Some of the newer types of chemical make possible the economical control of wireworms. These yellowish, wirelike worms are the active, larvae stages of click- beetles and live for several years. They are especially hungry in the spring of the year when they feed on germinating seeds, or bore into the underground portions of plants. Several years of experimental work has shown that ethylene dibromide is best applied before a crop is planted and a period of seven to 15 days should elapse before planting. Beans, corn and lettuce are particularly tolerant of the chemical, but tomatoes or certain other solanaceous plants—those family to which the potato belongs—may be injured if planted too soon following application. The material can also be used in hand applicators applying 3.0 milliliters per shot at 12 inch intervals.

The dosage necessary for wireworms is 600 pounds to the acre which is more than is ordinarily recommended for fumigant control. As with ethylene dibromide this material should be applied prior to planting a crop, and because of its volatility the soil must be adequately tilled to allow for the penetration of the gas to a depth below the dirt points and should be in a condition ready for planting—too wet or too dry. Under certain conditions a rain or roller should be pulled behind the applicator to fill up the furrows. The treatment should be made at temperatures of 45° F. to 50° F.

The cost of materials and application will run from $30 to $35 an acre depending upon the amount of mate- rial used, the type of applicator used, and the number of acre to be treated. One treatment usually continues to give a partial control the second year and occasionally into the third year.

The lasting effect of one treatment is based on a rather complex set of factors and for the reason a carry-over effect to a second year cannot be predicted definitely.

The necessary soil preparation is similar to fumigating with ethylene dibromide. A temperature above 50° F. is desirable.

**Benene hexachloride**

Benene hexachloride is one of the most promising of the newer materials for wireworm and garden centipede control. It kills the worms chiefly by contact action over a period of several months. Unfortunately it is of little value for the successful control of nematodes.

The chemical is a white to brown powder with a very pungent, earthy smell which solidifies without clogging, is widely used as a protection against over- heating. It is available in a range of power and speed for all sizes of manure pumps. A condensation of an address delivered before the Western Farm Ex- periment Station at Berkeley, October 3, 1947.

[Continued on page 3]

**Liquid Manure—Pumps, Tanks and Application Method**

John B. Dobie

The three-inch centrifugal pump, designed to handle up to 40 per cent solids without clogging, is widely used in liquid manure systems. In one type of installation the pump body is located near the edge of the storage tank and a suction pipe with a foot valve is extended into the pump. A discharge pipe is provided from the pump to the delivery point.

Another type of installation has the pump runner housing submerged in the bottom of the pit and driven by a long drive shaft which projects upward through the aeration. The shaft runs in bearings in the shaft housing, and is driven by a deep well motor. There is no suction pipe or foot valve on this type pump and the unit is self-prime. The discharge pipe is extended from the pump up over the side of the pit to the desired point of delivery.

The electric motor is a most aston- ishing development in the field of power. It is available in a range of power and speed for all sizes of manure pumps. A three-inch pump requires a motor of three horsepower electric power. The motor should be equipped with a good magnetic switch to prevent it from burning out.

**The Storage Tank**
The size of the storage tank varies according to the ideas of the indi- vidual owner. Installations for the use of liquid

[Continued on page 3]

**Low Cost Control Measure For Wireworms Made Possible By New Chemicals For Soil Application**

W. Harry Lange, Jr.

There is no one simple and easy solution to the international trade problem. Under present conditions of world-wide conflicts in ideologies, it would be foolish to base international trade policies mainly upon the possibilities of temporary peace or loss to this or that group without first getting a better, larger, or business.

Whether we can maintain peace and reasonable opportunity for pri- vate business activity will depend very much on what happens econom- ically and politically in the whole world, for the nations in main- taining democratic institutions. If peaceful solutions fail, the ulti- mate cost in dollars, to say nothing of moral values and human lives, will be so vast as to make any temporary gains or losses seem microscopic.

This is not to say that temporary gains or losses can or should be ignored, but merely to point out that we need to be on guard against overlooking things of major importance as we concern ourselves over local prob- lems.

Dr. M. G. A. van der Meer, University of California (Continued on page 3)

**Application Method**

**Products Affected**

**Benzene Hexachloride**

**Ethylene Dibromide**

**Benzene Hexachloride**

Late in the fall, in dry years, trees injured by the shot-hole borer are heavily infested with a gum which have been accumulating throughout the summer. The gum mas- ses reach their greatest total just at the start of the fall rains. At long as the leaves hold the gum leaves the gum is not conspicuous; but as soon as the leaves fall the gum becomes suddenly and forcibly aware that something is wrong. Heavy gummed trees are exten- sively combed by the gumactive. Each mass of gum acts as a lens to focus the light to a bright point.

With the advent of the fall rains, the conifer mites, mites, and drop from the tree, and to the casual observer the masses again appear to be in good health.

**Agriculture and the War Offensive**

In the war, the value of farm products in the United States has increased fourfold to $20 billion. A condensation of an address delivered before the Western Farm Ex- periment Station at Berkeley, October 3, 1947.

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[Continued on page 3]
Small Size Citrus Fruits May Be A Genetics Problem

(Continued from page 1)

mature, they are thicker and more disease-resistant. In California they are zinc and in average fruit size. Another important aspect of the widespread elimination of these diseases in Florida in the past 18 years has been a substantial increase in the amount of the disease. Not only is the disease in Florida in California, but also during the past 15 years has been a sharp increase in yield, which has been attributed to an increase in fruit size rather than to increased production per tree. The increase in fruit size has been substantial, and it is unquestionably the age of the trees. The California Live Oak trees normally produce their greatest flush of growth during February and March. However, it has been observed that the young tips of some trees of this species do not develop normal growth of leaves. This can not be the sole cause; the young tips of these trees may also be infected by the mildew fungus. Oak trees infected by this disease are less than 5% of the total area.

Among the possible causes which have been suggested are:

1. That the use of nitrogenous fertilizers is much more widely prevalent in California than in Florida.

2. That the influence of soil conditions on the trees is of major importance. The use of high nitrogen fertilizers is advocated to promote growth at that time, but the trees are killed in the following season by the disease. The disease may be provided only by rain during the following season.

3. That the use of such sprays is interfering with the intake of mineral nutrients necessary for growth. The use of such sprays is receiving much attention in connection with experimental work on the problem of water and mineral nutrients. The evidence is strong that in certain cases of tip mildew of oak trees was almost certainly due to the use of certain kinds of sprays. The use of such sprays is receiving much attention in connection with experimental work on the problem of water and mineral nutrients. The evidence is strong that in certain cases of tip mildew of oak trees was almost certainly due to the use of certain kinds of sprays. The use of such sprays is receiving much attention in connection with experimental work on the problem of water and mineral nutrients. The evidence is strong that in certain cases of tip mildew of oak trees was almost certainly due to the use of certain kinds of sprays. 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