

## SCREENING OF CHICKPEA (*CICER ARIETINUM* L.) GERMPLASM LINES AGAINST DRY ROOT ROT CAUSED BY *RHIZOCTONIA BATATICA* (TAUB.) BUTLER.

RIYAZ AHMAD KHAN<sup>1</sup>, TOWSEEF AHMAD BHAT<sup>2</sup> AND DR KRISHAN KUMAR

<sup>1</sup>Department of Botany, Singhania University, Jhunjhuna, Rajasthan, India, <sup>2</sup>Department of Botany, Bundelkhand University, Jhansi, U.P. India, Email: riyazzkhann@gmail.com

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### ABSTRACT

Dry root rot caused by *Rhizoctonia bataticola* (Taub.) Butler is emerging as a serious threat to chickpea production in India. It is the most important and widespread soilborne disease of chickpea grown between latitudes 20° N. and 20° S, where the climate is relatively dry and warm. To find out the resistance of different germplasm lines of chickpea against dry root rot disease in Jammu Kashmir, investigation was carried during 2011-2012 in the study area

**Keywords:** Dry root rot, Chickpea, Germplasm lines and Jammu Kashmir.

### INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the world's third most important pulse crop, after dry beans and dry peas (Vishwadhari and Gurha, 1998). Dry root rot (DRR) of chickpea caused by necrotrophic fungus *Rhizoctonia bataticola* (Taub.) Butler is emerging as a serious threat to the chickpea production worldwide (Pande and Sharma, 2010). Dry root rot generally appears during late flowering and podding stages and the infected plants appear completely dried.

Chemical control of dry root rot is not effective as *R. bataticola* has a broad host range and survives in soil for longer periods in the form of sclerotia. The sclerotia can survive up to 10 months even in the absence of the host plants and under prevailing dry soil conditions. Use of host plant resistance is the most economical approach for management of dry root in chickpea. A few chickpea lines with field tolerance to dry root rot have been identified, but high levels of resistance are scarce in cultivated genotypes (Anonymous 2010). The present investigations were undertaken to formulate promising integrated disease management strategies with the objective of screening of chickpea germplasm lines against dry root rot disease in sick plot.

### REVIEW OF LITERATURE

Chickpea (*Cicer arietinum* L.) is an important pulse and vegetable crop. A critical review of literature has revealed that a number of disease caused by fungi, bacteria, viruses and nematodes are known which lower the quality and quantity of the product of this crop (Nene and Reddy 1987).

Krishnamohan *et al.* (1981) tested 20 chickpea forms screened under field conditions and artificially in the green house, using a 1-6 score (1-highly resistant), BG205 and BG206, although moderately susceptible in the green house, were, highly resistant under field conditions against *R. bataticola*.

Singh *et al.* (1982) reported that 3 chickpea cultivars did not be related to their resistance to *R. bataticola* carbohydrate content was higher in the susceptible cultivar than in the 2 resistant ones.

Singh and Mehrotra (1982) reported resistant to *R. bataticola* was shown by the cultivars BG-203, G-543 and Hare Chhole when grown in infested soil.

Reddy *et al.* (1990) tested resistant to wilt and different root rots of chickpea and found that the mortality of variety J.G.-62 (100%), Avrodhi and ICC-48 was (20%).

Baker and Ahmed (1991) tested the resistance of 90 genotypes of chickpea in field infested with wilt, dry root rot pathogens and found that ICC 12263 was most resistant.

Jayant-Bhatt and Bhatt (1993) pre-germinated seed of 21 chickpea varieties were sown in contaminated soil. *R. bataticola* caused seed rot within 24h in NEC874 and EG234, Bold 2375, BG209, JG62,

JG315, ICC 3357 and JG1133 developed necrotic lesion 3 to 5 cells deep on the hypocotyls region within 7 days, RSG-44, AGC677, NEC41, GL269, JG74, ICC8983 and ICC 5003, developed only superficial necrosis along the hypocotyle region. BGM416, BG416, ICC1376 and ICC113314 were resistant. Resistant cultivars had a greater number of lateral roots during early growth phases.

Mishra *et al.* (2005) have tested 470 germplasm lines are found KGR-86 KWR-4, KWR-108 and KWR-277 as a resistant genotype.

Chaturvedi and Dua (2009) have reported 25 resistant cultivars including KPG-59, Radhey and K-50 against dry root rot.

Aghakhani *et al.* (2009) twenty - three isolates of *R. bataticola* causing dry root rot of chickpea (*Cicer arietinum* collected from 10 different major chickpea growing states of India were highly variable in their morphological and cultural characters as well as pathogenicity /virulence. The virulence analysis of the isolates on a set of chickpea cultivars namely ICC12441, ICC1224, ICC12450, Pusa 362, BGD112, Pusa1103, Pusa212, Pusa1088 and under blotter paper as well as sick soil grouped them into 6 pathotypes. The pathotype groups were related to agro ecological region of the country. The most virulent isolate (RBI from Bangalore, Karnataka) was fast growing and produced largest Sclerotia. A set of cultivars was proposed for the first time for differentiating the pathotypes of *R. bataticola* causing dry root rot of chickpea.

Ved Ratan *et al.* (2010) reported that the variation in date of sowing was tested as an effective and economic strategy against dry root rot caused by (*R. bataticola*) and wilt (*Fusarium oxysporum f.sp. ciceris*) disease of chickpea

Riyaz *et al.* (2012) reported management of chickpea dry root rot through biocontrol agents and resistant germplasm lines in Jammu kashmir.

### MATERIAL AND METHODS

Study was conducted under field conditions in the dry root rot in sick plot at Indian Institute of Integrative Medicine (IIIM), Pulwama. In order to create epidemic of the disease, the inoculum of fungus (*Rhizoctonia bataticola*) was added in the soil at furrow at the time of sowing. The inoculum was prepared by multiplying the fungus on maize meal medium in 250 ml conical flask.

The sterilization was made at 15lb pressure for 20 minutes. The inoculum was kept at room temperature for 21 days before use.

Each variety and strain under test was sown in three meter long rows in two replications. In order to ensure the spread of the pathogen a highly susceptible variety Radhey was sown as a check after every five row. Twenty five days after the sowing of the seed the total number of plants germinated in each row in both the replication were counted and dry root rot was recorded month wise.

To avoid duplication in dry root rot plant counting the counted dry root rot plants were uprooted every month. Isolation from dry root rot gram plants were taken from time to time to keep a check on the causal organism. The varieties and culture were placed in various categories of resistance and susceptibility on the basis of percentage of plants dry root rated as under.

1. Resistant :0.0 to 10.0 per cent
2. Moderately resistance :10.1 to 20.0 per cent

3. Moderately susceptible :20.1 to 30.0 per cent
4. Susceptible :30.1 to 50.0 per cent
5. Highly susceptible :above 50 per cent

## RESULTS

Sixty germplasm lines of chickpea were screened for their resistance against dry root rot disease in pot . All the germplasm lines were placed in various categories of resistant and susceptibility, are summarized in table-1.

**Table 1: Shows reaction of germplasm lines against dry root rot disease**

S.No.	Categories Of Resistance	Name of the Germplasm lines
1.	Resistance (0-10% mortality)	KGD-1189, KGD-1201, KGD-1209, KGD-1215, KGD-1217, KGD-1220, KGD-1221, KGD-1248, KGD-1289
2.	Moderately Resistance (10-20% mortality)	KWR-1, KWR-26, KWR-28, KWR-50, KGR-18, KGR-48, KGR-159, KKG-108, KKG-111, KGD-1201
3.	Moderately susceptible (20.1-30% mortality)	KWR-54, KWR-55, KWR-60, KWR-63, KWR-33, KWR-38, KWR-79
4.	Susceptible (30.1-250 mortality)	KGD-1238, KGD-1239, C-304, KWR-12, KWR-14, KWR-15, KWR-16, KWR-17, KLWR-18, KWR-21, KWR-22, KWR-61, KWR-65, KWR-70, KWR-71, KWR-111, KWR-1211
5.	Highly susceptible (More than 50% mortality)	KWR-76, KWR-140, KWR-147, KWR-150, KWR-152, KWR-156, KWR-157, KWR-161, KWR-166, KWR-178, KWR-181, KWR-182, KWR-192, KWR-193, C-313, C-135, Radhey

It is evident from the table that out of sixty germplasm lines screened only nine lines namely, KGD-1189, KGD-1201, KGD-1209, KGD-1215, KGD-1217, KGD-1220, KGD-1221, KGD-1248 and KGD-1289, were found resistant. Ten lines namely KWR-7, KWR-26, KWR-28, KWR-50, KGR-18, KGR-48, KGR-159, KKG-103, KKG-111 and KGD-1201 were found moderately resistant.

Seven lines namely KWR-54, KWR-55, KWR-60, KWR-63, KWR-77, KWR-78, KLWR-79, were found moderately susceptible. 17 lines namely KGD-1238, KGD-1239, C-304, KWR-12, KWR-14, KWR-15, KWR-16, KWR-17, KWR-18, KWR-22, KWR-61, KWR-65, KWR-70, KWR-71 KWR-1111, KWR-1211 were found susceptible and rest 17 lines were found highly susceptible against the disease.

## DISCUSSION

Chickpea (*Cicer arietinum* L.) is an important pulse crop of India. It is cultivated about 8.56 million hectare with a production 7.35 million tones and productivity 850 kg/hect. Diseases caused enormous damage to this crop and thereby adversely affect the national economy. Merely by controlling the important disease of chickpea crop in the country the problem of malnutrition can be minimized appreciably.

Dry root rot has been found to damage chickpea crop. Therefore, the experiment was under taken to find out resistant germplasm lines.

Use of resistant varieties is the best method of avoiding the occurrence of the disease. Keeping this point in view sixty germplasm lines of chickpea were screened in dry root rot. Only nine lines namely, KGD-1189, KGD-1201, KGD-1209, KGD-1215, KGD-1217, KGD-1220, KGD-1221, KGD-1248 and KGD-1289, were found resistant. Ten lines namely KWR-7, KWR-26, KWR-28, KWR-50, KGR-18, KGR-48, KGR-159, KKG-103, KKG-111 and KGD-1201 were found moderately resistant.

Seven lines namely KWR-54, KWR-55, KWR-60, KWR-63, KWR-77, KWR-78, KLWR-79, were found moderately susceptible. 17 lines namely KGD-1238, KGD-1239, C-304, KWR-12, KWR-14, KWR-15, KWR-16, KWR-17, KWR-18, KWR-22, KWR-61, KWR-65, KWR-70, KWR-71 KWR-1111, KWR-1211 were found susceptible and rest 17 lines were found highly susceptible against the disease.

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