16. Nagaharu, U., *Jpn. J. Bot.*, 1935, **7**, 389.
17. Winge, O., *Heriditas*, 1933, **18**, 181.
18. Winge, O., *C. R. Lab. Carlsberg. Ser. Phys.*, 1940, **23**, 17.
19. Love, R. M., *Am. Soc. Agron.*, 1946, **39**, 41.
20. Srivastava, S., Narain, P. and Srivastava, G. S. (unpublished).

STUDIES ON THE SURVIVAL OF *ALTERNARIA ALTERNATA*, THE CAUSAL AGENT OF ALTERNARIOSIS OF GROUNDNUT

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A NEW type of Alternariosis of groundnut (*Arachis hypogaea* L) caused by *Alternaria alternata* (Fr) Keissler was first recorded by Balasubramanian[1] from Tamilnadu. Later a detailed survey carried on groundnuts[2] of post rainy season revealed the extent and severity of this disease in Andhra Pradesh, Karnataka and Tamilnadu. Very few studies have been made on the perpetuation of this pathogen. We report here some of our observations on the survival of the pathogen in the crop debris.

Infected leaves showing typical disease symptoms were collected from the field during the harvest of the crop and divided into two sets. One set was spread in a protected area in the garden exposed to natural conditions and the second set was preserved in the laboratory. Samples were collected periodically at 15-day intervals and kept for isolation of the pathogen by traditional plant pathological techniques. Koch's postulates were followed in confirming the pathogenicity of the isolate.

The data of isolations revealed that the fungus can survive for three months on the leaves exposed to natural conditions. After this no growth of the fungus was recorded even after repeated isolations. In the case of the leaves preserved in the laboratory the fungus could survive upto 240 days.

It is well known that several fungal pathogens survive in the debris and cause primary infection. Vijayakumar and Rao[3] reported the survival of *Alternaria triticina* for 2 months in plant debris placed on the surface of the soil, 4 months in debris buried in soil and 10 months in infected seeds. Allen *et al*[4] isolated *A. helianthi* from sunflower crop debris from a diseased crop harvested one year earlier.

The present investigation shows that *A. alternata* could grow and sporulate well throughout the period of testing for 240 days on the leaves preserved in the laboratory and only 90 days on the leaves spread over the soil. Studies on the survival of spores and mycelium in the soil would yield additional information on the carryover of the pathogen to the next crop.

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1. Balasubramanian, R., *Curr. Sci.*, 1979, **48**, 76.
2. Subrahmanyam, P., McDonald, D., Siddaramaiah, A. L. and Hegde, R. K., *F.A.O. Plant Prot. Bull.*, 1981, **29**, 74.
3. Vijayakumar, C. S. K. and Rao, A. S., *Proc. Indian Acad. Sci.*,(Pl. Sci.) 1979, **B88**, 359.
4. Allen, S. J., Brown, J. F. and Kochman, J. K., *Ann. Appl. Biol.*, 1983, **102**, 413.

VARIATIONS IN THE LIPID CONTENT OF THE FAT BODY DURING METAMORPHOSIS OF *CHILO PARTELLUS* SWINHOE (LEPIDOPTERA: PYRALIDAE)

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WIDE variation has been demonstrated in the lipid content of insects of different insect species and even within a single family[1]. Studies on the variation of lipids during development of insects have shown that lipid content varies with size and age of the insects[2-4]. As no information regarding the lipid metabolism in *Chilo partellus*, a jowar pest, was available it was of interest to fractionate the lipids of the fat body into their major components and to investigate their quantitative changes during development.

The stem borer *Chilo partellus* is the most destructive pest of *Sorghum vulgare* pers (Jowar). For experimental purpose the above insect was reared in the laboratory on artificial diet[5] at $27 \pm 1°C$ and R. H. $65 \pm 5\%$. Lipids were extracted from the fat body of the fifth instar larvae, pupae, adults (male and female)

by the method of Folch *et al*[6]. The total lipids were fractionated into neutral lipids, phospholipids and free fatty acids, by the method of Pant *et al*[3].

The total lipid content of the fat body of *Chilo partellus* from the fifth instar to adults ranged from 339.4 ± 1.7 mg to 46.9 ± 1.4 mg in adult females and from 339.4 ± 1.7 mg to 164 ± 1 mg in adult males per gram weight of the fat body (figures 1 and 2). Neutral lipids were found to be the major lipid fraction in the fat body and accounted for 75–80% of the total lipids. Phospholipids accounted for 5–8% of the total lipid content and free fatty acids accounted for 10–20% of the total lipids.

The fifth instar larvae recorded the maximum concentration 339.4 ± 1.7 mg of total lipids, 294 ± 1 mg of neutral lipids, 20.4 ± 0.1 mg of phospholipids, 38 ± 0.7 mg of free fatty acids per gram weight of the fat body on the eleventh day of the fifth instar, that is by the end of the feeding period. This was followed by a sudden decline in its concentration with the onset of pupation. The level declined from 339.4 ± 1.7 mg to 332 ± 1 mg of total lipids, 294 ± 1.26 to 277.2 ± 1.8 mg of neutral lipids, 20.4 ± 0.1 mg to 19.7 ± 0.7 mg of phospholipids, 38 ± 0.7 mg to 33.4 ± 0.4 mg of free fatty acids per gram weight of the fat body.

The lipid content of the fat body exhibited sexual dimorphism (figures 1 and 2). The fat body of the freshly emerged male contained 252.7 ± 1.7 mg of total lipid, 206.5 ± 1.8 mg of neutral lipids, 15 ± 0.2 mg of phospho-lipid and 26.3 ± 0.3 mg of free fatty acids per gram weight of the fat body, while that of the freshly emerged female contained only 184.8 ± 1.0 mg of total lipids, 126.8 ± 1 mg of neutral lipid, 12.6 ± 0.1 mg of phospholipid and 18.3 ± 0.1 mg of free fatty acids per gram weight of the fat body.

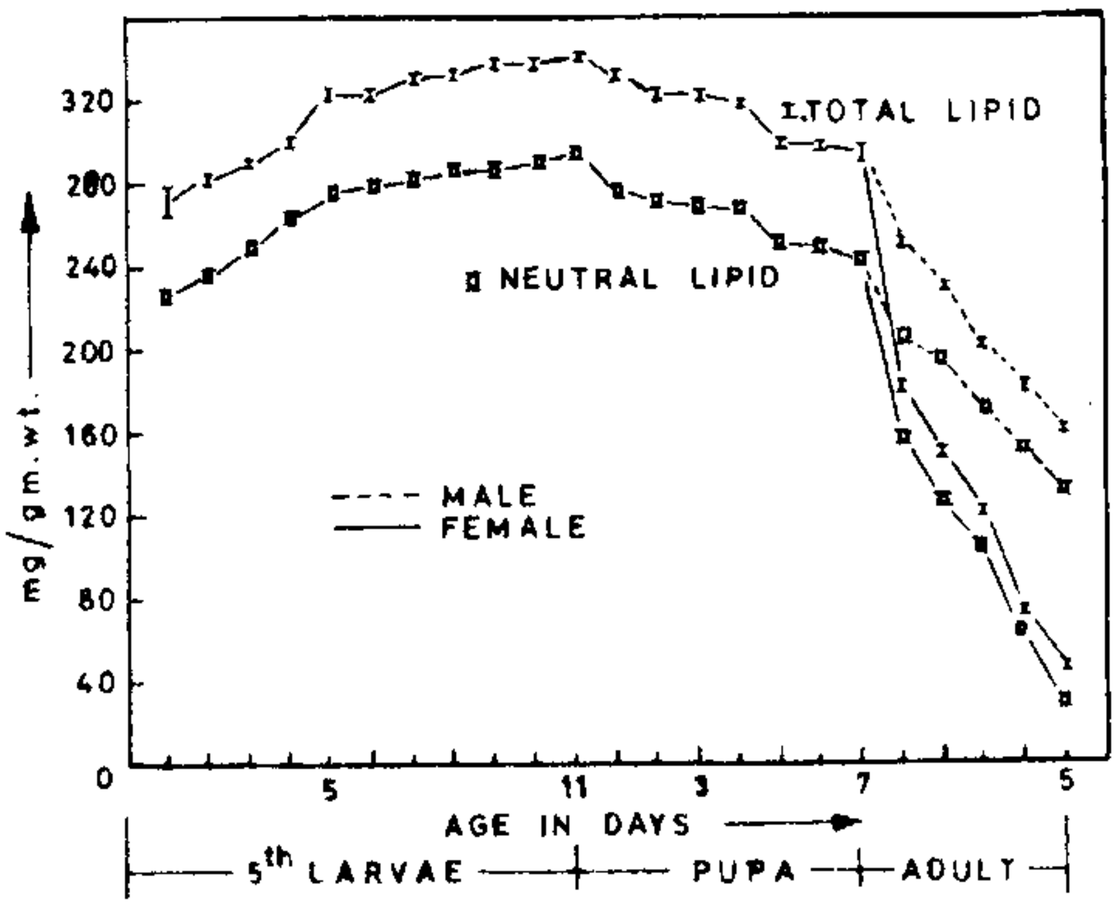

Figure 1. Quantitative changes in the total lipid, neutral lipid content of the fat body of the 5th instar larvae, pupae and adults, both male and female.

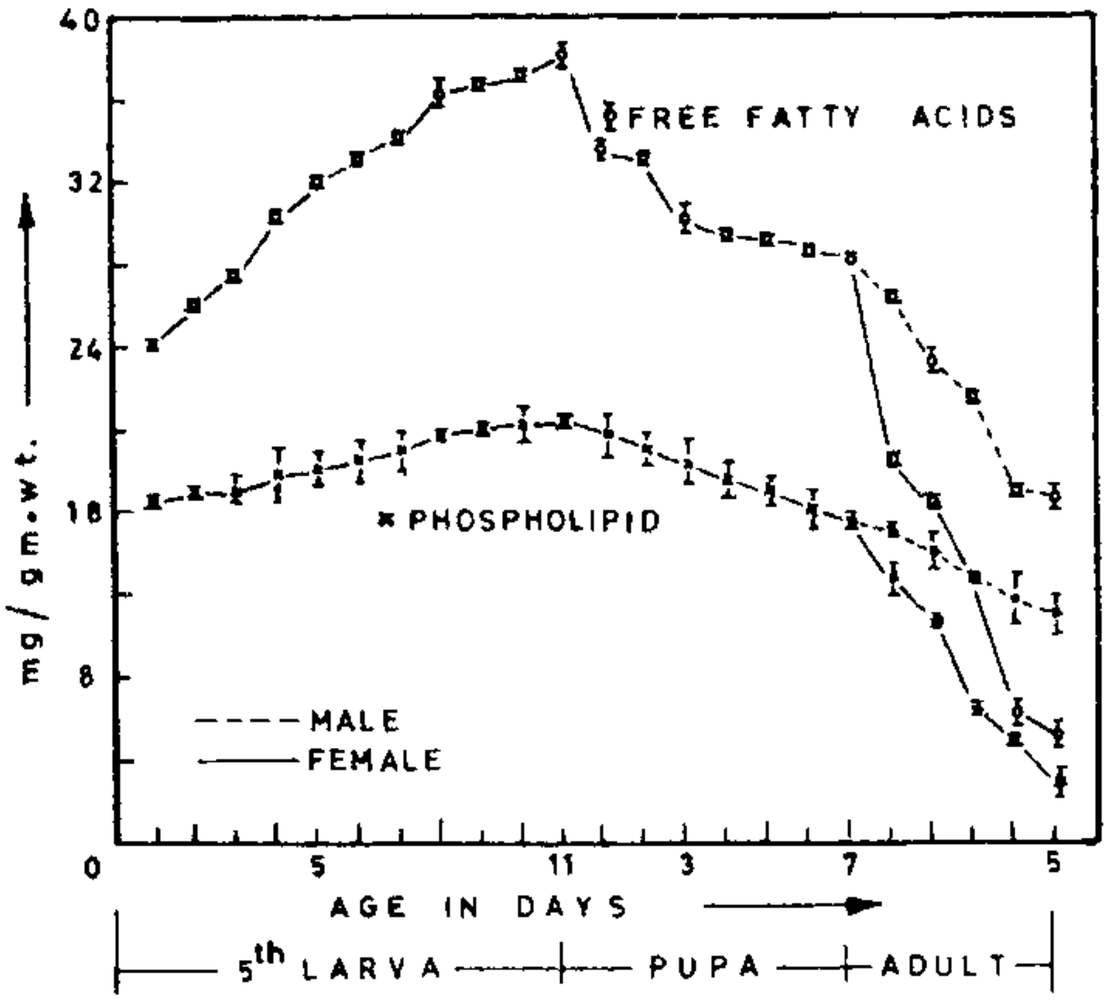

Figure 2. Quantitative changes in the phospholipid and free fatty acid content of the fat body of the 5th instar larvae, pupae and adults, both male and female.

In both sexes, the lipid concentration of the fat body registered a gradual decrease from the one-day-old pupa till emergence of adult continuing until the death of the moth. However the decrease in the lipid content was more prominent in the females than the males.

These results suggest the accumulation of lipids during the intensive feeding period, which may act as a potential reserve source for further energy-consuming processes that are due to take place during the pupal stage and adult development. In the later stages the *Chilo partellus* did not feed and hence when no exogenous energy is available to the insect they depend entirely on the endogenous source namely the lipids. Hence on commencement of spinning, lipids were utilized for energy, organogenesis and other vital processes taking place in the pupa as suggested by their depletion during this period. This supports the observations of Bade and Wyatt[7], Pant and Kumar[4], Tate and Wimer[8].

Sexual dimorphism in the lipid content was observed in *Chilo partellus*. The male contained higher levels of lipid than the female. These results are concurrent with earlier findings[9,10]. Suggesting that during adult stage the female apparently utilizes far more lipid than the male[11]. The fact that the female moth utilizes a significant portion of pupal lipid during

adult stage and contains much less than the male is explained by the utilization of lipids for egg development is the main reason attributed to the low level[1]. This study shows that lipids are obtained and synthesized during the fifth instar larval period and are mobilized and utilized during the pupal and adult phase of *Chilo partellus*.

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1. Gilbert, L. I., *Adv. Insect physiol.*, 1967, **4,** 70.
2. Agrell, I. P. S. and Landquist, A. M., In: *Physiology of Insecta* (ed.) M. Rockstein, Academic Press, New York, 1973, **1,** 159.
3. Pant, R., Nautiyal, G. C. and Singh, J. B., *Indian J. Biochem. Biophys.*, 1973, **10,** 116.
4. Pant, R. and Kumar, S., *Insect Biochem.*, 1979, **9,** 577.
5. Seshu Reddy, K. V. and Davies, J. C., *Indian J. Plant Protection*, 1979, **6,** 48.
6. Floch, J., Lees, M. and Stanley, G. H. S., *J. Biol. Chem.*, 1957, **226,** 497.
7. Bade, M. L. and Wyatt, G. R., *Biochem. J.*, 1962, **83,** 470.
8. Tate, L. G. and Wimer, L. T., *Insect Biochem.*, 1974, **4,** 85.
9. Niemierko, S., Wlodawer, P. and Wojtczak, A. F., *Acta. Biol. Exp. Vars.*, 1956, **17,** 255.
10. Gilbert, L. I. and Schneiderman, *Gen. Comp. Endocrinol.*, 1961, **1,** 453.
11. Domroese, K. A. and Gilbert, L. I., *J. Exp. Biol.*, 1964, **41,** 573.

LABORATORY EVALUATION OF CYCLOPICIDAL ACTIVITY OF CYPERMETHRIN

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THE efficacy of cypermethrin, a synthetic pyrethroid, was assessed against cyclops (*Mesocyclops leuckarti*), the vector of guinea worm disease, under laboratory conditions.

Species of cyclops were collected from the Powai lake, Bombay by a mesh sieve (no. 250 μm). They were examined morphologically under bionocular microscope and females of *M. leuckarti* were separated for the experiment. Technical cypermethrin (1 % EC) was supplied by the National Organic Chemical Industries Limited, India. Experiment was carried out in petridishes containing batches of 20 adult cyclops in 10 ml solution per petridish at the temperature of 26 ± 2°C. Mortality was recorded after 24 hr. Stock solution of cypermethrin (one ppm) was made from EC 1 %. The serial dilutions were prepared in water according to the requirements. In each test one batch of cyclops was kept in petridish containing water to serve as control. Four replicates were used for each concentration and control.

The results of susceptibility tests with *M. leuckarti* against cypermethrin, summarized in table 1 show that cypermethrin reveals cyclopicidal activity at the conc. 0.005 ppm.

Table 1 *Biological efficacy of cypermethrin against Mesocyclops leuckarti*

Concentration in ppm	No. of cyclops died after 24 hr	Mean per cent mortality
0.005	80	100
0.0025	47	58.75
0.00125	17	21.25
0.0005	3	3.75
Control	Nil	Nil

* For each concentration of cypermethrin eighty cyclops were exposed in four petridishes each with 20 cyclops. The total number of cyclops exposed for control was 80.

Cypermethrin is toxic to fish under laboratory conditions. However, its toxicity under field conditions is likely to be low, though experimental data to support this is not available at this stage. Considering its high efficacy as cyclopicide and low mammalian toxicity it is recommended that the compound should be evaluated in the field to assess its utility in cyclops control.

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