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The foreign varieties recently introduced by the State from Brisbane, Australia, are grown at the Sewage Farm, Bangalore and at the Kannambadi Dam Orchard. These varieties are "*Gros Michel*" (the famous banana of the West Indies), "*Ladies' Fingers*", "*Mons Mari*" and "*Giant Governor*", a tall form of *Vamanakeli*. Most of the varieties are thriving very well.

**Diseases.** 1. *Tharagumari* :— This disease was noticed at Nanjangud in the variety *Rasthali*. The leaves of the affected plants dry up from bottom upward even in grown up plants, the growth gets arrested and ultimately the whole plant dries up. A red streak was seen on one side of the trunk when the stem of a diseased plant was cut open and examined. It is a fungoid disease very similar to the "Panama disease" of the bananas in the West Indies.

2. *Sulikattuvadu* :—This disease was noticed at Jayachamarajapura, 4 miles from Chikkanayakkanahalli. It is common in *Rasthali* variety. Here the tops of the pseudostems get constricted, leaves fade and ultimately the plant dries up. It is very similar to the *Tharagumari* disease of Nanjangud and probably only a different name for the same disease.

3. *Katte roga* or *Palli roga*.—This was noticed at Kowsika, near Hassan. It is common in the variety *Boothi bale*. The disease starts with the yellowing of the bottom leaves and soon the central shoot is affected and the plant dries up.

The control method for all these diseases is more preventive. The affected plants should be removed with the entire rhizome with all the suckers and scorched. Suckers from affected plants should not be planted on any account.

## Studies on *Diatraea venosata* Walk—A Pyralid Pest of Sugarcane in South India.

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**Introduction.** *Diatraea venosata* Walk. is a Pyralid borer attacking sugarcane in South India. It is found along with two other borers—*Argyria sticticraspis* Hampson and *Scirpophaga rhodoproctalis* Hampson—also belonging to the family Pyralidae. Ramachandra Rao (1930) and Ramakrishna Ayyar (1933) while considering *Argyria sticticraspis* Hampson as the most important pest, state that the other two are of minor importance only. Cherian and Subramanian (1937) have shown that *Scirpophaga* is not so unimportant as it was once considered to be. Detailed studies by the authors of *Diatraea venosata* Walk. with special reference to the symptoms of attack and incidence go to show that the borer is mainly responsible for reduction in tonnage and sucrose content in millable canes and

partly responsible for the loss of young shoots in the earlier stages of the crop, especially in the Coimbatore tract.

**Distribution of the Pest.** This borer is prevalent in almost all tracts where sugarcane is grown in the Madras Province; specimens have been collected from Chittoor, South Kanara, Vellore, Palur, Chidambaram, Aduturai, Musiri, Northern Circars and Coimbatore. Outside the Presidency, it is reported to be present in Mysore, Bihar and Bombay (Fletcher 1919; Isaac 1937).

**Seasonal History.** Damage by the borer becomes evident mainly from the third month, i. e., when the canes or stems are just beginning to form. The borer continues to be active till about the time of harvest; naturally, many broods are developed during the total period. Its activity is checked, however, to some extent during the North-East monsoon due to the rain water accumulating at the entrance of the larval burrow, and aiding the development of a fungus which attacks the larva in its tunnel. After the rains have ceased the pest incidence increases and continues till harvest. As cutting and planting go side by side on different days in various cane fields, for over three months, there is scope for the pest to multiply without break.

**Nature of Damage.** The nature of damage to young shoots is different from that noticed in grown up or half grown up canes. As already explained, the pest starts about the time of formation of canes. In the young crops, the newly hatched larvae feed in the central leaf roll for about a week, and then go to the lower portions of the stem and bore on its sides to get into the tender fibrous joints. As a result of complete feeding of the rather thin small growing stems the central shoot begins to fade and dry and finally turns into a dead heart. The effect of feeding will not be plainly visible until after the leaves have opened out when excreta of the larva and the shot holes on the leaves come into view. Now all further growth of the shoot is stopped and unless there is tillering of the damaged shoot the result would be a gappy growth of the crop in the affected portions of the field. In the case of grown up canes whose stems are well above ground level the work of the larva cannot be easily located unless some of the semi dried leaf sheaths at the top are pulled off when the existence of the borer caterpillar inside the stem becomes evident by the presence of wet excreta at the entrance to the larval burrow and the leaf sheath covering it (Fig. 9). In grown up canes more than one joint may be bored by the larva (Fig. 8) and except for the constriction of the infested joints (Fig. 7) the growth will not be seriously affected.

**Extent of damage.** As mentioned above, the damage to cane generally begins when the crop is about three months old. In the case of grown up canes examined at the time of harvest in 1938—39 and 1939—40 in the Central Farm, Coimbatore, the percentage of incidence in whole canes and joints has been very appreciable. Tables I and II below give the various details.

TABLE I.

**Percentage of infestation by *Diatraea venosata* (crop at harvest) 1938—39.**

| Variety. | Total No of canes. | Total No. attacked canes. | Percentage of attack. | Total No. of joints. | Total No. joints attacked. | Percentage. |
|---|---|---|---|---|---|---|
| Co. 419 | 983 | 497 | 50 5 | 19359 | 1118 | 5·7 |
| ,, 417 | 734 | 492 | 67·9 | 14645 | 1321 | 9·2 |
| J. 247 | 842 | 53[ | 63·06 | 19.03 | 1281 | 6·6 |
| Co. 213 | 1605 | 695 | 43 3 | 31416 | 1169 | 3·7 |
| Poj. 2878 | 551 | 358 | 64·9 | 10283 | 791 | 7·7 |
| Co. 413 | 1006 | 506 | 50·3 | 17006 | 1276 | 7·5 |

TABLE II.

**Percentage of infestation by *Diatraea venosata* (crop at harvest) 1939—40.**

| Variety. | Total No. of canes. | Total No. attacked canes. | Percentage of attack. | Total No. of joints. | Total No. joints attacked. | Percentage. |
|---|---|---|---|---|---|---|
| Co. 413 | 372 | 238 | 63·9 | 7700 | 458 | 5·9 |
| Co. 419 | 403 | 212 | 52 9 | 6229 | 559 | 9·0 |
| Co. 417 | 328 | 277 | 84 4 | 6231 | 763 | 12·2 |
| Poj 2878 | 348 | 222 | 64·3 | 5354 | 492 | 9·2 |

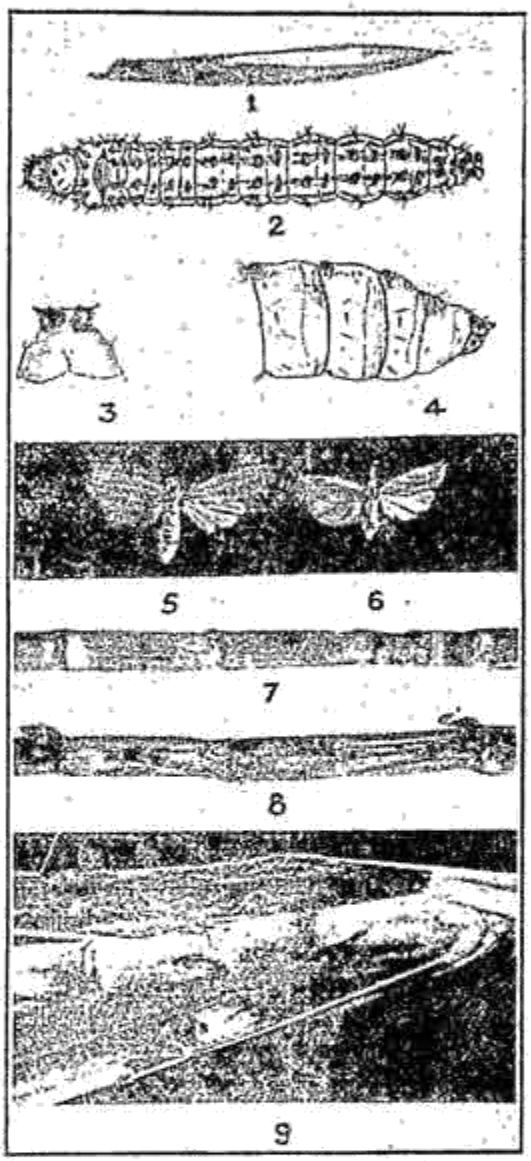
The results of analysis of infested canes as given by the Government Agricultural Chemist are given in Table III. It will be seen that there is appreciable decrease in the weight of the canes where the damage by the borers was pronounced.

TABLE III.

**Results of analysis of samples of sugarcane attacked by *Diatraea venosata*.**

| Number of joints attacked. | Number of canes cut for analysis. | Average weight. | Extraction percentage. | On the weight of juice. | | | Glucose ratio. | Co-efficient of purity. | Acidity in terms of N/10 KOH per 100 c.c. of juice. | Ash in juice. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Brix | Sucrose. | Glucose. | | | | |
| | | lb. | | | | | | | | |
| One joint attacked sample | 11 | 2·46 | 66·67 | 15·14 | 12·56 | 0·19 | 1·51 | 82·96 | 9 cc. | 0·86 |
| Three joints attacked sample | 10 | 2·40 | 66·67 | 15·04 | 12·45 | 0·18 | 1·49 | 82·77 | 10 ,, | 0·92 |
| Four, five and six joints attacked samples | 11 | 2·18 | 62·50 | 15·04 | 12·32 | 0·20 | 1·64 | 81·93 | 11 ,, | 0·95 |
| Seven and more joints attacked samples | 7 | 2 14 | 66·67 | 14·10 | 11·23 | 0·18 | 1·61 | 79·64 | 12 ,, | 0·99 |

**Life History.** The life history of the pest was studied in pot plants. For this purpose larvae were collected from harvested cane tops, reared into adults and then allowed to pair and lay eggs. When the caterpillars




## Explanation of Plate.

1. Egg mass of *D. venosata* Walk.
2. Larva of *D. venosata* Walk. (Report Proc. III Ent. Meeting Pusa 1919.)
3. Pupa—anal segment, ventral surface. " " "
4. Pupa—posterior segment—lateral view. " " "
5. Adult female.
6. Adult male.
7. Cane showing constriction of joints due to the borer.
8. Empty tunnels in mature cane indicating infestation in more than one joint.
9. Place of pupation (top) and feeding (bottom) of the borer.

hatched out, the larvae were transferred to cane shoots and their behaviour noted. *Eggs* are deposited on both surfaces of the green leaves and occasionally on leaf sheaths and stems. In the field they are laid in small masses generally in rows of two; while in cages rows of three, four and five are found (fig. 1). The place selected on the upper surface is mostly the mid rib groove and on the lower surface near the mid rib. The eggs when freshly laid are flat, shiny, waxy white in color and lie one overlapping the other. Immediately before hatching, the larvae could be seen lying curled up inside the egg shell with its black head and prothoracic shield and orange colored body with setae. Hatched eggs are thin, transparent and are of the texture of tissue paper while parasitised eggs turn black in color. Ten to thirtyseven eggs in a mass are laid in the field. In the cages, the number of eggs laid varied from 2 to 60. In one case as many as 51 masses were laid by one female. The maximum number of eggs laid by one moth was 414. The egg period lasts from 5 to 8 days. *Larvae.* The larvae escape out of the eggs by clipping the shell with their mandibles. They are active, orange colored, with black head and prothoracic shield. The warts are distinct with fine hairs rising from them. In the early stages the caterpillars are essentially leaf sheath borers and later on turn to the stem for further feeding. They crawl down and bore from outside into the soft core of the stem either by riddling through the leaf whorl or getting right in between sheath and the stem, the latter being most common. Under laboratory conditions, they appear to develop gregarious habits. Not more than six larvae are found at a time inside the leaf sheath, though finally the number dwindles down to one. The caterpillar always feeds on the fibrous joint immediately below the growing point. That is the reason why the tops usually contain the live stages of the pest. When mature, the larva measures 1 to 1·25" long with black shining warts all over its body segments (fig. 2). This character is of great importance in differentiating *Diatraea* from other borers. *Diatraea* is a clean feeder and ejects all excreta from its tunnel. The larval period lasts 28 – 38 days. *Pupae.* The larvae do not pupate inside the burrows. They desert them and seek out situations whereunder they construct thin silky cocoons and transform into pupae inside (Figs. 3 & 4). They seem to prefer the half dried leaf sheaths for this purpose (Fig. 9). At this stage they are vulnerable to attack by natural enemies. The pupal period lasts from 9—10 days. *Adults* are dull, straw-colored, with a spot on each forewing. The males (Fig. 6) are somewhat smaller than the females (Fig. 5) and their forewings slightly darker. They are nocturnal and sluggish in habits. When disturbed they fly short distances only. Otherwise they quietly rest in some corner of the cage and allow themselves to be transferred from cage to cage easily. Emergence from pupae generally takes place at night. Eggs are laid continuously for 2 or 3 days. Successful oviposition takes place if the adults are confined to plants in wire gauze cages. The females outlive the males by one or two days. On the whole, the longevity is short not exceeding 3 or 4 days. Sex-ratio is more or less equal, the males emerging in advance.

**Alternate Host Plants.** So far, the pest is found feeding in *Scacharum spontaneum* and maize. Fletcher and Ghosh (1919) have recorded sorghum, ikri, *cumbu* and Sudan grass as alternate host plants.

**Parasites.** This borer is subject to the attack of egg, larval and pupal parasites. Eggs are parasitised by *Trichogramma minutum*, R, and *Telenomus* sp. *Stenobracon deesae*, Cam; *Xanthopimpla nursei* Cam., *Pimpla* Sp. *Rhaconotus roslinensis*, Lal and *R. scirpophagae* Walk *Goniozus indicus* Ash. and *Apanteles flavipes*, Cam. are found to parasitise the pest in its various stages of larval life. A fungus—*Isaria* sp.—has been noted on the larvae at Coimbatore. Pupae are attacked by *Tetrastichus ayyari* Roh and *Tricospilus diatraea*, Cherian and Margabandu (MSS).

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# A Note on a Synthetic Tetraploid in Asiatic Cotton

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It is frequently observed that when a wild species of cotton is crossed with the cultivated species, there is either very little setting or the hybrid is sterile. A number of workers like Mendes (1939), Beasley (1940), Harland (1940), Amin (1940, 1941), Stephens (1940), Zhebrak and Ozaev (1940) and Kasparyan (1940), have shown that it is possible to induce chromosome doubling in cotton and also to make sterile hybrids fertile when the sterility is due to failure of chromosome pairing as a result of the absence of homologous partner chromosomes. Attempts to induce chromosome doubling in the sterile hybrids of cotton were made for two seasons, at the Cotton Breeding Station, Coimbatore. This note records the details of the trials made to transform a partially fertile hybrid between *G. anomalum* Wawra-et-peyr, (an African wild cotton with 26 somatic chromosomes) and *G. arboreum*, L (strain K. 1. with 26 somatic chromosomes)

The treatment consisted in wetting the shoot tip of an young plant bearing 4 to 5 leaves, with an aqueous solution of colchicine (0·08%). The wetting was done at intervals for a period of 12 hours and the shoot tip was subsequently washed with distilled water. The treated shoot bore malformed leaves. A branch that arose beneath the last malformed leaf appeared to bear normal leaves, but they had much broader lobes than the