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COMPARATIVE BIOLOGY OF BANANA APHID, *PENTALONIA NIGRONERVOSA* (COQ.) (HEMIPTERA: APHIDIDAE) ON BANANA CULTIVARS

ABHISHEK SHUKLA AND PARESH R. PATEL

AICRP on Tropical Fruits, Fruit Research Station, Navsari Agricultural University
Gandevi - 396 360, District - Navsari, Gujarat, India

ABSTRACT

An experiment was laid out at Plant Protection Laboratory, Fruit Research Station, Gandevi during 2007-08 to study the comparative biology of banana aphid, *P. nigronervosa*, a vector of BBTD in South Gujarat. Six banana cultivars *viz.*, Gandevi Selection (AAA), Grand Naine (AAA), Robusts (AAA), Basrai (AAA), Red banana (AAA) and Rasthali (AAB) were used to find out their effect on growth and development of *P. nigronervosa*. The newly born 30 nymphs were reared on the leaves of each cultivar and various growth parameters were recorded. Among the six cultivars, Grand Naine (AAA) was the most preferred on which the insect had shortest life cycle (24.96 days) and highest fecundity (29.50 nymphs per female). The nymphs reared on Red banana (AAA) had longest life cycle (34.03 days) and low fecundity (17.86 nymphs per female). No significant differences were recorded in case of body length and width of *P. nigronervosa*. On the basis of present study the descending order of preference was Grand Naine> Gandevi Selection> Robusta>Basrai > Rasthali> Red banana.

Key words: Banana aphid, *Pentalonia nigronervosa*, comparative biology

Banana (*Musa paradisica* L.), is extensively grown in India by small and marginal farmers for its fruit and leaves. Banana is the second largest fruit crop in the world, produced in tropical and subtropical regions of developing economics, recognized to be the fourth important food crop in terms of gross value exceeding by paddy, wheat and milk products (Valmayor, 1994). Of the total production of 88.24 million tones of banana and plantain globally 12.63 million tones of banana is exported to developed countries and rest are consumed in the domestic market. India is the largest producer of banana in the world with a production of 13.2 million tones. Banana production in India is affected by a few major insect pests. Among them banana aphid, *Pentalonia nigronervosa* (Coquerel) (Hemiptera: Aphididae) is a cause of concern as vector in transmitting banana bunchy top disease (BBTD) in areas with perennial cultivation. Very few studies on the biology and ecology of *P. nigronervosa* has been conducted. Host plant plays a very important role on the growth and development of insects. In case of banana aphid *P. nigronervosa* no such kind of work has been reported and the information on comparative biology would be useful in contributing to aphid control effort especially in development of resistant cultivars. Considering the importance of the pest the present laboratory studies on the comparative biology of *P. nigronervosa* were conducted.

MATERIALS AND METHODS

Plant material: Apparently healthy banana suckers of different cultivars *viz.*, Gandevi Selection, Grand Naine, Robusta, Basrai, Red banana and Rasthali were planted in pots containing clay, sand and peat in equal ratio. These plants were maintained in a green house at a photoperiod of 12:12 hours (light: dark) at 30-32 °C. The leaves of these plants were used for further laboratory studies.

Collection and maintenance of *P. nigronervosa*: *P. nigronervosa* were collected from banana plantation from Fruit Research Station, Gandevi, Gujarat and farmers' field. Aphids were kept in transparent Petri dishes on healthy banana leaves of different cultivars *viz.*, Gandevi Selection, Grand Naine, Robusts, Basrai , Red banana and Rasthali at room temperature of 28 ±1°C with 80 per cent relative humidity. To check overcrowding new born aphids were frequently shifted to new petri dishes containing banana leaves.

Development time: Thirty neonate nympus were placed individually on a leaf cuttings of banana (*viz.*, Gandevi Selection, Grand Naine, Robusts, Basrai , Red banana and Rasthali) in Petri dishes. They were observed daily until they became adults and began to reproduce.

Fecundity: Adult aphids were kept in petri dishes containing banana leaves and were observed for number of nymphs produced daily. The newly born nymphs were

Table 1. Comparative biology of banana aphid, *Pentalonia nigronervosa* on different banana cultivars

Cultivars	Genomic group	Nymphal period of different instars (days)				Total Nymphal period (days)	Adult longevity (days)	Total life cycle (days)	Fecundity (No of nymph per female)	Body length (mm)	Body width (mm)
		I	II	III	IV						
Gandevi Selection	AAA	3.33 ^{c}	3.30 ^{bc}	3.30 ^{c}	3.50 ^{bc}	12.76 ^{c}	13.86	27.30 ^{c}	22.66 ^{b}	0.503	0.32
Grand Naine	AAA	3.00 ^{c}	2.80 ^{c}	3.16 ^{c}	3.33 ^{c}	12.30 ^{c}	12.66	24.96 ^{d}	29.50 ^{a}	0.510	0.32
Robusta	AAA	4.06 ^{b}	3.56 ^{b}	4.20 ^{b}	4.03 ^{b}	15.90 ^{b}	14.36	30.26 ^{b}	21.00 ^{bc}	0.503	0.31
Basrai	AAA	4.16 ^{b}	3.56 ^{b}	4.30 ^{b}	4.10 ^{b}	16.13 ^{b}	15.36	31.50 ^{b}	21.83 ^{b}	0.520	0.31
Red banana	AAA	5.20 ^{a}	5.20 ^{a}	5.26 ^{a}	4.96 ^{a}	20.63 ^{a}	13.40	34.03 ^{a}	17.86 ^{c}	0.507	0.28
Rasthali	AAB	4.10 ^{b}	3.53 ^{b}	4.23 ^{b}	4.13 ^{b}	16.00 ^{b}	14.76	30.76 ^{b}	20.66 ^{bc}	0.513	0.30
C D at 5%		0.508	0.712	0.715	0.663	1.438	NS	1.896	3.329	NS	NS

*Mean of 30 replicates

counted daily and removed from petri dishes leaving the gravid female in the cage. Thirty adult aphids were used for each banana cultivar.

Life span: The life span of the viviparous aphid was determined by observing time from the birth of newly born nymph developing to an adult till its maturity.

Adult size: After recording fecundity for 10 days adult aphids were collected and preserved in 70 per cent ethanol. The body size (length and width) of 30 aphids were recorded.

RESULTS AND DISCUSSION

The data on comparative biology of banana aphid, *P. nigronervosa* are presented in Table 1. It is evident from the data that the aphid passed through four nymphal instars when reared on different banana cultivars. The period of I,II,III and IV nymphal instars were highest *i.e.*, 5.20, 5.20, 5.26 and 4.96 days when the nymphs were reared on the leaves of Red banana, whereas it was shortest when they were reared on the leaves of Grand Naine which were 3.0, 2.80, 3.16 and 3.33 days, respectively. It was at par with banana cultivar Gandevi selection. The total nymphal period were longest when the nymphs were reared on Red banana (20.63 days), whereas it was shortest on Grand naine (12.30 days) and Gandevi selection (12.76 days), while it was at par with Robusta (15.90 days), Basrai (16.13 days) and Rasthali (16.00 days). The adult period was highest *i.e.*, 15.36 days when they were fed on Basrai, while it was shortest when the adults were reared on Grand naine (12.66 days) cultivar of banana. In case of adult period non-significant difference were recorded in all the banana cultivars. The total life cycle of *P. nigronervosa* completed in 34.03 days when it was reared on Red banana, while it took shortest period (24.96 days) when reared on Grand naine cultivar of banana. The total life cycle was at par between the following banana cultivars *i.e.*, Robusta (30.26 days), Basrai (31.50 days) and Rasthali (30.70 days). The female gave birth up to 29.50 nymphs in her life span when reared on the leaves of banana cultivar Grand naine, while 17.86 nymphs were produced when it was reared on to Red banana. No significant difference were recorded in case of fecundity when the adults were reared on Gandevi selection (22.66 nymphs per female), Robusta (21.0 nymphs per female), Basrai (21.83 nymphs per female) and Rasthali (20.66 nymphs per female). Under the present study no significant difference were recorded in adult aphid body length and body width when reared on different banana cultivars. Under the present study it has been found that among all six banana cultivars Grand naine was the most suitable cultivar for *P. nigronervosa* for its growth and development, whereas Red banana was not favorable for growth and development of the aphid pest. So far no systematic work has been reported on comparative biology

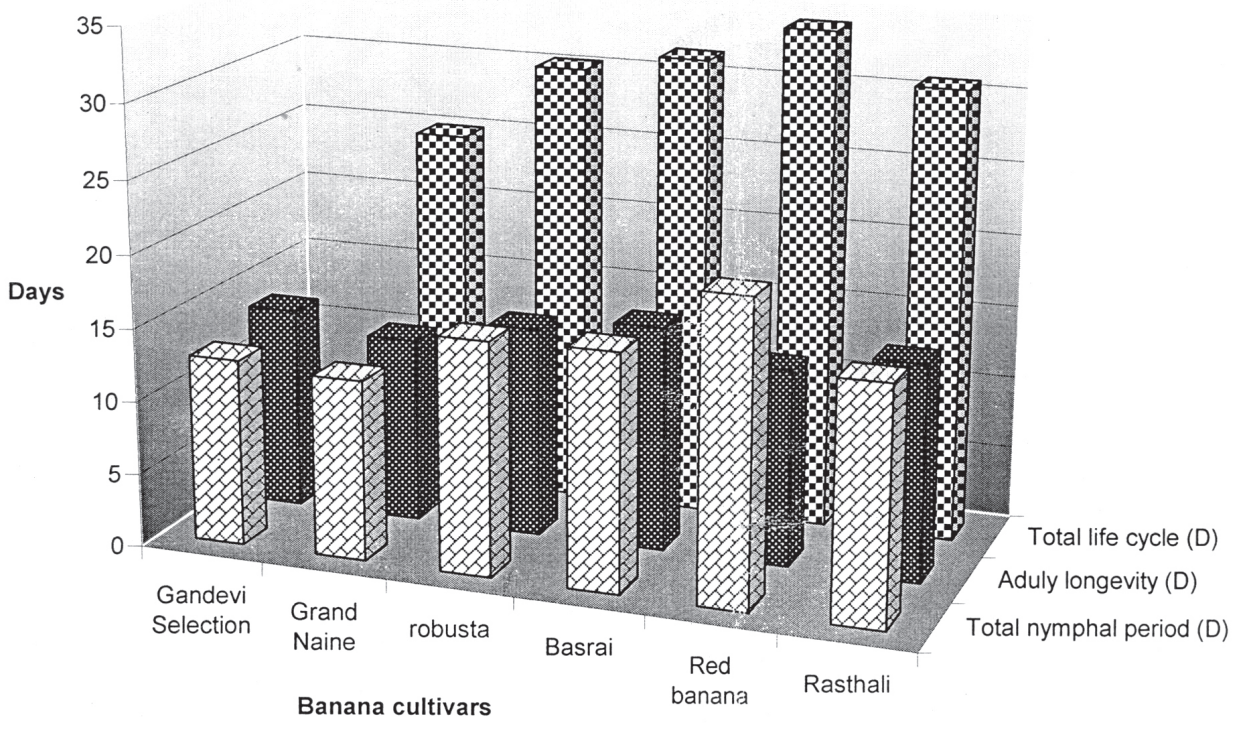

Fig. 1: Comparative biology of *P. nigronervosa* on different banana cultivars

of *P. nigronervosa*, some individual work on biology has been done by various workers. Viswanathan and Regupathy (1992) reported that *P. nigronervosa f. typical* has gone through four nymphal instars with nymphal period of 9-13 days, longevity of the adult varied from 9.9 to 12.5 days on cardamom (*Elettaria cardamomum* Matton). Yasmin *et al.,* (1999) studied the biology of banana aphid on dwarf Cavendish banana and reported nymphal period of 10 to 14 days, with a total life span of 20.3 days. Similarly, Lomerio and Calilung (1993) reported that development period of *P. nigronervosa* ranged from 6 to 21 days and generation time ranged from 20 to 28 days in five food plants in green house conditions. It is also identical to the findings of Sharma (1987). The present study was in the line of these earlier findings. On the basis of present study the descending order of preference was as follow: - Grand Naine > Gandevi Selection > Robusta > Basrai, Rasthali > Red banana.

REFERENCES

Lomerio, E.O. and Calilung, V.T. (1993). Comparative development of *Pentalonia nigronervosa* Coq. on five host plants. *Philippine Entomologist*, **9**: 101-105.

Sharma, S.R. 1988. Banana bunchy top virus – a review. *International Journal of Tropical Plant Diseases*, 6: 19-41.

Vishwanathan, S. and Regupathy, A. (1992). Bio ecology of banana aphid, *Pentalonia nigronervosa f. typical.* In. Bio ecology and control of insect pests ed. Goel, S.C. Proceedings of the national symposium on growth, development and control technology of insect pests, pp 42-49.

Yasmin, T., Ehsan-Ul-Haq, Khalid, S. and Malik, S. A. (1999). Some studies on biology of *Pentalonia nigronervosa* Conquarrel-the vector of banana bunchy top virus. *Pakistan Journal of Biological Science,* **2**: 1398-1400.