

RESEARCH ARTICLE

Survival of *Colletotrichum truncatum* in seeds and crop debris of greengram [*Vigna radiata* (L.) Wilczek]

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ABSTRACT

The per cent viability of conidia of *Colletotrichum truncatum* in crop debris was significantly affected by duration of storage as well as different storage conditions. The conidia survived for a maximum of 360 days under freeze (4 - 5°C) conditions and least survivability of 90 days under field condition (28 - 30°C). In case of infected seeds, the pathogen survived up to the next crop season (12 months) but the survivability decreased with lapse of time. However, the germination percentage of the seeds increased with storage time.

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INTRODUCTION

Greengram [*Vigna radiata* (L.) Wilczek] is one of the important pulse crops of India and is cultivated in 32.99 lakh ha with production of 13.74 lakh tonnes with a productivity of 417 kg per ha, while in Karnataka, the area under greengram was 1.77 lakh ha and production of 0.71 lakh tonnes and productivity of 399 kg per ha (Rajendra Prasad, 2006).

The average yield of greengram in our country is very low. It has the yield potential of 11 to 12 q per ha (Anonymous, 2004), as against the national average of 4.17 q per ha. Among various factors responsible for low yields, biotic and abiotic stresses take a heavy toll of the crop, out of which anthracnose disease causes an estimated yield losses of 18.2 to 86.57 per cent (Laxman, 2006).

Seed plays a vital role in the production of healthy crop. Seed borne disease of greengram like anthracnose caused by *Colletotrichum truncatum* (Schw.) Andrus and Moore has been reported from all regions of India in mild to severe form. It causes considerable damage by reducing seed quality and yield. Information with respect to the mode of survival of the pathogen from one season to another is hardly available in the literature. Therefore, attempts were made during 2007-08

post crop season to observe the role of infected seeds and crop debris in the perpetuation of the pathogen from season to season.

MATERIALS AND METHODS

The present investigation on viability and survival of *C. truncatum* was undertaken during 2007-08 at Agricultural College, Dharwad (Karnataka) to obtain the information about the perpetuation of the pathogen during the off season. Fresh leaves of greengram plants infected with anthracnose were collected and stored in paper bags under different storage conditions viz., freeze (4 - 5°C), under tree shade (18 - 22°C), room temperature (20 - 25°C), glasshouse (25 - 28°C) and field conditions (28 - 30°C) in separate lots.

Per cent germination of conidia on each type of stored leaf was recorded before their preservation. The viability of conidia on leaf under different storage conditions was regularly examined at 15 days interval by checking the germination under microscope.

To study the survival of pathogen on infected seeds obtained from naturally infected pods of greengram were initially sun dried for a week and stored at room temperature.

The seed samples were drawn at regular monthly interval and each time 400 seeds were subjected to standard blotter test in two replications to evaluate *C. truncatum* seed infection. Similarly, viability of greengram seeds during each observation was recorded by subjecting 100 seeds from each seed sample to standard germination test and per cent germination was worked out (Anonymous, 1996).

RESULTS AND DISCUSSION

The observations (Table 1) revealed that, per cent viability of conidia decreased with increase in storage period in all conditions tested. The conidia remained viable for 120 days when kept under glasshouse conditions, whereas they remained viable for 210 days at room conditions. Similarly, the viability of conidia, remained for 240 days under tree shade condition. Maximum period of viability of spores remained upto 360 days under freeze condition. The lowest period of viability of conidia remained for 90 days under field conditions.

Earlier, Tu (1983) reported that longevity of *C. lindemuthianum* varied greatly depending on environmental conditions. Moisture had a profound effect on its longevity. The fungus survived for at least five years in infected pods of bean that were air dried and kept in storage at 4°C. Under natural field condition, there was rapid decrease in viability of conidia under wet conditions which may be attributed to the loss of the mucilaginous water soluble matrix of the conidia.

The survival of fungus through infected seeds (Table 2) revealed that there was a sharp decline in survivability of the fungus over the period of storage, however the germination percentage increased with the time. Further, it was observed that initially *C. truncatum* fungus recorded 23.5 per cent survival in seed after 30 days of storage. Later, there was a gradual decrease in the survivability of fungus. The fungus remained viable at low percentage (7.3) upto 360 days. The germination percentage gradually increased with the increase in the storage period and reached upto 87 per cent after 360 days of storage. However, the difference was significant

Table 1: Studies on survival of conidia of *Colletotrichum truncatum* on greengram leaves under different storage conditions

Storage period (days)	Per cent viable conidia under different storage conditions				
	Freeze (4-5°C)	Tree shade (18-22°C)	Room/Lab (20-25°C)	Glass house (25-28°C)	Field (28-30°C)
15	87.2	82.2	80.2	76.7	66.2
30	85.8	76.5	77.3	68.2	57.2
45	83.2	70.2	73.1	61.2	42.3
60	80.4	67.9	69.6	55.2	30.8
75	77.5	63.4	65.3	46.3	15.2
90	73.6	54.7	56.8	23.1	2.9
105	70.8	48.3	50.4	10.4	0
120	67.5	40.1	42.4	2.2	0
135	63.8	35.7	36.9	0	0
150	60.1	30.2	29.2	0	0
165	57.8	25.4	21.7	0	0
180	54.2	20.8	15.4	0	0
195	51.4	17.2	10.8	0	0
210	48.6	13.9	3.3	0	0
225	45.9	8.1	0	0	0
240	41.3	5.3	0	0	0
255	38.2	0	0	0	0
270	35.8	0	0	0	0
285	34.5	0	0	0	0
300	30.2	0	0	0	0
315	29.0	0	0	0	0
330	25.2	0	0	0	0
345	20.2	0	0	0	0
360	5.2	0	0	0	0

between the initial and last stages of the experiment.

Table2 : Studies on survival of <i>Colletotrichum truncatum</i> in greengram seeds and its effect on germination		
Storage period (in days)	Percent survival of fungus	Percent germination of seed
30	23.5	54
60	22.2	55
90	22.0	57
120	24.0	57
150	18.8	60
180	17.1	63
210	14.0	66
240	13.5	69
270	13.0	74
300	10.8	76
330	9.0	81
360	7.3	87
C.D. at 5%	3.67	5.91

Rajkumar *et al.* (1989) had earlier reported decrease in survivability of the pathogen through seeds with increase in storage period and a corresponding increase in germination

of seeds with time. Decline in survivability may be due to factors like depletion of nutrients in seeds, low moisture as well as poor saprophytic ability of the pathogen. Increase in germination of seeds with time might be the result of decline in survivability of fungus with the increase in storage period.

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