

**POPULATION FLUCTUATION OF THE HARD BLACK
BEETLE *PENTODON BISPINOSUS* KUST WITH SPECIAL
REFERENCE TO THE EFFECT OF CERTAIN INSECTICIDES
AGAINST LARVAL STAGE.**

M.M. NOUR EL-DIN AND S. A. DOSS

Plant protection Research Institute, Agricultural Research Centre, Dokki, Egypt.

(Manuscript received 30 March 1991)

Abstract

Population fluctuation of the hard black beetle *Pentodon bispinosus* was studied in the adult and larval stages during the period 1988-1990. Ultra violet traps were used to catch the adults. The adult population increased gradually to reach its peak during July 1989 then decreased to reach its minimum during January 1990. The population started to increase again to reach its peak during July 1990.

As for the larvae, there was only one peak annually that existed during July.

Chemical control against white grubs using certain insecticides showed that Furadan 10% added to the soil in shallow furrows at the rate of 63 Kg/f was the most effective compound among the tested insecticides.

INTRODUCTION

The hard black beetle *Pentodon bispinosus* Kust has become an economic pest in the last few years. This insect attacks several field crops such as maize, sugarcane, vegetables as well as fruit trees, garden grass and certain varieties of plants. In recent years, the damage caused by this insect has been steadily increasing and becoming more pronounced in land fertilized with large quantities of organic manure,

which is an attractive medium for ovipositing females and also serves as a suitable food for both adults and larvae.

The literature revealed that much work had been done in other countries on grass grubs (Smith and Kirk, 1984; Stewart and Toar, 1983). Hafez and Bishara (1961 a and b) were among the workers who studied the biology and ecology of this pest in Egypt. Since in Egypt very little is known about this pest, the population fluctuation of *Pentodon bispinosus* with special reference to the effect of certain insecticides against the larval stage was studied.

MATERIALS AND METHODS

Ecological studies

The population density of adult beetles was determined by using three ultra-violet traps during 1988-1990. Each trap was used for five feddans, and daily catches of adults were collected and recorded.

In order to determine the population of white grubs in grass lands, an area of about 20 feddans was divided into 20 plots. Samples of soil from one square meter and 30 cm deep in each plot were taken, and the grubs found in were collected and recorded.

Chemical control of larval stage

Chemical control against larval stage was carried out in grass land of a garden at Arab El-Mohammady at Cairo, during 1988. Three trials were carried out at different times of the year. The experimental area of the first trial was divided into three plots and each plot was divided into three replicates, 1/100 of feddan each.

The carbamate insecticides, Temic 10%, Furadan 10%, Marshal 25% and Sevin 85% were used at the rate of 2kg for the first three compounds and 4 kg for the fourth. Two samples from treated and untreated soils were collected from each replicate after 6,12 and 21 days from application. Each sample was taken from an area of one square meter and 30 cm in depth. Alive and dead larvae found in each sample were counted and recorded.

The second trial was similar to the first except of digging a shallow trench

about 10 cm deep every one foot (30cm) to help reaching the insecticides to the larvae in soil. Furadan 10%, Marshal 25% and Sevin 85% were used in the second trial at the same rates used before.

The third trial was similar to the second except of using Furadan 10% at the three rates of application, 0.42 , 0.63 and 1.2 kg/1/100 feddan. The same trend of sampling was followed . The percentage of reduction in larval population was determined using Henderson and Tilton equation(1955).

RESULTS AND DISCUSSION

Ecological studies

Means of monthly catches of adult beetles during two successive years (Nov. 1988 to Sept. 1990) are tabulated in Table 1. The black hard beetles started to appear in traps during in 1988 (43 individuals/trap/month). The population density started to decrease during January and February reaching 18.2 and 13.9 adults / trap/month , respectively. The population increased gradually to reach its peak during August 1989 as 119.1 adults were recorded . Thereafter, the population decreased gradually to reach its minimum (4.1 adults/trap/month) during January 1990. Through 1990 season, the adult population started to rise in February with fluctuating numbers to reach three peaks in May (100.9 adults), July (122.8 adults) and September (101.4 adults).

Table 1 also presents the mean number of larvae found in m^2 /month throughout the two years (Nov. 1988 to Sept. 1990). The mean number of grubs started with 50.5 individuals then decreased in January 1989 to 31.9. The population increased gradually after that to reach 168.4 larvae/1 m^2 in July. Number of grubs per sample decreased gradually again to reach 35.6 larvae/ m^2 during February 1990, then fluctuated to reach a peak in September 1990 (167.9 larvae/ m^2 /month).

From the forementioned results it could be concluded that *P.bispinosus* has one generation per year.

Table 1. Population fluctuation of *Pentodon bispinosus* Kust larvae and adults during 1988 - 1989 and 1989 - 1990.

Monthly mean number of larvae and adults of the hard black beetle					
1988-1989			1989-1990		
Month	Larva/m ²	adult/one light trap	Month	Larva/m ²	adult/one light trap
Nov. 1988	50.5	43.0	Nov. 1989	43.1	16.4
Dec.	26.6	45.5	Dec.	57.3	7.6
Jan. 1989	31.6	18.2	Jan. 1990	47.5	4.1
Feb.	48.8	13.9	Feb.	35.6	10.7
Mar.	99.3	48.9	Mar.	121.9	77.0
Apr.	112.3	52.4	Apr.	51.5	48.7
May	125.5	69.9	May	138.5	100.9
June	149.8	102.5	June	115.7	73.0
July	168.4	110.2	July	161.9	122.8
Aug.	157.2	119.1	Aug.	84.9	75.9
Sept.	98.0	84.2	Sept.	164.9	101.4
Oct.	90.4	60.0			

Chemical control of white grubs

Results in Table 2 show the efficacy of different insecticides used in the first trial against the grubs of *Pentodon bispinosus* Kust. After three weeks of application, Marshal and Furadan gave 50% and 59% mortality, respectively, whereas Temic and Sevin gave lower but nearly similar results (13% and 12%, respectively.)

Table 2. The efficacy of different insecticides against white grubs in grass land.

Treatment	Dose/ 1/100f	No. of larvae before treatment	Mortality % at days after treatment			
			6	12	21	Mean
Marshal 25%	2 kg	50.0	30.0	35.0	50.0	38.3
Furadan 10%	2 kg	58.0	38.0	45.0	59.0	47.3
Temic 10%	2 kg	52.0	5.1	13.0	13.0	10.4
Sevin 85%	4 kg	49.0	15.4	12.7	12.0	13.2
Control		60.0				

L.S.D. = 6.27

In the second trial (Table 3) where the insecticides were added to the soil in furrows, Furadan 10% gave 95% kill after 6 days and 98.4 % kill after 3 weeks of application. However, Marshal 25% and Sevin 85% gave poor results after 3 weeks from application as expressed by 15.5% and 13.3% kill, respectively.

Table 3. The effect of some insecticides against white grubs when added to grass land in shallow furrows (1989).

Treatment	Dose/ 1/100f	No. of larvae before treatment	Mortality % at days after treatment			
			6	12	21	Mean
Furadan 10%	2 kg	63.0	93.0	95.2	98.4	95.5
Marchal 25%	2 kg	58.0	14.3	15.5	15.3	15.1
Sevin 85%	4 kg	60.0	4.5	13.2	13.3	10.3
Control		60.0	—	—	—	—

L.S.D = 15.6

Table 4 shows the results of the third trial in which Furadan 10% was used in three dosages. The results revealed that when Furadan was used at the rates 1.2 kg and 0.63kg per 1/100 feddan, high levels of mortality were produced, reaching 99.5% and 99% after 3 weeks from application, respectively. At the rate of 0.42 kg per 1/100 feddan, only 69.7 % mortality after 3 weeks was indicated.

Table 4. The efficacy of Furadan 10% with different doses in controlling white grubs in grass land (1990).

Treatment	Dose/ 1/100f	No. of larvae before treatment	Mortality % at days after treatment			
			6	12	21	Mean
Furadan 10%	0.42kg	20	20.0	69.7	69.7	53.1
	0.63kg	19	95.0	26.6	99.0	96.7
	1.20kg	22	97.0	98.0	99.5	98.7
Control		20	—	—	—	—

L.S.D = 1.12

From the foregoing results, it could be concluded that Furadan 10% is very effective against the larvae of *P. bispinosus* when added to the soil in shallow furrows at the rate of 63 kg per feddan.

REFERENCES

1. Hafez, M. and S.I. Bishara, 1961a. Studies on the biology and ecology of *Pentodon bispinosus* Kust in Egypt. The adult stage. Bull. Soc. ent. Egypte, 45:155-178.
2. Hafez, M. and S.I. Bishara, 1961b. Studies on the biology and ecology of *Pentodon bispinosus* Kust in Egypt. The immature forms. Bull. Soc. ent. Egypte, 45 : 179-198.
3. Henderson, C. F. and E.W. Tilton, 1955. Test with acaricides against the brown wheat mite. J. Econ. Entomol., 48:157-161.
4. Smith, T.J. R. and A.A. Kirk, 1984. Dung beetles and dispersal of cattle dung. Aust. Conf. on Grassland Invertebrate Ecology, Gsiro Div. of Entomol., Perth, Australia (c.f. R.A.E., A 72 (1-3), No. 2811).
5. Stewart, K.M. and R.V. Toar, 1983. Control of grass grubs *constelytra zealandica* by heavy rolling. N. Zealand J. Exp. Agric., 11 (3) : 265-270. (c.f. R.A.E., A., 72 (1-3), No. 1977).

Treatment	Rate of application (kg/ha)	Mortality % of larvae per treatment			Mean
		8	15	32	
Furadan 10%	0.45kg	50.0	63.3	69.7	57.7
	0.63kg	50.0	66.6	99.0	71.9
	1.50kg	97.0	98.0	99.2	98.1
Control	0	-	-	-	-

الكثافة العددية للجعل ذو الظهر الجامد مع الإشارة الي تأثير بعض المبيدات الحشرية علي طور اليرقة

محمد محمود نور الدين ، صفوت عزمي دوس

معهد بحوث وقاية النباتات -مركز البحوث الزراعية - الدقي

تمت دراسة التذبذب في تعداد اليرقات والحشرات الكاملة للجعل ذو الظهر الجامد خلال عامي ١٩٨٨ - ١٩٩٠ . وقد استخدمت المصائد فوق البنفسجية لجذب الحشرات الكاملة. وتوضح النتائج المتحصل عليها أن الكثافة العددية للحشرات الكاملة ازدادت تدريجيا حتي وصلت أعلى تعداد لها في خلال شهر يوليو ١٩٨٩ ثم بدأ التعداد في الانخفاض حتي وصل أدناه خلال شهر يناير ١٩٩٠. بدأ تعداد الحشرة الكاملة في الازدياد تدريجيا مرة أخرى حتي وصل أعلاه خلال شهر يوليو ١٩٩٠.

أما بالنسبة لليرقات فتشير النتائج إلي وجود أعلا تعداد لها خلال شهر يوليو سنوياً .

هذا وقد استخدمت بعض المبيدات الحشرية لتقييم فعاليتها ضد يرقات الجعل ذو الظهر الجامد . وأوضحت النتائج أن إضافة مبيد الفيورادان ١٠٪ بمعدل ٦٣ كجم / فدان في شقوق يجري عملها في المسطح الأخضر علي ابعاد ٢٠ سم من بعضها قد اعطي افضل النتائج في مكافحة الآفة بالمقارنة مع المبيدات الأخرى المختبرة.