., Boca Raton, p.11.
8. Tewari, J.P. 1985. Diseases of canola caused by fungi in the Canadian prairies. Agric. For. Bull., The University of Alberta. 8:13-20.
9. Tewari, J.P., and K.L. Conn. 1988. Incidence of the blackspot of canola caused by ***Alternaria brassicae*** (Berk.) Sacc. during 1987. Can. Plant Dis. Surv. 68(1):103.