RESISTANCE TO DELTAMETHRIN IN *BOOPHILUS MICROPLUS* (CANESTRINI) (ACARINA: IXODIDAE) IN NEW CALEDONIA

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Abstract

A strain (S) of *Boophilus microplus* collected from the east coast of New Caledonia was compared with a strain (R) from the west coast for resistance to deltamethrin. The R strain was significantly more resistant than strain S with a 5.7 fold resistance factor determined at the LD_{50} using the larval packet technique. This is the first report of synthetic pyrethroid resistance in *B. microplus* in New Caledonia.

Since its accidental introduction to New Caledonia in 1942, the cattle tick *Boophilus microplus* (Canestrini) has been controlled successfully through dipping or spraying with the following acaricides: Cooper's arsenic dip (1943-1950); Rucide (DDT, 1950-1973); Rhodiacide (ethion, 1973 until the present on some farms).

In 1980, control failure with ethion led to the demonstration of a highly resistant strain (Brun *et al.* 1983) from the Thio region. Following a large *B. microplus* outbreak and death of cattle, ethion was replaced on this farm by Butox (deltamethrin) in November 1982. Butox was initially used in alternate years with Bayticol (flumethrin) and then continuously since 1987. As control problems were recently reported with deltamethrin, laboratory tests were conducted on a strain from this particular location to check for resistance.

Two field strains were compared: a susceptible strain (S), with no history of exposure to deltamethrin, collected from Poya on the west coast; and a second strain (R) from a beef cattle farm in the Thio region experiencing control problems with deltamethrin. Cattle ticks from this farm were also the first record for ethion resistance in New Caledonia (Brun *et al.* 1983).

The strains were compared using the FAO recommended dosage-mortality technique (Stone & Haydock 1962; Anon. 1971) for detecting and measuring acaricide resistance. Both strains were collected in August 1991, and brought to Nouméa for study.

Females were cultured at 27 ± 1 °C and 85-90% r.h. for about 4 weeks for oviposition and hatching. Unfed larvae were dropped into impregnated paper packets in clusters of about 100-200 with each treatment replicated three times. The packets were then stored flat in an incubator under the same controlled temperature and humidity conditions for 24 h before mortality assessment. Ticks able to move were counted as alive.

Strain S had a LD_{50} of 14.2 ppm (95% fiducial limits 13.1-15.4) with a slope of 4.81 (S.E. 0.15). Strain R had a LD_{50} of 81 ppm (95% fiducial limits 64.7-102.4) with a slope of 2.79 (S.E. 0.07). Strain R had a resistance factor of 5.7.

As previously demonstrated in Australia after about 20 years' non-use of DDT (Roulston *et al.* 1981), a survey for DDT resistance in New Caledonia has shown that the DDT resistance gene was still detectable although this compound has been banned since 1973 (Brun *et al.* 1984). In this previous study, the DDT resistance of ticks from the R strain was demonstrated using a 2% discriminating dose and only 97.7% mortality was observed. Because of the presence of resistance to DDT in the field, and the cross resistance demonstrated elsewhere (Nolan *et al.* 1977), the significance of this first pyrethroid resistant strain in New Caledonia should be investigated. In Australia, control of the DDT-resistant strain (DDT-R) cross resistant to pyrethroids was achieved with increased concentrations (Nolan *et al.* 1979), and was enhanced by organophosphorus (OP) compounds (Nolan and Bird 1977). Although the R strain from Thio should be controlled by a similar approach, the recent occurrence of three new pyrethroids resistant strains causing serious implications for chemical control in Queensland (Nolan *et al.* 1989) raises important concerns for the future of synthetic pyrethroids in controlling cattle tick in New Caledonia.

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