Bio-efficacy of Plant Extracts on Parasitisation of *Trichogramma chilonis* Ishii, *T. japonicum* Ashmead and *T. poliae* Nagaraja

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ABSTRACT

The results revealed that the highest % parasitisation of *Trichogramma chilonis, T. japonicum* and *T. poliae* was observed in plant extracts of *Saccharum officinarum* (61.3%) and *Cajanus cajan* (54.0%) whereas the highest emergence was found in *Oryza sativa* (51.5%), *O. sativa* (52.0%) and *S. officinarum* (37.7%), respectively. Extract of *Ricinus communis* had shown lowest parasitisation (25.0%) as well as emergence (22.3%) in case of *T. chilonis*. In case of *T. japonicum*, the extract of *Vigna sinensis* and *R. communis* indicated lowest parasitisation (24.0%). *T. aestivum* had shown lowest parasitisation (15.6%) as well as emergence (14.6%) by *T. poliae*.

Key words : *Trichogramma* spp., Plant extracts, Parasitisation.

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Biological control is an important component of integrated pest management. To make biological control more effective, it is highly desirable to know the tri-trophic interactions between the host plants, insect pests and their natural enemies. Behavioral responses by parasitoids to chemical cues absorbed with host or their immediate environment, are apparently ubiquitous in nature. Egg parasitoids of the genus *Trichogramma* spp., are the most extensively used as entomophagous insects in insect pest control all over the world. The present study was undertaken to investigate effects of host plant extracts on parasitisation by *Trichogramma* spp.

Materials and Methods

The factitious host, *Corcyra cephalonica* larvae were reared on broken maize grains, mixed with yeast 2% at 28±2^{0}C and 65±5% R.H. Culture of *T. chilonis, T. japonicum* and *T. poliae* was maintained on 0-24 hrs. old sterilized eggs of *C. cephalonica* in a BOD incubator at 25±2^{0}C and 70±5% R.H. Eggs of *C. cephalonica* were sterilized under UV light (15 min.) and washed twice in hexane to remove any traces of scales and kairomones present on the surface of eggs. They were then, pasted equidistantly on 2 x 5 cm white sheet at the rate of 100 eggs/piece, thereafter each of those cards were sprayed with plant extracts. Spraying was done by glass atomizer and 0.5 ml spray liquid was used for each cards. The sprayed cards were allowed to dry in shade for an hr. and were introduced in glass vials of 15 x 2.5 cm. The adults of *T. chilonis, T. japonicum* and *T. poliae* were anesthetized using etherized CO_2. Later, healthy fast reviving 20 females were transferred to each vial containing a piece of card (with 100 eggs). They were allowed to parasitize the host egg cards (referred as *Tricho* cards) and were shifted to fresh glass vials. On the 6th day, blackened eggs recorded as parasitisation. Whole set up was maintained at 25±2^{0}C and 70±5% R.H. replicated three times. Adults emergence was recorded on 12th day as % emergence.

The leaf samples of *Oryza sativa, Triticum aestivum, Zea mays, Saccharum officinarum, Cajanus cajan, Helianthus annuus* and *Ricinus communis* were collected and shade dried for 12 hrs. Thereafter, 20.0 g of each plant sample was weighed, chopped into small pieces, and were transferred to 250 ml conical flask. A known

volume of acetone was poured into the individual conical flask containing chopped plant materials. The mouth of the conical flask was covered with non-absorbent cotton. The whole set was kept for 72 hrs for incubation. The plant material was filtered with Whatman no. 1 filter paper. The filtered solutions were concentrated with gentle heating at the 50^0C and the black residues obtained were diluted with acetone containing 0.1% teepol to make desirable concentrations. These extracts were used for bio-efficacy studies (Table 1).

Table 1. The details of plants used in the study.

Name of the plant extract	Conc. of the extract(g/ml)
Oryza sativa	0.02
Triticum aestivum	0.02
Zea mays	0.01
Saccharum officinarum	0.03
Vigna sinensis	0.02
Cajanus cajan	0.01
Helianthus annuus	0.02
Ricinus communis	0.02

Results and Discussion

Among the crop plant extracts tested, the highest % parasitisation of *T. chilonis, T. japonicum* and *T. poliae* was observed in plant extracts of *S. officiniarum* (61.3%) *C. cajan* (54.0%) and *C. cajan* (43.33%) whereas the highest emergence was found in *O. sativa* (51.5%), *O. sativa* (52.0%) and *S. officinarum* (37.6%), respectively. Extract of *R. communis* had shown lowest parasitisation (25.0%) as well as emergence (22.3%) in case of *T. chilonis*. In case of *T. japonicum*, the extract of *V. sinensis* and *R. communis* had indicated lowest parasitisation (24.0%) whereas *T. aestivum* extract had shown lowest emergence (19.3%) and lowest parasitisation (15.6%) as well as emergence (14.6%) by *T. poliae* (Table 2). Varied reaction parasitisation was attributed to the chemical composition of the hosts. Significant adverse action of insecticides on the biological parameters of parasitoids was very much pronounced (Kumar *et al.*, 2000). Quinalphos inflicted the most adverse effect on the rate of parasitisation irrespective of all other factors. The safest pesticide was γ-BHC (Sarkar *et al.*, 2005). However, application of

Table 2. Bio-efficacy of plant extracts on parasitisation and emergence of *Trichogramma* spp.

Name of the plant extract	Conc. of the extract (g/ml)	% parasitisation			% emergence		
		T.chilonis	*T.japonicum*	*T.poliae*	*T. chilonis*	*T.japonicum*	*T. poliae*
Oryza sativa	0.02	54.6(47.67)	53.0(45.57)	28.3(32.15)	51.5(46.70)	52.0(47.55)	25.3(30.10)
Triticum aestivum	0.02	26.0(23.57)	27.3(31.51)	15.6(23.30)	24.0(21.12)	19.3(26.05)	14.6(22.49)
Zea mays	0.01	46.3(45.19)	26.3(30.87)	22.6(28.42)	46.0(42.70)	25.3(30.21)	19.0(25.83)
Saccharum officinarum	0.03	61.3(51.57)	32.0(34.44)	38.3(36.46)	50.6(35.38)	28.6(32.36)	37.6(32.99)
Vigna sinensis	0.02	38.6(38.44)	24.0(28.87)	33.0(38.65)	34.0(35.66)	23.0(29.9)	30.0(36.56)
Cajanus cajan	0.01	46.3(42.89)	54.0(46.72)	43.3(41.66)	39.6(39.03)	48.0(33.84)	36.0(36.86)
Helianthus annuus	0.02	51.6(45.95)	32.0(35.66)	16.0(23.57)	46.0(42.70)	31.3(37.66)	15.0(22.77)
Ricinus communis	0.02	25.0(29.99)	24.0(27.77)	24.0(29.33)	22.3(28.19)	20.3(26.56)	20.0(26.79)
Control		86.0(85.66)	90.0(89.22)	89.0(88.55)	80.0(82.66)	86.0(80.22)	86.0(84.55)
CD(P=0.01)		5.33(3.17)	2.66(1.69)	2.87(1.94)	2.52(1.59)	4.24(2.74)	3.07(2.18)
$S.E_m$		1.29(0.76)	0.64(0.41)	0.69(0.47)	0.61(0.38)	1.02(0.66)	0.07(0.52)
C.V.		5.20(3.27)	3.33(2.02)	4.6(2.69)	2.83(1.79)	5.77(3.40)	5.73(3.26)

* Values in parentheses are angular transformed values

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insecticide coupled with release of *Trichogramma* in IPM schedule registered highest net income and net grain yield (Rachappa & Naik, 2004). Sharma *et al.* (2001) also reported similar results. Kumar and Khan (2005) attributed the parasitic ability of *Trichogramma* based on inverse relation between temperature and development. There were synergism on action of egg parasitoids followed by application of *Bt.* (Saikia & Parameshwaran, 2002).

Acknowledgements: The authors are highly thankful to G.B.P.U.A.&T., Pantnagar and I.C.A.R., New Delhi for providing necessary facilities and financial assistance for the investigation.

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