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SCREENING OF CHICKPEA VARIETIES AGAINST WILT (*FUSARIUM OXYSPORUM* F. SP. *CICERI)* UNDER FIELD CONDITION

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Abstract

Cicer arietinum is commonly known as gram, bengal gram and chickpea. Chickpea is the second most important food legume crop in India. It is grown under semi arid climate. Chickpea is mainly used for human consumption as well as for animal feeds. Chickpea is consumed as whole seed, fried dal, salted or boiled. Fresh green leaves and grains (chhole) are used as vegetable. Exudation of leaves locally called 'amb' contain oxalic and malic acids, which possess medicinal value for bronchitis, cholera, constipation, diarrhea, digestive disorders, snake-bites, warts and blood purification. *Fusarium oxysporum* f. sp. *ciceri* is one of the most destructive pathogen, causing wilt disease in chickpea and thereby inflicting account table quantitative as well as qualitative losses. Under natural conditions epiphytotics screening of Twenty one chickpea varieties against wilt *Fusarium oxysporum f.* sp. *ciceri* disease. The intensity of the pathogens *Fusarium oxysporum* f. sp *ciceri* were recorded after 60, 90 and 120 days after sowing by using rating scales. Among all Twenty one chickpea varieties (*i.e.* Harayna Chana 5) (HC 5), Samrat chana, Ghanghor 1581 (GNG 1581), GNG 1958 (Marudhar), Desi Chana 1, Chana 575, GNG 2144, BCP-60, PG-8108, Digvijay, BCP-10, PKV-Kabuli-2, Saki-9516, Vijay, Vishal, Virat, PKV-Kabuli-4, JG-62, L-550, WR-315 and ICCV-95. Harayna Chana 5 (HC 5), BCP-60, PG-8108 and WR-315 are resistant against *Fusarium oxysporum* f. sp *ciceri.* While Samrat chana, Digvijay, BCP-10, PKV-Kabuli-2, Saki-9516, ICCV-95, Vijay and Vishal are moderately resistant against *Fusarium oxysporum* f. sp *ciceri.* GNG-1958, Desi chana, Chana-575, GNG-2144, PKV-Kabuli-4, Virat and Ghanghor-1581 are moderately susceptible against *Fusarium oxysporum* f. sp *ciceri*. JG-62 and L-550 are highly susceptible against *Fusarium oxysporum* f. sp *ciceri*.

Introduction

Chickpea (*Cicer arientinum* L.) is the second most important food legume crop in India. *Cicer arietinum* is commonly known as gram, bengal gram and chick pea. Chickpea is consumed as whole seed, fried dal, salted or boiled. Fresh green leaves and grains (chhole) are used as vegetable. Exudation of leaves locally called 'amb' contain oxalic and malic acids, which possess medicinal value for bronchitis, cholera, constipation, diarrhea, digestive disorders, snake-bites, warts and blood purification.

It covers about 38% of area under pulse crop and among all the pulse crops chickpea cover 46.34% share in production. It is grown under semi arid climate. India is largest producer of chickpea in the world contributing 65.49 percent in production and 65.25 percent in area. In India chickpea is grown on 81.17 lakh hectare of land, producing 59.01 lakh tonnes with a productivity of 727 kg ha^{-1} (Anonymous, 2015). India exported 127.20 thousand tonnes of chickpea in 2017-18 and it was 70.92 % share in total pulse export (National Commodity & Derivatives Exchange Ltd). Productivity of chickpea in 1950-51 was 4.82q/ha but now its productivity has increased upto 9.32q/ha in 2015-16. Productivity of chickpea can be increased if it is grown under proper irrigation facilities and proper management of diseases were done.

Chickpea is attacked by number of fungal diseases like wilt, collar rot, sclerotinia blight, grey mold, aschochyta blight etc. The major limiting factor in chickpea production is *Fusarium* wilt which is caused by *F. oxysporum* Schlecht end fr. f. sp. *ciceris* (Padwick) Matuo and K.Sato (Nene and Reddy, 1987) According to a rough estimate, about 10 percent loss in yield due to wilt was considered to be a regular feature in all chickpea growing states of India (Singh and Dahiya, 1973). It observed damage to be upto 61 percent seedling stage and 43 percent at flowering stage (Nema and Khare, 1973). Crop losses can be reached upto 100% when

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attacked by diseases *i.e.* soil borne, seed borne and air borne. Fungi causes many severe diseases such as ascochyta blight, grey mold, powdery mildew, collar rot, wilt. The most important diseases with great economic importance are wilt. These diseases are taken as very serious as it can destroy entire crop. These diseases occur at seedling and maturity stage.

Wilt is caused by *Fusarium oxysporum* f. sp *ciceris*. It's initial symptoms appear on roots. Roots get dried and turn brownish to reddish in colour. Infection spread from roots to tip of chickpea plant. Upper plant parts show yellowish symptoms and ultimately plant dries off. Wilt occurs in seedling stage and maturity stage.

Material and Methods

Screening of chickpea varieties, cultivars and genotypes

The experiment was conducted in wilt sick soil field. Screening of the Chickpea varieties against the wilt is screened under field conditions during *Rabi* 2018-2019 at university agriculture farm of Lovely Professional University, Phagwara, Punjab to see the response of different chickpea varieties against *Fusarium oxysporum* f. sp *ciceri*.

Surface sterilized (0.1% $Hgcl_2$) seeds of all test entries of chickpea were sown (November) in wilt sick soil. The observations *viz*., total number of plants, total number of infected plants and the average of wilt plants in each entry were calculated. The observations on wilt were recorded in percentage of disease incidence was recorded by applying 0-9 point disease rating scale (IIPR, 1999). Natural disease incidences on chickpea against wilt were calculated. Disease rating scales is used *i.e.* wilt rating scale.

Results and Discussion

Screening of chickpea varieties against *Fusarium oxysporum* f. sp *ciceri.*

To find out the sources of resistance in chickpea for *Fusarium* wilt, seven varieties which were collected from Punjab Agricultural University, Punjab were evaluated during *Rabi* 2018-2019. Seven varieties are screened by observing the natural incidence of wilt in chickpea in field condition during *Rabi* 2018-2019 table 2. The intensity of the pathogens *Fusarium oxysporum* f.sp *ciceri* were recorded after 60, 90 and 120 days after sowing by using rating scales. Among all Twenty one chickpea varieties (*i.e* Harayna Chana 5) (HC 5), Samrat chana, Ghanghor 1581 (GNG 1581), GNG 1958 (Marudhar), Desi Chana 1, Chana 575, GNG 2144, BCP-60, PG-8108, Digvijay, BCP-10, PKV-Kabuli-2, Saki-9516, Vijay, Vishal, Virat, PKV-Kabuli-4, JG-62, L-550, WR-315 and ICCV-95. Harayna Chana 5 (HC 5), BCP-60, PG-8108 and WR-315 are resistant against *Fusarium oxysporum* f.sp *ciceri*. While Samrat chana, Digvijay, BCP-10, PKV-Kabuli-2, Saki-9516, ICCV-95, Vijay and Vishal are moderately resistant against *Fusarium oxysporum* f.sp *ciceri* . GNG-1958, Desi chana, Chana-575, GNG-2144, PKV-Kabuli-4, Virat and Ghanghor-1581are moderately susceptible against *Fusarium oxysporum* f. sp *ciceri*. JG-62 and L-550 are highly susceptible against *Fusarium oxysporum* f. sp *ciceri*.

Table 1: Disease rating scale for accounting per cent mortality *of Fusarium oxysporum* f.sp. *ciceri* (Categorization scale 0-5).

Grade	Per cent mortality	Disease reactions
0	No disease (Immune)	Highly resistant (HR)
1	1 to 10	Resistant (R)
2	10.1 to 20	Moderately resistant (MR)
3	20.1 to 30	Moderately susceptible (MS)
4	30.1 to 50	Susceptible (S)
5	50 and above	Highly susceptible (HS)

(IIPR, 1999)

Table 2: Screening of chickpea varieties under field conditions against *Fusarium oxysporum* f. sp. *ciceri.*

Sr. No	Chickpea lines	Disease reaction
1	Harayna Chana 5 (HC 5)	Resistant
2	BCP-60	Resistant
3	PG-8108	Resistant
4	WR-315	Resistant
5	Digvijay	Moderately Resistant
6	BCP-10	Moderately Resistant
7	PKV-Kabuli-2	Moderately Resistant
8	Saki-9516	Moderately Resistant
9	ICCV-95	Moderately Resistant
10	Vishal	Moderately Resistant
11	Samrat Chana	Moderately Resistant
12	Vijay	Moderately Resistant
13	GNG1958 (Marudhar)	Moderately Susceptible
14	Desi Chana	Moderately Susceptible
15	Chana 575	Moderately Susceptible
16	GNG2144	Moderately Susceptible
17	PKV-Kabuli-4	Moderately Susceptible
18	Ghanghor 1581 (GNG 1581)	Moderately Susceptible
19	Virat	Moderately Susceptible
20	JG-62	Highly Susceptible
21	L-550	Highly Susceptible

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