

# BIOLOGICAL STUDIES OF A PREDATOR *SYCANUS INDAGATOR*<sup>1</sup>

## I. LIFE HISTORY AND FEEDING HABITS<sup>2</sup>

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### ABSTRACT

*Sycanus indagator* Stål eggs held at 72-78°F hatched 18 days after being laid and nymphal development averaged 82 days. Starvation of newly hatched nymphs for 8 days and adults for 21 days resulted in death or no egg production. Nymphs fed on several insect species, but cannibalism was uncommon. Larvae of *Pseudoplusia includens* (Walker) were quickly paralyzed after beak penetration by the nymphal or adult predator.

The use of imported predators to reduce pest populations is well documented and in some cases has been very successful (DeBach 1971). One method of utilization of an imported predator would be to mass-release individuals ready to feed when the pest populations surpass economic damage levels (Ridgway and Jones 1969).

Bugs were reared in the laboratory to study their biology and to determine if *Sycanus indagator* Stål could be used for control of the soybean looper, *Pseudoplusia includens* (Walker).

### METHODS

Nymphs were reared in pint and half-pint pasteboard cartons and were fed looper larvae. The top was covered with a glass petri dish allowing light to enter the carton and permitting behavioral observations. Each carton contained from 1 to 50 individuals.

Development from egg to adult was investigated in several environmental temperature regimes with 1 nymph/container. One group was reared in the laboratory where the temperature ranged between 72 and 78°F while another group was held in a constant 84°F chamber. A third group of 10 nymphs was held in a temperature chamber with a daily range from 42 to 65°F, rising 2°F/hr for 12 hr and falling 2°F/hr for 12 hr. A second chamber was set for 44 and 78°F rising 3°F/hr for 12 hr and falling 3°F/hr for 12 hr.

Egg development was studied in the laboratory and field at Quincy. Eggs were transferred to the field the morning after they were laid, and were checked daily for hatch and survival. Companion egg masses were held in the laboratory.

After looper larvae were introduced into rearing containers, the loopers'

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feeding behavior was observed. Varying numbers of bugs of each instar were observed feeding at several different times. Starvation tests consisted of holding 4 to 12 nymphs per replication until 1 of the group died. Nymphs were held 1/glass vial in each of 3 replications following death of 1 nymph for each replication. The living individuals were given larvae to feed on and the predators' survival or reproduction was recorded.

#### RESULTS AND DISCUSSION

Individuals held at 84°F required 98.9 days from eclosion to the adult molt (Table 1). Nymphs held in the laboratory with the temperature varying between 72° and 78°F matured in 82 days, 17 days less than the 84° group. The principal difference was that the 5th stadium lasted 48.6 days at 84° compared to 24.8 days in the laboratory. The last stadium in the 44-78° chamber was 97 days, 4 times longer than the previous stage, and twice as long as at 84°. Adults held at 84°F and at 72-78°F laid eggs 5 days after the last molt. Egg hatch occurred after 17.8 days at 72-78°F and 10 days at 84°F. Incubation took 15-22 days in the field on soybean plants during August 1971 at Quincy. The air temperature during that time ranged from 66 to 93° and averaged 79.5° in a weather shelter. Ten nymphs held in a 42-65°F chamber lived 25-29 days and did not molt or grow even though they did feed on 23 small larvae. Eggs did not hatch at those temperatures. Nymphs held at 44 to 78°F had good survival and passed the first 4 stages in 23 to 25 days each (Table 1).

Nymphs reared in ½ pint, round, pasteboard containers developed faster and grew larger when several were kept together in comparison to solitary nymphs. The groups of nymphs molted sooner than the single nymphs and when fed appeared more aggressive. Cannibalism was uncommon when nymphs of a similar age were kept together. Only twice was cannibalism observed; starved adults were feeding on a weakened companion. Groups reared in ½ pint cartons for 18 months showed very little evidence of mortality due to cannibalism in the laboratory.

TABLE 1. DEVELOPMENT OF *Sycanus indagator* HELD INDIVIDUALLY IN THE LABORATORY AT 72° TO 78° F AND IN TEMPERATURE CHAMBERS DURING 1971 AT QUINCY, FLORIDA.

Life Stage*	No. days to complete life stage at indicated temperature		
	72-78°F	84°F	44-78°F
Egg	17.8	10.0	—
1	13.4	10.9	23
2	12.2	12.8	25
3	16.3	12.0	24
4	15.3	14.6	24
5	24.8	48.6	97
Nymphal development	82.0	98.9	193

\* The 72-78°F test began with 17 individuals of which 5 molted to healthy adults. In the 84°F and 44-78° chamber, 10 nymphs were used and only 1 died, during the 3rd stage.

Feeding bugs attacked larvae by penetrating the exoskeleton with their beak. Larger larvae were attacked in the middle of the back. After penetration, the predator remained motionless for 1 to 3 min. until the larvae stopped moving. Prey did not resume activity once they became motionless. Moving hosts were more often attacked than were still larvae.

The first nymph to attack would immobilize the larvae, then more would join to feed. A last-stage soybean looper larva was often fed on by 4 to 10 nymphs at one time. They lined up around the larvae and were inactive while feeding except when disturbed. This would last for several minutes to over an hour.

An important consideration for the success of a predator is the starvation period it can withstand. Starvation time was considered as the number of days until ca. 50% died. Four adults died 21 days after starvation began, and the remaining 3 died within 28 days, even though they were being fed larvae. No eggs were produced by the adults that had been starved 21 days and then fed. Eight newly-hatched nymphs were held without food for 8 days when 4 died. The remaining 4 were given larvae, but none fed. They died on the 9th day.

Feeding preference studies in the laboratory using larvae of the Mexican bean beetle, *Epilachna varivestis* Mulsant, an armyworm, *Prodenia ornithogalli* Guenée, southern green stink bug, *Nezara viridula* Linn, cabbage looper, *Trichoplusia ni* Hübner, and an unidentified tent caterpillar indicated a slight preference for the larvae with fewer spines. Feeding on adult Mexican bean beetles and stinkbugs was observed in the laboratory. Nymphs feeding on 1 species continued to feed on that species when given a choice, but there was little problem getting them to change food hosts following total replacement of the host species. It seemed probable that host specificity would not limit them to a single species in the field.

Molting was observed several times and took ca. 20 min. If the nymphs were forced to move during ecdysis they often had deformed appendages after molting. Last-stage nymphs did not feed for several days before molting, in some cases up to 10 days. Freshly molted individuals were bright orange to red and became red and black within an hour.

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