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Effect of protein food baits in attracting fruit flies in mango orchard

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ABSTRACT : Studies were made on evaluation of protein food baits in attracting fruit flies in mango orchard (cv. MALLIKA) during 2008-2009 at GKVK campus, Bangalore. Among various protein baits, casein + sugar + mango was the most superior food bait attracting significantly highest number of male fruit flies over an exposure of four weeks accounting for a mean trap catch of 26.00 fruit flies/trap/week. The food baits containing casein + sugar + banana attracted significantly highest number of female fruit flies over an exposure of four weeks accounting for a mean trap catch of 7.00 fruit flies/trap/week. When the total fruit flies irrespective of species were considered, traps baited with casein + sugar + mango was the most superior food bait attracting significantly highest number of fruit flies with a mean trap catch of 31.66 fruit flies/trap/week. The traps baited with casein + sugar + pineapple recorded lowest number of fruit flies.

KEY WORDS : Fruit fly, *Bactrocera dorsalis*, Protien baits, Mango orchard

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Mango is termed as the "King of fruits" owing to its delicious taste, captivating flavor and attractive aroma, besides being an excellent source of vitamins A and C. The ripe fruit is not only eaten fresh, but it is also utilized for processing into various products like canned mango slices in syrup, pulp, jam, squash, juice, nectar, cereal flakes, mango custard powder, mango toffee, mango leather and mango juice powder. Unripe mango fruits are also used for preparing various products like mango pickle, chutney, brined mango slices and powder, mango wine and other delicacies. Mango is commercially grown in more than 87 countries of the world, but India ranks first with respect to both area (10.63 million hectares) and production (10 million tones). Though India is the largest producer of mango in the world, it exports less than 1 per cent of the produce mainly due to quarantine problems.

Fruit fly is one of the important Tephritids in the tropics, which causes extensive damage to fruits. 129 species of fruit flies have been reported from India (Kapoor, 1993), which are mostly polyphagous in nature. Being polyphagous pests with high reproductive potential, wide host range, overlapping of generations, and adoptability to climate, their management is quite difficult.

Apart from minimal use of insecticide, sanitation combined with the use of traps and lures as well as synthetic protein food baits proved to be one of the best alternative for management of fruit flies. These traps have high specificity, low cost and are environmentally quite safe. In India, Rahman *et al.* (1995) discussed the role of baits and attractants in population suppression of fruit flies.

Monitoring and management of fruit flies are based on two main technologies. The first one uses parapheromone male attractants in traps that monitor male numbers and hence, called male annihilation technique (MAT) and the second technology is bait application technique (BAT) which relies on protein baits. Continuous research in the development of efficient trapping systems afford several new opportunities in the efforts to control the fruit flies. Since adult fruit flies use visual and olfactory stimuli to locate hosts, traps that combine visual and olfactory cues proved to be most effective for capturing fruit flies (Epsky and Heath, 1998). Availability of effective visual traps and olfactory attractants has facilitated behavioral approaches in management of fruit flies. As with many tephritid species, female fruit flies need protein source

to mature sexually and also for the development of their eggs. Female targeted system normally consists of traps baited with a liquid solution made from protein and fermenting sugar.

RESEARCH METHODS

This experiment was conducted during peak fruiting season of mango (six weeks during May to June) in a mango orchard (Mallika) at G K V K. Protein food baits were prepared by using different fruit pulp. The experiment was laid out in a Randomized Block Design with four treatments replicated six times. The details of the treatments were as follows :

T_1- casein + sugar + mango pulp
T_2- casein + sugar + banana pulp
T_3- casein + sugar + orange pulp
T_4- casein + sugar + pineapple pulp.

The food baits were placed in small plastic cups and were kept inside the traps. The bait was always kept in semi liquid state by adding 10-15ml water at regular intervals. Weekly observations on the number of fruit flies trapped in each trap were recorded. Efficacy of each combination of food lure was evaluated by RBD analysis.

RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Evaluation against male fruit flies:

Traps baited with casein + sugar + mango (T_1) was the most superior food bait attracting significantly more number of male fruit flies over an exposure of four weeks accounting for a mean trap catch of 26.00 fruit flies/trap/week (Table 1). Casein + sugar + banana (T_2) gave the next best response and attracted (23.66 fruit flies/trap/week) followed by the traps baited with casein + sugar + orange (T_3) and casein + sugar + pineapple (T_4) (17.00 and 16.33 fruit flies/trap/week, respectively).

Protein source as an important component in the food baits and commercial lures has been documented with *B. cucurbitae* (Steiner, 1952, Narayanan and Batra, 1960, Vijaysegaran, 1985; Satpathy and Rai, 2002 and Fabre *et al.*, 2003) and *B. dorsalis* (Steiner, 1952; Narayanan and Batra, 1960; Alyokhin *et al.*, 2000 and Cornelius *et al.*, 2000). Present results are endorse these reports.

Evaluation against female fruit flies:

The food baits containing casein + sugar + banana (T_2) attracted significantly highest number of female fruit flies followed by baits containing casein + sugar + mango (T_1) over an exposure of four weeks accounting for a mean trap catches of 7.00 and 5.66 fruit flies / trap / week, respectively (Table 1). The traps baited with casein + sugar + orange (T_3) gave the next best response and attracted (3.00 fruit flies / trap / week). The lowest number of fruit flies was attracted to traps baited with casein + sugar + pineapple (T_4).

Female fruit flies requires protein source to ensure fecundity (Christenson and Foote, 1960). This basic need of female fruit flies has been exploited in developing systems to attract female fruit flies (Epsky *et al.*, 1999) protein bait acted as a food attractant to immature female fruit flies (Allwood, 1997). protein food baits containing banana pulp as base attracted significantly highest number of male and female fruit flies (Satpathy and Rai, 2002; Jiji *et al.*, 2003; Bharathi *et al.*, 2004; Rajitha and Viraktamath, 2005). However, Bharathi *et al.* (2004) found that among the fruit pulps, grapes and banana appeared to be more attractive than pineapple. Present results are in conformity with these reports.

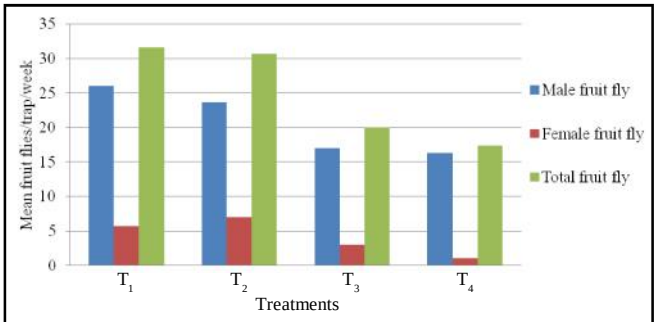

Fig. 1 : Evaluation of protein food balts in attracting fruit files in mango orchard

Table 1 : Evaluation of protein food baits in attracting fruit flies in mango orchard

Treatments	Mean trap catches / week		Total fruit flies
	Male fruit flies	Female fruit flies	
T_1- casein + sugar + mango pulp (1:1:1)	26.00 (5.22)	5.66 (2.44)	31.66 (5.74)
T_2- casein + sugar + banana pulp (1:1:1)	23.66 (4.93)	7.00 (2.80)	30.66 (5.54)
T_3- casein + sugar + orange pulp (1:1:1)	17.00 (4.21)	3.00 (2.00)	20.00 (4.53)
T_4-casein + sugar + pineapple pulp (1:1:1)	16.33 (4.13)	1.00 (1.22)	17.33 (4.13)
S.E.. ±	0.63	0.37	0.93
C.D. (P=0.05)	2.20	1.28	2.90

Means followed by the same letters do not differ significantly at p=0.05 by DMRT
Figures in parentheses indicates transformed value ($\sqrt{X+0.5}$)

Evaluation against pooled fruit flies:

When the total fruit flies irrespective of species were considered, traps baited with casein + sugar + mango (T_1) was the most superior food bait attracting significantly highest number of fruit flies over an exposure of four weeks accounting for a mean trap catch of 31.66 fruit flies/trap/week. Casein + sugar + banana (T_2) gave the next best response and attracted (30.66 fruit flies / trap / week) followed by the traps baited with casein + sugar + orange (T_3) and casein + sugar + pineapple (T_4) (20.00 and 17.33 fruit flies/trap/week, respectively) (Table 1 and Fig. 1).

Protein food baits were prepared by mango pulp as base attracted more number of fruit flies (both male and female) by Kumar and Agarwal, 1998; Agarwal and Kumar, 1999a and Ravikumar and Viraktamath, 2007.

Summary:

Traps baited with casein + sugar + mango was the most superior food bait attracting significantly more number of male fruit flies. While food baits containing casein + sugar + banana attracted significantly highest number of female fruit flies followed by baits containing casein + sugar + mango. The lowest number of fruit flies was attracted to traps baited with casein + sugar + pineapple.

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