# FRUIT FLY—CERATITIS CAPITATAY

## BAITING, TRAPPING AND LURING EXPERIMENTS

DURING the past summer and autumn a series of baiting, trapping and luring experiments have been carried out by the Entomological Branch, with a view to testing new and improved baits, traps and lures.

*Baiting.*—These baiting tests were made in breeding cages, using 50 flies in each, with the poisons arsenate of lead and sodium fluosilicate at varying strengths. The attractants in combination with the poisons were molasses and white sugar.

It was soon demonstrated that the molasses inhibited the poisoning effect of both poisons. This is a chemical reaction which we do not attempt to explain. Dr. Ripley, Department of Agriculture, South Africa, in reporting upon this fact, states in explanation that when treacle is used in combination with sodium fluosilicate, the lime in the treacle reacts chemically with the fluosilicate, producing compounds of much lower toxicity, but that it is not yet understood why it also lowers the toxicity of arsenate of lead. The same appears to apply to the use of molasses, as has definitely been proved in our experiments. Replacing the molasses by sugar, the toxic powers of these two poisons do not appear to be affected.

The use of molasses in the local arsenate of lead foliage bait accounts for the comparatively slow poisoning action on the fruit fly. This bait takes from 8 to 10 days to give 100 per cent. kill. It is probable that many of the flies continue to lay a proportion of their eggs after taking the bait. This bait, however, when applied systematically and regularly once a week, has considerably helped in the control of fruit fly. In the experiments just completed it has been definitely proved that sodium fluosilicate, when used with sugar, is more highly toxic to the fruit fly than arsenate of lead and sugar. The flies readily partake of the bait containing this poison and quickly die.

The following formula was used with great success :—

*Test* 1.—

| | | | |
|---|---|---|---|
| Sodium fluosilicate | .. | .. | 1 oz. |
| White Sugar | .. | .. | 2½ lb. |
| Water | .. | .. | 4 gallons |

This resulted in 100 per cent. kill of flies in 46 hours.

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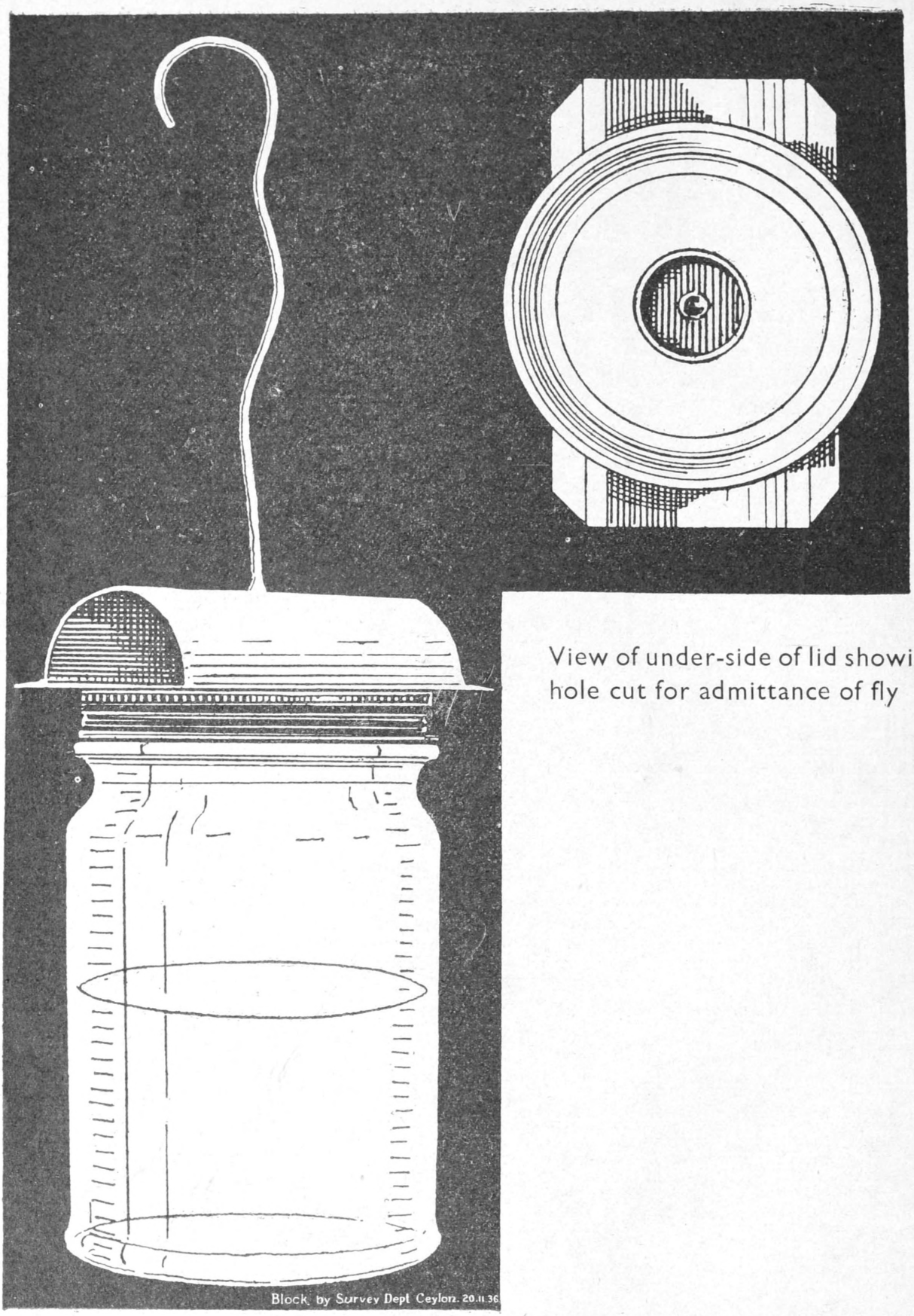
* By L. J. Newman, F.R.E.S., Government Entomologist and C. F. Jenkins, B.A., Assistant Entomologist, in the *Journal of the Department of Agriculture, Western Australia,* Vol. 13, No. 3, September, 1936.




View of under-side of lid showing hole cut for admittance of fly

BROWN'S FRUIT FLY TRAP

Note.—In this case the bottle was whitened for photographic purposes. A clear glass screw-topped bottle should be used

*Test* 2.—Formula :

| | |
|---|---|
| Sodium fluosilicate .. .. .. | 1 oz. |
| Molasses .. .. .. | 4 lb. |
| Water .. .. .. | 4 gallons |

It will be noted that the only difference was the substitution of the molasses for the sugar. This took 168 hours, or seven days, to give 100 per cent. kill of flies, against 46 hours when white sugar was used.

Following this definite proof of the inhibiting effect of molasses on the toxicity of sodium fluosilicate, similar tests were conducted with arsenate of lead.

*Test* 3.—Formula :

| | |
|---|---|
| Powdered Arsenate of Lead .. .. | 5 oz. |
| White Sugar .. .. .. | 4 lb. |
| Water .. .. .. | 4 gallons |

This gave a 100 per cent. kill in 120 hours or $5\frac{1}{4}$ days.

*Test* 4.—The same formula, substituting molasses for the white sugar :

| | |
|---|---|
| Powdered Arsenate of Lead .. .. | 5 oz. |
| Molasses .. .. .. | 4 lb. |
| Water .. .. .. | 4 gallons |

*Result.*—100 per cent. kill of flies in 216 hours, or nine days—nearly twice long as when white sugar was used.

This demonstrated that molasses has the same effect of reducing the toxicity of arsenate of lead as it had on the sodium fluosilicate.

*Test* 5.—Formula :

| | |
|---|---|
| Powdered Arsenate of Lead .. .. | 3 oz. |
| White Sugar .. .. .. | 4 lb. |
| Water .. .. .. | 4 gallons |

This resulted in 100 per cent. death of flies in 144 hours or six days. This was only 16 hours more than when 5 oz. of the arsenate of lead was used with sugar.

This would seem to indicate that there is not sufficient advantage gained by the increase of the arsenate of lead content above the 3 oz. to the four gallons of water.

A further test was made with the sodium fluosilicate and molasses, doubling the amount of the poison.

Formula :

| | |
|---|---|
| Sodium fluosilicate .. .. .. | 2 oz. |
| Molasses .. .. .. | 4 lb. |
| Water .. .. .. | 4 gallons |

This resulted in 100 per cent. kill of flies in 168 hours or seven days, being five days longer than when 1 oz. of the sodium fluosilicate was used with $2\frac{1}{2}$ lb. of white sugar to 4 gallons of water.

In carrying out these baiting experiments, all tests were duplicated.

To determine whether scdium fluosilicate would in any way injure trees or plants, a series of spraying trials were undertaken using double strength. This spray was applied to all kinds of fruit trees, shrubs and flowers, with negative effect, no sign of burning being noticeable. The bait was also found to remain moist and sticky for several days.

As the result of these series of experiments, the following foliage bait is advised :—

| Formula : | | |
|---|---|---|
| Sodium fluosilicate | .. .. .. | 1 oz. |
| Sugar | .. .. .. | 2½ lb. |
| Water | .. .. .. | 4 gallons |

The cost of this bait should not exceed 4*d*. per gallon. Allowing that each tree carrying fruit will require ½ pint of the bait, 1 gallon should be sufficient for 16 trees. The bait must be applied at least once every seven days and renewed when washed off by heavy rain.

Foliage baiting of deciduous fruit trees should be commenced when fruit is within seven weeks of ripening and continued until fruit is picked. Baiting of citrus trees carrying fruit should commence by the 1st of September and continue to the end of May. Advantage should also be taken of any fine period during the winter to apply the bait, thus poisoning the over-wintering flies.

It is important to refrain from baiting any fruit trees during the period of blossoming, as by so doing there is great danger of poisoning bees and other useful wasps, etc., which frequent the flowers. The fruit fly is essentially a fruit-infesting insect and does not attack the flowers.

The alternative formula, if sodium fluosilicate is for any reason not procurable, is the following :—

| | | |
|---|---|---|
| Powder Arsenate of Lead | .. .. | 3 oz. |
| White Sugar | .. .. .. | 2½ lb. |
| Water | .. .. .. | 4 gallons |

The juice of any fruit in season may be added.

In applying this bait it is essential to keep it well agitated as the poison has a tendency to precipitate to the bottom of the spray pump or bucket. The spray should not be applied too finely, a coarse nozzle being used so that it falls on to the leaves in the form of small rain drops. Apply to certain patches of foliage on two to four sides of the tree, avoiding the fruit.

*Trapping.*—Four types of covered traps were used namely Brown's "Slip On," new type, "Slip On," old type, and Green's new type. The "Slip On" old type was used as the control. The period of the test was from 8th April to the end of May.

The results were as follows :

Brown's captured 2,640 fruit flies
" Slip On " new type—2,559 fruit flies
" Slip On " old type—2,110 fruit flies
Green's new type—1,959 fruit flies

From these figures it will be seen that there is not much to choose between the first three traps, Brown's trap, which is not a proprietary trap, capturing the highest number.

Brown's trap is simple to construct. It is made with little labour, from any metal screw-topped glass jar, of about half a pint capacity. A hole about one inch in diameter is stamped or cut out in the centre of the lid. Over this hole is soldered a piece of galvanised iron in the shape of a small hood. To the hood is attached a piece of pliable wire, whereby the trap is suspended in the tree.

It is necessary that all traps shall be covered, as this reduces the evaporation of the lure, prevents flooding by rain and spilling over during windy weather. Covered traps can be used in citrus trees through the winter months, thus capturing the over-wintering flies.

In small orchards up to 200 trees, trapping is advised. At least two traps per tree should be used, the more the better. The traps should be placed about half way up the trees. During the months of November to March inclusive, they should be hung in a shady position and from April to October in sunny aspect.

In orchards of over two acres, it is recognised that the trapping method cannot be economically applied, foliage baiting being cheaper and more efficient. Traps can be used in large orchards as indicators, as to whether the fruit flies are present, thus acting as a guide for spraying.

*Lures.*—Beeco, clensel and Bordeaux mixture were the lures tested. Clensel was found to be the most effective and is therefore preferred. Beeco was also good. Bordeaux mixture proved somewhat attractive, but could not be called satisfactory. Clensel, 1 part to 30 parts water, is the luring formula recommended. It is easy to mix, the traps remain clean, and the captured flies are easily visible.

Finally, it must be pointed out that foliage baiting and luring must be supplemented by complete orchard sanitation, which means that all infested fruits must be picked from trees or ground daily and destroyed.

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