

low for foaming, and in view of the hot mixture being somewhat inflammable, the fire should not be allowed to blaze above the edge of the kettle.

When the temperature approaches two hundred and sixty degrees Fah., the cooking requires close attention, and if the mixture foams up near the top of the kettle, it may be advisable to subdue the fire for a time, or until the temperature reaches two hundred and seventy degrees when the foaming ceases. Under no circumstances should the cooking be done in or near a building, unless of course, a steam coil or jacketed kettle is used. If steam to a pressure of about sixty pounds is available, a jacketed kettle will be found most convenient. The operation of cooking whether done over a fire or by steam should not require more than thirty minutes.

When the required temperature is reached the kettle should immediately be removed from the fire, or the fire quickly subdued by means of sand or dry soil. The hot mixture should be transferred to a larger vessel and the kerosene immediately added then the water. Serious results may occur if the water is added before the kerosene. Both the kerosene and water should be poured in slowly while the whole is being stirred.

The emulsifier when properly made and at the ordinary temperature is quite liquid, somewhat stringy, and when held in a glass to the light, of a clear, reddish-brown color. It remains in good condition indefinitely—a sample at the end of eighteen months was found to just as efficient as at the beginning. In view of its keeping quality it may be made up during rough weather or slack seasons.

#### THE "SOLUBLE OIL"

Although the "soluble oil" remains in good condition for a long time, it seems advisable to delay its preparation till spraying time. It is readily made up without the application of heat. After thoroughly stirring up the emulsifier, the ingredients are simply brought together in the following order: Emulsifier, eight parts; crude petroleum, twenty-three parts; rosin oil, four parts; water, one part (more if necessary).

When the ingredients are brought together in the above proportions they should be vigorously stirred. With large batches, a garden hoe may be conveniently used for this purpose. At first the mixture when stirred will appear thin and sound harsh, but soon becomes thicker and smoother. When this condition is attained the soluble oil is complete. A test may be conveniently made by pouring a few drops in a glass of water. A white or milk-like emulsion should be the result.

In view of the variable character of crude petroleum the proportion suggested occasionally fails to produce a soluble



Winter Pruning at the Coldstream Ranch, B.C.

(Photo sent by Mr. R. T. Boies).

oil. As a rule, a slight increase in the proportion of water will produce the desired effect. The quantity which may be used depends greatly upon the quality of the crude petroleum and to some extent upon the efficiency of the emulsifier. With a well-made emulsifier and a good quality of crude petroleum, as many as forty-five parts of the latter have been used with excellent results. The emulsifier and the rosin oil being the more expensive items in the production of a soluble oil, it is important that they be made to carry as much crude petroleum as possible. In other words the cost per gallon of soluble oil is reduced by increasing the proportion of crude petroleum.

#### DIRECTIONS FOR USE

The amount of spray material required per tree varies from one quart for young trees to five or six gallons for large apple trees. For every 1000 gallons of emulsion or spray mixture, approximately the following quantities are required:

Carbolic acid, two and one-quarter gallons.

Fish oil, two and three-quarters gallons.

Caustic potash, five pounds.

Kerosene, three and three-quarters gallons.

Crude petroleum, forty gallons.

Rosin oil, seven gallons.

One gallon of "soluble oil" to fifteen of water is recommended, although a weaker solution, one to nineteen, has produced good results. If the "soluble oil" has been standing long after being made, it should be thoroughly stirred before using. When satisfied that it will readily mix with water, three gallons may be poured into a fifty-gallon spray barrel which is afterwards filled with water. This will give approximately the proper proportion.

It is extremely important that clean utensils be used. A barrel in which Bordeaux mixture has been used, is unsafe

for oil emulsion unless very thoroughly cleansed. The small amount of copper sulphate which clings to the inside of the barrel is enough to cause a separation of the oil and water. Lime and sulphur have a similar influence, but this mixture acts more slowly. Neither arsenate of lead nor Paris green has shown any such tendency.

The use of the agitator is not essential. An occasional stirring with a dasher of some kind will answer the purpose.

#### APPLY THOROUGHLY

Thoroughness of application is of utmost importance; every portion of the tree must be covered with a film of oil. In the case of badly infested orchards, two applications are recommended, one in the fall and the other in the spring. As a regular practice, however, one thorough application a year should keep the insect in check. With the use of a fine nozzle and abundant power, more thorough and more economical work may be done. Many insects hibernate under bud-scales and among plant hairs, and will escape the spray unless it is applied with sufficient force through a fine nozzle. It is more difficult to detect faulty work on the part of the operator with oil than with lime and sulphur, and for this reason, the spraying should be delegated to trusty men. With large apple trees, one man should spray from the ground to cover the lower parts of the branches and another from a tower on a wagon to spray the upper surfaces of the lower branches.

If a rain should occur within twenty-four hours after spraying, or before the water in the emulsion has evaporated, a second application may be necessary. After the water has evaporated, the oil is unaffected by the rain and will remain until it also has evaporated.

#### TIME TO SPRAY

Like the lime-sulphur wash, oil emulsion at regular strength must be applied