each year, but the most important reproductive period is during the next two months. Thus, this insect should be attacked at its most vulnerable period when in the "crawler" stage.

The red scale attacks fruit, leaves, and wood. On young trees the main trunk is often found encrusted with red scale, and many growers do not realise that this is often the cause of stunted, hidebound trees with the bark often split longitudinally. Such young unthrifty trees should be uprooted and burnt. For other and better trees the standard recommendation is two close ratio sprays of 3 per cent. certified summer oil.

Apply the first summer oil under fine weather conditions towards the middle of February, and the second three weeks later. Adequate coverage is essential, as oil sprays are contact sprays and, to be effectual, must enclose the insect. The effect is to smother it by blocking its breathing pores, or tracheae.

Value of Oils

The efficacy and value of the summer oils may be discussed at this stage. These spraying oils are obtained from crude petroleum by fractional distillation. They belong to the same fraction as the lubricating oils, with a boiling point range of from 250deg. to 400deg.

The composition of the fraction varies according to the source of the crude oil, the process of distillation, and degree of refinement. They consist of paraffin hydrocarbons, unsaturated hydrocarbons, and the aromatic hydrocarbons. The unsaturated hydrocarbons present in an oil are injurious to growing plant tissues. Hence, these must be removed by treatment with concentrated sulphuric acid, known as the sulphonation process. The unsaturated hydrocarbon content must be known, and this is generally done by the iodine value, as iodine will combine with the unsaturated to give saturated oils.

The relative viscosity and the volatility of an oil are important factors. The viscosity is the rate of flow of an oil, while the volatility is the rate of evaporation. Both of these factors are of importance, and govern the degree of permanence of the oil film. As oil and water cannot be mixed unless the oil is treated with an emulsifier, this is added in order to keep the oil globules dissociated.

Colour is not a reliable factor for the determination of the suitability of a spraying oil, the terms "winter" and "summer" oil being preferable. The time to apply the 3 per cent. certified summer oil for the red scale on citrus trees is after these notes appear. The toxicity of this spray depends upon the permanence of the oil film and its action in blocking the tracheae of the insects.

Cultivation

Cultivation of citrus groves should be continued until the green manuring cover crop is sown in March. In order to be prepared it is desirable to order the necessary seed and manure early, as too often the green manuring crop is sown later than intended, with the result that next spring's ploughing and seasonal operations are delayed or the full growth from the green manuring crop is not obtained.

During the hot summer months a good, clean circle should be maintained around each citrus tree or the mulching material retained in order to suppress weed growth.

Pruning operations may be continued at this period of the year, and every opportunity should be taken to have trees opened out before the application of the summer oil sprays.

—A. M. W. GREIG, Citriculturist, Auckland.

Viticulture

Vinegar-Making in the Home

VINEGAR is made from sugary and starchy substances by alcoholic and subsequent acetic fermentation. In France vinegar is made almost exclusively from wines. In the United States of America cider-vinegar is in great favour. In the British Empire the use of malt vinegar predominates, although other vinegars are manufactured locally, as, for instance, in parts of Wales and in Monmouthshire, where a quantity is made from perry and crab-apple cider. The principles involved in the manufacture of these vinegars are, however, identical.

Amateurs frequently find that the beer, cider, or wine they have made has not turned out quite what they expected—the flavour is not quite right, or there may be already a start of acetic fermentation, which renders it unpalatable. It may still, however, be suitable for making vinegar.

For flavour and aroma, home-made vinegars from red and white wine, cider, perry, mead, and the fermented juice of fruits such as currants and gooseberries are far superior to commercial vinegars, which are made principally from grain, glucose, or sugar, with the addition of caramel for colouring and artificial flavourings.

Essential Component

The acetic acid, which is the essential component of vinegar, is transformed from alcohol by a special ferment known technically as "Mycoderma aceti," or, more generally, as "mother of vinegar" or "vinegar plant," which forms a greyish film of fine network on the surface of the liquid. It is necessary that this film should remain on the surface, as it requires air for its development and to aid it in oxidising the alcohol.

The Mycoderma aceti also requires a warm atmosphere in which to work, from 70 deg. to 90 deg. F. being the most favourable. Higher or lower temperatures retard its growth. To facilitate the process the barrel containing the alcoholic liquor may be placed