

# Prairie Pest Management

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## Executive Summary

### Field Testing of ThermaCELL® Mosquito Repellent against Spring Aedes in Canada

**Introduction:** Field testing of ThermaCELL® Mosquito Repellent in Canada against Spring Aedes mosquitoes was undertaken to provide field data against this aggressive group of mosquitoes. The data were also needed to support product development in Canada. The Schawbel Corporation commissioned the study conducted by Dr. Roy Ellis of the Consulting Firm, Prairie Pest Management.

**Location:** LaBarriere Park is 1 km south of Winnipeg, MB, Canada (97° 10' W, 49° 54' N). It is an area of continuous river-bottom forest. Trees included green ash, bur oak, American elm, and Manitoba maple. The test sites were open grassy areas within the park, adjacent to wooded areas along the LaSalle River.

**Summary:** The ThermaCELL® area repellent system was placed outdoors in an area **heavily infested with adult Aedes mosquitoes**. Continuous and repeated biting counts were taken in the treated area and in an adjacent control area on four separate evenings during the first week of July 2000. The mosquitoes collected were predominantly *Aedes vexans* and *Aedes sticticus*. The data from the two areas were compared.

## Results

The results of this study were as follows: Generally, very high levels of mosquito bite protection were provided by the ThermaCELL® unit at distances of:

- **7.5 Foot Circle.** Protection averaged 79.8%
- **15-Foot Circle.** Protection averaged 81.1%
- **30-Foot Circle.** Protection averaged 62%

The downwind position provided the highest level of protection, averaging 79.5%. Overall, the ThermaCELL® area repellent system provided an average 74% protection, up to 15 feet (4.57 m) from the source.

## Discussion:

**Biting Pressures:** Throughout the 4 trials, the biting intensities of the **mosquito populations** were considered **high to extremely high**. Usually, more than 33 mosquitoes were collected from each test subject during each 30-minute test period. On average, each test subject endured 111 bites on the exposed calf of one leg during each 30-minute exposure in the untreated area. The maximum number of biting mosquitoes collected over a 30-minute period from any one subject was 623 mosquitoes; the minimum number was 6 mosquitoes. As expected, the biting intensities usually increased towards the time of sunset during each test evening.

**Mosquito Collections and Identifications:** Of the 12,901 mosquitoes collected coming-to-bite on the 6 test subjects, during the 4 evenings, 3287 were identified to species using the keys provided in Wood, Dang, and Ellis (1979, Mosquitoes of Canada). Seven species were present. *Aedes sticticus* dominated on 3 evenings; *Aedes vexans* dominated on the other evening. Overall, *Aedes sticticus* made up 66.8% of the mosquito population. *Aedes vexans* was second at 20.3%. The other 5 species present were *Aedes intrudens* (7.6%), *Aedes cinereus* (3.0%), *Aedes provocans* (2.1%), *Aedes canadensis* (<0.1%), and *Aedes dorsalis* (<0.1%).

**Weather Conditions** During each of the 4 evenings when the tests were done, the temperatures were warm, ranging from 18-32 degrees C, with clear to partly cloudy skies, and relatively calm winds. The relative humidity ranged from 33 to 98%. No rainfall occurred during any of the test periods.

**Objectionable Characteristics of the ThermaCELL® System** No **negative comments** were reported for the mosquito repellent by any of the test subjects.

**Statistical Analyses** Comparisons of average biting intensities in the treated and untreated sites were made at each distance and position using a two-sample t-test, assuming unequal variances (Microsoft Excel 2000, Microsoft Office). The maximum probability of a type-I error was set at 0.05 for all analyses.

The ThermaCELL® System provided an average of 74% protection from a mixed population of *Aedes* spp. This estimate of reduced biting intensity is based on measurements from 3 distances (i.e., 3.75, 7.5, and 15 feet), a variety of test subject positions relative to wind direction (i.e., downwind, upwind, and perpendicular to the wind direction), and over a period of 4 evenings. This level of protection is significantly different from the average level of biting activity experienced at the untreated sites, where  $t = -6.175$  and  $p = 1.82E-08$ .