

Elimination of white-tip nematode, *Aphelenchoides besseyi*, from rice seed

J. Satyanarayana PRASAD * and K. Sivannarayana VARAPRASAD **

* Directorate of Rice Research, Rajendranagar, Hyderabad-500 030, India, and

** Plant Quarantine Regional Station, National Bureau of Plant Genetic Resources, Rajendranagar, Hyderabad-500 030, India

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Summary — Sixteen treatment combinations were tried in ten rice entries heavily infected with white-tip nematode for its elimination. The treatment schedule of soaking of the seed in 0.2 % solution of mancozeb and monocrotophos followed by vacuum fumigation (methyl bromide *ca* 32 g/m³) for 2 h at 30 °C could eliminate the nematode in all the test entries. Even when the vacuum fumigation was substituted with atmospheric fumigation (aluminium phosphide *ca* 9.3 g/m³), the treatment schedule was equally effective. Soaking in water followed by hot water treatment (52 °C for 30 min) and vacuum fumigation, though effective in elimination of white-tip nematode, resulted in complete loss of seed viability.

Résumé — *Traitement des semences de riz pour l'élimination du nématode Aphelenchoides besseyi, agent du white-tip* — Seize combinaisons de traitements sont testées sur dix entrées de riz gravement infestées en vue de l'élimination du nématode agent du white-tip. Le schéma de traitement comportant le trempage des semences dans une solution à 0,2 % de mancozeb et de monocrotophos suivi d'une fumigation sous vide (bromure de méthyle, env. 32 g/m³) pendant 2 h à 30 °C élimine les nématodes chez toutes les entrées. Le remplacement de la fumigation sous vide par une fumigation à la pression atmosphérique (phosphore d'aluminium, env. 9,3 g/m³) ne modifie pas le bon résultat du traitement. Le trempage des semences suivi d'un traitement à l'eau chaude (52 °C pendant 30 min) ou d'une fumigation sous vide, quoiqu'efficace pour éliminer les nématodes, produit une perte complète de la germinabilité des semences.

Key-words : *Aphelenchoides*, rice, seed disease, treatment.

The white-tip nematode, *Aphelenchoides besseyi*, is a potential pest of rice in almost all rice growing areas of the world. Yield reductions due to this nematode were reported to be as high as 71 % in USSR (Tikhonova, 1966), 60 % in India (Muthukrishnan *et al.*, 1974) and Japan (Tamura & Kegasawa, 1959) and 54 % in USA (Atkins & Todd, 1959) on susceptible varieties. Seed is the main source of infection and the effective control of the nematode increased yields by 19-74 % (Komori *et al.*, 1963).

Hot water treatment at 52-55 °C for 10-30 min of presoaked (12-15 h) seed is being followed as a mandatory treatment for controlling this nematode in quarantine laboratories. However, after this treatment nematodes were not eliminated completely (Kononova & Vinnichuk, 1959; Nandakumar *et al.*, 1975). Further, the nematode has a wide host range including several economically important crops such as maize, strawberry and millets (Fortuner & Williams, 1975; Lal & Mathur, 1988). There are indications of the existence of two or more physiological strains of the nematode in different parts of the world (Fortuner & Williams, 1975). Hence, in spite of its wide distribution, the white-tip nematode carries quarantine significance. It is, therefore necessary to develop a treatment that completely eliminates the nematode without affecting the seed viability.

Materials and methods

One hundred rice entries from seed stocks of the Directorate of Rice Research, Hyderabad, India were screened for the presence of white-tip nematode. Ten entries (V1 to V10) with germination percentage ranging from 95 to 100 were selected for the present study with population ranging from 145 to 500 nematodes per 100 grains. Fifty grams of seed of each entry in a cloth bag was considered as one replication. Each treatment was replicated three times.

The seeds were dehusked manually and the kernels as well as the husks were placed in 3 cm diam. Petri plates and soaked in water. The nematode mortality was recorded after 12 h of soaking. One hundred seeds of each replication were placed on sterile moist blotter paper in a Petri plate and germination percentage was recorded after incubating for a week.

The following treatments were tested for their efficacy in eliminating the white-tip nematode from the seed :

- T-1 : Dry heat treatment.
- T-2 : Soaking in water followed by dry heat treatment.
- T-3 : Soaking in 0.2 % V/V mancozeb solution.
- T-4 : Soaking in 0.2 % V/V monocrotophos solution.
- T-5 : Soaking in 0.2 % V/V buprofezin solution.
- T-6 : Soaking in 0.2 % V/V carbosulfan solution.

- PRASAD, J. S., PANWAR, M. S. & RAO, Y. S. (1986). Effect of seed-soaking with chemicals on the parasitic nematodes of rice. *Indian J. Nematol.*, 16 : 119-121.
- SIVAKUMAR, C. V. (1988). Avoidable yield losses in rice due to *Aphelenchoides besseyi* in Kanyakumari District, Tamil Nadu, India. *Indian J. Nematol.*, 18 : 123-125.
- TAMURA, I. & KEGASAWA, K. (1959). [Ecological study on the rice nematode *Aphelenchoides besseyi* Christie. V. Normal growth of rice plants and harvest losses due to the rice nematode]. *Jap. J. Ecol.*, 9 : 120-124.
- TIKHONOVA, L. V. (1966). [*Aphelenchoides besseyi* Christie, 1942 (Nematoda : Aphelenchoididae) on rice and method of control]. *Zool. Zh.* 45 : 1759-1766.
- TODD, E. H. & ATKINS, J. G. (1959). White tip disease of rice. II. Seed treatment studies. *Phytopathology*, 49 : 184-188.
- YADAV, R. P., SHARMA, N. K. & KAUR, D. (1985). Efficacy of fungicides as nematicides against *Meloidogyne incognita* (Kofoid & White, 1919) Chitwood, 1949. *Indian J. Nematol.*, 15 : 273 [Abstr].