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Screening for *Ascochyta* Blight Resistance in Chickpea (*Cicer arietinum* L.)

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Abstract

Ten chickpea lines CM1966/93, CMC77S, CM843/98, CM1223/98, CM1441/98, CM2070/98, CC 104/99, CC106/99, CC124/00 were found highly resistant to Ascochyta blight with disease rating of 2 followed by 34 lines that were resistant and 21 lines were tolerant. None was found immune to blight. The highly resistant lines have exhibited higher level of resistance against blight as compared to earlier released varieties (CM72, CM88 and CM2000).

Introduction

Blight disease caused by *Ascochyta rabiei* (Pass) Labrousse has been the most devastating disease of chickpea in Pakistan. The primary infection of *Ascochyta rabiei* is established from debris or from infected seeds from previous years crops. The fungus perpetuates rapidly on chickpea crop in rainy seasons when the humidity is high (85-98%) and temperature is around 20°C (Chauhan and Sinha, 1973). The infected plants produce abundant conidia on necrotic lesions that disseminate copious inoculum by rain splashes to other plants in the field and causes epidemics if the plants are susceptible and the weather conditions are favorable. Chemical control to Ascochyta blight is impractical and very uneconomical. Cultivation of resistant varieties is the best method to control the disease. Resistant varieties were found to become susceptible to blight due to introduction of new virulent strains (Khan *et al.*, 1998) and therefore there is a continuous need to develop new varieties to combat this menace in order to obtain sustainable yield. Chinckpea varieties CM72, CM 88 (Haq and Hassan, 1980) CM98 (Haq *et al.*, 1999) and CM2000 (Haq *et al.*, 2002) developed by mutation breeding techniques have shown resistance to blight disease and have been commercially grown in the farmers fields. The present studies report the screening of chickpea materials and selection of lines with better resistance to *Ascochyta* blight.

Materials and Methods

Screening nursery: Ninety nine advanced chickpea lines developed through mutation, breeding and conventional breeding methods were screened. Seeds of these lines were planted in the field at NIAB in the third week of October 2001. One susceptible line (Aug 424) was planted between every two test entries. The material was planted in 3m row by keeping plant to plant distance at 10 cm in two replications.

Spore Suspension: A virulent isolate (AB-6) of *Ascochyta rabiei* (Khan *et al.*, 1998) was grown on boiled and autoclaved chickpea seed for preparation of spore suspension (Alam *et al.*, 1987). One-week old inoculum was agitated into water to release the copious spore into water and the content was passed through nylon mesh to clear the weft of mycelium and seed debris. Additional water was added to obtain a suspension of 10^6 spores/ml by counting the spores on haemocytometer under microscope.

Field Inoculation: Chickpea plants grown in the screening nursery were initially sprinkled by plain water to provide humidity in the field followed by spray of spore suspension in the 2nd week of March, 2002. It was a dry year without any rainy days. The humidity in the field was provided by sprinkling the crop with water using plastic pipes everyday in the morning till afternoon at intervals.

Data on blight incidence were recorded on 1-9 Scale (Reddy and Singh, 1984) When rating of nine was found on susceptible check/lines.

Results and Discussion

Ten lines were found highly resistant (Table 1) with better resistance against blight as compared to early released varieties (CM72, CM 88 and CM 2000). They are under trails to further evaluate the other agronomic characters under the breeding programme. Fifteen lines were moderately resistant, Nineteen lines were resistant and 21 lines were tolerant. Reddy and Singh, 1984 evaluated 9574 desi and 3836 kabuli germplasm accession and identified 11 kabuli and 6 desi

accession resistant in vegetative and podding stages. Bashir *et al.*, 1985, screened 3360 lines from International Center for the semi Arid tropics (ICRISAT), India and identified 10 highly resistant germplasm lines. They did not find any immune lines for chickpea blight. None of our chickpea mutant lines under screening was found free from blight disease (immune). However the number of available lines (highly resistant/resistant) under the breeding programme suggested that the mutation technique using gamma radiation is helpful for the development of *Ascochyta* blight resistance in chickpea.

Table 1: Disease ratings (Reddy and Singh, 1984) for blight of chickpea.

Disease Rating	**Entries**
Immune	Nil
Highly resistant	CM1966/93, CMC77S, CM843/98, CM1223/98
Resistant	CH1-1/92, CM1970/94, CMC1025, 95004, CMC44, 950248, 950072, CH22-18/93, Flip90-144C, Flip91-150C, x Flip93-93C, Paidar91, Nloma91. CM1327/98, CC77/99, CC83/99, CC116-6/99, CC102/99, CM72, CM40/89, CM1991/94, CM946/93, CM226-2/95, CMC22/11, 950035, CM2/95, CM12/95, CM3672/97, CM4214/97, CM3000/97, CM2021/97, CM3672/97, CM3674/97, CM1446/92, CM1388/92, CM88, CM2109/98, CC94/99.
Tolerant	CM738/93, CM238/96, CMC204S, CM1463-2/94, CM4212/97, CM2112/97, CM1290/93, CM3837/97, CM4016/97, CM4068/97, CH41/91, P14/1\91, CM457/92, CH17-12/93, Flip96-157C, Flip93-52C, Pb-1, CM2000, CM2130, CM1538/98, CC111-2/99, CC93/99.
Susceptible	CM368/93, CM98, CM684/83, CM1852/96, CMC140, NCS950261, Bittle98, CM2100/96, CM4170/97, CM3871/97, CM3839/97, CM4048/97, CM4199/97, CH40/91, CH9/85, CH21/91, CM471/94, ICVV95503, Flip96-154C, UC-15, CM444/92, Pb91. CC98/99.
Susceptible check	Aug424
Not germinated	CM2234, P10-8/93, CM449/92, Flip93-128C x Flip94-11C, Flip92-189C x Flip87-38C.

References

Alam SS, Strange RN, Qureshi SH, 1987. Isolation of *Ascochyta rabiei* and a convenient method for copious inoculum production. *The Mycologist*, **21**: 20.

Bashir M, Alam SS, Qureshi SH, 1984. Chickpea germplasm evaluation for resistance of Ascochyta blight under artificial conditions. *International Chickpea Newsletter*, **12:** 24-26.

Chauhan RKS, Sinha S, 1973. Effect of varing temperature, humidity and light during incubation in relation to disease development in blight of gram (*Cicer arietinum)* caused by *Ascochyta rabiei*. *Proceedings, National Science Academy, India*, **B. 37:** 473-482.

Haq MA, Hussain M, 1980. Induced mutations for resistance to *Ascochyta* blight in chickpea. *Pak. J. Agri. Sci*., **27:** 57-63.

Haq MA, Sadiq M, Hassain M, 1999. CM 98 (CM 31-1/85): A very high yielding and disease resistant mutant variety of chickpea. *International Chickpea and Pigeonpea Newsletter*, **6:** 9-10.

Haq MA; Sidiq M; M. Hussain Shah TM, Syed H, 2002. CM 2000, a new kabuli chickpea variety. *Pakistan Journal of Seed Technology*, **1:** 45-49.

Khan IA, Khan JA, Alam SS, 1998. Phytotoxins: The cause of virulence in *Ascochyta rabiei*. *Pak. J. Biol. Sci.*, **1:** 75-77.

Reddy MV, Singh KB, 1984. Evaluation of a world collection of chickpea germplasm accessions for resistance to *Ascochyta* blight. *Plant Disease*, **68:** 900/901.