EVALUATION OF “TRED-NOT™” DEERFLY PATCHES
AGAINST HOST-SEEKING DEER FLIES
(DIPTERA: TABANIDAE) IN NORTH FLORIDA

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ABSTRACT

“TRED-NOT™” DEERFLY PATCHES” (6.4 × 14.2 cm adhesive strips) affixed to the
back and front of nylon mesh solid black and solid white “baseball” caps were evalu-
ated for their ability to trap host-seeking Chrysops celatus Pechuman, C. vittatus
Weidemann, and Diachlorus ferrugatus (F.). Trials were conducted in a commercial
pine bottomland forest habitat in northwestern Florida during peak seasonal abun-
dance of these species. No D. ferrugatus were captured on patches but approximately
26% of host seeking Chrysops (regardless of patch location, cap color or fly species)
were captured compared with a standard aerial sweep net method. Significantly more
deer flies were captured on patches affixed to the back of the cap compared with
patches placed on the front. No statistical difference (>0.05) existed in number of flies
trapped on patches when cap colors (white versus black) were compared.

Key Words: Chrysops celatus, Chrysops vittatus, Diachlorus ferrugatus, personal pro-
tection

RESUMEN

Parches marca “TRED-NOT™” para la captura de moscas Chrysops celatus Pechu-
man (tiras adhesivas de 6,4 × 14,2 cm) pegadas al frente y al dorso de mallas de nylon
Host-seeking deer flies can often become a serious nuisance and large pestiferous populations can certainly discourage enjoyment of outdoor activities. Repellents applied to exposed skin have not been very effective against these pests especially for extended periods of time (Anderson 1985). Insecticides applied to, or impregnated in, clothing have been reported to provide some repellency in field situations (Schreck et al. 1978 and Carlson 1996). Recently, adhesive patches (affixed to headwear) have been advertised in various retail/outdoor recreational supply catalogs as an effective way to “stop biting deer flies”. This author is unaware of any published studies, conducted under Florida conditions, where such products have been evaluated. As a result, a field study to evaluate a commercially available adhesive patch against three species of host-seeking deer flies was conducted late spring, 1998.

MATERIALS AND METHODS

This study was conducted from May 27 through June 8, 1998 in Walton and Bay Counties, Florida, at a time when Chrysops vittatus Weidemann, C. celatus Pechuman and Diachlorus ferrugatus (F.) were at seasonal peak abundance as documented by Jones & Anthony (1968), Cilek and Schreiber (1996, 1999) and Cilek et al. (1994), respectively. “TRED-NOT™ DEERFLY PATCHES” (6.4 × 14.2 cm double-sided adhesive-coated fabric patches Detex, Leroy, Michigan) were used in all evaluations. Although package directions indicated that one strip be affixed to the back of a hat, or cap, comparisons were made with a strip placed in front and back to determine if location affected patch trapping effectiveness. Patches were affixed to “baseball” caps made of nylon mesh with solid foam fronts (Cobra Caps, Bangladesh). Solid-colored white and black hats were compared to determine if color influenced fly collections. Controls consisted of similar mesh caps with patches affixed in same locations as treatments but covered with a non-adhesive backing strip (used by the manufacturer to prevent adhesive strips from adhering to the packaging material). Adhesive patches were used once per test.

Evaluations were conducted in three geographically separate but similar habitats (at least 50 km apart) where only one fly species occurred. Each habitat consisted of abandoned commercial pine bottomland forests that contained a mixture of slash pine (Pinus elliottii Ex. Chapm.) magnolia (Magnolia grandiflora L.), and live oak (Quercus virginiana Mill.). Two non-continuous linear transects, each 30-m, were staked out in each location. One person walked the length of each transect back and forth (i.e. 60 m) and total number of deer flies attached to adhesive strip(s) recorded at the end of that
transect. After this, aerial net (32 cm diam) samples were then conducted by the same person in the same area. Sampling consisted of continually swinging the net in figure “8” sweeps that started at ankles and ended above the head while walking each transect (Cilek and Schreiber 1996). This method (herein referred to as a standard) was used as a “best estimate” to quantitatively compare abundance of host-seeking flies in the immediate vicinity of the sampler (i.e. control) with those captured on patches (i.e., treatment). Net collected flies were counted at the end of each transect and released. Treatments and standards were replicated twice per habitat per species on ten different dates.

Statistical Analysis

Data were transformed using $\sqrt{x+1}$ prior to analysis and subjected to ANOVA (PROC GLM, SAS Institute 1990). A Student-Newman-Keuls test was used to determine differences ($<0.05$) in overall mean fly abundance relative to patch (treatment) vs standard (control) collections, patch location (front vs back), hat color (white vs black), and Chrysops species (Sokal and Rohlf 1981). These data sets did not include D. ferrugatus as none were captured on adhesive patches. All mean data in tables are untransformed means.

RESULTS

Overall, significantly fewer host-seeking Chrysops ($F = 343.07$, df 1, 159; $P < 0.0001$) were collected from adhesive patches compared with the standard (Table 1). Adhesive patches captured approximately 26% of the fly population netted by the standard. Moreover, about 21% (17 out of 80) of the patches captured no flies at all. Patches affixed to the back of caps captured significantly more flies than those affixed to the front ($F = 193.03$ df 1, 159; $P < 0.0001$) (Table 1). No significant difference was observed in number of deer flies caught on white hats versus black hats ($F = 0.81$; df 1, 159; $P = 0.37$).

Overall, significantly more C. vittatus ($9.9 \pm 0.9$) were collected from the standard and patches compared with similar collections for C. celatus ($5.4 \pm 0.5$) ($F = 6.898$, df 1, 159; $P < 0.0001$). This difference was probably related to location/habitat, and/or relative population size, rather than species preference. As stated earlier, no D. ferrugatus were trapped on adhesive patches regardless of cap color or patch location although they were collected in the aerial net sampling standard (mean $11.4 \pm 0.5$).

DISCUSSION

The effectiveness of TRED-NOT™ DEERFLY PATCHES to trap deer flies was influenced by a fly’s host-seeking behavior. Chrysops preferred the upper regions, especially the head, and were readily trapped on the patches. D. ferrugatus was not captured because this species primarily visited the lower extremities when trying to obtain a blood-meal (Fairchild and Weems 1973, McKeever and French 1997).

Adhesive patches did capture both Chrysops species. Collection differences relative to patch location (i.e. front vs back) were interesting. Attraction of host-seeking deer flies to a person walking is well known (Bram 1978) but the orientation to the back of a human’s head may result from a “downwind” plume of expired carbon dioxide. Carbon dioxide has long been recognized as a strong attractant for host-seeking Tabanidae (Bram 1978).
There appeared to be no cap color preference relative to number of *Chrysops* trapped on patches, although, it has been well documented that tabanids are generally attracted to dark objects (Bram 1978). Because the study area bordered well-known tabanid developmental habitats (i.e. bottomland swamps/marshes), color preference may have not been an important factor for short-range host seeking, when expired carbon dioxide (signalling a potential blood host) was present.

In conclusion, TRED-NOT™ DEERFLY PATCHES captured some of the *Chrysops* attracted to a person’s head but did not completely trap all these pests visiting this body region. However, the amount of personal annoyance perceived from host-seeking deerflies is often relative. Therefore any device or method, including the one evaluated here, that removed or reduced host-seeking *Chrysops* (either perceived or actual) may be of general benefit to those seeking relief from such outdoor pests.

**REFERENCES CITED**


FRUIT FLIES (DIPTERA: TEPHRITIDAE) INFESTING FRUITS OF THE GENUS PSIDIUM (MYRTACEAE) AND THEIR ALTITUDINAL DISTRIBUTION IN WESTERN VENEZUELA

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ABSTRACT
A survey of fruit flies infesting Psidium fruits was conducted in western Venezuela from June 1992 through December 1995. Of 201 fruit samples collected from 139 localities at altitudes between sea level and 2,000 m, four species of Psidium plants were found in the western region of Venezuela. These were P. guajava L. (10-1930 m), P. guineense Sw. (100-1950 m), P. caudatum McVaugh (1800-1950 m) and P. friedrichstalianum (Berg) Niedenzu (35-1700 m). Four tephritid fly species were reared: Anastrepha striata Schiner, A. fraterculus (Wiedemann), A. obliqua (Macquart), and Ceratitis capitata (Wiedemann). All four fruit fly species emerged from P. guajava. A. striata was the most common on P. guajava, P. guineense and P. friedrichstalianum, with an infestation range of 96.1%-97.0%. P. caudatum was more frequently infested by A. fraterculus (94.5% adults emergence); the plant’s distribution was restricted to highlands. Observations on the altitudinal distribution of A. striata on P. guajava showed that the highest infestation (253.9 adults/kg fruits) occurred at about 1,000 m. The infestation rate of P. guajava by A. fraterculus and A. obliqua varied with elevation. In low elevation areas (0-1,200 m), A. obliqua was found more frequently than A. fraterculus, whereas A. fraterculus was found more frequently than A. obliqua in high altitude areas (1,201-2,000 m). C. capitata was erratically encountered in this study.

Key Words: Anastrepha, Ceratitis capitata, guava, Psidium spp., altitudinal distribution

RESUMEN
Desde junio de 1992 a diciembre de 1995 se estudiaron las moscas de las frutas (Diptera: Tephritidae) que infestan plantas del género Psidium en el occidente de Venezuela. De 201 muestras de frutas colectadas en 139 localidades a altitudes entre el nivel del mar y 2,000 m, se encontraron cuatro especies de plantas Psidium en la región occidental de Venezuela. Estas fueron P. guajava L. (10-1930 m), P. guineense Sw. (100-1950 m), P. caudatum McVaugh (1800-1950 m) y P. friedrichstalianum (Berg) Niedenzu (35-1700 m). Cuatro especies de moscas de la familia Tephritidae fueron criadas: Anastrepha striata Schiner, A. fraterculus (Wiedemann), A. obliqua (Macquart) y Ceratitis capitata (Wiedemann). Todas las cuatro especies de moscas de frutas emergieron de P. guajava. A. striata fue la más común en P. guajava, P. guineense y P. friedrichstalianum, con una tasa de infestación de 96.1%-97.0%. P. caudatum fue más frecuentemente infestado por A. fraterculus (94.5% emergencia de adultos); la distribución del plantío estaba restringida a las áreas altas. Observaciones sobre la distribución altitudinal de A. striata en P. guajava mostraron que la infestación más alta (253.9 adultos/kg frutas) ocurrió a alrededor de 1,000 m. La tasa de infestación de P. guajava por A. fraterculus y A. obliqua varió con la elevación. En áreas de elevación baja (0-1,200 m), A. obliqua fue encontrada más frecuentemente que A. fraterculus, mientras que A. fraterculus fue encontrado más frecuentemente que A. obliqua en áreas de alta altitud (1,201-2,000 m). C. capitata fue erráticamente encontrada en este estudio.

Key Words: Anastrepha, Ceratitis capitata, guava, Psidium spp., distribución altitudinal