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Screening of *in vitro* derived mutants of banana against nematods using bio-chemical parameters

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ABSTRACT

Investigations were carried out to screen the *in vitro* derived mutants of banana cv. ROBUSTA (CAVEIDISH- AAA) and RASTHALI (SILK- AAB) at Department of Fruit Crops, TNAU, Coimbatore, India by using certain bio-chemical parameters including some enzyme activities. The mutants tested were Ro Im V_4 6-1-1, Ro Im V_4 6-1-2, Ro Im V_4 6-2-1, Si Im V_4 10-5-3, Si Im V_4 6-2-5 along with respective susceptible checks (Robusta and Rasthali), tolerant check (Anaikomban- AA) and resistant check (Pisang Lilin- AA). Various bio-chemical assays used were total phenol, tannin content, lignin content, peroxidase, poly phenol oxidase, phenyl alanine ammonia lyase and ascorbic acid oxidase. The results revealed that the mutants namely Ro Im V_4 6-1-1 and Si Im V_4 10-5-3 were found to be resistant while the mutant Ro Im V_4 6-2-1 was moderately resistant. The rest of the mutants namely Ro Im V_4 6-1-2 and Si Im V_4 6-2-5 were found to be susceptible to nematodes. The resistant and moderately resistant mutants of banana could be further used in breeding programmes as well as be recognized as potential cultivars of commerce.

Key words : Banana, Nematode, Resistance, Biochemical parameters, Enzymes, Screening

Musa production is threatened by pest and disease pressure, which has been increasing during the past 20 years. Most alarming has been nematodes like Burrowing nematode (*Radopholus similis*), Root lesion nematode (*Pratylenchus* sp), Root knot nematode (*Meloidogyne incognita*). The existing practice of chemical control of nematodes leaves lot of residues causing much threat to the environment. Hence, there is a need to develop commercially acceptable types of banana with resistance /tolerance to this biotic stresses. In response to these production constraints, efforts aimed at the genetic improvement of *Musa* have gained renewed interest to generate resistant cultivars. Classical breeding consisting of recombination and selection is difficult for banana. Polyploidy and sterility are both serious handicaps in the genetic improvement of *Musa* cultivars. An alternative procedure to synthesis nematode resistant cultivars would be to induce mutants under *in vitro* conditions as vegetatively propagated crops like banana are usually heterozygous and the genetic nature of *Musa* is suitable for the application of mutation breeding.

MATERIALS AND METHODS

The mutants derived from the *in vitro* mutation studies from two commercial cultivars *viz*., Robusta (Cavendish group-AAA) and Rasthali (Silk group- AAB) were screened for nematode resistance along with Pisang Lilin (AA) (resistant check) and Anaikomban (AA) (tolerant check). Original Robusta and Rasthali were used as susceptible check. The mutants screened were Ro Im V_4 6-1-1, Ro Im V_4 6-1-2, Ro Im V_4 6-2-1, Si Im V_4 10-5-3 and Si Im V_4 6-2-5.These mutants were selected based on their performance for yield and quality parameters during the preliminary screening trials.

Inoculation with nematodes :

The suckers with rhizome weight of approximately 1.5 Kg were selected, pared and planted in earthen pots. The experiment was conducted in a Completely Randomized Design (CRD) with two replications each. Banana mutants maintained in the pots were inoculated with mixed population of nematodes *viz*., infective juveniles of root-lesion nematode *Pratylenchus coffeae* (1000 no.s / pot) and burrowing nematode *Radopholus similis* (400 no.s / pot). The nematodes were extracted by modified Baermann funnel technique. The nematode suspension was then poured in the holes made around the rhizosphere of the plants after the emergence of the roots *i.e.* at 45 days after planting. After inoculation the soil was lightly watered.

The total phenol content was estimated by Folin Ciocalteau method and expressed as mg/g of fresh weight (Mayer *et al*., 1965). The tannin content in the leaves of banana was quantified by following Vanillin Hydrochloride method (Robert, 1971). Activity of the enzymes such as polyphenol oxidase, peroxidase, phenyl alanine ammonia