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Research Article

Role of Mustard Oil in Eco Friendly Management of *Fusarium verticillioides*

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ABSTRACT

The genus Brassica has mustard plant that is principle oil seed crop which is used in variety of food items and medicines. The complete plant is rich with phytochemicals such as carotene, vitamin C, fibers, proteins, fatty acid, glycosides and glcosinolates that serve as antioxidant, anticancerous, antimutagenic, antifungal. It is also used in chronic diseases and personal healthcare in India. It has potent natural green manure and pesticides against number of pest. The present investigation analyzed effectiveness of mustard oil against Fusarium verticillioides with the use of poisoned food method. We measure percent (%) inhibition of fungus in treatment with respect in the control.

Key words: *mustard oil, Pesticides, Phytochemical, Fusarium.*

INTRODUCTION

Mustard is mostly cultivated in tropical and sub tropical provinces of the world. It belongs to genus *Brassica* that contains over 150 species with considerable economic importance. Ancient ayurveda literature says mustard oil is good for cooked traditional food items (Charaka samhita). India is the third largest mustard producing country and *Brassica campestris* is principle oil seed crop. Nearly 60 percent production comes from Rajasthan, other from Uttar Pradesh, Madhya Pradesh, Haryana, Bihar, Gujarat, West Bengal. Mustard plant grown in sandy loam and temperate climate. The Plant grown as green vegetables and green crop. Seeds and oil both are used in preparation of pickles, flavoring curries and vegetables, used as cooking oil and industrial purposes. The oil cake is for livestock as a protein supplement also used as fertilizer and green manure in Japan, India and Europe. The complete plant is useful and rich phytochemical content which attract to utilized the plant properties in discovering new drugs. Mustard is fulfilling most of the oil requirement of the world. It contains beta carotene, vitamin C , beneficial fiber and 35 to 38 % protein[10], 43%oil content also included monounsaturated fatty acids and nitrogenous substances.

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The mustard oil is pungent in nature due to the presence of essential oil of mustard. The seeds contain the oil that possess Glycoside sinigrin or potassium myronate, isothiocynates and related compounds showed protective effect against oxidation, mutagenesis and cancerous processes and reduce risk of chronic diseases[13,15].

It has potent natural pesticides against number of soil borne pest such as nematodes, fungi, bacteria due to presence of the degraded enzymatic product of Glucosinolate. Literature reveals that complete plant is quite medically effective and used for the treatment of diseases. In the present investigation we used screening of different concentrations of mustard oil in alcohol against potent fungus *Fusarium verticillioides*.

MATERIAL AND METHODS

Fusarium verticillioides is a soil and seed borne facultative endophyte plant pathogen that have wide range of host such as maize, sorghum, rice and millet. It infect host plant in different stages of development from early hours of kernel germination to the bout of harvest (Sreenivasa et al., 2006). Hot and dry conditions favourable for *Fusarium*. Nayaka *et al*.[7] states that *F. verticilliioides* producing mycotoxin fumonisin that cannot be easily detoxified or removed from the grains which causes serious health issue on human and animals.

The fungus is isolated from dark black brown lesions of pod of cluster bean by the tissue segment method. The isolated fungus grows on artificial media czapek dox agar. The fungus characterized by pink and purple mycelia, initially with white mycelia but later may turn pink to violet.

The infected part of pod cut in to small pieces of about 5-7 mm and transferred to sterile petriplate then incubated at 25±2°c. Pure culture obtains with the single hyphal tip and allowed to grow. The fungus is identified as *Fusarium verticillioides* by IARI (Indian Agriculture Research Institute, New Delhi, ID no- 10730.18, Ref no./pp/175). Mustard oil has been obtained directly from the seeds of mustard (*Brassica campestris*) using cold pressing technique called Ghani. We used alcohol as a solvent to make solutions of oil at the ratio of 1:3 (w/v). The dilution of oil for prepare different concentrations i.e. 20%,40%,60%,80%,100%.Potential of oil analyzed by poisoned food technique[4].

15 ml media is poured with 0.5 ml of mustard oil solution of different percent and allowed to solidify in pre sterile petriplates. The test fungus was inoculated at centre of plate and incubated at 25±2°c. The control maintained without oil whereas treated plate with different oil concentrations. All these process replicated three times .Every time 5 mm mycelia discs cut from 10 days old culture of fungus were aseptically inoculated on surface of medium. The diameter of fungal colony was measured on 15 day of inoculation. The growth is taken in mm for assessment of different percent of oil.

RESULT AND DISSCUSION

Data was analyzed using one way analysis of variance (Anova) to determine significance ($P \leq 0.05$) at 95% confidence level. Antifungal activity of mustard oil was assayed and data on effect of oil on the growth of *Fusarium verticillioides* is presented in table1 and table 2.

Table 1: Diameter of colony inhibition in different concentration of mustard oil

Concentration of mustard oil solution in %						
Diameter of fungus colony in mm						
s. no.	control	20%	40%	60%	80%	100%
1	80	75	68	63	55	33
2	85	78	65	63	55	35
3	85	78	65	60	52	35
Average mean	83.33	77	66	62	54	34.33
Std. dev.	2.88	1.73	1.73	1.73	1.73	1.15
Std. error	1.66	1.0	1.0	1.0	1.0	0.66
I%(inhibition)	0.00	7.59	20.79	25.59	35.19	58.80

Table: 2 ***ANOVA SUMMARY***

Source	Degrees of freedom(DF)	Sum of Squares(SS)	Mean Square (MS)	F-Stat
Between groups	5	4565.7794	913.1559	252.8627
Within groups	12	43.3353	3.6113	
Total	17	4609.1146		

The data revealed that moderate reduction in growth of *Fusarium* was observed with respect to different concentrations of oil .The result indicated that the growth of fungus is decreasing with increasing the percent concentrations of oil. The maximum inhibition of fungus is at 100% concentration. The inhibitory action may be due to presence of Glycoside sinigrin in mustard seeds which retards growth and activation of the pathogen. The higher concentration inhibit the fungus which are suitable for nature, human health and animals. This efficient treatment provides cheap, better and eco-friendly management of the *F. verticillioides*.

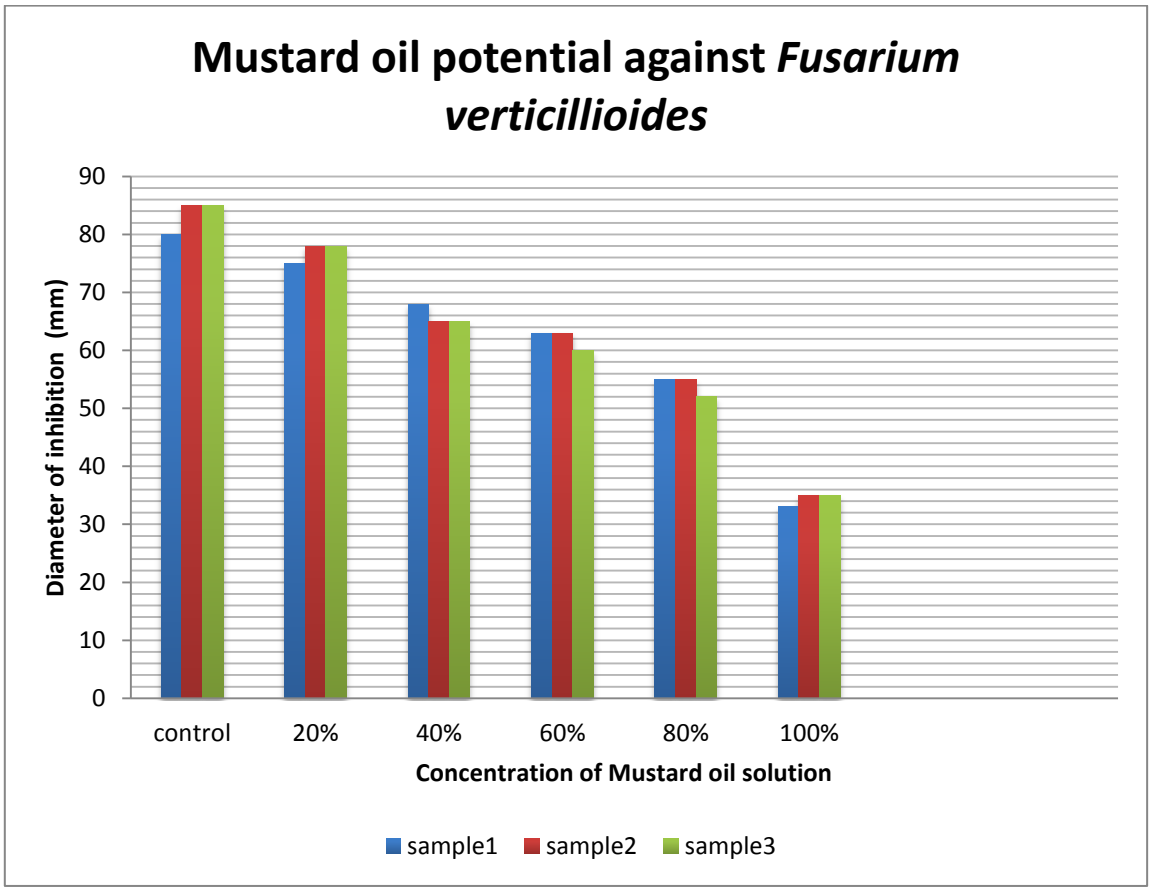

Fig. 1: Mustard oil solution of different concentration

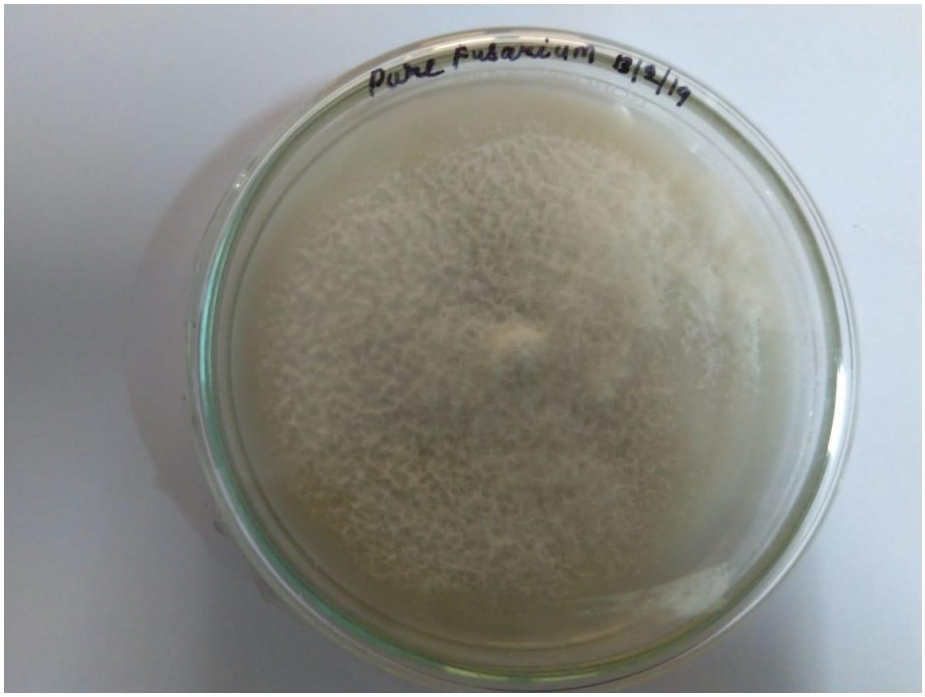

Fig. 2: Control plate of *Fusarium verticillioides*

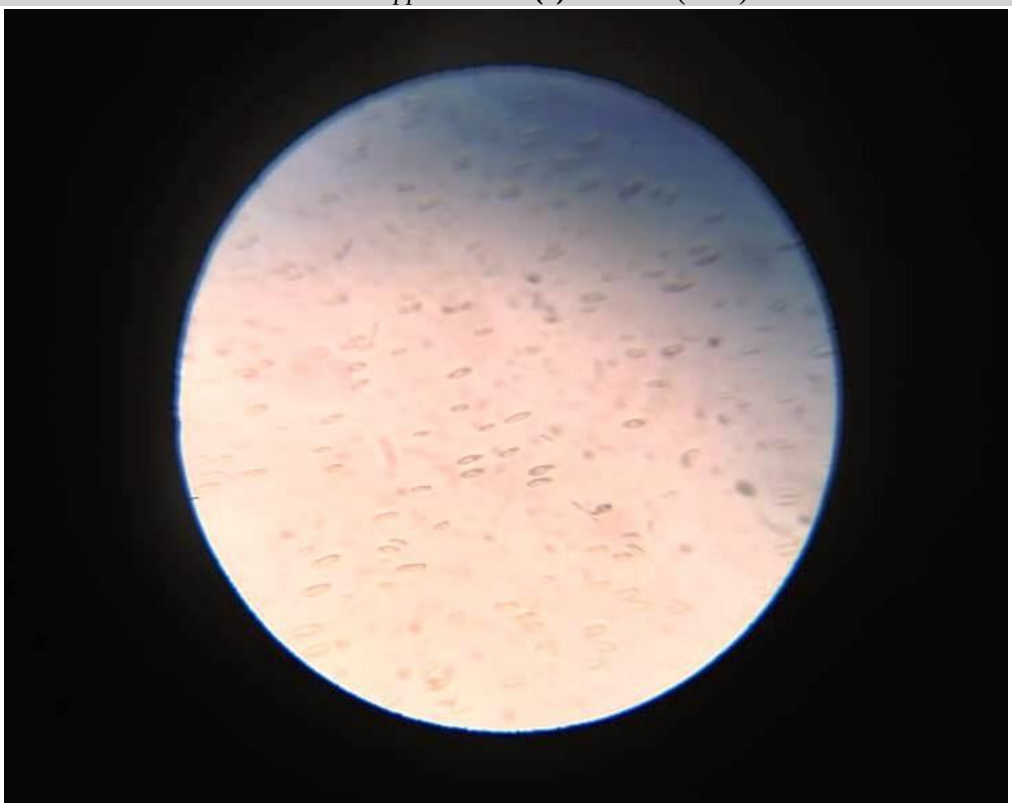

Fig. 3: Conidia of *Fusarium verticillioides*

Fig. 4. Growth of *Fusarium* inhibited by mustard oil

CONCLUSION

It may be concluded that the mustard seeds are conferred with antifungal activity. Mustard plant is believable source of medicines and variety of phytochemical. It revealed that if seeds are used with other medicines either with same percent or higher percent that increasing the potential of mustard oil. Therefore we can turn back to our traditional system of medicine and can apply to green manure or bio- pesticides to reduce the risk of pollution. So that it can prevent human being from contaminated food and water.

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