DEPARTMENTAL NOTES

THE SPOTTED LOCUST (AULARCHES MILIARIS)

J. C. HUTSON, B.A., PH. D.,
GOVERNMENT ENTOMOLOGIST

THE spotted locust has been known as a periodical pest of estate and village crops in Ceylon for about forty years, mainly in the middle portion of the Central Province, within a 20-25 mile radius of Kandy. Occasional outbreaks have occurred in the North-Western Province, and this pest has also been recorded from the following localities: Kegalle and Ruanwella in Sabaragamuwa Province, Veyangoda and Negombo in the Western Province, the Galle district in the Southern Province and Moneragala in Uva.

Its unusual prevalence in the Central Province areas during the years 1925-1927 led to a full investigation by the Entomological Division, and an article on this pest was published in the Year Book of this Department for 1926, pp. 36-44 giving details of its life-history and all the control measures known at this time. As the result of further experiments with insecticides a note appeared in *The Tropical Agriculturist* for February 1928, pp. 121-122, indicating the three stages of its development during which the spotted locust can be controlled, and recommending an insecticidal measure of control for the young hoppers.

SEASONAL OCCURRENCE

In the case of a pest which has such a long life cycle as the spotted locust, extending as it does over the best part of a year, it is essential to know the times of the year during which the various stages may be found in the field, so that the pest may be attacked at the weakest point or points in its life cycle.

The seasonal occurrence of the various stages has been known approximately for many years and the detailed study of the life history of this pest carried out at Peradeniya during 1926 served to confirm the numerous field observations. These observations, supplemented by the results of the breeding experiments, indicated the following approximate seasonal distribution:

The locusts attain the winged adult stage (fig. 1) from about July to about September and the females, after a period of feeding and mating, lay their eggs in holes in the ground during October to December. The adults die soon after egg-laying. The egg (fig 2) remain in the ground

for four months and the young hoppers (fig. 4) emerge in swarms from about February to April. For the first few days they cluster thickly on any low-growing plants, doing but little feeding; later on they eat the leaves of almost any cultivated plant. On tea estates they are partial to the interplanted dadaps, while in village cultivations they attack coconut, arecanut, jak, bread fruit, plantain, cardamoms, etc. The hopper stage lasts about 4 to 5 months, during which period there are six instars, or periods of feeding and growth between moults. Figures 4 to 7 show four of these stages. The hoppers become full-grown (fig. 1) and get their wings during July to September.

CONTROL MEASURES

When outbreaks of spotted locust occur on estates or among village crops, the insects are usually not noticed until they are about half-grown, at which stage they are very active and difficult to catch and are developing voracious appetites. Even at this stage, however, large numbers of them can be killed off by driving them into specially dug pits and trenches or into any convenient drains where they can be beaten down and killed or collected into sacks and crushed, or, better still, submerged in sacks in any available deep pools in neighbouring streams for at least 12 hours. Usually, however, and especially in village areas, they are allowed to develop unchecked until they get their wings, and during the next few weeks they are constantly flitting from place to place in search of fresh food, and often get into quite inaccessible positions at the tops of tall trees.

There are, however, three periods in the life cycle of this pest during which it can be destroyed with comparative ease:

(1) When the adult locusts are mating in pairs on the egg-laying grounds and are in a sluggish condition. This period would be during October, November and part of December, when the locusts can be collected into sacks and crushed or drowned and buried, or beaten down and killed on the spot.

(2) While the eggs are in the ground from about November to March, if the egg-laying areas have been noticed and marked, the egg-masses can be dug up and destroyed or exposed to weather conditions and natural enemies.

(3) When the young hoppers are emerging during February, March and part of April. All areas previously marked for eggs should be watched for the emergence of hoppers from undetected egg-masses. It is most important that the young hoppers should be destroyed during the first few days after hatching, since it is during this period that they are comparatively weak and helpless and can easily be collected and killed. It is at this stage also that they are most susceptible to control by the use of insecticides.

The simplest and cheapest form of insecticide is a soap and water solution made by dissolving soft soap or any good hard soap in water. For quite young hoppers up to a week or two old, 1 lb. of soap to 8 gallons of water is strong enough. When the locusts are about one in. long it takes a stronger solution to kill them, 1 lb. to 6 gallons being necessary. By the time they are 1½ in. long and over, spraying is no longer practicable on account of their greater activity and resistance to the spray. Therefore a careful lookout should be kept during the early months of the year for any emergence of young locusts and the spray should be applied as soon as possible after emergence. Where possible, the young hoppers should be driven into drains or pits or up against a bank where they can be sprayed to the best possible advantage. The soap solution is more effectively and economically applied with a machine giving a fine misty spray and the hoppers must be wet thoroughly. In an emergency the mixture can be applied with hand syringes or even with watering pots fitted with fine nozzles.

ANIMAL DISEASE RETURN FOR THE MONTH ENDED 31 JULY, 1935.

Province, &c.	Disease	No. of Cases up to Date since Jan. 1st 1935	Fresh Cases	Recoveries	Deaths	Balance Ill	No. Shot
Western	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	43	...	43	...	...	...
	Anthrax	...	...	...	...	..	...
	Rabies (Dogs)	11	2	...	...	...	11
	Piroplasmosis	...	...	..	...	...	...
Colombo Municipality	Rinderpest	..	...	...	...	...	...
	Foot-and-mouth disease	10	...	9	1	...	...
	Anthrax	2	.	...	2	...	...
	Rabies (Dogs)	14	3	...	...	...	14
	Haemorrhagic Septicaemia	...	...	...	..	...	...
	Black Quarter	...	...	...	...	...	...
	Bovine Tuberculosis	...	...	...	...	...	
Cattle Quarantine Station	Rinderpest	.	...	...	...	..	...
	Foot-and-mouth dlsease	...	...	...	...	...	...
	Anthrax (Sheep & Goats)	66	2	...	66	...	...
Central	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	1		...	...	...	1
	Anthrax	3	3	...	2	1	...
	Black Quarter	18	18	...	18	...	...
	Bovine Tuberculosis	8	8	..	...	...	8
	Rabies (Dogs)	2	2	...	...	...	2
Southern	Rinderpest Foot-and mouth disease Anthrax Rabies (Dogs)	FREE					
Northern	Rinderpest Foot-and-mouth disease Anthrax Black Quarter Rabies (Dogs)	FREE					
Eastern	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	40	...	40	...	...	...
	Anthrax	...	...	...	...	...	...
North-Western	Rinderpest		...		...	...	...
	Foot-and-mouth disease	105	6	100	5	...	...
	Anthrax	...	..	...	..	...	...
	Rabies (Dogs)	17	2	...	2	...	15
	Piroplasmosis	...	...	...	...	..	...
North-Central	Rinderpest	...	...	..	...	...	...
	Foot-and-mouth disease	301	197	218	...	83	..
	Anthrax	...	...		...	...	...
Uva	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	85	...	84	1	..	...
	Anthrax	...	...	...	...	...	...
	Bovine Tuberculosis	...	...	.	...	..	.
Sabaragamuwa	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	...	...	...	...	...	...
	Anthrax	...	...	..	...	...	...
	Piroplasmosis	2	...	1	1	...	...
	Haemorrhagic Septicaemia	9	..	2	7	...	...
	Rabies (Dogs)	5	...	...	...	...	5

Government Veterinary Department,
Peradeniya, 17th August, 1935.

M. CRAWFORD,
Government Veterinary Surgeon.

METEOROLOGICAL REPORT JULY, 1935.

Station	Temperature				Humidity		Amount of Cloud	Rainfall		
	Mean Maximum	Difference from Average	Mean Minimum	Difference from Average	Day	Night (from Minimum)		Amount	No. of Rainy Days	Difference from Average
	°	°	°	°	%	%		Inches		Inches.
Colombo	84·0	− 0·7	76·2	− 0·9	79	91	7·8	2·81	10	− 3·15
Puttalam	85·8	+ 0·4	77·1	− 1·1	74	84	6·0	0·06	1	− 1·30
Mannar	86·4	− 1·8	78·3	− 0·9	77	84	6·3	0	0	− 0·51
Jaffna	85·8	− 0·1	79·6	+ 0·2	77	82	5·5	0	0	− 0·56
Trincomalee	93·2	+ 1·6	78·6	+ 1·2	53	74	7·0	0·04	1	− 1·83
Batticaloa	93·4	+ 1·0	77·5	+ 1·0	56	76	7·6	0·26	3	− 0·91
Hambantota	87·1	− 0·9	75·3	− 0·9	74	91	6·0	0·92	7	− 1·51
Galle	81·8	− 1·2	75·8	− 1·2	86	91	6·0	2·29	10	− 4·41
Ratnapura	87·3	+ 0·8	74·5	+ 0.1	74	93	6·8	4·75	19	− 8·59
A'pura	92·6	+ 2·3	76·1	+ 0·4	58	88	7·0	0	0	− 1·36
Kurunegala	86·4	0	75·5	+ 0·4	69	84	7·1	1·12	10	− 3·00
Kandy	82·7	+ 0·3	71·0	+ 0·3	72	83	7·4	4·08	20	− 3·54
Badulla	88·2	+ 2·3	63·5	− 0·1	53	89	5·2	0·25	7	− 2·14
Diyatalawa	78·9	+ 0·7	63·8	+ 1·6	51	67	5·8	0·26	5	− 1·70
Hakgala	68·8	+ 0·8	58·0	+ 0 8	72	75	5·8	6·03	20	− 1·30
N'Eliya	65·7	+ 0·1	54·5	− 0·1	79	88	7·7	9·36	22	− 2·47

The rainfall of July was below normal over almost the whole Island, the only appreciable area reporting excess being the district between Hatton and Maskeliya, where the rainfall was slightly above normal. Deficits were most marked in the inland low-country districts to the west and south-west of the hills.

North of the Batticaloa-Puttalam line, only a few stations reported any rain at all during the month.

A few stations on the south-western slopes of the hills reported falls of over 20 inches, the highest being 25·98 inches, at Luccombe.

There were no daily falls of 5 inches or over during the month.

As regards barometric pressure, barometric gradient, and wind, the usual south-west monsoon/conditions prevailed during the month.

There was fairly frequent rain, generally slight in amount, in the hills and the south-west of the Island, from the beginning of the month till the 17th. From then till the 27th there was very little rain anywhere. After that the rain increased again, and some moderately heavy falls were reported, on the 29th and 30th, in the south-west of Ceylon.

Monthly mean temperatures showed no marked deviations from normal. Humidity and cloud were well below normal in the hills, and elsewhere generaly about normal.

Barometric pressure was a little above normal in the west, and a little below normal in the east; the gradient was therefore a little steeper than usual. On the east coast wind was above normal, elsewhere at the coast generally below normal. Its direction was mainly S.W.

H. JAMESON,
Supdt. Observatory.