

Fruit Rot of Strawberry Caused By *Alternaria Alternata* Control Using Homoeopathic Medicines.

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ABSTRACT : Fruit rot of Strawberry (*Fragaria ananassa* Dutch.) caused by *Alternaria alternata* is one of the most destructive pathogen in India. Total 25 isolates were isolated from infected strawberry collected from various localities of Maharashtra. All these isolates were ranged between 700 - 2040 µg/ml. isolate Aa-10 was sensitive and isolate Aa-8 was resistant. Wild sensitive isolate was further treated with chemical and physical mutagens and mutant Aa-EMS-2 was found. Total nineteen homoeopathic medicines were used for the management of mancozeb resistant mutant (Aa-EMS-2) of *A.alternata*. *Nux vomica* shows higher PCE (50%) when used individually while Sulphur 30 CH was effective showing maximum PCE i.e. 84.45% when used in mixture with mancozeb and followed by *Cina*, *Rhus toxicodendron*, *Arnica montana*, *Sanguinaria canadensis*, *Tarentula hispana* and *Selenium*.

I. INTRODUCTION

Strawberry (*Fragaria ananassa* Dutch.) are highly perishable fruits due to their extreme tenderness, vulnerability to mechanical damage, high level of respiration and their susceptibility to fungal spoilage (Maxie *et. al.* 1959; Dennis, 1978). Fresh strawberries, therefore, have a very limited postharvest life and cannot be stored except briefly (Dennis and Mountford 1975). Post-harvest losses are typically more severe, especially when conditions are favorable for disease development; in some cases 80-85% of a crop may be lost (Hong *et. al.* 1998; Larena *et. al.* 2005). During storage and transport, post-harvest pathogens significantly reduced the quality and value of strawberry fruits. Strawberry fruits infected by various fungal pathogens viz. *Alternaria alternata*, *Colletotrichum acutatum*, *C. gloeosporioides* *C. fragariae*, *Rhizopus nigricans*, *Phytophthora paracitica*, *P. cactonum*, *Botrytis cinerea*, *Fusarium solani*, *Aspergillus niger*, *Aspergillus flavus*, *Penicillium expansum* (Michel Dignand, 2004) out of which *Alternaria* rot caused by *Alternaria alternata* is severe. Strawberry growers rely heavily on the use of fungicides for control of fruit diseases in strawberries. Mostly mancozeb is recommended for the management of *A. alternata*. But due to adverse effects of fungicides growers are keen to incorporate integrated disease management methods in the production of strawberries; highly effective alternatives for disease management may not be available or cost-effective. There are few reports on the use of homoeopathic medicines in the management of various pathogens. Inhibitory effect of homoeopathic drugs such as *Lycopodium*, *Thuja*, *Arsenicum*, *Zincum* etc. against *Alternaria alternata*, *Fusarium moniliforme*, *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.

II. MATERIALS AND METHODS:

The antifungal activities of homoeopathic medicines viz; *Thuja occidentalis*, *Kali iodatum*, *Sulphur*, *Borax*, *Cina*, *Selenium*, *Lycopodium clavatum*, *Acidium phosphoricum*, *Tarentula hispana*, *Sambucus nigra*, *Rhus toxicodendron*, *Spongia tosta*, *Selenium*, *Nux vomica*, *Bryonia alba*, *Sanguinaria canadensis*, *Arnica montana*, *Tuberculinum* and *Chelidonium majus* were tested individually and in mixture with mancozeb (680µg/ml) against mycelial growth of mancozeb resistant mutant (Aa-EMS-2) of *A. alternata* using potato dextrose agar (PDA) medium by food poisoning method (Nene and Thapliyal, 1982). Percentage Control Efficacy (PCE) was determined after 8days incubation period using formula

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

Where, C - Mycelial Growth in Control

T - Mycelial Growth in Treated

III. RESULT AND DISCUSSION:

Total nineteen homoeopathic medicines were used for the management of mancozeb resistant mutant (Aa-EMS-2) of *A.alternata*. *Nux vomica* shows higher PCE (50%) when used individually while *Sulphur* 30 CH was effective showing maximum PCE i.e. 84.45% when used in mixture with mancozeb and followed by *Cina*,

Rhus toxicodendron, *Arnica montana*, *Sanguinaria canadensis*, *Tarentula hispana* and *Selenium* while used in mixture with mancozeb (Table 1). There are few reports on the use of homoeopathic medicines against plant pathogens. Dahiwalé and Suryawanshi (2010) observed that fruit rot of pomegranate caused by *Alternaria alternata* is one of the most important post harvest diseases. It was revealed that altogether 13 homoeopathic medicines were inhibitory against *A. alternata*. Out of which *Arsenicum album*, *Argentum metallicum* was highly effective followed by *Zincum metallicum*, *Baptisia tinctoria*, *Belladonna*, *Tabacum*, *Lycopodium clavatum*, *Thuja occidentale*, *Cyanopodium*, *Ustilago maydis*, *Sepia officinale* and *Iris versicolor* in decreasing PCE values against *A. alternata*. Dahiwalé and Suryawanshi (2014) also revealed the control of grey mould of grape caused by *Botrytis cinerea* using homoeopathic medicine.

Table1: PCE of mancozeb individually and in mixture with other Homoeopathic medicine against resistant mutant (Aa-EMS-2) of *A.alternata* on PDA.

Sr. no.	Homoeopathic medicine	Potency	Percentage Control Efficacy *	
			Individual	Mixture
1.	<i>Thuja occidentalis</i>	30	26.67	68.89
2.	<i>Kali iodatum</i>	30	21.12	67.78
3.	<i>Sulphur</i>	30	48.89	84.45
4.	<i>Borax</i>	30	24.45	56.67
5.	<i>Cina</i>	30	46.67	80.00
6.	<i>Selenium</i>	30	33.34	62.23
7.	<i>Lycopodium clavatum</i>	30	45.56	66.67
8.	<i>Acidium phosphoricum</i>	30	28.89	63.34
9.	<i>Tarentula hispana</i>	30	34.45	73.34
10.	<i>Sambucus nigra</i>	30	33.34	57.78
11.	<i>Rhus toxicodendron</i>	30	40.00	76.67
12.	<i>Spongia tosta</i>	200	33.34	67.78
13.	<i>Selenium</i>	200	36.67	70.00
14.	<i>Nux vomica</i>	200	50.00	63.34
15.	<i>Bryonia alba</i>	200	35.56	61.12
16.	<i>Sanguinaria canadensis</i>	200	37.78	75.56
17.	<i>Arnica montana</i>	200	37.78	76.67
18.	<i>Tuberculinum</i>	200	26.67	57.78
19.	<i>Chelidonium majus</i>	200	25.56	52.23
20.	Mancozeb	680 µg/ml	41.12	-- --
	S.E.		1.9133	2.1162
	C.D. at	0.05%	3.9144	4.3379
		0.01%	4.5766	5.0771

* Values are the mean of three replicates.

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