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A Review of the Predatory Mite *Anystis baccarum* and its Role in Apple Orchard Pest Management Schemes in Northern Ireland

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INTRODUCTION

The development of orchard Integrated Pest Management (IPM) systems have become an ever-increasing important concept throughout the world. Increasing public concern over the use of chemical insecticides on the environment and non-target species is continuing to drive the need to develop new and novel means of pest control in what is an ever increasingly competitive business. Within the United Kingdom (UK) and indeed internationally, much research regarding orchard IPM has centred on the predatory mites *Typhlodromous pyri* Scheuten and *Zetzellia mali* (Ewing). These mites have been shown to have the potential to control many orchard invertebrate pest species (Santos, 1976; Dicke *et al*., 1989; Croft *et al*., 1995). Studies have also shown *T. pyri* to have the potential to be incorporated along with insecticide treatments for the control of orchard pests (Cranham and Solomon, 1981). However, for the full implementation of IPM programmes, there is also the need to investigate the potential of other generalist predatory species and determine their potential for inclusion within such schemes.

Within the Bramley's Seedling apple orchards in Northern Ireland both *T. pyri* and *Z. mali* occur, though, in smaller numbers compared to English apple orchards (Cuthbertson and Murchie, 2005a). Cuthbertson and Murchie (2005a) also determined that the generalist predatory mite *Anystis baccarum* (Linnaeus) was the most commonly occurring beneficial species within the Bramley orchards. However, upon consultation with Northern Irish apple growers it was determined that the presence of *A. baccarum* within the orchards was unknown and that many had actively sprayed chemical insecticides against this beneficial species, confusing it with the pest *Panonychus ulmi* (Koch) (Cuthbertson, 2004; Cuthbertson and Murchie, 2005b).

According to Oudemans (1937), Hooke in 1665 was the first person to find this species (*Anystis baccarum*) but he only referred to it as an insect mite. Linnaeus (1758) first named this species *Acarus baccarum*. It was renamed to *Actineda baccarum* by Stoll (1886) and was first called *Anystis baccarum* by Trägardh (1905) as cited in Meyer and Ueckermann (1987). This mite belongs to the order Prostigmata which contains both predators and plant feeding species and the subfamily Anystinae (Krantz, 1978). Mites of this genus are moderately large (1.0-1.5 mm in length), long-legged and bright orange/red (Krantz, 1978; Titov, 1987). Certain characteristics are listed by Meyer and Ueckermann (1987) from which *A. baccarum* may be identified.

Anystis baccarum is a cosmopolitan species capable of surviving a range of climatic conditions and occurs in numerous places including Australia, U.S.A, Europe, Juan Fernandez Islands (close to the coast of Chile), St. Helena, Faeroe Islands, Mexico, Japan and northern and southern Africa (Meyer and Ueckermann, 1987). Mites belonging to the genus *Anystis* have been reported to occur in Northern Ireland (MacQuillan, 1966) but no individual species had ever been

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identified until recently (Cuthbertson, 2004; Cuthbertson and Murchie, 2004a; Cuthbertson, 2005). At least three other species occur in the British Isles: *Anystis salicinus* (Linnaeus), *Anystis cornigerum* (Hermann) and *Anystis cursorium* (Gervais). *Anystis agilis* Banks has also been recorded in the British Isles (Dr. Anne Baker, British Natural History Museum, London, UK, *personal communication*).

Mites of the genus *Anystis* have been suggested as agents for bio-control of various pest arthropods (Gerson and Smiley, 1990) as they have been observed feeding on a variety of prey species (Baker, 1967). In England, *A. baccarum* can become abundant during times of aphid infestation in cereal fields (El Banhawy *et al*., 1993), whereas in New Zealand, *A. baccarum* plays an important role in the predation of tortricid larvae in apple orchards (Baker, 1983). *Anystis baccarum* was also found to increase in number during outbreaks of fruit tree red spider mite in Canadian peach orchards (Putman and Herne, 1966) and also to offer control of phytophagous mites in orchards and blackcurrant plantations in Russia (Lange *et al*., 1974; Livshits and Mitrofanov, 1981; Titov, 1987). Further research investigating the impact of *A. baccarum* upon economically important orchard invertebrate pests, such as, apple rust mite *Aculus schlechtendali* (Nalepa) and apple-grass aphid *Rhopalosiphum insertum* (Walker), proved that this species has the potential to form a valuable component of orchard IPM strategies (Cuthbertson *et al*., 2003a, b; Cuthbertson and Murchie, 2004b, 2005c, 2006a). Studies have also indicated that *A. baccarum* can show various levels of compatibility with chemical fungicides and pesticides commonly used within orchard ecosystems for the control of both fungal and invertebrate pests and diseases (Cuthbertson and Murchie, 2003, 2006b, c). Therefore, in the development of orchard IPM programmes, generalist predatory mites such as *A. baccarum*, must also be fully researched to determine their impact upon pest species and included within any such IPM system developed and implemented within Northern Irish Bramley's Seedling apple orchards (Cuthbertson and Murchie, 2006d).

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