RESEARCH NOTE

MODIFICATION OF THE LABORATORY MASS-PRODUCTION TECHNIQUE FOR *Orius tantillus* (Mots.) (ANTHOCORIDAE, HEMIPTERA)

Marcela M. Navasero[1], Belen Morallo-Rejesus[2], Gliceria A. Hirao[3] and Mario V. Navasero[4]

[1]University Researcher, Department of Plant Pathology, College of Agriculture, University of the Philippines Los Baños, College, Laguna 4031,
[2]Professor Emeritus, Department of Entomology, College of Agriculture, University of the Philippines Los Baños, College, Laguna 4031
[3]University Research Associate, National Crop Protection Center, College of Agriculture, University of the Philippines Los Baños, College, Laguna 4031 and
[4]University Researcher, National Crop Protection Center, College of Agriculture, University of the Philippines Los Baños, College Laguna 4031

The predatory bug *Orius tantillus* (Mots.) is a general predator of thrips, mites and other small and soft-bodied arthropods. Some studies have been conducted on the bug covering its reproductive, developmental and survivorship rates, predatory capacity and functional response including mass-rearing {Manley, 1976 [Entomol. News. 87: 103-110]; Mituda and Calilung, 1989 [Philipp. Agric. 72 (2): 165-184]; Navasero and Calilung, 1997 [Philipp. Agric. 80 (3&4): 134-154]; Calilung *et al.*, 1998 [Philipp. Agric. 81 (1&2): 67-76]. Studies of cited authors showed that *O. tantillus* is a promising biological control agent against *Thrips palmi* Karny. It was also reported to prey on eggs of the noctuid *Heliothis obsoleta* and other lepidopterous pests in China {Chang and Lim, 1985 [Science Press, Beijing, China. pp. 191-196]}. More recently, it was evaluated for the control of the *Vanda* thrips, *Dichromothrips corbetti* (Priesner), and Asian corn borer (ACB), *Ostrinia furnacalis* (Guenee), under the study "Mass colonization and evaluation of the anthocorid bug, *O. tantillus*, against ACB". This study was part of a three-year project entitled "Development of a biological control-based IPM for the control of Asian corn borer, *Ostrinia furnacalis* (Guenee)," funded by the Department of Agriculture-Bureau of Agricultural Research, from November 1999 to December 2002.

O. tantillus possesses some characteristics of an ideal biological control agent such as high reproductive rate, short generation time and high predatory capacity {Mituda and Calilung, 1989[Philipp. Agric. 72 (2): 165-184]}. Also, the female oviposits in plant tissues, ensuring protection of the eggs from the attack of parasitoids and predators as well as from ovicidal effects of pesticides. Moreover, the adults are omnivorous, foraging on inflorescence of various crops and weeds, thus ensuring their survival during months when the natural preys are scarce.

The previous method of rearing *O. tantillus* in the laboratory made use of bean sprout as oviposition substrate, amaranth inflorescence as moisture or water source for developing nymphs, *Suidasia pontifica* and eggs of *Corcyra cephalonica* as preys and glass bottles as rearing units. The modification introduced included the use of flowers of *Vanda* orchid and bean pods as oviposition substrates, flowers of *Sesbania grandiflora* as water source for developing nymphs, the mite *Tetranychus truncatus*, and thrips *D. corbetti* as additional preys, and zip-lock bags as oviposition and rearing units. The modification of the method was necessary since the rearing bottles used were no longer available in the market and introduction of other predators harbored on the amaranth inflorescence could hardly be avoided.

In modifying the rearing protocol, different oviposition substrates were tried, offering them separately (no choice) to actively reproducing adult *Orius* inside oviposition bags measuring 30 cm x 40 cm. After 24h oviposition access time, each substrate was removed and inspected for the presence of eggs. The substrates found acceptable for oviposition were further evaluated for egg hatchability and as possible source of moisture for the developing nymphs of the predator. The best substrates were as follows:

Baguio bean pods and *Vanda* flowers. These were washed in running water, blot-dried on clean cloth or paper towel, or simply air-dried. Fresh pods/flowers were preferred; however, excess flowers could be kept in the refrigerator at about 10°C and 80% RH and used later.

Katuray flowers. Fully mature flowers of katuray, *S. grandiflora*, served as moisture or water source for developing nymphs of *Orius* in addition to *Vanda* flowers. They should be offered fresh to the predators.

Additional preys were also evaluated and the following species were found easy to mass produce:

D. corbetti. This prey was mass-reared using *Vanda* flowers in zip-lock bags following the mass-rearing technique of Navasero *et al.* {2002, Philipp. Ent. 16(1): 33-41}.

T. truncatus. The truncate mite was collected from *Eichornia crassipes* and reared on the same host in the laboratory.

The zip-lock cage was also evaluated as rearing unit and was found more suitable than the rearing jars used previously. This was a rectangular commercially available zip-lock plastic bag. On one side, a 10cm x 10 cm square area was cut off and replaced with paper towel (Kotex ®) which provided aeration while preventing escape of predators. A galvanized iron wire size #22, about 1m long, was bent (as shown in Fig. 1a & b), and inserted in the bag to prevent adhesion of the sides, thus increasing aeration inside and preventing build-up of unnecessary moisture. The bottom side of the bag was lined with plain paper and 2-ply tissue paper to absorb excess moisture and serve as refuge for newly hatched nymphs. The tissue paper served also as a good receptacle for prey *Suidasia* mites as it prevented them from wandering about and kept them within the reach of the predator, thereby minimizing cannibalism among newly hatched nymphs of *Orius* when they could not find the prey readily. The bags were emptied, cleaned and dried after use. These were reusable for rearing another 100-200 individual predators. Each bag was zipped and placed in an open-type cabinet.

MASS-REARING PROCEDURE

Parent stock. To start the rearing, natural populations of *Orius* were collected from inflorescence spikes of *Amaranthus* weed growing in the wild or planted for the purpose, or from tassels and silk of corn.

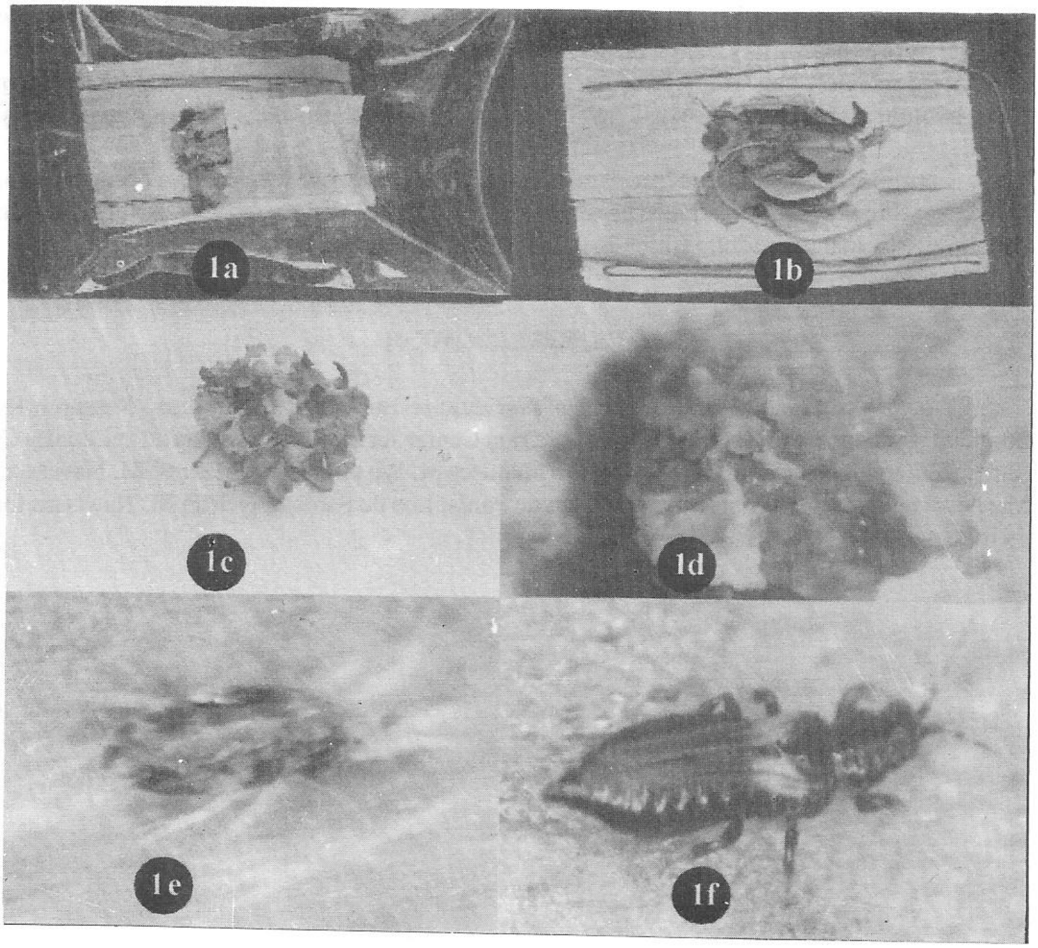

Fig. 1. Set-up for mass-rearing *Orius tantillus* (Mots): a) rearing unit - zip-lock bag, b) rearing medium inside the bag, c) fresh *Vanda* flowers d) flour mite, *Suidasia pontifica* Oudeman, e) *Tetranychus truncatus* Ehara, and f) *Dichromothrips corbetti* (Priesner).

Oviposition. Natural populations of *Orius* were confined in zip-lock cages. Petals of *Vanda* (Fig. 1c) were placed inside as oviposition substrates for the females. After 24 h oviposition access time, and daily thereafter, the petals were replaced with new ones. To ensure that the insects remain in the bag and were not removed together with the replaced petals, the bugs were brushed off with camel's hair brush or the petals were slightly tapped to dislodge all the bugs. The pods/petals were then washed and transferred to another zip-lock bag for incubation and rearing of nymphs later. When most of the adults were no longer productive, these were discarded and the bags cleaned for another batch of rearing.

Nymphal feeding. When the eggs were expected to hatch, a scoop of *Suidasia* mites (Fig. 1d) was placed at the center of the tissue paper where the petals were arranged in a circle. A fresh petal or two of *Vanda* and *Sesbania* were likewise added as moisture sources and additional refuge for newly hatched nymphs. Additional petals of *Vanda* and *Sesbania* were added as needed. At day 8 or 9, leaf of water lily infested with mites (Fig. 1e) was added for additional prey. At day 12 or 13 when *Orius* adults started emerging, adult *Dichromothrips* (Fig. 1f) were added as prey. When most of the adults had emerged, the bugs were aspirated and transferred to a new bag with fresh subtrates for feeding, mating and ovipositon. Rearing of *Orius* nymphs, oviposition and survival of adults in zip-lock plastic bags were monitored daily.

Continuous availability of prey and moisture source is critical to the developing nymphs and the rearing procedure described provided this condition. The nymphs were well fed, bigger, and developed to larger adults which had longer life span and higher fecundity.

ACKNOWLEDGMENT

We wish to thank the Department of Agriculture-Bureau of Agricultural Research for financial assistance, the National Crop Protection Center for facilities used, and Dr. Leonila C. Raros for her suggestions in improving the manuscript. We also thank Maurell M. Navasero, Marites Atienza, Linda Malabanan, Wilson de Panis, Leo de Panis & Nelson M. Navasero for their help.