

No. 27

27 | Investigation & reports on econ plants
1919-1921

F 27/1

Regarding the death of P. lanatum. (Rangoon bean)

It was noticed in the Nursery and in the block No. 15. when P. lanatum seeds were sown, that they were withering. On exam. the injury was attributed to a maggot/larvae and thrips like.

It cannot definitely be said which attacks them first. Thorough exam. of the soil indicated that the attack was not thoroughly done under the soil. (this was not just haphazard things.)

The larva commences its work from down the root and migrates up the stem and over into the leaf petiole. It is a white larva, turning brown in its later stages. (Observations having Feb. first week, 1919) The stem collar of bean/cate inside.

A few of the seedlings were lifted with a layer of soil and put in a lateral glass jar to watch the life history. They all formed cocones in the stem, or wherever they were feeding. The colour of cocones is yellowish dark (brown) (but not yet imaged out of the soil).

(The soil was not down to water to be seen / from the surface as a cocon)

The larva, when it is seen is white and is very small. For thousands, the larva is seen in the soil. Colour is yellowish or dark.

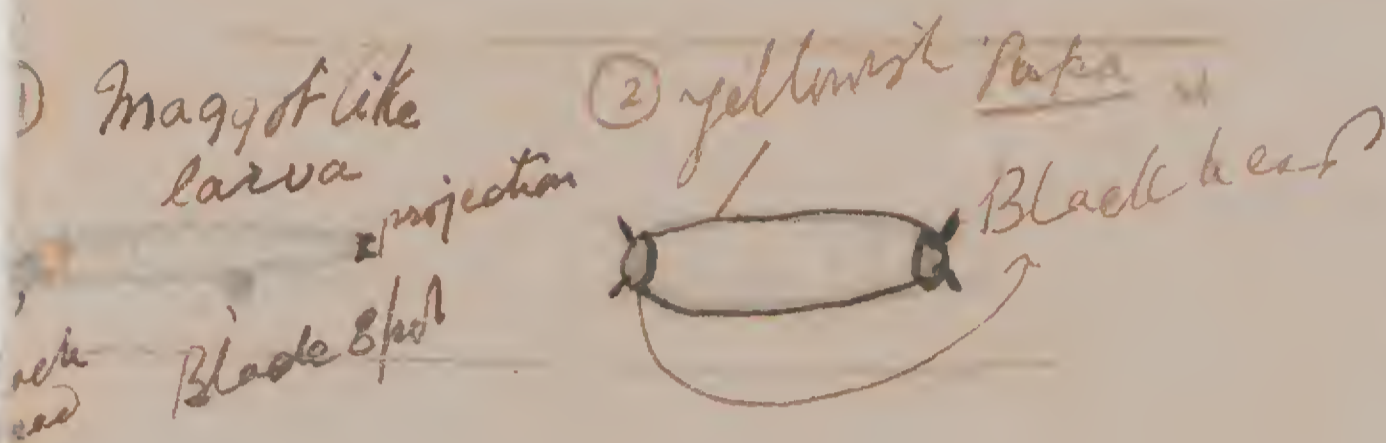
Maggot found FEB 5, cocoon FEB 18 (first stage seen)
In the place, disturbance, seed was seen again.

It was observed that though the attack was late still the insect was found on the roots. The maggot were just going to the cocoon.

This clearly indicates that the insect has a broad head and a narrow body. (Mar. 22 & 29.)

The seedlings were very badly attacked. and many of them were to be uprooted, and burnt.

It is not clear what other will have a good effect.



A Cyclorapha fly.
 Larva emerging by breaking open either of the black tops.

The colour of the insect is creamy white, and transparent. The insect has no legs and the chitinous rings of its body are joined by a thin membrane which are just like folds. While in rest the insect fix curls these folds helping the movement.

The effect on the plant:— The insect enters into the pith, and goes up through the canal out through the pith. It is seen in the petiole also. The result of this is to stimulate the plant to give out new roots above the soil, in the first internodes or upper ones.

The petiole splits up and the saggitts liberates. The part decays rapidly. The top root does not develop to its normal size.

Further as a response to the larva of the parasite, the seedling flowers before it is even 2 weeks old.

The larval period is from 10—15 days.

The pupal period. - 8-10 days.

The mirapo period. - - - - -

Eggs - - - - -

seems to be an *Aproniza* sp.

Rough diagram of mirapo



The seedlings were watered with soap water (1 lb - 10 gallons) for 15 days morning & evening for the first week after and harvest alternate 2 days. Effect obvious. The plants grew well & harvest

The fly emerges through either of the bubbly tops, and hence a cyclocephala. The fly is very sluggish and does not care to fly though disturbed. They were caught very easily. They after emerging cut rest on the plant itself or on a leaf, and lay eggs there. The tiny larva could be seen moving on or in the stem. Visible to the naked eye.

The fly is *actidea* ~~is~~ *Lausium Domesticum* v r. *dum*. Here the bark is eaten by the pest. The maggots lie ~~is~~ under the bark and pupate elsewhere. The flies hover about the affected parts.

Effect on the plant:— The bark ~~is~~ becomes a putrid mass and checks the vigor of the tree. It is renewed but takes a long time and by the time it is so the ~~again~~ attack it and destroy.

Treatment:— The treatment is as under. The bark is scraped off and the maggots removed with the pupae in the drying bark. Afterwards it is brushed ~~is~~ with carbolic soap.

Another trouble ~~actidea~~ connected with this pest is ~~that is~~ ~~is~~ a species of ant eating the bark. The ants eat the bark in company and not alone. But sometimes they do so.

They were prevented from damaging the tree by tying ~~is~~ soap (tied just at the bottom of the trunk.)

No ants were observed ~~at~~ the tree.

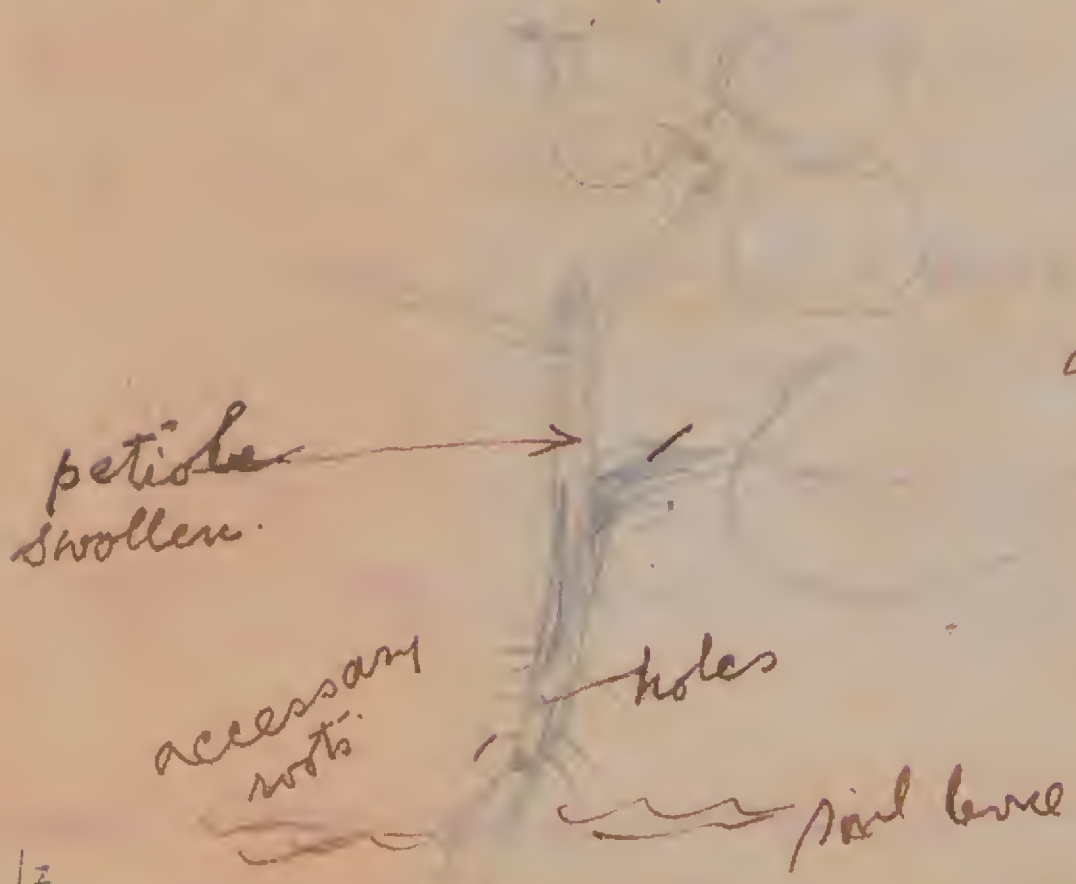


Diagram denoting the injury done to the plant by the fly maggot & the *Rhizoctonia*

Bean borer (a moth caterpillar).

This is a pest though ~~xxxx~~ minor one seems to promise to be one of major importance when the crop of beans spreads through the whole of the peninsula. The acclimatized variety of the bean which is widely spreading and favoured by the Europeans is a promising asset to the non-food producing country. It has admirably adapted to the island and yields abundantly with little attention.

With all this the pest -- a bean borer may check its career. The caterpillar is pink colour with five rows of brownish spots with hairs on them. The row on the back is obliquely double. The brown head ~~xxxx~~ has strong mouth parts with big ~~xxxx~~ pointed mandibles. It bores into the ~~xxx~~ bean and eats the embryo and lies crouching in the hole thus bored. Within a short time it is seen that it is nothing but mass of the excreta of the insect. The larva generally bores just near the micropyle ~~xxxxxxxxxxxx~~ and then the embryo and afterwards the starch. Thus its importance in the culture of the beans will be noted.

The Bean Borer.

This lepidopterous insect though of minor importance, at present, ~~may prove to be one of the most important type later on to this newly introduced and well acclimated plant.~~

The life history apparently covers 45--60 days (not worked out but stated from the appearance of the caterpillars at the time). The eggs are laid on the pods or in the flowers. In the case of the mature pods no hole through which the insect enters is ~~not~~ seen; while in those of the immature ones, the hole is blocked up by the excreta of the caterpillar. The caterpillar migrated from pod to pod in consuming the contents. The work of eating the bean commences from the embryo and then it proceeds to eat the cotyledons. Dried beans afford little chance to let them go on with their work; and while breeding it is noted some of the caterpillar ~~xxxxxxx~~ ~~xxxxxxx~~ ~~xxxxxxx~~ change its colour from creamy to pale orange and also reduce the size of the body. Pupation is favoured. Many cases of death in this state.

F27/4

- Egg period.....
- Larval period.....
- Pupal period.... 10-15 days.
- Imago period..... 5-5 days. They died apparently from want of food in the breeding cages.

Opisina mundana

north

Colour dark brown
 legs & body with strong
 scales.

Des.

described in the north

F27/4

Sept. 12, 1919.

~~XXXXXXXXXX~~

The borer is getting virulent and nearly all the pods will show the sign of the pest. As a moderate estimate of 25-30% the of the beans will be/damage due to the pest.

Mr. Mathieu says that the damage due to the fungus and the pest amounts to fall 50% . Out of the 20 pods I shelled I could get only a dozen of good uninjured ones. This will give the idea as to the virulence of the pest.

Regarding the death of the Sriehania Macrophylla seedlings
During the latter half of the Feb., it came to my notice that
there were a lot of deaths in the potted seedlings of the S.M.
The work was at once taken up to investigate the cause of the
same.

The appearance of the seedlings was just like that of those ~~of~~
attacked by wilt or those suffering from lack of water.
The examination of the roots, stem, and the leaves gave a
clue to the solution of the investigations.

Starting with the exam. of the roots, I could not find anything
wrong with them. There were a lot of fibrous healthy roots/
which filled the pots. The stem was the next one for exam.
and one could distinctly see the mischief was done to it.
In certain places, it presented a shrivelled appearance
with a hole or two either in the centre or at the side of the
shrivelled spot. The lvs. except in some cases, had a hole in
the axil/bored.

The stem was cut open and there were a lot of round-headed
beetles which when identified were found to be Scolitids.
(Cannot say which spp.) (Possibly Xyleborus spp.) . They had
cut either longitudinal canals through the with and part of
wood only/ or transversal. With the +nase could be seen --
larva and pupae. (without any case) This shows that the
beetles, once get into the plants, reproduce there. As these beetles
are said to be ambrosia, sections were cut to see whether they
had done so. (i.e. cultivated fungus.) The culture showed
that hyphae could be seen emerging out from /// rounded/ bodies.

(Insert the way which shows)

Scolitid beetles are reported to bore in the dead wood, but
rarely in the living plants. (Lefroy. Vinea. Econ. Ent. in Ceylon
(Apple Eate. Oct. 1912 474 . PP.

F27/5

This adds one more entry to the list of the living plants.

The Asst. Curator was requested ^{stop the} to sale of the plants.

The affected lot was isolated from the non-affected one. Out of 7 1/2 the 185 plants, 50 were suspected to be attacked by the beetles.

EXPERIMENT. I cannot say where ~~the~~ and how the insect enters the stem but possibly by directly attacking the stem and propagating inside. With a view to protect the stem from the ravage of the insect, it was painted with GUM in which was put some NAPHTHALENE powder. This might prevent the entry (in the absence of any other in the store.) Whale oil soap, tried in Ceylon. painting the bushes.

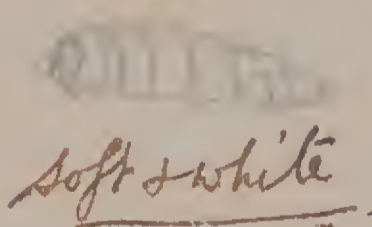
Gum and Naphthalene is defective in that it ~~it~~ is washed out in the rains. Addition of resin or any other ~~adhesive~~ adhesive will improve the paint. ~~On~~ examining a few days after the paint, it was found out that the paint was washed out, ~~in~~ In a few plants cut open, I found the holes vacated. (I cannot say none of the remedies unless some more are tried.)

Similarly, bait, a bundle of dried sticks, was kept ^{putting baits} to attract the insect to the bundle. (This is done in Viticulture in Bombay.) I did not find any being attracted to the n.

Imag.

Larva

Pupa (without pupal case.)



Round-headed with spines

soft & white

It is a curious sight to see the pupa, moving the free part of the abdomen,

(Insect in all stages preserved in Rectified spirit.)

The seedlings (in pots.) of *Suaeda macrophylla* are damaged by a Scoliid weevil. (*Xyleborus* sp.) The weevil enters through the soil of the leaves, or by boring a hole on the stem a little above the ground. Then it makes inside galleries either longitudinal or horizontal, and makes a colony in the stem.

At first sight, it seems the plant is suffering from water but on closer exam. the true cause is noted. The lvs. don't die but remain or reappear for a long time. The stem at the point of the attack shrivels and either in the middle or on the side of the shrivelled spot the hole may be found.

Inside the injury inflicted by the borer is as follows. The beetle eats the pith as well as the wood which is the favourite food of the insect. It is said to cultivate a fungus, on which the larvae feed. With this object, of ascertaining this fact, scrapings from the cavity were put in gelatine solution for germinating. They did well only few germinating. (Applied Entomology, Vol. 1818, p. 434)

The larvae are soft white while the pupae are without pupal cases. The imago is very small, and is always found with its head deep in the burrow.

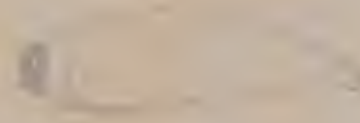
Remedy Trial, with the material at hand. Painting the stems with gum mixed with Naptalene.

Nature of injury.

Imago

Pupa

Crab.



The insect is observed to feed on dead and drying weed only;
but in this case it feeds on living timothy. Jeffrey reports
(Ill. Jour. Insect. Life.) that it feeds on timothy weed,
and the Taylor Entomologist reports on -es (sheet paper)

I have added one more case to the list of plants eaten living by
the insect.

Remedy. Bait was used to attract the insects.

These consisted of dried weed -- which -- without any help.

After a fortnight it was noted that the dried weeds were

bores into . The hollows were characteristic of the insect, but

I could not find the insect. The paste used seems to have a deleterious
effect on the stems of the plants . In *many* cases it was observed that
it was wanted.

Both of these seem to prove good for the insect.

Sept. 5, 19.

Hibiscus sabdariffa ~~7~~ Host.

The flea beetle ~~-----~~ pest. (polymorpha).

Out of the four ~~plots~~ plots in wherein this plant is grown, those in the nursery are seriously attacked by the pest.

Elsewhere no insect is seen ~~but~~ ^{though} the plants have ^{leaves with} shot-hole ~~like~~ [^] ~~les.~~

The beetle feeds on the leaves and floral buds as well. On the latter, the point of attack is near the base of the st bud, while in the former case the start is made from any place, either the base, or top or the middle part.

The main injury is done to the floral buds which drop in large quantity, or else do not develop.



felt like
cushion on
the sole.

F27/7

Sesamum caterpillar.

Acherontia atax (Death's hand moth).

This is a pest on the plant. The caterpillar eats the leaves and sometimes the whole plant is stripped of its foliage. This feeds on the capsules.

A very large green caterpillar, with slanting bands and a long tapering horn at the end of the abdomen. In the very young larvae the slanting bands are not observable.

Life history.

The moth is a dusky and beautiful to look at.

Remedy:-- Picking the larvae, trapping the moths at light which is most effective.



Another species is seen feeding on the leaves of Phaseolus tetragonolobus. The larva is a deep yellow with brown stripes. It was parasitised by a fly and died. The fly maggots were unknowingly thrown away.

Sweet potato.

Leaf roller of the crop:-----

This seems to be the only pest of the crop so common in the island of Singapore and the ~~island of Singapore~~.

The growth is very vigorous and within a few days it produces ^{of vegetation} lots of foliage. This pest is not so violent and of a much type is not so taxing because of the rapid growth of foliage.

The pest is conspicuous and the rolled is the sign of the larvae of the pest. All leaves of the plant are susceptible to the attacks of the pest and there is no preference shown. It will be found on young lvs. and old as well.

The caterpillar rolls the leaf after the fashion of the common or half grown leaf roller, the leaf being tied up with the silky secretion of the insect. The caterpillar is a tiny one of pale green colour and quite transparent one, with two to three white transparent bands on the sides and the back. The mouth parts are horny and the insect devours the leaf ~~xxxx~~ only the palisade tissue and leaves the veins intact, giving the leaf appearance of the lattice leaf of *Ouvirandra fenestralis*, the inside being filled in with the excreta of the insect. It jumps on disturbance and hence care in collecting otherwise it is lost and again a trouble ~~xxx~~. While breeding it is observed that the colour changes from that of green to orange and the size small, This, I think is due to the irregularity in feeding and heat. This is thought to ^{hasten} ~~hasten~~ the pupation period.

Larval period seems to cover a fortnight. Collected 12 Aug. 19.
pupal period. 26 inst. The caterpillars were small ~~xxxx~~ or it may be taken to 3 weeks. or so.

pupal period 6-10 days. The pupal cases are of pale yellow colour

The imago is 7c.m. in length and nearly double the length in

XX

Sweet-potato. (conhd).

across . The wings are characteristic of the moth . The well set and conspicuous fringe and the wavy lines --- lines fold & on themselves before reaching the border and doubling on themselves.

The border line is also worth attention and a means to know the moth.

On death , the wings rather close on themselves and the c.n. across cannot be told definitely. They wings are then held vertically.

The antennae are long and filary. The whole body is covered over with silvery scales xxxxx.

The only remedy we are efficient in the practice is to cut the leaf folded and kill or burn them. Spraying the leaf is of no use.

Folded leaf

Caterpillar

Pupa

Moths.



Briagal leaf eating caterpillar.

Briagal has a very bad pest in this caterpillar of a moth which is always set-ed on the shoots of the plant. They feed in swarms and prepare web like inhabiting place for their protection. They enclose the whole top portion and bind it with the thread, this being their ~~secret~~ secreted. If they are thrown down they produce this thread and climb up by means of this thread. The caterpillar is blackish with interrupted whitish strips.

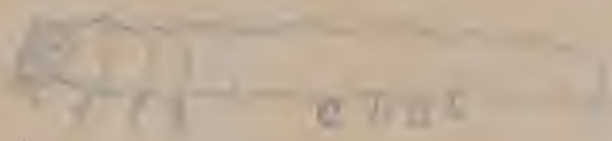
The life history is *follows* :----- Larval period pupal period. 10-15 days. imago period. 6-8 days. as observed in the cage.

The moths ^{are} seem to be nocturnal in habit. They ~~are~~ small in size. with dusky wings. (wings with two big black spots on the outward side of the same.

~~xxxxxxx~~ The caterpillars do a lot of damage, and eat the leaves and the buds. Their point of attack is easily noticed.

. Remedy :--- picking up the bound leaves and destroying or burying them. At night time, light trap serves best to attract the moths.

Caterpillar



Pupa



Moth



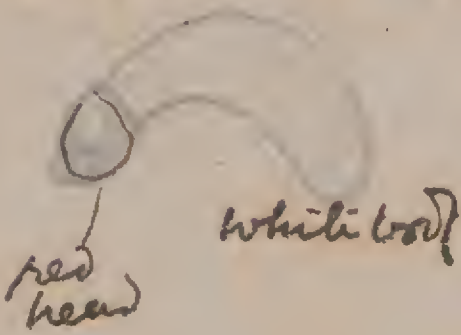
Brain of fruit bearer and the flower bearer.

Plantain stem borer(*Odoiporus glabricollis*)

This is the base to the banana growing here. The ~~green~~ larva feed in the stem and does a good deal of damage. The outward symptom of the presence of the larva feeding is the exudation of gum through the hole. This gum is found throughout the whole canal of the larva. The tissues at and by the side of the canal rot and give out a foul smell. The larva goes up the stem feeding and pupates in the stem, in the ~~coconut fibre~~ cocoon of the ^{plantain} fibre. The weevil is generally found in the stem ~~which~~. This is a shining black creature with the final joints of its abdomen visible. ~~xxxxx~~ The weevil lives for a long time without air. Over ¹⁵ ~~20~~ days.

Remedy:--- No other remedy but uprooting the affected plants seems to be possible. The larva is seen to go even to the true stem of the banana.

Larval (leptera)



cocoon of (fibre)

white body

Imago. weevil.



Plantain Leaf roller. (Butte rfly. *Erionota thrax*.)

Butterflies except a few are mostly harmless, the exceptions are rice, lemon, mango, castor, the pulse butterflies and many others, are of ~~importance~~ importance, to the economic ecologist. The Banana butterfly which seems to be absent from ~~the~~ India is very common not only on the banana but it is said to feed on the palms such as Livistonia and many others, it being its common food plant.

This pest is common through the Island of Singapore, and can be held to be responsible to damage the plants to a great extent. The leaves are the object of attacks which are shredded and torn and made into rollers for the protection of the caterpillar. The roll of the leaf is very strong and is pushed as it were by the gummy substance of the larva. The larva is pale green copiously covered with waxy powder (white). It is 2-3 in. long when fully grown and .5 in. through. It is narrowed towards the front side and thickened towards the anal side. The mouth is a big black horny structure which helps the larva to cut the leaf very effectively and devour the same quite readily. The sight of the banana plant is characteristic to when this feeding. The rolls of the leaf hang down as if stuck to the mid rib. This may be mistaken for the injury ~~due~~ due to the wind. It is said that crows are very effective in picking these larvae, and hence it ~~is~~ absent from the Indian ~~islands~~ Here crows ~~are~~ except those introduced by the penitent of Pahang? were reported to be preying on these and have done a good clearing of these pests.

The larva makes a very close tight roll which is not accessible to a beetle or any other insect except the one eats the parts of the same (roll).

Plantain leaf roller. (contd.)

The life history is as follows:---

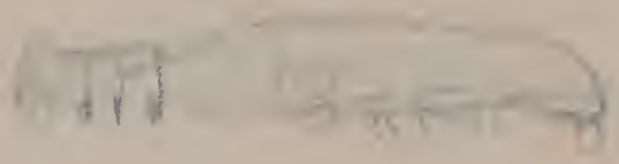
Eggs cream yellow are laid by the female which dies after this operation. They hatch out about a days, and the larva begins to roll the leaf and commence the work of eating. The larval period lasts for days. It pupates in the special case but in the last moult of the larva/ in the leaf roll, and emerges out after about 13-15 days.

It commences laying eggs after 4-6 days and continues till it dies. In the field it is seen hovering about the plants (banana) and resting on the under side of the leaf, where eggs are laid. The butterfly is a big one with an expanse of 2-2½ in. dusky colour with yellow stripes at the ends of the wings. The eyes are big red at the top of which can be seen the long knobbed antennae. Eggs are of the size of the mustard. The body is densely hairy.

The plant suffers much owing to the labor being being brought down by the pest.

Remedy:-- cutting the shredded leaves and keeping watch on the insects. They can be caught by nets or other wise. Crows as it is suggested above seem to have a beneficial effect on the plants.

Caterpillar



Butterfly

Yellowish
stripe



big red eyes

Mango shoot borer, --- a caterpillar, of a moth.

It seems to be reasonable to attribute the the unfruitfulness of the mangoes in Singapore to this caterpillar. The moth is very wise to lay eggs on the shoots of the new season's growth. A small hole is bored in the shoot and a small brownish egg is laid individually into it. The caterpillar on hatching enters the shoot and by boring a hole either at the top or down on the new growth. In no case it is observed that a hole exists on the old years growth. The caterpillar commences the work of boring and stays there for not more than 7-8 days, in some cases for even 3 days. The larva bores a well cut round canal leaving the outer bark untouched. While it is working in no symptoms develop until the work of boring has gone too far. At this time the lvs. begin to wither and then it is only possible to say that the grub is working in the stem. This is noticed

* from a distance, because the top shoots all ^{wither} and can be seen very easily. But on close examination a hole or two can be seen/ with excreta at the mouth of the hole.

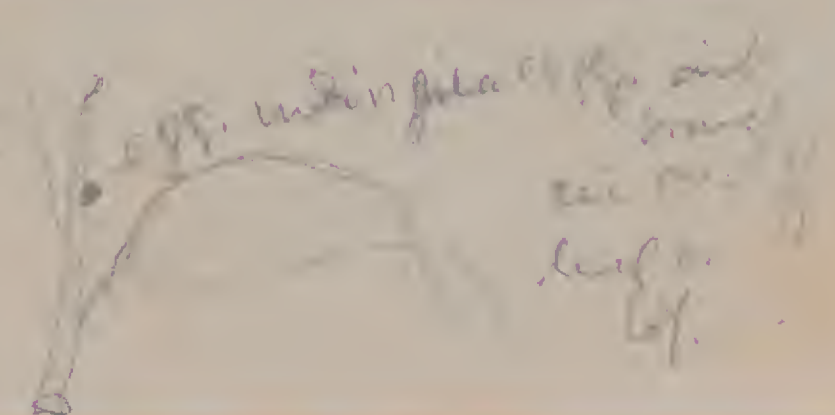
On opening the hole, a caterpillar is invariably can be in the hole.

This observation does not hold good in a few cases. In the majority of cases 2 holes are noted.

The caterpillar is either purplish or pinkish with ^{transparent} longitudinal strips on the back and on sides. Head red. Length 2.1c.m. full mature larva. This pupates outside of the canal. ~~xxxxxx~~

The caterpillar pupates in the soil. It was put in a tin pot and covered with a wire netting. It went down into the crevices and formed a cocoon.

*Brown
but - much of purple*



The time of brood seems to coincide ~~xxxxxx~~ the season of growth of the plant. Still, it is observed that if the season of growth is early or late then ~~the~~ before the injury advances the tree puts forth its fruit. But if it is late then the caterpillar eats the whole shoot and all dry. Shoots being the parents of the fruit.

The mangifera Foetida sprouts earlier and hence escapes the injury to the extent of having the chance of producing ~~the~~ a few fruits, the rest ~~being~~ dropping and if formed falling.

secondary

The effect on the plant:--- ~~xxxxxx~~

Dormant buds on the ripe wood which are never observed to wake up are seen sprouting all over the branch. 2 After the top shoot dries ~~xxx~~ three to four shoots come up from the base of ~~the~~ dried shoot. No opportunity ~~xxxxxx~~ for the tree to propagate its species. The tree becomes stunted and ~~the~~ many fungi and loses strength. It is observed (June last week D 1919)

that M. foetida was again flowering at an unnatural season because of the pest and the strong reproductive force of the nature. LIFE history (from only one caterpillar) :jjj

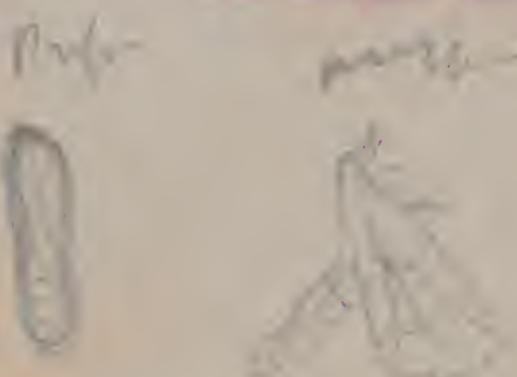
April 11, 19. caught,

"15 pupa.

May 12 Image cut.

~~xxxxxx~~

The moth is 1c.m. long and 1.4c.m. across. The hind wings greyish with blackish wavy lines across. The wings have fringes. When dead it turns the abdomen upwards.



Citrus fruit trees and seedlings pests.

Caterpillar of a butterfly (papilio Danoleus)

This seems to be a very bad pest of the oranges and other plants when they are small. The caterpillars are cryptic in colour and feeds on the ~~upper~~ upper surface of the lvs. and in hot hours lies on the midrib, having the appearance of the excreta. Pupation on the plant by hanging itself on to the stem, by a silk thread. There are two horns at which give out bad smell.

Life history:--

The butterfly is a large sized one coloured in black with yellow spots. There are two red spots on the hind wings.

Remedy :-- Picking the caterpillars, which may be very expensive in a big plantation but on a small scale it is the most effective one. Spraying will be effective.

Catching the butterflies.

(For full description .CF. Lefroy. pp.423)

Malvaceae and Boehmeria ^h nevea, pest.

A leaf roller of the --- a caterpillar of a moth Sylepta derogata is very voracious on the leaves of these plants. From this it ~~is~~ appears that it is one of the fibre plants, rarely or not at all its areas of activities is noted beyond these.

It is a pale green caterpillar with a dark line at the top of the abdomen. It is found feeding on the leaves of the said plants, rolling the leaves and fixing them by the silk. The eggs seem to have been on the lower side of the leaf and then it first eats the epidermis and then the food on r rolling from the upper side. It is seen to pupate in the leafroll but generally it does so in the soil.

The life history:--- The eggs are laid on the lower side of the lvs. The larva then makes a roll and commences its work. It pupates after days, either in the soil or in the leaf roll.

Pupation period.

The moth a dusky straw colour with the wings striped lightly with a black spots are seen on the edges of the pinkish wings. The pupal is brown one.

Remedy :- picking the leaf rolls seem to be the only feasible one. Light trapping may prove effective. In India, if necessary arsenate is sprayed.

Caterpillar



moth with purple wings
wavy stripes of black
brownish colour.

Mr. Bohm

to note.

Ans.

18 June 1949

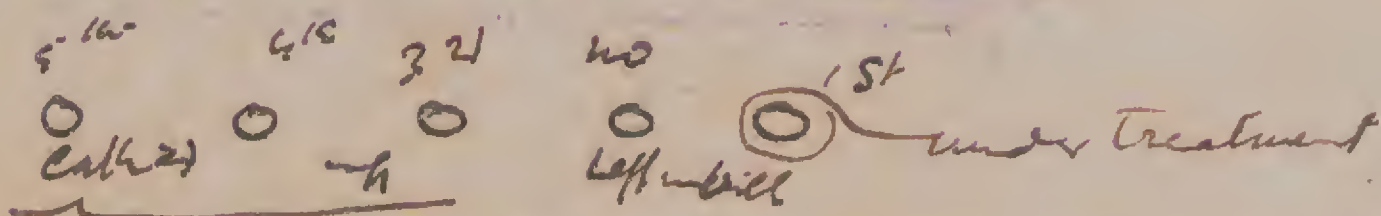
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About the bark disease of tree. Lansium Domesticum.

Causative factor seems to me to be a fly. (similar to the one already sent for identification.) Ants, secondary factor. observations by Prof. Baker. Arboreal -

The experiment and observations---



A

Scraping the bark (as far as possible within the reach of the ladder. Removing the ants and killing by spraying with a jet of of the Knapsack. Tree painted with soap, soft and carbolic. Tying coil soaked in the solution of the soap, at the base of the trunk. Treatment ~~with~~ for the 1st tree.

The second tree left untouched.

Third, fourth and fifth earthed up to block up the inlets of the antholes. (ants found out an outlet from the holes).

After 5-6 days it was observed ~~that~~ only one or two ants on the first tree. I cannot say how they got on the tree. The bark was ruptured in many places and had the flesh like that of an apple. On ~~this~~ these pustules flies were noticed with maggots ~~and~~ buried in the same.

~~XXXXXXXXXX~~

(2) On all other trees similar pustules were noticed and the flies hovering caught. (maggots and pupae also in the decaying parts). It is also noticed that ants do eat the bark. ~~this~~ This is or may be due to the scarcity of food. ~~or~~

The new pustules on the first tree were scraped out and in 8 cases out of ten I ~~of~~ found maggot in them. In some pustules I did not see any maggot but instead I could see a small hole

hole with a brownish spot at its base. I did not see any thing with the adequate power of my hand lens.

From the above it may be safely (as far as I have observed) be concluded that the fly is ~~the~~ at the root of the rotting of the bark.

DES.

This is Agromyzidae.

" Ants are arboreal. They have nests (mud, in some cases in their cases ~~but~~ dry logs rolled together), on the tree. Aphides are reared (found ⁱⁿ under mud nests).

{ on the 4th tree, purple aphides are found. The sp. of ants rearing them is different from that rearing white.

These observations, may, if you think, worth intimating Prof. Baker, be passed on to him.

Aphids can be sent for determination (in vial of alcohol) to
Mr. G. van der Goot
Experiment Station
Salatiga, Java

Memorandum

If the flies turn out to be of the genus *Agromyza* it is probable they may attack the living tissues but if of the fam. Sapromyzidae, these will feed on the sap exuding from other wounds. Wounds exuding sap and gummosis produced are usually invaded by maggots of various flies and by larvae of Nitidulidae and other beetles. Back of this the original gummosis may be induced by a variety of causes.

Ants are known to actively attack and destroy the juicy susceptible cambium of a variety of trees. A case of considerable economic importance is that of citrus trees in Cuba being severely injured by ant attack.

It is therefore, necessary, to investigate these features, one by one and determine their relationship.

In the meantime, the treatment
mentioned under paragraph A
offers a good alternative to the
attack. Use of gum resin
is a specific regimen
presently the cleaning and treating
with an antiseptic wash is
very good. In the latter case
Bordaux paste is used.

It is suggested that
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on trees where the birds
gather, is necessary.
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(over)

