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INETRGRETED MANAGEMENT OF PENICILLIUM EXPANSUM CAUSING BLUE MOULD OF APPLE FRUITS USING SOME HERBAL EXTRACTS

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ABSTRACT

Apple is the most significant fruit crop in India which is extensively used as nutritious fruit. It is well known to cause considerable loss and quality of apple obtained from the markets. A total of 23 isolates of *Pencilium expansum* obtained from apple and tested against fludioxonil. In the present study *in vitro* the management of fludioxonil resistant isolates, Pe-14 (MIC 880ug/ml). *Penicillium expansum* was evaluated against leaf extracts of 24 medicinal plants out which *Eucalyptus globulous, Azadirachta indica, Chrysanthemum indicum, Zinziber officinalis, Sesamum indicum, Catharanthus roseus* and *Oscimum sanctum* extracts were showed PCE range from 66.02-60.10 individually and in mixture with fludioxonil PCE range from 79.80-65.00 and followed by the other medicinal plants as *Polyalthia longifolia, Curcuma longa, Plumbago zeylanicum, Terminalia bellerica, Terminalia chebula, Eugenia jambolana, Asparagus recemosus, Annona squamosa, Annona reticulata, Tinopospora cordifolia, Vitex negundo, Adhatoda vasica, Allium sativum, Phyllanthus emblica, Allium cepa, Withania sominifera,* and *Aloe vera* were PCE was ranges from 56.35-32.55 indidually and mixture with plant extract and fludioxonil PCE was increased 65.35-42.33.

KEYWORDS: *Penicillium expansum*, Blue mould, Fludioxonil, Plant extracts.

INTRODUCTION

Apple (*Pyrus malus* L.) is the most important temperate fruit of the North Western Himalayan region. In India it is predominantly grown in Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh. It accounts for about 90% of the production of which is

extensively used as fruit. Apple is infested by *Penicillium expansum* after harvesting during storage. The various fungicides are used to control of blue mould disease. In earlier sense farmer used different systemic fungicides to manage fungal diseases, their indiscriminate use may cause environmental hazards. Therefore, its management is equally important to increase the percentage of yield and maintain quality of post harvest apple using plant extracts is the alternative for fungicides. Apple caused by various pathogens (*Venturia inaequalis, Erwinia amylovora, Botryospaeria obtusa, Leptodontium elatius, Rhizopus arrhizus*) among these blue mould disease caused by *Penicillium expansum* is very serious plant pathogen was considered to be controlled using plant extracts. Very few research works have been carried out on disease management using herbal extracts. Various plants are known to have antifungal and antibacterial properties and these are used as promising bio-control agents.[1,5,3,4,2] Therefore it was felt worthwhile to study the efficacy of some plant extract against *Penicillum expansum* of apple.

MATERIALS AND METHODS

The medicinal plants (*Eucalyptus globulous, Terminalia bellerica, Terminalia chebula, Azadirachata indica, Polyalthia longifolia, catharanthus roseus, Chrysanthemum indicum, Emblica officinalis, Anona reticulata, Anona squamosa, Tinopospora cordifolia, Aloe vera, Asparagus recemosus, Zinziber officinalis, Withania sominifera, Curcuma longa, Adhatoda vasica, Vitex negundo and Ocimum sanctum*) were collected from K.V. Pendharkar college campus Dombivali (E) Dist- Thane. The leaves of above plants collected and clean with tap water and sterilized distilled water. The fresh 100gms leaves were crushed and homogenized. The leaf extracts were expressed in the four layered of muslin cloths with 100ml SDW (sterile Distilled Water) and sterilized in autoclave at 15lbs. The sterile leaf extracts were mixed with PDA medium with equal quantity and pour in the Petri plates. This was considered as 100% extract. The method used for testing fungi toxic properties of plant extract was poisoned food technique.[5] Similarly fludioxonil concentration was also adjusted along with the leaf extracts to see the combine effect. Plates were inoculated with resistant isolate (Pe-15) and incubated at 27±2°C. Percentage Control Efficacy (PCE) was determined after 10 days.

RESULTS AND DISCUSSION

The results are depicted in Table no.1. It was seen that individually certain plant extracts showed PCE more than 60.29%. Some of them showed PCE more than 52.20-56.35%, while

some of them showed PCE 32.55-48.25%.individually. Thus *Eucalyptus globulus, Azadirachta indica Chrysanthemum indium, Zingier officinalis, Sesamum indicum, Catharanthus roseus,* and *Oscimum sanctum,* extracts when used alone showed PCE ranging from 60.10-66.02. Plants those showed PCE in between 52.20-56.35 were as *Eugenia jambolana, Terminalia chebula, Terminalia bellerica, Plumbago zelanica, Polyalthtia logofolia, Curcuma longa.* Extracts of other plants were also effective showing PCE in between 37.42-48.32%. When the plants extracts were mixed with fludioxonil PCE against *P.expansum* was increased. For example use of *Azadirachta indica* extract along with fludioxonil increased PCE from 65.00-79.80. Aqueous extracts of twenty four medicinal plants were effective in control the blue mould diseases caused by penicillium expansum on agar plates. While extracts in combination with fludioxonil Percentage Control Efficacy (PCE) was increased up to 79.80. *Eucalyptus globulous, Azadirachta indica, Chrysanthamum indicum, Zingiber officinalis, Sesamum indicum, Catharanthus roseus,* and *Oscimum sanctum* were highly effective when used alone or in mixture with fludioxonil. As compared to earlier investigators studies have depicted and co-relate the results in which leaf extract of different plants inhibited the growth of *Fusarium, Alternaria* and *Helminthosporium*[6] and also the results compared with earlier studies showed that the efficacy of the extract, biological agents and Fungicide against *Alternaria* blight of Cumin.[7]

Table no. 1: PCE of fludioxonil Individually and In mixture with plant extracts against resistant isolate *Penicillium expansum* on agar plates.

Sr. No.	Medicinal Plant Extract	PCE Individual	PCE mixture Fludioxonil (880µg/ml)
01	*Eucalyptus globulous Labill.*	66.02	69.62
02	*Azadirachta indica A.Juss.*	64.50	79.80
03	*Chrysanthamum idicum L.*	63.29	65.23
04	*Zingiber officinalis Rosc.*	62.62	65.00
05	*Sesamum indicum L.*	62.30	66.27
06	*Catharanthus roseus L.*	60.36	64.99
07	*Oscimum sanctum L.*	60.10	65.23
08	*Polyalthtia logifolia Benth.*	56.35	59.62
09	*Curcuma longa L.*	55.20	64.35
10	*Plumbago zeylanicum L.*	55.00	61.89
11	*Terminalia bellerica Roxb.*	54.32	64.33
12	*Terminalia chebula Retz.*	53.20	56.23
13	*Eugenia jambolana Lam.*	52.20	55.42
14	*Asparagus recemosus L.*	48.25	56.72
15	*Anona squamosa L.*	48.32	62.22
16	*Anona reticulata L.*	44.36	58.29

17	*Tinopospora cordifolia Mers.*	42.27	49.74
18	*Vitex negundo L.*	42.00	45.01
19	*Adhatoda vasica Nees.*	40.33	46.22
20	*Allium sativum L.*	40.32	60.43
21	*Phyllanthus emblica Gaertn.*	40.12	63.18
22	*Allium cepa L.*	40.12	58.33
23	*withania sominifera L.*	37.42	48.20
24	*Aloe vera L.*	32.55	42.33
25	Fludioxonil (880µg/ml)	54.65	---
	SE	2.878	2.080
	CD at 0.05	5.805	4.285
	at 0.01	6.759	4.996

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