EFFECT OF CERTAIN NATURAL PLANT EXTRACTS ON THE RICE STEM BORER, *CHILO* AGAMEMNON BLES. AND RICE WHORL MAGGOT, *HYDRELLIA* PROSTERNALIS DEEMING INFESTATION

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Abstract

Six water plant extracts compared to Furadan granules 10% were applied to rice in 1991 and 1992 to study their efficiency in controlling the rice whorl maggot, *Hydrellia prosternalis* and the rice stem horer *Chilo agamemnon.*

Giza-176 variety was chosen for its susceptibility to *Hydrellia prosternalis*, and Giza-180 was selected for its susceptibility to *Chilo agamemnon.* Plant extracts were used as spraying, and Furadan 10% was applied as broadcasting once after 30 days from trans-planting to Giza 176 and 50 days to Giza 180 for the control of the rice whorl maggot and rice stem borer, respectively.

Concerning rice whorl maggot infestation, Furadan and onion extracts gave the best control, while the extracts of wormwood seed of chinaberry seeds, wormwood, onion, garlic and chinaberry leaves were the least effective.

Regarding rice stem borer infestation, Furadan and extracts of coriander seeds gave the highest control followed by the extracts of chinaberry seeds, wormwood, onion, garlic and chinaberry leaves in the two

INTRODUCTION

The rising consumption of currently used insecticides in developing countries has led to a number of problems such as insect resistance, toxicity to nontarget organisms, environmental pollution and health hazards associated with pesticide residues. These facts, in addition to the high cost of pesticides, have stimulated considerable interest in plants as a source of insecticides and / or new tools in insect control.

pyrethrins, nicotine and rotenone. A number of surveys concerning plants and their effects on insects suggest that plant kingdom may be a rich source of new chemicals to achieve this type of control (Abo - Sholoa, 1990).

Rice is considered as one of the most important grain crops either in Egypt or other countries.

Several insects attack rice plants causing economic damage among them the rice whorl maggot, *Hydrellia prosternalis* Deem and the rice stem borer, Chilo agamemnon Bles.

Damage caused by the rice whorl maggot *Hydrellia prosternalis* has become much more common in Egypt in recent years. Rice plants are attacked 10 days after transplanting with the peak of larval population at 30 days after transplanting (Anonymous, 1976). Leaf losses and the resulting reduction in photosynthesis, are critical, the damaged leaves are distorted and break in the wind (Ferino, 1968). Damage results in a reduced plant height and tiller number and bout a 10-day delay in maturity (Andres, 1975).

Chilo agamemnon is considered the most important rice insect in Egypt. Chilo larvae invade rice plants causing either dead hearts symptom if the infestation occurs before heading or infested stems and white heads if the infestation occurs during heading. Isa et al. (1970), Tantawi et al. (1985) and Sherif (1986) studied the effect of some insecticides on the borer in rice fields and reported that Furadan (10% granules) was superior to all tested insecticides.

The objective of this study is to evaluate the efficiency of some natural plant extracts to control the rice whorl maggot and rice stem borer.

MATERIALS AND METHODS

Plant extracts

The plants tested are presented in Table 1. Wormwood, Coriander and Chinaberry were soaked in clear water for 72h. The weight of water was three times that of the seeds. The resulting water was then collected every day for experimentation. As for onion, Chinaberry and garlic, the leaves were put in a calender for 5

minutes with a volume of water that was two times that of the leaves. Water extracts were used as spraying with the aid of a 200 liters knap sack sprayer. The rate of application was 15 kg/f.

Table 1. Plants investigated for their insecticidal effects against the rice whorl maggot and rice stem borer.

Scientific name	Common name	Part used
Melia azedarch	Chinaberry	Leaves and seeds
Allium sativum	Garlic	Gloves
Allium capa L.	Onion	Heads
Artemisis herba alba	Wormwood	Seeds
Coriander sativum	Coriander	Seeds

Insecticide

Furadan 10% granules at the rate of 6kg/f. was used as broadcasting. It was considered as a standard insecticide for comparison with plant extracts.

Treatment

Two field experiments were carried out during 1991 and 1992 at Sakha Agricultural Research Station to evaluate plant extracts against rice pests. Randomized complete block design with four replicaions was used. Rice was sown on mid May and transplanted 32 days later. The plot area was 15 m2. Giza-176 variety was chosen as a susceptible variety to the rice whorl maggot, while Giza-180 was used as a susceptible variety for the rice stem borer. Six plant extracts and Furadan were applied at 30 and 50 days after transplanting for the control of the rice whorl maggot and rice stem borer, respectively.

Concerning rice whorl maggot samples, 50 leaves were taken from each experimental plot, the percentage of infested leaves and severity of infestation as average number of mines and damaged area (mm2) / leaf were calculated.

As for rice stem borer, ten hills were taken at random from the four middle rows in each experimental plot to count dead hearts (10 days after application) and white heads as well as partially infested tiller (10 days before harvesting). Yield loss in each reatment due to borer infestation was calculated using a formula devel-

oped by Isa *et al.* (1970) as follows:

$$\text{Percentage losses} = \frac{D + w + s/10}{N} \times 100$$

Where :

D = The number of plants showing dead heart symptom.
W = The number of plants showing white head symptom.
S = The number of plants having infested symptom and sound heads.
N = The total number of plants in the sample.

Reduction in losses compared to check was estimated.

The results obtained were subjected to analysis of variance and least significant difference at 5 % level of probability .

RESULTS AND DISCUSSION

Table 2 indicates the effect of six water plant extracts compared with Furadan which was applied once (30 days after transplanting) against the rice whorl maggot, *Hyderllia prosternalis* in the two successive rice seasons, 1991 and 1992. The untreated plots had the maximum damage, while the plots treated had lower percentage of damage. Generally, the infestation by the whorl maggot in 1992 was higher than in 1991. This is in agreement with the yearly increase in rice whorl maggot population observed in recent years.

Table 2 . Influence of certain water plant extracts on the rice whorl maggot *Hydrellia prosternalis* Deem. (Giza-176 variety) .

Treatment	Dose/f (kg)	% of infested leaves		Average No. of mines/ leaves		Damaged area/ leaf (mm)2	
		1991	1992	1991	1992	1991	1992
Wormwood extract	15	10.3	14.6	0.18	0.24	0.60	1.20
Coriander extract	15	8.0	12.0	0.16	0.32	1.33	2.66
Onion extract	15	6.8	9.0	0.15	0.12	0.57	1.14
Garlic extract	15	9.8	13.5	0.60	0.40	1.42	2.84
Chinaberry seed	15	9.0	14.0	0.18	0.36	1.52	3.04
Chinaberry leave	15	10.9	14.9	0.12	0.24	1.23	2.46
Furadan 10% G	6	6.5	8.3	0.14	0.28	0.82	1.64
Check	-	18.8	22.0	0.90	0.95	2.95	3.20

Concerning the percentages of infested leaves, Furadan and onion extracts gave the highest control (6.5%, 8.3 and 6.8%, 9.0% in 1991 and 1992, respectively), while the wormwood seeds and chinaberry leaves showed the least control (10.3%, 14.6% and 10.9%, 14.9%) in the two successive seasons, respectively.

Regarding the severity of damage to the leaves, (average number of mines and damaged area mm2) there were significant differences between the check and 11 treatments. Severity of infestation followed the same trend of infestation in the two successive years.

It is important to denote that certain extracts like onion, chinaberry seeds and coriander are effective in controlling the rice whorl maggot exactly as Furadan without any significant difference. These data are in agreement with those of Awadallah *et al.* (1984), who mentioned that onion juice acted as a repellent for *Sesamia cretica* Led., while garlic juice acted as an attractant.

The protection reached by chinaberry is similar to that indicated by Zein El-Abdin, (1991).

Table 3 shows the effect of six water plant extracts compared with Furadan applied once (50 days after transplanting) on the rice stem borere during 1991 and 1992.

Concerning dead heart symptom, Furadan 10% granules (6 kg/f) gave the best control (0.1 , 0.6), while onion extract (15 kg/f) was the least effective 1991 and 1992, respectively. There were significant differences among all treatments and the check. Between treatments however, no significant differences were observed in the two seasons.

Regarding white head symptom, there were significant differences between the check and all treatments, Furadan and coriander extracts gave the best control (1.0, 1.1 % and 1.0, 1.5%) followed by chinaberry seed extract (1.3, 1.2%), wormwood extract (1.4, 1.9%) and chinaberry leaf extract (1.5, 3.0%). Garlic and onion extracts were the least effective in this respect, in the two seasons.

The previous trend was also indicated for infested stems with sound head symptom.

Table 3 . Influence of certain water plant extracts on the rice stem borer Chilo agamemnon Bles. infestation. (Giza-180 variety) .

Treatment	Dose/ f (kg)	% Dead heart		white head		Infested stem		% loss		% reduction in loss	
		1991	1992	1991	1992	1991	1992	1991	1992	1991	1992
Wormwood extract	15	0.1	1.4	1.4	1.9	4.1	5.2	1.9	3.8	78.9	65.8
Cariander extract	15	0.3	0.7	1.0	1.5	2.7	4.5	1.6	2.7	82.2	75.7
Onion extract	15	1.4	1.3	2.6	3.2	5.6	6.5	4.7	5.2	47.8	53.2
Garlic extract	15	0.8	2.0	2.6	2.4	3.7	7.4	3.8	5.1	57.8	54.1
Chinaberry seed	15	0.4	0.7	1.3	1.2	3.5	4.9	2.1	2.4	76.7	78.4
Chinaberry leave	15	1.6	1.8	1.5	3.0	3.5	6.8	3.5	5.5	72.2	50.5
Furadan 10% G	6	0.1	0.6	1.0	1.1	2.0	3.8	1.3	2.1	85.6	81.1
Check	-	2.5	3.8	4.5	5.3	14.9	18.8	9.0	11.1	-	-

Reduction in calculated losses ranged between 47. 8%, 53.2% (onion extracts) and 85.6 % , 81.1 % (Furadan) in the two successive rice seasons 1991 and 1992, respectively.

The present data are in agreement with the results of many workers. Sherif (1986) in Egypt found that Furadan was the most effective against the rice stem borer, while Diazinon was less effective. Tantawi et al. (1985) mentioned that one application at 50 days after transplanting was enough to protect rice plants against borer infestation and that Furadan 10% granules at 6 kg/f gave very satisfactory results. Metwally and Abd El-Rahim (1975) reported that the last two generations of the rice stem borer were usually the most substantial. The first one of them is peaked at the 3rd week of August coinciding with white head infestation. Awadalla et al. (1984) and Zein El-Abdin, (1991) used some plant exracts against some borers or pests and reported that some of them can be used as an alternative to the traditional application of synthetic insecticides with less danger and costs.

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تأثير استخدام بعض المستخلصات المائية النباتية على اصابة نبات الأرز بصانعات الانفاق وثاقبة ساق الأرز

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معهد بحوث وقاية النباتات – مركز البحوث الزراعية - الدقى .

إجريت الدراسه بمحطة بحوث سخا لتقدير مدى كفاءة بعض المستخلصات المائيه النباتيه بالمقارنه بمبيد الفيورادان على الاصابة الحشرية لنبات الأرز بصانعات الانفاق وثاقبة ساق الأرز، وقد أختبر صنف جيزة – ١٧٦ لشدة حساسيتة للإصابة بصانعات الانفاق وصنف جيزة – ١٨٠ باعتباره أعلى الاصناف المحلية حساسية للاصابة بثاقبة ساق الأرز.

أوضحت النتائج أن مبيد الفيورادان المحبب ١٠٪ بمعدل ٦ كجم / فدان والمستخلص المائى للبصل بمعدل ١٠ كجم/فدان كان افضل المعاملات فى مكافحة صانعات الأنفاق بينما كان المستخلص المائى لورق الزنزلخت بمعدل ١٥ كجم/فدان أقلها تأثير وبالنسبة لمكافحة ثاقبه ساق الأرز كان مبيد الفيورادان المحبب ١٠٪ بمعدل ٦ كجم / فدان والمستخلص المائى لبذور الزنزلخت بمعدل ١٥٪ كجم / فدان أفضل المعاملات فى حين كان المستخلص المائى للثوم بمعدل ١٥ كجم / فدان أقلها تأثير فى محكافحة الافه.

كان تأثير بعض المستخلصات النباتية المستخدمة على قدم المساواه مع الفيورادان بالنسبة لتأثيرها على مكافحة صانعة الانفاق أو ثاقبةساق الأرز على نباتات الأرز ، الأمر الذى يطرح فكرة استخدامها كبديل ذات فعالية وتكلفة أقل من بعض المبيدات المستعملة على هذه الآفة.