

***Anystis baccarum* – an important component of orchard integrated pest management strategies**

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Apple orchards cover c. 27000 ha in the United Kingdom, of which 14000 ha are dessert varieties, 9000 ha culinary varieties, and 4000 ha are for cider making. The major concentration of dessert apples and culinary apple orchards is in the southeastern county of Kent and the eastern counties of Essex, Norfolk, Suffolk and Cambridgeshire. Cider and dessert apples are grown in Hereford and Worcester in the West Midlands and Somerset in the Southwest. Mostly culinary apples are grown in Northern Ireland, with up to ninety percent of the apples grown within a six-mile radius of the village of Loughgall in County Armagh, just south of Lough Neagh.

Unnecessary pesticide application

Northern Irish apple orchards receive on average 2-3 sprays of insecticide or acaricide per annum to control invertebrate pest species. While this is a small expenditure compared with costs of fungicide application, there are several reasons for the avoidance of unnecessary sprays: (1) environmental: adverse public attitudes to pesticides have intensified in recent years and this has led to a desire by fruit growers to reduce dependence on pesticides, especially broad-spectrum neurotoxic compounds that can adversely affect human health or the environment; (2) resistance: unnecessary applications of pesticides can foster pest resistance to the chemical making it useless;

(3) cost: unnecessary chemical applications are a waste of money in an ever increasing competitive business. There is a need for apple growers to desist from the 'calendar spraying' regime; (4) creation of new pest problems: within a comparatively stable ecosystem like orchards, the ability of natural enemies to control pests, completely or partly, is well documented. Loss of natural enemies means that minor pests can become more damaging as the natural constraints on their populations have been removed.

The natural enemy fauna

Within the British Isles a wide range of natural enemies have been exploited, or have the potential to be exploited, as biological control agents against pests of apples. These include mirid bugs, flower bugs and several mite species including *Typhlodromus pyri* and *Zetzellia mali*. These beneficial species all occur within Northern Irish orchards. However, Cuthbertson and Murchie (2005a) confirmed that the most commonly-occurring natural enemy in Northern Irish orchards was the predatory mite *Anystis baccarum* (Figure 1), often referred to as the 'whirli-gig' mite.



Figure 1. The predatory mite *Anystis baccarum*.

Mites of this genus have been recorded before as occurring ‘rarely’ in a County Armagh apple orchard (MacQuillan, 1966), but no individual species was ever identified until now (Cuthbertson and Murchie, 2004a,b; Cuthbertson, 2005; Cuthbertson and Murchie, 2005b). Consultation with a number of apple growers revealed that the presence of this beneficial mite within their orchards was unknown and that some had actively sprayed against it thinking it was the pest fruit tree red spider mite, *Panonychus ulmi* (Figure 2), (Cuthbertson, 2004; Cuthbertson and Murchie, 2005c).



Figure 2. Fruit tree red spider mite (*Panonychus ulmi*) adult.

Phenology of *Anystis baccarum*

Anystis baccarum occurs all year round in the Bramley orchards (Cuthbertson and Murchie, 2004b) with peak numbers in late spring (Figure 3). This is at the same time as pest species such as red spider mite and apple rust mite (*Aculus schlechtendali*) eggs are hatching and adults are beginning to migrate from over-wintering sites out onto the leaves to feed. Therefore, any prey encountered by *A. baccarum* will be readily devoured. *Anystis baccarum* lay eggs in batches ranging between 20-24 under bark on the trunk of the trees or in the soil surrounding the tree base. These eggs hatch and juveniles migrate up the tree trunk and out over the branches and foliage seeking prey to devour.

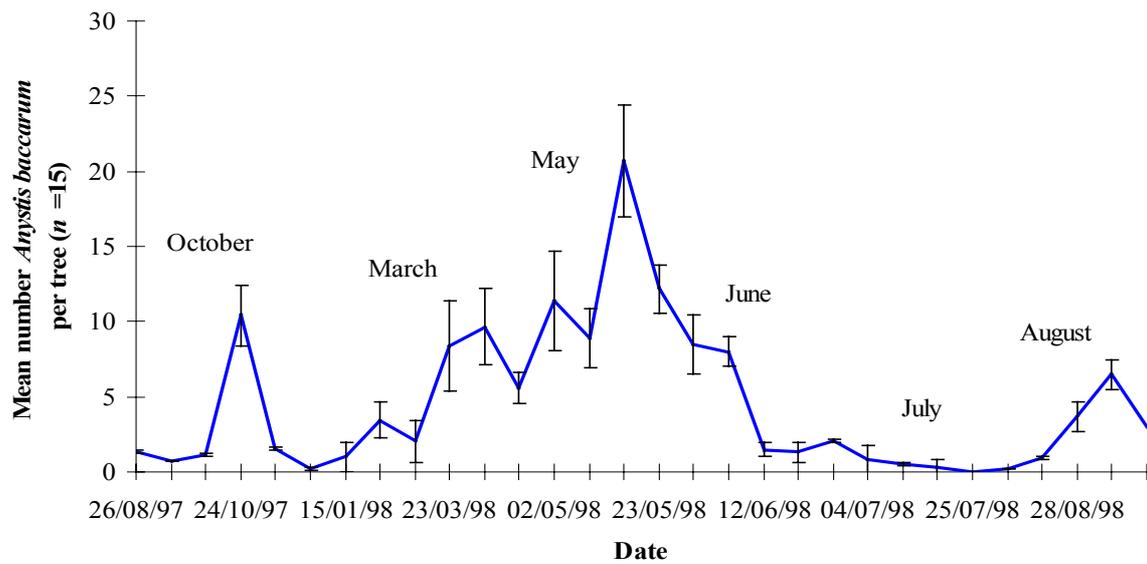


Figure 3. Seasonal occurrence of *Anystis baccharum* in Armagh's Bramley orchards.

Impact of *Anystis baccharum*

Anystis baccharum has been recorded as feeding on a wide variety of small insect and mite prey. The mite will readily feed upon any prey item it can over-power (Figure 4). This beneficial mite is not only a valuable predator in orchards but several other ecosystems, including, blackcurrant bushes in Russia and cereal fields in England. In these situations it has offered various levels of invertebrate pest control.



Figure 4. *Anystis baccharum* attacking and feeding upon aphid prey.

Investigations into the feeding activity of *A. baccharum* against economically important invertebrate apple pest species (red spider mite, apple rust mite, apple-brown mite (*Bryobia rubrioculus*) and apple-grass aphid (*Rhopalosiphum insertum*)) within the laboratory situation revealed that *A. baccharum* readily feed upon all prey offered (Cuthbertson and Murchie, 2004b). In the field *A. baccharum* was shown to play an active role in controlling apple rust mite numbers (Cuthbertson *et al.*, 2003a) and to be a major predator of apple-grass aphid (Cuthbertson *et al.*, 2003b). In New Zealand apple orchards *A. baccharum* is stated to be a predator of tortrix moth larvae: this may be one of the reasons why invertebrate pests, including the fruit tree tortrix moth (*Archips podana*), are perhaps not as ‘economically important’ as once thought in Ulster apple orchards (Cuthbertson and Murchie, 2005d; Cuthbertson and Murchie, 2006a).

Compatibility with chemicals

Little information exists on the impact of chemicals on *A. baccharum*. A study in Russia found the most toxic insecticides included dicofol and copper sulphate. In Northern Ireland the primary disease affecting apple production is apple scab (*Venturia inaequalis*). As result, between 12-14 fungicide applications can be applied within one season to control the disease. Further research has found *A. baccharum* to be compatible with several of the most commonly applied fungicides (e.g. dithianon) in local orchards (Cuthbertson and Murchie, 2003). Such wide compatibility with fungicides is not always the case with other predatory mites such as phytoseiids.

Integrated Pest Management potential

Further work is required to fully demonstrate the impact of *A. baccharum* on invertebrate pest species within the orchards. However, the preliminary work undertaken has shown that *A. baccharum* does have a valuable role to play in

controlling pest species within the orchards. *Anystis baccharum* also causes no damage to fruit or foliage of apple trees, unlike the growers friend, the 'Typhs' (*T. pyri*) (Sengonca *et al.*, 2004). The compatibility of *A. baccharum* with chemical fungicides offers potential for this predatory mite to be incorporated into integrated pest management strategies for the control of invertebrate pest species. Apple growers should be encouraged to recognise this beneficial mite within their orchards and seek to conserve their populations (Cuthbertson and Murchie, 2006b).

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