SHORT COMMUNICATIONS

Relationship between the Field Cage Reproductive Capacity and Some Quantitative Characteristics of the Pupae and Adults of the Darksided Cutworm, *Euxoa messoria* (HARRIS) (Lepidoptera: Noctuidae)¹

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Abstract. *Euxoa messoria* (HARRIS) were reared in insectary during two years. The weights and the lengths of the pupae as well as the widths of the heads and the lengths of the fore wings of the adults were measured. Significant correlations between these measurements and the fecundity of the female were demonstrated. No differences in the lengths of the fore wings were observed between the females and the males. The results of these studies can be used for an evaluation of the field fecundity of *E. messoria* after sampling of pupae and adults.

The darksided cutworm *Euxoa messoria* (HARRIS) is the most important pest of tobacco plantations in southwestern Ontario (CHENG 1971) and causes serious damages to tobacco in Québec (MELOCHE et al., 1980) as well as to other market garden crops (HUDON et MARTEL, 1973). The eggs overwinter and hatch during April. The young larvae begin to feed on rye and in late May move and cause damages to tobacco seedlings (BUCHER and CHENG, 1970).

A relation between the number of eggs laid by *E. messoria* females and the pupa weight has already been demonstrated in the laboratory (CHENG, 1972). In this paper, the correlations between the reproductive capacity (number of eggs laid per female) and some quantitative characteristics of the pupae (weight and length) and adults (length of the fore wings and width head) of the

darksided cutworm were studied under field cage conditions.

Experiments were carried out in 1979 at Lavaltrie (75 km, north-east of Montreal) and 1980 at Laval-des-Rapides (suburb of Montreal) in screened insectary measuring 10×6×7 feet and 8×6×3 feet respectively. Sand of the type used in tobacco plantations was put inside each insectary. During the last week of May 1979, one insectarium was infested with approximately 10,000 eggs and on May 15, 1980, two others with 1,000 and 2,000 third instar larvae of *E. messoria* respectively. The larvae were fed on rye.

During the first week of August, pupae were collected, identified to the sex (CHENG, 1970), measured, weighed and individually stored in a styrofoam tube (2.5 inch diameter by 4 inch high). One extremity of the tube containing the pupae was pushed in the soil, the other was covered by a net. Each pupae was stored in the same insectarium until emergence of adult.

The adults were transferred to oviposition cages and fed with 10% honey. Each cage containing one pair was kept in the field under a protective screen tent. Eggs were collected every three days and counted for each couple. At the end of the experiment the width of the head (including eyes) and the length of the fore wings of the adults were measured. Twenty five and fourty females were used in 1979 and 1980 respectively to determine the relation between the number of eggs laid and the measurements taken from the pupae and adults as described above. The females used were those within or superior to the female standard deviation of the mean female longevity in order to minimize the ratio of incomplete ovipositions. The coefficient of correlation was calculated and regression lines were traced. The data was analyzed by the student test.

As presented in Table 1 the different values obtained from measurements of males were slightly higher than for the females. The difference between these values was not found to be significant if few insects were sampled. When the number of measurements increased, only non significative difference between the males and the females concerning the length of adults fore wings and the adult longevity remained (Table 1). As also stated by CHENG (1972) following laboratory investigations,

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Table 1. Some quantitative characteristics of pupae and adults of the darksided cutworm *Euxoa messoria* (HARRIS)

	1979 ^a		1980 ^b	
	Males $\bar{x} \pm SE$	Females $\bar{x} \pm SE$	Males $\bar{x} \pm SE$	Females $\bar{x} \pm SE$
Pupae weight (mg)	(97) 216.25 $\pm$ 34.72	(108) 208.65 $\pm$ 33.79	(125) 192.15 $\pm$ 24.14	(120) 180.80 $\pm$ 24.08***
Pupae length (mm)	(97) 15.83 $\pm$ 0.92	(108) 15.49 $\pm$ 0.82**	(125) 15.20 $\pm$ 1.38	(120) 14.80 $\pm$ 1.46*
Adult head width (mm)	(41) 2.82 $\pm$ 0.13	(42) 2.78 $\pm$ 0.17	(82) 2.73 $\pm$ 0.14	(73) 2.62 $\pm$ 0.10***
Adult fore wing (mm)	—	—	(64) 14.99 $\pm$ 0.56	(73) 14.97 $\pm$ 0.72
Adult longevity (days)	(30) 19.73 $\pm$ 5.88	(44) 19.66 $\pm$ 5.47	(82) 19.77 $\pm$ 7.97	(71) 19.61 $\pm$ 6.32

	1980 ^c	
	Males $\bar{x} \pm SE$	Females $\bar{x} \pm SE$
Pupae weight (mg)	(37) 189.70 $\pm$ 24.41	(47) 184.53 $\pm$ 26.39
Pupae length (mm)	(37) 15.27 $\pm$ 0.83	(47) 14.94 $\pm$ 0.69
Adult head width (mm)	(24) 2.58 $\pm$ 0.12	(33) 2.61 $\pm$ 0.15
Adult fore wing (mm)	(13) 14.77 $\pm$ 0.64	(33) 14.91 $\pm$ 0.79
Adult longevity (days)	(24) 21.54 $\pm$ 7.32	(33) 20.79 $\pm$ 5.49

^{a, b, c} Insectariums infested by approximately 10,000 eggs, 2,000 larvae and 1,000 larvae respectively.

^d Number of insects observed.

*, **, *** indicates a significant difference at $p < 0.05$, $p < 0.01$, $p < 0.001$ respectively between males and females.

Table 2. Some quantitative characteristics of the pupae and adults of *Euxoa messoria* (HARRIS) females in relation with the fecundity

	Females (1979) ^a $\bar{x} \pm SE$	Females (1980) ^b $\bar{x} \pm SE$
Pupae weight (mg)	215.80 $\pm$ 39.98	182.60 $\pm$ 21.41
Pupae length (mm)	15.60 $\pm$ 0.83	14.92 $\pm$ 0.70
Adult head width (mm)	2.79 $\pm$ 0.20	2.61 $\pm$ 0.10
Adult fore wing (mm)	—	14.93 $\pm$ 0.70
Adult longevity (days)	21.44 $\pm$ 3.62	21.25 $\pm$ 6.34
No. of eggs laid per female	854.32 $\pm$ 328.97	706.37 $\pm$ 182.08

^a 25 females observed.

^b 40 females observed.

Table 3. Relationship between the number of eggs (*Y*) laid and some quantitative characteristics (*X*) of the darksided female

Characteristic	1979		1980	
	Regression equation	Correlation coefficient	Regression equation	Correlation coefficient
Pupae weight (mg)	$Y = 6.34X - 514.36$	0.771**	$Y = 5.86X - 363.35$	0.689**
Pupae length (mm)	$Y = 238.64X - 2871.30$	0.605**	$Y = 131.64X - 1258.20$	0.505**
Adult head width (mm)	$Y = 1220.76X - 2556.49$	0.749**	$Y = 990.56X - 1877.74$	0.554**
Adult fore wing (mm)	—	—	$Y = 126.36X - 1180.54$	0.487**

** Significant at 0.1% level of confidence.

we found no difference in the longevity between the adult males and females reared in field cage condition.

The females studied in 1979 were larger and weighed more than those reared in 1980. The number of eggs laid increased by 17.32% (Table 2). CHENG (1972) found a highly significant correlation between the weight of the pupae and the fecundity of *E. messoria* reared in the laboratory. Our studies conducted in field cage conditions lead us to the same conclusion. Furthermore a significant correlation (0.01% level) between the fecundity of the insect and the width of the head, the length of the fore wings of adult females or the length of the pupae was demonstrated during our experiments in 1979 and 1980 (Table 3). Regression relationship demonstrated that the highest significant correlation was obtained between the weight of female pupae and the fecundity (Table 3). The female fecundity was also related in decreasing order to the width of the adult head, length of pupae and length of adult fore wings (Table 3).

Our results demonstrated that knowledge of the weight of the pupae could be helpful in the determination of the field fecundity of *E. messoria*. However, sampling in the soil of the pupae of this insect is difficult. For this reason, measurements of some adult characteristics are more practical for the determination of the fecundity of a field population of *E. messoria*.

Finally no significant difference was found between the fore wings length of males and females (Table 1). Therefore, the measurements of fore wings of males trapped by pheromones will be useful to assess the fecundity of field population of *E. messoria* since capture by light traps proves difficult (CHENG, 1973).

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Stathmopoda masinissa MEYRICK and
Eretmocera impactella (WALKER)
 (Lepidoptera: Stathmopodidae)
 New to the Fauna of Thailand^{1,2,3}

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It is well known that *Stathmopoda masinissa* MEYRICK is a serious pest of the persimmon, *Diospyros kaki* THUNBERG, in Japan. This species also inhabits Taiwan and Central China as well as Sri Lanka, but has hitherto been unrecorded from Southeast Asia. On 26th August 1981 a single female of *masinissa* was collected at Kao Yai, Nakorn Nayok Province, Central Thailand by the senior author in the course of a lepidopterological expedition to Thailand. It was identical with the Japanese specimen of *masinissa* in superficial appearance and genital character. This is the first record of this species from Thailand.

Stathmopoda masinissa MEYRICK was originally described from a female specimen taken in Sri Lanka. This species had long appeared in the Japanese literature as *Kakivoria flavofasciata* NAGANO, until KASY (1973) synonymized not only *Kakivoria* with *Stathmopoda* but also *flavofasciata* with *masinissa*. The type-series of *flavofasciata* is no longer extant. The biology is utterly unknown in China, Sri

Lanka and Thailand, but it is quite certain that the larva feeds on fruits or buds of trees of the genus *Diospyros*, including economic plants used for food or wood, in these countries.

Eretmocera impactella (WALKER) is also recorded herewith from Thailand for the first time. The senior author collected four males of this species at Ta Ton near Fang (Chiang Mai Province) in the northern extremity of Thailand on 17th July 1981. According to FLETCHER (1920), it is common throughout the plains of India, Burma and Sri Lanka; it also occurs in Singapore and Taiwan. The larva feeds on *Amaranthus* (some of the plants being important annual vegetables in the tropics), *Achyranthes aspera* LINNAEUS and *Alternanthera sessilis* (LINNAEUS) DE CANDOLLE (Amaranthaceae) and *Vernonia cinerea* LESSING (Compositae), webbing up the heads of the plants in India (FLETCHER, 1920, 1933), but could not be found in Thailand. The larva, pupa, adult and affected plant were illustrated in colour by FLETCHER (1920).

The *impactella* adult varies considerably in markings on the forewing. All the Thai specimens examined, however, have the average markings, i.e., the blackish forewing with four distinct orange-yellow spots. Having examined the genitalia, the authors have found that *impactella* belongs to *Eretmocera*, and that *Eretmocera* is not referable to the family Stathmopodidae, where some genera (e.g., *Oedematopoda* and *Snellenia*) similar in superficial appearance to it are placed. They are tentatively placing *Eretmocera* in this family, however, until its true systematic position is determined.

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