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FURTHER INVESTIGATIONS ON THE CONTROL OF STORAGE ROT OF MANGO, GUAVA AND TOMATO FRUITS WITH HOMOEOPATHIC DRUGS

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Abstract : Efficacy of five different adjuvants (glycerol, castor oil, paraffin oil, soap and wheat flour) and certain homoeopathic drugs effective in checking storage rots of mango (*Pestalotia mangiferae*), guava (*Pestalotia psidii*) and tomato (*Fusarium roseum*) fruits was evaluated. Soap was most successful adjuvant for all the drugs. The drugs did not cause any change in the quality and palatability of the fruits. A comparison of the investment and profit indicated the treatment to be fairly economical.

Keywords : Control, Fruit rot, Mango, Guava, Tomato, Homoeopathic drugs

The efficacy of certain potencies of homoeopathic drugs in controlling the storage rots of mango (*Pestalotia mangiferae* Henn.), guava (*Pestalotia psidii* Pat.) and tomato (*Fusarium roseum* Link) fruits has been indicated in earlier reports (Khanna and Chandra, 1976, 1977, 1978). In order to ensure its practical application and wider sanction, the control method was further evaluated with reference to the effect of drugs on the quality and palatability of treated fruits and economics of their applications. In addition, potentiality of certain adjuvants (auxillary materials) in improving the efficacy of the drugs in controlling the rots was also evaluated. The present report includes the results of these investigations.

MATERIALS AND METHODS

The pathogens were isolated from the diseased fruits and maintained on Asthana and Hawker's medium (1936). Different potencies of drugs were prepared by the method of Khanna and Chandra (1976, 1977). Glycerol, castor oil, paraffin (mineral) oil, soap (Surf—a detergent powder) and wheat flour were used as adjuvants. First three were mixed with the drugs at a rate of 10 ml/l while remaining two at a rate of 500 mg/l. Fruits were given pre- and post-inoculation treatments with the mixtures of drug and adjuvant following method described by Khanna and Chandra (1976). Treatments were replicated thrice and suitable controls (drug without any adjuvant) were maintained with every treatment. Treated fruits were stored at 26 ± 2°C for eight days, thereafter the percentage fruit infected and percentage rot developed were recorded.

Tissues from the fruit of control and treated series were subjected to extraction and the extracts were analyzed for amino acids, amides (both soluble and protein fractions), sugars and organic acids employing method described by Ranjan and Laloraya (1960). They were also analyzed for vitamin C following the method of Ghosh *et al.* (1966).

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Economics of the treatment was computed on the basis of cost and benefit ratio. For the purpose, 100 ml of drug was mixed in 10 litres of water with the adjuvant at the rate described earlier and the fruits were given dip treatment for 5 min. Bulk of treated and untreated fruits wrapped in newspaper sheets were packed in wooden boxes and stored at room temperature (26 ± 2°C) for eight days. After storage, the damage in treated and untreated fruits was compared and benefit from the treatment was calculated on the basis of additional investment on the treatment and cost of the fruits which escaped damage.

RESULTS AND DISCUSSION

Better performance of fungicides, when used in combination with adjuvants, has been shown by many investigators (Harding and Schade, 1967; Smith and Crosby, 1972; Solel *et al.*, 1972; Erwin *et al.*, 1974). By changing the surface tension, the adjuvants reduce the contact angle and help the fungicidal solution to make a uniform film on the surface of fruits. Out of five adjuvants tested in the present study, only soap was highly effective in improving the efficacy of drugs (Tables 1-3). Wheat flour was also effective but to a lesser extent. In general, castor oil and paraffin oil were either ineffective or caused a damaging effect on the fruits. Castor oil improved the efficacy of Kali iodatum potency 87 for the fruit rot of guava but caused a number of water-soaked patches over the fruit and thus made them unpleasant. Glycerol was a complete failure as adjuvant since it suppressed the efficacy of drugs in majority of cases.

A variety of sugars, namely, glucose, fructose, maltose and sucrose, and organic acids, namely, citric, malic, malonic, succinic, fumaric and tartaric acids were detected in the tissues of treated and untreated fruits. A variety of amino acids/amides, namely, leucine, isoleucine, valine, γ-amino-*n*-butyric acid, α-alanine, glutamic acid, arginine, aspartic acid, serine, glycine, asparagine, cysteine, histidine and lysine were detected in the fruits in the free form. On the other hand, a variety of amino acids/amides, namely, leucine, isoleucine, valine, α-alanine, glutamic acid, aspartic acid, serine, glycine, histidine, lysine, proline and threonine were recorded in the bound form. Amino

TABLE 1 : Effect of different adjuvants on the potentiality of Kali iodatum potency 149 in controlling tomato fruit rot caused by *Fusarium roseum**

Adjuvants	Pre-inoculation treatment		Post-inoculation treatment	
	Percentage of fruit infected	Percentage of rot developed	Percentage of fruit infected	Percentage of rot developed
Glycerol	12 a	10 a	15 a	14 a
Castor oil	8 b	6 b	8 b	9 b
Paraffin oil	7 bc	8 abc	6 bc	6 bc
Soap	1 d	0.5 d	1.5 d	0.2 d
Flour	2 de	1.5 de	2 de	1 de
Control	10 abc	8 abc	8 bc	5 c
Critical difference at 5 per cent level	3.1	2.4	2.1	3.2

*Results were statistically analysed for analysis of variance and Duncan's Multiple Range Test at 5 per cent level. Numbers followed by the same letter are not significantly different within columns.

TABLE 2 : Effect of different adjuvants on the potentiality of Lycopodium clavatum potency 190 in controlling mango fruit rot caused by *Pestalotia mangiferae**

Adjuvants	Pre-inoculation treatment		Post-inoculation treatment	
	Percentage of fruit infected	Percentage of rot developed	Percentage of fruit infected	Percentage of rot developed
Glycerol	15 a	35 a	28 a	18 a
Castor oil	35 b	54 b	25 b	31 b
Paraffin oil	20 c	15 c	15 c	9 c
Soap	2 d	0.5 d	0.5 d	0.1 d
Flour	4 e	5 e	3 e	8 ce
Control	12 f	8 f	6 f	10 cf
Critical difference at 5 per cent level	1.7	1.4	2.1	1.8

*Results were statistically analyzed for analysis of variance and Duncan's Multiple Range Test at 5 per cent level. Numbers followed by the same letter are not significantly different within columns.

TABLE 3 : Effect of different adjuvants on the potentiality of Kali iodatum potency 87 in controlling guava fruit rot caused by *Pestalotia psidii**

Adjuvants	Pre-inoculation treatment		Post-inoculation treatment	
	Percentage of fruit infected	Percentage of rot developed	Percentage of fruit infected	Percentage of rot developed
Glycerol	38 a	14 a	62 a	28 a
Castor oil	0 b	0 b	1 b	2 b
Paraffin oil	18 c	10 c	20 c	7 c
Soap	0.5 bd	0.8 bd	2 bd	3 bd
Flour	5 e	5 e	15 e	22 e
Control	8 f	7 e	83 f	64 f
Critical difference at 5 per cent level	2.8	2.2	3.2	3.4

*Results were statistically analyzed for analysis of variance and Duncan's Multiple Range Test at 5 per cent level. Numbers followed by the same letter are not significantly different within columns.

acid/amide pool and carbohydrate in the fruits of mango, guava and tomato exhibited qualitative and quantitative differences. However, no such difference was recorded between untreated and drug-treated fruits. Same was true with the vitamin C content of the fruits.

The organoleptic test indicated that drug treatment caused no change in the taste of the fruits and they retained their entire palatability even after treatment.

Drug treatment caused a marked reduction in the losses during storage (Table 4). In a period of seven days, the untreated fruits incurred a loss of 13-15 kg/20 kg, while the treated fruits incurred a loss of only 4-8 kg/20 kg. Calculations showed the treatments to be highly profitable in all the cases. Drug treatments suppressed the infection of all the fungal forms. In addition, the infection by some of the forms, namely, *Pestalotia Psidii* in guava, *P. mangiferae* in mango and *Fusarium roseum* in tomato was completely eliminated by the treatment.

TABLE 4 : Economics of the drug treatment of tomato, guava and mango fruits

Fruits	Drugs		Fresh fruits taken (kg)	Fruits diseased after 7 days (kg)	Fruits left healthy after 7 days (kg)	Fruits saved by drug (kg)	Cost of fruits saved by drug (Rs)	Cost of drug and soap (Rs)	Net profit (Rs)
Tomato	Kali iodatum potency 149	Control	20	13.5	6.5				
		Treated	20	4.0	16.0	9.5	38/- @ Rs. 4/ kg	10/-	28/- (Rs 140/q)
Guava	Kali iodatum potency 87	Control	20	15.2	4.8				
		Treated	20	8.2	11.8	7.0	35/- @ Rs 5/ kg	10/-	25/- (Rs 125/q)
Mango	Lycopodium clavatum potency 190	Control	20	13.6	6.4				
		Treated	20	4.8	15.2	8.8	50/- @ Rs 6/ kg	10/-	40/- (Rs 200/q)

The present findings clearly show that the use of adjuvants with the drugs makes the drug treatment more efficacious and thus more economical. Further, the treatment neither makes a marked constitutional change in the fruits nor any change in their palatability. In view of this, the use of the effective drugs in combination with selected adjuvants may be safely recommended for the control of fruit diseases included in the study.

REFERENCES

Asthana, R. P. and Hawker, L. E. (1936). The influence of certain fungi on the sporulation of *Melanospora destruens* Shear and of some other ascomycetes. *Ann. Bot. (Lond.)* **50** : 325-344.

Erwin, D. C., Khan, R. A. and Buchenauer, H. (1974). Effect of oil emulsions on the uptake of benomyl and thiabendazole in relation to control of Verticillium wilt of cotton. *Phytopathology* **64** : 485-489.

Ghosh, A. K., Bhargava, S. N. and Tandon, R. N. (1966). Studies on fungal diseases of some tropical fruits VI. Post-infection change in ascorbic acid contents of mango and papaya. *Indian Phytopath.* **19** : 262-268.

Harding, P. R. and Schade, J. E. (1967). Testing thiabendazole in resin-solution and wax-emulsion coating for control of *Penicillium digitatum* in navel oranges. *Plant Dis. Reptr.* **51** : 51-53.

Khanna, K. K. and Chandra, S. (1976). Control of tomato fruit rot caused by *Fusarium roseum* with homoeopathic drugs. *Indian Phytopath.* **29** : 269-272.

Khanna, K. K. and Chandra, S. (1977). Control of guava fruit rot caused by *Pestalotia psidii* with homoeopathic drugs. *Plant Dis. Reptr.* **61** : 362-366.

Khanna, K. K. and Chandra, S. (1978). A homoeopathic drug controls mango fruit rot caused by *Pestalotia mangiferae* Henn. *Experientia* **34** : 1167-1168.

Ranjan, Shri and Laloraya, M. M. (1960). Metabolism of isolated leaves. 1. Changes in the protein, soluble nitrogenous compounds, sugars and organic acids in tobacco leaves in light and dark. *Plant Physiol.* **35** : 714-725.

Smith, D. H. and Crosby, F. L. (1972). Effects of foliar applications of a benomyl-oil-water emulsion on the epidemiology of Cercospora leaf spot of peanuts. *Phytopathology* **62** : 1029-1031.

Solel, Z., Pinkas, J. and Loebenstein, G. (1972). Evaluation of systemic fungicides and mineral oil adjuvants for the control of mal-secco disease of lemon plants. *Phytopathology* **62** : 1007-1013.