

ハスモンヨトウの交尾率に及ぼす性比および密度の影響

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Influence of Sex Ratio and Density on the Mating Success of *Spodoptera litura* F. (Lepidoptera: Noctuidae)¹

Through their observation on the fecundity of *Spodoptera litura* in net-covered wooden frames, ÔTAKE and SAKURATANI (1972) demonstrated a tendency towards the decrease in the total number of deposited eggs with the lowering of the male ratio. In that study, the number of female moths in each frame was fixed and their fecundity was investigated by collecting egg masses which were deposited within the frame 2 days after the release of the moths.

In 1972, a similar study was made by us by using frames of the same kind. In this case, however, the possession of spermatophores by females was examined, and the density and the sex ratio of adult moths confined in the frame were varied by the following procedures:

On a plot cultivated with taro plants, *Colocasia antiquorum* SCHOTT, in the farm of the Shikoku Agricultural Experiment Station, 9 sets of net-covered wooden frames with the same dimensions (3.3 m × 3.3 m × 1.6 m) as used by ÔTAKE and SAKURATANI (1972) were arranged. Unmated 2-day-old moths (mass-cultured) were confined in the frames in such 9 combinations of sexes as shown in the first and second columns of Table 2. These combinations were randomly allotted to the 9 wooden frames. Wings on one side of each female was tethered with a thread to one of the leafstalks of a plant which was randomly selected from the 16 plants within a frame. Tethering was unavoidable because it was shown through our preliminary test that when females were allowed to move freely within the frame, recapturing them was so difficult that we failed to collect some of them. The males were randomly placed

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on taro leaves to enable them to take to wing and seek the tethered females on their own. The tethering of females and the placement of males were carried out just before sunset, when they were calm. The females were brought into the laboratory in the following morning and dissected for the presence of spermatophores. The observations were repeated 5 times during the period from September to October, 1972.

The influence of the tethering of females upon the mating was investigated as follows: Net cages, 90 cm × 90 cm × 40 cm in dimensions, were arranged among taro plants. In each cage, a tethered female, an untethered female and a male were confined together. The end of the thread tethering the female was tied to a small bamboo stake which was planted on the ground through the net. The females were dissected the following morning. Twelve cages were arranged at one time. Result shown in Table 1 indicates that the tethering would have no unfavourable influence upon the mating.

The numbers of mated females in the respective combinations of both sexes are shown in Table 2. The figures within the 5 repetitions are rather variable in the combinations with high male densities. However, it is clearly pointed out that the numbers of mated females tended to increase as the male density was raised.

As noted by OYAMA (1972), either sex of *S. litura* usually mates only once during a night. Even in our present investigation, both in the wooden frames and in the net cages, each one of the mated females possessed single spermatophore. So, we can regard the number of females with spermatophores as the number of mated females. Thus, the mating rate of males in each combination was calculated by the method as in Table 2. However, this mating rate of males (last column of Table 2) does not show any tendency

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Table 1. MATING SELECTION BETWEEN TETHERED AND UNTETHERED FEMALES BY A MALE CONFINED IN A NET CAGE.

Repetition no.	Spermatophore discovered in:			Total
	tethered female	untethered female	neither female	
1	4 ^a	5	3	12
2	4	3	5	12
3	4	5	3	12
4	5	5	2	12
5	5	5	2	12
6	4	4	4	12
Total	26	27	19	72

^a The number of cages belonging to any of the 3 categories in each repetition.

Table 2. THE NUMBERS OF MATED FEMALES AND THE MATING RATE OF MALES IN EACH OF THE 9 COMBINATIONS OF BOTH SEXES

Combination		No. of females with spermatophores					Total (A)	Total of males released (B)	Mating rate of males (A/B)
No. of males	No. of females	Repetition							
		1	2	3	4	5			
1	4	0	0	1	1	0	2	5	0.40
2	4	2	2	1	2	1	8	10	0.80
2	8	1	2	1	2	2	8	10	0.80
4	4	3	3	3	3	2	14	20	0.70
4	8	1	3	3	2	3	12	20	0.60
4	16	2	4	3	3	3	15	20	0.75
8	8	4	6	5	4	5	24	40	0.60
8	16	5	3	5	8	6	27	40	0.68
16	16	5	10	11	14	8	48	80	0.60
Total		23	33	33	39	30	158	245	0.64

to vary regularly in accordance with the change in sex ratio or density.

All the raw data given in Table 2 were totalled to get the average rate of mated males. The rate thus calculated was 0.64 as seen at the bottom of the table, and this is fairly lower than the rate of the same kind, 0.74 ($=72-19/72$), in the net cage test. However, this discrepancy appears to be reasonable because of a great difference in space between the wooden frame and the net cage.

To find the mating rate during 12 hours of darkness in the laboratory, 79 pairs of both sexes were prepared. Each pair was held in a glass cylinder 9.0 cm in diameter and 6.0 cm in height at 25°C. Sixty-three of the 79 females had single spermatophore each, and no female carried more than one spermatophore. The mating rate was calculated to be 0.80. Some of the pairs remained unmated, even after they were confined throughout

the night in such a limited space to make contact of both sexes nearly unavoidable.

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