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Short Communication

Slow rusting and its potential donors for resistance in lentil (*Lens culinaris* Medik.)

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Lentil rust caused by *Uromyces fabae* (Pers.) de Bary is one of the major production constraint not only in India but in several other lentil growing countries [1, 2]. Under epidemic conditions, it can cause 70-100% yield losses [3-4]. Although effective chemical control measures are available to control the disease, however, development of resistant varieties is the most economical and eco-friendly means to control the disease. Evaluation of germplasm and advanced breeding lines are essential to identify resistant donors for their utilization in resistance breeding program. Therefore, the present study was conducted to evaluate diverse lentil genetic materials of indigenous and exotic origin at HPKVV, Dhaula Kuan, the hot spot for lentil rust.

A set of 255 lentil lines from various categories of international nurseries (LIEN-L-04, LIEN-S-04, LIABN-04, LIEN-E-04, LIRN-04, LIF3N-E-03, LIDTN-04) were received at IARI, New Delhi from ICARDA, Syria. These 255 lines along with 50 local accessions were evaluated during rabi 2003-04 cropping season at HPKVV, Dhaula Kuan, which is a hot-spot site for lentil rust, in order to generate information on potential donors for rust resistance from the materials of diverse origin. All these materials were grown in a single row plot of 2.5 m length in augmented design with row-to-row spacing of 50 cm and plant to plant distance of 3-4 cm. The resistant (PKVL 1) and susceptible (Sehore 74-3) checks were used repeatedly after every 10th test entry. The recommended agronomical practices were followed to raise a good crop except the application of any measures of disease control. Additionally, an infector-cum-indicator variety (Sehore 74-3) was planted all around the experimental block to ensure enough inoculum of *Uromyces fabae*. The natural epiphytotic condition was used to screen against rust. The disease started appearing in the first week of February 2004 as yellow white (muddy coloured) pycnia and aecial cups developed on lower leaf surface. However, in the first week of March 2004, uredial symptoms were clearly visible. Data on rust incidence were recorded twice, initially on 12.3.2004 and finally on 31.3.2004, as per standard procedures.

The rust incidence appeared in first week of February when the crop was at flowering stage. The typical disease symptoms included yellowish-white pycnia and aecial cups on the lower surface of leaflets and pods. Later, brown uredia were formed on both sides of leaflets, stem and pods. The dark brown (sometimes black) telia can also be seen on stems and branches. In many genotypes the whole plant dried before seed formation. According to Accatino [3], the lentil plants are more susceptible to rust at flowering stage.

The dynamics of rust development on selected accessions is presented in Table 1. The perusal of data revealed that the rust incidence varied from free to 100% susceptible in the materials under study, indicating the presence of adequate diversity in the material for their response to rust infection. Also, a wide spectrum and uniform disease development in the experimental plot indicated the presence of sufficient inoculum load. It was interesting to note that many lines which showed disease free reaction on initial screening turned to be highly susceptible later. These genotypes can be considered as fast rusting type. These are ILL 9893, ILL 9845, ILL 9913, ILL 9112, ILL 9888, ILL 9844, ILL 4401, ILL 7207, L 4649, L 7706, and L 7711. On the other hand, the lines that maintained a very low level of rust incidence until crop maturity, can be considered as lines that rusts slowly (ILL 8184, ILL 9907, ILL 9926, ILL 9969, ILL 9921, ILL 7547, ILL 6821, ILL 9941, ILL 7177, L 7669, L 7510 and L 7512). These genotypes can serve as very useful donors for genetical studies against lentil rust. The phenomenon of slow rusting has been investigated extensively in case of wheat [5]. Among the test lines, a total of 101 genotypes (33.1%) showed highly resistant reaction (Table 2). Out of these, 91 lines belonged to different nurseries received from 1CARDA, Syria and 10 lines were of Indian origin (L 1218, L 4618, L 7219, L 7647, L 7703, L 7704, L 7708, L 7709, L 7710, L 7773). Several lentil lines have been identified to be rust resistant in the past [6-7]. The resistant lines identified in the present study

Table 1. Dynamics of rust development on selected lentil materials

Sl. No.	Line	Rust incidence		Sl. No.	Line	Rust incidence	
		12.3.04	31.3.04			12.3.04	31.3.04
1.	ILL 9891	10 S	80S	38.	ILL 9921	5MR	10MR
2.	ILL 9895	F	40S	39.	ILL 9887	F	F
3.	ILL 9893	F	60S	40.	ILL 9997	F	10MR
4.	ILL 10009	F	30S	41.	ILL 9888	F	40S
5.	ILL 10006	F	F	42.	ILL 9962	TR	60S
6.	ILL 10005	F	F	43.	ILL 9941	5S	5S
7.	ILL 9901	F	F	44.	ILL 9956	10S	40S
8.	ILL 9957	5 MR	60S	45.	ILL 9830	20S	60S
9.	L 4592	20S	80S	46.	ILL 9844	F	80S
10.	ILL 6994	F	F	47.	ILL 2580	25S	60S
11.	ILL 7979	10S	80S	48.	ILL 5725	20S	80S
12.	ILL 9840	20S	80S	49.	ILL 4401	F	60S
13.	ILL 9917	TR	15MR	50.	ILL 5715	10S	60S
14.	ILL 9846	F	30S	51.	ILL 7177	5S	5S
15.	ILL 9847	F	F	52.	ILL 7207	F	80S
16.	ILL 9860	TMR	60S	53.	ILL 7127	30S	80S
17.	ILL 9958	30S	80S	54.	ILL 5684	20S	60S
18.	ILL 9982	F	20S	55.	ILL 7213	5S	20S
19.	ILL 590	10S	80S	56.	ILL 5597	20S	60S
20.	ILL 9958	30S	80S	57.	ILL 4401	TR	20S
21.	ILL 9913	F	60S	58.	ILL 7504	F	20S
22.	ILL 9861	10S	80S	59.	ILL 6037	5S	20S
23.	ILL 10015	10S	100S	60.	ILL 7219	F	F
24.	ILL 9912	F	80S	61.	ILL 7618	20S	40S
25.	ILL 10014	TS	80S	62.	ILL 7547	5S	5S
26.	ILL 9984	TR	60S	63.	ILL 6024	20S	60S
27.	ILL 9993	10S	100S	64.	ILL 8006	30S	60S
28.	ILL 9976	5S	80S	65.	ILL 7701	30S	60S
29.	ILL 9961	F	80S	66.	ILL 6821	F	10S
30.	ILL 9951	TR	60S	67.	ILL 7616	10S	20S
31.	ILL 9954	F	40S	68.	ILL 6567	TR	30S
32.	ILL 9933	5S	60S	69.	ILL 7668	30S	60S
33.	ILL 9991	10S	80S	70.	PKVL 1	F	F
34.	ILL 9927	10S	80S	71.	L 4076	10S	40S
35.	ILL 10019	10S	80S	72.	Sehore 74-3	40S	80S
36.	ILL 9924	10S	80S	73.	PL 4	10S	80S
37.	ILL 9969	TR	TR	74.	JL 1	25S	80S

F-Disease free, TR-Traces, TMR-Traces and moderately resistant, MR-Moderately resistant, S-Susceptible.

Table 2. Lentil lines completely free from rust infection in both the observations

Name of the nursery	Total number of entries	Entries free from rust infection
LIEN-L-04	22(6)	ILL 9896, 1851, 9979, 10006, 1005, 10005
LIEN-S-04	64(31)	ILL 9901, 9902, 9903, 9963, 9973, 9981, 6994, 9970, 9898, 5883, 9908, 9905, 9847, 10002, 9975, 9899, 9864, 9900, 9841, 9858, 9904, 9867, 9897, 9915, 9916, 9987, 9859, 9854, 9911, 9988, 9974
LABN-04	29(12)	ILL 7517, 7179, 5755, 2439, 7193, 6465, 7537, 5244, 8106, 6258, 358, 5604
LIEN-E-04	48(8)	ILL 9985, 9928, 9994, 10012, 10021, 10016, 9943, 9996
LIRN-04	39(13)	ILL 8007, 8008, 7199, 7217, 7670, 7215, 7717, 7204, 4605, 7683, 7219, 7713, 8076
LIF3N-E-03	22(6)	P 26105, 26106, 26107, 26112, 26115, 26120
LIDTN-04	31(12)	ILL 9938, 9887, 10011, 9972, 9850, 9923, 9948, 9922, 9971, 9878, 9998, 9947
Others	50(13)	L 1218, L 4618, L 7219, L 7647, L 7703, L 7704, L 7708, L 7709, L 7710, L 7773, ILL 4605, ILL 7217, ILL 9928

Note. Number of lines free from rust infection are given in the parentheses.

shall be further evaluated for rust reaction on multi-location basis, alongwith agronomic traits for their utilization in lentil breeding program.

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