



## A Study on Incidence of Cigarette Beetle, *Lasioderma serricorne* (Fab.) in Turmeric Rhizomes in Storage Houses at Duggirala, Andhra Pradesh

N Chaitanya, S V S Gopala Swamy, T Madhumathi, V Manoj Kumar and R Lakshmipathy  
Department of Entomology, Agricultural College, Bapatla 522 101, A P

### ABSTRACT

A survey was conducted at fortnight interval from July, 2014 to December, 2014 to observe the incidence of cigarette beetle in turmeric storage godowns of M/s Krishna Food Products (processing mill) and at Agricultural Market Committee yard, Duggirala which are important market centres for turmeric trade in Guntur district. As many as 2.83 adults (mean) were emerged from the samples collected from the AMC yard and the mean number increased to the tune of 33.0 after six months of storage. The mean number of adults (2.67) emerged from the samples collected at processing mill after one month of storage further increased to 35.0 after six months of storage. Up on storage of 180 days, these insect populations caused loss in weight to an extent of 15.38 and 16.13 per cent in AMC yard and processing mill, respectively.

**Key words :** Cigarette beetle, Incidence, Turmeric, Storage godowns.

Turmeric, *Curcuma longa* (L.) which is designated as “Golden Spice” due to its therapeutic, curative properties and culinary values (Arunava *et al.*, 2011), originated from Indonesia and Southern India. India ranks first in the world in cultivation of turmeric (1.92 lakh ha) and production (9.73 lakh t) accounting for as much as 90% of global output (Spices Board of India, 2013-14). India occupies around 60 per cent of the world’s trade in turmeric due to its superior quality (Angles *et al.*, 2011). It is exported as dry turmeric, fresh turmeric, turmeric powder and value added products like turmeric oil as well as oleoresin. Among the insect pests infesting stored spices, the cigarette beetle, *Lasioderma serricorne* (Fab.) (Coleoptera: Anobiidae) is the most serious one as it attacks exclusively all the spices including turmeric under storage that causes serious loss both in terms of quantity and quality during storage (Ashworth, 1993). Larval feeding causes most of the damage to stored commodities, while adults are known to cause damage by making holes to penetrate or escape from packaged commodities (Highland, 1991). Abraham (1975) reported that 30 to 60 per cent of the dry turmeric samples in Kerala were infested by cigarette beetle, while Srinath and Prasad (1975) noticed that 88 of 115 stored turmeric samples collected from various markets across

India were infested by this insect. In Udaipur (Rajasthan), 67.7 per cent of the market samples were infested by cigarette beetle (Kavadia *et al.*, 1978). Duggirala is an important market centre for turmeric trade in Guntur district where cured turmeric rhizomes are received throughout the year from various places of Andhra Pradesh. Several traders and processors store the turmeric rhizomes for various purposes and for varying storage periods during which the cigarette beetle is of common occurrence. However, the presence of the insect as well as the extent of losses inflicted by this pest is not fully estimated. Hence, an attempt was made to understand the incidence of cigarette beetle in turmeric rhizomes in the storage godowns at Duggirala, Guntur district, Andhra Pradesh.

### MATERIAL AND METHODS

Agricultural Market Committee (AMC) yard and storage godowns of a processing mill namely, M/s Krishna Food Products, located at Duggirala were visited regularly at 15 days interval during July – December 2014, to observe the presence of cigarette beetles in turmeric. Turmeric rhizome samples of 500 g were collected randomly from the market yard and processing mill. A sub sample of 100 g was taken from the main sample and kept separately in plastic jars (250 ml capacity)

to observe adult emergence from the rhizomes. The moisture content of turmeric rhizomes was determined by using gravimetric method by oven-drying the sample of 20 g at 70°C and it ranged from 10.5 to 11.5% (w/w) during the study. The number of adults emerged from the rhizomes and per cent weight loss was recorded for every 30 days of storage. The adults were separated from the turmeric sample using a setup consisting of two sieves of different mesh sizes and a bottom pan. Rhizomes were retained on the top sieve and the adults were collected on the second sieve, while the dust material resulted from larval excavations in the rhizomes and excretory material passed through the second sieve into the bottom pan. Weight of the rhizomes was recorded by using precision balance and per cent weight loss was worked out using the following formula;

$$\text{Per cent weight loss} = \frac{\text{OW} - \text{CW}}{\text{OW}} \times 100$$

Where, OW = Original weight on dry weight basis, CW = Current weight of the sample

Live insects were reintroduced after removing the dead insects. Thus, the experiment was continued till the sample collected during second fortnight of December, 2014 completes six months of storage period.

## RESULTS AND DISCUSSION

Turmeric rhizome samples collected from Agricultural Market Committee (AMC) yard and storage godowns of M/s Krishna Food Products at Duggirala were observed for six months to study the incidence and progeny development of cigarette beetle on turmeric. Weight loss caused by the pest was also estimated at monthly interval. Among the 24 samples, incidence of *L. serricornis* was found in 22 samples and no other insect species was found in these samples. After six months of storage, the total adult population emergence ranged from 28 to 48 (Table 1) and weight loss ranged from 14.12 to 19.84% (Table 2) in the samples collected from the AMC yard and 30 to 50 adults (Table 3) with weight loss of 15.84 to 18.88% (Table 4) in the samples collected from processing mill. There was no emergence of cigarette beetle even after six months of storage, from the two samples of rhizomes *i.e.*, one sample collected during November, 2014 at AMC yard and another during December, 2014 at processing mill; indicating that they were free from insect damage. The observance of continuous emergence of cigarette beetle adults with more or less similar trend from the samples collected from the AMC yard and processing mill indicated its extent of incidence in stored turmeric during the study period. From the samples collected at market

Table 1. Incidence of cigarette beetle, *Lasioderma serricornis* in turmeric rhizomes at AMC yard, Duggirala.

Std. week	No. of adults emerged						Total
	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	
30	3	8	11	7	8	7	44
32	4	6	8	5	11	5	39
34	4	5	6	3	8	10	36
36	6	7	8	3	11	7	42
38	1	6	5	3	5	12	32
40	2	7	4	2	8	13	36
42	3	2	5	3	7	11	31
44	2	4	4	4	6	11	31
46	3	4	3	4	8	7	29
48	4	3	4	3	7	7	28
50	0	0	0	0	0	0	0
52	2	8	9	9	15	5	48
Mean	2.83 ± 0.46	5.00 ± 0.72	5.58 ± 0.87	3.83 ± 0.67	7.83 ± 1.05	7.92 ± 1.06	33.0 ± 3.50

\*DAS – days after sampling

Table 2. Per cent weight loss due to cigarette beetle, *L. serricornis* in stored turmeric rhizomes at AMC yard, Duggirala.

Std. week	Weight loss (%)					
	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS
30	1.39	4.81	8.2	11.35	15.65	19.84
32	1.37	3.15	6.97	10.88	17.82	18.87
34	1.46	3.75	5.59	7.92	15.64	17.36
36	2.46	2.54	5.12	5.84	11.76	17.79
38	1.85	2.68	4.1	8.16	10.96	14.38
40	0.29	4.49	5.65	7.84	11.91	15.72
42	0.88	1.52	6.05	8.86	10.88	16.21
44	0.86	3.35	5.88	9.92	11.22	14.89
46	0.79	6.61	8.74	9.98	13.62	16.21
48	2.82	5.64	8.18	10.94	12.66	14.12
50	0	0	0	0	0	0
52	0.72	4.36	8.86	10.74	18.56	19.21
Mean	1.24 ± 0.24	3.58 ± 0.52	6.11 ± 0.71	8.54 ± 0.91	12.56 ± 1.38	15.38 ± 1.50

\*DAS – days after sampling

Figure 1: Incidence of cigarette beetle and its damage in turmeric rhizomes at Duggirala

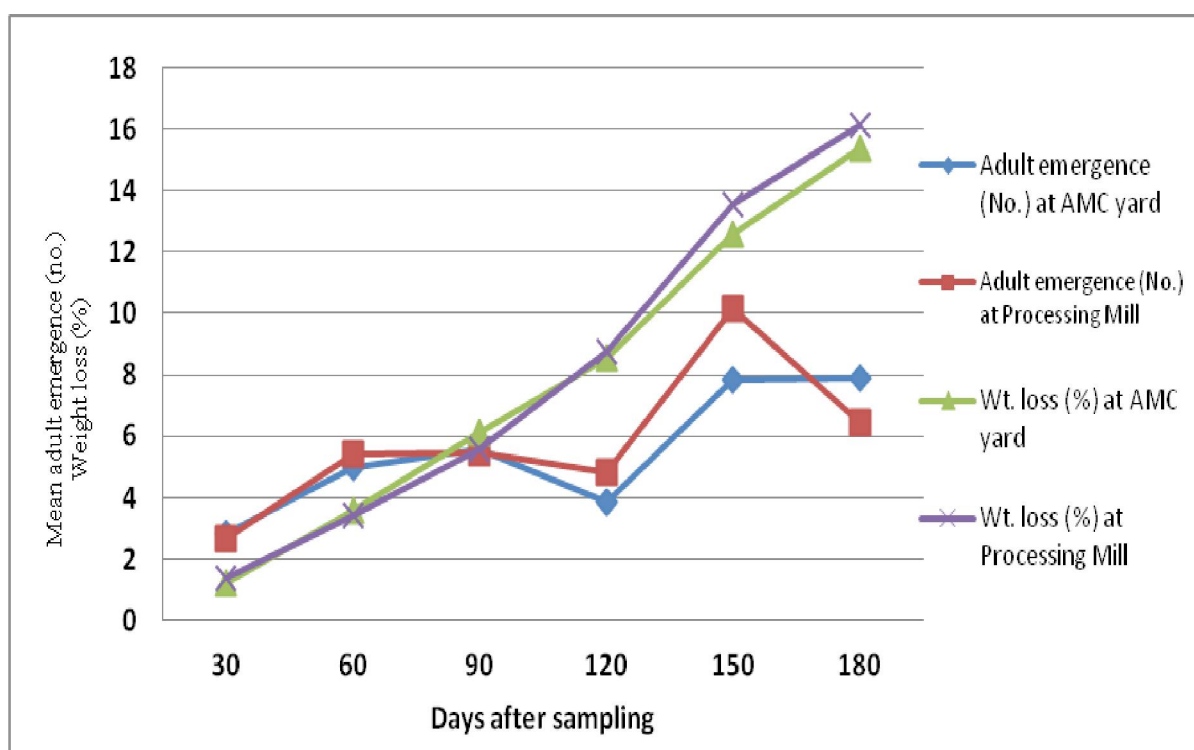


Table 3. Incidence of cigarette beetle, *L. serricornis* in stored turmeric rhizomes at M/s Krishna Food Products, Duggirala.

Std. week	No. of adults emerged						
	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	Total
30	4	9	12	8	5	12	50
32	5	7	9	6	14	3	44
34	4	6	6	5	15	11	47
36	4	8	7	4	13	12	48
38	2	6	4	4	14	3	33
40	3	8	4	3	12	2	32
42	2	3	3	3	11	8	30
44	2	3	3	4	10	8	30
46	2	3	4	3	9	9	30
48	0	0	0	0	0	0	0
50	2	4	8	6	11	5	36
52	2	8	6	12	8	4	40
Mean	2.67 ± 0.39	5.42 ± 0.80	5.50 ± 0.93	4.83 ± 0.87	10.17 ± 1.24	6.42 ± 1.19	35.0 ± 3.85

\*DAS – days after sampling

Table 4. Per cent weight loss due to cigarette beetle in stored turmeric rhizomes at M/s Krishna Food Products, Duggirala.

Std. week	Weight loss (%)						
	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	
30	2.29	4.9	7.19	10.38	13.69	18.88	
32	2.77	4.2	5.97	9.88	17.86	18.65	
34	1.66	3.79	5.69	8.92	15.72	18.69	
36	2.46	3.58	5.32	7.86	10.86	17.84	
38	0.89	2.62	4.89	8.16	13.79	16.76	
40	1.59	2.44	5.79	9.79	15.06	17.14	
42	0.88	1.58	6.19	10.09	14.87	17.69	
44	0.86	4.36	5.89	9.87	13.76	15.84	
46	0.79	5.68	6.82	10.16	14.86	16.79	
48	0	0	0	0	0	0	
50	1.36	4.09	7.19	11.09	16.34	18.86	
52	1.02	3.89	6.36	8.86	15.82	16.45	
Mean	1.38 ± 0.02	3.43 ± 0.45	5.61 ± 0.55	8.76 ± 0.84	13.55 ± 1.33	16.13 ± 1.50	

\*DAS – days after sampling

yard, higher number of adults (48) was emerged during 52<sup>nd</sup> standard week indicating its increased activity during that period in stored turmeric compared to the samples collected earlier. Whereas, the highest number of adults (50) was recorded from the sample collected from processing mill in 30<sup>th</sup> standard week. When the samples collected from AMC yard were observed in laboratory after

one month of storage, as many as 2.83 adults (mean) were emerged and the mean number increased to the tune of 33.0 after six months of storage. This is in agreement with the earlier observations of Srinath and Prasad (1975), Kavadia *et al.* (1978); who also reported the infestations of cigarette beetles in the market samples of stored turmeric. Similarly, Zakka *et al.* (2010) also noted

the incidence of tobacco beetles in the market samples of ginger.

The mean number of adults (2.67) emerged from the samples collected at processing mill after one month of storage further increased to 35.0 after six months of storage. Though the increase in adult numbers was not found with the increase in storage period, up on storage of 180 days, these insect populations inflicted damage to an extent of 15.38 and 16.13 per cent in terms of weight loss in AMC yard and processing mill, respectively with gradual increase of storage period (Figure 1). Present findings are in range with the observations of Krishna and Bhargava (2009) that weight loss caused by cigarette beetle in fennel varieties was up to 16.0%. The variations in the incidence of cigarette beetle in turmeric at Duggirala may be attributed to the season, period of storage prior to arrival to the market and protection measures during that period. However, it is noteworthy that cigarette beetle populations can cause 16.13 per cent loss in weight of turmeric rhizomes within six months of storage and the loss can be minimized by adopting effective measures to control the pest.

#### LITERATURE CITED

- Abraham C C 1975** Insects pest of stored spices and their control. *Areca nut and Spices Bulletin*, 7(1):4-6.
- Angles S, Sundar A and Chinnadurai M 2011** Impact of globalization on production and export of turmeric in India – An economic analysis. *Agricultural Economics Research Review*, 24: 301-308.
- Arunava G, Topu B, Pulok K and Mukherjee 2011** Validated method for estimation of curcumin in turmeric powder. *Indian Journal of Traditional Knowledge*, 10 (2): 247 – 250.
- Ashworth J R 1993** The biology of *Lasioderma serricornis*. *Journal of Stored Products Research*, 29: 291–303.
- Highland H A 1991** Protecting packages against insects. In: Gorham, J.R. (Ed.), Ecology and Management of Food Industry Pests. *Association of Official Analytical Chemists, Arlington*, 309–320.
- Kavadia V S, Pareek B L and Sharma K P 1978** Control of *Lasioderma serricornis* Fab. infestation of turmeric by phosphine fumigation. *Journal of Entomology*, 3: 57-58
- Kawamura S 2000** Spices to food – New trends, New dimensions. In *Proceedings of World Spice Congress*, 17 - 20.
- Krishna R and Bhargava M C 2009** Relative susceptibility of some promising fennel varieties to *Lasioderma serricornis* Fab. *Indian Journal of Applied Entomology*, 23(1): 44-48.
- Spices Board of India, 2013-14** Annual report.
- Srinath D and Prasad C 1975** *Lasioderma serricornis* (F.) as a major pest of stored turmeric. *Bulletin of Grain Technology*, 13(5): 170-171.
- Zakka U, Lale N E S and Okereke V C 2010** A survey of pests of stored ginger (*Zingiber officinale*) in some selected markets in Rivers State, Nigeria. *African Journal of Agricultural Research*, 5(18): 2529-2534.

(Received on 24.06.2015 and revised on 11.04.2016)