

SHORT NOTE

EVALUATION OF BANANA CULTIVARS AGAINST ROOT MEALYBUGS, *Geococcus* Spp.

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Banana is an important fruit crop of Kerala as well as South India. A number of pests attacks various parts of this crop. Root mealybugs, viz., *Geococcus citrinus* Kuwana and *Geococcus coffeae* Green were reported as pests of banana damaging the root system (Smitha, 2007). They were reported as a serious threat to Nendran banana in Palakkad, Thrissur and Ernakulam districts (Verghese *et al.*, 2000; Therattil, 2002). Plant resistance or tolerance is a major component of IPM and hence six popular varieties of banana, including a local check were assessed for their susceptibility/resistance to root mealybugs under field conditions. The cultivars tested were Rasthali, Robusta, Njalipoovan, Kodappanilla-kunnan and Palayankodan and Nendran was maintained as a check to compare the intensity of root mealy bug infestation. The experiment was laid out in a farmer's field at Mannarkkad of Palakkad district in a Completely Randomized Block Design with four replications. Four suckers were maintained for each variety per replication. The cultivars were grown in a heavily infested site, which was chosen based on the reports of infestation of the root mealy bug.

The suckers of all the cultivars except Kodappanillakunnan were collected from the farmer's field at Thannerpanthal area. The suckers of Kodappanillakunnan were collected from Banana Research Station, Kannara. The

experiment was laid out during January 2006. The observation on the intensity of root mealy bug was taken for six months at bimonthly intervals in second, fourth and sixth month after planting of suckers. The intensity of the root mealy bug was expressed as the number of mealy bug colonies in 15cm³ soil. The mean data on the number of colonies of root mealy bug in different varieties were analyzed through ANOVA and discussed separately.

Total phenol content in the roots of varieties was estimated as per the protocol of Malick and Singh (1980). Root sample of 0.5 g was ground with a pestle and mortar in 5 ml of 80 per cent ethanol and the homogenate was centrifuged at 10,000 rpm for 20 minutes. The supernatant was collected in a test tube. The residue was re-extracted with 5 ml of 80 per cent ethanol. The residue obtained after evaporation in water bath was then dissolved in 5 ml of distilled water. From the stock, 0.5 ml aliquots were pipetted out in to test tubes and the volume was made up to 3 ml with water. To each test tube, 0.5 ml Folin-Ciocaltean reagent was added. After three minutes, 2 ml of 20 per cent sodium carbonate was added to each test tube. The solution was thoroughly mixed and the test tubes were placed in boiling water for exactly one minute. After cooling, the absorbance was measured at 650 nm against the reagent blank.

A standard curve was prepared using different concentration of catechol. From the standard curve, the concentration of phenols in test sample was found out and expressed as mg phenols per 100 g materials.

The phenol content was calculated using the formula,

$$\frac{\text{Concentration of standard}}{\text{O D of standard}} \times \text{OD of sample} \times \frac{\text{Total volume}}{\text{Volume pipetted}} \times \frac{1}{\text{Weight of sample}}$$

The data on root mealybug population and phenol content in different varieties were subjected to regression analysis, to estimate the correlation coefficient.

The differences among tested cultivars were highly significant for root mealybug count. They reacted differently to *Geococcus* sp. Irrespective of the seasons, two cultivars viz., Palayankodan and Kodappanillakunnan were completely free from root mealybug (Table 1). The number of colonies of the root mealybug was significantly highest (4.38 colonies/sample) in Nendran. The

cultivar, Njalipoovan also recorded more number of colonies (2.55). The least number of colonies (0.42) was observed in the cultivar, Poovan (Rasthali). Irrespective of cultivars, significantly highest number of colonies (2.60/ sample) was recorded in the month of June. In the remaining two months, the number of colonies was on par being 1.88 in February and 1.79 in April months, respectively. Among all cultivars, Nendran recorded significantly more root mealybug population (5.25 colonies/ sample) in the month of June, followed by 4.5 colonies in the month of February and 3.38 colonies in April month. The number of colonies recorded in Njalipoovan in the month of June (3.13 colonies) was also on par with that in Nendran in April month. The number of colonies was significantly least in Poovan and that in the month of February.

The reaction obtained with phloroglucinol-HCl revealed a difference in the degree of lignin deposition in sections of different cultivars. There were also significant differences in the total phenol content among the cultivars. Total phenol content in the roots of different varieties of banana revealed that the highest total phenol content was in the variety Palayankodan (176.90

Table 1. Intensity of root mealybug infestation on different cultivars of banana

Variety	*Mealy bug colonies/15cm ³ soil				*Phenol content µg 100g ⁻¹
	February 2006	April 2006	June 2006	Mean for varieties	
Njalipoovan	2.38 ^d (1.70)	2.13 ^d (1.62)	3.13 ^c (1.90)	2.55 ^b (1.74)	102.40 ^e
Poovan	0.25 ^g (0.87)	0.38 ^{fg} (0.93)	0.63 ^{fg} (0.16)	0.42 ^d (0.95)	138.90 ^c
Robusta	0.38 ^{fg} (0.93)	1.25 ^e (1.32)	1.38 ^e (1.37)	1.00 ^e (1.21)	115.69 ^d
Nendran	4.50 ^b (2.24)	3.38 ^c (1.97)	5.25 ^a (2.40)	4.38 ^a (2.20)	97.34 ^e
Palayankodan	0.00 ^h (0.71)	0.00 ^h (0.71)	0.00 ^h (0.71)	0.00 ^e (0.71)	176.90 ^a
Kodappanillakunnan	0.00 ^h (0.71)	0.00 ^h (0.71)	0.00 ^h (0.71)	0.00 ^e (0.71)	162.86 ^b
Mean for months	1.88 ^B (1.54)	1.79 ^B (1.51)	2.60 ^A (1.76)		

* Mean of three replications

Figures followed by the same alphabets did not differ significantly (P=0.01)

Figures in parentheses are square root transformed (x + 0.5) values

$\mu\text{g } 100\text{g}^{-1}$ followed by Kodappanillakunnan $162.86 \mu\text{g } 100\text{g}^{-1}$ (Table 1). The lowest phenol content ($97.34 \mu\text{g } 100\text{g}^{-1}$) was observed in Nendran variety. The phenol content in Njalipoovan was $102.4 \mu\text{g } 100\text{g}^{-1}$, which was significantly on par with that of Nendran. Palayankodan and Kodappanillakunnan were free from root mealybug infestation. But Nendran was highly susceptible to root mealybug.

Correlation data revealed that there was a significant positive correlation between root mealybug population and phenol content ($r = 0.981$) in different varieties. The phenol content in the roots might be the reason for offering resistance to plants against mealybug. Jayanthi and Goud (2001) reported similar observation in sugarcane varieties in respect of coccids, *Melanaspis glomerata* Green and *Sachharococcus sacchari* Ckll. wherein higher phenols in sugarcane cultivars were correlated to low population compared to those that were heavily infested. Our studies confirm the existence of variability among genotypes in their response to root mealybug infestation.

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