Several life traits history of *Oomyzus sokolowskii* parasitoid of Diamondback moth.

THE species Oomyzus sokolowskii *(Kurdjumov), a major parasitoid of Diamondback moth (DBM)* Plutella xylostella *(L.) pest of Brassicaceae is a potential biological control agent against this species. These species are gregarious and cosmopolitan like its host (Fitton and Walker, 1992).*

The aim of this work is to study under laboratory conditions some life history traits of this Hymenoptera species. The life-traits knowledge is very important to build entomophagous programs to control populations DBM in cabbage crops field farmers in tropical areas.

Female in laying position on *Plutella xylostella* larva

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Material and Methods

O. sokolowskii adults emergence.

- The parasitoid population was obtained from parasitized pupae of DBM collected in cabbage crop (*Brassica oleracea* var. capitata) in Fass Boye, in the "Niayes" area, situated in North West of Senegal. The population of DBM is native to the same locality.
- The rearing of the host and its parasitoid were conducted in climate rooms with the following conditions: 25 °C temperature, 60% relative humidity and 12L/12D photoperiod.
- Traits such as development stage cycle, reproductive mode, host age preference, foraging behaviour of the female were assessed. All tests performed in this study were realized in the laboratory of Entomology for International Cooperation in Agronomic Research for Development Center (CIRAD) in Montpellier (France).
- All data were analyzed with the software StatView 4.55.

Results

- The duration of the larval stage is between 4 and 7 days. The pupal stage during 7 days. In our study conditions, the development time from egg to adult is 15 days. (Table 1)
- Parasitism rate was significantly different between unmated and mated females ($t = 6.391$, $df = 6$, $P = 0.0007$).The mated females produced normal sexual offspring (male and female) while unmated females have produced only males. (Table 2)
- The parasitism rate varies significantly with age of the host ($F = 26.23$, $df = 4.16$, $P < 0.0001$). This rate is significantly higher at the L4 larval stages. (Table 3)
- The parasitism rate was significantly different in the three laying-boxes ($F = 15.87$, $df = 2.18$, $P < 0.0001$). Male offspring number was significantly different among the three laying-boxes ($F = 5.87$, $df = 2.18$, $P = 0.008$). Female offspring number was significantly different among the three laying-boxes ($F = 10$, $df = 2.18$, $P = 0.001$). The offspring development time was significantly different between the laying-boxes ($F = 9.01$, $df = 2.18$, $P = 0.004$). (Table 4)

Table 1. Developmental stage of parasitism and *O. sokolowskii* biological cycle.

J0	Laying inside L4 larvae
J+1	Eggs inside L4 or pupae
J+2	Eggs inside pupae
J+3	Hatching
J+4	Young larvae, visible holes inside the pupae
J+5	Idem
J+6	Ponctued larvae visible trough the pupae
J+7	Prepupae
J+8	White pupae
J+9	Idem
J+10	Pupae eyes begin red
J+11	All pupae eyes are red
J+12	Pupae body become black
J+13	All pupae body are black
J+14	Idem
J+15	Adults emergence

Table 2. Offspring productivity, parasitism percentage and sex ratio (% female) between mated and unmated *O. sokolowskii* female.

	Males	Females	Total progeny	Parasitism (%)	Sex ratio
Mated female	1.80 ± 0.40 a	8.40 ± 0.70 a	10.20 ± 1.00 a	45.60 ± 3.90 a	83.00 ± 2.00 a
Unmated female	10.30 ± 0.90 b	0.00 ± 0.00 b	10.30 ± 0.90 a	12.20 ± 0.10 b	0.00 ± 0.00 b

Values are mean ± SE. Numbers in columns followed by the same letter are not significantly different (P > 0.05).

Table 3. Host age preference in *O. sokolowskii* females on immature DBM stage.

Host age	Parasitism %	Min / Max
2nd	39,9 ± 7,6 b	23,3 / 63,3
3rd	54,7 ± 8,7 b	23,3 / 73,3
4th	75,9 ± 2,4 c	70,0 / 83,3
Prepupa	15,3 ± 5,9 a	0,0 / 36,7
Pupa	0,0 ± 0,0 a	0 / 0

Values are mean ± SE. Numbers in columns followed by the same letter are not significantly different at P = 0.05 (ANOVA; Fisher). Min = Minimum; Max= Maximum.

Table 4. Laying box volume effect on the parasitism percentage and the *O. sokolowskii* female production.

Laying box	Parasitism %	Females laid	Males	Females	Total adults	Cycles (days)	Sex-ratio
3 (A)	30,0 ± 15,3 b	3	0,7 ± 0,3 a	5,9 ± 3,0 a	6,6 ± 3,4 a	14,3 ± 0,3 a	89,5 ± 0,8 a
7 (B)	85,5 ± 7,6 c	10	2,1 ± 0,6 b	13,6 ± 1,7 b	15,7 ± 2,0 b	15,7 ± 0,3 a	86,8 ± 2,3 a
40 (C)	5,0 ± 5,0 a	1	0,2 ± 0,1 a	0,8 ± 0,5 a	1,0 ± 0,6 a	18,0 ± 0,0 b	80,0 ± 0,0 a

Values are mean ± SE. Numbers in columns followed by the same letter are not significantly different at P = 0.05 (ANOVA; Fisher).

Conclusion

- The *O. sokolowskii* life cycle lasted 15 days. The parasitism rate is significantly different between mated and unmated females which imply that mating stimulates the behaviour of parasitism. Females can parasitize all larval stages including prepupae of DBM. However, the parasitism rate was higher in the fourth larval stages. The host-seeking behaviour is influenced by volume.
- The results presented in this study provide valuable information on some *O. sokolowskii* life traits history, a major natural enemies of DBM, pest of Brassicaceae. This information can help a better understanding on the biology of this species and allow more efficient use of this parasitoid in the programs of population management of DBM in the release of entomophagous.

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