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Succession of Soil Borne Diseases of Chickpea With Regard to Crop Growth Stage and Its Relation With the Weather Data.

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ABSTRACT

The studies conducted on succession of soil borne disease of chickpea with regard of crop growth stage and its relation with weather data revealed aimed at their management through host plant resistance under the progressive development of collar rot, vascular wilt and dry root rot under field condition. The experiment was conducted by using a extra large seeded kabuli chickpea genotype Kripa (Phule G 0517) and small seeded desi chickpea (CSJ 515) grown in multiple disease sick field along with susceptible checks JG 62 and BG 212 led to conclusion that maximum collar rot (28.2%) and vascular wilt (22.5%) incidence has been observed in the 52th standard week i.e. 5th week of Dec. 2011. During that period the temperature ranged from 7.4^{0}c to 24.9^{0}c and relative humidity, 24.0 to 89 percent which simultaneously lower down in both desi as well as kabuli chickpea. On contrary to this, highest percent mortality due to dry root rot was observed in the 10th standard week i.e. 2nd week of March 2012 when the temperature was ranging from 11.6-30.8^{0}C coupled with 18 to 76 percent relative humidity. However, the disease initiated when the temperature was >27^{0} C with the decrease in relative humidity too.

Keyword: *Chickpea, Collar rot, Vascular wilt, Dry root rot, crop growth stage, weather data*

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is an important pulse crop, ranking third after dry beans. India is the largest producer of chickpea contributing around 70 per cent (6.2 m. tones) of the world's total production. It is affected by several seed, soil and air borne diseases which is responsible for lowering its yield. Soil borne .

Pathogens like *Sclerotium rolfsii* (Collar rot), *Fusarium oxysporum* f. sp. *ciceri* (Vascular wilt) and *Rhizoctonia bataticola* (Dry root rot) are responsible for causing diseases from seedling to flowering and pod formation stage. seed rot and seedling mortality in the initial stage of crop growth up to 45 days. The mortality ranges from 54.7- 95 per cent in India (Kotasthane *et al.*,1976) causing significant reduction in plant population. The disease becomes series .When soil moisture is high and temperature is warm at the seedling stage.

Fusarium wilt is a serious disease, especially in low rainfall areas, where weather conditions are favorable for disease development. It has been reported from 33 countries of the world

(Nene *et al*., 1996) Incidence of dry root rot becomes most under stress condition when the temperature is >30^{0}C Gupta *et al* (1983) reported its incidence ranging from 3.58 to 20.63 per cent in 30 villages of Northern Madhya Pradesh ;The present investigation were, therefore undertaken to know .The succession of three most important soil borne disease of chickpea with regard to crop growth stage and its relation with the weather data.

MATERIAL AND METHODS

Present investigations were undertaken to study the succession of soil borne diseases of chickpea with regards to crop growth stage and its relation with weather data. The experiment was conducted in multiple disease sick field under AICRP on chickpea at seed breeding farm, JNKVV Jabalpur during 2011-2012. The chickpea genotypes viz.,extra large seeded kabuli type (Kripa, Phule G-0517) and desi type (CSJ 515) were grown in multiple disease sick field alongwith susceptible checks JG 62 and BG 212 (collar rot, wilt, dry root rot). Two rows of each entries, were sown in 5 m. rows at 30 cm apart in two replication. Percent emergence was recorded at 20 DAS whereas mortality due to weekly observations on plant mortality due to collar rot *(Sclerotium rolfsii)*,vascular wilt *(Fusarium oxysporum)* and dry root rot (*Rhizoctonia bataticola)* were recorded and correlated with the weather data (Nov. 2011 – March 2012).

RESULT AND DISCUSSION

The progressive development of collar rot, vascular wilt and dry root rot were investigated in relation in environmental factors using a extra large seeded kabuli chickpea genotype (Kripa, Phule G 0517) and small seeded desi chickpea (CSJ 515) grown in multiple disease sick field along with susceptible checks JG 62 and BG 212 (collar rot, wilt and dry root rot). The data is presented in (tables1,2,3 and figs.1 and 2.)

Collar rot and vascular wilt

The data presented in the Table 1and 2 indicated that maximum collar rot 28.2 per cent and 22.5 percent vascular wilt in desi variety (CSJ 515) and 30.5 per cent collar rot and 25.2 vascular wilt in kabuli variety Kripa (Phule G 0517) was observed in the 52nd standard week *i.e.* 5th week of Dec.2011.During that period the temperature ranged from 7.4^{0}C to 24.9^{0}C and relative humidity 24.0 to 89 per cent.(fig1 and 2)

Dry root rot

Increased percent mortality due to dry root rot i.e. 25.3 percent in desi variety CSJ 515 and 29.2 percent in Kabuli Kripa (Phule G- 0517) was observed in the 10th slandered week i.e. 2nd week of March 2012. When the maximum temperature was 30.8^{0}c ranging from 11.6-30.8^{0}C coupled with the range of relative humidity 18 to 76 per cent. However earlier the incidence was 17.2 percent in desi variety CSJ 515 and 15.4 per cent in Kabuli variety Kripa (Phule G 0517) was observed in the 7th standard week. Which increased dramatically from 15.4 to 29.2 per cent in desi and 17.2 to 25.3 per cent in kabuli during 10th week i.e. March 2012 (Table 1 and 2)

No disease was observed in 51st, 52nd 1st and 6th standard week when the maximum temperature ranged from 20.8 to 26.4^0 C. But the disease started after that when the maximum

temperature rises with decrease in relative humidity. Succession of disease is positively correlated with the increase / decrease in temperature as well as relative humidity. Analysis of the weather data (2000-2010) of the major chickpea growing areas in India indicated higher incidence of DRR in years when temperature exceeds 33^{o} C (4).Increasing incidence of DRR at various location over years suggest a strong influence of climate change on disease infection (Shrma and Pande 2013) . High incidence of dry root rot in Southern Haryana has been reported from late October to Mid November than again increased in the month of February and March (Tripathi and Sharma 1983).

Table 1 : *Progressive development of collar rot, vascular wilt and dry root rot observed under field*

condition on Desi (515 Genotype) CSJ

Month	Week	S.D. Week	Collar rot	Wilt	DRR	Temperature		Rainfall (mm)	Relative Humidity	
						Max.	Min.		Max.	Min.
December 2011	iv	51	27.2	20.2	0.0	24.8	5.3	00	90	24
	v	52	28.5	22.5	0.0	24.9	7.4	00	89	24
January 2012	i	01	25.2	15.36	0.0	23	12.2	28.6	95	69
	ii	02	17.5	13.1	0.0	20.2	6.3	00	93	41
	iii	03	0.0	18.2	0.0	23.7	7.1	13.2	90	36
	iv	04	0.0	0.0	0.0	21.5	9.0	7.6	89	57
February 2012	i	05	0.0	0.0	0.0	20.8	8.0	00	91	46
	ii	06	0.0	0.0	0.0	26.4	8.8	00	89	57
	iii	07	0.0	0.0	17.2	27.6	10.4	00	90	42
	iv	08	0.0	0.0	23.5	30.5	9.4	00	86	28
March 2012	i	09	0.0	0.0	22.4	30.1	10.4	00	86	24
	ii	10	0.0	0.0	25.3	30.8	11.6	00	76	18

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Table 2. Progressive development of collar rot, vascular, wilt and dry root rot observed on under field condition **Kabuli Kripa (Phule G 0517) Genotype**

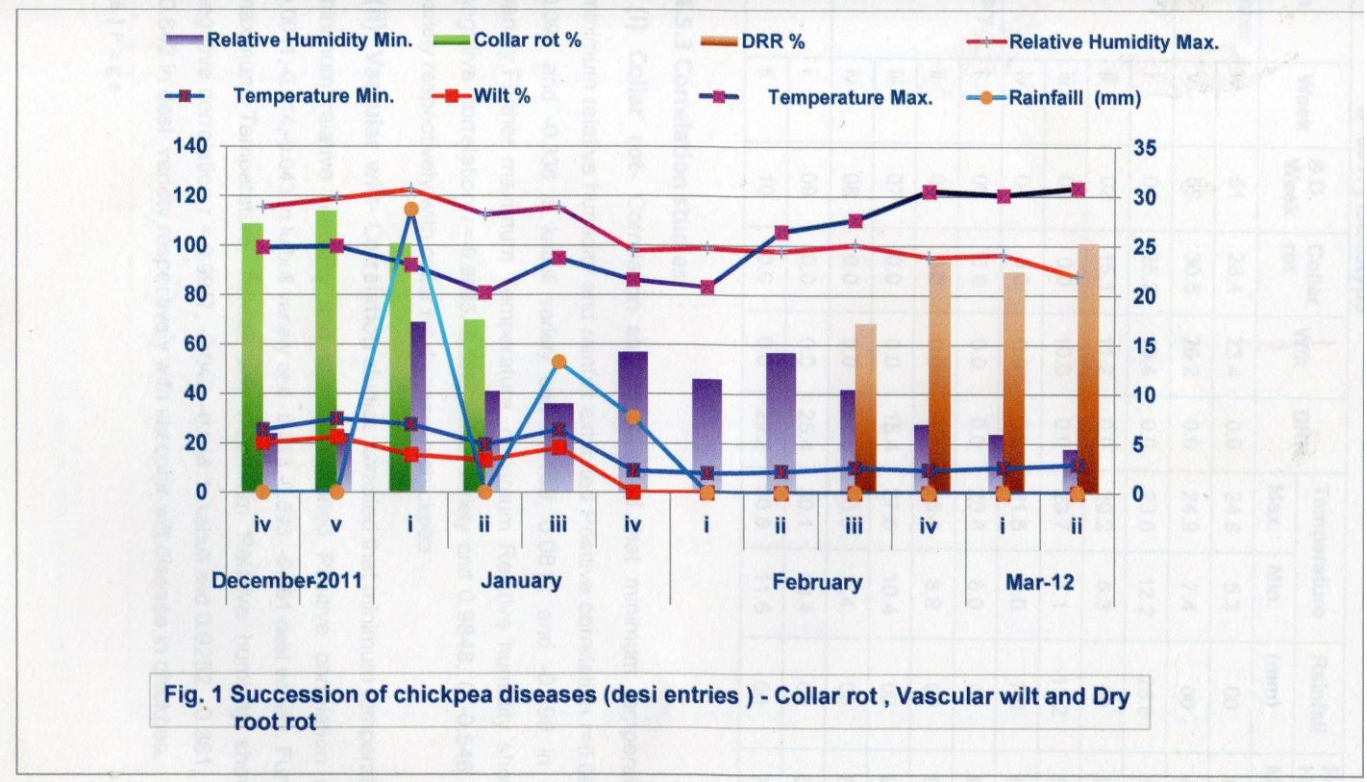

Fig. 1 Succession of chickpea diseases (desi entries) - Collar rot , Vascular wilt and Dry root rot

Month	Week	S.D. Week	Collar rot	Wilt	DRR	Temperature		Rainfall (mm)	Relative Humidity	
						Max.	Min.		Max.	Min.
December 2011	iv	51	28.4	23.4	0.0	24.8	5.3	00	90	24
	v	52	30.5	25.2	0.0	24.9	7.4	00	89	24
January 2012	i	01	25.2	19.4	0.0	23.0	12.2	28.6	95	69
	ii	02	15.1	11.2	0.0	20.2	6.3	00	93	41
	iii	03	0.0	10.0	0.0	23.7	7.1	13.2	90	36
	iv	04	0.0	0.0	0.0	21.5	9.0	7.6	89	57
February 2012	i	05	0.0	0.0	0.0	20.8	8.0	00	91	46
	ii	06	0.0	0.0	0.0	26.4	8.8	00	89	57
	iii	07	0.0	0.0	15.4	27.6	10.4	00	90	42
	iv	08	0.0	0.0	27.5	30.5	9.4	00	86	28
March 2012	i	09	0.0	0.0	25.4	30.1	10.4	00	86	24
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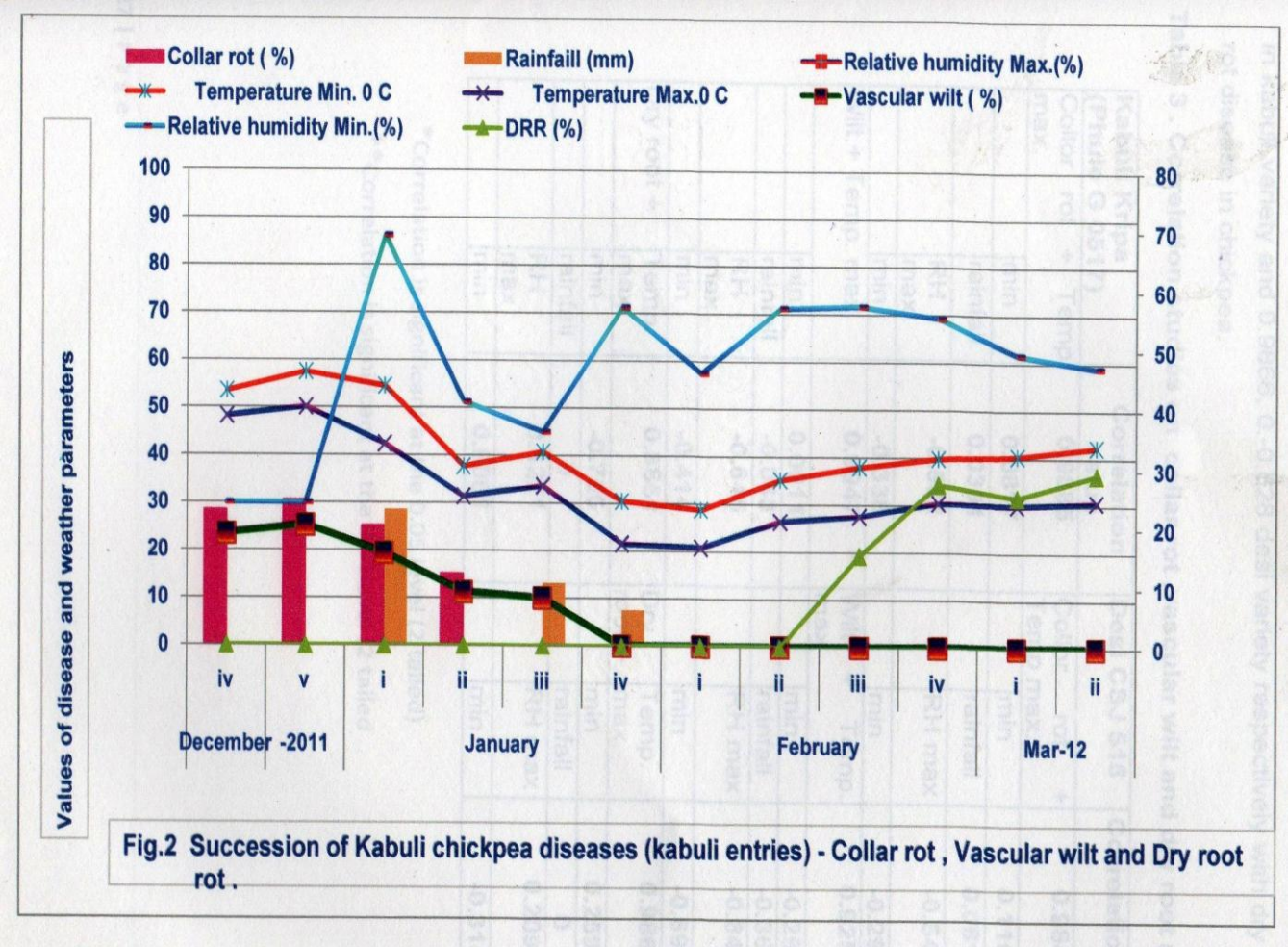

Fig.2 Succession of Kabuli chickpea diseases (kabuli entries) - Collar rot , Vascular wilt and Dry root rot .

The data presented table -02, indicate that maximum Collar rot .kabuli chickpea genotype (kripa phule G 0517) 30.5 per cent at the maximum temperature 24.9 per cent as compare to minimum temperature 7.4 per cent in the month of 5 th Standard week of December. Vascular wilt 25.2 per cent kabuli chickpea genotype (kripa phule G 0517) at the maximum temperature 24.9 percent as compare to minimum temperature 7.4 percent (December).

The data presented in the table 02 show the maximum temperature 30.2 per cent as compare to minimum temperature 9.4 percent .Collar rot and Vascular wilt kabuli (kripa phule G 0517) was not observe but Dry root rot was observe 27.5 per cent in the 8 th Standard week of Feb. 2012.

The data presented in the table 02 Dry root rot was observe 29.2 per cent in kabuli (kripa phule G 0517) at the maximum temperature 30.8 percent as compare to minimum temperature 11.6 per cent in the 10 th – Standard week of march 2012. Collar rot and vascular wilt was not found in the month of march (2012).

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