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Short Note

Effect of leaf crinkle disease on yield and quality of urdbean (*Vigna mungo* L. Hepper) in Himachal Pradesh

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Abstract

The study was conducted to assess the losses caused by leaf crinkle disease in terms of quantity and quality in urdbean in Himachal Pradesh. The disease is caused by *urdbean leaf crinkle virus* (ULCV) which consists of filamentous virus particles. There was significant reduction in yield components (cv. T-9) *viz*., plant height (23.8%), inter-nodal length (20.0%), pods/plant (70.0%), pod length (18.8%), seeds/pods (37.5%) and seed weight/plant (25.0%) as compared to healthy plants. Seed quality parameters viz., germination (45%), seed viability (86%), seed vigour (0.74%) and protein content (21%) were severely affected by virus infection. The severe reduction in various yield and quality parameters in the infected seed crop clearly envisages the need to control the virus by adopting effective control measures.

Key words: Leaf crinkle, urdbean, seed viability, seed vigour

Pulses constitute an important part of dietary proteins of the vegetarians. The importance of pulses as an excellent source of protein, vitamins and minerals is well established. Urdbean or blackgram (*Vigna mungo* L. Hepper) is one of the important pulses of *Phaseolus* group which holds an important position after chickpea in India. It is cultivated on an area of about 3.25 million ha with an annual production of 1.5 million tonnes (http:// www.aicrpmullarp.res.in/crop_profile. html). Leaf crinkle disease was first reported from Delhi (Nariani, 1960).

Urdbean is vulnerable to the attack of a large number of diseases. Among them leaf crinkle disease caused by *urdbean leaf crinkle virus* (ULCV) is important (Biswas *et al*. 2009). Under field conditions ULCV is more serious in blackgram than green gram and other pulses (Bashir and Zubair, 1985; Biswas *et al*. 2009). This may results in 100% yield loss during the epidemic years (Kanimozhi *et al*. 2009).

On an average, the virus has been reported to decrease grain yield by 35-81% (Bashir *et al*. 1991). Kadian (1982) reported that losses from leaf crinkle disease ranged between 2.12-93.98% in *Vigna radiata* cv. *versa* and 2.82-95.17% in *Vigna mungo* cv. T-9. The direct relation existed between the stage of plant growth at which infection occurred and yield loss. The reduction in tryptophan, increase in IAA and higher sugar content have been reported in urdbean leaves infected by leaf crinkle virus (Brar and Rataul 1990). The disease is characterized by crinkling, curling, puckering, rugosity of leaves, enlargement of leaf lamina, stunting of plants and malformation of floral organs (Kanimozhi *et al.* 2009). Infected plants produce sterile flowers and few pods (Bashir *et al.* 1991). Seed borne nature of the virus is well established and the disease has attained serious proportions (Sharma *et al*. 2014).

In Himachal Pradesh, occurrence of leaf crinkle disease has been widely encountered (Sharma *et al.* 2004) and the association of filamentous virus with leaf crinkle disease has been established (Sharma *et al*. 2014). The present study was conducted to study the effect of leaf crinkle disease on seed quality and yield components in urdbean.

The field trial was conducted at the experimental farm of the Department of Plant Pathology, CSK HPKV, Palampur, using seeds of highly susceptible cultivar T-9

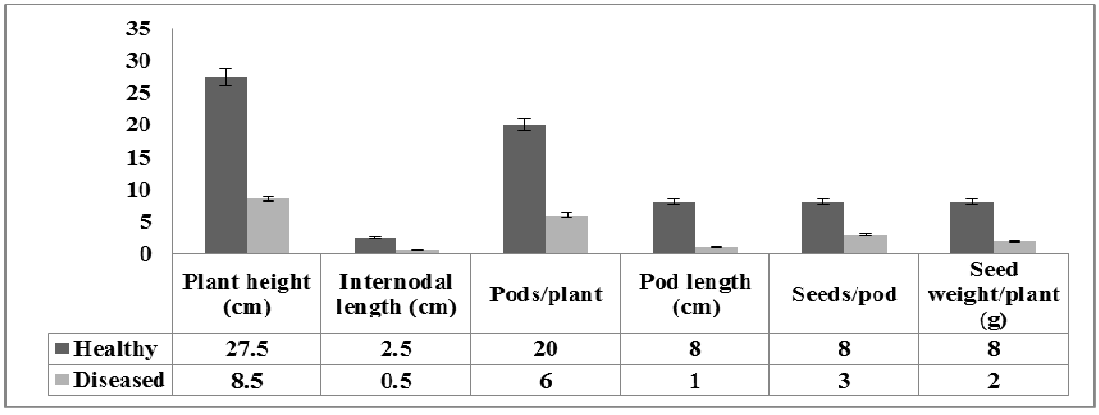
obtained from naturally infected and healthy plants. The seeds were sown in plots of 2.0m x 2.5m size with a spacing of 50cm x 20cm. The crop was raised as per standard agronomic practices. Twenty-five healthy and diseased plants were selected at random and data were recorded on various yield contributing factors *viz*., plant height (cm), internodal length (cm), number of pods/ plant, pod length (cm), seeds/pod and seed weight/plant (g).

To assess the germination percentage of healthy and virus infected seeds, a germination test was conducted by rolled towel method (Agarwal and Dadlani, 1992). Five hundred seeds placed on double layer of germination paper lined with wax paper were rolled carefully and allowed to germinate at 25± 1ºC for 7-10 days and germination percentage was recorded. The viability of healthy and diseased seeds was studied by Tetrazolium test (Moore 1973). The vigour test was conducted by following the methods of Killock and Law (1988). The protein content of healthy and virus infected seeds was determined by Kjeldajl method (Hesse 1971).

The results on yield loss assessment in urdbean due to leaf crinkle disease indicated that virus affected all the parameters of urdbean plant (Fig. 1). Plant height reduced by 23.8% compared to that of healthy plant. Similarly, infected plant (6 pods) suffered with 70% reduction in number of pods/plant. Pod length and no. of seeds per pod reduced to 18.8% and 37.5%, respectively. Inter-nodal length was decreased by 20.0% over healthy plant. The seed weight per plant was reduced by 25.0%. The reduction in yield components of urdbean by virus may lead to reduction in production and productivity of the crop. Kadian (1982) also observed significant yield reduction in the T-9 variety due to the effect of virus infection. Similar, results have been reported by Bashir *et al.* (1991).

The virus infection had pronounced effect on various seed quality parameters (Table 1). Seed germination in diseased seeds was 45% as compared to the healthy seeds (97%). Tetrazolium chloride staining test revealed that the seed viability of diseased seed was 86% as against 95% in healthy seed crop. Seed vigour was also reduced in infected seed (0.74). The virus infection also decreased the protein content of the diseased seed (21%) over the healthy seed (32.4%). Kanimozhi *et al.* (2009) also reported significant reduction in seed germination and seedling vigour in ULCV infected seed compared to healthy seed.

Due to the seed borne nature of the virus, use of healthy seeds is recommended. The virus also can effectively be controlled by rouging out of infected plants, eradication of weeds and controlling vector population. However, still there is need to further develop an effective method for the control of virus on a practical point of view.



	Plant height (cm)	Internodal length (cm)	Pods/plant	Pod length (cm)	Seeds/pod	Seed weight/plant (g)
Healthy	27.5	2.5	20	8	8	8
Diseased	8.5	0.5	6	1	3	2

Fig 1. Effect of ULCV infection on yield attributes of urdbean

Table 1. Effect of ULCV infection on seed quality of urdbean

Seed	Seed germination (%)	Seed viability (%)	Seed vigour (OD)	Seed protein (%)
Healthy	97	95	1.50	32.4
Diseased	45	86	0.74	21.0

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