

**INTEGRETED MANAGEMENT OF ZIZIPHUS FRUIT ROT CAUSED BY
CARBENDAZIM RESISTANT MUTANT OF *Aspergillus niger* USING
INSECTICIDE COMBINATION WITH CARBENDAZIM**

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ABSTRACT

Different agrochemicals and botanical pesticides were used for the integrated Management of Carbendazim resistance in *Aspergillus niger*. It was studied by mixing different fungicides, insecticides herbicides and plant part extracts which have antifungal activity were mixed in carbendazim. In vivo studies carried out. Carbendazim and effective concentration of selected insecticides extracts of Medicinal plants were mixed well and ber fruits were treated with this solution Plant extracts alone and in combination with carbendazim and other Insecticide were used individually and in combination with carbendazim for the management of Ziziphus fruit rot caused by resistant mutant of *Aspergillus niger*

Keywords: *Aspergillus niger*, Carbendazim Resistant, Insecticide

INTRODUCTION

The fruit Ber (*Ziziphus mauritiana* Lamk.) are very nutritious fruit and are available at low cost hence it is really a poor man's fruit. It is xerophytes in nature In Maharashtra the *Ziziphus* plant is found every field wherever irrigation facilities are less. The genus *Ziziphus* belongs to family Rhamnaceae and consist of 40 species in tropical and subtropical regions. There are more than 125 cultivars grown in India However Ber suffers from various diseases like powdery mildew, sooty mold, *Alternaria*, Leaf spot and phoma leaf spot. The fruit are attacked by many pathogens at pre and post-harvest condition and spoil test and market quality. Among the post-harvest pathogens *Aspergillus niger* was observed to be most common in Maharashtra state. There are reports that pre and post-harvest diseases of various fruits can be managed through systemic and conventional fungicides including carbendazim. However during last 30 years application of fungicides has plagued with several environmental problem and development of fungicide resistance in pathogen is major one. Many examples of fungicide resistance in fungal pathogens have been reported from U.S.A. Australia Europe, Israel, Japan, and from South East Asian countries. In India, it appears that management of pathogenic fungi with systemic and non-systemic fungicides has become more and more common over past 15 years. The aim of present study was to examine the possibility of development of resistance in *Aspergillus niger* against carbendazim and to find out the integrated methods to manage this pathogen causing fruit rot of *Ziziphus*. Integrated management of a disease have been emphasized now a day's hence agrochemicals were used individually and in combination with carbendazim for management of *Ziziphus* fruit rot caused by resistance mutant of *Aspergillus niger*.

MATERIALS AND METHODS

Different insecticides were used for the integrated management of carbendazim resistance in *Aspergillus niger*. It was studied by mixing different insecticides like cypermethrin, dimethoate, endosulfon, malathion, pyriban. These were agrochemical used individually and in combination with carbendazim for the management of *Ziziphus* fruit rot caused by resistance mutant of *Aspergillus niger*. In vivo studies were carried out. This was done by using mycelia suspension of *Aspergillus niger* strain. A.N. EMS.9 was inoculated on

Berfruits for pathogenicity test. Ber fruit were surface sterilized with 0.01% HgCl_2 solution and washed 10 times with sterile distilled water. They were inoculated with spore suspension of *Aspergillus niger* isolates or mutant resistant to carbendazim. Percentage control efficacy (PCE) was calculated¹. In order to study the effect of carbendazim and other agrochemicals. Percentage control Efficacy (PCE) was calculated by using following formula.

$$\text{PCE} = 100(1 - X/Y)$$

Where X= Diameter of the colony on the plates containing carbendazim.

Y= Diameter of the colony on absolute control plates

Percentage control efficacy (PCA) was recorded after 12 days.

In vitro wild sensitive isolate AN-9 was cultured on agar plates containing sublethal dose of carbendazim (2.5mg/ml). The plate with carbendazim only served as control. And different fungicides like cypermethin, dimethoate, endosulfon, melathion, pyriban were mixed in carbendazim by food poisoning technique². The principle involved in this technique is to poison the nutrient medium with a fungi toxicant and allowing a test fungus to grow on such medium (Zapek-Dox) medium (2x) was prepared. It was sterilized and 10 ml of this medium was properly mixed with 10ml of carbendazim alone and combination with other insecticides (2x a.i. concentration) selected for study in sterile petriplates. These agrochemicals were used individually and in combination with carbendazim.

RESULTS AND DISCUSSION

Insecticides such as cypermethion, dimethoate, endosulphan, melathion and pyriban were selected for this study. Individually all the insecticides showed their efficiency for the control of *Aspergillus niger* rot of *Ziziphus* fruits. Dimethoate appeared to be more effective followed by endosulfon, melathion, pyriban in decreasing manner. However mixing of carbendazim again increased in PCE. The increase was more due to mixing of Pyriban followed by and other insecticides. (Table No. 1 and fig No 1.)



Table No.1: Percentage Control Efficacy (PCE) of Carbendazim individually and in Mixture with Insecticides against resistance strain mutant (AN EMS-9) of *Aspergillusniger* on fruit of Ber.

Sr.No.	Insecticides (mg/ml)		PCE
	Carbendazim	Individual	In mixture with
1.	Cypermethinl 50	43.2	47.2
	100	46.8	48.8
2.	Dimenthioate 50	71.2	74.4
	100	74.8	78.0
3.	Endosulphon 50	55.2	70.8
	100	70.4	75.2
4.	Melathion 50	42.8	50.8
	100	51.2	58.0
5.	Pyriban 50	54.4	70.0
	100	72.8	78.4
6.	Carbendazim only (2.5 µg/ml)	52.8	--

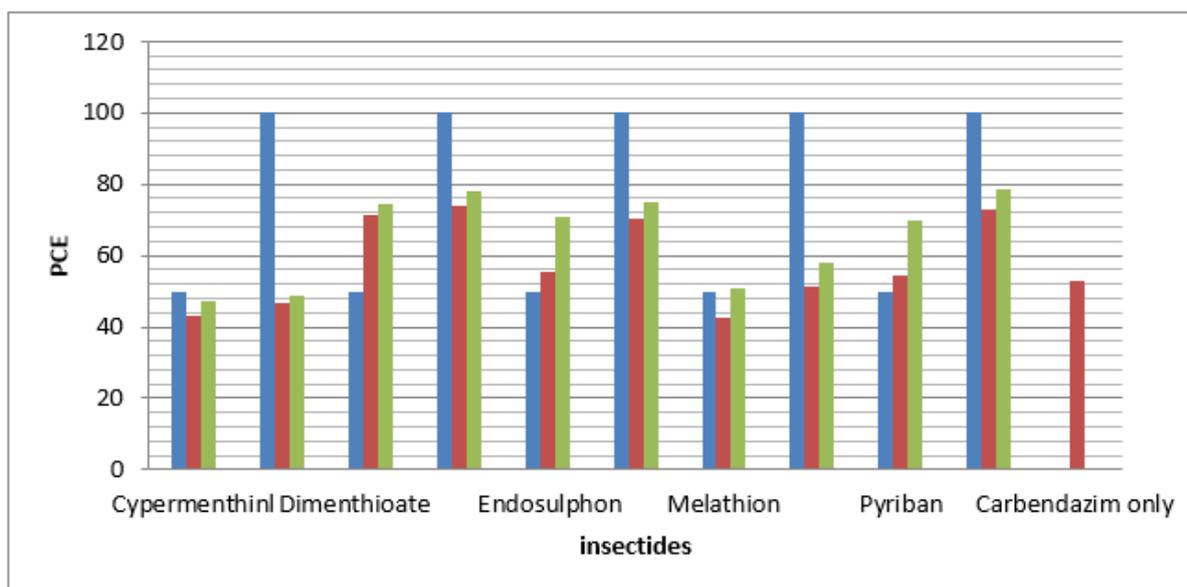


Fig No1. Percentage control efficacy of carbendazim in combination with insecticides against *Aspergillus niger* to Carbendazim on agar plates

DISCUSSION

Use of agrochemical individually or in combination with carbendazim appeared in to be more beneficial for managing this fruit rot in present investigation. Cypermethin, dimenthioate, endosulfon, Melathion, pyriban gave higher percentage control efficacy individually. But carbendazim mixture with these agrochemicals enhanced the percentage control efficacy for controlling this disease investigation. Use of fungicides or Insecticide in combination have been suggested for the management of the level of fungicide resistance in pathogen¹ with the combination of two specific site inhibitors the possibility exist that the pathogen will acquire resistance to both compounds. This would be less likely happen if a combination is used of a systemic fungicides and multisite inhibitor. These results are also confirmative with findings of earlier workers¹. To prevent, a further case of resistance, Ciba-Geigy has adopted a basic strategy of the prepack mixture of metalaxyl with mancozeb against Oomycetes². In addition³ have found that combined application of Diathane-M-45. With different insecticides' can control the fruit rot and pest complex on chilli⁴. Showed that certain micronutrients when used singly or in mixture with carbendazim

reduce resistance in *Aspergillusniger* singly or mixture with carbendazim reduce resistance in *Aspergillusflavus*. There are theoretical models developed in this basis.(Kable and Jaffery,1980;Skylakakis,1981;Levy et. al.,1983) and practical examples (Delp,1980;Dekker,1981;Gangawane and Shaikh,1988; Gangawane et.al.,1990.).(Gangawane L.V. andDekker,1981;Gangawane and Shaikh,1988; Gangawane et.al.,1990.).(Gangawane L.V. and B.R.C.Reddy,1985).(Gangawane L.V.,1981.)¹ Suggested that there is a significant delay of resistance build up in the pathogens when mixture of different Insecticides or fungicides has been used. In the present study agrochemicals other than Insecticides have also been proved useful in the management of carbendazim resistance in *Aspergillusniger* causing fruit rot of *Ziziphus*.

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