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Research Article

Efficacy of botanicals and insecticide used in single and combination for controlling plant hoppers in transplanted rice

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Abstract

The study had been planned to evaluate the efficacy of botanical extracts, insecticide used in single along with combination i. e.*Azadirachta indica*, *Eucalyptus golobulus* and Spinosad insecticidefor controllingbrown plant hopper (*Nilaparvata lugens*) and White backed plant hopper (*Sogatella furcifera*)in transplanted rice during kharif 2012-2013. The results showed that statistically significant (P<0.05) mortality was recorded by *Azadirachta indica*71.52% and 70.64 % respectivelyfollowed by*E. golobulus*54.34 %, 52.67%, and Spinosad 51.20% and52.15% respectivelyfor controlling*N. lugens* and *F. furcifera*after 1st day. However minimum mortality was recorded by combined effect of *A. indica*+*E. golobulus*+Spinosad i.e. 77.95%& 74.92% after 1stday during both the years. Statistically significant (P<0.05%) reduction in both the pests were recorded by *A. indica*+*E. golobulus*+Spinosad after three days i.e. 72.72%, 61.14% followed by *A. indica*; *E. golobulus* and Spinosad i.e. 64.69% & 60.81%; 45.05% & 50.34%; 33.04% & 29.66% respectively. However *A. indica*+*E. golobulus*+Spinosad was sprayed and reduced populations of these two pests i.e. 48.45% &49.34% statistically highly significant effect (P<0.05) followed by *A. indica* (24.05 & 29.42%); *E. golobulus* (22.39% & 22.86%) and Spinosad (21.01% & 20.36%) after seven days. At the end it was concluded that botanical extracts not only played a vital role for controlling pestsbut also act as alternate to pesticides.

Keywords: Botanical, extracts, insecticide, pollution, plant, hopper, mortality

Introduction

Rice belongs to family graminaeis an important food crop after wheat and major export item(Shafique and Ashraf, 2007). It accounts for 5.9 percent of value added in agriculture and 1.3 percent in GDP. It is cultivated on an area of 2963 thousand hectares, 17.8percenthigher than last year. The production of the crop is estimated at 6952 thousand tons which was 24.9 percent higher than last year (Anonymous, 2009). However leaf and plant hoppers have considered a pest status in Pakistan after the introduction of high yielding short duration varieties (Inayatullah et al., 1986).Brown plant hopperand White backed plant hopper are the most important insect pests of rice crop; reducesyield by sucking the sap from leaves and causes hoppers burn in severe infestation. However to control these pests by using different botanical extracts except synthetic insecticides are well known by their anti-feedent, repellent, mortality causing effects (Matsumura, 1996). Leaf and Plant hoppers, after severe infestation shows discoloration of leaf sheaths and massive ovi-position from plant hoppers(Matsumura, 1991). Population densities of whitebacked plant hopper are higher on high yielding

varieties than on local Basmati varieties(Ashraf, 1986).Random and unsystematic use of chemicals has become the reason of major outbreaks of insect pests. Pest management techniques are necessary for consideration of appropriate economics, ecological and socio-ecological factors (Salim *et al.*, 2003).Botanicals are the most important alternatives to minimize huge usage of synthetic pesticides; however they possess toxic properties against pest, repellency, anti-feedant, insect growth regulatory activities (Prakash and Rao, 1989). Botanical pesticides are used in Indian agriculture to minimize losses caused by pests and diseases (Parmar and Kumar, 1993).Spinosad reduces mammalian toxicity and degrades quickly when exposed to sun light. Spinosad affects acetylcholine receptors which was exclusive among other known insecticides (Thompson *et al*., 2000).Azadirachtin have impact on the biological nature against brown planthopperand minimizes its population (Senthil *et al*. 2007).However the study had been planned to evaluate the efficacy of different botanical extracts i. e.*Azadirachta indica*,*Eucalyptus golobulus*, Spinosad insecticide used as single and in combination for controlling brown plant hopper and white backed plant hopper in transplanted riceduring kharif 2012-2013.

Materials and Methods

The study had been planned to evaluate the efficacy of botanical extractsi. e. *Azadirachta indica*, *Eucalyptus golobulus*, Spinosad insecticide used as single and in combination for controlling brown plant hopper and White backed plant hopper in transplanted rice during kharif 2012-2013.Experiment has been conducted with Randomized Complete Block Design with three replications having a net plot size of $7.5\times22ft^2$areas.Extracts from the leaves of *Azadirachta indica* and *Eucalyptus golobulus*had prepared by crushing the leaves; soaking in water for 7 days and extract sieved through muslin cloth. After the calibration of area for each treatment, the extract was sprayed over to the varieties (Iqbal et. al., 2013). Formulation of spinosad (*Sacchalaropolyspora spinosa)*was used as microbial insecticide and the crop was sprayed by knapsack hand sprayerand recorded population of hopper before spraying. All the recommended agronomic and plant protection practices had been adopted during the experimentation to avoid any biasness.Mortality (%) data was recorded before and 1, 3 and 7 days after insecticides application on the basis of five sweep by netand compared to control.

Results and Discussion

From table 1, the result showed that statistically significant ($P<0.05$) mortality (%) was recorded by *Azadirachta indica*71.52% and 70.64 % respectivelyfollowed by*E. golobulus*54.34 %, 52.67%, and Spinosad 51.20% and 52.15% respectivelyfor controlling *N. lugens* and *F. furcifera*after 1stday. However minimum mortality was recorded due to combined effect of *A. indica*+*E. golobulus*+Spinosad i.e. 77.95% & 74.92% after one day during both the years. Statistically significant ($P<0.05$%) reduction in both of the pests were recorded by *A. indica*+*E. golobulus*+Spinosad after three days i.e. 72.72%, 61.14% followed by *A. indica*; *E. golobulus* and Spinosad i.e. 64.69% & 60.81%; 45.05% & 50.34%; 33.04% & 29.66% respectively. However *A. indica*+*E. golobulus*+Spinosad was sprayed and reduced population of these two pests i.e. 48.45% & 49.34% statistically highly significant effect ($P<0.05$) followed by *A. indica* (24.05 & 29.42%); *E. globulus* (22.39% & 22.86%) and Spinosad (21.01% & 20.36%) after 07 days. The results were in accordance to Sexana and Khan (1985) who recorded population of BPH and WBPH to minimum level after spraying. This result was also in accordance to Senthil et al. (2006) who reported that neem applied against*N. lugens* population showed maximum mortality of nymphs (94-100%) before reaching adult stage. Shanthi and Janarthan, (1995) reported that the indirect insecticidal effects of *Eucalyptus camadulensis* found by inhibiting growth and the cycle of development of pests such as *Nilaparvata lugens* and *Rhyzopertha dominica* (Singh et al., 1996).Neem leaves provide good source for control of insect pest in the form of neem oil extracts and even seed water extracts.These results were contradictory to Karthikeyan et al. (2008) who reported that Spinosad produces no significant effect on spider population and was safe to spiders. Saxena et al. (1981) found that neem oil produced excellent anti-feedant activity for the control of rice brown hopper.Schmutterer et al. (1983) found that neem seed extract limited the population of white backed plant hopper up to maximum level.Rajasekaran et al. (1987a) recorded that 1% neem oil spray on the rice plant reduced leaf folder and green leaf hoppers population. Ramraju and Sundarababu (1989) recorded that WhiteBacked Plant Hopper emergence

was reduced with application of 5 % neem cake extract. Spinosad is a stomach poison having characteristics of contact activity and active against Lepidoptera and Diptera (Salgado, 1998).

Table: 1. Mortality (%) of *Nilaparvata lugens* and *Sogatella furcifera* population after the application of botanicals, Spinosad in single and in combination during 2012-2013

TREATMENTS	INTERVALS					
	AFTER 1 DAY		AFTER 3 DAYS		AFTER 7 DAYS	
	N. LUGENS	S. FURCIFERA	N. LUGENS	S. FURCIFERA	N. LUGENS	S. FURCIFERA
A. INDICA	71.52 ± 1.64	70.64 ± 1.34	64.69 ± 1.94	60.81 ± 2.47	24.05 ± 0.56	29.42 ± 1.87
E. GOLOBULUS	54.34 ± 1.32	52.67 ± 1.54	45.05 ± 0.69	50.34 ± 1.38	22.39 ± 0.88	22.86 ± 2.28
SPINOSAD	51.20 ± 2.04	52.15 ± 1.54	33.04 ± 1.56	29.66 ± 1.93	21.01 ± 1.78	20.36 ± 1.50
A.INDICA+E.GOLOBULUS+ SPINOSAD	77.95 ± 7.69	74.92 ± 3.34	72.72 ±1.05	61.14 ± 1.30	48.45 ± 1.23	49.34 ± 1.85
CONTROL	4.20 ± 0.74	4.34 ± 1.05	3.07 ± 0.87	3.85 ± 0.58	1.20 ± 0.50	1.70 ± 0.69
DF	4, 24	4, 24	4, 24	4, 24	4, 24	4, 24
F VALUE	66.55	162.92	817.65	325.15	339.64	113.10
P VALUE	0.00	0.00	0.00	0.00	0.00	0.00

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