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R. J. BALDWIN, Director

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# FERTILIZING THE MATURE APPLE ORCHARD

A definite amount of copper sulphate and a definite amount of lime, combined with a definite amount of water make bordeaux mixture. They make bordeaux mixture at any time, at any place. All fruit growers know this. Many are tempted to believe that orchard fertilization can be carried on by use of another invariable formula and that because nitrogen increases yield in one orchard it will increase yield everywhere. Unfortunately, this is not always true. The bordeaux formula works always because it deals with inert materials which are always the same. The soils in which apple trees stand are not always alike; more important still, apple trees themselves are not always alike even when growing in the same soil. Hence, orchard fertilization with nitrogen sometimes is extremely profitable and sometimes it is distinctly unprofitable.

There are four ways in which fertilization may, at least theoretically, increase apple crops:

1. By increasing the size of the apples, so that it takes fewer to fill a barrel.
2. By increasing the percentage of "set," so that, though the number of bossoms is not increased, the number of apples is greater.
3. By increasing the frequency with which the various spurs on the tree form fruit buds; speeding the existing machinery.
4. By making a bigger tree with more spurs on which blossoms can form.

Certain orchards in the state, where fertilization has been profitable, have been studied rather carefully to determine in which of the ways just mentioned, fertilization has affected the trees. This study and others have made certain facts stand out rather clearly.

The effect of fertilizer on size is variable. With moderate crops, there is apparently at times an increase in size accompanying fertilization,

but this will never double the yield. Sometimes, the set is increased by fertilization to such a point that the apples are smaller.

The effect on set is often very marked, especially on distinctly weak trees, but it has been known to increase the yield per tree to 23 bushels in an orchard where the unfertilized trees averaged 19 bushels. To secure a benefit of this sort, application should be made 10 days to two weeks before the trees blossom; the increase should come in the same year. Applications in the off year to affect set are of questionable use. It is a temporary stimulation only. More trees will receive benefit in this way than in any of the other three.

In the majority of mature commercial orchards in this State, no great benefit can be expected from increasing the frequency of fruit bud formation on the older spurs. In extremely run-down trees, this will occur, but the spurs maintain a fair vigor even after the shoot growth at the tips of the branches has become very slight. In very weak trees, they continue to blossom in alternate years and even after several years of fertilization their performance remains the same. If they are not blossoming as frequently as every other year, fertilization may benefit them. However, this will, in most orchards, be a minor benefit.

As trees grow older, even in good soils, they tend to make less shoot growth at the tips of the branches. The less the shoot growth made this year the less room there will be next year for the formation of new spurs to bear the following year and to replace the wastage of the older spurs. Without this new growth and new spur formation, an apple tree may continue fruitful for a while but it will hardly hold its own in yield and it will go down sooner or later. The effects of fertilization are evident more often in stimulating this growth than they are in stimulating the old spurs. This effect naturally cannot be translated into fruit for at least two years, but once the additional framework is established it is a permanent gain, while the effect on set is but temporary.

The two points, then, to watch in considering the advisability of fertilization or in measuring its effects, are the set of blossoms and the formation of new fruiting wood. If these are satisfactory where no fertilizers have been used, the money set aside for fertilizers can be invested elsewhere to better advantage.

If the shoot growth in a mature tree is long enough so that each shoot of last year's growth forms two to six new spurs, the grower can feel rather complacent. The chances are very strong in a tree of this kind that the old spurs are doing all that can at present be expected of them; if they are not, attention to pruning rather than more fertilization is necessary. If new spurs are not appearing, he can use his money on fertilizers in hope of getting good returns; fertilization for this purpose is as good one year as another.

Some orchards which are up to standard in all other respects can still have the "set" increased profitably. It is better to have some excess to be thinned off than to have a poorly distributed load. If, however, the trees have met the other tests and carry one apple per spur beyond the June drop there are lots of other outlets for money more profitable than fertilization. If they fall seriously below this standard, fertilization in the blossoming year is advisable.

One other aspect of fertilization should be considered. Many trees which now respond markedly to fertilization, showing need of it in three distinct ways, have in former years been very productive. The age of the tree makes a great difference in its requirements.

Trees in sod are much more likely to repay—and to require—fertilizers. To no little extent, nitrogen-carrying fertilizers act as substitutes for cultivation. It is doubtful whether they will do so satisfactorily in the soils most subject to drought, but there are many orchards so situated that it is possible to dispense with cultivation, for a few years at least, using fertilizers as a cheap substitute, and at the same time in some measure to secure the high colored fruit that characterizes sod-grown trees. The general trend of careful studies of apple orchards in sod indicates that nitrate deficiencies limit production more frequently than moisture and the fertilized sod orchard is gaining increased favor over the cultivated orchard on account of the erosion in the latter.

For mature trees, when fertilizers are needed at all, applications of nitrate of soda at the rate of eight pounds of sulphate of ammonia at five pounds per tree are ordinarily sufficient. The material can be broadcasted and the first rain will take it into the soil. In making the applications it is wise to pay more attention to the soil beneath the tips of the branches or beyond than to the soil close to the tree. Before ordering fertilizers, it is equally wise to look at the trees rather than the soil.

This bulletin presents in more condensed form the more important points covered in detail in Special Bulletin No. 127 of the Michigan Agricultural Experiment Station. A copy may be had upon request.