Seed Research Vol. 34(1) 110-112, 2006

Short Communication

Effect of Wheat Rusts on Seed Germination and Seedling Vigour

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Wheat has been a major contributor towards green revolution in the country. It is one of the most important grain crops and the backbone of national food security system. Diseases like black rust caused by *Puccinia graminis tritici* and brown rust caused by *Puccinia recondita*, take heavy toll of the crop in Karnataka, especially during epidemic years.

Infected plants usually produce fewer tillers and set fewer seeds per head, the kernels are smaller in size, generally shriveled and of poor milling quality and food value. Under extreme situation, heavily infected plants may die. The amount of losses caused by stem rust may vary from slight to complete destruction of wheat fields over large areas, some times encompassing several states. Hence an attempt was made to quantify the loss due to rusts in terms of per cent germination and seedling vigour in different susceptible genotypes.

Experiments were conducted during 2001-02 at Dr. Sanjay Rajaram wheat laboratory. Seeds of ten rust susceptible varieties were collected from both artificially inoculated and healthy plants. Fifty seeds of each treatment were placed in Petri dish lined with moist blotting paper and incubated at room temperature for a week. Each treatment was replicated thrice. Observations were recorded on seed germination, and seedling vigour in terms of shoot and root length and analyzed statistically.

Rust infection has significantly reduced the per cent seed germination, shoot and root length in all the varieties tested.

1000 - grain weight: There was significant reduction in 1000 - grain weight due to rust infection in different cultivars which varied from 18.89 to 63.08 per cent. Per cent reduction in 1000 - grain weight was maximum in Gulab followed by Lalbahadur (61.01). C-306 recorded minimum reduction in 1000 - grain weight due to rust and was followed by local red.

Seed germination: Per cent reduction in seed germination varied from 20 to 75 with an average of 46.84%. Per cent reduction in seed germination was maximum in Agra local, which was followed by Sonalika, Amruth and Gulab. Per cent reduction in seed germination was minimum in Pusa-4 followed by C-306 (Table 1).

Shoot length: Per cent reduction in shoot length due to rust infection varied from 13.89 to 71.79 in different genotypes with a mean of 46.17%. Per cent reduction in shoot length was maximum in Sonalika followed by Agra local, Gulab and Vijay. Per cent reduction in shoot length was minimum in Pusa-4 followed by Amruth (Table 2).

Root length: Per cent reduction in root length varied from 16.89 to 63.22 varieties like Gulab, Agra local, Vijay and Sonalika recorded more than 50% reduction in root length due to rust infection. Per cent reduction in root length was maximum in Gulab which was followed by Agra local and Vijay. Per cent reduction in root length was minimum in C-306 followed by Pusa-4 and Bijaga yellow (Table 2). Several workers have reported that rusts of wheat

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Received Aug., 2004 Revised Jan., 2006 Accepted March, 2006

Table 1. Effect of rust infection on seed germination in wheat

Variety	Seed germination (%)			1000 grain weight (g)			Disease score	
	Healthy	Infected	Per cent reduction	Healthy	Infected	Per cent reduction	Stem rust	Leaf rust
Bijaga yellow	83.33	53.33	30.00	42.84	31.54	26.38	40S	60S
Sonalika	80.00	13.33	66.67	38.50	20.96	45.56	30S	80S
Lal bahadur	86.67	46.67	40.00	34.71	13.53	61.01	5S	80S
Agra local	83.33	08.33	75.00	31.54	16.02	49.20	20S	80S
Amruth	76.67	23.33	53.30	37.00	25.56	30.92	40S	60S
Gulab	90.00	36.67	53.30	43.34	16.00	63.08	40S	60S
Local red	76.67	36.67	40.00	37.43	27.43	26.71	60S	80S
C-306	70.00	46.67	23.33	30.92	25.08	18.89	20S	80S
Pusa-4	83.33	63.33	20.00	30.70	22.75	26.61	40S	60S
Vijay	86.67	20.00	66.67	41.00	27.30	33.41	60S	40S
	SEm ±	CD at 1%		SEm ±	CD at 1%			
Variety (V)	3.54	13.53		0.25	0.72			
Infection (I)	1.50	05.72		0.11	0.32			
V x I	5.01	19.07		0.36	1.02			

Table 2. Effect of rust infection on seedling vigour in wheat

Variety	Shoot length (cms)			Root length (cms)		
	Healthy	Infected	Per cent reduction	Healthy	Infected	Per cent reduction
Bijaga yellow	8.63	4.95	42.64	5.21	4.03	22.65
Sonalika	11.52	3.25	71.79	6.90	3.42	50.43
Lal bahadur	10.83	4.89	54.85	7.43	4.34	41.59
Agra local	14.40	4.25	70.49	8.43	3.83	54.57
Amruth	8.33	6.75	18.97	5.65	3.98	29.56
Gulab	11.42	4.03	64.71	6.58	2.42	63.22
Local red	8.58	5.67	33.92	4.08	2.67	34.56
C-306	9.33	6.67	28.51	5.92	4.92	16.89
Pusa-4	9.00	7.75	13.89	6.58	5.07	22.95
Vijay	11.83	4.50	61.96	5.67	2.67	52.91
Mean	10.39	5.27	46.17	6.25	3.73	38.93
	SEm ±	CD at 1%		SEm ±	CD at 1%	
Variety (V)	0.592	2.26		0.378	1.44	
Infection (I)	0.265	1.00		0.169	0.64	
V x I	0.838	3.20		0.536	2.04	

cause significant reduction in grain number and 1000 - grain weight. Direct relation between yield and infection of leaf rust was established by Nargund [1]. Meenakumari *et al.* [2] reported 60.8 to 65.1 per cent maximum yield losses in highly susceptible wheat cultivars.

Results clearly indicated that rust infection has resulted in maximum reduction of seed germination and seedling vigour which varied with genotypes.

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