INTRODUCTION

For sheer abundance and variety, insects can be regarded as the most prolific creatures on earth. More than a million species have been identified and this accounts for about half of all known species of animals in the world. They have achieved unprecedented ecological succession in both diversity and dominance with the capability to invade and multiply in diverse ecological conditions.

Extensive studies on insect plant interactions have revealed that insect pests are known to cause substantial damage to their host plants, thereby reducing their yield. Sap-sucking insects weaken crops by consuming the energy rich sugars in the sap and by causing viral disease, which can cause premature leaf fall and inhibit the maturing of fruits.

In the class of Insecta, the whitefly belonging to the order Hemiptera has a higher claim to our interest and study, as these are fascinating insects infesting a wide range of flora. They comprise a single superfamily Aleyrodoidea and family Aleyrodidae within the suborder Homoptera and division Sternorrhyncha. Of the four groups of Sternorrhynchous Hemiptera, the whitefly is the least speciose group with around 1450 named species compared to 6000 coccoids, 4400 aphidoids and 2500 psyllids (Martin *et al.*, 2000).

The biology of this group of insects is somewhat intermediate between that of the psylloidea and coccoidea. The adult whitefly is small, fly-like, and often dull white in colour. It measures about 1-3 mm in length and bears a superficial resemblance to a tiny moth. In fact, the European cabbage whitefly (*Aleyrodes proletella*) was initially

considerable importance and interest, both from the economic and biological stand points.

The oldest fossil remains of this species dates back to 135 million years ago (Schlee, 1970). Whiteflies with modern affinities are known from a period in which there was great diversification in angiosperm plants (Martin, 2000). Only a few species of whitefly today feed on non-angiosperm hosts and ferns, as most whiteflies in existence feed only on dicotyledonous angiosperms.

Cestone in the 17th century first published an account of an aleyrodid and Reaumur first described whiteflies in 1736, although he mistakenly placed *Aleyrodes proletella* in Lepidoptera. Linnaeus, who in 1758 considered it to be a moth, conferred the name *Phalaena* (=*Tinea*) *proletella* for the insect.

Even though aleyrodids were known since 1758, it was only in 1943 that Sampson proposed tribes for the subfamily Aleyrodinae: Aleurochitonini, Aleyrodini, Dialeurodini, Neomaskellini and Siphonini. A sixth tribe Trialeurodini of Aleyrodinae was proposed by Russell (1947) and two more new tribes, Aleurocanthini and Aleurolobini, were suggested by Takahashi (1954). David (1990) placed 35 genera of Indian Aleyrodidae among 12 tribes, five of which (Aleuroplatini, Bemisini, Lipaleyrodini, Tetraleurodini and Zaphanerini) were new.

Studies on Aleyrodidae in India have been carried out as early as 1895 by Maskell and were continued by Buckton (1903), Peal (1903), Quaintance and Baker (1917), Singh

(1931), Takahashi (1950), David and Subramaniam (1976), Jesudasan and David (1991), Sundararaj and David (1993), Regu and David (1993) and Meganathan and David (1994).

Some economically important species of whiteflies include the green house whitefly *Trialeurodes vaporariorum* (Westwood), the citrus whitefly *Aleurocanthus woglumi* Ashby, the sugarcane whiteflies *Aleurolobus barodensis* (Maskell), *Neomaskellia bergii* (Signoret) and *Neomaskellia andropogoni* (Corbett), the jasmine whiteflies *Dialeurodes kirkaldyi* (Kotinsky) and *Kanakarajiella vulgaris* (Singh) and the most important and cosmopolitian cotton whitefly *Bemisia tabaci* (Gennadius).

Throughout the 20th century, species like *Bemisia tabaci* (Gennadius) and *Trialeurodes vaporariorum* (Westwood) have been notorious as pests and vectors of many diseases in field crops in warmer climates, and of crops under glass or polythene. The emergence of biotypes in *Bemisia tabaci* has led to increased resources being expended on the study of this insect.

Recently, an increasing problem has been the sudden economic impact caused by previously little-known whitefly species becoming established in new geographical areas; the most notorious of these is undoubtedly, *Aleurodicus dispersus* Russell, the so called 'spiralling whitefly'. Substantial monitory loss has been associated with whitefly infestation and with plant diseases caused by whitefly transmitted viruses which pose a potential threat to agro ecosystems. They have reached this point by spreading into new regions, attacking new plant species, becoming adapted to new environments, evolving into new biotypes and becoming resistant to systemic insecticides. All this have paved the

way towards intensive investigations of whiteflies on an international scale and their study in the present context is vital.

Whitefly present taxonomic problems of a sort unique among insects (Martin, 1987). The taxonomy of the whitefly is based primarily on the puparial stage, as adults in isolation are not easily collected and identified and they do not offer much scope to facilitate species definition. However, whitefly puparia are sessile and this is very convenient as it permits the collection and identification of insects with host plants by studying the puparial cases, after the metamorphosis and emergence of the insect from the puparial cases. According to Martin (1987), the first instar whitefly larvae can crawl short distances to select their feeding sites, but the second, third and fourth stages are sessile and scale-like, often protected by waxy secretions. The emergence of the adult insect from the totally dissimilar larval exoskeleton has led to the term 'puparium' being applied to the fourth instar larva, and the exuvium is referred to as a 'puparial case'.

Most whitefly genera and species are, therefore, described from their puparial cases as they relate to the placement of the morphological structures. Many authors, including Takahashi (1931-1962), Russell(1945-1965) Mound (1965, 1966), Cohic (1968), Dobreanu and Manolache (1969), David and Subramaniam (1976), Bink-Moenen (1983), Martin (1987) and Jesudasan and David (1991) have used illustrations that are similar to show morphological characters of puparia. The puparial case and the associated dorsal setae are polymorphic and display great variations influenced by the physical environment (Mound, 1963). Such variations seem to be the result of factors such as the changes in the environment, the degree of the hairy and waxy nature of leaf lamellae and

whether the puparium develops on the upper leaf or lower leaf surface and the characteristics of the host plant. As a result, from the late nineteenth century to the present, much confusion has surrounded the nomenclature of specimens (Gill, 1990), as the puparial case of the same species may vary from one host plant to another.

Besides displaying the variations mentioned above, many whiteflies also display puparial sexual dimorphism, which often is manifested in female puparia being consistently larger than male puparia in specimens of the same colony, though in certain groups such as a few species of *Aleurolobus*, the antennae of the male puparia are noticeably longer than those of females. A few other species also exhibit distinctive seasonal dimorphism, the puparia exhibiting clear differences.

OBJECTIVES

The present field of study is restricted to Tambaram and its adjoining areas within Kancheepuram District and the specific areas of study are the forest regions, represented by the Madras Christian College campus and the adjoining Air Force campus, the cultivated areas and the urbanized regions in and around the forest area. The forest type is of the tropical dry evergreen forest. This area has a wide range of trees and shrubs. Some of the common average trees are *Albizia lebbeck, Diospyros chloroxylon, Lannea coromendelica, Syzygium cumini, Albizia amara, Peltophorum pterocarpum Tebebuia rosea, Tamarindus indica, Cassia* sp., *Delonix regia*. There are also plants like *Atalantia monophylla, Bauhinia racemosa, Drypetes sepiara, Grewia orbiculate, Capparis brevispina, Combretum albidum, Hugonia mystax, Ventilago madraspatana* and *Ixora*

pavetta; which makes this region a unique jungle in term of its faunal and floral composition.

Though a few reports on some whiteflies have been documented, investigations on whiteflies in this region have not been systematically attempted. Considering the likelihood of occurrence of a wide range of whitefly species in this region, the present investigation was initiated with the following objectives:

1. to survey, collect and study the whiteflies along with their host plants.
2. to study the inter-specific and intra-specific diversity in aleyrodids.
3. to prepare a workable dichotomous key for this group of insects.
4. to record the whiteflies which are seriously infesting medicinal plants and forest trees of commercial importance.