



**ORIGINAL ARTICLE**

**Biological Control of Anthracnose Disease of Chilli (*Capsicum annum* L.) by  
Streptomyces Species**

**K.K. Singh**

Department of Botany, Agra College, Agra

Email: [kksinghdr@yahoo.co.in](mailto:kksinghdr@yahoo.co.in)

**ABSTRACT**

*Anthrachnose disease caused by collectotrichum capsici is one of the baffling disease of chillies (capsicum annum L.) in India. This disease causes severe damage to mature fruits in field and transit. It can be controlled by synthetic fungicides but they cause toxicity problems. Thus, biological control of this disease was attempted with the help of their Streptomyces species. In this study, spraying plants with spore suspension of Streptomyces Carcinomycicus was found to be most effective measure for control of disease as it caused 77.50% reduction in disease. The next effective antagonist was Streptomyces galbus and S. hygroscopicus was least effective in minimizing the disease. Further, spraying of antagonist over one month old chilli plants, one week before the spray of pathogen was found to be superior than the treatment in which pathogen was sprayed one week before the spraying of antagonist. This suggests that spraying of antagonist before disease appearance is good for minimizing disease on chilli plants.*

**Key words:** Biological Control, Anthracnose Disease, Chilli

*Received: 20<sup>th</sup> March 2016, Revised: 27<sup>th</sup> April 2016, Accepted: 30<sup>th</sup> April 2016*

*©2016 Council of Research & Sustainable Development, India*

**How to cite this article:**

Singh K.K. (2016): Biological Control of Anthracnose Disease of Chilli (*Capsicum annum* L.) by Streptomyces Species. Annals of Natural Sciences, Vol. 2[2]: June, 2016: 39-41.

**INTRODUCTION**

Anthrachnose and fruit rot is one of the worst and baffling diseases of chilli (*Capsicum annum* L.) in India and is caused by *collectotrichum capsii* (Syd) Butler and Bisby, a coetlonmycetons fungus. This disease is capable of causing considerable damage to chillies when there is continuous rain or high humidity during flowering and fruiting. Fruit rot causes severe damage to mature fruits in the fields as well as in storage to mature fruits in the field as well as in storage and transport. According to Chowdhary (1957) about 20 to 30% of the fruits are affected by this disease and the seeds are also affected. Though chemical control is regular practice for managing plant diseases but continuous use of a synthetic fungicide leads to pollution problems, residual effects, toxicity, and imbalance in soil microbial association. Therefore, alternative means of disease control are advisable and are being searched worldwide. Actinomycetes are known to destroy pathogenic fungi (Bressan, 2004), so these can be explored as a controlling agent for pathogenic fungi as they are safe and cheap. The present paper deals with the effect of three Streptomyces species on the control of anthracnose disease of chillies.

**MATERIALS AND METHODS**

During isolations of actinomycetes from soils of unusual habitats at Agra, three promising species of Streptomyces viz; *S. carcinomycicus*, *S. galbus* and *S. hygroscopicus* were recognized as potentially antifungal during screening. These were maintained on tryptone yeast extract agar medium. The chilli seedlings were raised in seed beds and then

transplanted in pots in glass house. The present experiments were conducted in two series.

In first series, the seedlings (one month old) were simultaneously sprayed with spore suspension of *collectotrichum capsici* and that of *Streptomyces carcinomyces*, *S. galbus* and *S. hygroscopicus*. In another treatment the antagonists were sprayed on seedlings a week before or after the inoculation of the pathogen following Gaur and Singh (1985). A control set was also maintained in each series, where in only the pathogen was sprayed. After spraying the seedlings were kept in moist chamber for 2 days to facilitate the spore germination as well as easy observation and translocation of the antibiotic. The results were recorded every month during crop season extend from January to March 2010. The date regarding no. of infected plants and infected leaf per diseased plant was recorded and percent reduction in disease was calculated following Arjuna rao (1971).

## RESULTS AND DISCUSSION

The results presented in Table 1 indicate that the antagonists viz. *Streptomyces carcinomyces*, *S. galbus* and *S. hygroscopicus*, which were strongly antagonistic in vitro to *collectotrichum capsici*, could bring about a considerable reduction in the development of disease. It was observed that in control sets, the symptoms appeared at an early stage of growth, while in treated plants the diseased symptoms appeared late. In general, *Streptomyces carcinomyces* was found to be more effective in controlling the disease followed by *S. galbus* and *S. hygroscopicus* was found to be least effective. Further reduction in disease was 77.50, 73.50 and 67.67% is case percent of *S. carcinomyces*, *S. galbus* and *S. hygroscopicus* respectively when antagonists were sprayed simultaneously on the test plants. However, percent reductive was quite less when pathogen was sprayed one week before spraying antagonists. Thus, it is advisable that antagonists or their culture filtrate should be sprayed early possibly in young stage of plant so as to avoid incidence of disease.

**Table 1:** Effect of spraying spore suspension of *Streptomyces* species on development of anthracnose of chillies caused by *collectotrichum capsici*

Treatment	Percentage of infected plants			% reduction in number of infected pants
	JAN	FEB	MAR	
<b><i>Streptomyces carcinomyces</i></b>				
A	NIL	18.65	22.50	77.50
B	12.50	22.75	29.50	70.50
C	17.50	25.50	27.25	64.25
<b><i>Streptomyces galbus</i></b>				
A	9.66	20.25	28.91	71.01
B	12.50	20.33	30.66	69.34
C	17.25	20.50	37.66	62.25
<b><i>Streptomyces hygroscopicus</i></b>				
A	11.25	24.25	32.33	67.67
B	20.50	34.50	40.66	59.34
C	20.50	32.33	45.00	55.00
Control	49.75	76.90	100.00	NIL

A = Antagonist sprayed over plants one week before pathogen

B = Antagonist and pathogen sprayed over plants simultaneously

C = Pathogen sprayed over plants one week before the antagonist.

A number of earlier reports suggest the possibility of successful biological control of fungal plant diseases by the use of spore suspension or culture filtrate of antagonistic actinomycetes particularly species of *Streptomyces*. (Sinha and Basuchaudhary 1977; Sinha and Paliwal 1982 and Gaur and Singh 1985).

#### **REFERENCES**

1. Arjuna Rao V. (1971): Biological control of cotton wilt II In vitro effects of antagonists on the pathogen *Fusarium vasinfectum*. Proc Indian Acad. Sci. Section-B, 74(1); 16-18.
2. Bressan W. (2004): Biological control of maize seed pathogenic fungi by use of actinomycetes. Springer Netherlands, 48: 233-248.
3. Chowdhary S. (1957): Studies on the development and control of fruit rot of chillies. Indian Phytopath, 10: 55-61.
4. Gaur R.B. and Singh R.D. (1985): Control of *Ascochyta* blight of chickpea through foliar spray. International chickpea News Letter No. 13, 22-24.
5. Sinha S.K. and Basuchaudhary K.C. (1977): Control of sorghum anthracnose with *Streptomyces ganmycicus* Indian J. Microbiology, 17(4): 200-202.
6. Sinha S.K. and Paliwal M. (1982): Control of *Drechslera graminea* stripe disease of barley by a strain of *Streptomyces albus* Proc. Chemrawn- Phillipines, Manila C-37.