

Study on effect of different botanicals against rice leaf folders (*Cnaphalocrocis medinalis* Guen. and *Pelopidas mathias* Fb.)



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SUMMARY

The botanicals remained next in order of their effectiveness against rice leaf folders, *C. medinalis* and *P. mathias*. The treatment chlorpyrifos 0.05 per cent found significantly superior and most effective treatment than rest of the treatments with lowest per cent damaged leaves (0.52 for rice leaf roller and 0.62 for rice skipper) and larvae per plant (1.05 for rice leaf roller and 1.25 for rice skipper). In botanicals, nimbecidine was found more effective followed by neemrus.

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Key words :

Cnaphalocrocis medinalis,
Pelopidas mathias, Rice leaf folders

Rice (*Oryza sativa* L.) is the staple food of more than sixty per cent of the world's population and known as a king of cereals. The total area of the world under rice cultivation is 153.33 million hectares producing 588.56 million tonnes of grain with an average productivity of 3.37 MT/ha (Anonymous, 2004). The total area under rice cultivation in India was 44.6 million hectares with a production of 90 million tonnes (Sharma, 2005). India has the largest growing area (42.7 million hectares) with production of 86.30 metric tonnes in 2000-2001 and 78.64 MT in 2002-2003 (Anonymous, 2004). In Gujarat, rice occupied about 5 to 7 lakh ha area with a total production of 9 to 10.5 lakh tonnes (Vashi *et al.*, 2005).

Rice crop is attacked by a several hundred species of insect pests during its different stages of crop period. Adult of rice leaf roller, *Cnaphalocrocis medinalis* Guenee (Pyraustidae : Lepidoptera) is small with yellowish brown wings and dark wavy lines on fore and hind wings. Eggs are laid singly on the under surface of tender leaf blade. Larvae are active, yellowish green and remain inside the leaf rolls. It folds the leaf longitudinally by fastening the two edges of

the leaf and feeds inside by scrapping the green matter and makes white stripes on it. Scrapped leaf, initially green, later on turns to white. The full-fed caterpillar pupates inside the folded leaf while adult of rice skipper, *Pelopidas mathias* Fabricious, (Hesperidae : Lepidoptera) is dark brown with white spots on the forewings while caterpillar is greenish yellow, smooth, elongates with constricted neck and 'v' shaped mark on head has a tendency to remain inside the leaf by rolling it and making it like a tube. The larva sticks together the two edges of the leaf by a sticky white substances and feeds outside leaving behind midrib.

Among the leaf defoliators, leaf folders viz., *C. medinalis* Guen. and *P. mathias* Fb. are found to be occupying a major status in South Gujarat. So, it became necessary to explore the economical and eco-friendly management strategy to manage rice leaf folders *i.e.*, *C. medinalis* and *P. mathias*. Therefore, keeping this view, it was decided to investigate botanical control of rice leaf folders *C. medinalis* Guenee and *P. Mathias* Fabricious in rice growing area of South Gujarat.

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MATERIALS AND METHODS

Present investigation on botanical control of rice leaf folders, *Cnaphalocrocis medinalis* Guen. and *Pelopidas mathias* Fb. was carried out at NARP Farm, Navsari Agricultural University, Navsari, Gujarat during Kharif 2005 and summer 2006 .

Experimental details:

- Crop : Rice
- Variety : Masuri
- Design : RBD
- No. of treatments : 8
- No. of replications : 3

Efficacy of various treatments:

In order to evaluate the efficacy of different botanical insecticides against leaf folders *i.e.* *C. medinalis* and *P. mathias*, observations were recorded before and 3 and 10 days after spraying of each treatment following weekly interval. For this purpose, observations were taken by counting the number of damaged leaves and total number of leaves from randomly selected five spots per plot consisting of five plants in each spot. The data thus obtained were converted to per cent infestation. Numbers of larvae of leaf folders were recorded before and 3 and 10 days after spraying of each treatment. For this purpose the observations were taken by counting the total number of larvae from each of damaged leaves, comprising of five plants then the average population per plant was calculated. The spraying was done with the help of lever operated “Knapsack” sprayer. The care was taken during the spraying to obtain uniform coverage of insecticides on each plot and each plant. Two sprayings were carried out during the experiment period. The data thus obtained were statistically analyzed.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been presented under following heads:

Bio-efficacy of botanicals against rice leaf folders :

Rice leaf roller, *C. medinalis* based on per cent damaged leaves:

The per cent damaged leaves of rice leaf roller of two sprays ranged from 0.52 to 2.07 per cent.(Table1) Among all the treatments, chlorpyriphos 0.05 per cent found to be significantly superior and most effective treatment than rest of treatments with lowest per cent damaged leaves (0.52). The botanicals *viz.*, nimbecidine

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S. No.	Treatments	Dose	Before spray		3 DAS		10 DAS		Spray		10 DAS		Spray		Pooled data over periods
			3 DAS	10 DAS	3 DAS	10 DAS	3 DAS	10 DAS	3 DAS	10 DAS	3 DAS	10 DAS			
1.	Nimbecidine 0.03 %	10 ml/0.1	0.58(2.29)*	0.21(2.08)*	0.71(2.16)*	0.58(2.03)*	0.57(1.61)*	0.59(2.02)*	0.79(2.91)	0.59(2.02)*	0.57(1.61)*	0.59(2.02)*	0.79(2.91)	0.59(2.02)*	1.04(3.59)*
2.	Nimbecidine 0.15 %	10 ml/0.1	0.66(2.28)	0.50(2.26)	0.51(2.23)	0.88(2.15)	0.73(2.39)	0.80(2.7)	0.80(2.7)	0.80(2.7)	0.73(2.39)	0.80(2.7)	0.80(2.7)	0.80(2.7)	1.69(3.82)
3.	Nimbecidine 1 %	30 ml/0.1	0.81(2.35)	0.52(2.20)	0.71(2.16)	0.58(2.19)	0.73(2.62)	0.79(2.70)	0.79(2.70)	0.79(2.70)	0.73(2.62)	0.79(2.70)	0.79(2.70)	0.79(2.70)	1.91(4.93)
4.	Chlorpyrifos 5 %	20 g/0.1	0.79(2.19)	0.75(2.11)	0.76(2.11)	0.98(2.91)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.98(2.98)	0.20(2.07)
5.	Chlorpyrifos 5 %	10 ml/0.1	0.50(2.20)	0.38(2.11)	0.71(2.16)	0.72(2.07)	0.67(1.99)	0.69(2.00)	0.69(2.00)	0.69(2.00)	0.67(1.99)	0.69(2.00)	0.69(2.00)	0.69(2.00)	0.25(2.07)
6.	Chlorpyrifos 0.5 %	10 ml/0.1	0.51(2.21)	0.52(2.21)	0.71(2.16)	0.38(2.11)	0.66(1.93)	0.72(2.61)	0.72(2.61)	0.72(2.61)	0.66(1.93)	0.72(2.61)	0.72(2.61)	0.72(2.61)	1.83(3.88)
7.	Chlorpyriphos 0.05 %	25ml/0.1	0.88(2.16)	0.56(2.16)	0.79(2.62)	0.37(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.72(2.36)	0.96(3.52)
8.	Control (water spray)		0.68(2.30)	0.21(2.08)	0.92(3.18)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.29(2.93)	0.06(3.06)
S.D.			0.15	0.18	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.15
C.D. (P 0.05)			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %			8.9	10.2	10.1	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	10.5

* Data in the parentheses are original values, while those in bold letters are pooled values
 DAS Days after spraying NS Non significant

0.03 per cent (1.59), neemrus 0.15 per cent (1.82), cal 10, 5 per cent (1.88), econeem 1 per cent (1.93), calpaste 0.2 per cent (2.04) and calnova 5 per cent (2.07) remained next in order for their effectiveness.

These results are in agreement with the findings of Abdul Kareem and Visvanathan (1981) wherein they found that chlorpyriphos 5 and 10 G were as effective as carbofuran 3 G and quinalphos 5 G against leaf roller. Similar results were also reported by Kandasamy and Ravikumar (1986) where they found that cartap 50 SP and chlorpyriphos 10 G @ 1.0 kg a.i./ha were effective. Again these results are in accordance with the findings of Kaul and Sharma (1999) wherein they found that Neem products, viz., nimbecidine, neemax, neemgold, econeem, neemazal were statistically at par with the chlorpyriphos for the control of *Canaphalocrocis medinalis*. Similarly, Sontakke and Dash (2000) reported that chlorpyriphos, quinalphos and fipronil were highly effective against the leaf folder, *C. medinalis*.

Rice skipper, *P. mathias* based on per cent damaged leaves:

Treatment chlorpyriphos 0.05 per cent (0.62) was found to be most effective against rice skipper and it was at par with nimbecidine 0.03 per cent (1.93) as botanical insecticide (Table 2).

These results are in accordance with the findings of Roshanlal (2000) where he found that chlorpyriphos 20 EC @ 500 g a.i./ha reduced leaf damage of rice leaf folder compared to the commercial formulation of neem. Similar result was also reported by Kaul and Sharma (1999) wherein they studied the efficacy of six different neem products viz., nimbecidine, neemax, neemgold, econeem, neemazal and fortune against *Cnaphalocrocis medinalis* and showed that all the neem formulations were statistically at par with the insecticide chlorpyriphos for the control of *Canaphalocrocis medinalis*

Rice leaf roller, *C. medinalis* based on larval population:

Among all the treatments, chlorpyriphos 0.05 per cent (1.05 larvae/plant) was found to be most effective against rice leaf roller and was at par with nimbecidine 0.03 per cent (1.15 larvae/plant). The botanicals viz., neemrus 0.15 per cent (1.51 larvae/plant) and econeem 1 per cent (1.74 larvae/plant) were next in order for their effectiveness (Table 3).

Rice skipper, *P. mathias* based on larval population:

Chlorpyriphos 0.05 per cent was found to have lowest population of rice skipper (1.25 larvae/plant) and

Sr. No.	Treatments	Dose	Rice skipper, <i>P. mathias</i>	
			3 DAS	6 DAS
1.	Chlorpyriphos 0.05 %	1.0 ml/l	1.30 (1.98)*	1.30 (1.93)*
2.	Nimbecidine 0.03 %	1.0 ml/l	1.75 (2.09)	1.73 (1.93)
3.	Neemrus 0.15 %	30 ml/l	1.56 (2.04)	1.59 (2.09)
4.	Econeem 5 %	20 g/l	1.58 (2.10)	1.59 (2.08)
5.	Calpaste 0.2 %	1.0 ml/l	1.68 (2.13)	1.60 (2.10)
6.	Calnova 5 %	1.0 ml/l	1.67 (2.11)	1.66 (2.13)
7.	Chlorpyriphos 0.05 %	25 ml/l	1.21 (0.94)	1.27 (0.99)
8.	Control (water spray)		1.97 (2.28)	1.97 (2.15)
S.S.D.			0.10	0.10
C.D. (P 0.05)			0.29	0.29
C.V. %			10.8	10.8

* Data in the parentheses are D.F. values of the F-test for differences between treatments at 5% level of significance. NS Not significant.

Table 1: Effect of different concentrations of neem oil, E.V. 90% on the growth of *C. medialis*

Sr. No.	Concentrations	Dose	Average No. of larval/pupa				700.00.000.000
			30 days spray	3 DAS	10 DAS	Spray	
1.	Neem oil 0.03%	10 ml/l	1.9 (3.18)*	1.30 (2.25)*	1.29 (2.22)*	1.33 (2.17)*	1.26 (0.99)*
2.	Neem oil 0.5%	10 ml/l	1.92 (3.22)	1.6 (6.7)	1.7 (5.7)	1.7 (5.3)	1.7 (1.2)
3.	Neem oil 1%	30 ml/l	1.93 (3.27)	1.56 (9.8)	1.5 (9.3)	1.7 (6.8)	1.7 (1.7)
4.	Control 5%	20 g/l	2.0 (3.93)	1.58 (2.63)	1.59 (2.66)	1.59 (2.83)	1.6 (6.66)
5.	Control 5%	10 ml/l	1.8 (3.65)	1.53 (2.7)	1.6 (2.7)	1.78 (7.5)	1.7 (1.62)
6.	Control 5%	10 ml/l	2.08 (3.85)	1.5 (2.32)	1.66 (2.30)	1.5 (2.60)	1.5 (1.92)
7.	Control 0.05%	25 ml/l	1.96 (3.36)	1.2 (1.3)	1.29 (1.9)	1.2 (1.72)	1.18 (0.92)
8.	Control (water spray)	1.89 (3.2)	1.9 (3.16)	1.92 (3.23)	1.9 (3.19)	1.8 (2.90)	1.72 (2.50)
S.D.		0.10	0.08	0.07	0.12	0.11	0.11
C.D. (P 0.05)		NS	0.25	0.23	0.25	0.22	0.23
C.V. %		9.3	9.6	9.5	9.66	9.5	9.53

* Data in the parentheses are original values, while those outside are square root transformed values
DAS - Days after spray

Table 2: Effect of different concentrations of neem oil, E.V. 90% on the growth of *P. maidis*

Sr. No.	Concentrations	Dose	Average No. of larval/pupa				700.00.000.000
			30 days spray	3 DAS	10 DAS	Spray	
1.	Neem oil 0.03%	10 ml/l	1.93 (3.28)*	1.35 (2.30)*	1.35 (2.32)*	1.35 (2.32)*	1.33 (2.8)*
2.	Neem oil 0.5%	10 ml/l	1.8 (3.36)	1.6 (6.7)	1.7 (5.3)	1.7 (5.3)	1.7 (1.58)
3.	Neem oil 1%	30 ml/l	1.92 (3.0)	1.5 (8.3)	1.78 (7.5)	1.78 (7.5)	1.56 (1.9)
4.	Control 5%	20 g/l	1.83 (3.7)	1.58 (2.67)	1.5 (2.66)	1.5 (2.66)	1.58 (2.52)
5.	Control 5%	10 ml/l	1.9 (3.1)	1.53 (2.6)	1.59 (2.68)	1.59 (2.68)	1.5 (2.72)
6.	Control 5%	10 ml/l	1.8 (3.09)	1.68 (2.38)	1.6 (2.7)	1.6 (2.7)	1.65 (2.26)
7.	Control 0.05%	25 ml/l	1.8 (3.13)	1.29 (1.9)	1.29 (1.9)	1.29 (1.9)	1.29 (1.25)
8.	Control (water spray)	1.8 (3.02)	1.90 (3.13)	1.93 (3.26)	1.93 (3.26)	1.93 (3.26)	1.9 (3.19)
S.D.		0.11	0.08	0.09	0.09	0.09	0.09
C.D. (P 0.05)		NS	0.25	0.28	0.28	0.28	0.16
C.V. %		10.1	9.6	10.3	10.3	10.3	9.8

* Data in the parentheses are original values, while those outside are square root transformed values
DAS - Days after spray

it was at par with nimbecidine 0.03 per cent (1.28 larvae/plant) and neemrus 0.15 per cent (1.58 larvae/plant) which remained next in order of their effectiveness (Table 4).

These results are in accordance with the findings of Roshanlal (2000) where he found that chlorpyrifos 20 EC @ 500 g a.i./ha reduced the larval population of rice leaf folder compared to the commercial formulation of neem. Similar results were also reported by Qui *et al.* (2003) wherein they found that fipronil had highest mortality (80.77%) of rice leaf folder followed by chlorpyrifos (69.23%) and monosultap (65.38%), respectively.

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