

selecting only the best females from the entire flock, by mating them to good vigorous males from high-laying mothers, and by using this special mating as a breeding pen from which all eggs for hatching should be saved. In this way a continual improvement will be had, which can not be assured when the entire flock is used to propagate the future layers. In other words, as the New Jersey station points out—

"The time has come for the poultryman to pay more attention to individual birds, and less to the flock as a whole, especially when breeding for future producers. The practice of making special breeding pens in this way is bound to result in time in larger, more vigorous birds, better layers, and hence more profit.

"Great care should be exercised not to include in these special matings for breeding purposes any birds which have had any poultry disease. Some diseases, such as bacillary white diarrhea, are known to be directly inherited, others are known to give to the offspring an inherited weakness which makes them especially susceptible to that particular disease. This is true of tuberculosis, diarrhea, enteritis, etc. Still others, such as roup, catarrh, and other general disorders, weaken the birds constitutionally and make them unfit for breeding. Any bird once affected with disease should be conspicuously marked, so that it may never find its way into the breeding pens.

"In selecting the females for the breeding pen in the spring, the following factors have been found by observation and experimentation, to be essential to heavy egg production, namely:—

1. Breeding from heavy producers.
2. The use of mature birds, preferably hens, not pullets.
3. Line breeding rather than too close in-breeding or outcrossing.
4. Breeding from birds which were early producers as pullets.
5. Selecting birds which show a good vigorous constitution.
6. Selecting for egg type (long, rather deep bodies with abundant room for the organs of digestion and reproduction).
7. Selecting large specimens of the breed.
8. Selecting late molters since they are usually the best winter layers.
9. Breeding from birds which have shown by records to be persistent layers.
10. Selecting birds that eat well, rise early, and retire late, for such birds are usually heavy layers."

The work of the Maine station indicates that in this breeding, matings should be made only with the male progeny of high-laying mothers, because the high egg-producing power is transmitted through the male.

Without strong, well-bred birds a good egg yield is not certain, even with the most efficient management. Hence much time and thought and if need be, money should be expended in the improvement of the flock by mating and breeding.

The birds set aside for breeding should be so cared for as to provide for the production of fertile eggs in the breeding season, which will hatch into vigorous chicks. They should not be crowded into small, insanitary houses, nor should they be forced for a heavy egg yield during the winter. The three factors which especially favor the production of fertile eggs are exercise, which can be made compulsory by supplying most of the feed in deep litter on the floor of the pen; green food, which, for want of beets or cabbage, can be supplied in the form of sprouted oats; and meat scrap, supplied liberally (15 per cent) during the breeding season, but not excessively prior to the breeding season.

The saving of eggs for hatching purposes should begin about the 1st of February. They should be collected at least twice a day, and should be kept at a temperature of about 45 deg. to 50 deg. They should not be subjected to great variations in temperature, and should be placed so that they may be turned daily and protected from the direct rays of the sun. The factor of temperature is especially important, for the germ (embryo) begins to develop at 70 deg. F. High temperatures start the development of the germ, but if heat is not supplied uniformly it ultimately dies. As a result of this, many eggs are later tested out as infertile. Eggs for hatching should be selected with a view towards uniformity in shape, size, and color, the idea being to select toward the ideal type of egg for the breed kept.

Raising Chickens.

Editor of "The Farmer's Advocate":

Many of our farmers' wives are complaining of poor hatches of chickens this year. But even when the eggs hatch well it is hard to raise the tender little chicks to maturity. There are hawks, crows, and rats, craving for fresh meat, and consequently never miss an opportunity of having a good meal. Then the chicks are sometimes killed by getting under the feet of the horses and cattle, although the hen does her very best to take care of her family she is so proud of, and for whom she will bravely fight.

One of our hens stole away her nest under a pile of brush or branches. Evidently she didn't believe in having a large family, for when we found the nest there were only eight eggs in it. After a while she came home, bringing seven fine chickens. But she always returned to her old nest at night, down in the clover field. We never shut them up, only fed them when they came looking for food. We always used to imagine that chicks should be shut up for a few weeks after they were hatched and never let out in the morning until the dew was off the grass. But this summer we let them run, and they have thrived well. No matter how hard it rained we just left them in their mother's care, and we never lost one. I think it is a great mistake to shut up the chicks when they are just hatched, for they do so much better when they have their liberty. The mother hen knows her business, and we need not interfere with her methods. She knows when the little ones are getting cold or wet, and then she calls them under her sheltering wing and the warmth of her body puts new life into them, as it were.

In many instances only about half of the eggs set under hens hatch. But when the hen is mistress of the situation and steals away her nest she seldom fails to have a good flock of chicks, which surely proves that she has good common sense, and knows just how to manage. Our chicks have been out in the wet grass, and in pouring rain, but it never hurt them in the least. As long as we give them good food, water, and liberty the mother hen will do the rest, for she is an industrious, faithful mother.

In view of the high prices for chickens and eggs, many of our farmers are increasing the size of their poultry flock. If properly managed, there is certainly money in poultry. One farmer, who lives about twenty miles from the city, says that his 100 hens bring him in about one dollar a day. He has about 60 chickens this year.

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HORTICULTURE.

How Fire Blight is Disseminated.

No doubt many readers of "The Farmer's Advocate" have noticed in orchards in their localities a number of twigs and large branches upon which the leaves have all browned and dried up, and often blackened, much as though they had been injured by fire or frost. The leaves do not drop readily, but cling tenaciously to the twigs. Apple shoots often turn to an amber-yellow, or reddish color, and characteristic cankers appear. This is all caused by the presence of a species of bacteria (*Bacillus amylovorus*), which remain alive over winter, and become active in the spring when the warm weather causes the sap to commence to flow. A gummy exudate oozes out of the lenticels and cracks in the infected bark laden with these organisms. The disease attacks blossoms, shoots, limbs, and may extend down to the root.

It is well known that spraying is ineffective, and as no blight remedy has yet proven effective with such a disease it is important that fruit growers understand its methods of dissemination and a recent Cornell bulletin on the "Control of Fire Blight Disease in Nursery Stock" by Vern. B. Stewart, gives some valuable information.

Such agents as bees and wasps have long been conceded important in the spread of blossom blight, says the bulletin, but in recent years certain other insects have been associated with the spread of the disease, particularly with twig blight. While visiting blighted tissues the insect becomes smeared with the gummy exudate and carries the bacteria to the tender twigs. In sucking the sap from the twigs the insect punctures the tissue and thus furnishes a means of entrance for blight germs.

The common green aphids (plant lice) frequently spread the disease in apples and quinces. However, of all the sucking insects that may disseminate the blight bacteria in the nursery, perhaps the most important is the tarnished plant bug (*Lygus pratensis*). This insect has been recognized for many years as the cause of the severe injury to peach stock known as "peach sting." The injury resulting from the insect's "stinging" the terminal shoot of the first-year peach buds causes the tree to make a stunted, bushy growth and to fall short of the proper height. During the past two seasons, not only has the peach stock been injured in this way, but considerable damage has been apparent in several blocks of first-year apple buds. A large number of apple shoots that had been stung by insects a few days previously, developed infections of fire blight. When abundant in blocks of two-year-old stock (especially in apples where there may be considerable blight) the insects visit the sweet, gummy exudation on infected trees, and thus not only spread the disease to the large trees, but carry the bacteria to adjoining blocks of one-

year-old apple stock where infections occur through the punctures made by the insects.

Besides the general distribution of the blight germs by insects, man himself is often an active agent in spreading the parasite. His pruning tools are certainly a frequent means of transmitting the organisms. In Maryland a nursery block of 10,000 trees of Bartlett and other pears was completely destroyed by blight. This block, as determined by the specimen, carried actual samples of hold-over blight in the stocks. When the stocks were cut off above the dormant buds in the spring, the pruning tools became infected and the disease was transmitted to nearly every tree reached by the pruners. Instead of the buds pushing up, the cut surface began to gum and blight.

Blight is frequently introduced into seedling blocks by the use of diseased scions that have been cut from two and three-year-old stock in which considerable blight has been present. The seedlings, which are budded with diseased buds, not only blight, but bacteria are carried on the budder's knives to other seedlings. Later, at rebudding time, the budders, being unfamiliar with the disease, frequently attempt to rebud the blighted stocks; their knives become infected and the bacteria are transmitted to other seedlings. The number of diseased seedlings is also frequently increased when the strings used for tying the buds are cut. Often in cutting the string a slight incision is made in the bark and the trees are inoculated in this manner, blight germs having been carried on the knives from diseased stocks.

Blight may also be introduced into the seedling block by means of insects, which carry the bacteria to tender shoots. Occasionally, entire trees become diseased in this manner. However twig infections are seldom if ever so abundant in the seedlings as to be the source of a serious outbreak of the disease. On the other hand, an attempt to bud such infected seedlings would tend to favor the more rapid spread of the disease, the blight bacteria being carried to healthy trees on the budding knives.

The shipment of scions from one nursery to another may also be a means of transmitting the blight for long distances, and bacteria have even been known to live over in scions used for grafting purposes. In the winter, when the grafts were made, the grafting knives became infected, and transmitted the blight bacilli to grafts made from healthy scions.

The elimination of certain disseminating agents is an important consideration. It has been demonstrated that controlling the aphids is frequently an essential step in preventing the spread of blight bacteria. The greatest necessity at the present time, however, is a means of eradicating from the nursery the numerous other sucking insects which occur on stock that is susceptible to fire blight. Of these blight disseminators the tarnished plant bug (*Lygus pratensis*) appears to be the most important.

The most satisfactory means of controlling the blight is by strict sanitation and an attempt to eradicate the disease from any given locality. All sources of infection should be destroyed. Old orchard trees—such as pear, apple, or quince—in the vicinity of the nursery, usually favor the blight, in that frequently such trees become diseased, and, for years to follow, are sources of infection for nursery stock. Unless they are given special attention and kept free from the disease, their presence is a menace to the nursery. Old, neglected orchard trees should be removed, and every effort made to keep the surroundings clean. Old hawthorn and wild crab-apple trees along the fence rows or in near-by pastures frequently harbor the blight. Such trees should be destroyed. Too much emphasis cannot be laid on the necessity of a thorough and systematic cleaning-up of all diseased trees before growth starts in the spring. Orchard trees in the vicinity should be inspected at least once a week throughout the summer; all blighted twigs, shoots, and water sprouts should be cut out, the cut disinfected with corrosive sublimate 1-1,000, and the pruning burned.

A thorough cleaning-up and removal of all sources of disease in early spring naturally reduces the possibility of blight infection in the nursery. As previously pointed out, however, bees and other insects frequently carry the bacteria from oozing hold-over cankers, which are especially common on orchard trees, to blossoms that often appear on the two-year-old quince stock. Since the production of fruit by such trees not only causes a stunted growth for the tree, but also furnishes a source of infection at blossoming time, it is considered good practice to pinch off or remove all quince blossoms before they open.

The apple crop in the Niagara district is reported very light, but a very heavy crop of peaches will be harvested, and plums and pears are also a good crop. Much the same state of things is reported from Lambton county.