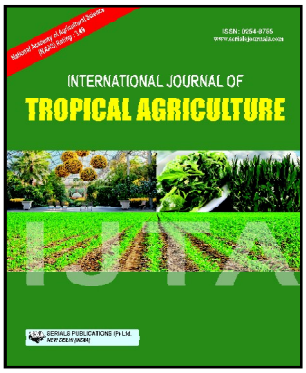

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Effect of microbial inoculants on feeding preference of okra shoot and fruit borer *Earias vittella* Fab.

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Abstract: Okra (Abelmoschus esculentus L. Moench) is an important vegetable grown extensively in the tropical, subtropical and warm area of the temperate zone. Bhendi shoot and fruit borer, *Earias vittella* is the most serious pest which cause direct damage to tender shoots and fruits. The indiscriminate use of synthetic chemical pesticides to control this pest resulted in development of resistance and harmful pesticide residues in fruits. To avoid such problems caused due to the use of insecticides, utilization of Host Plant Resistance (HPR) is an ecologically viable, alternate insect pest management strategy. The okra accession Salem Local along with a popular variety Arka Anamika was tested for induction of resistance by various microbial inoculants *viz., Azospirillum,* Phosphobacteria, *Pseudomonas* and K-solubilizer. Feeding preference of *E.vittella* larvae to the fruits was the minimum towards the accessions Salem Local treated with K-solubilizer. Maximum damage recorded in the accession Arka Anamika treated with *Azospirillum*.

Keywords: Okra, Biofertilizers, Feeding preference, *E.vittella*

INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) is the choicest fruit vegetable grown extensively in the tropical, subtropical and warm area of the temperate zone. Okra is considered as heat loving plant. Hence this crop is mainly grown in kharif and summer seasons. Being hardy and short duration crop, it is profitably cultivated in summer months when other vegetables are not available in the market. Like other crops, okra crop is also ravaged by various insect pests. Incidence of insect pests is one of the prime factors in production of okra. The crop is attacked by a number of insect and non-insect pests during different

growth stages and seasons (Butani and Jotwani, 1984).

Bhendi shoot and fruit borer, *Earias vittella* is the most serious pest which cause direct damage to tender shoots and fruits. It is reported that about 69% losses in marketable yield due to attack of this insect pest (Suman *et al.,* 1984). Host plant resistance is the main basic component of IPM, and the utilization of resistant plants has long been considered as one of the most effective components of insect control. In the absence of natural resistance in the gene pool of crop plants or lack of desirable yield attributes in the identified insect tolerant/ resistant crop varieties, inducing resistance by manipulation of plant nutrients may be attempted (Muthukumaran and Selvanarayanan, 2010). Keeping this in mind, the present study was undertaken to analyse the role of certain microbial inoculants in enhancing insect resistance in okra accessions.

MATERIALS AND METHODS

Based on preliminary and confirmatory field screening of okra accessions for resistance against shoot and fruit borer, a promising accession Salem Local was selected (Karthik, 2015) for further studies on the influence of bioinoculants in enhancing resistance traits. For comparison, a popular variety, Arka Anamika was also evaluated. The evaluation was conducted under glasshouse condition at the Department of Entomology, Faculty of Agriculture, Annamalai University. The mean average temperature and relative humidity during these seasons were 28ºC to 33°C and 70% to 85% respectively. For raising the seedlings, earthen pots of 30 cm diameter were filled with potting mixture comprising two parts of soil, one part of sand and one part of farm yard manure. Then the seeds were sown and covered with a thin layer of sand. The seedlings were irrigated regularly. Bio fertilizers were applied as detailed below (Table 1).

Table 1
Induction of resistance in okra accessions as influenced by bio inoculants

S. No.	*Treatments*	*Dosage / Pot*	*Day of application*	*Method of application*
1.	*Azospirillum* (T1)	200 mg	30 DAS	Soil
2.	Phosphobacteria (T2)	200 mg	30 DAS	Soil
3.	*Pseudomonas*(T3)	200 mg	30 DAS	Soil
4.	K – solubilizer (*F. aurentia*) (T4)	3 ml/kg of seed	One day before sowing	Seed treatment
5.	*Azospirillum* + Phosphobacteria (T5)	200mg+200mg	30 DAS	Soil
6.	*Azospirillum* + *Pseudomonas* (T6)	200mg+200mg	30 DAS	Soil
7.	*Azospirillum* + K – solubilizer (*F. aurentia*) (T7)	200 mg +3 ml/kg of seed	30 DAS and One day before sowing	Soil + Seed treatment
8.	Phosphobacteria + *Pseudomonas*(T8)	200mg+200mg	30 DAS	Soil
9.	*Pseudomonas* + K – solubilizer (*F. aurentia*)(T9)	200 mg +3 ml/kg of seed	30 DAS and One day before sowing	Soil + Seed treatment
10	Phosphobacteria + K – solubilizer (*F. aurentia*) (T10)	200 mg +3 ml/kg of seed	30 DAS and One day before sowing	Soil + Seed treatment
11	Control	–	–	–

DAS- Days After Sowing

Studies on Antixenosis on okra accessions against *E. vittella*

Feeding Preference of *E. vittella*

To find out susceptible and resistant accessions a feeding preference assay was conducted with free choice test. Promising treatments were identified and tender fruits of the accessions were kept at equal distance in circular manner, in a metal container (36 x 15 cm) and 15 numbers of four hours pre - starved third instar larvae were released at the centre. After 8 h of release, the numbers of larvae settled on the respective accessions was recorded. This was replicated three times.

STATISTICAL ANALYSIS

The data thus obtained from screening of okra accessions treated with selected microbial inoculants were analyzed statistically using factorial randomized block design (FRBD). The data thus gathered were statistically analyzed using IRRISTAT software and the critical difference values were arrived at 5%.

RESULTS AND DISCUSSION

On studying the feeding preference of *E. vittella* larvae towards the okra accessions, it was observed that the maximum number of larvae settled on the accession Arka Anamika than Salem Local, irrespective of the microbial inoculants. The accession Salem Local was collected from a hilly terrain in Salem district. Wild relatives or their derivatives have been reported to possess resistance against shoot and fruit borer, *E.vittella* (Sankhyan and Verma, 1997).

In free choice tests, among the treatments, K-solubilizer nourished accessions of Salem Local were less preferred by *E.vittella* larvae followed by Phosphobacteria + K – solubilizer applied plants (Table 2). Maximum number of larvae settled in Arka Anamika nourished with *Azospirilum*. High dose of potassium decreases the nitrogen uptake. It adversely affects the biology and behavior of insects. Increase in potassium dose decreases intake and assimilation of food. Excessive amount of potassium causes quantitative changes in nutrients and Allelochemicals.

Table 2
Fruit feeding preference of *E.vittella* larvae towards okra accessions as influenced by bioinoculants-Free choice test

S. No.	*Treatments*	*Fruit damage (Number of larvae preferred)*					
		24 hrs		*48 hrs*		*72 hrs*	
		SL	*AA*	*SL*	*AA*	*SL*	*AA*
1	T1	2	2	1	2	3	3
2	T2	1	1	2	1	1	1
3	T3	2	2	1	1	2	0
4	T4	0	0	0	0	0	0
5	T5	1	2	1	2	1	1
6	T6	1	1	1	2	1	2
7	T7	2	1	2	1	2	1
8	T8	1	1	2	1	1	0
9	T9	2	2	1	0	0	1
10	T10	0	0	0	1	0	1
11	T11	3	3	4	4	4	5
	CD (P=0.05)	0.98	1.02	0.88	1.22	1.09	0.86

Each values mean of three replications

They strongly influence the chemical environment of the plant and play an important role in suppressing the population. Similar negative influence of potassium on certain insect pests was reported by Rashid *et al.*, 2013. A significant interaction between nitrogen and potassium levels was found in which the greatest increases of shoot and root dry matter with increasing N levels were found at the highest potassium level. High potassium application decreased population build up of Brown plant hopper.

The increase in the population of K-solubilizing microbe in the rhizosphere would have enhanced the ready availability of potassium to the plants and in turn its higher uptake. This enhanced potassium content in the fruits would have evinced a negative influence on *E.vitella* as reported earlier by Marwat *et al.* (1985). On the other hand, Inayatullah (1987) concluded that potassium had positive correlation with the sugarcane borer infestation. It is concluded from the present investigation that the accession Salem Local was less preferred by *E.vittella*. Among the treatments, K-solubilizer nourished plants of Salem Local recorded least preferred by *E.vittella*.

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