

POPULATION AND FEEDING CAPACITY OF DRAGONFLIES ON INSECT PESTS OF RICE IN PAKISTAN (ANISOPTERA: LIBELLULIDAE)

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Abstract — The quantity of rice pests consumed by 4 spp. in a day (12 h) was determined by forced feeding. Adult *Orthetrum sabina* devoured, on an average, 4.8, 4.2, 5.1, 3.8, 32.1 and 68.0, *Crocothemis s. servilia* 3.9, 3.4, 4.0, 3.0, 20.3 and 39.0, *C. erythraea* 3.5, 3.0, 3.8, 2.7, 15.2 and 22.8 while *Pantala flavescens* 2.9, 2.6, 3.3, 2.2, 9.1 and 15.2 white stem-borers (*Scirpophaga innotata*), yellow stem-borers (*S. incertulas*), leaf-folders (*Cnaphalocrocis medinalis*), white leafhoppers (*Cofana spectra*), green leafhoppers (*Nephotettix* spp.) and white-backed planthoppers (*Sogatella furcifera*), respectively. The ♀♀ of all the species consumed higher number of pests as compared with their ♂♂. The number of insect pests taken by each sp. ranked in the following

order according to the size of insects: *C. spectra* < *S. incertulas* < *S. innotata* < *C. medinalis* < *Nephotettix* sp. < *S. furcifera*.

Introduction

The rice crop in Pakistan is attacked by a number of insect pests, which are mostly controlled with insecticides. This unidirectional effort is not very successful and has resulted in substantial losses by the pests. Therefore, the focus should be shifted from chemical control to the pest management strategy which, in turn, emphasises the preservation and evaluation of the natural control agents already operating in the fields (FEIJEN, 1977; DEAN 1978; AGASSIZ, 1978; VAN VREDEN & AHMADZABIDI, 1986; XIA & WANG, 1989;

Table I — Population density of dragonflies in rice fields at Gujranwala and Sheikhpura in 1983

Date, 1983	Number of dragonflies per 7 rows			Total	No. per row
	Baigpur	Muridke	Nokarian		
July 15	0	0	0	0	0.00
August 1	2	2	1	5	0.71
August 15	4	3	2	9	1.29
September 1	8	5	4	17	2.43
September 15	9	7	7	23	3.29
October 1	8	8	7	23	3.29
October 15	7	7	6	20	2.86
November 1	5	4	2	11	1.57
November 15	1	1	2	4	0.57
December 1	0	0	0	0	0.00

KHALIQ & SIDDIQUE, 1995). The present study was designed to assess the dragonfly population and its feeding capacity on paddy field insect pests.

Material and methods

The research was carried out in three distantly located rice plots at Muridke (Sheikhupura distr.), Nokarian (Sheikhupura distr.) and Baigpur (Gujranwala distr.). Each plot measured 84x1.5 ft and there were 140 rows in each plot. Adult dragonflies were collected, identified and released at the spot. The population of the identified species was counted visually from 7 rows in each plot (each of 84 ft length and selected after leaving 19 rows, at fortnightly intervals from 15 July to 1 December, 1983. The method of forced feeding, devised by YOUSUF & ALI (1986), was used to identify the dragonfly feeding capacity.

Results and discussion

The dragonflies visiting the three experimental rice plots were identified as *Orthetrum sabina* (Drury), *Crocothemis s. servilia* (Drury), *C. erythraea* (Brullé) and *Pantala flavescens* (Fabr.), all Libellulidae. Their population density is given in Table I. The minimum per row population (0.71) was recorded on 1 August. Then the population started increasing, until the maximum population (3.29) was observed on 15 September and 1 October. Thereafter, the population commenced declining and the minimum population (0.57) was seen on 15 November. No dragonflies were present

in the experimental plots on 1 July and 1 December. Apparently, the most suitable period of dragonfly activity in the rice fields studied lasts from early September to mid October.

The number of various insect pests of rice consumed by different dragonfly species is given in Table II. Female *O. sabina*, *C. servilia*, *C. erythraea* and *P. flavescens* are more voracious feeders and eat higher numbers of insect pests, viz., white stem-borers (*Scirpophaga innotata*), yellow stem-borers (*S. incertulas*), leaf-folders (*Cnaphalocrocis medinalis*), white leafhopper (*Cofana spectra*), green leafhoppers (*Nephotettix* spp.) and white-backed planthoppers (*Sogatella furcifera*) as compared with their males. The four dragonfly species consumed the highest number of white-backed planthoppers, followed by green leafhoppers, leaf-folders, white stem-borers, yellow stem-borers and white leafhoppers. The number eaten was inversely proportional to prey size.

O. sabina is the most voracious predator, consuming the highest number of pests. The next was *C. servilia*, followed by *C. erythraea* and *P. flavescens*. The feeding behaviour of different species was also recorded during these studies. On offering the prey, the individuals of all four species first start eating the abdomen, which is finished in 3-4 bites. Thereafter they take the thorax in a single loaf, rejecting the wings, legs and heads of the prey. When insect heads are offered, they chew and vomit them out in a blackened condition. When a vomited head is offered again, the

Table II – Average number of insect pests of rice consumed by four dragonfly species under forced feeding

Dragonfly	Number of insects fed in 12 hours						
		<i>S. innotata</i>	<i>S. incertulas</i>	<i>C. medinalis</i>	<i>C. spectra</i>	<i>Nephotettix</i> sp.	<i>S. furcifera</i>
<i>O. sabina</i>	♂	4.2	3.6	4.6	3.2	23.8	57.4
	♀	5.4	4.8	5.6	4.4	40.4	78.6
<i>C. servilia</i>	♂	3.4	3.0	3.4	2.6	14.4	32.8
	♀	4.4	3.8	4.6	3.4	26.2	45.2
<i>C. erythraea</i>	♂	3.0	2.6	3.2	2.4	12.6	17.4
	♀	4.0	3.4	4.4	3.0	17.8	28.2
<i>P. flavescens</i>	♂	2.6	2.2	2.8	2.0	6.8	11.8
	♀	3.2	3.0	3.8	2.4	11.4	18.6

dragonfly refuses it. An exception were white-backed planthoppers, which were swallowed as such, without rejecting any part of the body. When about full-fed, the dragonflies cut the insects in two halves and throw down. This behaviour was similar to that reported by ALI (1983). The dragonflies put their fore-legs on the prey insect during the whole act of forced feeding.

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