wjpls, 2020, Vol. 6, Issue 4, 148-151 Research Article ISSN 2454-2229

World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

MANAGEMENT OF PATHOGENIC FUNGI, THROUGH BIOPESTICIDAL ACTIVITIES OF SOME COMMON WEEDS OF NASHIK, MAHARASHTRA

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Article Received on 31/01/2020 **Article Revised on 22/02/2020** **Article Accepted on 12/03/2020**

ABSTRACT

The present investigation has been undertaken to manage two fungal crop pathogens i.e Alternaria alternate and Fusarium oxysporum., through common weeds (Cocculus hirsutus L., Aristolochia bractiata, Achyranthus aspara L., Celosia argentea and Hemidesmus indicus.), which gave very better results as antifungal activity. Tridax procumbes L., Ageritum conyzoids, found more effective to manage pathogens at 25% concentrations of leaf extracts as a biopesticides.

KEYWORDS: Antifungal, Biopesticides.

INTRODUCTION

Plants which are unwanted and grow along with agricultural plants are known as weed. Approximately 250,000 species of plants are found worldwide, from that about 3% behave as weeds. According to Anderson, 1954, History of weeds is the history of man, the plants, which are called today as a weed, are persistent since time immemorial, but during the ancient periods the prevailing forest conditions were not suitable for the growth of weedy species. Many species of weeds also use as food by early man and some species are natural disturbances of environment.

Biopesticides offer one of the best alternatives to chemical pesticides, because they have biological origin. Fungal pathogens of various crop diseases are easily inhibited by such Biopesticides, leaf, stem or root extracts of plants showed antifungal activities. Biopesticides are certain types of pesticides derived from such natural materials as plant parts. This material does not cause any adverse effect to agro ecosystem, ecosystem or biodiversity, so this strategy of using biopesticides is one of the ecofriendly practices of managing fungal crop diseases. Fungicides introduced during 1940's, they successfully combating fungal diseases but these pose damager to eco-system as they kill target and non-target organisms. To conserve our eco-system it is necessary to redefine our present agricultural strategies and achieve disease management.

The present investigation has been undertaken to manage two fungal crop pathogens through common weeds are used as Biopesticides, which gave very better results for inhibiting fungal pathogens i.e. *Alternaria alternate and Fusarium oxysporum.*, isolated from crop plants.

Cocculus hirsutus L. is a common tropical weed grows in agricultural land or on waste land, vine climbing under shrub, belonging to family Menispermaceae, *Aristolochia bracteolate* also known as worm killer due to its anthelminthic activities, it is perennial herb, common weed found in crop field in Maharashtra, belonging to family Aristolochiaceae. *Achyranthus aspara*, a very common tropical weed found in India belonging to family Amaranthaceae. *Celosia argentea* commonly known as silver cocks comb, a herbaceous weed, in India and china it is known as troublesome weed (Grant and William, 1954) and *Hemidesmus indicus*, ptostete or semi erect shrub, a common weed found in south India belonging to family Apocynaceae.

MATERIALS AND METHODS

For the preparation of biopesticides (key extract) fresh leaves of *Cocculus hirsutus* L., *Aristolochia bractiata*, *Achyranthus aspara* L., *Celosia argentea* and *Hemidesmus indicus*. were collected, cleaned, dried under shade and pulverized to obtain dry powder, extract of each plant powder was prepared with 95% Ethanol (1:5 w/v) and condensed to serve as stock extract (Shivpuri Asha *et. al.* 1998) from the stock extract 10% and 25 % & 50 % concentrations were prepared.

The test fungi (*Alternaria alternate* and *Fusarium oxysoprum*) were isolated from host plants, and prepared

its culture. The toxicity of stock extract was determined against the test fungi (*Alternaria alternate and Fusarium oxysoprum*) following the poisoned food technique (Mishra and Tiwari, 1992) at 10, 20, 50 % concentrations Petri plates containing Czapek Dox agar, supplemented with different plant extracts at three concentrations with three replications were inoculated at 28 $0^c \pm 2\ 0^c$, the plates without leaf extracts (biopesticiedes) were served as control. Radial growth of fungal colonies was measured at different intervals.

Effect of biopesticieds was also studied on the sporulation of test fungi by following equation.

$$conidia.per.ml = \frac{No.of conidia observed.per.Microscopic.field}{12.5} X \frac{40000}{1}$$

The percentage control efficacy (PCE) of each leaf extract was calculated as follows

PCE = 100 (1-X/Y)

Where,
X= The diameter of the lesion on biopesticides
Y = The diameter of lesion on untreated host (control)

Table 1: Inhibition of test fungi due to leaf extracts.

S. No.	Biopesticides	Conc. %	Diameter of fungi in mm	
			Alternaria alternate	*Fusarium oxysporum*
1	*Cocculus hirsutus* L	10	23.6	26.3
		25	0.00	0.00
2	*Aristolochia bractiata*	10	19.3	21.3
		25	0.00	0.00
3	*Achyranthus aspara* L	10	38.3	32.3
		25	13.6	12.3
		50	0.00	0.00
4	*Celosia argentea*	10	43.3	35.3
		25	21.3	18.3
		50	0.00	0.00
5	*Hemidismus indicus*	10	41.3	37.6
		25	15.6	13.0
		50	0.00	0,00
		Control	90.0	90.0
		S.E.	5.83	4.26
		C.D.	13.45	9.82

Table 2: Effect of leaf extracts on sporulation of test fungi.

S. No.	Biopesticides	Conc. %	*Alternaria alternate*		*Fusarium oxysporum*	
			No. of Sclerotia per microscopic field	No. of Sclerotia per ml suspension	No. of conidia per microscopic field	No. of conidia per ml suspension
1	*Cocculus hirsutus* L	10	4.0	12800	53	16000
		25	0.0	0.00	0.0	0.00
2	*Aristolochia bractiata*	10	3.0	9600	3.3	10560
		25	0.0	0.00	0.0	0.00
3	*Achyranthus aspara* L	10	6.3	20160	5.0	16000
		25	1.0	3200	1.0	3200
		50	0.0	0.00	0.0	0.00
4	*Celosia argentea*	10	7.3	23360	6.6	21120
		25	2.0	6400	2.0	6400
		50	0.0	0.00	0.0	0.00
5	*Hemidismus indicus*	10	7.0	22400	5.6	17920
		25	1.3	4160	1.0	3200
		50	0.0	0.00	0.0	0.00
		Control	16.0	51200	17.3	55360
		S.E.	0.83	2686.47	0.58	1872.47
		C.D.	1.93	6195.01	1.35	4317.93

Table 3: In vivo percentage control efficacy (PCE) of leaf extracts.

S. No.	Biopesticides	Conc. %	*Alternaria alternate*		*Fusarium oxysporum*	
			No. of Sclerotia per microscopic field	No. of Sclerotia per ml suspension	No. of conidia per microscopic field	No. of conidia per ml suspension
1	*Cocculus hirsutus* L	10	15.3	64.90	16,6	64.90
		25	0.00	100	0.00	100
2	*Aristolochia bractiata*	10	13.6	68.00	14.3	69.76
		25	0.00	100	0.00	100
3	*Achyranthus aspara* L	10	24.6	44.95	21.3	54.96
		25	7.0	83.94	6.6	86.04
		50	0.00	100	0.00	100
4	*Celosia argentea*	10	28.3	35.09	23.3	50.73
		25	14.0	67.88	12.3	73.99
		50	0.00	100	0.00	100
5	*Hemidismus indicus*	10	25.6	41.28	23.6	50.10
		25	13.0	70.18	7.0	85.20
		50	0.00	100	0.00	100
		Control	43.6	0.00	47.3	0.00
		S.E.	3.77	8.60	2.67	5.65
		C.D.	8.70	19.83	6.17	13.05

RESULTS AND DISCUSSIONS

The leaf extracts of different concentrations of five plants were tested against pathogenic fungi (*Alternaria alternate* and *Fusarium oxysporum*) isolated from infected parts of crop plants significantly inhibited the growth of test fungi both *in vivo* and *in vitro*.

Leaf extracts of *Cocculus hirsutus* L., *Aristolochia bracteolate*, inhibited the radial growth of *Alternaria alternate* at 25% concentration and the same two plants also inhibited the radial growth of fungus *Fusarium oxysporum* at 25% concentration, remaining three plants i.e. *Achyranthus aspara* L., and *Celosia argentea Hemidesmus indicus*. stops the growth of both test fungi (*Alternaria alternate* and *Fusarium oxysporum*) at 50% concentrations.(Table no.1).

Effect of leaf extracts on sporulation of test fungi was also studied. After treatment of different leaf extracts at different concentrations with test fungi, the number of sclerotic/ conidia per microscopic field and the number of sclerotic/ conidia per ml suspension was also observed and calculated. The leaf extracts of *Cocculus hirsutus* L., *Aristolochia bracteolate* showed nil sclerotia/conidia in 25% concentration of both fungi (*Alternaria alternate* and *Fusarium oxysporum*) while remaining three leaf extracts (*Achyranthus aspara* L *Celosia argentea* and *Hemidesmus indicus*.)showed nil sclerotic/ conidia per ml suspension in 50% concentration of both fungi (Table no.2).

In vivo percentage control efficacy (PCE) of all five plants was also studed, leaf extracts of *Cocculus hirsutus* L., *Aristolochia bracteolate* exabite 100% PCE at 25% concentration and leaf extracts of *Achyranthus aspara* L., *Celosia argentea* and *Hemidesmus indicus*. showed 100% PCE at 50% concentrations .

According to Duncan Webstar *et.al*, (2000) Out of 14 plants extracts studied almost plants showed antifungal activity against many isolates in Yeast. The antifungal activity of acetone, methanol, hexane and dichloromethane leaf extracts of six plant species (*Bucida buceras*, *Breonadia salicina*, *Harpephyllum caffrum*, *Olinia ventosa*, *Vangueria infausta* and *Xylotheca kraussiana*) were evaluated for antifungal activity against seven plant pathogenic fungal species (*Aspergillus niger*, *Aspergillus parasiticus*, *Colletotricum gloeosporioides*, *Penicillium janthinellum*, *Penicillium expansum*, *Trichoderma harzianum* and *Fusarium oxysporum*). These plant species were selected from 600 evaluated inter alia, against two animal fungal pathogens.(S.M.Mahalo *et.al.*,(2000).

According to Paola Dias Dellavela *et.al.* (2011) Antifungal activity of extracts of 10 plants species used in traditional medicines against the fungus *Alternaria* sp. found antifungal activities. L.Askame,(2012) Studied the antifungal activity of 50 plant species collected in different regions of southern Morocco against *Penicillium italicum*, the causal agent of citrus blue mold. The *in vitro* antifungal activity of plant powders was determined using the agar plate method. results showed that among the 50 plant species tested, the powders of *Anvillea radiata* and *Thymus leptobotrys* completely inhibited mycelial growth of *P. italicum.*

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