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Key Mortality Factors Of Scirpophaga Incertulas (Rice Stem Borer) Infesting Rice

Research Article

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Abstract: Scirpophagaincertulaspassed through one generation each during rainy season at Agricultural Engineering College, Kumulur. TrichogrammaJaponicum,Trichogrammabraziliensis, Telenomusbeneficiens, Tetra stichus SP. are egg parasites and BraconChinensis, Stenobraconnicenilles, Tropobracon sp. Platygaster. In addition to the above TrichogrammaJaponicum and playgasterOryzac unidentified as key mortality factors of scirpopherga incertulas. Using the key mortality factors the killing power of k value is decrease by second generation.

Keywords: Rice, Key Mortality factors, Scirpophaga incertulas.

1. Introduction

Scirpophaga incertulas is the biggest share of rice pest (Noorhosseni Niyaki, [1]). Prasad [2] record 20 to 80 per cent damage to paddy crop. K.Vijayalakshmi, Subhashini Sridhar and E.Damodharan [4] say that some natural enemies do exist in the field itself which feed upon stem borer larvae,eggs and adults. The commercially available parasites are trichogramma japonicum, Trichogramma braziliensis, Telenomus beneficiens, Tetra stchus Sp., ect. They parasitize the egg stage of the pest. The present investigation provides information on the key mortality factors in the population fluctuations of scirpophaga incertulas in the field, Which could aid in developing biocontrol programmes for these pest.

2. Materials and Methods

A non-replicated field experiment on life tables and key mortality factors of scirpophergaincertulas infesting rice field was conducted at the farm of Agricultural Engineering College, Kumulur during the rainy season of 2014-15 and the varietyADT 49 was transplanted with a spacing of three week old seedlings were transplanted to the main field. Frequent field visits were made alternative days in a week known number of egg were collected along with the plant material.

On hatching the tiny larvae were reared in small plastic boxes individually on paddy till the cessation of pest population in the field. This laboratory culture was used as a check culture for deciding on the number of regular generations of the

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pests in the field conditions. The sampling of early and late inster larvae was done on the basis of development of the pests in laboratory reared culture. At each observation, Carefully examined alternative days in a week for the number of larvae of target pests. The field collected larvae were brought to the laboratory and reared on paddy. This was referred to as field culture. Fresh paddy leaves were provided as and when reqired. The culture was reared till adult emergence.

Observations were made on larval and pupal parasitism and pupal parasitism and mortality due to unknown reasons during early and late insters pupal stages. An interval of four to six days was provided before sampling eggs of the next generation after the adult emergence of the previous generation. This period was considered as completion of the pre-oviposition period by moths of the previous generation. The life table were constructed based on studies by A.S.Atwal and Balraj Singh (1990) as detailed below.

x – the age interval of egg , larva, pupa and adult

l_x – the number surviving at beginning of stage noted in the column

d_x – the number dying within the age interval stated in the x column

d_xF – the mortality factor responsible for d_x

$100q_x$ – percentage mortality

S_x – survival rate within the age mentioned in the x column

The 'l_x' for eggs was derived indirectly. The viability was determined on the basis of field collected eggs and the d_x value worked out. The trend index was simply 'i_x' for the early instar larvae in the next generation expressed as a ratio of previous generation. It was calculated by using the formula 'N_2/N_1' where N_2 is equal to population of early instar larvae in next generation and N_1 is equal to the population of early instar larvae in previous generation. The generation survival was index mortality. It was calculated by using the formula 'N_3/N_1' where N_3 is equal to population of adults in a generation andN_1 is equal to the population of early instar larvae in previous generation.

A separate budget of each generation was prepared to find out the key factors that influenced the population trend in different generations of the scirpophaga incertulas of rice under investigation. The method of key factor analysis developed by Varley and Gradwell (1963, 1965) was used to detect density relationship of mortality factors. By this method, the killing power (K) of such mortality factors in each age group was estimated as the difference between the logarithms of population density of the killing power of 'k' s.

3. Result and Discussion

Two generation of Scirpophaga Incertulas were observed on rice field during rainy season 2014. However, it did not appear during winter2014. Number of parasitized and sterile eggs 132. Expected number of viable eggs 363. Expected number of early instar larvae 363. Actual number of early instar larvae(L_1) in second generation during (N_2)=228.

Trend index (I) N_2/N_1=228/228=1. Generation survival (SG)N_3/N_1=31/228=0.13596. The killing power(k) of such mortality factor of first generation 1.6021. The killing power(k) of such mortality factor of second generation 1.297. The maximum contribution towards generation mortality came early instar larvae in both generation.

Age Interval	Number alive/ha at the beginning of xl_x	Factor responsible for d_x, d_xf	Number of dying during x	d_x as % of l_x, $100q_x$	$Log(l_x)$	'k'values
First generation during rainy season						
Expected eggs	1280	Parasitoids, Sterility	146 108	11.41 8.4375	3.1072 3.0546	0.0526
Expected viable eggs	1026	–	–	–		
Expected larvae	1026	Failure to enter mid-ribs unknown causes	798	77.7778	3.0111	0.0435
Larvae $L_1(N_1)$	228	Unsuccessful boring through mid-ribs/leaf whorls and unknown cases	146	64.0351	2.3579	0.6532
Larvae L_2	82	Parasitoids, Unsuccessful boring through growing points and unknown causes	12 38	14.6341 54.2857	1.9138 1.9138	0.4441
Pupae	32	Parasitoids, Unknown causes	4 0	12.50 0.00	1.5051	0.4087
Moths, Females x_2N_3, Normal females x_2	28 28 28	Sex ratio(1:1), Adult mortality	–	–	– 1.4472	
Total			1252			1.6021

Table 1. **Key mortality factors of Scirpophaga Incertulas on Rice in 2014-15**

Expected egg = 495

Number of parasitized and sterile eggs = 132

Expected number of viable eggs = 363

Expected number of early instar larvae = 363

Actual number of early instar larvae (L_1) in second generation during (N_2) = 228

Trend index (I) $= N_2 \ / \ N_1 = 228/228 = 1$

Generation survival (SG) $= N_3/N_1 = 31/228 = 0.13596$

Age Interval	Number alive/ha at the beginning of xl_x	Factor responsible for d_x, d_xf	Number of dying during x	d_x as % of l_x, $100q_x$	$Log(l_x)$	'k'values
Second generation during rainy season						
Expected eggs	495	Parasitoids, Sterility	96 36	19.3939 9.0225	2.6946 2.601	0.0936
Expected viable eggs	363	–	–	–		
Expected larvae	363	Failure to enter mid-ribs unknown causes	135	37.1901	2.5599	0.0411
Larvae $L_1(N_1)$	228	Unsuccessful boring through mid-ribs/leaf whorls and unknown cases	183	80.2632	2.3579	0.202
Larvae L_2	45	Parasitoids, Unsuccessful boring through growing points and unknown causes	12 8	26.6667 24.2424	1.6532 1.6532	0.7047
Pupae	25	Parasitoids, Unknown causes	4 0	16 0.00	1.3979	0.2556
Moths, Females x_2N_3, Normal females x_2	21 21 21	Sex ratio(1:1), Adult mortality	–	–	– 1.4471	
Total			474			1.297

Table 2.

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