

milling a second time. Squeezed enough from curd cloth for an alkaline test, which gave .765 per cent. of acid.

The cheese was allowed to ripen for two weeks, and was then analyzed; and the germ previously found in the cheese and water from the Ashton Union Factory was discovered in large numbers. The cheese had a bad flavor and was pronounced poor by two expert judges, Mr. T. O. Bell, of Tavistock, and Mr. G. J. Brill, of Guelph. Three and a half months later the cheese was re-examined, and still found off in flavor; and from a sample recently taken I have again succeeded in isolating the original germ.

The results of the analysis of the water, etc., were briefly communicated to Mr. Publow, who condemned the well. The cheesemaker at once stopped using this water and thereafter obtained what he required from another well.

In a letter dated August 30th, 1897, Mr. Publow writes: "The cheese is all right since they stopped using the water." This completes the chain of evidence, and from it cheesemakers and others will see the importance of using pure water.

The germs may have got into the cheese in two ways: 1. From the setting of the vats. The rennet was as usual mixed with half a pailful or more of water and stirred into the milk. 2. Through infection of the vats by contaminated water. Perhaps germs from the water used in washing found lodgment in crevices and cracks of the vats, or even on the surface; and the momentary application of hot water or steam not being sufficient to destroy their life, they multiplied very rapidly when the milk was added. Further, it may be that the floors, etc., washed with the contaminated water dried and microbes rising in the currents of air were carried about and brought into contact with the milk in the vats, for germs are so small that very many find lodgment on the dust particles that we see when sunlight strikes through a semi-darkened room. In this case, however, the infection was probably due chiefly to No. 1. Another factor that should be mentioned was the high average temperature of the curing-room, which was 72 degrees Fahrenheit. This temperature gave more favorable conditions for the growth of the noxious germ, and less favorable conditions for the growth of those germs whose presence in cheese is necessary for the production of the finest flavor and quality. A temperature of 65 degrees Fahrenheit is more favorable to the latter.

Summary.—The cheese from the Ashton Union Factory was said to be "off flavor" and "not clean," an abnormal condition arising from the presence in cheese of a noxious germ. This harmful germ was found in the well-water; and the water was used in setting the vats, thus inoculating the milk with the germ. In other words, the water acted as a starter.

Currents of air or dust arising from dry surfaces which were washed with the contaminated water may have contributed something towards the seeding of the cheese with the undesirable germ; but it is likely that the trouble arose chiefly from the use of the water in washing the vats and in setting.

The high average temperature of the curing-room—72 degrees Fahrenheit—favored the growth of the undesirable germ in the cheese.

A change in the water supply caused an immediate difference in the flavor of the cheese. Since the change there has been no trouble. Hence, we may repeat what has often been said, viz., that factorymen should pay very close attention to the water supply in their factories, to see that it is clear, pure and good. Bad-smelling water should never be used for setting vats. In all doubtful cases the water should be boiled and then cooled to the required temperature.

GARDEN AND ORCHARD

Cultivation and Fertilization of Orchards.

BY G. C. CASTON, SIMCOE COUNTY, ONT.

There is perhaps no part of the farm that is so much neglected or so generally ill-treated as the orchard. It is the common practice to let the orchard take care of itself, while if it received the same care and attention as other branches of the farming industry it would return more profit acre for acre than any other part of the farm.

The soil is often robbed of the necessary plant food, and the young trees stunted, by trying to grow cereal crops and orchard trees on the same ground and at the same time. A young orchard should never be sown with grain or grass, except it be with clover for the purpose of plowing down for fertilizing purposes. Any kind of a hoe crop may be grown with benefit, and in this way the land will return a good profit while the young trees are growing, providing fertility is kept up. As the trees grow larger cultivation should be shallow and should be at a regular depth. It is a mistake to plow or cultivate deep at one time and shallow at another. As the roots of the trees spread out, the small fibers will be found just below the line of cultivation. These are the feeders of the tree, and if cultivation is shallow for a time, and then followed by a deep plowing, a great number of these little feeders are destroyed. As to the question, Should an orchard ever be seeded down to grass? I would say that better results will be attained if the soil is always kept in cultivation, and no hay or grass should be taken from the land. If, when an orchard has attained

bearing age, it is seeded to grass for a few years, no serious results may be noticed, and the trees may bear fairly well, providing the soil is fertile. But it would give better results if always cultivated. And a bearing orchard if seeded down to grass should be pastured with sheep or hogs, the latter preferred, as they root over the soil and pick up the wormy apples, and thus greatly aid in keeping the codling moth in check.

When an orchard has been in grass for a few years a decrease in the vigor of the trees will be noticed; the foliage will become of a pale color, and the fruit will begin to fail in quality and quantity. That is where crops of grain and hay have been taken off. Three or four years would belong enough to allow an orchard to remain in sod. It should then be plowed and cultivated as shallow as possible, as the small fibers will be found in great abundance near the surface. They are seeking for food and moisture, and should not be interfered with more than is necessary.

The fertility of an orchard may be kept up very well without the ordinary stable or barnyard manure, by plowing in clover to supply the nitrogen, which is the principal element in our stable manure, and applying hardwood ashes, about 40 bushels per acre, to supply the potash and phosphoric acid. Where the ordinary manure is not available this course should be followed, and will be found to answer the purpose all right.

So much manure is required for other purposes about the farm that the orchard seldom gets any, unless it happens to be planted to roots or some kind of hoe crop.

Now if a heavy crop of clover is plowed in and a dressing of 40 bushels of good ashes per acre applied once in two years, that would be better than most orchards receive as to fertility. And if no grain or hay crops were taken off, an orchard of bearing age would respond fairly well to this course of treatment. The clover furnishes an important element to the soil besides the nitrogen, and that is humus, or, in other words, vegetable mold, without which no soil can be in proper mechanical condition for the carrying on of nature's operations in manufacturing raw material into available plant food. If ashes cannot be got in sufficient quantity, then some other substitute should be used, such as muriate of potash and ground bone, or some commercial fertilizer made up chiefly of potash and phosphoric acid. There is enough hardwood ashes made in our own Province to keep up the fertility of our own orchards if they were kept at home. But unfortunately they are exported in immense quantities to the United States to enrich the fruit farms and gardens of rival fruit-growers. I would like just here to emphasize the importance of keeping this cheap and valuable fertilizer at home. It should never be allowed to leave the country. In addition to those made on the farm large quantities can be gathered in the villages and towns, and can be bought cheaply. If valued at the price we pay for the same elements in commercial fertilizers, they are worth to the fruit-grower 25 cents per bushel. Let us avail ourselves of this valuable material which is so essential to the production of good, thrifty fruit trees and fruit of the highest quality, a product for which our Province is already becoming famous.

Insecticide and Fungicide Mixtures.

To the Editor FARMER'S ADVOCATE:

SIR,—Permit me to offer you my warm and sincere congratulations on the great success you achieved in bringing out the Christmas number of the good old FARMER'S ADVOCATE. Not only is it handsome and tastily gotten up, but it is filled with matter of the most interesting and valuable nature; though, as a horticulturist, I would have liked a little more bearing upon the country's fruit industry. The Christmas ADVOCATE for 1897 must have been a welcome visitor in Canadian farm homes. Speaking of fruit reminds me of my present craving for some good sound Canadian Famuse or Spies. While Ithaca is the principal town of Tompkins County, N. Y., the home of the famous King (of Tompkins Co.), it has been very difficult to purchase a peck of sound apples of this or any other variety. The immense crop of 1896 practically spoiled the market for two years. Low prices disheartened fruit-growers. Last year (1897) with a small crop of fruit and a large crop of insects and fungi the farm orchards were uncared for; the result may be seen in every grocer's window, when an average bushel of Kings will not yield a peck of absolutely sound specimens. The injury is largely due to the codling moth, whose ravages have been almost unprecedentedly severe—this, too, under the shadow of the Experiment Station, where such excellent work has been done by Mr. Slingerland in clearing up doubtful points in the life history of this insect. A bulletin on this subject by Mr. Slingerland will shortly appear, which will definitely settle what were hitherto thought to be debatable questions. Apropos of codling moth injury, it does seem strange that farmers should be so tardy in taking up and putting into practice well proved preventive remedies. In looking over some spraying experiments carried on at Ottawa last season, I note that in no case where Paris green was used did I find more than 5 per cent. of the apples injured by codling moth; where this or some other insecticide was not used the wormy apples amounted to fully 25 per cent. of the crop. This in an orchard where all had

been sprayed for four years previously. These results are merely in line with those recorded year after year in the reports of the Central Experimental Farm. The man who sprayed in 1897 will be well repaid for his labor. While on this subject of spraying I may refer to the question so often mooted by fruit-growers at Institute meetings, viz.: Is Paris green as efficacious when used with Bordeaux mixture as when it is applied in water by itself? Careful experiments carried on in 1895-6 answered the question in the affirmative. The experience of the past season corroborated that of former years. Paris green was used in both cases; that is, in Bordeaux mixture and in water alone, at the rate of 1 lb. to 100 gallons of fluid. Three applications were made. Where applied in water the third application of Paris green caused some injury to Tetofsky apple foliage. No injury was noted in the case of other varieties of trees treated three times. Of course, the danger of injury is easily obviated by adding lime in the same quantity as the Paris green. As to results, a Transcendant crab tree sprayed with Bordeaux mixture and Paris green yielded five bushels of fruit. Of these nine specimens only were wormy. One Hyslop, treated as above, yielding 3½ bushels, gave 36 wormy specimens.

Paris green and water.—One Jumbo crab tree yielding 1½ bushels gave 5 wormy specimens. One Orion crab tree yielding 1 bushel gave 14 wormy specimens. It will be noted that the proportion of wormy apples is small in both cases, and does not point to important practical differences. It is my opinion that it would not pay a fruit-grower to incur the expense involved in making a separate application of Paris green in view of the very doubtful benefit derived.

BORDEAUX MIXTURE.

Six pounds of copper sulphate vs. four pounds.—Some horticulturists advise the use of six pounds of copper sulphate with four pounds of lime to each barrel of water in making Bordeaux mixture. This formula has in one or two instances given better results when used against potato rot than the 4:4 formula. In combating diseases of fruit trees its advantages have never been apparent to me. If four applications are made many varieties of apples will be more or less russeted by the 6:4 formula (see rep. 1896, p. 174), and during seasons of heavy precipitation the foliage may suffer injury. A careful comparison was made last year of the two formulas applied to crab trees heavily laden. With the 4:4 formula the foliage and fruit were healthy and clean throughout the season. No injury to the leaves was observed, while with the 6:4 formula all the fruit was distinctly russeted and the foliage slightly scorched or browned. In the case of a Quaker Beauty crab tree part of the fruit was rendered unsalable. As to effects against furges, the fruit was equally clean as to scab and the number of wormy specimens about the same. There does not seem to be any good reason for using against apple scab the stronger, more expensive, and sometimes dangerous formula. These thoughts are suggested by the quality of fruit I meet with when viewed from the standpoint of the consumer. I am glad to see that a liberal amount of time was devoted by the Ontario Fruit Growers' Association at its recent annual meeting to the discussion of insect and fungous pests, and pleased still more to see the stand taken by the Hon. Minister of Agriculture for the Province on the more serious question of how best to fight the San José scale. Wishing you and your readers a prosperous New Year, I am,

Yours faithfully, JOHN CRAIG.
Tompkins Co., N. Y., January, 1898.

VETERINARY.

Antitoxine Serum for Hog Cholera.

A dispatch from Washington states that Dr. Salmon, of the Bureau of Animal Industry, has found an antitoxine serum possessing both a preventive and curative action for hog cholera. Tests were made in Page Co., Ia., last fall with 244 head. Of this number 88 were sick and 39 died. The per cent. of loss in the herds treated in which the disease existed was 17 per cent., while in untreated herds observed during the same time the loss was 35 per cent. Dr. Salmon believes that a better quality of serum can be prepared, and seems convinced that by the employment of this inoculation the loss need not run above 15 to 20 per cent. U. S. Secretary of Agriculture Wilson, gratified at the success attending the Iowa experiments, will ask Congress for an appropriation sufficient to enable the Department to furnish serum for at least 2,000,000 inoculations next year. It is desirable that the manufacture of the serum be exclusively in the hands of the Bureau officials; and as it takes about three to four months to put a horse or cow in condition to furnish the antitoxine, the Secretary is anxious that the appropriation be available immediately. The serum is made on the same principle as the antitoxine of diphtheria, a horse or cow being inoculated with repeated doses of the germs of the disease until a condition of high resistance to the disease is produced. The blood of an animal thus inoculated is injected under the skin of the hog, one "dose" being sufficient to produce immunity. The present cost is about 10 cents per dose, but this may be reduced.

Veterinary

To the Editor FARMER'S ADVOCATE:

SIR,—I most do vast distance separate from you, Ontario County, Ont. Hopkins, and should most certainly me the honor of a afford me the o gratulating him o signature in you much virility of the absolute fear must be rather u officials connecte Department is one accustomed generally meets of what one wish wrong half at the

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