

Survey for the assessment of severity of soybean rust and identification of hot spots in different ecosystems of Northern Karnataka

Soybean *Glycine max* (L.) Merrill is a protein rich number one oilseed crop. In Karnataka, soybean is grown over an area of 2.47 lakh hectares with a production of 3.00 lakh metric tonnes and productivity of about 1215 kg/ha (Anon., 2013). The crop is cultivated in northern transitional zone (rainfed conditions) and Ghataprabha, Krishna and Malaprabha project areas (irrigated conditions), mainly distributed in Belagavi, Bidar, Dharwad, Haveri and parts of Bagalkot districts of north Karnataka. Soybean rust is an economically important disease in northern Karnataka causing yield loss of 80 to 100 per cent (Devaraj, *et al.*, 2013). Severity of the disease is reported to cause yellowing, premature drying and defoliation. Usually on the lower leaves small, yellow lesions appear in the beginning which later develops into light dark brown pustules. Since, the survey of the disease over a period of time gives the intensity with which it affects the yield and quality besides providing information on the existence of races on particular geographical zones. The roving survey was therefore conducted to locate the endemic areas in northern Karnataka during *kharif* 2013.

A survey was carried out for recording the severity of rust at farmer's field in different villages of Dharwad, Bidar, Belagavi, Haveri and Bagalkot districts of northern Karnataka during *kharif* 2013. In each village, five soybean fields were selected randomly on both sides of the road. In each field, ten soybean plants were randomly selected and severity of rust was recorded using 0-9 scale developed by Mayee and Datar (1986).

Further, these scales were converted to Percent Disease Index (PDI) using the formula given by Wheeler (1969).

$$PDI = \frac{\text{Sum of individual disease rating}}{\text{Total No. of plants observed} \times \text{Maximum disease rating}} \times 100$$

The data on severity of disease at village, taluk and district level were recorded and compared for final analysis. During the survey along with severity, different soil types and cropping situation was also recorded.

Survey conducted for identification of hot spots and disease free area revealed that rust was prevalent in all the soybean growing areas of northern Karnataka in low to severe form with the percent disease index ranging from 25.55 to 94.66 PDI during *kharif* 2013. In Bagalkot district, the maximum rust severity of 57.77 PDI was recorded in Mudhol followed by 48.70 PDI in Nagaral village of Mudhol taluk on JS 335 under irrigated condition while, in Madarkandi of Jamkhandi taluk the rust severity was 46.66 PDI on JS 93-05 under irrigated condition. In Belagavi district, the maximum rust severity of 87.50 PDI was recorded on variety JS 335 at Ugarkhurd of Athani taluk while, minimum severity of 45.10 PDI was recorded in Sankeshwar followed by 49.85 PDI in Nidasoshi of Hukkeri taluk. In Dharwad district, the maximum severity of 94.66 PDI was recorded in Dharwad where in, minimum severity of 25.55 PDI was recorded in Aerikoppa of Dharwad taluk. (Table 1). In Haveri district, rust severity was ranged from 38.88 to 69.13 PDI with maximum severity 69.13 PDI in Akkialur followed by 49.62 PDI in Havanagi of Hanagal taluk. The minimum rust severity 38.88 PDI was recorded in Haveri district of Haveri

Table 1. Severity of soybean rust in different districts of northern Karnataka during *kharif* 2013

District	Taluk	Village	Genotype	Soil type	Cropping situation	Stage of the crop	Disease severity (PDI)	
Bagalkot	Jamakhandi	Madarkandi	JS 93-05	Black	Irrigated	Pod formation	46.66	
		Mudhol	JS 335	Black	Irrigated	Pod formation	57.77	
		Nagaral	JS 335	Black	Irrigated	Pod formation	48.70	
Mean							51.04	
Belagavi	Athani	Ugarkurd	JS 335	Black	Irrigated	Maturity	87.50	
		Chikkodi	Kabbur	JS 93-05	Black	Rainfed	Pod formation	64.4
			Manjari	JS 335	Black	Rainfed	Maturity	48.80
	Gokak	Gokak	JS 335	Black	Rainfed	Pod formation	65.92	
		Hukkeri	Hukkeri	JS 93-05	Black	Rainfed	Pod formation	62.70
			Nidasosi	JS 93-05	Black	Irrigated	Flowering	49.85
			Sankeshwar	JS 335	Black	Rainfed	Flowering	45.10
Mean							60.61	
Bidar	Bidar	Bidar	JS 335	Red	Irrigated	Pod formation	58.70	
Dharwad	Dharwad	Aerikoppa	JS 93-05	Black	Rainfed	Pod formation	25.55	
		Dharwad	JS 335	Black	Rainfed	Pod formation	94.66	
		Garag	JS 335	Black	Rainfed	Maturity	80.00	
		Kotur	JS 335	Black	Rainfed	Maturity	68.00	
	Hubli	Varur	JS 335	Black	Rainfed	Pod formation	70.37	
		Kalghatagi	Hirehonnalli	JS 335	Red	Rainfed	Maturity	78.70
	Mean							67.71
Haveri	Hangal	Akkialur	JS 93-05	Black	Rainfed	Maturity	69.13	
		Havanagi	JS 335	Red	Rainfed	Maturity	49.62	
	Haveri	Haveri	JS 335	Black	Rainfed	Maturity	38.88	
Mean							52.54	

Table 2. Soybean rust severity as influenced by soil type, cropping situation, stage of the crop

Particulars	Kharif 2013						
	Cropping situation		Soil type		Stage of the crop		
	Rainfed	Irrigated	Black soil	Red soil	Flowering	Pod formation	Maturity
Mean PDI	59.24	60.10	58.82	57.66	43.98	59.41	61.28

taluk. In Bidar district, rust severity of 58.70 PDI was recorded on variety JS 335 under irrigated condition. The severity of 60.10 PDI was observed under irrigated condition compared to rainfed condition (59.24 PDI) and there was no much difference in severity levels. The severity of 58.82 PDI was observed in black soil condition when compared to red soil (57.66 PDI). The highest disease severity was recorded at maturity stage of the crop (61.28 PDI) when compared to flowering (43.98 PDI) and pod formation stage of the crop (59.41 PDI) (Table 2). Sachin (2012) observed that soybean rust was more severe in irrigated black soil of northern Karnataka. Among the surveyed districts, Dharwad district recorded highest disease severity (67.72 PDI) followed by Belagavi (60.61 PDI) and Bidar (58.70 PDI). However, Bagalkot district recorded the lowest disease severity (51.04

PDI) (Table 2). Devaraj *et al.* (2013) conducted survey during *kharif* 2011 revealed that the average severity of rust was 67.46 PDI in northern Karnataka. The severity varied from one locality to another, due to varied environmental conditions, cropping pattern, type of cultivar and inoculum density and inoculum potentially of a given geographical area. Thus, the study identified that Dharwad and Ugarkhurd as hot spot areas of soybean rust in Karnataka. With respect to soil types, black soil under irrigated situation and pod formation stage is more vulnerable stage for soybean rust severity than red soil with rainfed situation. This information will help in mapping up the hot spots for rust severity and identification of less prone area for rust which can be used for multiplication of soybean during the off season.

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