Vitis 23, 202—204 (1984)

Plant Pathology Laboratory, Palli Siksha Sadana (College of Agriculture), Visva-Bharati, Sriniketan, Birbhum, West Bengal, India

Control of postharvest grape rots caused by *Aspergillus niger* and *Botryodiplodia theobromae* [1])

by

N. C. MANDAL and M. K. DASGUPTA

Die Bekämpfung der durch *Aspergillus niger* und *Botryodiplodia theobromae* an geernteten Trauben verursachten Fäulnis

Zusammenfassung. — Trauben der Sorten Thompson Seedless, Anab-e-Shahi und Kishmish wurden nach der Ernte mit *A. niger* und *B. theobromae* — sowohl rein als auch gemischt — infiziert. Die Wirksamkeit verschiedener Nahrungskonservierungsmittel, Pflanzenöle, Wachstumsregulatoren, homoeopathischer Drogen, Antibiotika und Fungizide, vor und nach der Inokulation angewandt, wurde geprüft. Durch die Behandlung der geernteten Trauben mit Bavistin (0,1 %) + Kaliummetabisulfit (5 %) könnten hohe wirtschaftliche Verluste vermieden werden.

Postharvest losses of grapes were found to vary between 4 and 60 % (MANDAL and DASGUPTA 1981). Among the pathogens occurring on grape, *Aspergillus niger* VAN TIEGH. and *Botryodiplodia theobromae* PAT. caused 5—30 % and 0—25 % loss, respectively, in West Bengal (India) (MANDAL, 1981). The synergistic nature of association in their mixed inoculation has been discovered (MANDAL and DASGUPTA 1982 a). Control of postharvest diseases of grapes has recently been reviewed (MANDAL and DASGUPTA 1982 b), which reveals that no attempt has been made to control *B. theobromae* or mixed infection of *A. niger* and *B. theobromae.* In this communication, results of the attempts to control *A. niger* and *B. theobromae* either singly or in combination have been reported.

Apparently uninfected grape fruits (cvs. Thompson Seedless, Anab-e-Shahi and Kishmish) were surface-sterilized (dipping in 0.1 % $HgCl_2$ for 30 s followed by several washings in sterile water), inoculated by dipping for 5 min in conidial suspensions (50×10^3 spores/ml) and blended mycelial mass of *A. niger* and *B. theobromae,* respectively. An interval of 24 h was maintained between treatment (dipping for 5 min) and inoculation or *vice versa* for pre- and postinoculation treatments, respectively. After 10 d of incubation at room temperature (32 ± 4 °C), effects of the treatments were observed and analysed by using the variables such as per cent infection, degree of softening (0—3 point scale), superficial growth and/or sporulation (0—3 point scale), average infection index (0—5 point scale), change in colour, flavour, residue left etc. (MANDAL 1981). The chemicals used at different doses were food preservatives, vegetable oils (linseed oil, chalmugra oil, neem oil), growth regulators (2,4-D, MH, GA, cycocel [(2-chloroethyl) trimethyl ammonium chloride]), homeopathic drugs *(Blatta orientalis, Calotropis, Cina, Filix mas, Ruta graveolens, Tercium),* antibiotics and fungicides (chemical names provided in MERCER 1979).

In the preinoculation treatment against *A. niger,* none of the 14 treatments was effective. In the postinoculation treatment against *A. niger* out of 12 treatments only bavistin (0.05 % for 5 min) was found to be effective (87 % reduction in infection) and since it has no known or observed undesirable effect, it deserves strong recommenda-

[1]) Part of the Ph. D. Thesis of N. C. MANDAL approved by Visva-Bharati, Santiniketan, India.

tion. This confirms the findings of TANDON *et al.* (1977) (cit. MANDAL and DASGUPTA 1982 b). It is interesting that benomyl was not effective which suggested further investigation (MARSH 1977).

Preinoculation treatments against *B. theobromae* were carried out with 24 treatments, but only potassium metabisulphite (5 %) was most effective, although with a tendency to slight desiccation. Diphenylamine (0.1 % of both aqueous and alcoholic) and macuprax (0.2 %) were effective, but caused discolouration and left undesirable residues, respectively. However, although effectiveness of SO_2 fumigation was reported (NELSON and AHMEDUALLA 1972), dipping in sodium metabisulphite was not found to be effective against *Botrytis cinerea,* when treated after 6 h of inculation (COMBRINA 1975, cit. MANDAL and DASGUPTA 1982 b).

In the postinoculation treatment against *B. theobromae,* TBZ (0.25 %), bavistin (0.05 %), benomyl (0.1 %), topsin M-70, (0.1 %), NF-48 (0.01 %) were effective, but considered undesirable in one or more respects. Aureofungin (0.1 %), griseofulvin (125 ppm), nystatin (0.2 %), calixin (0.1 %), hot water treatment (52 °C for 5 min) were not effective.

For control of spoilage against the mixed inoculation of *A. niger* and *B. theobromae* at the postinoculation stage, out of 21 treatments, bavistin (0.1 %) + potassium metabisulphite (5 %) were highly effective (80 % reduction) and could be recommended. NF-48 (0.1 %) + potassium metabisulphite (5 %) were highly effective; NF-48, however, has been claimed to be carcinogenic. Rest of the treatments were either not effective or effective, but left one or more undesirable effects.

Storage of surface-sterilized apparently uninfected grapes in refrigerator (3—5.5 °C) followed by room temperature (28.3—36.1 °C and 61.2—68.4 % RH) indicated that grapes could be cold-stored at least up to 35 d and shelved for another 10 d at room temperature. While it is generally recommended to store grapes at 0.2 °C (PORRITT 1974), our results indicated that higher temperatures may not be harmful. This piece of information may be useful for shipping of grapes and to the homemakers.

Assuming 25 % average loss, annual loss was computed to be 90,000 t and Rupees 800 millions ($ 100 millions) in India. The case of mixed treatment of bavistin (0.1 %) +potassium metabisulphite (5 %) has been computed at the rate of Rs. 100/t ($ 12.5) and 20 % average loss can be saved that way.

Authors are thankful to Visva-Bharati for providing laboratory facilities. N. C. MANDAL acknowledges the financial support received from the Council of Scientific and Industrial Research, New Delhi.

References

MANDAL, N. C., 1981: Post-harvest diseases of fruits and vegetables in West Bengal. Ph. D. Thesis, Visva-Bharati.

— — and DASGUPTA, M. K., 1981: Post-harvest diseases of perishables in West Bengal. II. Losses. Ann. Agricult. Res. **2**, 73—85.

— — and — —, 1982 a: Post-harvest diseases of persihables in West Bengal, India. Indian Phytopathology **35**, 645—649.

— — and — —, 1982 b: Control of post-harvest diseases of fruits. Pesticides Information **8** (2), 6—16.

MARSH, R. W., 1977: Systemic fungicides. 2nd Ed. Longman, London.

MERCER, S. L., 1979: Pans pesticide index — 1979 edition. Centre for Overseas Pest Research, London.

NELSON, K. E. and AHMEDUALLAH, M., 1972: Effect of type of inpackage SO_2 generator and packaging material on quality of stored table grapes. Amer. J. Enol. Viticult. **23**, 290—301.

PORRITT, S. W., 1974: Commercial storage of fruit and vegetables. Information Division, Canada Department of Agriculture, Ottawa.

Eingegangen am 14. 2. 1984

Dr. N. C. MANDAL
Lecturer in Plant Pathology
Dr. M. K. DASGUPTA
Reader in Plant Pathology
Plant Pathology Laboratory
Palli Siksha Sadana
(College of Agriculture)
Visva-Bharati
Sriniketan 731236
Birbhum, West Bengal
India