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Varietal screening against corm rot/wilt of gladiolus cause by *Fusarium oxysporum* f. sp. *Gladioli*

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Abstract

Field experiments on varietal screening screening in sick soil for corm rot of gladiolus was carried out during 2019-2020 at National Agriculture Research Project, Ganeshkhind, Pune. The results indicated that none of the variety was noticed free from disease. Nine varieties viz. IIHR-59-32, Punjab glance, Arti, Pusa Kiran, Punjab glad-1, Surayakiran, Subhagini, Arka ragini, and Phule Tejasfound resistant to wilt. While twenty two varieties were found moderately resistant, three varieties namely Summer sunshine, Suchitra and Psitacinus hybrid showed moderately susceptible reaction, while one variety viz. Sancerre showed susceptible reaction. Out of twenty gladiolus hybrid lines, only one hybrid line viz. 07-9 was found free from wilt disease. Eight hybrid lines viz. 07-1,07-2, 07-8, 07-13, 07-14, 07-15, 07-19 and 94-02 showed less than 5.0 percent disease incidence and were found resistant to wilt. While, ten hybrid lines showed 5.1 to 10.0 percent disease incidence. Only one hybrid line viz. 07-6 was found susceptible to wilt.

Keywords: Germplasm selection, resistance, wilt of gladiolus, incidence

Introduction

Gladiolus (*Gladiolus dracociphalus* L.) is generally referred to as sword lilly, after rose, carnation and chrysanthemum, fourth on the international market. It is a major cut flower crop that grows primarily for the purpose of cutting flowers. In several parts of the world, it has achieved prominence. In India, gladiolus has become the most popular commercial cut flower crop grown over an area of 500 ha because of its unsurpassed beauty and economic value. But the consistency and quantity of the flower is decreased because of certain biotic stresses. Wilt, caused by *Fusarium oxysporum* f sp gladioli and can cause a crop failure of up to 60-80 percent, is the most serious biotic stress of gladiolus. The present research was therefore conducted in order to identify effective steps for improved disease control through varietal screening against wilt of Galdiolus cause by *Fusarium oxysporum* f. sp. *Gladioli*.

Material and Methods

Field experiments was carried out on varietal screening of corm rot of gladiolus was carried out during 2019- 2020 at National Agriculture Research Project, Ganeshkhind, Pune. The material used and the methods followed are described in this chapter.

Varietal Screening for Disease Resistance

To find out the source of resistance in gladiolus varieties and hybrid lines, screening of gladiolus were done in field. Thirty five varieties and twenty hybrid lines of gladiolus were selected for screening.

Disease Reaction

Virulence of pathogen and disease reaction against thirty five varieties and twenty hybrid lines of gladiolus were recorded by (Mayee and Datar, 1986) ^[2].

Reactions		% Wilt Incidence
Immune	(I)	00.00
Resistant	(R)	00.1- 5.0 %
Moderately resistant	(MR)	05.1- 10 %
Moderately susceptible	(MS)	10.1- 20 %
Susceptible	(S)	20.1- 50%
Highly susceptible	(HS)	50.1% and above

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Varieties of Gladiolus

Thirty five varieties of gladiolus were selected for screening against *Fusarium oxysporum* f. sp. *Gladioli*.

Hybrid Lines of Gladiolus

Twenty hybrid lines were selected for screening against *Fusarium oxysporum* f. sp. *gladioli*. Gladiolus corms of varieties and hybrid lines were stored in refrigerator for one month. After this, corms were surface sterilized with 0.1 per cent Mercuric chloride. Then corms were washed with sterile distilled water and dried at room temperature before sowing. In the sick soil, corms of gladiolus varieties and hybrid lines were sown. Observation on wilt per cent incidence was recorded after 15 days. Per cent wilt incidence was calculated by using following formulae.

$$\% \text{ Incidence} = \frac{\text{Number of wilted plants}}{\text{Total number of sown corms}} \times 100$$

Table 1: Varieties of gladiolus selected for screening

Sr. No	Name of varieties	Sr. No	Name of varieties
1.	White Chiffon	18.	Punjab glad-1
2.	UHFS gold	19.	Surayakiran
3.	Sancerre	20.	Punjab pink elgance
4.	Hyderabad AC-7	21.	Pusa shubhangi
5.	Punjab lemon delight	22.	Jag-G-7
6.	Red floret	23.	Psitacinus hybrid
7.	Arka kesar	24.	Shubhagini
8.	Tambri	25.	Pusa urmila
9.	DHL-86-1	26.	Suchitra
10.	Selection white	27.	Melody
11.	Rose supreme	28.	Arka ragini
12.	Yellow stone	29.	Pusa sinduri
13.	IIHR-59-32	30.	Colding cream
14.	Punjab glance	31.	Phule Neelrekha
15.	Arti	32.	Phule Ganesh
16.	Summer sunshine	33.	Phule Tejas
17.	Pusa Kiran	34.	Phule Prerna
		35.	Arka Manorama

Table 2: Hybrid lines of gladiolus selected for screening

Sr. No	Name of Hybrid Lines	Sr. No	Name of Hybrid Lines
1.	07-1	11.	07-11
2.	07-2	12.	07-13
3.	07-3	13.	07-14
4.	07-4	14.	07-15
5.	07-5	15.	07-16
6.	07-6	16.	07-18
7.	07-7	17.	07-19
8.	07-8	18.	07-22
9.	07-9	19.	94-02
10.	07-10	20.	94-97

Result and discussion

Table 3: Reaction of different varieties against wilt / corm rot of gladiolus caused by *Fusarium oxysporum* f. sp. *gladioli*

Sr. No	Name of varieties	Per cent Disease incidence	Reaction
1.	White Chiffon	10.00	MR
2.	UHFS gold	5.55	MR
3.	Sancerre	27.77	S
4.	Hyderabad AC-7	9.52	MR
5.	Punjab lemon delight	9.09	MR
6.	Red floret	5.00	MR
7.	Arkakesar	5.55	MR

1. Varietal Screening

The results presented in Table 3 and Table 5 indicated that the gladiolus varieties and hybrid lines have variable reaction against *Fusarium oxysporum* f. sp. *gladioli*. Within first fifteen to twenty days wilting plant appears and after some days of observations majority of genotypes exhibited wilting symptoms. The reaction of genotypes was worked out as per Mayee and Datar (1986) [2] per cent wilt incidence scale with slightly modifications.

Reactions		% Wilt Incidence
Immune	(I)	00.00
Resistant	(R)	0.1- 5.0%
Moderately resistant	(MR)	5.1- 10 %
Moderately susceptible	(MS)	10.1- 20 %
Susceptible	(S)	20.1- 50%
Highly susceptible	(HS)	50.1% and above

Screening of Gladiolus Varieties against Wilt/Corm Rot Disease

Out of thirty five gladiolus varieties, none of the variety was found free from wilt disease, nine varieties showed 1.1 to 5.0 % disease incidence, twenty two varieties showed 5.1 to 10.0 % disease incidence and three varieties showed 10.1 to 20.0% disease incidence. While only one variety viz. Sancerre showed more than 20% disease incidence. (Table 3 and 4)

The results depicted in Table 5 and Table 6 indicated that, none of the variety was noticed free from disease. Nine varieties viz. IIHR-59-32, Punjab glance, Arti, Pusa Kiran, Punjab glad-1, Surayakiran, Subhagini, Arka ragini, and Phule Tejas found resistant to wilt. While twenty two varieties were found moderately resistant, three varieties namely Summer sunshine, Suchitra and Psitacinus hybrid showed moderately susceptible reaction, while one variety viz. Sancerre showed susceptible reaction.

Screening of Gladiolus Hybrid Lines against Wilt/Corm rot Disease

The results presented (Table 5, 6) indicated that, out of twenty gladiolus hybrid lines, only one hybrid line viz. 07-9 was found free from wilt disease. Eight hybrid lines viz. 07-1, 07-2, 07-8, 07-13, 07-14, 07-15, 07-19 and 94-02 showed less than 5.0 percent disease incidence and were found resistant to wilt. While, ten hybrid lines showed 5.1 to 10.0 percent disease incidence. Only one hybrid line viz. 07-6 was found susceptible to wilt.

The work on finding the source of resistant through varietal screening against *Fusarium* wilt/ corm rot pathogen of gladiolus was also done by Palmer and Pyral (1958), who reported out of 160 gladiolus cultivars, 10 per cent cultivars were resistant to wilt disease of gladiolus caused by *Fusarium* spp. Ronald *et al.* (1974) had screened 211 cultivars for resistance to *F. oxysporum* f. sp. *gladioli* by inoculating dormant corms and they found that selections 66 – 109 – 5 and 63– 51 were found resistant.

8.	Tambri	6.66	MR
9.	DHL-86-1	5.55	MR
10.	Selection white	6.66	MR
11.	Rose supreme	5.26	MR
12.	Yellow stone	4.76	MR
13.	IIHR-59-32	5.00	R
14.	Punjab glance	4.54	R
15.	Arti	4.54	R
16.	Summer sunshine	11.11	MS
17.	Pusa Kiran	5.00	R
18.	Punjab glad-1	5.00	R
19.	Surayakiran	5.00	R
20.	Punjab pink elegance	6.66	MR
21.	Pusashubhangi	5.88	MR
22.	Jag-G-7	9.09	MR
23.	Psitacinus hybrid	13.63	MS
24.	Shubhagini	4.45	R
25.	Pusaarmila	6.66	MR
26.	Suchitra	10.66	MS
27.	Melody	10.00	MR
28.	Arkaragini	5.00	R
29.	Pusasinduri	5.88	MR
30.	Colding cream	5.26	MR
31.	Phule Neelrekha	9.09	MR
32.	Phule Ganesh	8.00	MR
33.	Phule Tejas	4.16	R
34.	Phule Prerna	7.40	MR
35.	ArkaManoroma	8.00	MR

Table 4: Reaction for disease resistance of gladiolus varieties against corm rot/ wilt disease

Disease Rating	Reaction	No. of Varieties	Name of Varieties
00 %	Immune	00	-
0.1 -5.0%	Resistant	09	IIHR-59-32, Punjab glance, Arti, Pusa Kiran, Punjab glad-1, Surayakiran, Subhagini, Arka ragini, and Phule Tejas
5.1.1-10 %	Moderately resistant	22	White Chiffon, UHFS gold, Hyderabad AC-7, Punjab lemon delight, Red floret, Arkakesar, Tambri, DHL-86-1, Selection white, Rose supreme, Yellow stone, Punjab pink elegance, Pusashubhangi, Jag-G-7, Pusaarmila, Melody, Pusasinduri, Colding cream, Phule Neelrekha, Phule Ganesh, Phule Prerna, Arka Manoroma.
10.1- 20 %	Moderately susceptible	03	Summer sunshine, Suchitra, Psitacinus hybrid
20.1- 50 %	Susceptible	01	Sancerre
Above 50 %	Highly susceptible	00	-

Table 5: Reaction of different Hybrid lines against wilt / corm rot of gladiolus caused by *Fusarium oxysporum* f. sp. *gladioli*

Sr. No	Name of Hybrid Lines	Per cent Disease Incidence	Reaction
1.	07-1	5.00	R
2.	07-2	4.54	R
3.	07-3	10.00	MR
4.	07-4	6.66	MR
5.	07-5	8.33	MR
6.	07-6	20.00	MS
7.	07-7	6.66	MR
8.	07-8	5.00	R
9.	07-9	00	I
10.	07-10	7.14	MR
11.	07-11	8.00	MR
12.	07-13	4.76	R
13.	07-14	5.00	R
14.	07-15	4.16	R
15.	07-16	6.66	MR
16.	07-18	6.66	MR
17.	07-19	2.85	R
18.	07-22	10.00	MR
19.	94-02	4.00	R
20.	94-97	8.00	MR

Table 6: Reaction for Disease Resistance of Gladiolus Varieties against Corm rot/ Wilt disease

Disease Rating	Reaction	No. of Hybrids	Name of Hybrids
00 %	Immune	01	07-9
0.1 to 5.0 %	Resistant	08	07-1,07-2, 07-8, 07-13, 07-14, 07-15, 07-19 and 94-02
1.1- 10 %	Moderately resistant	10	07-3, 07-4, 07-5, 07-7, 07-10, 07-11, 07-16, 07-18, 07-22, 94-97.
10.1- 20 %	Moderately susceptible	1	07-6
20.1- 50 %	Susceptible	0	-
Above 50 %	Highly susceptible	00	-

Tarabeih *et al.* (1981) Screened different cultivars against *Fusarium* causes wilt disease in gladiolus and found that, one cultivar 'Mentee White' was resistance while four cultivars 'WoodPecker', 'Lilac Wonder', 'True Love' and 'White Friendship' were reported moderately resistant to the disease. Chandra *et al.* (1985) screened 41 cultivars and 14 hybrids for resistance to *F. oxysporum* f. sp. *gladioli* and found that Australian fair and Monsoer were tolerant.

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