

Efficacy of botanical pesticides against white backed plant hopper in rice

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ABSTRACT

A field trial was conducted during Kharif season, 2004, repeated in Rabi season, 2004-05 and Kharif season, 2005 at the Regional Research and Technology Transfer Station (RRTTS), Keonjhar, OUAT Bhubaneswar. The performances of the neem derivatives like neem seed extract (NSE), neem oil (NO), Multineem (commercial product of neem based pesticide) and a commercial B.t. formulation (Halt) were evaluated for their bioefficacy against white backed plant hopper. Populations of WBPH were recorded at 30 and 50 DAT. Results indicated that first round application with neem pesticides at 20 DAT and subsequent application with the same neem pesticides or with chemical pesticide like chlorpyrifos at 40 DAT could be the appropriate step to handle the WBPH population in rice crop.

Key Words: B.t. formulation, multineem, neem seed extract, neem oil, WBPH

The WBPH occupies the major pest status because of accelerating momentum in its occurrence in rice ecosystem. In ecological term WBPH is a typical 'r' strategist and its population is kept under natural check only under low densities but if the population escapes this catch, it rapidly grows exponentially. So in the present investigation an attempt has been made to formulate an ecofriendly management schedule against WBPH of transplanted rice by integrating neem derivatives, Bt formulation and synthetic pesticide, chlorpyrifos. A field trial was conducted during *kharif* season, 2004 and the same experiment was repeated in *Rabi* season, 2004-05 and *kharif* season, 2005 at the Regional Research and Technology Transfer Station (RRTTS), Keonjhar, Orissa operating under the control of Orissa University of Agriculture and Technology, Bhubaneswar to develop a bio-rational management strategy for whitebacked plant hopper

MATERIALS AND METHODS

The experiments were designed in a Randomized Complete Block Design (Factorial). A rice variety Lalat moderately resistant to insect pests and a susceptible rice variety Jaya were included in the test. The dates of transplanting were 10.08.04, 01.02.05 and 16.08.05 during *kharif* season, 2004, *rabi* season, 2004-05 and *kharif* season, 2005 respectively. The neem derivatives like neem seed extract (NSE @ 5%), neem oil (NO @ 5%) and a commercial product of neem based pesticide, Multineem (@ 0.3%) were also included in the experiment. A commercial B.t. formulation (Halt @ 1.0 kg/ha) was also utilized in the experiment. The performances of these biopesticides were studied for their bioefficacy against white backed plant hopper (WBPH). Recommended IPM practice and untreated check treatments were also included in the field experiments for the relative comparison of results. The nymph and adult population of white backed plant hoppers was collected by adopting water pan sampling

technique on 10 hills. In a yellow plastic pan of 9" diameter, a small amount of water to the level of 1/5th of height of the yellow pan was taken and two to three drops of liquid detergent was added to the water taken in the yellow plastic pan. The pan was placed at the base of the hill and the hill was struck 3 times to dislodge the arthropods into the pan. In this manner, collection was made for individual treatment of each replication separately. After the collection of arthropods into the pan, they were transferred into a funnel fitted with a fine screen and then the arthropods were collected on the screen. The funnel was gently inverted and a specimen tube was placed correctly touching to the edge of the funnel. Ethyl alcohol (70%) was allowed to pass through the pipe side of the funnel from a wash bottle very gently for the purpose of getting the arthropods collected into the specimen tube. After that the specimen tube was capped and carried from the field to the laboratory for identification. Population WBPH (*Sogatella furcifera*) was then recorded. Such observations were noted at 30 and 50 DAT.

RESULTS AND DISCUSSION

Population of WBPH was below the ETL at 30 DAT except the *rabi* season (2004-05). However the population was found markedly increased at 50 DAT and crossed the ETL over all the three cropping seasons with the record of 5.0 to 6.0 numbers of WBPH hill⁻¹ in control plots. From the results it is marked that all the protection schedules provided a good level of protection against the WBPH and limited the population to below the ETL. Three protection schedules where the neem pesticides like NSE (@ 5%), NO (@ 5%) and Multineem (@ 0.3%) were applied at 20 DAT and subsequent protection of the crop with chlorpyrifos (0.4 kg a.i. ha⁻¹) at 40 DAT registered the WBPH population varying from 2.0 to 3.6 numbers of WBPH hill⁻¹ at 50 DAT as against 5.0 to 6.0

Table 1: Population of white backed plant hopper in different treatments

Treatment	Number of WBPH hill ⁻¹ at 30 DAT						Number of WBPH hill ⁻¹ at 50 DAT					
	Jaya			Lalat			Jaya			Lalat		
	<i>Kharif</i> , 2004	<i>Rabi</i> , 2004- 05	<i>Kharif</i> 2005	<i>Kharif</i> 2004	<i>Rabi</i> , 2004- 05	<i>Kharif</i> , 2005	<i>Kharif</i> 2004	<i>Rabi</i> , 2004- 05	<i>Kharif</i> 2005	<i>Kharif</i> 2004	<i>Rabi</i> , 2004- 05	<i>Kharif</i> 2005
T ₁ :Recommended IPM Practice	0.66 (1.08)	1.00 (1.22)	0.33 (0.91)	0.33 (0.91)	1.00 (1.22)	0.33 (0.91)	.00 (1.58)	1.60 (1.45)	1.00 (1.22)	2.00 (1.58)	1.30 (1.34)	0.66 (1.07)
T ₂ :NSE @ 5% at 20 & 70 DAT + Chlorpyriphos @ 0.5kg a.i. ha ⁻¹ at 40 DAT	1.00 (1.22)	3.30 (1.95)	1.00 (1.22)	0.66 (1.08)	3.00 (1.87)	1.00 (1.22)	3.00 (1.87)	3.00 (1.87)	2.00 (1.58)	3.33 (1.96)	3.00 (1.87)	2.00 (1.58)
T ₃ :NO @ 5% at 20 & 70 DAT+ Chlorpyriphos @ 0.5kg a.i. ha ⁻¹ at 40 DAT	0.66 (1.08)	3.00 (1.87)	1.33 (1.35)	1.33 (1.35)	3.00 (1.87)	1.00 (1.22)	3.33 (1.96)	3.00 (1.87)	2.66 (1.78)	3.00 (1.87)	3.00 (1.87)	2.00 (1.58)
T ₄ :Multineem at 20 & 70 DAT+ Chlorpyriphos @ 0.5kg a.i. ha ⁻¹ at 40 DAT	1.00 (1.22)	3.30 (1.95)	1.66 (1.48)	1.00 (1.22)	3.60 (2.02)	1.33 (1.35)	2.66 (1.78)	3.30 (1.95)	3.00 (1.87)	2.00 (1.58)	3.60 (2.02)	2.66 (1.78)
T ₅ :Halt @ 1kg ha ⁻¹ at 20&70DAT + Chlorpyriphos @ 0.5kg a.i. ha ⁻¹ at 40 DAT	1.00 (1.22)	5.0 (2.35)	2.00 (1.58)	0.66 (1.08)	4.60 (2.26)	2.00 (1.58)	3.00 (1.87)	4.00 (2.12)	4.00 (2.12)	4.33 (2.20)	5.00 (2.35)	4.00 (2.12)
T ₆ :NSE @ 5% at 20, 40 & 70 DAT	0.66 (1.08)	2.00 (1.58)	2.00 (1.58)	0.33 (0.91)	2.30 (1.67)	1.00 (1.22)	3.00 (1.87)	3.30 (1.95)	3.33 (1.96)	4.66 (2.27)	3.00 (1.87)	3.00 (1.87)
T ₇ :NO @ 5% at 20, 40 & 70DAT	1.33 (1.35)	3.00 (1.87)	1.00 (1.22)	0.66 (1.07)	2.60 (1.76)	1.00 (1.22)	3.66 (2.04)	3.60 (2.02)	4.00 (2.12)	3.00 (1.87)	3.30 (1.95)	4.00 (2.12)
T ₈ :Multineem @0.3% at 20, 40&70 DAT	1.33 (1.35)	3.30 (1.95)	0.66 (1.07)	1.00 (1.22)	3.60 (2.02)	1.66 (1.47)	4.00 (2.12)	3.60 (2.02)	4.33 (2.20)	3.00 (1.87)	3.60 (2.02)	4.00 (2.12)
T ₉ :NSE @ 5% at 20 & 70 DAT + Halt @1kg ha ⁻¹ at 40 DAT	1.00 (1.22)	2.60 (1.76)	1.00 (1.22)	0.66 (1.07)	2.30 (1.67)	2.00 (1.58)	3.66 (2.04)	3.00 (1.87)	4.00 (2.12)	4.00 (2.12)	3.00 (1.87)	3.00 (1.87)
T ₁₀ :Untreated Control	2.00 (1.58)	5.0 (2.35)	3.00 (1.87)	1.50 (1.41)	5.6 (2.47)	3.66 (2.04)	5.00 (2.35)	6.0 (2.55)	6.00 (2.55)	5.33 (2.42)	5.30 (2.41)	5.33 (2.41)
SEm(±)	0.008	0.045	0.037	0.008	0.045	0.037	0.007	0.037	0.045	0.007	0.037	0.045
LSD(0.01)	0.020	0.300	0.110	0.020	0.130	0.110	0.020	0.110	0.130	0.020	0.110	0.130

numbers of WBPH/hill in control plots. Thus these management schedules appeared to be quite effective against the WBPH and also harmonic to the rice ecosystem. Repeated spray of neem pesticides like NSE (5%), NO (5%) and Multineem (0.3%) at 20 and 40 DAT also exhibited a good level of bioefficacy against the WBPH with the record of 3.0 to 4.66 numbers of WBPH/hill and maintained the WBPH population below ETL. Crop management schedule with Bt formulation application (Halt) at 20 DAT followed by chlorpyrifos application (0.4 kg a.i./ha) at 40 DAT was found inferior in suppressing the WBPH population compared to the first round application of neem based pesticide at 20 DAT followed by chlorpyrifos spray at 40 DAT.

Shukla and Kaushik (1994) reported that neem seed kernel extract (5%) resulted in 79.5% reduction in population of WBPH in *Kharif* season and 53.4% in *rabi* season. Neem derivatives were quite efficacious against the WBPH (Ramaraju and Sundarababu, 1989; Sontakke *et al.*, 1994). Bt formulations are ineffective against WBPH (Anon, 1996; Anon, 1995-96). From the present investigation, it is revealed that the protection schedule with neem seed extract (5%) at 20 DAT and subsequent application of chlorpyrifos at 40 DAT was found quite effective against the WBPH. Further the results indicated that two round applications of neem derivatives at 20 DAT and 40 DAT were also effective against the WBPH.

From the results it can be concluded that first round application with neem pesticides at 20 DAT

and subsequent application with the same neem pesticides or with chemical pesticide like chlorpyrifos at 40 DAT could be the appropriate step to handle the WBPH population in rice crop.

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