

the bugs. It has to be applied in fairly large quantities and it is rather an expensive substance; but it has given good results when used on potatoes.

The *most important* Paris green substitutes are those which contain large quantities of arsenic such as the arsenates and arsenites, commonly called commercially the "arsenoids." Among these we have copper arsenite (green arsenoid), lead arsenite (pink arsenoid), barium arsenite (white arsenoid), calcium arsenite and lead arsenate, the latter two being the only ones extensively used. We will thus mention only calcium arsenite and lead arsenate in detail.

LEAD ARSENATE.

This arsenical is becoming very popular and is replacing Paris green to a great extent. This is because lead arsenate is much safer to apply than Paris green, especially on the more tender foliage, such as peach; and further, because it stays longer suspended in water on account of its extremely finely divided condition, and that it adheres more firmly to bark and foliage, and therefore exerts its influence over a longer period of time. It is also the only arsenical which can safely be mixed with lime-sulphur solution.

There are two forms of lead arsenate, the PbH or acid lead arsenate ($PbH As O_4$), and the Pb_3 or neutral lead arsenate ($Pb_3 (As O_4)_2$). It is not known definitely which is the better form to use; they are both quite insoluble in water if well made. The former is richer in poisonous material and would thus seem to be the better; but, on the other hand, it seems to be the general opinion that the neutral arsenate is the safer to use with lime-sulphur solution, since it is not so likely to decompose the wash nor to itself break up and liberate soluble arsenic acid. The formation of soluble arsenic acid, of course, would make the wash destructive to foliage.

In the light of present knowledge, therefore, it is recommended that the neutral lead arsenate be used when applying lead arsenate along with lime sulphur wash. When using lead arsenate alone, however, it does not matter which form is used, either the neutral or acid being suitable when mixed with water only.

Some investigators claim that a third form of lead arsenate exists, viz., the pyro arsenate of lead ($Pb_2 As_2 O_7$). Its presence or the extent to which it occurs in our lead arsenates is unsettled. It is a form which is fully as rich in poisonous material as acid arsenate of lead is, but it is not such a stable substance as the latter and would readily break up when mixed with water, especially alkaline water, and with lime-sulphur solution, and liberate arsenic acid and would thus be extremely destructive to foliage. Not enough complaint is on record, however, to warrant us in believing that any quantity of this pyro arsenate is present in our lead arsenates.