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# USE OF AN INFUSION-BAITED GRAVID TRAP TO COLLECT ADULT *OCHLEROTATUS JAPONICUS*

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ABSTRACT. *Ochlerotatus japonicus* adults have proven difficult to collect in significant numbers in the USA. Standard trapping and collection methods have been ineffective. Infusion-baited gravid traps, typically intended to attract *Culex* spp., have provided the greatest number and most consistent supply of *Oc. japonicus* adults collected in New Jersey.

**KEY WORDS** *Ochlerotatus japonicus,* gravid trap, West Nile virus surveillance

Since its discovery in the northeastern USA in 1998 (Peyton et al. 1999), adult *Ochlerotatus japonicus* (Theobald) have been difficult to collect in large numbers for virus testing. Traditional light and $CO_2$-baited traps rarely collect more than a single *Oc. japonicus* on a given trap night, even in areas where large larval populations exist. Recent isolations of West Nile virus (WN) from *Oc. japonicus* in the northeastern USA demonstrate the need to find an effective method of collecting this mosquito for virus testing and vector surveillance purposes.

During New Jersey's routine mosquito trapping of *Culex* spp. for WN testing, several gravid traps set in Sussex County, New Jersey, regularly collected *Oc. japonicus.* Larval surveys of the county in 1999 revealed that *Oc. japonicus* was present throughout the county and in large numbers near several trap locations. This led us to investigate the gravid trap's potential as a collecting method for *Oc. japonicus* in 3 different habitats in New Jersey.

We used commercially available battery-powered gravid traps (Hausherr's Machine Works, Toms River, NJ) designed for the collection of *Culex* spp. (Reiter 1983). Each trap was powered by either a rechargeable 6-V gel cell or four 1.5-V D-cell batteries. Both grass and hay infusions were used as attractants. The infusions were made by placing approximately 0.9 kg (2 pounds) of fresh grass clippings or hay into a 121-liter (32-gal) plastic trash can, adding 5 g of brewer's yeast, and 114 liters (30 gal) of tap water. The lid was then securely fitted (both to facilitate the fermentation process, and to prevent mosquitoes from gaining access), and the container was left in a sunny location while the mixture was allowed to ferment for 5–7 days before use.

Traps were placed near known breeding habitats for *Oc. japonicus* in Sussex, Warren, and Ocean counties, New Jersey. Each county provided very different larval habitats. The Sussex County sites were all in close association with homes and businesses, and the majority of *Oc. japonicus* larvae were found in small-volume (1-liter or less) artificial containers including tires, tarps, and plastic milk cartons, although a few larvae were collected from tree holes near these sites. The traps placed in Warren County were near rockpools of varying sizes in the Delaware Water Gap National Recreational Area. The Ocean County trap site was located on a rural horse farm where the primary larval habitat for *Oc. japonicus* was in automatic water dispensers that service individual paddocks.

Traps were set out in the morning or afternoon and collected the following day. Individual trap times ranged from 12 to 26 h. The $CO_2$-baited traps were placed for comparison near several of the gravid traps. Upon collection, the trap nets were placed in a dry ice cooler for approximately 5 min to immobilize the mosquitoes, and the collections were transferred to a labeled plastic vial for transportation back to the laboratory.

A total of 125 *Oc. japonicus* were collected over 20 trap nights in Sussex, Warren, and Ocean counties (Table 1). All but 2 of the *Oc. japonicus* collected using the gravid traps were females, and approximately two thirds of those females were gravid. The average number of *Oc. japonicus* collected in a single trap night was 6.25 and the number recovered from any single trap ranged from 0 to 31.

The majority of gravid trap collections came from Sussex County, where *Oc. japonicus* was collected on 14 of 16 trap nights. A total of 110 *Oc. japonicus* was collected in Sussex County, 65 of which were gravid females.

Two gravid traps were set in Warren County near natural rockpools that contained large numbers of *Oc. japonicus* larvae. Although the catch was small, possibly because of an unexpected heavy rainfall that night, 12 of the 19 mosquitoes collect-

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Table 1. Individual gravid trap collections by night with number of each species collected.[1]

| County | *Oc. japonicus* | *Cx. restuans* | *Cx. pipiens* | *Oc. triseriatus* | Other species |
|---|---|---|---|---|---|
| Sussex | 13 | 0 | 0 | 0 | 0 |
| | 0 | 59 | 2 | 0 | 0 |
| | 1 | 24 | 0 | 0 | 0 |
| | 1 | 2 | 1 | 0 | 0 |
| | 31 | 92 | 22 | 0 | 0 |
| | 11 | 6 | 6 | 1 | 0 |
| | 1 | 150 | 51 | 0 | 0 |
| | 3 | 30 | 1 | 4 | 0 |
| | 24 | 77 | 8 | 9 | 0 |
| | 4 | 14 | 0 | 1 | 0 |
| | 7 | 121 | 0 | 0 | 0 |
| | 0 | 123 | 0 | 0 | 0 |
| | 2 | 7 | 0 | 0 | 0 |
| | 3 | 7 | 0 | 0 | 0 |
| | 8 | 33 | 2 | 0 | 0 |
| | 1 | 7 | 2 | 0 | 0 |
| Warren | 11 | 6 | 0 | 0 | 0 |
| | 1 | 0 | 0 | 0 | 1[2] |
| Ocean | 3 | 300 | 50 | 2 | 1[3] |
| | 0 | 76 | 27 | 2 | 0 |
| Total no. collected | 125 | 1,134 | 172 | 19 | 2 |
| Mean no. collected per trap night | 6.25 | 56.7 | 8.6 | 0.95 | 0.1 |

[1] *Oc., Ochlerotatus; Cx., Culex.*
[2] One unidentified *Culex* sp.
[3] *Aedes vexans.*

ed in the 2 traps were *Oc. japonicus* females, 9 of which were gravid.

Smaller numbers of *Oc. japonicus* were collected at the rural horse farm in Ocean County. This was most likely because of the lower density of larval habitat than that found at either the Sussex County site or the Warren County site. Two traps were placed in the early morning, and checked at dusk, but no mosquitoes of any species were collected during this period. When the traps were gathered the following morning, 1 contained more than 300 *Culex restuans* Theobald, 50 *Cx. pipiens* (L.), 2 *Ochlerotatus triseriatus* (Say), a single *Aedes vexans* (Meigen), and 3 gravid *Oc. japonicus.* The other trap collected *Cx. pipiens, Cx. restuans,* and *Oc. triseriatus,* but no *Oc. japonicus.* In all cases, the $CO_2$-baited traps collected lower numbers of different species than the gravid traps, but no *Oc. japonicus.*

Infusion-baited gravid traps have provided the majority of adult *Oc. japonicus* collected in the state of New Jersey. One major advantage of the gravid trap is that the mosquitoes are collected live, which allows them to be tested for the presence of WN and other arboviruses. Infusion-baited gravid traps may prove to be a useful tool in surveillance efforts for *Oc. japonicus.*

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