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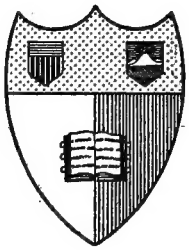

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Fertilizers and Fruit

A Trip Among Growers in the Famous Hudson River Fruit District

BEST QUALITY IN FRUIT

BY H. W. COLLINGWOOD
Managing Editor RURAL NEW-YORKER

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Here are my sales for the past six years: 1891, $697.39. No manure and fertilizers bought. 1892, $1,070.26. Manure and Fertilizers bought, $45.83. 1893, $1,427.64. Manure and fertilizers bought, $96.31. I have also remaining to sell of my 1893 crop, 400 bushels of potatoes, about $20 worth of celery, and a few other articles which will swell the 1893 sales to over $1,700.

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Fertilizers and Fruit.

From Fertilizer Bag to Fruit Basket.

IN the following pages I wish to present the record of a trip among the fruit growers whose vineyards and orchards are found on the hills that line the Hudson River. As viewed from the river this section presents anything but a favorable outlook for farming. Steep and rugged hills rise tier after tier, their slopes apparently offering slight foothold even to a cow. A stranger from the West would surely put these down as among the "abandoned farms" he has read so much about. Not only are these hill-sides steep, but they are "exhausted fields," for over them tramped and camped Washington's soldiers over a century ago—before the great, fertile West was more than a dream.

That is the theory. The hard fact is that this hilly region contains some of the most prosperous farmers. One would search for many a day before finding a section where there is less general complaint about hard times even in this year of low prices and uncertain credit. Those who look at the natural disadvantages of this section should also consider its natural advantages. These steep hill-sides may not be profitable for grain or potatoes, but they face directly to the sun and are just suited for fruit. The river not only tempers the air and holds off the late and early frosts, but it presents a cheap and rapid means of communication with the great city—the finest market in the land.

"That may all be," says the stranger, "but how about the *feeding* of these great *vineyards* and orchards?" These lands have been farmed for many years and are no longer naturally fertile. The soil must be

fed, and what is to feed it in such a country where live stock is not profitable? It is just this question that I hope to answer in the very language of men who have worked the problem out in actual practice.

In this section all fertility is *imported*, either in the form of manure or fertilizers. It comes from somewhere outside the farm, and the question asked is, whether the town horse stable is a cheaper manufacturing place than the fertilizer factory. It is like a dairy farmer asking himself if corn and oats are cheaper than some of the newer stock foods. My purpose is to show wherein the manure and fertilizers differ and what peculiar values may be justly given to each.

We took a good time for the investigation, for farmers were not at all enthusiastic over their prospects, but were inclined to view the matter in a conservative and businesslike way. I have been careful to state what these men *have done*, and not what they *expect to do*.

The past season has not been very profitable for grape growers. While crops have been fair prices have ruled low, so that there has been little left for the grower. The following statement, made by one of the local papers, of the average cost of picking and selling a ton of grapes was said by conservative growers to be very fair:

Cost of packages	$12.20
Cutting and packing	8.00
Freight	5.00
Cartage	3.30
Commission	4.00
Total	$32.50

The average price obtained for the ton of grapes was $40, while five tons per acre of 500 vines would be a large yield. One can see, therefore, that there has been no fortune in grapes this year, when fair estimates are made on the cost of fertilizing and cultivating.

The Annals of a Fruit Farm.

At Highland, N. Y., I met Mr. A. W. Williams, who, with his father, conducts an excellent fruit business, famed in all their markets. They have established a great reputation for *quality*, and take remarkable pains not only with their growing, but with selecting and packing as well.

"How large is your farm and how is it divided in fruits?" I asked.

"We have about 80 acres, including woodland and hill that is not cultivated. Our fruit land is divided substantially as follows: 20 acres of grapes, six acres of currants, three of raspberries, five of apples, two of pears and four of peaches."

"What stock do you keep and what grain and other crops are grown?"

"We have three horses, two cows and about 125 hens. We raised three loads of hay and two acres of fodder corn. We did sow some oats, but plowed them in for green manuring. We have seldom grown any grain. We buy each year about 40 bales of hay, 300 bushels of oats and three tons of bran and middlings. We aim to keep stock enough to provide work, milk and butter.

"How large is your working force?"

"We employ three men regularly, about 25 pickers during the picking season, and during the fall and spring work from 10 to 13 hands extra."

"Is this farm an old one?"

"The house is nearly 125 years old. The farm has been put through all the changes of farming that have taken place in this section—grain growing, dairying, potatoes, etc. When we came here, some 25 years ago, the land was pretty well run out. At that time there were about 1,000 grape vines, not in good condition, on the place. We have since convinced ourselves that fruit is the only profitable crop to grow on these hills. Our farm is well situated for fruit, with a high hill at the west to shelter us from the cold winds and a long slope to the east."

"What do you buy to feed your 40 acres of fruits?"

"We make at home and buy in nearby markets about 50 tons of stable manure. We also buy 25 tons of New York stable manure. This costs us $2.25 a ton. The hauling costs us about $4 for nine tons, or about 45 cents a ton, which makes the total cost $2.70 a ton delivered. We also use about six tons of fertilizers each year. We prepare a 'home mixture' by using the hen manure with coal ashes. We burn some 20 tons of coal. The ashes are put where all the house slops can be thrown over them and then thoroughly mixed with the hen manure. This makes a fine mixture to put around currant bushes."

"Could you get along without buying any stable manure?"

"In answer to that I will say 'yes,' if we could get a cheap material for mulching. I have no doubt that fertilizers and well-rotted straw would give us a complete substitute for manure, but we can buy the manure cheaper than we can the straw. Our chief reason for buying manure is to obtain a good *mulching* material and vegetable matter to lighten and loosen up the soil. Ours is a very dry location, and on such fruits as raspberries, currants, etc., we feel that a mulch is necessary. When it comes to the question of the price per pound of nitrogen, potash and phosphoric acid, there is no doubt that fertilizers are

cheaper; but, as I said, on our soil and with some of our crops a mulch of some sort is necessary, and stable manure gives us this cheaper than we can get it in any other material."

The Relation of Fertilizers to Manure.

"You speak of using manure on small fruits; do you not use it on grapes, too?"

"No, except when the vines are young and we are trying to produce an abundant growth of wood. Grapes do not need mulching like strawberries or raspberries. The roots of the latter are short and the fruit grows and matures very rapidly, so that a constant supply of moisture must be right at hand. The mulch of manure helps to conserve this moisture. On the other hand, the grape has a longer growing season and its roots stretch out everywhere after food and moisture. Thus the mulch is not needed—in fact, shallow cultivation is better than the mulch."

"So you use fertilizers on the grapes?"

"Yes, after they begin bearing. Our farm is naturally very droughty. Strawberries have never done well with us for lack of water, but grapes seem to thrive better in dry seasons than any other fruits. Our experience is that stable manure is a forcing or stimulating plant food. Its amount of nitrogen is proportionately too high, and when used in quantities large enough to supply the needed potash and phosphoric acid it gives too much growth of wood, which not only delays ripening, but stimulates the vine or tree too much and leaves it in the fall with too much tender young growth to be killed by the frost. This is why we say that stable manure is very good for forcing the growth of young grape vines, but we never would use it on bearing vines to produce a crop. In other words, use manure to grow *wood* and fertilizers to grow *fruit!*"

"You say the fertilizers give you an earlier ripening grape?"

"Certainly; the fertilizers have a tendency to ripen the grapes four or five days earlier than when manure was used. They not only ripen earlier, but they ripen better and more uniformly."

"Do you find any difference in quality and appearance?"

"Yes, indeed; the fertilized grapes are ahead in these respects. We have one vineyard of Delaware and Catawbas on a spot where it was not convenient to haul any manure. They have had absolutely nothing but fertilizers from the day they were planted. They are the finest *looking* grapes we pack, and as for *quality* our pickers ought to be good judges, for they pick all over our 20 acres as well as for other people. Yet, to get grapes for their own eating, they will always go from choice right to that spot where manure has never been used.

That ought to settle the question of *quality*. In fact, fertilizers are absolutely necessary to us in order to grow grapes of the highest quality."

The Feeding of the Grape.

"This vineyard that you speak of has had no stable manure at all?"

"Not a pound. As I said, it is a place where it is not convenient to haul manure. On most of our grapes we use manure when the vines are young to induce a heavy growth of wood, but even this may be overdone and too much wood growth made. I am satisfied with the growth made on those vines where nothing but fertilizer was used. In fact, these vines are sounder and freer from disease than any others. We may not get such a luxuriant growth when less nitrogen is used, but the wood thus made is sounder and harder."

"What combination of fertilizers has given you the best results on fruits?"

"I have not tried any home mixing, but have used mixed goods—the Mapes Fruit and Vine seems to have about the right composition for our use. This contains about 3 per cent. of ammonia, 10 of phosphoric acid and 11 of potash. If we were to mix at home we should try to get about that proportion."

"How heavily do you fertilize?"

"On grapes, we use about 600 pounds every other year. On Delaware grapes we use about 800 pounds."

"Why more on this variety?"

"One reason is that there are more *vines* of this variety to the acre. It is a smaller vine and is set closer. Again it is a heavy feeder and will stand more fertilizer than others. To show how many more Delawares there are on an acre than of some other varieties, I can tell you how close we plant them. Catawbas and Moore's Early 9 x 8 feet, Concords and Niagaras 9 x 9 feet and Delawares 6 x 8."

"What other differences in *feeding habit* of grapes have you noticed?"

"As I said, Delawares will stand most crowding, with Moore's Early close to them in this respect. We have found that Niagaras cannot stand too much prosperity, but can be overfed so that fertilizer may be wasted on them. Differences of varieties in this respect are considerable - and are well worth studying—almost as much so as with different kinds of animals."

"What about varieties?"

"We have 47 varieties in all—some tested in a small way only. For our chief crop we confine ourselves to some half-dozen varieties. There is most money for us in Delawares. That variety and Catawba grow to perfection on our soil, while in many localities they will not

do well at all. I believe that nine-tenths of the Delaware vines planted have been pulled out because they did not suit the locality. That is the great advantage of testing varieties and *knowing* just how they yield."

"How do the grapes ripen with you? What would be your rotation for selling?"

"First come Moore's Early and Hartford. Last year the first ripe ones were picked August 17. This year the date was August 23. Then follow Delawares if they have been well cared for. Then come Concord and Niagara, and last Catawba."

"How are the vines protected?"

"We practice the Kniffin system of pruning and training. We are obliged to lay down Niagara and Catawba. Last winter was the first that Delaware stood up. In laying down we prune and then bend the vines towards the center from either row and fasten down with a peg or crotch."

Putting on the Fertilizer.

"When do you apply fertilizer?"

"About the third week in April we aim to begin, and make one job of applying the fertilizer to all crops. We broadcast it all over between rows and around vines. It is done by hand entirely—the men are instructed to take big handfuls and not to mind if they take so much much that part of it spills on the ground. The man with the biggest hand is the fellow to broadcast fertilizer for us!"

"After broadcasting fertilizer, what?"

"We plow it in about three inches deep, and at once run over with the harrow. We plow three times and harrow four times; that is, once after each of the first two plowings and twice after the last one. There is no regular time for these workings of the soil. We do it to keep weeds down and the ground stirred. We use the Syracuse plow and the Osborne lever set harrow. The latter is a valuable tool for such work, as it can be regulated to cut at any depth."

"In what respect does your feeding of currants differ from that of grapes?"

"We have found it best to use stable manure on currants as a mulch. We also use our home mixture of coal ashes and hen manure on this crop. To illustrate how heavily we feed them I will tell you what we did on an acre of currants with strawberries growing between the rows. The plants were set three feet apart. We first put 14 loads of stable manure between the bushes. Then over the furrows on a space three feet wide we put 1,600 pounds of bone and over that 600 pounds of sulphate of potash. Then we threw a light furrow towards

the bushes and ran a cultivator around them until all was level. This dose was to feed both currants and strawberries."

"It ought to do it, but isn't that very heavy feeding?"

"It is heavier than usual with us, but heavy feeding pays with small fruits. One of our neighbors once had a rule of putting 'all the manure he had left' on an acre of strawberries. He never could grow a profitable crop on this basis. Finally he changed his plan and put all the manure on half an acre. Then he began to grow profitable fruit, and that is a good illustration of the wisdom of giving short lived, quick growing fruits an abundance of food."

"How about raspberries?"

"We manure them much the same as for currants. Sometimes in the spring we put a handful of fertilizer around each bush—not being very careful to avoid taking more than a handful. Our apples and pears are among the currants."

"What food for peaches?"

"For young growing trees we use stable manure, but when they begin bearing we use fertilizers entirely. The fertilizer gives a thriftier bearing tree and better color and flavor to the fruit. We use a big handful of fertilizer (say about 1½ pound) scattered around the tree, increasing the space around the tree over which it is spread as the tree grows older. The trees are set 15 x 15 feet. The fertilizer is put on in the spring—from the middle of April to May 1. There can be no doubt that fertilizers give fruit of best quality."

"You do not grow strawberries?"

"No, it is too dry for them here. In fact, as I have said, that is why we grow so many grapes—this fruit doing better in this dry section than any other."

The value of Mr. Williams's experience lies in the fact that his fruits are noted everywhere for their fine *quality*. He sent some magnificent grapes to the World's Fair, and always commands the highest market prices. He does not hesitate to say that this excellent *quality* is largely due to the fact that he uses fertilizers alone to grow the *crop*. Stable manure is very useful as a mulch on small fruits or to grow wood in the early life of the vine, but for the *fruit* he will use nothing but fertilizers.

"No Use for Stable Manure."

At Marlboro, N. Y., I met Mr. J. F. Wygant, who has made quite a reputation as a grower of fine fruit and also as a buyer. He has a cold storage room and is an expert in collecting fruit and holding it for shipment. From what follows it will be seen that Mr. W. is a thorough fertilizer farmer, and the fact that he has been able to observe the

effect of manure and fertilizers not only on his own farm, but also on many places from which he bought fruit, makes his observation all the more valuable.

Mr. W. has 46 acres and raises gooseberries, currants, grapes, apples, peaches and pears. He has about an acre of gooseberries, 12,000 grape vines, 6,000 currant bushes among the vines, 3,000 peach trees and a few pear trees (too young to bear) among the peaches. The gooseberry patch is four years old—not yet in full bearing. The third year they bear a small crop and increase after that. To set out gooseberries Mr. W. said he plowed in the fall and furrowed in the spring, and set the plants 3 x 4½ feet.

"Do you use stable manure on gooseberries?"

"Yes, when I have it; but I would not buy it for that special purpose. I would use it only when the plants were young, to promote wood growth and to provide a mulch. I *can* raise the best of gooseberries without any stable manure. You can't possibly hurt gooseberries by using chemical fertilizers."

"How much fertilizer would you use?"

"When setting out I would use half a ton or more per acre, with extra bone meal added. After that at least half a ton every year. I use the Fruit and Vine manure, which is lower in nitrogen and higher in potash and phosphoric acid than the mixtures for potatoes or vegetables. On currants I use half a ton each year."

"Why do you prefer fertilizers, and are they cheaper than manure?"

"I prefer fertilizers on gooseberries because there are fewer weeds than when manure is used. Many a patch is seeded to weeds by the use of manure, and that makes a lot of extra work in a crop like gooseberries or raspberries. Stable manure costs, at the dock, $2 a ton, and teaming costs 75 cents. Compare the analyses and prices of manure and fertilizers and you will see that the manure is a costly form of fertility as compared with the latter—to say nothing of the extra work it gives both in handling and in killing the weeds it brings on your farm."

"You don't seem to have much use for stable manure!"

"Very little, I can tell you. I know it is excellent to force wood on young plants. I use about all I have on young vineyards. On gooseberries I can get good crops and healthy plants by the use of fertilizers alone. If the bushes seem to require extra growth a little nitrate of soda extra will answer just as well and act quicker than stable manure. Of course I use stable manure on strawberries—but only as a winter covering, and this because it is the handiest thing I can get for this purpose. For the *food* of the crop I use a ton of fertilizer to the acre."

Fertilized Fruits Much Better.

"How did you come to use fertilizers so heavily?"

"Well, at home we used to farm on the old stable manure basis and we were taught that manure was the only safe foundation for fertility. I did not like such farming. There was too much work about it and no profit at all unless you counted in a big manure pile as part payment. I do not care to do that when I can do a cash business with fertilizers! When I came to be a fruit *buyer* I found that the best fruit came from farms where they used most fertilizer. It seemed to me that a heavy use of fertilizers gave the best fruit, with least expense in money and labor. I have been increasing my use of fertilizers ever since I started with them."

"What do you mean by best fruit?"

"I speak more particularly of peaches and grapes. With peaches the difference is plainly evident to any one who will put two lots side by side. Those grown with the fertilizers are of better color, firmer and of better flavor. They will keep better. Grapes grown with stable manure will not keep so well—they are soft and flabby when taken from cold storage. I speak positively about this, for in my business I have had much experience in handling both kinds of fruit. There is no doubt about it. Any dairyman will tell you that he can make firmer and better butter from feeding corn meal than from feeding bran. It is very evident that the difference is in the *food*. It is no more remarkable that certain fertilizers will give better flavored and firmer fruit than others. The difference is certainly as great."

"How much stock do you keep then?

"Two horses, 40 chickens and a cat! I have hay enough for the horses and some two acres of corn. The grain I feed, while the stalks are exchanged for our milk and butter. I would not take any more live stock as a gift—I have absolutely no use for it while I can buy fertilizers."

"How much help do you need on your farm?"

"We have 2 men for eight months steady, and about 10 pickers and packers during the busy season. None of the men are boarded here. We have our home to ourselves and are not slaves to a lot of 'chores' and hired hands. Talk about the 'freedom of the farm,' there is very little of it, as some folks farm—spending the best part of their time waiting on a lot of scrub 'manure makers.'"

A Liberal Dose for Peaches.

"You use fertilizers on peaches then?"

"Entirely. They not only give better fruit but healthier trees. Manure is well enough on young trees, where wood alone is to be

grown, but for a bearing tree—keep the manure away from it. The life of a peach tree with us is about 12 years if it is well cared for. Quantities of trees are killed by stable manure applied heavily after they begin to bear. That sort of manuring forces the tree both to produce a crop and also a heavy growth of wood, which is too much, and the tree is weakened. That is the way many peach orchards are ruined. The well-balanced fertilizer produces the crop and leaves the tree healthy and sound. I fertilize every year, crop or no crop. Last year there was a light crop only, but against the advice of many I piled on the ashes and fertilizer as heavily as ever, and I got my reward in a magnificent crop this year. Heavy feeding of proper food is the only way to make anything at fruit growing."

"You speak of giving your peach trees a liberal feeding—how much per acre does that mean?"

"Well, on my 3,000 trees I used 15 tons of ashes and three of mixed or complete fertilizer. I do not try to mix at home; in fact, home mixing is but little practised about here. A good many ashes have been used in years past, but now farmers are using more of the potash salts in place of the ashes. A good deal of kainit is used, but not always with the best results."

"How much fertilizer do you use in the course of a year?"

"About $350 worth. You can see from the area I have in fruit that this means quite an expense per acre; still the returns are very satisfactory."

Grapes Pay Best—Cultivation vs. Humus.

"One year with another, what fruit pays you best?"

"Grapes pay best in the long run. This year, of course, they are very low because the demand has not kept up to former years. In many of our manufacturing towns men have been out of work and thus unable to buy as much fruit as formerly, but another year may tell a different story."

"What varieties of grapes do you raise?"

"Moore's Early, Delaware, Worden, Pocklington and Concord. About two-thirds are Concords and the remainder about equally divided between the other four varieties. As I have said I use my stable manure on the young grape vines to grow wood. After they come into bearing I use fertilizers entirely. We buy most of our plants and vines. The nursery business is quite another business from that of growing fruit. After strawberries begin fruiting we have a regular succession of fruits for four months. Strawberries begin about June 1, gooseberries and currants about June 15 and last about three weeks. Grapes and peaches begin about August 20 and run till frost. The

life of the fruit grower is a lively one while the season lasts, and that continues from the earliest spring till long after the ground freezes up, with trimming, plowing, fertilizing, cultivating and picking."

There are two important things in Mr. Wygant's testimony that are worth thinking over. One is that, in common with Mr. Williams, he is positive that fertilizers give the best *quality* in fruits—particularly with grapes and peaches. Both recognize the value of stable manure as a mulching material and as a *forcer* for the growth of wood in young vines and trees, and they recognize *why* the manure acts as it does—viz.: Because the amount of nitrogen it contains is out of proportion to the potash and phosphoric acid. Another point peculiar to these fruit farms is the fact that no effort is made to grow clover or other crops for green manure. On that vineyard that Mr. Williams spoke of, now 15 years old, where no stable manure has ever been used, there must be little or no humus left in the soil, and yet neither in quantity nor quality do the crops of grapes fail. This brings up a curious problem in the use of manures and fertilizers. Has the importance of humus or vegetable matter in the soil been overestimated? In how far will frequent and thorough cultivation of the upper soil take the place of the mechanical effect of stable manure or sod? This would be an interesting question for our experiment stations to take up. These vineyards certainly prove that on the soil of these farms it is not necessary to consider the application of vegetable matter in order to produce large crops of good grapes. It is true that some weeds and grass are worked into the soil in cultivating these grapes, but no studied effort is made to secure a green manure crop or a sod.

More Humus Needed Here.

This is not quite the plan followed by Mr. W. F. Taber, of Poughkeepsie, whose place was next visited. Strawberries and grapes are Mr. T.'s chief crops, with the former as the principal money earner. We can see from his practice that the strawberry grower must have a mulching material of some sort, while the grape grower can get on without it. Mr. Taber uses large quantities of stable manure, because that is the cheapest and best mulching material he can get. Like all the rest of these fruit men, he says that *actual fertility* is cheaper in the form of chemical fertilizers, but the mulch and vegetable matter is cheaper in the form of manure. The difference between strawberry and grape growing in this matter of the necessity of using manure is worth remarking. Mr. Taber's soil is heavier than that of the other farms thus far described, and he has found that humus or vegetable matter is needed to help lighten or loosen it. The grapes, by the way,

are on the highest and lightest part of the farm, and receive fertilizer only at the rate of 500 pounds per acre.

Unlike Messrs Williams and Wygant, Mr. Taber makes a great point of securing a heavy green crop for his strawberry ground. To illustrate this we can give this season's history of one bed this year. That bed was plowed on July 21 and thoroughly fined. On August 1 a mixture of clover and turnip seed was sown. The amount per acre was one pound of turnip seed, twelve quarts of Medium and four quarts of Alsike clover. At the time of my visit, October 24, the turnips were as large as one's fist, while the clover had made a fine growth. The turnips will be sold or used to feed stock, the tops cut off and left on the ground. The clover will be cut twice for hay and then plowed for strawberries again. Mr. Taber is greatly pleased with the success of this experiment, for the crop of turnips will pay all cost of seed and rent of land, besides insuring a first-rate catch of clover. On another part of the field was a heavy growth of rye, which will be turned under in the spring and the ground set to strawberries, using 400 pounds of fertilizer besides the rye. In fact, you will notice that all these strawberry growers, while using large quantities of stable manure, also use from a half to a ton per acre of fertilizer, which they call the *food* of the crop. Mr. Taber says that he cannot use too much of a well-balanced fertilizer on strawberries, though he might use stable manure alone at a loss, because in order to get enough potash and phosphoric acid for the crop he would be forced to use too much nitrogen.

Mr. Taber says that there is no doubt that fertilizers give fruits of a better quality than those grown with stable manure. On his soil this difference is also very evident in potatoes. The fertilizers also hasten ripening—this, in fact, is the general opinion of those who have used fertilizers heavily. One good thing about Mr. T.'s farming is that all the fertilizers are distributed by machine. There is no hand work about it. He uses the McKinney distributor, which, with one or two changes which he made himself, will either broadcast the fertilizer or drop it in hill or drill as desired.

For training his grapes Mr. T. uses a modification of the Kniffin system. The two upper arms alone are left and trained along the upper wire and then down to the lower wire. This gives an umbrella shaped vine, exposing all the fruit to the sun, and giving a better chance for spraying and picking.

Big Sales From a Little Farm.

Mr. Taber's farm comprises 45 acres with 30 under actual cultivation. The following figures show what he is able to sell from this area:——

	1891.	1892.
Strawberries	$2,377.29	$1,607.68
Raspberries	245 80	406.45
Currants	65.40	63.08
Potatoes	350.00	500.00
Sweet Corn	412.00	240.32
Tomatoes	63.30	144.63
Grapes	220.49	375.96
Apples	44.50	
Blackberries	21.55	
Pears	24.65	25.00
Plums	5.50	
Vegetables	6.76	
Sundries	185 41	
Total sales	$4,022.70	$3,363.12

The difference in sales for the two years, is about equal to the difference in value of the strawberry crop. In 1892 the crop was much injured by the wet. One year with another, however, the sales will run not far from $4.000 a year.

Mr. Taber is a great believer in "heavy fertilizing, and deep and thorough cultivation."

"You believe in heavy feeding?" I asked.

"Certainly, there is no use trying to farm without using large quantities of manure or fertilizer."

"Do you use both?"

"Yes, we keep but little stock, and do not make much manure. We use quite a good deal of the Mapes fruit and vine manures, and also haul large quantities of stable manure from town."

"It pays you to buy stable manure, then?"

"As a mulch on our berries only. If we could get anything else that would answer for a mulch, we would not buy manure. We could get the same results easier and cheaper with fertilizer. We pay $1.50 per load in the town stables. Two men and a team can haul four loads a day to our field. We estimate that it costs $1.00 per load to haul it, saying nothing of the cost of spreading it. It is, therefore, costly stuff. We can buy the *fertility* cheaper in fertilizers, but strawberries need something to act as a mulch."

"How do you handle the manure?"

"As it is hauled from town we spread it over a large compost heap on level ground close to our strawberry bed. We keep the heap well

trampled down so that it does not firefang or leach out. When the ground freezes so that we can drive over the strawberry bed, we load the manure right into our Kemp's spreader, and it is an easy matter to put it over the berries. That spreader has saved us an immense amount of work. Our strawberries usually follow corn."

Advice About Using Fertilizer.

"How do you use fertilizer?"

"We have a McKenny drill with boards arranged underneath so as to drop the fertilizer in bands about two feet wide where the berry rows are to be. We use both manure and fertilizer on the berries."

"On what crops have fertilizers given you the best results?"

"I should say on potatoes. My soil is not good potato ground naturally, yet with fertilizers I grow large crops of good quality. With stable manure alone we cannot grow good potatoes; they are strong and rank and "smell like a cow yard" when cooked. I would never use stable manure except on corn or as a mulch for fruit."

"I noticed a Western paper advising a farmer to try 150 pounds of potato manure on an acre to test it. What do you think of that?"

"Perfect nonsense. If they had said 1,500 pounds, there would be more sense in it. I believe that 150 pounds per acre will do more harm than good. The crop may be stimulated a little at first, but will not be permanently helped by such a little dose. Think of a man putting one load of manure on an acre and expecting good returns from it. That is what 150 pounds of fertilizer amounts to. If a man would only stop a moment and think that a bag of fertilizer means no more than one big load of manure, he would see how foolish it is to expect big returns from a small dose of fertilizer."

"How do you figure out the difference between fertilizer and manure?"

"Take it with potatoes: Three tons of stable manure will supply all the nitrogen needed for 100 bushels and tops. This leaves to be supplied in chemicals 60 pounds of phosporic acid and 150 pounds of potash. If nothing but stable manure is used, it will take 18 tons to supply the necessary amount of potash for the crop: 18 tons at $2, equal $36. Or three tons at $2, equal $6; 60 pounds of phosphoric acid at 12 cents, equal $7.20; 150 pounds of potash at 4½ cents, equal $6.75—$19.95. Balance in its favor, $16.05. Not only is there a saving of almost half in manures, but I know from repeated trials of chemical fertilizers in growing potatoes, both in combination with stable manure and alone, that there is a gain in quality and in freedom from scab and rot. I have raised four successive crops of potatoes on the same ground by the use of Mapes Potato Fertilizer, alone, and all were

excellent in quality. In 1889 I raised a crop of potatoes that, to my mind, fully substantiates every position here taken. I grew, in 90 days from planting, 103 bushels on 38½ square rods of ground, being at the rate of 427 bushels to the acre. I think they would have yielded at the rate of 500 bushels per acre had they been left to attain full growth."

Mr. Taber's grapes were in fine condition. About half the space is given to Concords, with Niagara, Moore's Early, Worden, and a few vines each of newer varieties making up the balance. Heavy dressings of fertilizer are given this vineyard.

"Where do you put the fertilizer—close to the vines or between the rows?"

"It is broadcasted all over the surface. Where are the feeding roots of a grape? The best of them are in the sunshine or out beyond the shade of the vines. Put your fertilizer where the sun strikes the ground if you want to get sunshine in your fruit."

"I see you have plowed in berry plants here; do you grow double crops in your vineyard?"

"When we set our grape cuttings, we also set out strawberries between the rows. After two pickings we plow the plants in. That is all the double cropping we do. We can feed the young plants so that they will not suffer, but we want no crops to grow in the space where the fruit crops ought to feed."

"There is no doubt about the greater cost of fertility in manure then?"

"Not a bit:—I am satisfied that the manurial elements in it cost more than they do in the commercial fertilizer. When we consider that there are but 38 pounds of fertilizer in a ton of stable manure, that we have to draw and handle 100 pounds of mineral matter, such as sand, iron, etc., of which the soil always contains an abundance; 266 pounds of woody matter, derived from air and water, which succeeding crops can obtain with equal freedom, and 1,500 pounds of water, which is about the average amount in the ton, you can see what a tremendous waste of time and muscle, and expense in wear and tear of horses, wagons, etc., is incurred in handling that which is almost useless. I am satisfied from experience, that the cheapest plan for the average farmer to pursue to enrich his soil, is to grow green crops by the aid of commercial fertilizers and plow them under, repeating the operation until a sufficient quantity of vegetable matter is incorporated into the soil, which has been loosened and pulverized by these repeated plowings and harrowings, so as to cause it to produce paying crops. I have sown oats in the spring which, by the application of a fertilizer, made a heavy growth, which was plowed under by July 1, the ground

was then sown with buckwheat, which in turn was plowed under, and we found the land in fine condition after plowing in the spring, the estimated value of the two crops plowed under being equal to 25 loads of manure per acre. Wheat or rye could be sown after turning under the buckwheat and seeded, if you wish to do it."

The Double Crop System.

Everybody along the Hudson River knows W. D. Barns, of Middle Hope. Mr. Barns is a fruit grower of many years' experience, and as a member of the Board of Control of the New York Experiment Station is well known throughout the State. His place was next visited, and here we found several peculiarly characteristic features. Mr. Barns has 86 acres. His son is in the fruit business with him, having left a business in the town to enter it. The peculiar features of this farming are the heavy use of stable manure and the system of double cropping. For example, there are 28 acres of grapes, with a row of strawberries between each two rows of grapes, and a current bush between each two vines in the rows and at the stakes. In the peach orchards, pear and apple trees are set, so that when the peaches are done bearing, there is still a fruit orchard left. The peach trees are set 15x15 feet, and the apples and pears 40x40. The peach trees last—with Mr. Barns's cultivation—about 10 years. Every third year they set out from five to eight acres of peaches—thus working the entire farm into fruits. Of course this double cropping system demands an immense amount of manure. As the strawberries are among the grapes, of course a good deal of the stable manure goes there. This practice differs from Mr. Wygant's, for example. The stable manure is needed on the berries however and, in this double system, probably the manure is not so objectionable as it would be if put directly on the grapes. Mr. Barns was not prepared to say whether he thought the stable manure induced too great a growth of wood. We understood him to say that he rather thought it did. In fact, he spoke of one vineyard near the barn that made an immense wood growth, but bore few grapes and finally stopped. By the heavy use of wood ashes the vines were brought to bear. On peaches, he believes, with the others quoted in these articles, that fertilizers give the best flavored fruits. He uses stable manure only on young trees, always putting the fertilizers on the *bearing* crop.

The Value of Stable Manure.

Mr. Barns uses every year about 500 tons of stable manure and five tons of mixed fertilizer. He also uses some kainit. Where does he get this great quantity of manure? He has a contract with the horse car

company of Newburgh to keep the manure hauled from their stables. He pays $3.60 per year for each horse, and considers it a good bargain at this price, for this manure from horses heavily fed on grain is very strong. Professor Watson, of the Cornell Experiment Station, found the average voidings of a 1,000-pound horse weighed 48 3-5 pounds *per day*, worth at prices now paid for fertilizers, 7 3-5 cents, or $27.74 a year. Of course a large part of the valuable liquid manure is lost, but, at the same time, one can see that the value of the manure from a horse for a year, is considerable, I asked Mr. Barns if he expected to use more fertilizers in the future, and he said "Yes," as he may not be able to obtain manure at his present favorable rates. In the case of an electric horse road in Newburgh, for example, unless a supply of manure from the brickyards were available, he would use more fertilizer with some green crop. A neighbor, he said, had had fair success with plowing under a good crop of rye and using fertilizer with it. As to the double cropping system, Mr. B. said it gave him more fruit per acre and made the cultivation cheaper in one sense and dearer in another. For instance it was easy to work both berries and grapes by running the cultivator up and down, but it needed more hand hoeing because one cannot work so close to the rows among the currants.

The Business on a Fruit Farm.

"How many hands do you employ?" I asked Mr. Barns.

"Five men for eight months and needed pickers and packers."

"What live stock do you keep?"

"Five horses, five cows and poultry."

"What do you call an average crop of grapes and peaches."

"Four tons per acre is a large crop of Concords, three tons a fairer average. Of peaches, the yield, of course, varies. I have picked five baskets per tree from this orchard. I thin out the peaches one-half to two-thirds. This year it was done in July—too late."

"About how much fruit do you dispose of per year?"

"We expect to send at least a load of fruit every day from June 10 till frost. We have sent 3½ tons of grapes in one day. We sell some blackcaps and strawberries in Newburgh, but all the rest of the fruit in New York. We have 60 varieties of grapes in all—some of course merely for testing. Two-thirds are Concords, with the remainder divided among Moore's Early, Worden, Delaware, Champion, Brighton and Martha. The average crop from a good Concord vine is from 23 to 28 pounds. We never have two heavy crops of Concords in succession. Still that variety is about as valuable as any. We have sold

Champions so that they brought $1 per vine, but we would not grow any more of them. All our peaches are late varieties—nothing earlier than Crawford's Early."

"About how much can you sell from such a farm?"

"We sold 55 tons of grapes from 18 acres, and 1½ ton of cherries from half an acre. In 1892 we sold 1,936 quarts of strawberries and this year 9,352 quarts. Of currants, we sold 6,000 quarts this year, blackcaps 4,500 quarts and of peaches 1,475 baskets for $1,300. Last year we sold 1,180 baskets of peaches for $1,100. Our sales as a whole are a little less this year than last. We have built a cold storage house which is very handy and profitable for holding fruit a few days when our commission-man telegraphs us that the market is full. We sell all our fruit through a commission house."

"Do you feed your peach orchards heavily?"

"Yes, when they bear a crop. I do not use potash on peaches unless they bear. Hereafter I shall use some bone and potash on young trees in addition to the stable manure. It will not do to crowd a peach tree."

"What about pruning?"

"We prune only the currants in fall, the grapes in December and the rest in spring. We believe that if peaches are pruned in the fall they are more likely to die back—they seem to be hurt by the cold."

Mr. Barns has his farm arranged in a very methodical way. Each field is named and a careful record is kept to show the number and variety of vines or trees in each with the field from year to year. Mr. Barns can thus see just what has been done since the first 800 vines were set in 1880.

Big Doses of Fertilizer.

The next farm visited was that of David Allerton, a very intelligent farmer, who lives a few miles from Mr. Barns. Here was something of a change in method. As we have explained, Mr. Barns uses very large quantities of manure because he is in a position to secure it at very reasonable rates. He uses it heavily on grapes, too, because the currants and strawberries are set among the vines, so that all are fed from the same plate. Mr. Allerton uses less stable manure and more fertilizer. There are 40 acres in his farm, the fruit ground divided as follows: 11 acres of grapes, three of currants, four of strawberries, two of peaches, one of sour cherries, with young orchards of pears and apples coming.

"What stock do you keep, and what plant food do you buy?" I asked.

"We keep three horses and one cow, and buy about 40 tons of manure and five tons of fertilizer. We use the manure on strawberries and currants. We prize it for its *mulching* properties rather than for its plant food. Like others, I have noticed that manure tends to wood growth in plants and vines ; an excess of rich manure is as sure to do this as an application of nitrate of soda, and for the same reason, viz., it supplies an excess of nitrogen as compared with the potash and phosphoric acid."

"Then you use fertilizer in addition to the manure on your strawberries?"

"I should say so. I never use less than 1,500 pounds per acre for strawberries, and oftener a full ton. I would consider it useless to use less than 1,000 pounds per acre. On grapes I use 600 to 1,000 pounds per acre. Yes, there is a limit to the amount of fertilizer that may profitably be used on grapes. About 1,200 pounds per acre of the Fruit and Vine manure, is, I would say, about all average vines can profitably use. Delawares need heavier feeding than some other varieties."

"Strawberries pay you, do they?"

"Yes, they pay well when well grown and large. Ours are mostly Sharpless and Bubach. We average 5,000 quarts to the acre, one year with another. As with grapes, I am satisfied that fertilizers give fruit of better flavor and color, and firmer texture."

"What about your peaches?"

"I use 1,000 pounds of fertilizer to the acre. I have experimented with superphosphate and sulphate of potash on some of my trees with, I think, fair results. But I never use stable manure in a bearing peach orchard."

Can Stable Manure be Discharged?

"Could you conduct your farm without any stable manure?"

"That is a hard question that cannot be answered off-hand. On some of my clay soil I consider that some sort of humus or vegetable matter is necessary to lighten and loosen up the land. If I could get straw or other vegetable material cheaper than I can get the manure, I would say that we do not need the latter, As it is, however, stable manure is the cheapest form in which we can buy this mulching material when we count the plant food that comes with it, and so it is bought. Should you ask me, 'Could you conduct your farm without chemical fertilizers?' I would not hesitate to answer 'No!' for it would not be possible for me to raise the quality and quantity of fruit I now do on manure alone."

"What else do you raise besides fruit?"

"Our own potatoes and some vegetables. I used to raise prime egg plants for sale, but the Southern product has about destroyed my market for this, though I still grow some. We buy all our hay and grain."

"How much help?"

"We have five men for six months, two men for eight months and one man through the winter."

"What were your sales for 1893?"

"Of grapes, about 35 tons. They were mostly Concords, Delaware, Worden and Pocklington. Of course we test all the promising new sorts. We also sold about 14,000 quarts of strawberries, 2½ tons of currants and 150 baskets of peaches."

"Do you follow the double system of cropping?"

"We have a few currants among the grapes, but in most of the vineyards the vines are alone."

"What are your main reasons for advocating the use of fertilizers?"

"Besides what I have already said, I may add that the fertilizers are easier to handle and apply. There is less labor involved in their handling. They are also far better suited for some fruits, like grapes and peaches. They give higher color and flavor and firmer texture and also promote maturity. As a matter of cost, at present prices they are cheaper than stable manure. The fair way to test the two is to put the same *value* into each and use them side by side. Buy $50 worth of manure and $50 worth of good fertilizer and put them on equal sized fields. On such a test the fertilizer will win every time at the prices we are called upon to pay.

"Do you think fertilizers will pay on any kind of soil?"

"I see no reason why not. Of course, in using fertilizer, it is necessary to have the soil in a fine mechanical condition. It must be well worked and fined. No use to expect fertilizers to do their best in a poorly prepared and rough soil. On many heavy lands, there is no doubt that vegetable matter in the form of manure or a green crop is needed to loosen or lighten the soil. How much of this effect may be produced by thorough working, I am not prepared to say, as I do not know."

The Feeding of Nursery Stock.

At Cornwall, N. Y., Mr. T. J. Dwyer conducts a nursery business with much skill and success. Mr. D. is a very careful student of the problems of plant feeding, and his aim is to produce thrifty and well-grown plants, vines and trees. Bear in mind that his chief desire is to

grow *wood*—the crop of fruit is of less consequence to him. On the other farms described in these articles the problem was to secure a large yield of firm, well flavored and highly colored fruit. It was generally agreed by these farmers that, while manure gives an excellent growth of wood to the young vine or tree, for the crop itself fertilizer gave by far the best results. From this we may reasonably expect that Mr. Dwyer uses large quantities of manure, as he is after *wood* growth—the most of his stock being sold long before it bears a crop.

That surmise is correct. On his 25 acres Mr. Dwyer uses about 170 tons of manure and 10 tons of fertilizer. The manure is obtained from near-by brick yards and is of fine quality, as the horses or mules are fed heavily on grain. Of course, in a nursery business like this a great deal of mulching material is needed on the very young plants and vines. This is another reason why so much manure is used, for Mr. Dwyer, like the rest of these farmers, says that manure is cheaper than pure straw or other mulching material. Stable manure is the material for plant babies. It is blanket and food in one—keeping them warm and feeding them at one time. With the fruit grower its office is to make *wood*—that point seems settled beyond dispute.

"And yet," said Mr. Dwyer, "I always use more or less fertilizer *with* the manure. For example, on strawberries, I use 600 pounds to the acre on the rows and after the plants are set out a handful around each plant—well worked into the soil. Then if there are any lagging plants noticed I put on more fertilizer just before hoeing. This is one great advantage that I find in the use of fertilizers. They are quickly available. If one plant is behind the rest and evidently needing more food it is a very easy matter to drop a handful of fertilizer around it and work it well into the soil. The handful of fertilizer contains more plant-food than a big forkful of manure and think what a job it would be to go over a big field and put *manure* around lagging plants."

Fertilizers for Babies; Difference in Manure.

"Have you ever grown young plants without manure?"

"Oh, yes. For instance, I have put out thousands of currant cuttings on land that had been so heavily manured in former years that we could hardly cultivate it. That land was rich from former manuring, and with fertilizers alone it will grow a fine crop. That is another illustration of the peculiar value of fertilizers. On land already rich in humus, from previous manuring, the fertilizers provide all the needed elements of the manure at much less cost. Now, while with my nursery business I would not like to try to get along without any

manure, I recognize the great value of fertilizers and would feel lost without them."

"Do you grow double crops?"

"Yes, and treble. For example, I set a young apple orchard last spring. Later in the season, I set in cabbage, and later still, sowed turnips all over the field. So there are trees, cabbage and turnips all growing in the field and doing well. Of course we used fertilizers on the cabbage and turnips as it would have been impossible to work manure into the ground. I could cut out the cabbage, plow in the turnips and add fertilizer and have a perfect substitute for stable manure—there is no doubt of that."

"Then you think a green crop plowed under and fertilizers added to it would give you a manure substitute?"

"There is no doubt of it. If I had more land so that I could seed to clover and thus let the soil 'rest' long enough to make a good sod and fill up with good, strong roots, I could use much less manure, because the sod would provide much of the vegetable matter that my soil needs and which the manure supplies. But my area is limited, and I need it all for crops, so it pays me better to buy the manure and not lose the use of my land by growing green crops or sod to plow under. My experience goes to show that with the proper use of fertilizers and green crops, I would obtain the needed wood growth on young plants. In other words, while we use manure largely to produce this young growth, it is not because manure alone will do it, but because manure, counting in its fertilizing value, gives us our cheapest material for mulch and humus."

"Is the use of fertilizers increasing?"

"No doubt of it, and not only that, but farmers realize more and more the folly of using cheap, low-grade goods. When a dairyman buys grain, he doesn't see any advantage in buying 500 pounds of sawdust with every 1,500 pounds of corn meal or bran, even though he only pay for the actual grain. It is about that way with cheap fertilizers, and it is a hopeful sign that farmers recognize the fact more and more. Any farmer who knows his business will pay more for horse manure from car stables where plenty of grain is fed than from stables where idle 'boarders' are fed mostly on hay. That is the same principle as paying more for a high grade fertilizer with a high analysis and making money by doing so."

Change of Food for an Apple Orchard.

One of the most noted apple orchards along the Hudson is that owned by Mr. W. H. Hart of Poughkeepsie. The problem of feeding

this orchard properly has developed one of the most interesting phases of the fertilizer question that we have seen.

Mr. Hart's orchard comprises 90 acres—none of which was cropped or pastured. On the same farm were 70 acres of rather light soil. The proposition was to make the 70 acres provide the great amount of manure needed on the orchard and at the same time grow more fertile. That is to say, let 70 acres feed 90, at a profit. Mr. Hart decided to keep dairy cows—enough to consume all the forage produced on the 70 acres—buying all grain. Then the point was to raise all possible fodder on the 70 acres. To do this, ensilage and soiling crops were introduced, and so well pushed that 35 head of stock were kept on the farm, with every promise that double that number, or one animal to each acre, could be fed. Two plants were chiefly responsible for this work—Indian corn and prickly comfrey—the ensilage and soiling systems. From the last of July till the last of May—10 months—the corn provided food for the cows as fodder or in the silo. All through June the prickly comfrey kept the cows in forage. The hay was cut as early as possible and the hay fields then pastured—thus keeping the cows until corn fodder was ready. The cows were fed on strong grain foods and the manure carefully saved for use on the orchards. Thus the 70 acres were made to feed the 90.

How the Cows Fed the Orchard.

I visited the farm last June purposely to watch the feeding of prickly comfrey. It has often been said that cows will not eat this plant, and that even if they were starved to it, they will never thrive on it. I went into the patch myself and cut some of the comfrey and carried it to the cows. Did they eat it? Certainly they did, as readily as a boy would eat a piece of pumpkin pie.

Mr. Hart says that he has never known a cow to eat the comfrey at first at her own free will. Starve them into it? Oh, no—coaxing beats starving for profit. The comfrey is run through a fodder cutter and grain is sprinkled over it. In order to get the grain, the cows eat up the comfrey, and after a few meals, acquire such a liking for it that they will eat it as readily as any other soiling crop. This I can well believe from the way they started at a big ox-load of it that had just been hauled in. Mr. Hart said that cows would often leave good pasture to eat in the comfrey patch. He has two acres set in comfrey within short hauling distance of the barn. Two men with scythes can soon cut down and load enough to feed the cows, which do not leave the stable while given this food.

As was stated before the comfrey is fed during June. Then the

meadows are cut and the cattle turned on them till corn is large enough to cut, and this keeps them in rough fodder until the silos are opened, so that, as stated, the corn plant provides cow food from the last of July until the last of May. Of course, some hay is fed with the ensilage, but the latter provides most of the ration. Up to this year strongly nitrogenous foods like bran and cotton-seed meal were bought and fed heavily, making a good ration with the ensilage. The cows are Jerseys of good breeding. The cream only is sold, delivered at the door. The cows stand over iron gratings with a cement floor beneath them, so that the rich manure is all saved in good condition.

This system of dairying gave a good profit, but the chief object of it was to provide manure for the great apple orchard. It did this and did it fairly well, but the dairy farm fed the orchard at the expense of itself. You will notice there was no clover in the rotation—in fact hardly any rotation at all. The only fertility *brought* to the farm under this system was in the form of *grain* fed to the cows and the great crops of apples sent away each year more than balanced that. If the 90 acres of orchard were fed properly there would be little manure left for the dairy land. In other words, the strength of the dairy land was all going to the orchard while by rights, in order to maintain the cows properly *all* of the manure should have gone back to the grass and corn.

A Change of Food for the Orchard.

More fertility of some sort was evidently needed, the farm could not improve so long as nothing but grain was brought to it, and Mr. Hart began seriously to consider the use of fertilizers. Where should they be used? On the orchard directly and thus leave the manure for the grass and corn, or on the latter crops and thus provide heavier crops and more manure for the orchard? Either plan was feasible, but after experiments Mr. Hart decided to put the fertilizers directly on the orchard. This has given the best of satisfaction—producing fruit of fine flavor and high color. He uses about 400 pounds per acre of bone and potash broadcasted in spring and harrowed in. Hereafter, Mr. Hart says that he will use no more manure on the orchards, but will crowd it all on the corn and grass lands. The change to fertilizers too, has brought in another change, viz., the growing of clover in the young orchards. In fact, Mr. Hart said that he doubted if he should fill his silos at all as the work came just at his busiest time in apple picking. With the clover hay now grown, he expects to feed the cows as cheaply as before. With the use of the clover, too, it will not be necessary to buy so much of the nitrogenous grains. Thus on this famous fruit farm fertilizers have solved the problem of fertility with-

out interfering with the dairy. The dairy farm paid well, but it could not maintain its own fertility and still have all the manure taken away. With all the manure returned to its fields it will pay better than ever while the fertilizer gives cheaper and better plant food for the orchards than the manure ever did.

Mr. Hart's orchard is not on rich land. In fact it was only a rough and broken hillside which, left to itself, would not grow corn enough to pay for the labor. Yet in a bearing year it will fill the great cooling rooms of 8,000 to 10,000 barrels' capacity. The chief varieties are Greening, Baldwin, Ben. Davis, Spy, Peck's Pleasant, Russett, etc. In 1892 Mr. W. F. Taber visited the orchard and found the Baldwins fairly loaded to the ground. The apples, as he said, "hung in ropes," he counted 17 in the space of two feet. These trees are liberally fed *every year*. Not only is the orchard *fed* but it is plowed and cultivated for the *trees*—not for the purpose of taking another crop away. Speaking of the usé of fertilizers Mr. Hart said he believed farm manure tended to produce growth of *wood*, loose texture and light color in the fruit, while fertilizers gave the reverse, viz., higher color and firmer texture.

A Review of the Matter.

From the experiences of the men who have given testimony in these articles it seems safe to say that certain things about *feeding* vines and trees are settled.

As a rule, the best fruit growing sections are not the best for stock growing. There are situations where the two may be profitably combined so that a good supply of manure can be obtained. Fruit growing is, however, a business of itself and should not be mixed with stock keeping. It has been proved beyond question that successful fruit growing does not depend on manure or stock feeding since fertilizers alone will supply all the plant food needed by the crop of fruit. Several of our large nurserymen have stock farms in connection with their nurseries. This is a wise plan as we understand from what all have said about the tendency of manure to promote the growth of *wood*. On young trees manure is a good thing to apply. Mr. Hart's experience shows that with the *crop* of apples, fertilizers made the better plant food, and that it is better to use the manure from the dairy to grow better and heavy crops of dairy food. No dairy farm can feed an orchard and support itself. No fruit farmer need fear for success because he cannot obtain stable manure.

As to *quality* of fruit, there is no doubt about the superiority of a well balanced fertilizer. The testimony of Mr. Williams on this point seems to me conclusive. Not only is the *quality* improved, but there is

a firmer texture and a higher color where fertilizers are used. To recall Mr. Wygant's analogy, the peach tree responds to different forms of fertility, about as the cow gives butter of varying quality and appearance as she is fed sour brewers' grains or sweet corn meal and clover hay.

As to the relative cost of fertility in fertilizers and manure, if any fair estimate is to be given for the cost of handling the latter, the cheaper price of nitrogen, potash and phosphoric acid in the former will be easily seen. A ton of manure containing 10 pounds of nitrogen, 6 pounds of phosphoric acid and 12 pounds of potash, costing $3 a ton, means 21 cents for nitrogen, 8 for potash, and 14 for phosphoric acid—altogether too much as compared with the fertilizer. This figuring is on the assumption that all the nitrogen, potash and phosphoric acid in stable manure is in an available condition, whereas, *in fact*, as the long continued experiments of Dr. Lawes show, only *one fifth* of the nitrogen and one half of the potash and phosphoric acid can be depended upon for the first crop. At the same time stable manure is the cheapest mulching material and the best source of humus these farmers can obtain. Of course, where one has land enough to grow crops to be plowed under for green manuring, so much stable manure is not needed, but most fruit growers are intensive farmers and cannot spare the land for growing green crops.

The use of good fertilizers is sure to increase as farmers become convinced that it is possible to provide a substitute for manure. A thorough knowledge of the possibilities of chemicals will work great changes in Eastern farming. Many hillsides, at present neglected, because of the great cost of restoring their fertility with stable manure, can be turned into profitable fruit farms with fertilizers. There are such slopes and hills fronting the sun that might be turned into veritable gardens in a few years by the judicious use of fertilizers. There should be no rivalry between manure and fertilizers. Each has its legitimate place in agriculture. The greatest mistakes are made when farmers through prejudice against fertilizers ascribe to manure fictitious properties and values.

It seems to me that too little prominence has been given by fruit growers to the matter of *feeding* their trees and vines in the most scientific way. When fruit growers meet in convention or in private most of their talk is given to discussions of varieties or methods of pruning or cultivating. Manures and fertilizers are discussed in a general way, but not in anything like the detail in which other matters are handled. For example, when Mr. J. H. Hale makes the statement at these meetings that he would arrest a man who hauled stable manure into his peach orchards, most of those who listen fail to see

and understand what he means. I think Mr. Williams and others have made clear why stable manure may be just the thing to produce wood and yet a poor thing—when used alone—to grow the crop of *fruit.* The fact is that many fruit growers who are thoroughly posted as regards varieties and culture know but little about the science of feeding plants successfully. This is but a repetition of the progress in the science of feeding animals. Breeding and careful handling did much, but not until the chemist showed how foods may be combined into rations that will prevent waste can true economy be said to have fairly started. Any one with a pocketbook could learn in a few years that there was no profit in dairying when feeding an exclusive diet of corn meal and timothy hay. Why this was so few rightly knew until the chemist showed that in order to obtain the needed protein, so much of these foods must be given that the surplus fat in them was wasted. Then they found that by adding more clover hay and bran, they had a cheaper and better ration. Now, to a certain extent, fruit growers must study out similar problems about manures and fertilizers. In this day, to use stable manure on vineyards and orchards is like using corn meal and timothy for cows. The manure is not well balanced and should have both potash and phosphoric acid added to make an economical fertilizer.

TABLE OF CONTENTS.

GRAPES, STRAWBERRIES, ORCHARDS, PEACHES, SMALL FRUIT, ETC.

Eight First Premiums on Strawberries—Mapes Fruit and Vine Manure Used Alone.

A. W. Clark, Ashton, R. I., reports, December 8th, 1893:

"In regard to the strawberry crop on which I took so many premiums I will say that the crop was grown with the Mapes strawberry fertilizer (Mapes Fruit and Vine Manure) without any yard manure whatever. The soil was heavy loam, and the land had not been broken up for thirty years previous to the spring of 1891, when it was planted to potatoes, a little fertilizer being used in the hill without any other manure. In the spring of 1892 the land was plowed, at the rate of 1,500 lbs. fertilizer per acre applied broadcast, harrowed in, and the plants set. The plants were set four feet apart between the rows and allowed to mat, no other dressing being applied to the plants. The crop matured the best of any crop of berries I have ever grown, and I consider the Mapes fertilizer just what the plant needs, and shall use it on my new set beds next season. The crop was at the rate of 150 bushels per acre and without extra care."

"I herewith inclose you premium cards showing that eight first, one second and three third premiums were awarded at the R. I. Horticultural Strawberry Exhibition in June, 1893, for berries grown by the Mapes fertilizer, as stated above."

Rate of 300 Bushels Strawberries per Acre; 125 Bushels Raspberries per Acre.

W. A. Freed, Homewood, Pa., writes, December 15th, 1893:

"I raised at the rate of 300 bushels strawberries and 125 bushels red raspberries per acre with the Mapes Fruit and Vine Manure. This is a mighty big yield on our poor clay ground."

Eight Years on Apple and Pear Orchards.

Wilmer Atkinson, editor and proprietor of *The Farm Journal,* has used the Mapes Manures for many years on his farms. Under the heading "Orchards," in *The Farm Journal,* January, 1894, Mr. Atkinson writes:

"We are often asked what kind of fertilizers to use in the orchard, and perhaps as good an answer as we can give is, use Mapes Manures, for this is the kind and only kind we have used in our young thirty-acre orchard since it was planted eight years ago. The trees are vigorous and healthy, are now coming into bearing, and the past season we cut three tons of timothy hay per acre off a part of the orchard, and we have not used a ton of stable manure from the beginning. While pure, fine-ground bone and muriate of potash are splendid fertilizers for all orchards, and we can recommend them, but in Mapes Manures we have something ready mixed; we know what we are getting, and they are good enough for us. We have found these manures equally good for grass, potatoes and corn as for orchard trees."

J. H. Hale, of G. H. & J. H. Hale, Elm Fruit Farm and Nursery, South Glastonbury, Conn., January 14th, 1889, writes:

"The Mapes Fruit and Vine Manure gives brighter color, better flavored and firmer berries than can possibly be obtained with stable manure."

Eminent Authorities on the

Mapes System FOR Fruit Culture.

MR. CHARLES V. MAPES was the first to lay stress upon the importance in fruit culture of using manures especially adapted to promoting fruit power, in contradistinction to wood growth. He insisted that the essential elements of plant food should be supplied not only in varied forms, so as to insure the greatest certainty of action possible in meeting the demands of the trees or vines at their successive stages of growth and ever-changing conditions, but also that there should be present those forms that have been found by practical experience and scientific research to be the best adapted for promoting the highest quality of fruit as well as quantity. He claimed that merely to make a fruit tree or grape vine grow vigorously, was a very small part of real success; that rapid wood growth was often made at the expense of both quantity and quality of fruit, together with impaired stamina and disease-resisting strength of the trees and vines, thereby causing them to fall an easy prey to attacks and strains put upon them by adverse seasons, fungi, insects, etc. this injudicious forcing manuring he claimed to be especially injurious to the orange and grape (for vine or market), and but little less so to apples, peaches, pears, strawberries, etc.—E. S. CARMAN, in *Rural New Yorker.*

Dr. F. M. Hexamer, President of the Farmers' Club of the American Institute, New York, and the well-known authority on Fruits and Potatoes, writes in the *American Garden.*

The widely varying effects of different fertilizers upon the quality of Grapes, Strawberries and various tree fruits as well as upon the vigor and health of the plants and trees, are well known to careful observers. The Orange, however, has only so recently come under extensive cultivation in our country, that comparatively little study has been given to its special needs. Mr. Charles V. Mapes, who has probably given more attention to this subject than any other chemist or fruit grower, has for some time collected and sifted all the information about the Orange culture obtainable, and this, together with the results of his own experiments and conclusions, is embodied in his interesting pamphlet. It would be difficult to crowd more solid practical information into an equal number of pages, although the author modestly states in his introductory remarks that they are intended more to invite further investigation and discussion than to afford a definite solution of the question.

Carefully compounded manures, like the Mapes, which contain large proportions of potash and phosphoric acid, and with these the nitrogenous portions in *the best* forms for the use of plants, make Fruit Trees and Fruit Vines that are strong and well developed in all their parts, just as proper food builds a man or horse as he should be. Mr. Mapes emphasizes the fact that *rapid growth does not mean fruiting power;* that the *forcing manures weaken* rather than strengthen the productive faculties of fruit plants, and also *impair their strength to resist disease, insects and bad weather.*—E. H. LIBBY, in the *American Garden.*

THE AGRICULTURAL STATE EXPERIMENT STATIONS

—ON THE—

Mapes Manures for Fruit.

THE MAPES FRUIT AND VINE MANURE.

1891.—AMMONIA,	3.60 per cent.		3.68 per cent.		3.04 per cent.
PHOS. ACID,	9.21	"	8.93	"	9.21 "
POTASH,	11.45	"	11.12	"	11.45 "
1892.—AMMONIA,	3.15 per cent.		3.20 per cent.		
PHOS. ACID,	9.86	"	9.67	"	
POTASH,	10.75	"	11.38	"	
					FLA.
1893.—AMMONIA,	3.20 per cent.		3.31 per cent.		3.06 per cent.
PHOS. ACID,	8.	"	9.71	"	9.55 "
POTASH,	12.96	"	11.08	"	11.43 "
AVERAGE FOR 3 YEARS,	3.28 per cent.		9.27 per cent.		11.44 per cent.
GUARANTY,	2 to 3	"	7 to 9	"	10 to 12 "

FOR DEVELOPING WOOD-GROWTH whenever desired either in young Vines (Grapes, Strawberries, etc.) or in trees (Apples, Pears, etc.) young or in bearing we recommend either of the following manures:

MAPES COMPLETE MANURE FOR HEAVY SOILS.

Average of Analysis by the State Experiment Stations.

AMMONIA, 6.10 per ct.	PHOS. ACID, 13.31 per ct.	POTASH, 3.61 per ct.
GUARANTY, 6 to 7 "	10 to 12 "	3 to 4 "

MAPES ORANGE TREE MANURE.

AMMONIA, 4.58 per ct.	PHOS. ACID, 10.39 per ct.	POTASH, 3.89 per ct.
GUARANTY, 4 to 5 "	9 to 11 "	3 to 4 "

FOR PEACHES THE MAPES ECONOMICAL MANURE may be used *at all stages of growth.* For this crop Chlorine seems to be unobjectionable.

☞ **For Prices and Pamphlet, Address,** ☜

The Mapes Formula and Peruvian Guano Company,

143 Liberty Street, New York.

(From the *Volusia County Record*, E. Prevatt, Editor, De Land, Florida, March 24, 1894.)

A MODEL GROVE.

What an Orange Grove Will Do When Proper Attention is Given It.

While there are only 300 trees in it, the John Cannon grove southwest of the city is probaby the best paying grove, in proportion to its size, that is found in the county. There has been so much talk about the heavy crop of ripe fruit that hangs on the trees, at the same time white as a sheet with the bloom, we went out there this week to see if such conditions really existed, and to get a point or two from its owner.

We have given considerable attention within the past fifteen years to the growing of the orange, but we must confess that John Cannon has got the business down to that point that these 300 trees bring him a round sum of net money every year—not every year or two, but the big crop is there every fall.

This grove is on our ordinary pine land, just as the thousands of acres of groves found around us. The variety of the fruit as seen in all other groves, and the fact that Mr. Cannon gets a heavy crop every year without a miss, is proof evident that his method is the correct one.

Four years ago he changed his tactics as to getting fruit from his trees. He began the process of high fertilizing. The first year he put forty pounds of the Mapes fertilizers to the tree. The second year he doubled the quantity, and every tree responded wonderfully to this better treatment, putting on heavy crops of fine, bright, smooth fruit. One year he put on 120 pounds to the larger trees, but the Messrs. Mapes informed him that he was overdoing it. Not that too much of their goods would injure the tree or its fruit, but that not more than from 60 to 80 pounds to the tree could be absorbed a year. This is now about what these trees are getting of this fertilizer every year, and the superb condition of this grove to-day is the admiration of every orange man that sees it. John has stuck to Mapes and none other for these four years, and says that company has the formula in their manufacture to perfectly supply every function of the tree, the root and the fruit. The lower limbs that swing to the ground with the fine fruit are as clean, as vigorous and as luxuriant as the waving boughs of the top.

Mr. Cannon says he gives Mapes' fertilizers the entire credit for taking his grove out of that condition of an off year in bearing, and not full at that, to its present profitable condition.

An Orlando grower stopped off at De Land recently to see this grove, and said he never saw anything in the way of a grove to equal it. He went home and will profit by John Cannon's advice.

There are groves here that look as well as this one, but we know of no other grove that has put on four big crops in succession, and the fifth one, the biggest yet, can be seen in the bloom and young fruit now on the trees. There has been a steady gain every year since the higher fertilizing began.