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Screening of Different Genotypes Against Castor Gray Mold Disease

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ABSTRACT

The gray mold of castor is one of the most important destructive diseases of castor is gray mold, caused by the fungus Botryotinia ricini.Castor germ plasm lines were screened againt gray mold diseases for the identification of resistance source in field and also in glass house by using detached spike technique.Among all the germplasm lines, only RG - 1826 germplasm lines showed disease severity of 25% in field conditions where as in detached spike technique , germ plasm line RG-1826 showed 20 % disease sevearity. Remaining all germplasm lines showed more than 25 % disease severity. Where as in susceptible check DCH -519 showed more than 90 % disease severity. Fifty germplasm accessions were screened by detached spike/ raceme technique in glasshouse and by field fogging technique. Out of the fifty germplasm lines, only one germplasm line RG-1826 showed least susceptible to the gay mold disease.

Key words: *Castor, gray mold disease, detached spike technique, Field fogging technique*

INTRODUCTION

Castor is an important non-edible oil seed crop. Castor is known to suffer from many fungal and bacterial diseases at different crop growth stages.The crop is most commonly affected by wilt, gray mould, root rot, seedling blight, Cercospora leaf spot, powdery mildew Alternaria blight, and bacterial leaf spot. Among them,gray mold of castor is one of the most destructive diseases of castor is gray mold, caused by the fungus *Botryotinia ricini*. In Telangana State, the area of castor cultivation has come down drastically from 3.92 lakh ha during the year 2000-01 to 1.30 lakh ha during the year 2014-15 as the farmers are reluctant to grow the crop due to huge yield losses caused by the gray mold. In India, the disease first occurred in Karnataka[2]. The anamorph of B. ricini was characterized based on morphological & molecular studies. The morphological studies are in accordance to reportd[4].Castor oil is commercially very valuable and obtained from seeds, which contain 50-55% oil, and plays a vital role in Indian vegetable oil economy. This oil is considered as an option for biodiesel production in several countries. The disease is confined to few states of India *viz*., Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Odisha, Rajasthan and Gujarat. Gray mold is regarded as troublesome only in Andhra Pradesh and Tamil Nadu, in the South, where the weather conditions are more favorable for disease development[3].

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Yield losses of up to 100% are quite frequent when highly susceptible cultivars are planted. Conversely, in Bahia the major castor producer in Brazil gray mold is not a problem because the weather conditions are usually not favorable for disease development. The primary targets of the fungus are the inflorescence and the capsules, in any development stage reported[5]. Gray mold disease shows a random distribution pattern, matching its airborne nature. However, under high rainfall, the disease assumes an aggregate pattern, typical of those dispersed by water splash reported[8].B. ricini produces good sporulation and profuse mycelium on Oat meal agar medium enriched with L-aspargine, gallic acid and castor pericarp extract reported[7]. The fungus survives on infected castor crop debris for six and nine months under 9 field and laboratory conditions, respectively. It may also survive in quiescent state in seeds or in other host parts or form dormant resting structures like sclerotia, which may help in disease initiation and development under favourable conditions[9]. In the present study, different germplasm lines are screened against to the gray mold disease under glass house and also in field for the identification of resistant sources.

MATERIALS AND METHODS

Isolation of Botrytis and preparation of spore suspension

The pathogen Botryotinia ricini Whetzel used in the present study were isolated from infected samples collected from (DOR), experimental fields of Directorate of Oilseeds Research Hyderabad, India. Botryotinia ricini was isolated using Oat meal agar (OMA) medium. Sterile water (50ml) was added to the culture plates and the surface was scraped lightly with a sterile transfer loop. The resulting suspension was filtered through two layers of sterile muslin cloth. The conidia suspension was adjusted to 10^6 conidia/ml with sterile distilled water using haemocytometer. The fungal suspension (spore and hyphae) was mixed and homogenized using sterile water and 0.03% Tween-20 added to the spore suspension for the stickiness of spores on castor. The pathogenic isolates has been maintained on modified Oat Meal Agar (OMA) reported[7]. Spikes/ racemes of 20 days old along with 10cm stalk are cut from castor plants, cut end of stalks immersed in 2% sucrose solution in conical flasks and *Botryotinia ricini* conidia spore suspension (10^6 spores/ml) was prepared from 7-day-old culture grown on OMA medium was used.Gray mold disease severity was records based on the visual symptoms area observed on castor spikes.The spikes thus prepared are kept in glasshouse where a humidity of 80%, temperature around 270 C and continuous capsule wetness are maintained by fogging for one min for one hour in detached spike technique Where as in field for maintaining capsule wetness and humidity, four way foggers are fixed on PVC lateral pipes drawn at a height of 6 ft one line each between two castor rows from underground irrigation pipelines for which pre-filtered (30 m3 screen filter) irrigation water is supplied at a pressure of 4kg/ cm2 from water source[6]. Based on the infection of Botryotinia ricini (on primary, secondary and tertiary racemes (sequence of recemes/ spikes appear on growing plant) a 0-9 scale developed at Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad[1].

Disease grade	Intensity of infection %	Reaction
0	No infection	Immune
1	1-10	Resistant
3	11-20	Moderately resistant
5	21-30	Moderately susceptible
7	31-50	Susceptible
9	>51	Highly susceptible

RESULTS AND DISCUSSION

Symptomology

Infected capsules are covered by characteristic grey or ash coloured growth of the fungus. Infected spikes become sterile without capsules. Full growth of the gray mold disease was observed 6th day after inoculation Blue spots of different sizes appear on the side branches and laterals of the spike. Yellowish drops of liquid exude from these portions which are covered by fluffy grey fungal growth Infected. Capsules rot and shed off. Bluish spots on capsules from which yellow liquid oozes out could be seen and strands of fungal hyphae emerge out from these spots within a short period[10].

Table 1: Confirmation of resistance against Botryotinia gray mold under glass house and also in field condition (IIOR, 2016-17)

S.No	Entry No.	Disease Severity (%)		S.No	Entry No.	Disease Severity (%)	
		field	Detachedspikes			field	Detached spikes
1	RG-3968	50	55	26	RG-3880	35	35
2	RG-1494	55	64	27	RG-3938	60	65
3	RG-3975	50	65	28	RG-2740	50	70
4	RG-3976	65	85	29	RG-3798	42	98
5	RG-1826	25	20	30	RG-3790	50	75
6	RG-3978	NS	NS	31	RG-3477	55	85
7	RG-3981	NS	NS	32	RG-18	45	55
8	RG-3983	NS	NS	33	RG-27	55	60
9	RG-3985	60	72	34	RG-1117	60	75
10	RG-3987	NS	NS	35	RG-297	60	80
11	RG-1437	65	85	36	RG-3100	50	62
12	RG-2139	70	80	37	RG-3031	45	55
13	RG-3999	50	75	38	RG-298	55	65
14	RG-4001	80	95	39	RG-3055	40	56
15	RG-4003	55	62	40	RG-3087	40	62
16	RG-4018	85	85	41	RG-3445	70	85
17	RG-4024	70	80	42	RG-66	65	70
18	RG-4025	60	65	43	RG-2747	60	70
19	RG-2661	53	60	44	RG-57	35	64
20	RG-3060	55	62	45	RG-3454	NS	NS
21	RG-3527	65	75	46	RG-3233	50	62
22	RG-3705	85	80	47	RG-2364	75	70
23	RG-3728	45	65	48	RG-1741	80	85
24	RG-3714	50	60	49	RG-3722	45	65
25	RG-3741	45	55	50	RG-3746	55	72
				51	DCH-519	95	100

Fifty germplasm accessions were screened for confirmation of resistance against Botryotinia gray mold under artificial epiphytotic conditions in the glass house and in field. Gray mold incidence was scored by determining the percentage of capsules infected on racemes using a 0-9 scale for the gray mold in castor. All the germplasm lines showed disease severity of >25% except RG - 1826 which showed disease severity 25% and 20 % in both field and in glass house respectively. Only one gremplasm line showed 35 % disease severity in both field and in glass house. The susceptible check DCH -519 showed more than 90% disease severity. In detached spike technique, capsule wetness are maintained by fogging for one min for one hour. Initial symptoms of gray mold infection appear 4 days after inoculation. All the capsules are covered with gray mycelium of the fungus 7 th

day after inoculation. Fifty germplasm accessions were screened by detached spike/ raceme technique in glasshouse and by field fogging technique. out of the fifty germplasm lines , only one germplasm line RG-1826 showed least susceptible to the gay mold disease. The use of varietal resistance is one of the major strategy for disease management. However, as highlighted previously, there are no genotypes with satisfactory resistance levels to gray mold[3].

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