ETHOLOGICAL STUDIES USING *ACALYPHA INDICA*(L.) AND *MURRAYA KOENIGII* (L.) ON THE FEEDING BEHAVIOUR OF *ATRACTOMORPHA CRENULATA* (FAB.)

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ABSTRACT
Phytochemicals, *Acalypha indica* and *Murraya koenigii* extracts (Aqueous, Methanol, Acetone) were used for their antifeedant and repellent activity on *Atractomorpha crenulata*. Among the six extract tested, *A.indica* (Aqueous) recorded maximum antifeedant activity. *M.koenigii* (Aqueous) showed higher repellent activity of 84%

Key words: *Atractomorpha crenulata,* Antifeedant and repellent activity, *Acalypha indica, Murraya koenigii*

INTRODUCTION

At Present day, the role of crop protection in agriculture is of great importance and a challenging process than before, as the so called resistant species should be brought under check. All other management practices of crop husbandry will be futile if the crop is not protected against the raveges of pest. In absence of crop protection, the yields may be drastically declined. The entire effect of growing a crop will be defeated in absence of crop protection resulting in financial loss to the grower. So the crop protection against the various pests is must in agriculture. It is well known fact that insects being widely distributed became more problematic in tropical climate. In developing country like ours insects are dominating over other pest by acquiring characters like resistance to toxic chemicals, particularly in intensive crop management region of our country. Plant pesticides do not contribute to resistant development of pest resurgence; nor do they cause negative effects on non- target organisms. They do not affect the plant growth, seed viability and food quality but possess insecticidal, repellent, antifeedant or growth regulator activities. Botanical pesticides tend to have broad spectrum activity are relatively specific in their mode of action, east to process, produce, use and safe for higher animals and environment. In this context, an attempt is made here to evaluate the potential of two commonly available plants namely, *Acalypha indica* (L.) and *Murraya koenigii* (L.), in terms of their effect on feeding behaviour of the tobacco grasshopper, *Atractomorpha crenulata* (Fab.).

MATERIALS AND METHODS

COLLECTION OF INSECT

Atractomorpha crenulata was collected from Mangadu agricultural site. In this place paddy is grown. Sweep-net technique was followed for collecting the insects without injuring them. The sweep net hand had a mouth of diameter 30 cm. the collected insects were brought to the laboratory and reared in wooden cages measuring 30 x 30 cm and provided with *Riccinus communis* leaves for feeding.

REARING OF INSECTS

Insect were reared the stalks intact so that they can be immersed in water to keep the leaves fresh for a long time. A cup with moist soil was placed in the cage for the females to lay eggs.

PREPARATION FOR LEAF EXTRACT

Fresh leaf of , *Acalypha indica and Murraya koenigii* were collected from the surrounding. Afterwards they are washed in running water. The plant materials were kept in shade for air drying. Powder samples were prepared by grinding the dried leaves with the help of grinder. The ground samples were passed through 25- mesh sieve to obtain fine and uniform dust. Ten gram of each sample was taken to a 500 ml beaker and mixed separately with 100ml of different solvents (Acetone, Methanol and distilled water). The mixer was stirred for 30 minutes by a magnetic stirrer. The mixture was filtered through filter paper. The filtered materials were taken in a round bottom flask and condensed to 10 ml by evaporating of solvent in a water bath material at 45 C 55 C and 80 C temperature for Acetone, Methanol and distilled water extracts respectively. After the evaporation of solvent the condensed extracts were preserved in tightly corked labelled bottle and stored in a refrigerator until their use for insect bioassay.

BIOASSAY FOR ANTIFEEDENT ACTIVITY

Antifeedant activity for crude extracts was studied using leaf disc no choice method (Isman *et al*.,1990). Riccinus communis leaves were collected and washed in water. One ml of *Acalypha indica and Murreya koenigii* leaves extracts (Acetone. Methanol and distilled water) were applied on *Riccinus communis* leaves and air dried. Leaf treat with these extracts was used as feed for *Atractomorpha crenulata*. Five insects were introduced into the test cage. The weight if the insects and weight of the leaves were recorded before the test. After 24 hour , the remaining leaf and insects were weighed and the difference between the initial and final weights was calculated. A suitable control was maintained. There were three replicates. The following parameter of feeding behaviour was calculated.

a) Consumption (C)was calculated as the difference in the weight of the food given and weight of the food remaining.

b) Production (P) was calculated as the difference in the final weight of the nymphs and initial weight of the nymphs

REPELLENT ACTIVITY IN GRASSHOPPER

An olfactometer was fabricated to the repellent activity of the grasshopper. A clear, transparent, colourless, polyvinyl tube of length 30 cm and diameter 1.2 cm was taken and a circular window pierced in the middle of the tube to serve as the gate for introduction of the test insects. The two ends of the tube were closed with a cotton wad after inserting the test extracts at the end. Ten third instar nymphs were introduced through the central window and the behaviour of the nymphs recorded every 5 minutes. After each observation, the olfactometer was rotated at 45^ to nullify the effect of light and wind if any on the movement of the grasshopper. The data obtained on the number of individuals moving towards each of the extracts were recorded.

RESULT

ANTIFEEDANT BIOASSAY

Phytochemicals, Acalypha indica and Murreya koenigii leaves extracts (Acetone. Methanol and distilled water)were assayed for there antifeedant effect on A.crenulata. Consumption (C) of leaf and production (P) of nymphs (weight gained by experimental nymphs) were calculated (Table.1). The results revealed that irrespective of the solvents all the extracts showed antifeedant activity. Low amount of leaf consumption was found in *Acalypha indica* (Aquous) extracts treatment and minimum production was found in Murraya koenigii (Acetone), Acalypha indica (Aqueous) extracts treatments.

Food consumption: Food consumption of *A. crenulata* on *R. communis* varied for the six extracts tested. Generally, the rate of consumption decreased as the concentration of the pesticides on the leaf increased. Among the six extracts tested, the total food consumption recorded was very low on *Acalypha indica* (Aqueous) when compared to the other extracts (Table 1).

Production: Allocation of the assimilated energy for growth increased as the nymph advanced in age. However, this allocation for growth was affected by the biopesticide. At each stage of the instar a significant reduction in weight gained was records compared to the control. (0.19g/5 nymphs). Nymph weight was significantly reduced in *Murraya koenigii* (Acetone) (0.03g/5 nymphs) *Murraya koenigii* (Methanol) (0.03g/5 nymphs) treatment.

REPELLENT ACTIVITY

Six different extracts were used to study repellent activity in *A.crenulata*. Repellent activity conducted using an olfactometer through dual choice experiment. Table 2 provides a comparative study analysis of all the six extracts in terms of their percentage repellency. The data shows that the aqueous extract of *M.koenigii* had the most repellent propertyto the feeding of *A.crenulata* followed by the methanol extracts of *M.koenigii* and *A.indica*. The acetone extract of *M.koenigii* was the least repellent.

TABLE 1: ANTIFEEDANT ACITIVITY OF ATRACTOMORPHA CRENULATA

Name of Extract	*Average initial Weight*		*Average Final Weight*		*Consumption (C) (gm)*	*Production (P) (gm)*
	Leaf (gm)	*Insect(gm)*	*Leaf (gm)*	*Insect (gm)*		
Murraya koenigii (Aqueous)	*8.36*	*0.37*	*4.63*	*0.41*	*3.73*	*0.04*
Murraya koenigii (Methanol)	*6.63*	*0.3*	*2.86*	*0.33*	*3.77*	*0.03*
Murraya koenigii (Acetone)	*5.16*	*0.3*	*2.3*	*0.33*	*2.86*	*0.03*
Acalypha indica (Aqueous)	*5.63*	*0.31*	*3.59*	*0.36*	*2.04*	*0.05*
Acalypha indica (Methanol)	*7.0*	*0.25*	*3.9*	*0.34*	*3.1*	*0.09*
Acalypha indica (Acetone))	*7.43*	*0.26*	*3.03*	*0.34*	*4.10*	*0.08*

TABLE 2 :COMPARITIVE REPELLENCE OF DIFFERENT EXTRACTS TO FEEDING OF A.CRENULATA

Extracts	No. Of Insect repelled (%)
Murraya koenigii (Aqueous)	84
Murraya koenigii (Methanol)	80
Murraya koenigii (Acetone)	70
Acalypha indica (Aqueous)	76
Acalypha indica (Methanol)	80
Acalypha indica (Acetone))	74

DISCUSSION

The best time to control the insect pest during early nymphal development. It eat large amount of leaves during nymphal stage. The resent observation shows that *R. communis* is a good host for rearing the grasshopper in the laboratory. The grasshopper successfully completed its life cycle on this host in the laboratory. Data on the feeding of the leaves indicates that the consumption of *R.communis* increased with the age of the nymphs and the maximum consumption was observed for the fifth instar nymphs. This indicates that this stage of the grasshopper is the most destructive stage.

In the present study, *A.indica* (Aqueous) extract recorded maximum antifeedant activity against *A.crenulata*. Antifeedant property of the plant does not kill the insects and therefore the consideration of the ecological balance being affected through this method of control becomes irrelevant. Antifeedant property of the plant reduces the attack of the pest and thereby protects the plant form further damage. Upon feeding on a plant with this property, insects are affected through reduced growth and fecundity. The antifeedant property of Neem was discovered by Pradhan *et al*. (1962). They reported that it provided good protection to plants like cabbage, tomato, peas, wheat, castor, pomegranate, citrus and litchi against desert locust. The ethanol extract of *T.terrestris* and methanolic extracts of neem seed kernel resulting in morphological deformities has been placed on record by Gujar and Mehrotra (1983), Gunasekaran and Chelliah (1985), Nemade *et al*. (2003)observed that among the herbs *V.negundo*(1.59%) and *Cleistanthus collinus* (1.91%) exhibited more antifeedant effect on *S.liturawith* methanolic extraction at 5% concentration.

Thousands of plants have been tested as potential sources of insect repellents. Unlike synthetic insect repellents, plants derived repellents have been relatively poorly studied. Synthetic repellents tent to be more effective and longer lasting than 'natural' repellents may provide effective relief as well (Mishra *et al.*),. In this study *M. koenigii*(Aqueous) showed higher repellent activity of 84% when compared to other extracts against *A.crenulata*. repellence relates to the response of *A.crenulata* to move away from the source while antifeedant reduce feeding. Both these responses however do not kill the insect at least concentration tested. This response is significant because it help in protecting the plant from the insect and at the same time does not upset the ecological balance.

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