ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 07, Issue, 07, pp.14117-14119, July, 2017

ORIGINAL RESEARCH ARTICLE Open Access

EFFECT OF SOLAR TREATMENT AND DIFFERENT COLORS ON *CALLOSOBRUCHUS CHINENSIS* ON COWPEA UNDER STORAGE CONDITION

***[1]Manisha Sharma, [1]Agrawal, V. K. and [2]Suman Choudhary**

[1]Department of Entomology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur
[2]Department of Entomology, S.K.N. College of Agriculture, Jobner

ARTICLE INFO

Article History:
Received 07th April, 2017
Received in revised form
29th May, 2017
Accepted 26th June, 2017
Published online 31st July, 2017

Keywords:
Solar treatment and Different Colors on Callosobruchus Chinensis on Cowpea.

Corresponding author:

ABSTRACT

The exposure period of 24 hrs to solar energy in black and blue coloured bags was most effective to reduce adult emergence and infestation and to cause adult mortality of *C. chinensis*. The seed germination was also decreased with the increase in solar time exposures.

Citation: Manisha Sharma, Agrawal, V. K. and Suman Choudhary. 2017. "Effect of solar treatment and different colors on *callosobruchus chinensis* on cowpea under storage condition", *International Journal of Development Research*, 7, (07), 14117-14119.

INTRODUCTION

Cowpea, *Vigna unguiculata* (L.) commonly known as lobia, is major pulse crop belongs to family Leguminosae. It is believed to be originated from central Africa. It has been cultivated since very ancient time in the Mediterranean region by the Greeks, Romans and Spaniards. It is claimed to be 90 per cent of the total world acreage is covered by India followed by Africa, Australia as well as central and Southern parts of Europe. In case of severe infestation cent per cent damage is caused by the pest (Pruthi and Singh, 1950). In India 17 species of bruchids belonging to 11 genera have been recorded infesting different pulses (Arora, 1977). There are encouraging reports on the use of certain indigenous plant products as grain protectants (Sundria *et al.*, 2001, Bhargava and Meena, 2002, Bajiya, 2010 and Sharma, 2014) but definite information on mortality doses, efficacy of oils and extracts by treatment of packaging materials and direct feeding with the seed and their residual life is meagre, hence needs detailed investigations.

MATERIALS AND METHODS

Maintenance of insect culture

To maintain the stock culture of *C. chinensis,* the sound and healthy cowpea grains (RC– 19) were cleaned and sieved to remove the fractions of grains or insects if any. The grains were sterilized at 60+50C for 8 hours in order to eliminate both apparent and hidden infestation of insects and mites, if any. These grains were conditioned at least for a week in an incubator maintaining 27+20C and 65+5 per cent relative humidity to raise their moisture content. The adults of *C. chinensis* were obtained from Department of Seed Technology, RARI Durgapura (Jaipur), for mass rearing and reared on already conditioned grains of cowpea in plain glass jars of 2.5 litre capacity. These jars were kept at a temperature of 27+20C and 65+5 per cent relative humidity. The adults so emerged from the culture were used for further experimentation. The development of *C. chinensis* on cowpea (RC-19) was studied under laboratory conditions on different

levels of temperature (20, 25 and 30 ºC) and humidity (60, 70 and 80) in Complete Randomized Design and the treatments were replicated three times. The following observations were recorded. The survey's were carried out in five randomly selected *tehsils* of Jaipur district *viz.*, Chaksu, Amer, Phagi, Phulera and Jhotwara. In each *tehsil*, five farmers were selected randomly. The moisture content and per cent infestation were recorded.

(0.33 adults) was recorded when the grains with eggs exposed to sun for 24 hrs, while maximum (2.39 adults) in 8 hrs exposure period. Jakhar *et. al.* (2006), Riyad (2009) and Sharma (2013) also reported that hundred per cent adult mortality of khapra beetle and its variant was obtained with exposure to sun heat at different periods fully support the present findings.

Table 1. Effect of colours and exposure periods on adult emergence of *C. chinensis* (eggs exposure)

S. No.	Polythene bag colour	No. of adult emerged** in different exposure periods (hrs)			Mean
		8	16	24	
1.	Black	0.67	0.00	0.00	0.22
		(1.08)	(0.71)	(0.71)	(.85)
2.	Blue	1.33	0.67	0.00	.67
		(1.35)	(1.08)	(0.71)	(1.08)
3.	Red	2.00	1.67	0.33	1.00
		(1.58)	(1.47)	(0.91)	(1.22)
4.	Yellow	2.00	1.33	0.33	1.44
		(1.55)	(1.33)	(0.91)	(1.39)
5.	Green	0.30	1.35	0.67	2.00
		(0.89)	(1.68)	(1.08)	(1.58)
6.	Transparent	5.33	3.00	1.33	3.22
		(2.41)	(1.87)	(1.35)	(1.93)
	Mean	2.39	1.39	0.33	
		(1.70)	(1.47)	(0.91)	
		S.Em±	C.D. at 5%		
	Colour	0.06	0.28		
	Period	0.09	0.19		
	Colour x period	0.13	0.42		

* Data based on 120 eggs (three replications of 40 eggs in each)
** Observation recorded after 45 days
Figures in parentheses are $\sqrt{x + 0.5}$ transformation values

Table 2. Effect of colours and exposure periods on seed germination*

S. No.	Polythene bag colour	Per cent seed germination in different exposure periods (hrs)			Mean
		8	16	24	
1.	Black	79.33	72.00	70.00	73.78
		(62.95)	(58.05)	(56.79)	(59.34)
2.	Blue	83.33	74.67	71.33	76.44
		(65.90)	(59.78)	(57.63)	(60.81)
3.	Red	84.33	76.33	74.00	78.22
		(66.68)	(60.79)	(59.34)	(62.18)
4.	Yellow	85.00	78.66	75.33	79.33
		(66.68)	(62.49)	(60.22)	(63.19)
5.	Green	86.00	80.33	77.67	81.33
		(68.03)	(63.59)	(64.65)	(64.40)
6.	Transparent	88.33	84.67	79.00	84.00
		(70.02)	(66.95)	(62.73)	(66.42)
	Mean	84.39	77.78	74.56	
		(66.73)	(61.87)	(59.71)	
		S.Em±	C.D. at 5%		
	Colour	0.26	0.80		
	Period	0.17	0.52		
	Colour x period	0.41	1.21		

* Data based on 300seeds (three replications of 100 seeds in each)
Figures in parentheses are angular transformed values

RESULTS AND DISCUSSION

Effect on adult emergence

The results revealed that no adult emergence was observed when the eggs were exposed to sun in black, blue and red polythene bags for 24 hrs, however, few adult emergences ranging from 0.33 to 1.00 in other bags for the same exposure period. The mean number of adult emerged ranged from 0.22 to 3.11 in different colour bags. Assessing the results of different time exposures, it was found that the adult emergence decreased with the increase in solar time exposure. As regard the exposure periods, the minimum number of adult emerged

Effect on seed germination

The maximum germination (84.00%) was observed in colourless polythene bag which differed significantly from coloured polythene bags. The mean per cent seed germination varied from 73.78 to 81.33 per cent in different colour bags. Assessing the results of different exposure periods, it was clearly indicated that the per cent germination significantly decreased with the increase in solar time exposure. The mean seed germination ranged from 74.56 to 84.39 per cent in different exposure periods. The present findings also get support from the observations of Bajiya (2010) who claimed that black and blue polythene bags for 24 hrs exposures to sun affected the seed germination.

Table 3. Effect of colours and exposure periods on the adult mortality of *C. chinensis* (adults exposure)*

S. No.	Polythene bag colour	Per cent adult mortality in different exposure period (hrs)			Mean
		8	16	24	
1.	Black	71.50	85.67	100.00	85.72
		(57.73)	(67.76)	(90.00)	(70.53)
2.	Blue	69.00	83.33	93.50	81.94
		(56.17)	(65.99)	(75.23)	(61.12)
3.	Red	64.33	78.33	90.00	77.55
		(53.33)	(62.26)	(71.57)	(58.48)
4.	Yellow	58.33	72.50	87.33	72.72
		(49.80)	(58.37)	(69.15)	(56.03)
5.	Green	45.67	70.50	82.67	66.28
		(42.52)	(57.10)	(65.40)	(53.79)
6.	Transparent	41.00	51.67	75.00	55.89
		(39.82)	(45.96)	(60.00)	(48.38)
	Mean	58.31	73.67	88.08	
		(49.78)	(59.13)	(69.81)	
		S.Em±	C.D. at 5%		
	Colour	0.50	1.51		
	Period	0.36	1.10		
	Colour x period	0.59	2.60		

* Data based on 150 adults (three replications of 50 adults in each)
Figures in parentheses are angular transformed values

Effect on adult mortality

In another set of experiment, 50 newly emerged adults from stock culture were released in each plastic bag containing cowpea grains and bags exposed to solar heat. The observations on mortality of adults were recorded. It is evident from the data that 8 hrs exposure period to sun, the maximum mortality of beetles (71.50%) occurred in black polythene bag, which was significantly higher as compared to other colour polythene bags exposed to same period. A similar trend of beetle mortality was observed in other exposure periods (16 and 24 hrs). The mean per cent mortality in different coloured bags ranged from 55.89 to 85.72, being maximum (85.72%) in black polythene bag followed by blue, red, yellow, green and transparent polythene bags with 81.94, 77.55, 72.72, 66.28 and 55.89 per cent, respectively. Comparing the results of different exposure periods, it is clear from the data that the mortality of test insect increased with the increase in solar exposure period. The mean per cent mortality varied from 58.31 to 88.08 in different exposure periods, being maximum in 24 hrs exposure period which was significantly higher over rest of the exposure periods. Ghaffar and Chauhan (1999) reported that per cent mortality of *C. maculatus* without lay eggs when polythene bags containing pigeonpea seeds exposed sun light for 7 days, support the present findings.

REFERENCES

Arora, G.L. 1977. Bruchidae of North-West India. Oriental Insects Supplement No. 7. The association for the study of Oriental Insects, New Delhi. Pp.132

Bajiya, R. S. 2010. Bio-ecology and Management of Pulse Beetle, *Callosobruchus chinensis* (Linn.) on Mungbean, *Vigna radiata* (Linn.) Wilczek Ph.D. Thesis submitted to Department of Agricultural Zoology and Entomology, S.K.N. College of Agriculture, Jobner.

Bhargava, M.C. and Meena, B.L. 2002. Efficacy of some vegetable oils against pulse beetle, *Callosobruchus chinensis* (Linn.) on cowpea, *Vigna unguiculata* (L.). *Indian Journal of Plant Protection*, 30:46-50.

Ghaffar, M.A. and Chauhan, Y.S. 1999. Solarization to protect pigeonpea seeds from bruchid damage during storage. *International Chickpea and Pigeonpea New Letters*, 6 : 50-52.

Jakhar, B.L.; Bharagava, M.C., Nitharwal, M. and Yadav, J.P. 2006. Solar treatment of grains stored in coloured bag for the control of *Trogoderma granarium* Everts. *Journal of Insect Science*, 19: 235-236.

Pruthi, H.S. and Singh, M. 1950. Pests of stored grain and their control. Manager of Publications, Delhi: Pp. 68.

Riyad, S.R. 2009. Management of khapra beetle, *Trogoderma granarium* Everts on wheat. *M.Sc. Thesis, submitted to Swami Keshwanand Rajasthan Agricultural University, Bikaner*.

Sharma, S.R. 2014. Bio-ecology and management of groundnut bruchid, *Caryedon serratus* (Olivier) on groundnut, *Arachis hypogaea* (Linnaeus). *Ph.D. Thesis, submitted to SKRAU, Bikaner*.

Sundria, M.; Kumar, J. and Kumar, A. 2001. Efficacy of different botanicals against *Callosobruchus chinensis* (Linn.) in stored green gram. *Indian Journal of Applied Entomology,* 16: 1-5.

****