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EVALUATION OF DIFFERENT PLANT EXTRACTS AND CHLOROTHALONIL AGAINST *ASPERGILLUS FLAVUS* ROT OF PAPAYA (*CARICA PAPAYA* L.) IN MAHARASHTRA, INDIA.

Mhaskar P. A and N. S. Suryawanshi*

*Research Laboratory, Department of Botany, K.V. Pendharkar College of Arts, Science and Commerce, Dombivli (E)-421203 Maharashtra (India).

***Corresponding Author: N. S. Suryawanshi**
Research Laboratory, Department of Botany, K.V. Pendharkar College of Arts, Science and Commerce, Dombivli (E)-421203 Maharashtra (India).

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ABSTRACT
Papaya rots caused *Aspergillus flavus* Link. is a serious fruit rot pathogen to reduce market values. It is equally important to control papaya rot using different plant extracts instead of systemic fungicide because of the lowering chemical pesticides. In this view, in our mind towards the plant extracts to control *A. flavus*. Plant extract of *Lawsonia inermis* L. was highly reduced the growth of *A. flavus* and PCE value was significantly reduced @ 25% (67.18), 50% (74.74), 75% (83.39) and 100% (85.58) in individual and Plant extracts mixed with Chlorothalonil PCE values significantly decreased @ 25% (62.56), 50 %(74.07), 75% (75.86) and 100% (81.78) similarly, 25 different plants were tested and found lowest PCE was recoded in *Blumea lacera* @ 12.24, 10.67, 15.56,and 23.93 in individual and in mixture with Chlorothalonil PCE was increased in all cases @ 12.27, 14.84, 15.95 and 23.83. *Zingiber officinale* Roscoe., 23.38, 33.34, 40.67 and 43.93 individual PCE value at respective @ and in mixture with Chlorothalonil PCE values were observed different conc. @ 36.68, 37.34, 40.23, 47.76 and *Citrus aurentifolia* L., @ 12.28, 15.87, 18.43 and 22.76 individual PCE was lowest while in mixture with Chlorothalonil PCE values were seen @ 23.63, 24.45, 27.44 and 29.11 Percentage control efficacy.

KEYWORD: Papaya rot, *Aspergillus flavus*, Medicinal Plants, Chlorothnoil etc.

INTRODUCTION
Papaya (*Carica papaya* L.) is belongs to family Caricaceae the most important fruit cultivation in Maharashtra. It is a very wholesome, refreshing and delicious fruit. Green fruits are diuretic and mildly laxative and are used as vegetables. It has a high nutritive and medicinal values *Viz.* Papain, protein, removing skin blemishes, in treatment of stomach ulcer, diphtheria, chewing gum, cosmetics, and degumming natural silk and to give shrink resistance to wool. The ripe papaya are rich source of carbohydrates, minerals, vitamin and ascorbic acid with this nutritive value maintain. Papaya fruit is very popular with the farmers in general because it requires less area per plant, comes to fruiting in a year, easy to cultivate and provides more income per hectare. Presently investigated that the various plant extracts were used in controlling fruit rot of Papaya caused by *Aspergillus flavus* Link. *A. flavus* control using *Lawsonia inermis* (L.) extracts was highly reduced the PCE value at the @ 25% (67.18), 50% (74.74), 75% (83.39) and 100% (85.58) in individual while in mixture with Chlorothalonil PCE values was decreased at @ .25% (62.56), 50 % (74.07), 75% (75.86) and 100% (81.78). *Zingiber offcinale* Roscoe. @ 23.38, 33.34, 40.67 and 43.93 individual PCE value respectively and 36.68, 37.34, 40.23, 47.76 in mixture with Chlorothalonil PCE value increased. In case of *Citrus aurentifolia* L. the PCE value was also recorded at different concentrations @12.28, 15.87, 18.43 and 22.76 in lowest individual PCE values were recorded while in mixture with Chlorothalonil the PCE values were increased in the following order 23.63, 24.45, 27.44, 29.11. Similarly, 25 different plants were used in the management of *A. flavus* in Table 1. Biopestcides was non-hazardous to fruits or as well as different crops when used excess amount therefore, recommended such. It as a lowering the chemical pesticides. Lastly we recommended plant extracts in the management of different plant pathogens in feature. Last ten decades farmers used chemical pesticides to increased crop productivity while today don't use chemical pesticides because resistant in pathogen was increased while lowering the chemicals used only and only biopestcides.

MATERIAL AND METHODS
The experiment was conducted in the Research laboratory, Department of Botany, K.V. Pendharkar College of Arts, Science and Commerce, Dombivli (E)

Dist. Thane Maharashtra.20 grams of Potato Dextrose Agar (PDA) was weighed and poured into a clean 500 ml sterile distilled water was added and stirred vigorously to dissolve. Inserted into the conical flask and sealed with masking tape. The content was autoclaved at 121^{0}C for 15minutes and allowed to cool at room temperature. Rotted papaya were randomly collected from the field and market of Maharashtra for isolation of rotted pathogens were identified using morphological characters and spores as well as literature. *Aspergillus flavus* was severely rotted and confirmed and pathogenicity was tested on healthy papaya. *Aspergillus flavus* was control using fresh leaves of various plants *viz. Bryophyllum pinnatum* (Lam.), *Riccinus communis* (L.), *Azadirachta indica* (A. Juss.), *Vitex nigundo* (L.) *Senna tora* (L.)Roxb., *Gloriosa superba* (L.), *Lantana camara*(L.), *Guizotia abyssinica* (L.f.) Cass, *Malachra capitata* (L.), *Celosia spicata* (L.), *Justicia adhatoda* (L.) Nees.,*Nyctanthes arbor-trisis* (L.), *Impatiens balsamina* (L.), *Hyptis suaveolens* (L.), *Arnica Montana* (L.), *Lawsonia inermis* (L.), *Ocimum sanctum* (L.), Blumea lacera (L.)DC., *Citrus aurentifolia* (L.), *Carica papaya* (L.), Moringa oleifera (Lam), *Catharanthus roseus* (L.), *Zingiber officinale* (Roscoe), *Allium sativum* (L.) and *Curcuma longa* (L.) these plant extracts were weigh 100 gm of plant leaves were cut into small pieces and minced with the help of grinder by adding 100 ml sterilized distilled water. These leaf extracts were filtered through double-layered muslin cloth in 150 ml conical flasks and plugged with non-absorbent cotton. These filtered extracts were autoclaved at 15 lbs. pressure for 20 minutes. The effect of plant extracts against mycelial growth of Chlorothalonil resistant mutant of *Aspergillus flavus* was tested by poisoned food technique (Nene and Thapliyal, 1992). To evaluate the effect of the fresh leaves and rhizome extracts against *Aspergillus flavus.* A disc of 6mm diameter of the *A. flavus* was placed on PDA. Plates were incubated at 27 ^{0}C. After 7 days, the progress of the radial mycelia growth was measured and subtracted from the initial diameter and the difference were recorded and kept for later analysis. Control plate were used without plant extract but sterile was used. Each plant extracts were tested at four different conc. 25, 50, 75 and 100% individually and in mixture with Chlorothalonil. Each plate was inoculated with 6 mm disc of mycelial bit taken from the periphery of 7days fresh culture of chlorothnoil resistant mutant of *Aspergillus flavus* growing on PDA. The inoculated petri-plates were incubated at 27$\pm$2^{0}C. Petri-plates were used for each treatment serving as three replications. Petri-plates without plant extract severed as control. Percentage Control Efficacy was calculated using this formula PCE =C-T/C X 100 (Baviskar and Suryawanshi, 2014). Statistical analysis of all experimental results were analyzed using Microsoft excel software.

RESULT AND DISCUSSION

Twenty five Leaves fresh extracts *viz. Bryophyllum pinnatum* (Lam.), *Riccinus communis* (L.), *Azadirachta indica* (A. Juss.), *Vitex nigundo* (L.) *Senna tora* (L.)Roxb., *Gloriosa superba* L., *Lantana camara*(L.), *Guizotia abyssinica* (L.f.)Cass, *Malachra capitata* (L.), *Celosia spicata (*L.), *Justicia Adhatoda* (L.) Nees., *Nyctanthes arbor-trisis* (L.), *Impatiens balsamina* L., *Hyptis suaveolens* (L.), *Arnica Montana* L., *Lawsonia inermis* L., *Ocimum sanctum* (L.), *Blumea lacera* (L.)DC., *Citrus limon (L.)Burm.f. Carica papaya* (L.), Moringa oleifera Lam, *Catharanthus roseus* (L.), *Zingiber officinales* Roscoe, *Allium sativum* L. *Curcuma longa* (L.) extracts were used to prevent the chlorothnoil resistant mutant of *Aspergillus flavus.* Results are indicated in (Table 1) that twenty five medicinal plants. All most all plants were effective in the management of *Aspergillus flavus. Lawsonia inermis (*L.) was more fruitful PCE value increased at the @ of 25, 50, 75 and 100% as 60.40, 70.00, 75.50, and 81.12 respectively increased individual while in mixture with chlorothnoil PCE values increased as compared to individual values significantly up to 67.72, 74.44, 83.34 and 85.57 respectively and followed by *Justicia adhatoda* (L.) *Nees, Lantana camera* (L.), *Guizotia abyssinica* (L.f.) Cass, *Impatiens basamina* (L.) 18.89, 28.89, 65.11 and 67.78% respectively. It was more effective individually and mixture with chlorothnoil PCE values. Similar results were also reported by earlier researches and correlation with earlier workers. Gomathi (2011) noted the antifungal activity of five different medicinal plants namely *Lawsonia inermis* L, *Mimosa pudica* L., *Phyllanthus niruri* L., *Tephrosia purpurea* Pens., *Vinca rosea* L. were tested against *Pythium debaryanum.* The plant leaves were extracted with various solvents like n-butanol, methanol, aqueous. Among the different plant tested, Methanolic extracts of *Lawsonia inermis* showed maximum antifungal activity against *Pythium debaryanum.* Shivpuri and Gupta (2001) reported that the ethanol extract of *Azadirachta indica, Datura stramonium, Oscimum sanctum, Polyalthia longifolia* and *Vinca rosea* were more toxic to *Alternaria brassicola, Colletotrichum capsici, Fusarium oxysporum* and *Rhizoctonia solani*.

Kumar *et.al.* (2011) studied that the methanolic, ethanolic, chloroform and petroleum ether extracts of *Sapium sebiferum* leaves were investigated for their antifungal activity against *Aspergillus niger.* The extracts reduced colony growth by 1-32%. It was found that among all the leaf extracts, methanolic and ethanolic extracts have maximum percentage growth inhibition (26%) against *Aspergillus flavus*, while methanolic extracts showed maximum percentage growth inhibition (32%) against *Aspergillus niger.* Reddy (2011), reported that the efficacy of some local plants viz. *Zingiber officinalis, Trigonella foenum-graecum* and *Oxalis corniculata* inhibited aflatoxin production and suppress growth of *A. flavus*. Srivastava and Singh (2011) concluded that the leaf powder of *Lantana camara* and *Parthenium hysterophorus* exhibit antifungal effect of weeds as good sources of antifungal compounds. Gayathri and Ramesh (2013) noticed that the *Euphorbia hirta* common garden weed used against many fungi.

Babaei *et.al.* (2013) reported that the acetone extract of *Aloe vera* can be used as an effective antifungal agent to inhibit the growth of *A. flavus* compared to other solvents. Behbahani *et.al.* (2014) observed that the antifungal effect of the aqueous and ethanolic extracts of *Avicennia marina* against *Aspergillus flavus* and *Penicillium italicum* (*in vitro*). Tijjani*et.al.* (2014) suggested that the aqueous Moringa, Lantana, Garlic and Pawpaw each with two varying concentrations (40 and 60g/l) were evaluated along with carbendazim for comparison and untreated tomatoes serving as control against *Aspergillus flavus*. Theddeus *et.al.* (2014) noticed that the evaluated the efficacy of 15 selected medicinal plants from Eastern Kenya against *A. flavus.* Different concentrations of 1000mg/ml, 750mg/ml and 400mg/ml using agar well diffusion method were used. Plants found to have inhibition zones of more than 10mm at 400mg/ml had their bark further assayed for antifungal activity. Leaf extracts showed better antifungal activity of *Boscia coriacea*(mean 17.40mm) had the highest zone of inhibition followed by *Zanthoxylem chalybeum* (mean 17.20mm). For the bark extracts, *Croton megalocarpus* (mean 15.0mm) recorded significantly high antifungal activity while *Tithonia diversfolia* (mean 13.0mm) had the lowest at 400mg/ml. *Senna siamea* had the lowest MIC and MFC of 6.25mg/ml and 12.5mg/ml respectively.

Thippeswamy (2014) revealed that the inhibitory activities of aqueous and solvent extracts of twelve selected medicinal plants were evaluated against biosynthesis of aflatoxin B1 (AFB1) by *Aspergillus flavus*. All the extracts showed varying degree of antifungal and AFB1 inhibitory activities, but chloroform extract of *Albizia amara*, *Cassia spectabilis* and *Solanum indicum*, and methanolic extract of *Acacia catechu*, *Albizia saman* and *Anogeissus latifolia* showed the highest activity. Amadi *et. al.,* (2014) observed that the effect of guava (*Psidium guava* L.) leaf and ginger (*Zingiber officinale*) rhizome extracts on the sporulation and spore of *Aspergillus flavus*, *A. niger*, *Rhizopus stolonifer* and *Fusarium*. The effect of the extracts on the test organisms increased with concentration of the extracts. Rodino *et. al.,* (2014) illustrated that the powder extracts of *Artemisia absinthium*, rosemary (*Rosmarinus officinalis*), *Datura stramonium* and cocklebur (*Xanthium strumarium*) against *Alternaria alternata*. Regmi *et. al.,* (2014) noticed that the efficacy of *Jatropa* leaf powder at concentration 1, 2 and 3% w/w against *Alternaria solani* inciting the leaf blight of tomato. All concentration was found to be effective in suppressing the disease intensity. Suryawanshi (2015) concluded that the Fungicide resistance in fungal pathogens of various crops and its integrated management.

STATISTICAL ANALYSIS

Experimental results were performed in triplicate and the results were expressed as mean ± Standard Deviation (SD) and Critical Difference (CD). Calculation was done using Microsoft Excel software and $P < 0.01$ and $P < 0.05$ was considered as hypothetical significant.

Table 1: Efficacy of fresh leaves extracts against Chlorothalonil resistant mutant isolate of *A. flavus (in vitro)*.

Sr. no.	Scientific name	Family	P	T	Percentage Control Efficacy			
					25%	50%	75%	100%
1.	*Bryophyllum pinnatum* (Lam.)	Crassulaceae	L	Ind.	17.78	27.76	28.89	40.23
				Mix.	21.43	31.56	27.74	18.87
2.	*Ricinus communis* L.	Euphorbiaceae	L	Ind	32.27	43.34	42.12	45.57
				Mix	25.58	17.73	12.62	06.67
3.	*Azadirachta indica* (A. Juss.)	Meliaceae	L	Ind	31.19	34.46	40.67	51.18
				Mix	18.87	21.16	23.38	27.73
4.	*Vitex nigundo* L.	Lamiaceae	L	Ind	27.78	26.64	45.59	56.66
				Mix	32.23	38.84	34.26	48.84
5.	*Senna tora* (L.)Roxb.	Fabaceae	L	Ind	17.34	27.70	17.79	54.41
				Mix	17.73	17.76	21.00	43.34
6.	*Gloriosa superba* L.	Colchicaceae	L	Ind	34.46	25.54	31.61	52.24
				Mix	25.58	23.36	32.24	61.16
7.	*Lantana camara* L.	Verbenaceae	L	Ind	61.14	43.34	55.45	78.89
				Mix	57.79	58.92	56.76	65.57
8.	*Guizotia abyssinica* (L.f.)Cass	Asteraceae	L	Ind	45.53	52.27	54.45	62.28
				Mix	56.67	56.69	51.14	65.58
9.	*Malachra capitata* L.	Malvaceae	L	Ind	20.56	13.39	26.67	31.51
				Mix	25.75	18.82	17.78	38.84
10.	*Celosia spicata* L.	Amaranthaceae	L	Ind	25.50	31.17	34.46	42.28
				Mix	38.84	27.74	32.67	40.69
11.	*Justicia Adhatoda* L. Nees.	Acanthaceae	L	Ind	46.65	48.82	58.83	73.36
				Mix	52.21	54.54	55.65	76.62
12.	*Nyctanthes arbor-trisis* L.	Oleaceae	L	Ind	32.26	28.96	26.66	32.27
				Mix	17.79	24.44	24.29	54.74
13.	*Impatiens balsamina* L.	Balsaminaceae	L	Ind	40.56	42.89	45.97	55.33
				Mix	36.65	41.17	46.67	58.82
14.	*Hyptis suaveolens* L.	Lamiaceae	L	Ind	23.33	21.23	17.73	23.39
				Mix	16.69	26.86	29.81	27.34
15.	*Arnica Montana* L.	Asteraceae	L	Ind	46.08	36.26	43.93	47.97
				Mi	62.26	44.44	57.76	48.56
16.	*Lawsonia inermis* L.	Lythraceae	L	Ind	67.18	74.74	83.39	85.58
				Mix	62.56	74.07	75.86	81.78
17.	*Ocimum sanctum* L.	Lamiaceae	L	Ind	37.77	26.60	26.67	35.43
				Mix	37.73	34.24	28.78	43.73
18.	*Blumea lacera (Burm.f).DC*	Asteraceae	L	Ind	12.24	10.67	15.56	23.93
				Mix	12.27	14.84	15.95	23.83
19.	*Citrus aurentifolia* L.	Rutaceae	L	Ind	12.28	15.87	18.43	22.76
				Mix	23.63	24.45	27.44	29.11
20.	*Carica papaya* L.	Caricaceae	L	Ind	13.83	24.48	26.26	21.56
				Mix	16.65	17.73	21.68	23.83
21.	*Moringa oleifera* (Lam.)	Moringaceae	L	Ind	23.67	15.99	16.09	18.85
				Mix	32.62	28.97	26.65	28.84
22.	*Catharanthus roseus* L.	Apocynaceae	L	Ind	05.59	13.35	14.49	22.28
				Mi	17.75	20.57	23.39	26.96
23.	*Zingiber officinale* Roscoe	Zingiberaceae	R	Ind	23.38	33.34	40.67	43.93
				Mix	36.68	37.34	40.23	47.76
24.	*Allium sativum* L.	Alliaceae	C	Ind	22.29	26.65	32.25	43.38
				Mix	27.71	33.37	40.03	51.19
25.	*Curcuma longa* L.	Zingiberaceae	R	Ind	24.41	28.83	45.65	55.58
				Mix	36.65	38.89	48.86	56.76
26.	Chlorothalonil	-	F	Ind	53.34	55..25	65.67	80.20
				Mix				
Individual			S.E		6.7181	6.8383	7.940	7.954
			CD 0.05% 0.01%		13.635 15.860	13.8796 16.1445	16.115 18.745	16.144 18.778
Mixture			S.E		5.912	6.6901	7.627	9.519
			CD 0.05% 0.01%		12.011 13.9824	13.592 15.822	15.495 18.038	19.339 22.513

Whereas,
P-Plant extracts, T-Treatments, L-Leaves, R-Rhizome, C-Clove and F-Fungicide

CONCLUSION

In the present investigation noticed that the fresh leaves and rhizome extracts plants were effective in controlling of plant pathogen is the alternative methods for fungicides in the management of Chlorothalonil resistant mutant of *A. flavus*. We are recommended the *Lawsonia inermis* extracts for the management of papaya rot and also control other plant pathogens.

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