[SECOND EDITION.]

STANDARD COPY,
NOT TO BE REMOVED.

New York Agricultural Experiment Station.

(These series of frequent reports are intended to inform the public of progress at the Station rather than to give complete results.)

BULLETIN NO. II—NEW SERIES.

N. Y. AGRICULTURAL EXPERIMENT STATION,
GENEVA, N. Y., Aug. 24, 1885.

The following bulletin, by the Station botanist, J. C. Arthur, will be found of value and interest.

E. LEWIS STURTEVANT,
Director.

The progress of the work at the Station on pear blight this season has been substantial and practical. The work last year established the infectious nature of the disease, The large number of artificial inoculations made for this purpose were quite free from any danger of accidental contamination, as there was no spontaneous occurrence of the disorder in the orchard or the immediate vicinity. This year the disease has shown itself in force, over one-third of the trees of the orchard being attacked, as well as the trees in adjoining grounds, and

the nursery stock, hawthorn hedges, etc., of the vicinity. This opportune visitation has permitted a very thorough study of the progress of the disease in its virulent form.

Last year's work, as well as that of Professor Burrill in Illinois some time since, indicated that the disease does not as a rule spread from limb to limb, and we have now discovered the reason why it does not, and what is more important, have found out the manner and time of its real attack upon the tree—when it first finds entrance into the tissues and begins the work of destruction.

While taking a stroll the last day of June a solitary hawthorn shrub was met, with the larger part of the leaves brown and dead. Its odd appearance attracted attention, and a close inspection indicated that it was suffering from blight, a conclusion fully corroborated by a subsequent microscopic examination. In all cases the blighting had evidently begun at the ends of the branches, and largely at the ends of the short spurs along the sides of the limbs. These spurs usually terminate in one or more clusters of flowers in the hawthorn, which at that time had long passed, and on the uninjured parts had matured into fruit fully two-thirds grown. On the diseased spurs, however, the dead flowers had not perceptibly developed beyond the condition at flowering. Here was surely a significant fact. The blight must have attacked these parts not later than the period of flowering, which this year was from the middle to the twentieth of May. The germs found a favorable place of entrance through the moist surface inside the flower, and from that point passed down the flower stalk into the branch, and so on, killing the tissues as it progressed. In cases where it did not find entrance in this way, it had attacked those shoots of the present season which were making the most vigorous growth, as the length of the internodes and the number of partially grown leaves on the dying portion readily showed. Subsequent inspection of several untrimmed hawthorn hedges near the Station confirmed all that has been said above, both in regard to the behavior and extent of the disease.

The orchard was at once carefully gone over, and evidences of blight were found in no less than one-third of the trees. The following varieties were among the blighted ones: Bartlett, Buffum, Doyennè Boussock, Flemish Beauty, Mt. Vernon, Seckel, Sheldon and White Doyennè. In fact the blight seemed no respecter of varieties so far as our assortment was concerned, for all kinds on one side of the orchard were touched, while almost every tree on the opposite side remained free. It was found that in many instances the entry had been made through the flowers as in the hawthorn, but more often through the growing tip of a branch. An armful of blighted

branches from Kieffer pears, which are not found in our orchard, were brought me on July 24 as badly blighted as one often sees.

The blighted branches were removed with pruning shears on July 1, by a day laborer who was none too keen eyed. Ten days afterward the orchard seemed far more blighted than at first, and in many instances it had struck at the bodies of the larger limbs, and in one instance at the trunk below the limbs.

There was now a marked difference in the amount of blight showing on the several varieties. The Bartlett led them all, some of the larger trees being so much affected that when the diseased branches were removed there was but little of the top left.

At first this was puzzling. A careful study of the case, however, furnished a solution. Although all had probably taken the blight about equally, yet it had spread through the tissues at very different rates in the different varieties. The Bartlett showed itself the most susceptible. The apparently rapid blighting of large limbs was readily traced to the incursions of the disease through the short spurs near their bases. In the less susceptible varieties the disease had not traveled the whole length of the spur at the time of the first pruning, and was therefore all removed. In the most susceptible kinds it had gone the length of the spur and already entered the large limb when the spur was cut away. Here it did not take long to girdle the limb, prevent the passage of sap, and thus practically kill it. In the single instance where blight occurred on the trunk of a tree below the branches, it was perfectly evident that it had entered through a vigorous young shoot that had started out at that point this spring. The failure to cut it away before the blight reached to the trunk cost us the entire tree.

In addition to the out-of-door observations, a very extended course of experiments in the house have been carried on. It is only necessary to refer to these in the present connection in order to mention the artificial cultivation of the germs of the blight. These have been grown in sterilized infusions of corn meal, hay, barn-yard manure, green fruits, starch, etc. The important point is that they will live and thrive outside the tree in dead organic substances.

These are the facts. They explain the phenomena of pear blight in this way. The disease is due to living germs. These germs can live and multiply indefinitely in any damp spot where there is decomposing vegetable matter. From such places they are raised into the air when dry, or carried up by moisture. From the air they lodge upon the trees, and when the conditions are favorable pass into the tissues and cause the blight. The conditions referred to are in general (1) very tender tissues, such as are found within the flowers and at

the ends of expanding shoots in spring, and (2) a moist atmosphere. No varieties are entirely blight proof, but the disease spreads so slowly in some that they receive little injury, especially when not making too rapid growth. The reason why the blight, when seen in July and later, does not pass directly from one limb to another, or from one tree to another, is because in the first place the germs cannot escape, being confined by the bark, or else escape in a viscid exudation which holds them firmly together, and in the second place there are very few places on the tree at this time of the year where the surface tissues are sufficiently tender for them to find an entrance.

Does not all this suggest some thoughts regarding preventives and remedies? Do not force the trees into too rapid growth by heavy fertilizing or otherwise. Place no confidence in sulphur, lime, or washes or applications of any sort. Promptly remove every trace of the disease a foot or more below the lowest spot where it shows, and burn the branches.