

built stone or brick cellar answers very well, and with a good cellar no extra fixing need be resorted to for a few colonies, but such as have not this should try and put up some little place, or leave them outside with a packing of six to twelve inches of saw-dust or chaff at bottom or sides, and twelve to fifteen inches of chaff at the top. The entrance must of course be left open.

MOVING BEES.

As May is the proper time for an inexperienced or even experienced man to buy bees, the proper way to move them will be desirable information. The distance they have to be moved is important, and the nature of the road. A spring wagon is good, with six inches of straw underneath; a wagon without springs, but straw in the wagon, will answer. Combs in hives should run with the length of the wagon, and may so be carried a mile or two with safety. If the frame bars are glued down pretty well, a cloth can be stretched down tightly over the top of frames, and the entrance closed with wire cloth. They should be moved at night in any case when taken on a wagon. If bees have to be taken longer distances, they may at times be safely taken as above, but if the weather is warm, the bees for want of air may melt down the combs. It is not wise to risk it, and better to put a wire screen over the top after removing all the cloths. If the frames move loosely on their rests, then drive a light wire nail partly through the frames and hive, but not farther than you can draw them out. This should be done in any case if sending by rail. First-class colonies in Langstroth hives should not cost more than \$7.50, and can sometimes be bought for less. Be careful who you buy from, especially if you do not understand the business.

INCREASE IN THE APIARY.

Do not divide your bees, let them swarm naturally. There is no money in the sale of bees at present prices. To increase by dividing a colony is a doubtful method at almost any time. If you do not understand it, it is folly, and you may lose both colonies, and it is very likely at best that you will not get as much honey from them. Place your bees where the ground is sweet and dry, and they will get the morning and evening sun, but not much of the sun when it is high. On the edge of a shade tree answers very well.

Horticultural.

A Few Insecticides and How to use Them.

The progressive farmer and horticulturist meet with no problem of greater moment to them than that of combatting the attacks of the many insect enemies that are warring on their crops, and this becomes of more and more importance as time passes and the countries grow, for with our advancement these pests increase in both variety and numbers. New immigrants are constantly arriving with the introduction of new grains, and sallies are made by species hitherto thought harmless, on the products of the farmer's care, they being compelled by force of circumstances to make ravages on cultivated plants through the destruction of their natural foods. It has been estimated that there are about 350,000 already known species of insects in the world, and about as many more that have not been described. Of these about 25,000 species may be credited to this continent, and about a similar number prey upon the productions of man. Among the 7,000 or 8,000 that are said to be fruit pests, the apple alone is preyed upon by 210

species. This being so, it behooves the farmer and fruit grower to call to their aid all possible measures that will enable them to combat these foes, taking advantage of scientific experiment and research, and the practices that others have found successful, as well as coupling with these close observation of the habits of these depredators. If all strive and work with this object in view very noticeable results will as surely follow.

No other insecticides are more universally used than the two arsenical compounds, Paris green and London purple. The former is an arseniate of copper, and contains about 60 per cent. of arsenious acid. The constituents of Paris green, it being a chemical compound, always bear the same relation to one another, and consequently, unless adulterated, is always of the same strength. This however, cannot be said of London purple, as it is a refuse from the manufacture of aniline dyes, and hence its strength is not stable. It is an arseniate of lime, containing about 43.65 per cent. of arsenious acid and 21.82 per cent. of lime. It is of very great importance to secure pure Paris green, for many of the tirades directed against its use have sprung from the using of an adulterated article. To determine whether the brand offered is pure or not the following is given as a test: Take 100 grains of Paris green, place it in a glass vessel and add one ounce or so, according to its strength, of liquid ammonia. Stir this with a glass rod, and if the Paris green is pure it will all dissolve, forming a beautiful blue transparent solution, and if it is adulterated a sediment will remain. As white arsenic, another insecticide used by some, is also soluble in liquid ammonia, and cheaper, it might be used to adulterate Paris green without this test detecting it, but the lighter tinge given the Paris green would at once indicate its presence. This white arsenic has been spoken of highly by some, its cheapness and solubility being largely in its favor, while the easiness with which it might be confounded with harmless substances and the tendency to burn the foliage, that it possesses, unless very weak, are features of it that lessen its value.

Extended experiment and use in the orchard has demonstrated clearly that as a means of fighting the codling moth, the canker worm, and as many claim, the plum curculio, Paris green has no equal. Prof. Forbes reports as the result of his experiment, that the outcome of the examination of 2,418 apples from trees which had been sprayed with Paris green 1 1/2 ozs. to 5 gallons water, and of 2,964 others from check trees, which had not been so treated, it appeared at the end of the season that 21 per cent. of the treated apples had been infested with the codling moth, and 67.8 per cent. of those not so treated; while 27.3 per cent. of the poisoned lot had been infested by the curculio, and 51.3 per cent. of those not sprayed. The London purple (3/4 oz. to 10 gals. of water) saved about 1/6 of the apples that would otherwise have been sacrificed to the codling moth, and about 1/4 of those otherwise spoiled by the curculios. Mr. E. L. Goff, horticulturist, of N. Y. Experimental station, came to the conclusion from his experiments, that the percentage of wormy fruit from trees sprayed with Paris green and water was about 22 per cent. less than those not sprayed. In an 1886 bulletin Prof. Forbes claims a saving of 70 per cent. of fruit by spraying once or twice in early spring, as soon as the fruit is fairly set, and not so late as the time when the growing apple turns downward on the stem. There is no doubt whatever but that spraying in conjunction with the using of bands around the tree, put on before the first of June, and kept on until every apple is off the tree, will effectually rid us of this

pest. The larva that escape the Paris green may be caught in this way if the tree is clear and free of all rough, loose bark.

At the late meeting of the Fruit Growers' Association it was brought out clearly that spraying in the proportion of 3 ozs. to 40 gals. is of sufficient strength, and the time to apply when the petals of the blossoms have fallen off, and thus prevent the poisoning of bees and other useful insects that visit the flowers. In smaller quantities than that given above, 1/2 to 3/4 oz. to a pail of water. For cankerworm Prof. Fletcher recommends the liquid applications, 2 to 4 ozs. to a barrel of water (40 gals.), one before the buds open and the other as soon as petals have fallen; for plum curculio an application of similar strength to the foregoing sprayed over the trees as soon as the young plum has formed, and if necessary repeated, a fortnight later. The following method of dry application is recommended by the same authority: one part of Paris green may be mixed with from 25 to 50 of land plaster or common flour. This is given as useful on all plants of which the foliage is not used as food.

Another insecticide that has been used with success for some time past is pyrethrum or buhach. This substance so known commercially is the ground-up flowers, leaves and stems of the plants, one a native of the Caucasian mountains and the other of Dalmatia, viz., *Pyrethrum roseum* and *P. cinerariaefolium*. These are very closely related to our common chrysanthemum. Pyrethrum possesses one important feature that makes it of great worth, and that is its being not at all poisonous to the higher animals. It is to be remembered that it kills by contact, and hence it is practically useless dusting the upper side of the leaves when the insects are on the under, for the principle contained in it is so quick acting in its effects and is very volatile. On this account also, unless the air is kept carefully from it, it soon becomes worthless with age. Its success as a remedy for the house-fly led to successful experiments on the cabbage-worm and all kinds of vermin that infest poultry and other domestic animals. A solution of it in cold water, a tablespoonful to two gallons of water, has been found to work with effect on cabbage-worms. It should be applied early so as to destroy the first brood. The same solution is of great use in destroying plant lice. Prof. Cook, of Michigan, gave the above solution a thorough trial with great success on the currant slug, rose slug, green cabbage caterpillar, and also on the zebra caterpillar. Experiments with about twenty insecticides on these insects, under the direction of the entomologist of the Washington department of Agriculture show that pyrethrum powder mixed in the proportion of one part of the powder to three parts flour, and dusted on the plants, gave the best results.

Other insecticides that have made rapid advances in the favor of those that have to meet the attacks of insect enemies, are the kerosene emulsions. Milk and soap are the two substances that have been found best to mix with the kerosene. The former preferably in its sour state, 1 part to 2 of kerosene, vigorously churned, while at blood heat, for from 15 to 20 minutes, results in a substance called "kerosene butter," that will keep well, and finely sprayed, in the proportion of 12 parts of water to one of emulsion, it will, as stated by the Washington authority, kill most insects without injury to the plant. The same authority recommends the following emulsion with soap, as equally good: kerosene or refined coal oil, 2 gallons; common soap 1/2 lb.; water, 1 gallon. Heat the mixture of soap and water and add it boiling hot to the kerosene. Churn the mixture for five