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EVALUATION OF SELECTED HOMOEOPATHIC MEDICINES AGAINST FRUIT ROT OF PEAR CAUSED BY *PENICILLIUM EXPANSUM* LINK.

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ABSTRACT

Blue mold of pear caused by *Penicillium expansum* is one of the most significant serious destructive post harvest disease in India. Twenty three isolates of *Penicillium expansum* were isolated from rotted fruits of pear collected from APMC fruit market of Vashi, Navi Mumbai. Their sensitivity was tested against fludioxonil. It was found that Pe-10 was sensitive while Pe-17 resistant. MIC values ranged from 756.10-972.30µg/ml. Sensitive isolate was selected for further studies and treated with chemical and physical mutagens and resistant mutant of *Penicillium expansum* (Pe-EMS-11) was found (4952.15g/ml). Total 14 homoeopathic medicines were selected for the control of fludioxonil resistant mutant of *Penicillium expansum* (EMS-Pe-11). *Nux vomica* was more effective PCE value (41.92) when used individually and in mixture with fludioxonil PCE value was increased as compared to individual (55.37) and followed by *Arsenicum album, Sambucus nigra, Cynopodium, Baptisia tinctoria, Ustilago maydis, Iris versicolor, Zincum metallicum* and *Argentum metallicum.*

KEYWORDS: Pear, Blue mold, *Penicillium expansum*, Homoeopathic medicines, fludioxonil.

INTRODUCTION

Blue mold of pear (*Pyrus communis* L.) caused by *Penicillium expansum* is one of the most important post harvest disease. Pear fruit play a vital role in human nutrition by supplying the necessary growth factors such as vitamins, antioxidants and essential minerals in human daily diet and that can help to keep a good health. It accommodate high level of sugar, minerals

and nutrient components and their low pH value create them susceptible for fungal attack and are being rotten.[14] Fungi not only cause rot to a number of post harvest fruits but also minimize their market values.[2] Some fungal pathogens viz. *Alternaria alternata, Aspergillus fumigates, Aspergillus flavus, Colletotrichum acutatum, Venturia inaequalis, Monilinia fructicola, Botrytis cinerea, Sclerotina fructigena, Rhizopus stolonifer, Mucor piriformis, Penicliium digitatum* and *Penicillium expansum* on pear was reported during the transportation and storage condition. Among the pathogens *Penicillium expansum* was more serious and dominant in the store houses of local and APMC Fruit Market, Vashi, Navi Mumbai in packing boxes noticed damages of pear. 20-25% losses of the fruits are spoiled by pathogens during post-harvest handling even in developed countries.[1]

Fludioxonil is recommended to manage various fruit rot fungal pathogens during post harvest. Fungicides resistance few examples have been reported in India.[4, 7, 8] Pear growers rely deliberately on the use of fungicides for control of fruit rot of pear. Excessive use of fludioxonil was harmful to pear as well as *Penicillium expansum*. Therefore, alternative for fludioxonil presently recommended that use of homeopathic medicines to manage various pathogens was highly effective and safe for fruit and environment. Therefore, inhibitory result of homoeopathic drugs such as *Lycopodium, Thuja, Arsenicum, Zincum* etc. against *Fusarium moniliforme, Alternaria alternata, Gloeosporium psidii, Colletotrichum gloeosporioides* and *Pestalotia sp*. and certain fruit rot pathogens have been reported by Khanna and Chandra, 1989 and 1992; Chandra *et. al*., 1981; Wilson *et. al*., 1991. The present investigation revealed that the effect of homoeopathic medicines i.e. *Nux vomica* was fruitful PCE (41.22) value individually and in mixture with fludioxonil PCE value increased up to 55.37.

MATERIALS AND METHODS

Homoeopathic medicines viz; *Belladonna, Sambucus nigra, Thuja occidentalis, Argentum metallicum, Nux vomica, Lycopodium clavatum, Ustilago maydis, Iris versicolor, Cynopodium, Zincum metallicum, Arsenicum album, Baptisia tinctoria, Teucrium marum verum,* and *Sepia officinale* etc. was purchased from wholesale market of Vashi, Potency (200) of all these medicines were used. The antifungal homoeopathic medicines were tested individually and in mixture with fludioxonil (971.5µg/ml) against mycelial growth of fludioxonil resistant mutant (Pe-EMS-11) of *Penicillium expansum* using potato dextrose

agar (PDA) medium by food poisoning technique.[12] Percentage Control Efficacy (PCE) was determined using formula.

$$PCE = \frac{C-T}{T} \times 100$$

Where, C - Mycelial Growth in Control

T - Mycelial Growth in Treated

RESULTS AND DISCUSSION

Results are depicted in (Table.1) observed that fourteen homoeopathic medicines were used for the management of fludioxonil resistant mutant (Pe-EMS-11) of *Penicillium expansum.* It was investigated that all homoeopathic medicines were inhibitory against *Penicillium expansum*. *Nux vomica* showed significantly increased PCE (41.92) individually and followed by *Arsenicum album* (39.10), *Sambucus nigra* (39.58), *Cynopodium* (39.00), *Baptisia tinctoria* (37.52), *Ustilago maydis* (37.98), *Iris versicolor* (37.88), *Zincum metallicum* (35.56), *Argentum metallicum* (33.28) and four homoeopathic medicines showed PCE 21.52-31.78 individually. In other hand all 14 homoeopathic medicines were mixed with fludioxonil PCE against *penicillium expansum* was increased. *Nux vomica* mix with fludioxonil the PCE (55.37) value increased as compared to individual PCE value. The lowest PCE (36.91) was detected in *Belladonna* and followed by other homoeopathic medicines which showed values of PCE more than 53.75. There are few reports available on the use of homoeopathic medicines against plant pathogens correlate with other researchers. Dahiwale and Suryawanshi (2014) reported that the control of grape grey mould caused by *Botrytis cinerea* using some homoeopathic medicine. Patil and Suryawanshi (2014) notified that strawberry fruit rot caused by *Alternaria Alternata* control using homoeopathic medicines. *Nux vomica* shows higher PCE (50) when utilized individually while Sulphur 30 CH was effective and showed maximum PCE (84.45) when used in mixture with mancozeb and followed by *Rhus toxicodendron, Cina, Arnica montana, Sanguinaria canadensis, Selenium* and *Tarentula hispana.* Baviskar and Suryawanshi (2015) reported that, total thirteen homoeopathic medicines were used for the control of carbendazim resistant mutant (Pe-EMS-10) of *Penicillium expansum.* It was observed that *Sepia officinale* showed significantly hightest PCE (40.42) individually and *Belladonna* (35.85) showed lowest PCE value and all homoeopathic medicines were inhibitory against *Penicillium expansum*. *Sepia officinale* mixture with carbendazim the PCE (53.25) value raised as compared to individual PCE value. The lowest PCE (35.85) was notified in *Belladonna.* Jagtap and Suryawanshi

(2014) reported that certain homoeopathic medicines were utilized for the management of thiophanate methyl resistant mutant (*Foc*-EMS-10) of *Fusarium oxysporum* f. sp. *cepae.* Homoeopathic medicines are highly inhibitory against thiophanate methyl resistant mutant of *F. oxysporum* f. sp. *cepae* (*Foc*-EMS-10). *Nux vomica* (48.66) was most effective against *F. oxysporum* f. sp. *cepae* at 200 Potency PCE (48.66) individually while *Tuberculinum* (25.66), *Chelidonium majus* (23.00) showed lowest PCE values and *Sulphur* (52.33).

Table 1: Percentage Control Efficacy (PCE) of fludioxonil individually and in mixture with homoeopathic medicines against resistant mutant of *Penicillium expansum* on PDA medium.

Sr. No.	Homoeopathic medicines	Percentage Control Efficacy *	
		PCE individual	PCE mixture With Fludioxonil
1.	*Belladonna*	21.52	36.91
2.	*Sambucus nigra*	39.58	52.52
3.	*Thuja occidentalis*	29.74	43.55
4.	*Argentum metallicum*	33.58	45.75
5.	*Nux vomica*	41.92	55.37
6.	*Lycopodium clavatum*	31.78	45.38
7.	*Ustilago maydis*	37.98	49.95
8.	*Iris versicolor*	37.88	51.50
9.	*Cynopodium*	39.00	52.58
10.	*Zincum metallicum*	35.56	49.46
11.	*Arsenicum album*	39.10	51.00
12.	*Baptisia tinctoria*	37.72	53.75
13.	*Teucrium marum verum*	29.50	43.78
14.	*Sepia officinale*	28.30	38.20
14.	Fludioxonil (971.5µg/ml)	52.50	---
	SE	2.129	1.716
	CD at 0.05	4.452	3.581
	at 0.05	4.933	4.240

* Values are replicates.

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