



Impact of Date of Sowing on incidence of chickpea Stunt Disease

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ABSTRACT: Chickpea is an important pulse crop in India. Crop suffers from various biotic and abiotic stresses during growing period. Among biotic stresses chickpea stunt disease caused by Bean (Pea) Leaf Roll Virus is an economical and emerging disease of chickpea in the country. Diseased plants are easily spotted in the field by their symptoms as yellow, orange or brown discoloration, small size and thickening of leaves, shortened internodes and stunted growth of plant. In Kabuli type chickpea, the colour of leaves becomes yellow while in Desi type chickpea leaves shows brown or red discoloration. Kabuli type chickpea is more susceptible than Desi type. Extent of incidence of stunt was observed 5-20 per cent in farmer's fields. It causes 100 per cent yield loss when incidence of chickpea stunt disease in early stage of crop growth. Later stage infection during podding stage also causes yield loss 80-90 per cent. It is a limiting factor for chickpea cultivation. Present investigation was carried out to know extent of incidence of stunt disease and identify suitable date of sowing for least incidence. Chickpea was sown early on 1st November, mid sown on 15th November and late sown on 30th November. The incidence of stunt disease and its vector aphid was observed in early sown crop and found maximum disease incidence during second week of January and minimum during last week of December. In mid sown crop the incidence of stunt disease was maximum during first week of January and minimum during third week of February. During late sown crop, stunt disease was found maximum in second week of January and it was observed minimum in third week of February. The incidence of chickpea stunt disease and its vector was recorded highest in early sown crop followed by mid sown crop and least in late sown crop.

Keywords: chickpea, stunt disease, date of sowing, disease incidence.

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INTRODUCTION

Chickpea is grown in more than 50 countries in worldwide and the second-most consumed legume crop. It is an important *Rabi* pulse crop of India. Chickpea is severely influenced by different biotic and abiotic factors during different stages of crop growth. Diseases are the most serious problems to chickpea productivity causing up to 100% losses. Though 67 fungi, 3 bacteria, 22 viruses and 80 nematodes are reported to adversely affect the growth and productivity of the crop (Singh *et al.*, 1999). The extents of yield losses in chickpea are mainly due to wilt, root rot and stunt diseases. About 50 pathogens including viruses and 54 insect pests have been reported on chickpeas from different parts of the world. Stunt disease of chickpea is an emerging problem of chickpea cultivation. Viral diseases often cause significant yield losses (Kumari *et al.*, 2008). Among biotic factors stunt disease is an important disease of chickpea and causes economic losses. Chickpea stunt disease caused by bean (pea) leaf roll virus and

transmitted by aphid is an emerging disease of chickpea. Affected plants can be easily identified in the field by their yellow, orange or brown discoloration, shortened internodes and stunted growth. The reduction of plant height was observed due to shortened internodes. Kotasthane and Gupta (1978) reported 80-95% yield reduction in chickpea. This observation was based on natural incidence of chickpea stunt disease in chickpea fields. Consistent occurrence of chickpea wilt and stunt disease causes serious yield loss to the chickpea crop every year in all major chickpea growing areas of India (Malathi and Kanakala, 2017).

MATERIALS AND METHODS

Present investigation was conducted at pulse research area of Bihar Agricultural University, Sabour, Bhagalpur during *Rabi* season 2015-16. The experimental field had a fairly uniform topography and soil was sandy loam well drained. Recommended package of practices was followed to grow a good crop of chickpea.

Chickpea was sown in three different date viz., 1st November was considered as early sown, 15th November as mid sown and 30th November as late sown crop. Row to row 50 cm and plant to plant spacing were 10 cm. The plot size was 12.5 m² and laid out in randomized block design. Total seven varieties were sown in different dates of sowing. All recommended package of practices was followed and application of fertilizer dose (N @ 10 kg/ha, P @ 40 kg/ha) at the time of sowing. The chickpea stunt disease (CpSd) incidence was observed after 30 days of sowing in the first date of sowing on 1st November. CpSd incidence was initiated after 25 days of sowing in the second date of sowing on 15 November. In late sown crop on 30th November disease was appeared after 30 days after sowing. The incidence of CpSd was recorded at 10 days interval in each date of sowing. Data were recorded at every 10 days interval upto 140 days after sowing in early sown crop, 125 days in mid sown and 110 days in late sown crop. All the data of chickpea stunt disease and its vector in tables were recorded on seven varieties viz., BG256, JG62, GCP105, PG186, JG315, JG14 and BG372 in all three dates of sowing. The graph of each date of sowing along with disease incidence in susceptible variety JG315 was constructed using Microsoft Excel software.

The incidence was calculated by using formula

$$\text{Percent incidence} = \frac{\text{No. of plants infected}}{\text{Total no. of plants}} \times 100$$

RESULTS AND DISCUSSION

Chickpea stunt disease incidence was observed in all seven varieties during all three different dates of sowing. Data of Per cent Disease Incidence (PDI) was recorded at 30 days after sowing in early date of sowing (1st November), in second date of sowing observations were recorded after 15 days after sowing on mid sown (15th November) and in late sowing (30th November) observations were recorded just one week after germination of crop and extended up to 120 days. Incidence of chickpea stunt was observed in all seven varieties at different extent. Maximum incidence 41.72 per cent was observed in early sown crop followed by 39.10 per cent in mid sown. However incidence of stunt disease was recorded least 31.63 per cent in late sown crop. Similar findings were also observed by Kanakala *et al.* (2013). In early sown crop maximum infestation of chickpea stunt virus vector *i.e.* aphid was observed in variety JG315 was 11.93 while minimum number of its vector observed in variety GCP 105 was 5.83. In mid sown crop maximum chickpea stunt disease and number its vector observed in variety JG315 was 9.53 and number of aphid observed in variety GCP 4.50. Similarly In late sown crop maximum number of aphid observed in variety JG315 was 8.03 and minimum number of vector aphid observed in variety GCP 105 was 2.47 (Table 1).

Table 1: Varietal responses of stunt disease development in different date of sowing.

Date of sowing	Variety	Percent disease incidence	Aphid population
Early sowing	BG256	36.06	10.03
	JG62	18.07	8.23
	GCP105	11.94	5.83
	PG186	16.11	8.53
	JG315	41.72	11.93
	JG 14	30.72	10.50
	BG 372	19.97	9.47
Mid sowing	BG256	29.29	7.47
	JG62	16.13	5.60
	GCP105	10.94	4.50
	PG186	15.68	5.37
	JG315	39.10	9.53
	JG 14	16.87	8.20
	BG 372	15.87	6.17
Late sowing	BG256	25.61	5.67
	JG62	17.72	3.70
	GCP105	8.09	2.47
	PG186	13.15	3.77
	JG315	31.63	8.03
	JG 14	19.21	4.53
	BG 372	14.23	3.40
CD at 5%	Date of sowing (D)	1.61	0.58
	Variety (V)	2.27	0.99
	Interaction (D X V)	3.93	NS

Temporal dynamics of chickpea stunt disease:

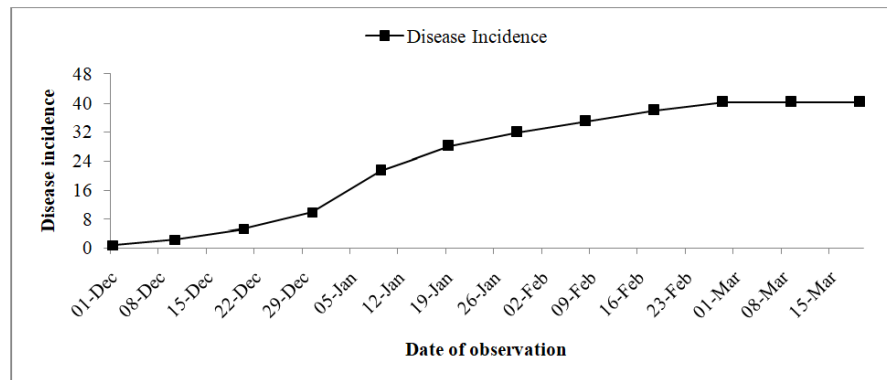


Fig. 1. Incidence of chickpea stunt disease (CpSd) during early sown conditions.

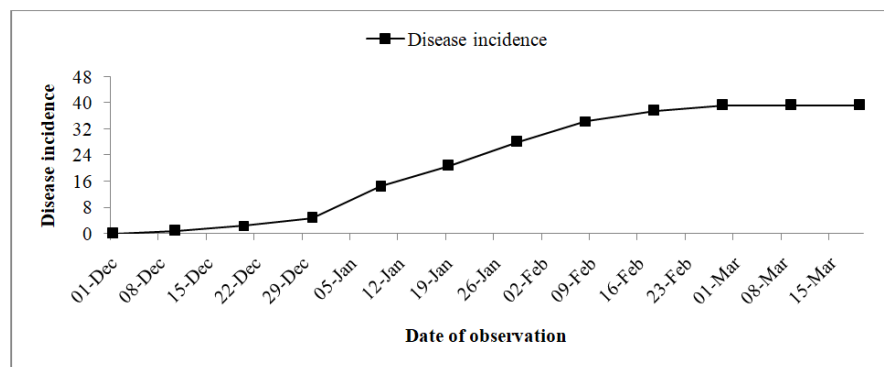


Fig. 2. Incidence of chickpea stunt disease (CpSd) during mid sown conditions.

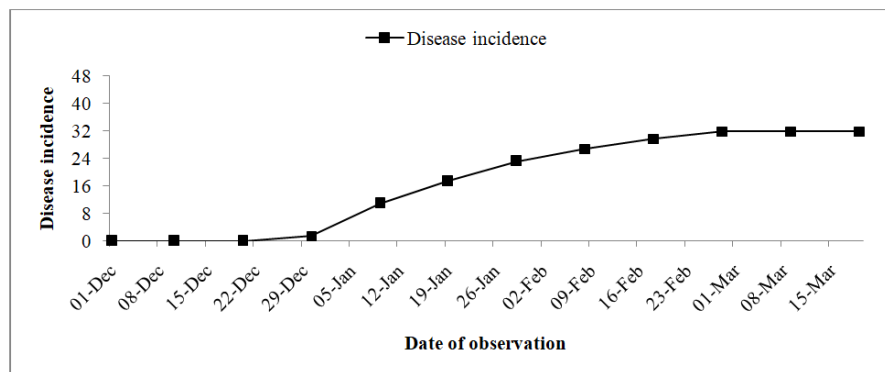


Fig. 3. Incidence of chickpea stunt disease (CpSd) during late sown conditions.

In early sown crop stunt disease incidence was observed 0.8 per cent on 1st December. The disease incidence gradually increased up to 36.06 per cent on 28th February. Onward 28th February the disease incidence was became constant *i.e.* no more disease progress up to 19th March (Fig. 1). In mid sown crop disease incidence initiation was observed 0.8% at 10th December later on PDI gradually increased and reached up to 29.29 per cent on 28th February (Fig. 2). In late sown crop the CpSd incidence was observed 1.4% at 30th December then PDI gradually increased and reached up to 25.61 per cent

during 28th February after that it became constant till 19th March, 2016 (Fig. 3). In all three different sowings, disease was gradually increased up to 18th February later on disease progress was restricted and constant. These findings are in confirmation with Abawi and Grogan (1979); Natti (1971), Sharma (1995); Sharma (1994). Darini and Azadvar (2016) reported that Tomato Yellow Leaf Curl Virus (TYLCV) is one of usual ailments which changing sowing date, as one of appropriate agricultural methods, has significant effect on damage reduction of tomato curl leaf disease.

CONCLUSIONS

Stunt disease of chickpea is an important disease of chickpea. The severity of disease was depending upon its vector aphid. Maximum aphid population was observed during early sown crop followed by mid and late sown conditions. The incidence of chickpea stunt disease was recorded highest in early sown crop followed by mid sown crop and least in late sown crop. Late sowing crop on 30th November showed minimum incidence of chickpea stunt disease.

FUTURE SCOPE

Further investigation could be done for the integrated disease management strategies of stunt disease of chickpea and other pulse crop.

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CONFLICT OF INTEREST. None.

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