

I. INTRODUCTION.

1. GENERAL:-

The first large-scale plantings of citrus in Trinidad were those of grapefruit and oranges which took place during the nineteen-twenties. They were largely stimulated by the failure of cacao due to witches broom disease coinciding with low prices for that crop and rendering it uneconomic. The Trinidad citrus industry, which depends today mainly on grapefruit, is thus relatively new; but it has made and is making rapid growth, being now third in importance among the agricultural exports of the island, ranking in value behind only sugar and cacao. The export of citrus fruits and their products realised over \$2 million in 1948, and nearly \$3 million in 1950.

Much of this increase is due to expansion of the area planted in citrus through the impetus received from funds made available under the Cacao Subsidy Scheme for replacement of cacao in unsuitable areas by other crops. The increase in acreage under citrus is reflected by the records of the Citrus Growers' Cooperative, to which the great majority of citrus growers in the island belong. In 1947 the combined acreage registered with that organisation was 3015.74 acres of grapefruit and 1843.45 acres of oranges. This represented 226,215 grapefruit and 230,130 orange trees in full bearing, and though no final figures are available for years since then, it is expected that these numbers will have been greatly increased by more and more young trees coming into full bearing annually.

The humid climate of Trinidad seems favourable to the development of citrus, particularly in so far

in so far as growth and yield are related to the prevalence of pests. As will be seen later, humidity favours the growth of entomophagous fungi which are a major factor in the natural control of scale insects which are of major importance in other citrus areas. Such areas are those of California, South Africa, and Australia, which have a dry climate and where citrus is grown under irrigation. Florida, Japan, and some parts of Queensland resemble the West Indies in humidity of climate and the consequent importance of natural scale control.

In Trinidad there is no very recognisable dormant season for growth. In more northerly and southerly latitudes a cool or frosty winter period occurs when growth of the trees is small, and this dormant period is represented in some warmer citrus areas by a dry season. The growth of citrus — the development of "flushes" of leaves and the production of fruit — is a year-round phenomenon in Trinidad. This, while in general an advantage, introduces some disadvantageous factors, as for instance the continuity of insect populations where these depend for a livelihood on the presence of young leaves, flowers or fruit. The point will be considered further in the account of the various pests.

Comparison of the yield per acre of citrus in Trinidad with that of California, a "dry" citrus area, is interesting (6).

Yield per acre in crates.

Trinidad, California (1941 - 45 average).

Valencia Oranges	140	398
Grapefruit	280	545

Though

Though the larger yields of California cost more to produce in general management and care, fertilisers, and extensive and expensive control of pests and diseases, than those of Trinidad — machinery, materials and labour for insect-control alone cost an estimated \$4 million in California for 302,500 acres(10) — the economy of the methods used there cannot be in doubt.

Poor management and lack of care are primary factors reducing the yield of fruit in Trinidad, and it must be said that the figures given above do not by any means tell the whole story. A high percentage of the fruit produced here is so marked and blemished by scab, rust mite, thrips, scale and other pests and diseases, that it is quite unsaleable as whole fruit, and must be juiced at the Cooperatives Factory. This process is expensive and yields a cheaper product than whole fruit, and thus the grower loses a considerable amount of the value of his crop. The price difference between whole fruit and fruit for juicing is in general about \$1 per crate, about 50% of the value of a crate of fruit to the grower in 1951. Moreover citrus juice is not nearly so saleable on the world market as West Indian citrus which is of a high quality. A general realisation among growers of the fact that greater care in citrus cultivation would reap ample dividends is one of the great desiderata for the Trinidad citrus industry today; and part of the new care required is in the better control of the pests of citrus.

It is probable that the major factors influencing the type and importance of pests in citrus growing areas are governed by the climatic variations between these areas and their relative accessibility.

Thus in

Thus in two areas having similar climate and easy accessibility by sea, lines of rail or other means of transport, one can expect almost identical lists of citrus fauna, given time. Trinidad is important among the trade routes of the western world and it would be expected that its citrus pests bear a close resemblance to those of similar humid citrus areas in the west — in Florida, other West Indian islands and Brazil. This is found to be true to a great extent.

The existence of a similar citrus fauna in different areas does not however necessarily imply that the relative importance of the pests will be the same. In California different insects are major pests from those in Japan, though the citrus insects of these areas are similar, as they are on a direct trade route. In Trinidad itself, the order of importance of citrus pests differs from that of those in Florida, though the actual insects species present are very similar in both countries. Thus Watson and Berger(15) give the following six pests of primary importance in Florida:-

1. Purple Scale.
2. Citrus Whitefly.
3. Rust Mite.
4. Green Citrus Aphid. (*Aphis spiraecola* .
Patch.)
5. Florida Red Scale.
6. Cloudy-winged Whitefly.

from which it is easily seen that citrus scales and whiteflies are of very great importance as pests. Of the next twelve pests in order, scales and mealybugs contribute five.

This extreme importance of scale insects, Aleurodids and mealybugs as citrus pests is not so evident in Trinidad. These three groups of insects are to a great extent naturally controlled, particularly so the mealybugs and Aleurodids on citrus. Thus out of six pests important in Florida only one, the citrus rust mite is of major importance in Trinidad.