

## Screening of Plants for Juvenile Hormone Like Activity Affecting Insects

Many plants possess juvenile hormone principles (Bowers, 1971; Jacobson et al., 1975, Rajendran and Gopalan, 1978), moulting hormones (Slama et al., 1974) and antiallato tropic compounds (Bowers, 1976) affecting the development of insects. All these substances are of importance in that they are likely to become third and fourth generation pesticides (Williams, 1967; Bowers 1976). Many species of plants were screened for Juvenile hormone mimicking compounds and the results of the investigations are reported in this paper.

Plant materials collected were air dried and finely ground and 20 gm. of such plant materials were continuously extracted with solvent ether (Reagent grade) (200 ml) in Soxhlet extractors for 48 hours, filtered and the filtrate was freed of solvent completely in a rotary evaporator at 30°C. All the extracts were dissolved in acetone and 5 to 10 ml of the extracts were topically applied to the freshly moulted 5th instar nymphs of *Dysdercus cingulatus* F. With the help of a micro syringe applicator. The nymphs were held until the following moult to de-

TABLE I Plants Showing Juvenomimetic Activity

Botanical name (1)	Family (2)	* Plant part (3)	** Degree of activity (4)
<i>Adhatoda vasica</i> Ness	Acanthaceae	L., S.	0
<i>Polianthus tuberosa</i> Linn.	Amaryllidaceae	WP	0
<i>Alternanthera sessilis</i> R.Br.	Amaranthaceae	L., S.	0
<i>Anacardium occidentale</i> Linn.	Anacardiaceae	Sh, Oil	0 (INS)
<i>Catharanthus roseus</i> Linn.	Apocyanaceae	R	4
<i>Impatiens balsamina</i> Linn.	Balsaminaceae	WP	0
<i>Blumea lacera</i> DC	Compositae	WP	1
<i>Bidens Pilosa</i> Linn.	Compositae	L., S.	0
<i>Parthenium hysterophorus</i> Linn.	Compositae	WP	4
<i>Helichrysum hookerianum</i> W & A	Compositae	WP	4
<i>Vernonia conyzoides</i> W.	Compositae	S. F. & L.	0
<i>Wedelia urticaefolia</i> DC	Compositae	WP	0
<i>Tridax procumbens</i> Linn.	Compositae	WP	0



(1)	(2)	(3)	(4)
<i>Canyza stricta</i> Willd.	Compositae	WP	0
<i>Eclipta alba</i> Hassk.	Compositae	WP	0
<i>Phyllanthus niruri</i> Linn'	Euphorbiaceae	WP	1, 4
<i>Acalypha indica</i> Linn.	Euphorbiaceae	WP	0
<i>Pelargonium graveolans</i> Linn.	Geraniaceae	L. S. (E. O.)	2, 3, 4
<i>Vetiveria zizanioides</i> Nash.	Graminae	R. (E. O.)	2, 3, 4
<i>Hypericum hookerianum</i> W & A	Hypericaceae	WP	0 (INS)
<i>Mentha piperita</i> Linn.	Labiatae	L. S. (E. O.)	0
<i>Ocimum basilicum</i> Linn.	Labiatae	S. L.	2, 4
<i>Bauhinia purpurea</i> Linn.	Leguminosae	Br.	4
<i>Hibiscus rosasinensis</i> Linn.	Malvaceae	WP	0
<i>Acacia mollissima</i> Willd.	Mimosaceae	Br.	0
<i>Carica papaya</i> Linn.	Papayaceae	Seeds	0
<i>Argemone mexicana</i> Linn.	Papayaceae	Br.	0
<i>Cupressus macrocarpa</i> Hartw.	Pinaceae	Br.	0
<i>Araucaria excelsa</i> R. Br.	Pinaceae	Br.	0
<i>Polygonum chinense</i> Linn.	Polygonaceae	S. L.	0
<i>Fagopyrum esculentum</i> Moench.	Polygonaceae	WP	0
<i>Eichornia crassipes</i> Solms.	Pontederiaceae	WP	0
<i>Polypodium vulgare</i> Linn.	Polypodiaceae	WP	2, 4
<i>Rosa leschenaultiana</i> W & A	Rosaceae	S. L.	0
<i>Aegle marmelos</i> Corr.	Rutaceae	Br.	4
<i>Atalantia monophylla</i> Corr.	Rutaceae	Br.	4
<i>Digitalis purpurea</i> Linn.	Scrophulariaceae	WP	0
<i>Digitalis lanata</i> Ehrh.	Scrophulariaceae	WP	4
<i>Solanum indicum</i> Linn.	Solanaceae	WP	0
<i>Solanum xanthocarpum</i> Sch. Wendi.	Solanaceae	Fr, L, S	1
<i>Tectona grandis</i> Linn. F.	Verbenaceae	Wood	2, 4
<i>Verbena bonariensis</i> Linn. F.	Verbenaceae	WP	0
<i>Tribulus terrestris</i> Linn.	Zygophyllaceae	WP	1

\* WP: Whole plant; S-Stem; L-Leaves; R-Roots; F-Flowers Sh. oil-Shell oil; Br-Branch; Fr - Fruits; E. O. - Essential oil; INS-Insecticidal activity.

\*\* 0 Normal adults: fully formed wings completely covering the abdomen; No black pigment spot on the abdominal tergum; tarsi three segmented.



1. Mortality of the fifth instar nymphs
2. Incomplete ecdysis - mortality of adults unable to extricate from the nymphal skin.
3. Supernumerary nymphs
  - a) Sixth instar with three tarsi, wings in the form of wing pads
  - b) Perfect 6th instar with two segmented tarsi; wings in the form of wing pads, abdominal spots larger than in (a) above.
4. Adultoids:

Wings crumpled or incompletely covering the abdomen, but more advanced than wing pads; abdominal spots present but small; tarsi three segmented.

termine JH activity which was signalled by the presence of immature characters. Activity in *Dysdercus* was rated from 0 to 4 as indicated in the Table I.

Results obtained with extracts of the plant parts are shown in Table I. Extracts of *Vetiveria zizanioides*, *Pelargonium graveolans* (leaves and stems), *Bauhinia purpurea* (leaves and Branch), *Ocimum basilicum* (leaves and stem and *Polypodium vulgare* (whole plants) were active on *Dysdercus* and *Pelargonium graveolans* extract showed considerable juvenilization on *Spodoptera litura* B. larvae also. As shown in Table II, application of extracts of two species of plants viz., (*Anacardium occidentale* (Shell), and *Hypericum hookerianum* (whole plant) caused high mortality of *S. litura* caterpillars. Prabhu et al. (1973) have screened a series of plants from South India for JH activity on *D. Koenigii* and reported *Tectona grandis* to possess JH activity. Rajendran and Gopalan (1978) reported the presence of JH mimicking compounds in *Parthenium* and in *Catharanthus roseus*. Deshpande et al. (1974)

screened 13 plant species for JH activity. The present study indicated the presence of juvenomimetic compounds in several plants growing normally in Tamil Nadu and it is of interest that many of these plants are used in the preparation of indigenous medicines.

M. GOPALAN  
R. MADHUSUDHAN

Department of Agrl. Entomology  
Tamil Nadu Agrl. University,  
Coimbatore - 641 003.

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# RESEARCH NOTES

TABLE II Plants showing insecticidal activity

Botanical name	Family	Mortality of <i>S. litura</i> larvae	
		Dose $\mu$ g/larva	Per cent
<i>Anacardium occidentale</i> Linn.	Anacardiaceae (Shell oil)	100	32.5
		200	60.1
		350	75.1
<i>Hypericum hookerianum</i> Linn.	Hypericaceae (WP).	300	30.1
		600	55.1
		900	35.0

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