

Engaging the Community to Defeat Biting Midge

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Abstract

Hervey Bay is a coastal city of 47,000 people and is 3.5 hours drive north from Brisbane near heritage-listed Fraser Island. As people shift to live nearer the ocean, areas close to mangrove habitat within the city boundaries have come under pressure to be developed for housing. Areas recently developed are affected by biting midge.

There has been no treatment against the effects of biting midge for people moving into the local community. The midge species *Culicoides ornatus* occurs along coastal Australia from Darwin to Tin Can Bay, and recently in Brisbane. It is a painful biter and has been shown to cause health effects to humans. This includes painful blisters that may become infected when scratched and often leads to scarring.

Public demand to find a solution to the problem forced the local council to investigate methods of control that were safe, sustainable and acceptable to government agencies such as Queensland Fisheries and the EPA. Through a biting midge committee with scientific, community and elected representation a product, later registered as Bistar, was identified and tested giving 90 per cent control against biting midge (and mosquitoes) for a period up to three months. This paper is a case study of the process that has resulted in UN Habitat recognition of the process as good practice in improving the living environment.

Introduction

The continuing 'sea change' phenomenon has seen a marked increase in people living in close proximity to the coast. This shift has seen land developed for housing in many coastal habitats, including mangrove areas, previously left undeveloped. People shifting to these environments for the first time are usually unaware of biting midge and are often very susceptible to bites. These bites itch when scratched and may develop secondary infections, which then can lead to more serious consequences requiring hospitalisation. Residents clamoured for the city council to find a solution to the problem (Fanning et al. 2003). This resulted in public marches on the council chambers to protest, and adverse publicity in the media on biting midge in the area that was affected. Land values were adversely affected. Family, friends and even tradespeople refused to visit, lifestyle was severely affected, additional costs were incurred in living alongside the insect and the strain of living with biting midge even caused marriages to break up.

The insect

Biting midge belongs to the genus *Culicoides* and two human-biting species, *Culicoides ornatus*, associated with estuarine creeks, and *Culicoides subimmaculatus*, associated with sandy beaches and sand-mud interphase areas (Shivas 2001), cause the problem. Adult emergence is triggered by different stages of the lunar cycle. Males rest in the mangroves awaiting females to emerge and then mate with females. The females then disperse to find a blood meal being attracted to human habitation where they rest on screens, fences and vegetation while waiting to take blood. No chemical control method, apart from adult fogging, has until now been available to control this insect.

Nature of the problem

Community participation was galvanised through a city council biting midge committee formed with community, government and organisational representation. Council funding was obtained to examine what research that had been done to date, what gaps remained, and to quantify the health and economic impact of biting midge. Partnerships were formed with universities to undertake this work and reports were produced for council (Neller and Howie 2003, Ratnayake et al. 2003). Community expectations were addressed through feedback via community representatives, press releases and public meetings. A report was produced on the economic impact of biting midge that showed it was costing Hervey Bay in excess of \$61 million a year (Neller and Howie 2003), \$56 million of which was in housing value depreciation. A community SF-36 health survey also showed significant differences in health attributable to biting midge for residents in affected areas of Hervey Bay in 2002 which, when repeated in 2004 by the University of the Sunshine Coast, reconfirmed these findings (Neller 2005).

Health norms below the Australian average were recorded in this university implemented community health survey. The elderly, young and overseas visitors were the worst affected, often exhibiting blistering and scarring following repeated bites. Further investigation of blood types seems warranted, following indications that the majority of worst affected people had O-positive blood group. Mosquito research in Japan by Dr Yoshikazu Shirai has noted a preference for type-O positive blood in mosquitoes (available from <[http://www.smh.com.au/articles/2004/09/10/1094789688314.html?from=storylhs&on](http://www.smh.com.au/articles/2004/09/10/1094789688314.html?from=storylhs&on>)>). The social impact of biting midge was also investigated and evidence of the effect on family, friends, neighbours, tenants, pets and tradesmen was noted (Neller and Howie 2003; Fanning et al. 2003; Neller 2005).

Attention then focussed on finding a solution to the problem (Fanning 2002) A process of consultation with state government authorities, other stakeholders and the public occurred through a series of public meetings, at which larvicides were eliminated as a possible control method (because of effects on non-target organisms). Instead, an adulticide with residual

properties was identified, and public agreement to proceed with trials was gained through a local consultation process (Fanning 2003).

Trialling of bifenthrin as Bistar 80SC

Trials of Bistar 80SC were held at River Heads during the period October to December 2002 (Fanning 2002) with four sets of paired houses (one house treated and the other house untreated). A second set of trials with paired blocks of three houses and a vacant allotment were conducted in March and April 2003. It was intended to use blocks of four houses but only one such block existed. Houses, fences and vegetation were treated with bifenthrin at the label rate, a 0.1 per cent mix (125 ml/10 L water) using a Solo Back Pack Sprayer (Solo, Germany) to deliver a dilute spray comprised of large (150-200 micron) droplets. A 65 per cent mean reduction of biting midge and a 94 per cent mean reduction of mosquitoes over six weeks was obtained. In the second lot of experiments the vacant allotment acted as a flypath and results did not improve. Subsequent trials have resulted in up to 90 per cent reduction in biting midge and mosquito numbers for periods of up to three months (Standfast et al. 2003a, 2003b).

Breakdown of the product under conditions of direct sunlight reduces the period that the chemical remains effective. A minimum of six weeks protection should result from a properly applied treatment (Fanning 2004).

The peri-domestic application of Bistar 80SC satisfied Environmental Protection Agency and fisheries concerns, as this provided a safe alternative to broad-scale application of organophosphates in a sensitive estuarine habitat at rates that would have been ecologically disastrous. Also in terms of comfort to city council personnel applying the product, the bifenthrin molecules non-alpha-cyano characteristics were appreciated. No skin or eye irritation characteristics occurred and no staining of peoples property or phytotoxic effects were recorded during the trials (Standfast et al. 2003a, 2003b).

Efficacy of Bistar 80SC Insecticide Barriers

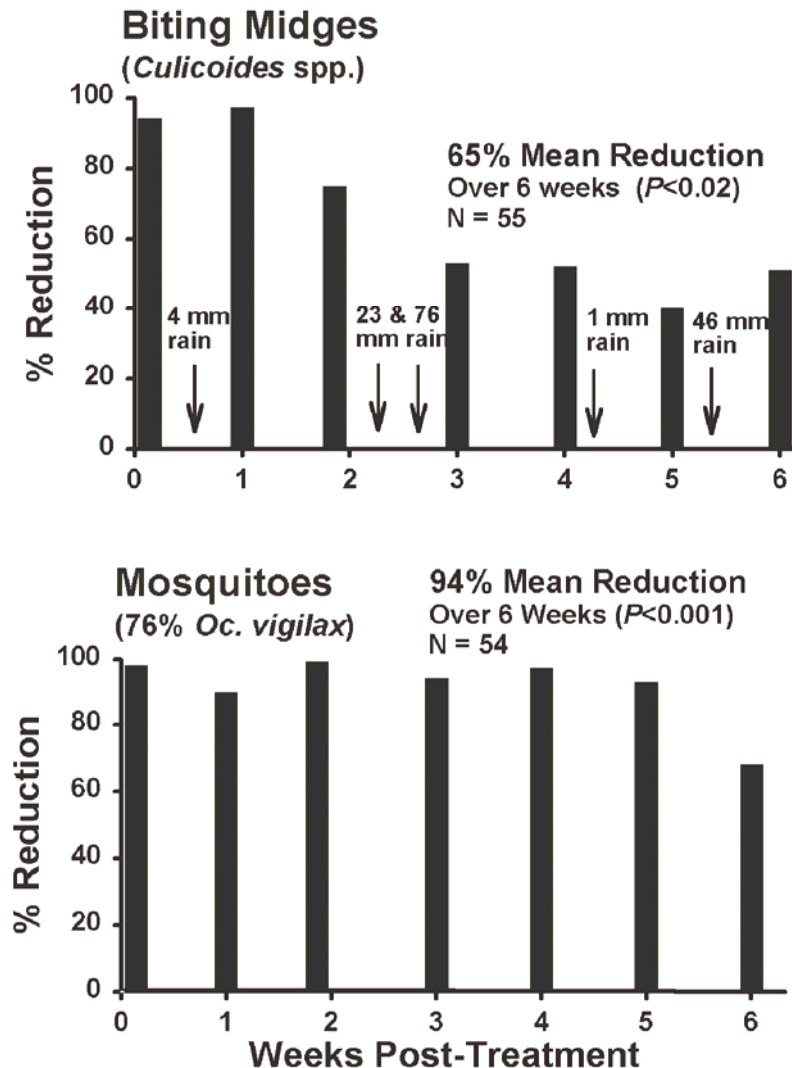


Figure 1. Efficacy of Bistar

Release of results

Public meetings were held to release the results, during which time the product was registered as Bistar for the control of biting midge. Local pest control operators were then trained in application techniques by the city council. Other local coastal councils started to use Bistar and it has become accepted internationally. In 2004 UN Habitat accepted the Bistar method to control biting midge on their Best Practice Database and the Australian Institute of Environmental Health recognised the work to date with their inaugural Communicable Diseases — Immunisation Award. Questions still have to be answered on midge biology, plants that attract and repel midges, and the surfaces where they prefer to rest. Government higher-level funding and recognition of the health problems biting midge cause still have to be followed up. Land development guidelines still have to be adopted at local government level.

Bistar is not the full answer to the control of biting midge but is a step along the way to finding a solution.

Acknowledgments

The author acknowledges the input of partners in the project FMC (Chemicals), The University of the Sunshine Coast, Griffith University, Queensland EPA and specifically recognises the work of Luke Maloney and Shane Kelly of Hervey Bay City Council in technical assistance during the Bistar 80SC trials, students from the Faculty of Science at the University of the Sunshine Coast for assistance with the health survey, and Julie Waldron of the Institute for Sustainability, Health and Regional Engagement at the University of the Sunshine Coast for assistance with data analysis from the health survey.

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