

## Screening of Sunflower Genotypes Against Rust Caused by *Puccinia helianthi*

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### Abstract

In the present study 107 genotypes were screened against sunflower rust under field conditions during *kharif*. Observation on incidence of rust was recorded at grain filling stage using 0—9 scale. The rust severity ranged from 1 to 7 grade. None of them were found to be immune to rust. However, only three genotypes viz., ACC No.373, 410 and RSFH-1 were found to be highly resistant to rust showing I grade while 82 genotypes showed three grade. Twenty genotypes showed five grade and two genotypes viz., Morden and L-101 showed seven grade.

**Key words :** Sunflower genotypes, Rust, *Puccinia helianthi*.

Sunflower (*Helianthus annuus* L.) is one of the most important sources of vegetable oil next to groundnut in the world. It is rich source of edible oil (40 to 52%), sunflower oil is considered as good quality oil from health point of view due to the high concentration of polyunsaturated fatty acids which are known to reduce the risk of coronary diseases. Among different diseases of sunflower, rust caused by *Puccinia helianthi* is one of the most destructive disease of sunflower in the world. In India the disease was first reported from the then Bombay state by Uppal et al. in 1935 (1). The disease severity varies in different parts of the country. The disease has assumed epiphytotic proportions in recent years in many parts of Karnataka and neighbouring states. Cultivation of resistant genotype is the effective and cheap method to combat the disease as compared to chemical control. In Karnataka, Raichur has been considered as a hot spot for rust screening.

### Methods

#### *Screening of Sunflower Genotypes Against Rust*

A field experiment was conducted to find out the sources of resistance to rust disease of sunflower at Regional Research Station, Raichur. A total of 107 germplasm/lines were screened from the experiment of All India Co-ordinated Research project on Sunflower at Regional Research Station, Raichur. All the

genotypes and hybrids collected were sown in single line of three metre length. An infector row L-101 was sown after every 10 test entries all along the border of the experimental field. Two rows each of L-101 and Morden were sown. Environmental factors like rainfall, relative humidity and temperature were congenial for the disease development during the period of experiment. Observation on rust was recorded at the grain filling stage of the crop growth using 0 to 9 scale as given by Mayee and Datar (2).

Rating value	Description
0	No symptom on the leaf
1	Small, dark brown. Powdery pustules covering 1% or less of the leaf area
3	Typical rust pustules covering 1 to 10% of the leaf area
5	Typical rust pustules covering 11 to 25% of the leaf area
7	Typical rust pustules covering 26 to 50% of the leaf area
9	Rust pustules covering 51% or more of the leaf area, withering of leaf

### Results and Discussion

The management of disease through host plant resistant resistance has been an apt choice in all crop

**Table 1.** Screening of sunflower genotypes against rust caused by *Puccinia helianthi* during late *kharif*.

		Disease screening 0—9 scale		Disease screening 0—9 scale	
	Genotypes		Genotypes		
1	ACC. No. 8	3	54	MLSFH-82	3
2	ACC. No. 9	3	55	MLSFH-84	3
3	ACC. No. 15	3	56	MLSFH-17	5
4	ACC. No. 25	3	57	MSFH-55	3
5	ACC. No. 35	3	58	NARDI-412	5
6	ACC. No. 82	3	59	NARDI-413	3
7	ACC. No.208	3	60	NDDH-188	3
8	ACC. No. 336	3	61	NJSFH-63	5
9	ACC. No. 373	1	62	NJSFH-72	3
10	ACC. No. 410	1	63	NSFH-9411	3
11	ACC. No. 664	3	64	NSSH-27	3
12	ACC. No. 715	3	65	NSV-45	3
13	ACC. No. 916	3	66	PAC-312	3
14	ACC. No. 1039	3	67	PAC-335	3
15	ACC. No. 1166	3	68	PAC-1091	5
16	ACC. No.	3	69	PAC-3776	3
17	AASF-13	3	70	PAC-8310	3
18	Amrutha-51	3	71	PAC-39002	3
19	DSH-26	5	72	PAS-8372	5
20	DSH-34	3	73	PBSFH-54	3
21	DSH-39	5	74	PBSFH-72	3
22	DSH-111	3	75	PESH-245	3
23	DSH-255	5	76	PGS-207	3
24	DSH-257	5	77	PGS-262	3
25	DSH-276	5	78	PGS-303	5
26	DRSH-105	3	79	PKVSH-46	3
27	EC-68414	3	80	PGS-303	3
28	GAUSUF-15	3	81	Pro-007	3
29	GAUSUF-22	3	82	RSFH-1	1
30	GAUSUF-85	3	83	S-11104	3
31	IAHS-19	5	84	S-9618	3
32	ISFH-944	3	85	SCH-24	3
33	JKSFH-311	3	86	SCH-44	5
34	JKSFH-992	3	87	SH-177	3
35	Kaveri	5	88	SH-205	3
36	Kaveri-636	3	89	SH-6068	3
37	KBSH-44	3	90	SH-6113	5
38	KBSH-46	3	91	Sungene-75	3
39	KBSH-47	3	92	Sungene-95	3
40	KBSH-50	3	93	Sungene-96	3
41	KBSH-51	3	94	Surya	5
42	KBSH-52	3	95	TAHS-21	3
43	Konark-1	3	96	TNAU-2	3
44	Konark-2	3	97	TNAUSUF-7	3
45	Krishidan-1397	3	98	TNAUSUF-242	3
46	Krishidan-1999	3	99	TNAUSUF-9522	3
47	Krishidan-2000	5	100	Topaz	3
48	LS-1-41-1	3	101	TWCH-442	3
49	LS-988	3	102	USFH-116	5
50	Mahabeej-530	3	103	ZSH-9704	3
51	Mahabeej-917	3	104	ZSH-9837	3
52	Mahabeej-933	3	105	ZSH-9838	3
53	MLSFH-47	3	106	L-101	7

**Table 1.** Continued.

		Disease screening 0—9 scale		Disease screening 0—9 scale
	Genotypes		Genotypes	
107	Morden	7		

improvement programmes. Utilization of resistant varieties in farming is the most simple, effective and economical method in the management of biotic means. Besides the resistant varieties conserve natural resources and reduce the cost, time and energy when compared to the other methods of disease management. In Karnataka, Raichur has been considered as hot spot to rust disease (3). In the present study out of 107 sunflower genotypes screened, none of them were found to be immune to rust. However, three genotypes viz., ACC No. 373, 410 and RSFH-1 were found to be highly resistant to rust showing 1 grade. The results are presented in Tables 1 and 2.

Eighty two genotypes viz., ACC. No. 8, 9, 15, 25, 35, 82, 208, 336, 664, 715, 916, 1039, 1166, 1565, AASF-13, Amrutha-51, DSH-34, DSH-111, DRSH-105, EC-68414, GAUSUF-15, GAUSUF-22, GAUSUF-85, ISFH-944, JKSFH-311, JKSFH-992, Kaveri-636, KBSH-44, KBSH-46, KBSH-47, KBSH-50, KBSH-51, KBSH-52, Konark-1, Konark-2, Krishidan-1397, Krishidan-1999, LS-1-41-1, LS-988, Mahabeej-530, Mahabeej-917, Mahabeej-933, MLSFH-47, MLSFH-82, MLSFH-84, MSFH-55, NARDI-413, NDSH-188, NJSFH-72, NSFH-9411, NSSH-27, NSV-45, PAC-312, PAC-335, PAC-3776, PAC-39002, PBSFH-54, PBSFH-72, PESH-245, PGS-207, PGS-262, PKVSH-46, Pro-007, S-11104, S-9618, SCH-24, SH-177, SH-205, SH-6068, Sungene-75, Sungene-95, Sungene-96, TAHS-21, TNAU-2, TNAUSUF-7, TNAUSUF-242, TNAUSUF-9522, Topaz, TWCH-442, ZSH-9704, ZSH-9837, ZSH-9838 were found to be resistant to rust which showed 3 grade (Table 1).

The genotypes viz. DSH-26, DSH-39, DSH-255, DSH-257, DSH-276, IAHS-19, Kaveri, Krishidan-2000, MSFH-17, NARDI-412, NGSFH-63, PAC-1091, PAC-8372, PGS-303, SCH-44, SH-6113, Surya, USFH-116, ZSH-9704 were found moderately susceptible to rust showing 5 grade. Two genotypes viz., Morden and L-101 were found susceptible to rust which showed 7 grade.

Nagaraju et al. (4) evaluated eight populations

**Table 2.** Screening of sunflower genotypes against rust caused by *Puccinia helianthi* under filed conditions.

Rating	Reaction	Genotype response
0	Immune	Nil
1	Highly resistant	ACC No. 373, 410 and RSFH-1
3	Resistant	ACC. No. 8, 9, 15, 25, 35, 82, 208, 336, 664, 715, 916, 1039, 1166, 1565, AASF-13, Amrutha-51, DSH-34, DSH-111, DRSH-105, EC-68414, GAUSUF-15, GAUSUF-22, GAUSUF-85, ISFH-944, JKSFH-311, JKSFH-992, Kaveri-636, KBSH-44, KBSH-46, KBSH-47, KBSH-50, KBSH-51, KBSH-52, Konark-1, Konark-2, Krishidan-1397, Krishidan-1999, LS-1-41-1, LS-988, Mahabeej-530, Mahabeej-917, Mahabeej-933, MLSFH-47, MLSFH-82, MLSFH-84, MSFH-55, NARDI-413, NDSH-188, NJSFH-72, NSFH-9411, NSSH-27, NSV-45, PAC-312, PAC-335, PAC-3776, PAC-39002, PBSFH-54, PBSFH-72, PCSH-245, PGS-207, PGS-262, PKVSH-46, Pro-007, S-11104, S-9618, SCH-24, SH-177, SH-205, SH-6068, Sungene-75, Sungene-95, Sungene-96, TAHS-21, TNAU-2, TNAUSUF-7, TNAUSUF-242, TNAUSUF-9522, Topaz, TWCH-442, ZSH-9837, ZSH-9838.
5	Moderately susceptible	DSH-26, DSH-39, DSH-255, DSH-257, DSH-276, IAHS-19, Kaveri, Krishidhan-2000, MSFH-17, NARDI-412, NGSFH-63, PAC-1091, PAC-8372, PGS-303, SCH-44, SH-6113, Surya, USFH-116, ZSH-9704
7	Susceptible	Morden, L-101
9	Highly susceptible	NIL

and eight hybrids of sunflower for resistance to rust. Among the populations, TNAUSUF-5 was considered as most resistant and all hybrids showed superiority over the population in resistance to rust.

Velazhahan et al. (5) assessed 196 sunflower germplasm for rust disease severity at heading stage under natural field conditions. Their results revealed that none of the lines were immune to *Puccinia helianthi*. Seven were resistant, 61 were moderately resistant (MR), 76 were moderately susceptible and 52 were susceptible.

Jamadar et al. (6) evaluated 110 genotypes against rust of sunflower at Regional Research station, Raichur under field conditions. Among them 22 showed 1 grade, 69 genotypes with 3 grade and 19 genotypes showed 5 grade.

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