

as thought to be a heavier
largely because it does not
ever; Mr. Raynor pointed
oil as is found in that dis-
plant food must be added.
ne that Green Mountain
root and, therefore, cannot
appeared to die earlier in
in this connection it was
mountain seed secured from
s seriously affected with
produce this effect.

Mr. Raynor, "depends
as upon soil and climate.
the greatest importance,
selection, Reproductiveness
quality and Robustness or
always be considered.
n appearance whether a
if the centre of a potato
water core the potato will
two halves show a tendency
again, plenty of starch
good cooking quality."
est potato soil, according
packs hard and yet has
end crops, with plenty
has shown that one man
time and that of a team
a 20-acre field of potatoes.
ation for a five-acre field
rily a principal crop is to
the middle of May, after
v stable manure per acre.
14 inches apart in every
r commercial grower it
ree or four-year rotation,
seeded down to clover,
ending on whether the
years. Stable manure
in the fall or with the
sen the chances of scab;
fall it should be plowed

larger yields than small
size of the pieces used,
ounce to two and a half
n shown by experiments
s should be planted from
and this should require
a acre. A potato crop



moisture, as much as 650
er acre, or 450 tons for
ed. Hence, there is a
which should not stop
period if the weather
shallower as the plants
aking, moulding is not
is required," said the
inted out that a digger
sufficient moulding of
t way up on the digger;
Experiments were sug-
line whether or not the
when not moulded to
of the crop if dug with a

ertilizers and fertilizing,
al importance of water
materials. The root
very quickly, according
after planting the tiny
ween the rows. Lime
s to sweeten them, be-
d do grow good crops
is necessary for stalk
c acid is necessary for
quality and maturity.

of plant food, and in
rs apply as much as
high-grade commercial
relative amounts and
ferent classes of plants

quired.

oric Acid	Potash
air	Fair
undance	Fair
air	Abundance

The speaker showed the purpose of artificial fertilizers and where the nitrogen, phosphoric acid and potash come from. It was pointed out that fertilizers must be dissolved in the soil before they can be taken in by the plant, and that in dry weather it must be the stored-up moisture in the soil that dissolves them. Fertilizers should be worked into the soil when the potatoes are planted.

A. H. MacLennan, Vegetable Specialist, Ontario Department of Agriculture, spoke briefly on labor-saving machinery. Referring to fertilizers the speaker said that vegetable growers had secured yields of early potatoes at the rate of over 600 bushels per acre. One grower, to secure such a yield, applied 15 loads of manure, 800 pounds of bone meal in the fall and 600 pounds of acid phosphate and 200 pounds of tankage per acre in the spring. This was, of course, on high-priced, vegetable-growing soil near a large market. It pays better to cut potatoes by hand, said Mr. MacLennan, who also advocated the use of a two-horse digger, larger ones being needlessly cumbersome.

Justus Miller, Acting Potato Specialist, outlined the extension work being conducted throughout the province in potato growing. Three factors are necessary, he said, to a progressive potato-growing industry. These are the production of the crop, its preparation for market and its sale. The present commercial situation in Ontario with regard to potato growing is that our ideas are not uniform, disease is very prevalent, and there are great fluctuations in price from one year to another as well as wide variations in price between the different potato districts in the same season. We must have graded stock to develop an export market, and New Brunswick potatoes sometimes sell for over a dollar a bag more than Ontario potatoes, because they are graded and our own are not. There is no special outlet for the Ontario crop, and normally we have not even our own local markets because the Maritime Provinces run us off with a more marketable product, notwithstanding the fact that our own potatoes show equal quality and greater maturity. We must get our industry better organized. Mr. Miller suggested several promising lines of investigation which might be undertaken as co-operative experiments or tests by growers in the district. These referred to time of planting, rate of planting, and cost of production. Demonstration experiments conducted by the Agricultural Representatives in 1918 with Green Mountain and Irish Cobbler seed from different sources resulted as follows:

Source of Seed	Green Mountain	Irish Cobbler
	(Bushels per acre)	(Bushels per acre)
Southern Ontario	127	167
Northern Ontario	153	177
New Brunswick	148	137

This year experiments are to be tried comparing certified seed from Northern Ontario, good seed from New Brunswick, and the farmer's own seed. Apparently it is possible to get comparatively better results from Irish Cobbler on clay soils than from Green Mountain.

Notes on the Spray Calendar and Spraying.

BY L. CAESAR, PROVINCIAL ENTOMOLOGIST.

In a spray calendar covering so many kinds of fruit trees and bush fruits as the one published last week in "The Farmer's Advocate" it has been found convenient to use the letters A, A2, A3, B1, B2, B3, and C, to indicate the different mixtures and strengths of mixtures to be used for each particular application. These abbreviations are fully explained. References are made to the hydrometer, but the equivalent of all hydrometer readings are given, so that unless a person is making his own lime-sulphur mixture an hydrometer is not necessary. Commercial lime-sulphur tests between 32 degrees and 33 degrees Beaume or between 1.280 and 1.295 specific gravity.

In the lower part of the Calendar under the heading "Bordeaux mixture" a new formula or rather an old formula modified has been given, which states the amount of hydrated lime that can be used instead of stone lime. This is done because hydrated lime is readily secured and is very convenient to use. The stone lime is, of course, excellent too. Hydrated lime is about one-third weaker than the stone lime and for this reason the quantity given in the formula is increased. An excess of lime does no harm except that it is a little harder sometimes to send through the nozzles, particularly with hand outfits. Hydrated lime may be kept for many months in tightly-closed paper bags in a dry room, but if exposed to the air it soon becomes worthless. This should not be forgotten.

Hints re Outfits.

If a fruit grower wishes to spray well he must have a good outfit, whether it be a barrel pump or a larger machine. The barrel pump of course, is only suited for a very limited amount of work as small orchards of large trees or moderate-sized orchards of small trees. A leaky outfit that will not give good pressure is a nuisance and a waste of money. Nearly half the poor spraying in the country is caused by poor outfits kept in bad condition. Now is the time to put the spray machine into good condition. Nothing about it is more important than to have the cylinders well packed so that at every stroke they will draw in all the liquid that they were built capable of drawing in. This means good pressure with the minimum amount of effort whether

it is man power or gasoline power. Repacking the pumps is not a difficult process. Candle wick steeped in tallow or even in oil makes a good packing in many cases. Often, however, excellent ready-made packings can be purchased from the manufacturer of the pump and are quick and easy to apply. If the pressure begins to go off screw down the packing a little tighter. Examine the valves also to see that both are working right. Often only one valve is working in a double acting pump or two in the triplex type. The valves get set and all they need is to be loosened.

Another matter of great importance is the size of the openings in the nozzles. Large openings should very seldom be used and then only with powerful gasoline outfits. They let too much mixture out and make it hard to get a fine mist. The opening in any nozzle soon becomes worn, so have a good supply of discs with small or comparatively small holes and put a new one on as soon as the old becomes much worn.

For comfort and satisfaction no spray machine should be leaky at any place. This means having a good line of hose tightly fastened to the couplers. Wire, such as the wire used on baled hay, makes an excellent fastener, better in many cases than the clamps that are made specially for the purpose. Do not use short lines of hose except for a man standing on the tank or tower. The man on the ground requires one thirty to forty feet long, and he should have a comparatively short spray rod; six feet long is the most convenient, so that he can go underneath the tree and reach places that the man on the tower cannot.

If a power outfit is used it is desirable to purchase a good spray gun. There are several excellent ones on the market. A spray gun will pay for itself in a short time, because it takes the place of two spray rods and four nozzles and requires only one man to operate it instead of two as in the case of the spray rods. It also uses less mixture per tree and enables the operator to cover every part of the tree thoroughly without having to go in under it as he would have to do with the spray rod. Of course, some system must be followed with a spray gun to see that nothing is missed and to avoid unnecessary waste. The gun is so adapted that by turning the handle in one direction it will give a fine wide mist and by turning in the opposite direction it will give a narrow, coarser spray that will carry ordinarily over or through the largest tree. This is its great advantage. The only drawback is that if a coarse opening is used and great pressure it is more inclined to cause burning. This can be largely overcome by using a smaller opening in the disc and setting the pressure gauge so that not more than 225 pounds pressure will be supplied. A small opening is also more economical, though not quite so rapid as the large opening. The large opening may be safely used at the first spray. Very good hose is necessary for the spray gun.

Importance of Promptness in Spraying.

Many growers quite naturally overlook or minimize the importance of spraying a tree at a certain definite time. This time is indicated as nearly as possible in the Spray Calendar. For the first application there is a good deal of license allowed as to the time, for good results may be obtained from spraying any time the buds are ready to burst until the leaves are the size of a ten cent piece; but for the second application it is of the greatest importance to wait as long as possible before the buds actually burst. The best time is when the pink is clearly showing but the blossoms have not opened. This spray in some cases has to protect the fruit for three weeks until the blossoms fall and the next application can be given. Hence the great importance of waiting as long as possible and of getting the blossom buds in the ideal shape, that is most of them visible, to cover them with a protecting mixture. The third spray should not be put off a day after most of the blossoms have fallen, say 90 per cent., because every day from that time on means a great risk of apple scab getting started on the young fruit. Most years this is the most important spray for apple scab, though some years the one before the blossoms is just as important. It is also of great importance to get this application on promptly because of the Colding Worms. Most of these enter the calyx end of the fruit and unless the spray is put into that end of each blossom before the calyx closes it cannot get in at all, and the worms will enter later without being poisoned.

Omission of Applications.

Many fruit men who are considered good growers omit the second application and talk as if this were unnecessary. Some of these men are making money, but it is not due to the omission of this application and if their fruit were compared with that of a good sprayer who gives all three applications the difference would often be striking. Do not follow the advice of such men. Of the three applications the least important one except where there is San José Scale or Oyster-Shell Scale, is the first, but even this should only under the most urgent circumstances be omitted, because each application helps to make the other a success. As to the fourth application mentioned under "Remarks" in the Spray Calendar, there are some districts where apple scab is harder to control than in most districts. Under such circumstances it is always wise to give the fourth application. Snow and McIntosh in all districts would be better for the fourth application every year.

Choice of Fungicides.

In most cases the lime-sulphur will be most desirable for the first application, because of its value against scale insects. If there are no scale insects it will have practically no advantage over Bordeaux mixture, and if it is used in orchards free from scale it need not be stronger than one gallon to twenty of water. No

poison is necessary. For the second application, the one just before the blossoms burst, there is no doubt that Bordeaux mixture will in most instances control the scab better than lime-sulphur, this is especially true in years very favorable for scab development. With it either arsenate of lime or arsenate of lead may be used. Lime-sulphur in spite of all that is said against it has given and is yet giving good results for this or any other application, but we still advise the use of arsenate of lead with it instead of arsenate of lime, as being safer. For the third application use nothing but the lime-sulphur and arsenate of lead at the strengths recommended in the Calendar.

In conclusion we may say that if you do not get satisfactory results from your spraying, that is do not obtain a high percentage of clean fruit (the average should not be less than 95 per cent. after the first year or two) there is something wrong with your spraying and not with the mixture. We shall be glad to have you correspond with us and tell us of your troubles and in most cases we hope to be able to point out what has been the error.

A Bright Future for the Apple Grower.

W. F. KYDD, DEPARTMENT OF AGRICULTURE, TORONTO.

In the winter of 1917 and 1918 a great number of apple trees were killed and many badly injured in Ontario with the severe cold. In the extreme eastern part of the Province, Snow or Fameuse are nearly all gone, one large orchard of that variety near the St. Lawrence River being practically wiped out. Prince Edward County and the district from Trenton to Pickering have lost a great many trees. Many young trees beginning to bear have suffered from "Winter Injury", particularly in the crotches, and very few of those trees will be long lived.

The bearing orchards have been sadly neglected during the war. Nothing else could be expected, because the farmers were urged to produce wheat, bacon, cheese, etc., necessities to win the war. There will never be as many apples again in Ontario until the young trees already planted come into bearing. It certainly looks as if apple growing would be a paying proposition for many years.

There are several things that must be done to secure profitable crops of apples. Fertilizing is probably the most important; many, perhaps nearly all orchards, are starved. Barn-yard manure is, without a doubt, the best fertilizer to-day, but it is very expensive getting it from the city. The price has gone up and the freight has also increased. Yet, after all, I think it is the cheapest fertilizer in the end.

It is a mistake to put manure close to the trunk as there are few feeding roots there. It is not much value nearer the trunk than 5 feet. From that distance to the tips of the root branches is where best results will be received. Four hundred pounds of rotted manure would give a bearing tree a liberal application in one season.

It is also impossible to have high-class apples without pruning. There are many trees so high that it is almost impossible to spray thoroughly. Those high trees should be lowered. Twenty feet is a good height for a bearing tree. Many of them, however, could not be lowered to this height in one season without great danger of injury and perhaps death in many varieties. Better take one or two feet off the top the first year; this will have a tendency to force out sprouts on the long bare branches below. All of these sprouts should not be left, but thin them to one in a place about fifteen inches apart and cut most of the sprouts back to four or five inches, unless there is a vacancy higher up that the pruner desires to fill. Sprouts if well managed, will bear apples in four or five years. Pruning a vigorous neglected orchard is slow work, but a little time on each tree would be a great improvement. Take out all cross branches and branches that will rub the fruit also everything dead or cankered.

Many trees have very rough bark where San José Scale or Oyster Shell Bark Lice hide away from the spray. This bark should be scraped off. It is better to do this scraping after a heavy rain when the bark comes off easier and there will be very little dust to hurt the eyes of the operator.

Some men are making a great success with no cultivation, but those growers have excellent land to begin with and mulch very heavily with coarse or strawy manure. If the orchard is in sod, mow the grass but be sure to leave it on the land. However, the average orchard in Ontario will pay better if cultivated.

If there is no good in putting manure near the trunk, what value is there in cultivating nearer than 5 feet? Bearing trees that have got their growth do not require cultivation close to the tree, that is the most expensive part to work and most likely to cause injury by the tools.

Plow as shallow as possible between the trees. Deep plowing will cut off too many fine roots. The more thorough the cultivation the more moisture will be conserved for dry weather.

Quality in apples is often mentioned. In red apples, color denotes quality. Color is the one thing we should all strive for. The later in the season cultivation is carried on, the less color there will be. Cultivation makes the tree vigorous so the apples will be large, but medium sized apples, well colored, are worth more than very large ones of poor color. It depends on the season when cultivation should stop. The drier the weather the later cultivation should be continued. In average seasons about the middle of June, would be nearly the proper time to stop in Southern Ontario, and further north, even earlier.