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Screening of chickpea (*Cicer arietinum* L.) germplasm lines against dry root rot disease caused by *Rhizoctonia bataticola* (taub.) butler

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Abstract
Chickpea dry root rot caused by *Rhioctonia bataticola* is the most destructive disease and causes severe losses in yield in Andhra Pradesh. Therefore the present investigation was under taken to screen different germplasm lines for their resistance to dry root rot. A field experiment was conducted for screening of chickpea germplasm lines (75) and L 550 (susceptible check) during rabi season of 2016-17. Out of 75 entries, 17 entries have found moderately resistant and 52 entries were susceptible whereas 6 entries were recorded as highly susceptible to dry root rot disease.

Keywords: Chickpea, dry root rot, resistance

Introduction
Chickpea (*Cicer arietinum* L.) is the world's third most important pulse crop, after dry beans and dry peas (Vishwadhar and Gurha, 1998). Out of total production of pulses, chickpea accounts for 37 per cent and area wise 28.28 per cent. India contributes the major share to the global chickpea area (65%) and production (68). Chickpea productivity is low due to susceptibility of crop to various biotic and abiotic stresses. Nene (1996) [3] reported that chickpea suffers from several seed borne fungal diseases *viz*.,black root rot, dry root rot, wet root rot, stem rot, crown rot, foot rot, sclerotinia wilt and grey mould. According to McRae (1932) [2], the root rots such as dry root rot (*Macrophomina phaseolina*), black root rot (*Fusarium solani*) and wet root rot (*Rhizoctonia solani*) cause severe losses from seedling to maturity stages of the crop. Amongst the diseases, dry root rot is a serious threat to the chickpea growers. The disease is reported to be more severe when the crop is exposed to moisture stress conditions (Taya *et al.*, 1990) [6] among biotic stresses dry root rot (DRR) of chickpea caused by fungus *Rhizoctonia bataticola* (Taub.) Butler is emerging as a serious threat to the chickpea production worldwide (Pande and Sharma, 2010) [5]. 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 rot 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) [1]. The present investigations were under taken to formulate promising integrated disease management strategies with the objective of, screening of chickpea germplasm lines against dry root rot disease in field condition by artificial inoculation of the fungus.

Materials and Methods
In this study all the germplasm lines received from the genetic resources unit ICRISAT, Patancheru were screened for their resistance. A field experiment was conducted at Regional Agricultural Research Station, Lam, Guntur by artificial inoculation of the fungus *R. bataticola*. In order to create the disease, the inoculum of fungus (*Rhizoctonia bataticola)* was added to the soil at furrow at the time of sowing and flowering stages. The inoculum was prepared by multiplying the fungus on sorghum grains 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 germplasm line under testing was sown in three meter long rows in two replications. In order to ensure the spread of the pathogen a highly susceptible variety L 550 was sown as a check after every ten rows. Dry root rot incidence was recorded at the time of harvest by pulling the entire plant. The germplasm lines were placed in various categories of resistance and susceptibility on the basis of percentage of plants dry root rated as under.

Scale	Reaction	Observation
1	Immune	No infection on roots
3	Resistant	Very few lesions black discolouartion on roots
5	Moderately resistant	Lesions (black discolouartion) on roots clear but less, new roots free from infection
7	susceptible	Lesions (black discolouartion) on roots more, many new roots free from infection
9	Highly susceptible	Roots infected and completely discoloured

Results and Discussion

Use of resistant varieties is the best method of avoiding the occurrence of the disease. Keeping this point in view seventy five germplasm lines of chickpea were screened for the resistance against dry root rot disease in field conditions. All the germplasm lines were placed in various categories of resistant and susceptibility, are summarized in table-1.

Out of 75 entries, 17 entries) were found to be moderately resistant (NbeG 25, NbeG 38, NbeG 178, NbeG 222, NbeG 297, NbeG 325, NbeG 367, NbeG 391 NbeG 379, NbeG 382,NbeG 389, NbeG 391,NbeG 392, NbeG 394,NbeG 396, NbeG 401, NbeG 543) and 52 entries were susceptible (NbeG 403,NbeG 422, NbeG 452, NbeG 455, NbeG 456, NbeG 457, NbeG 463 NbeG 468, NbeG 472, NbeG 536, NbeG 538, NbeG 540, NbeG 541, NbeG 544, NbeG 546,NbeG 562, NbeG 564, NbeG 569, NbeG 575, NbeG 583, NbeG 585, NbeG 587,NbeG 588, NbeG 592,NbeG 595, NbeG 597, NbeG 598, NbeG 602,NbeG 606,NbeG 607, NbeG 608, NbeG 613, NbeG 629, NbeG 634, NbeG 635, NbeG 639, NbeG 644, ICC 4872, ICC5383, ICC 5845, ICC 5899, ICC 6279, ICC 6874, ICC 7076, ICC 8318, ICC 9002, ICC 9895, ICC 10942, ICC 12037, ICC 12471, ICC 13124, ICC 14669, ICC-II-19193) where as 6 entries (NbeG 444, NbeG 461, NbeG 469, NbeG 539, NbeG 622, ICC 12623) were recorded as highly susceptible in disease reaction. These identified germplasm lines can be used as resistance source in breeding programmes of chickpea.

Table 1: Screening of chickpea germplasm against dry root rot disease

S. No	Entry	Scale	Reaction
1.	NbeG 25, NbeG 38, NbeG 178, NbeG 222, NbeG 297, NbeG 325, NbeG 367, NbeG 391 NbeG 379, NbeG 382,NbeG 389, NbeG 391,NbeG 392, NbeG 394,NbeG 396, NbeG 401, NbeG 543 (17)	5	Moderately Resistant
2	NbeG 403,NbeG 422, NbeG 452, NbeG 455, NbeG 456, NbeG 457, NbeG 463 NbeG 468, NbeG 472, NbeG 536, NbeG 538, NbeG 540, NbeG 541, NbeG 544, NbeG 546,NbeG 562, NbeG 564, NbeG 569, NbeG 575, NbeG 583, NbeG 585, NbeG 587,NbeG 588, NbeG 592,NbeG 595, NbeG 597, NbeG 598, NbeG 602,NbeG 606,NbeG 607, NbeG 608, NbeG 613, NbeG 629, NbeG 634, NbeG 635, NbeG 639, NbeG 644, ICC 4872, ICC5383, ICC 5845, ICC 5899, ICC 6279, ICC 6874, ICC 7076, ICC 8318, ICC 9002, ICC 9895, ICC 10942, ICC 12037, ICC 12471, ICC 13124, ICC 14669, ICC-II-19193 (52)	7	Susceptible
3	NbeG 444, NbeG 461, NbeG 469, NbeG 539, NbeG 622, ICC 12623 (6)	9	Highly susceptible
4	L550 (Susceptible check)	9	Highly susceptible

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