

METHODS OF MAINTAINING THE FERTILITY OF LAND IN ORCHARDS.

Synopsis of an address given by DR. SAUNDERS, Director of the Experimental Farm, Ottawa, before the Ontario Fruit Growers' Association, at Waterloo.

The chief aim of all cultivation of the soil for all kinds of crops is to so treat the land that its fertility will be so maintained that crops can be grown indefinitely. To understand the proper manuring of the orchard it is necessary to know the composition of the soil and the amount of fertility removed each year by the growth of fruit trees.

The soil is a storehouse of fertility in which is laid up a treasure more valuable to the national life of the country than gold. There are many mineral constituents found in the soil, but only some of them are used by plants as food. The most important and most valuable of the plant foods found in the soil are nitrogen, phosphoric acid and potash. The following table gives an estimate of the amount of these plant foods in an acre of soil one foot deep. The samples of Canadian soils were analyzed by Professor Shutt, the chemist at the Experimental Farm, Ottawa.

In one acre of soil one foot deep.			
Soils from	Nitrogen	Phosphoric Acid	Potash
	LBS.	LBS.	LBS.
Eastern Canada, average	6,200	3,600	6,500
Northwest plains, average	10,000	5,000	10,000
European, average	7,500	3,600	5,800

It will be thus seen that our soils contain a large amount of the necessary plant foods, and also that they compare very favorably with the European soils. It will be necessary now to see what growing fruit trees take from the soil.

Production of Apple Wood.

Professor Shutt has analyzed a great number of samples of apple wood. It gives about 2 per cent. of ash. The ash contains about 3½ per cent. of potash, and 3¼ per cent. of phosphoric acid, and a much larger amount of lime. Thus 100 lbs. of apple wood takes from the soil less than one ounce each of potash and phosphoric acid and not more than three to four ounces of nitrogen.

Allowing that the trunk and branches of an average tree weigh a thousand pounds, then at the figures just given, one tree would take away from the soil from 2 to 2½ lbs. of nitrogen, and about 10 ounces each of potash and phosphoric acid. At thirty trees to the acre this would amount to 60 to 70 lbs. of nitrogen and about 19 lbs. each of potash and phosphoric acid per acre.

Production of Leaves.

One hundred pounds of mature leaves show by analysis about 14 ozs. of nitrogen, 3 ozs. of phosphoric acid, 6 ozs. of potash, and 14 ozs. of lime. One hundred pounds of young leaves taken the 25th day of May showed only 12 ozs. of nitrogen, a little more than 4 ozs of potash, and a little less than 4 ozs. of phosphoric acid.

In estimating the weight of leaves we have no basis to work upon, but the leaves on an average fruit tree would not weigh more than 100 lbs. This, then, at 30 trees to the acre

would mean a loss of 24 lbs of nitrogen, about 9 lbs of potash, 7 lbs. of phosphoric acid, and 18 lbs. of lime. Since, however, the leaves fall to the ground and thus return to the soil much of what is taken from it, it is only fair to take about half this estimate as the annual loss of plant food by means of the leaves.

Production of Fruit.

About 80 per cent. of the fruit is juice, the rest is pomace. The juice is simply water containing from ¼ to 1¼ per cent. of oxalic acid, 6 to 12 per cent. of sugar, and a little flavoring material. Everything in the juice except the water comes from the air.

The pomace contains the core and seeds. The seeds are rich in nitrogen, and the forming and maturing of the seeds taxes the vital forces of a plant. Hence heavy crops are less trying on the trees if they are thinned out. It is better for the trees and the fruit is larger and of better flavor and quality. The capacity of the tree for future work is also economized.

One hundred pounds of apple pomace contains 4½ ozs. of nitrogen, 2 ozs. of potash, and less than ½ of an ounce of phosphoric acid. At 30 trees to the acre, each yielding six barrels of fruit annually, the loss to the soil would

be about 60 lbs. of nitrogen, 30 lbs. of potash, and 7 lbs. of phosphoric acid.

The Waste per Acre.

	Nitrogen	Potash	Phosphoric Acid
	lbs. ozs.	lbs. ozs.	lbs. ozs.
For total growth of the wood	2 8	10	10
For half the annual growth of leaves	12	4 8	3 8
For the annual waste in producing fruit	60	30	7
Total loss per acre	74 8	35 2	11 2

How to Return the Waste.

A ton of average farmyard manure contains from 8 to 10 lbs. of nitrogen, 10 to 15 lbs of potash and from 6 to 8 lbs. of phosphoric acid. So that an application of fifteen tons of well rotted farmyard manure every three years would more than supply all the plant food removed. But as this supply must reach the roots it must be liberal.

The nitrogen is best supplied by plowing down clover sown in the spring. The clover will also gather potash from the soil and when plowed down it too will be rendered available. It can also be supplied in the more expensive forms of nitrate of soda and ammonium sulphate. Potash can be supplied in the form of unleached wood ashes,

kainit, and as muriate of potash. Phosphoric acid can be supplied as ground bone, apatite, basic slag and superphosphate. Basic slag is decomposed by humus and vegetable acids in the soil.

Losses by Other Fruits

It will be seen from the foregoing tables that the greatest loss is with the fruit. The following table will give some idea of the losses which the other fruits cause.

Per 1,000 lbs. of fruit.	Potash.	Phosphoric Acid.
Apple	1 lb.	½ lbs.
Pear	2½ lbs.	1½ "
Plum	2½ "	1½ "
Peach	2½ "	1½ "
Cherry	2½ "	1½ "
Grape	7 "	3 "
Strawberry	5½ "	1½ "

The raspberry and blackberry take about ½ less potash than the apple. Knowing the drain these fruits make on the soil, we will be able to keep the soil supplied in a proper manner with the necessary manures.

See that the supply of fire wood for the summer is got into the woodshed ready for use. Don't leave it until it is wanted, or you will have to stop more important work to attend to it.



WHEN THE SAP BEGINS TO FLOW.

By R.S.G.A., in *The Westminster*.

When nights are clear, and frosts are keen,
And the day is warm in the sun,
The snow wreaths vanish like a breath,
The sap begins to run.
And thro' the bush with shout and song
The merry toilers go;
For the boys are out for work and fun
When the sap begins to flow.

When trees are tapped, and the pails are hung
For the nectar of the Spring,
Then over the blazing maple logs
The giant kettles swing;
And the dipper that stirs the bubbling spoil
From lip to lip doth go;
For there's nothing so sweet as the syrup that's made
When the sap begins to flow.

But it's best at dusk by the light of the flame,
In the bonfire's smoky breath,
Where shadows weird by the caldron crouch
Like the witches in "Macbeth";
Shadows that gibber and clutch and writhe,
With laughter echoing full;
For it's work to carry the amber juice,
But it's fun at the taffy-pull.

When night is clear, and the frost is keen,
And the sap has ceased to run,
And the sugar is caking clear and crisp,
The work of the day is done,
And thro' the bush with shout and song
The weary toilers go;
But they'll play it again on the morrow morn
When the sap begins to flow.