

and treatment of affected individuals, and for curtailment of malaria transmission, control of mosquito vectors is undertaken. Vector control requires knowledge of the ecology of breeding and resting habitats and behavior of various species of mosquitoes. The life of mosquitoes is influenced by variations in climatic conditions, and hence there is diversity in the distribution and habitats of different vector species. Periodical surveys are essential for arriving at any conclusion for developing vector control strategy. Routine entomological surveys over vast geographic areas are impractical, time consuming and expensive and therefore are confined to limited areas. Malaria transmission by major vector mosquitoes depends on their ecology, on their environmental determinants of distribution, and also on the ecology of humans. The result is a complex interaction among populations of humans, mosquito vectors and pathogens, and between these populations and the environment. The spatial and temporal distribution of malaria is restricted typically by the geological range of humans and mosquitoes (or both), and by their habitat preference. Several new tools such as GIS, Global Positioning System (GPS), remote sensing, and spatial modeling provide new means for data gathering, management, integration, and analysis. The example of how the spatial model (wetness and slope indices) can identify breeding habitats of malaria mosquitoes will be presented.

**The Entomology and Nematology Department, Institute of Food and Agricultural Sciences, University of Florida. Gainesville, Florida, USA. 27 February 2004.**

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## **SEASONAL DISTRIBUTION, BIOLOGY, AND HUMAN ATTRACTION PATTERNS OF CULICINE MOSQUITOES (DIPTERA: CULICIDAE) IN A FOREST NEAR PUERTO ALMENDRAS, IQUITOS, PERU**

**Jones JW, Turell MJ, Sardelis MR, Watts DM, Coleman RE, Fernandez R, Carbajal F, Pecor JE, Calampa C and Klein TA**

This study was conducted as part of a field ecology study of arboviral activity in the Amazon Basin, Peru, to determine the taxonomy, frequency, seasonal, and vertical distributions of potential mosquito vectors. In addition, the relative efficiency of human-landing collections and dry ice-baited Centers for Disease Control (CDC)-type light traps was determined for collecting mosquitoes. A total of 70 species of mosquitoes from 14 genera were collected from June 1996 through December 1997 at a forested site near Puerto Almendras, ≈20 km west-southwest of Iquitos, Peru. Three species [*Psorophora (Janthinosoma) albigena* (Peryassu), *Ochlerotatus (Ochlerotatus) fulvus* (Wiedemann), and *Ochlerotatus (Ochlerotatus) serratus* (Theobald)] accounted for 70% of all mosquitoes captured in human-landing collections. Overall, biting activity occurred throughout the 24-h cycle but was higher during the daytime, primarily because of large populations of two day-biting species, *Ps. albigena* and *Oc. serratus*. *Oc. fulvus* was active throughout the 24-h cycle but was more frequently collected during the evening. *Oc. fulvus*, *Ps. albigena*, *Culex (Melanoconion) pedroi* Sirivanakarn & Belkin, and a mixture of *Culex (Melanoconion) vomerifer* Komp, and *Culex (Melanoconion) gnomatos* Sallum, Huchings & Ferreira, accounted for 73% of the mosquitoes captured during darkness) by human collectors. In general, *Ochlerotatus* spp. and *Psorophora* spp. were more commonly captured in human-landing collections, whereas most *Culex* spp. were more frequently collected in the dry ice-baited CDC-type light traps. In general, mosquito populations were lowest from June through

August when river levels were at their lowest. Two large population peaks occurred in November-December and in February-March as a result of "flood water" mosquito populations (e.g., *Ps. albigenu*). These data provide a better understanding of the taxonomy, population density, and seasonal distribution of potential mosquito vectors within the Amazon Basin region and allow for the development of appropriate vector and disease prevention strategies.

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## **SOIL ANALYSIS OF ANOPHELINE AQUATIC HABITATS IN NORTH-WESTERN THAILAND**

**Kankaew P, Jones JW, Krasaesub S and Sithiprasasna R**

Thailand is the country where anopheline mosquitoes are vectors transmitting human malaria. The epidemiology of malaria is largely dependent on its vector habitat. Each species of *Anopheles* larvae has a specific habitat requirement for its development. Anopheline mosquitoes are common throughout Thailand and utilize a wide variety of habitats. The dominant malaria vectors in Thailand are *An. dirus*, *An. maculatus*, and *An. minimus*. Correlation between soil chemical components and existing of particular species of anopheline in specific anopheline aquatic habitat was studied from September 2002 to July 2003 in Ban Khun Huay, Ban Pa Dae, and Ban Tham Seau of Maesod district, Tak province, Thailand. Mapping of each habitat was performed by using a GPS unit. A total count of 2,130 laboratory reared adult *Anopheles* were collected from 138 habitats categorized into 11 different types identified to 18 species from larval sampling in three villages. The dominant malaria vectors in Thailand; *An. dirus*, *An. maculatus*, and *An. minimus* were found 5.26%, 10.70%, and 55.31% respectively along with other minor species. Results and statistical analysis will be discussed.

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## **TEMEPHOS RESISTANCE BY BOTTLE AND BIOCHEMICAL ASSAYS IN *Aedes Aegypti* IN THAILAND**

**Sithiprasasna R, Saelim V, Kankaew P, and Jones JW**

Bottle bioassay measuring time-mortality rate is a simplified procedure for detecting insecticide resistance. It can be used with biochemical microplate assay to identify mechanism involved. This integrated approach was used to detect temephos resistance in *Aedes aegypti* from Nonthaburi and Roi Et. *Ae. aegypti* BKK1 laboratory strain was used as the susceptible reference strain. Appropriate concentration of insecticide for bottle bioassay determined empirically with *Ae. aegypti* BKK1 strain was found to be in the range of 800-1,050 µg/bottle. Time-mortality rate at 800 µg/bottle was 170±8.66 minutes, significantly different from time-mortality rates at 850, 900, 950 and 1,050 µg/bottle (p=0.008) with 135±15.00, 140±8.66, 135±15.00, and 125±8.66 minutes, respectively. Cutoff concentration selected for resistance detection was 850 µg/bottle.