OBSERVATIONS ON THE BIOLOGY AND BEHAVIOUR OF THE PREDACEOUS MITE *TYPHLODROMUS ITALICUS* [ACARINA: PHYTOSEIIDAE] IN PEACH ORCHARDS (1)

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The results of investigations on *Typhlodromus italicus* Chant in some peach orchards in the Verona district, where the predator is wide-spread, are described. Both field and laboratory studies have shown that *T. italicus* grows rapidly (egg to adult 6 days at 25 °C) and has a long reproductive period, especially when prey is available. It speedily recovers in number and has a high prey-searching capacity. It is fast-moving, and its distribution over the tree corresponds to that of the phytophagous mites. It can live and reproduce on the tree in the absence of prey. A density of 50 — 60 *T. italicus*/100 leaves is reached in August.

Female *T. italicus* are found on leaves till November feeding whenever prey is available, and wintering in a mated condition in bark crevices. Many enter diapause in late autumn. Overwinter mortality is high.

These characteristics enable *T. italicus* to play a very significant role in the control of peach mites and in orchards, which are unsprayed, it keeps their populations at a low density from spring to autumn.

Apart from a brief note by Chant (1959) in which he described females of *Typhlodromus italicus* Chant from peach leaves imported from Italy, there appears to be no other recorded information on this phytoseiid mite. During work on the effects of spray practices in a peach orchard in the Verona area, however, *T. italicus* was found to be an efficient predator of the phytophagous mites *Tetranychus urticae* Koch and *Panonychus ulmi* Koch and, since 1967, aspects of its biology, ecology and its role as a predator have been studied in several peach orchards around Verona.

MATERIALS AND METHODS

In the laboratory, *T. italicus* was reared at 24°C on excised peach leaves furnished periodically with *Tetranychus urticae* as food (Mc Murtry & Scriven, 1964). Its development was recorded twice daily, initially from 15 eggs. Information on oviposition was obtained from groups of 10 females and 10 males, to which replacement males were added when losses occurred. Eggs were collected every 12 hours.

The field studies were carried out in a peach orchard of about 6 hectares, on trees aged from 4 to 15 years. The orchard was sub-divided into plots of early, mid-season

(1) Studies of the Working Group of the C.N.R. on the integrated control against animal enemies of plants: n.CVIII.
and late varieties of peach. It was on level ground and planted in rows running from North to South, 4.50 m apart. The soil was sandy and there was no artificial irrigation. The insecticide treatments varied in number with the variety of peach, the early variety receiving one application of phentotoate 50% (200 g/l) + azinphosmethyl (100 g) the mid-season 2 or 3 applications and the late varieties 4 or 5 to control *A. lineatella* and *L. molest*.

Because of seasonal variation in the distribution in peach trees of mite populations and variation in their density between and within trees, leaf samples were obtained from different positions on the tree, from different exposures and at different times of day.

On each occasion, 200 or more leaves were examined on site through an 8x lens, to show:

1) the percentage of mite-infested leaves; 2) the species, number and developmental stages of the phytophagous mite; 3) the distribution on the infested leaves of the tree; 4) the species, the number, the developmental stage of the predators (insects and mites) and their distribution on the tree and leaves.

The observations were made every one or two weeks, as required, from April to November. Less detailed observations were also carried out in several orchards differing in environmental conditions and with different spray programs, and where different situations could be taken into account.

**THE PHYTOPHAGOUS MITES OF THE PEACH TREE**

Both *Panonychus ulmi* and *Tetranychus urticae* often co-exist on the same peach tree and generally overwinter on its trunk or large branches. The first generations of these mites in spring, therefore, develop near their overwinter sites, but, while later generations of *P. ulmi* spread to foliage on all parts of the tree, those of *T. urticae* remain in the centre.

**OBSERVATIONS ON THE BIOLOGY**

The eggs of *T. italicus* are laid on the under surfaces of the leaves of peach trees. Here the life cycle is undergone and although this predator is occasionally found on the branches, it is very rarely found on the flowers. Both adults and nymphs move rapidly over the leaves and shelter near the central vein towards the pediole when at rest; generally singly, but in autumn females collect in groups of 4 and 5 or more.

The overwintering females become active in April, and from the low numbers that survived winter, increase in June and July, on trees that remain unsprayed during summer, to reach a peak of 50 to 60 individuals per 100 leaves in August (fig. 1). Numbers decline on the foliage after mid-September when females begin to move to winter quarters, although some can still be found even on yellow leaves in late autumn.

The speed of development of *T. italicus*, and hence the number of generations, depend on conditions, especially temperature and the amount and quality of food available.

At 25°C and with abundant prey, the time from egg to egg is about 6 days; the times of development of the individual stages being: egg 25-30 hours; larva 15-18 hours; pre-nymph and nymph, 60-65 hours and pre-oviposition 50-55 hours.

The egg is laid on the underside of the leaf, mostly near the central vein; rarely on the leaf surface but stuck to the extremity of a hair or on some other slight support such as the web of a tortricid; in late summer as many as 8 to 10 eggs can be found on these webs.

The newly-born larva remains inactive for some time; it rarely predates during its larval life, but could feed on vegetable juices; moulting takes place, however, even in the absence of food.