

brought through it in future. It is an excellent practice to use tile one size larger than we think absolutely necessary.

A good outlet should always be provided; this may be an open ditch, but it should be of sufficient depth to allow the drain to discharge the water freely into it. The outlet should be secured with flat stones or a wooden box, as tiles that are exposed will crumble from the action of the weather.

For lateral drains use nothing smaller than three-inch tile. The depth and distance apart will depend entirely on the soil. In heavy clay soils the depth should be less than three feet and distance apart from 60 to 100 feet.

For digging, only first-class tools should be used. Half-round spades and scoops the proper size for different tile are essential. Be most particular about levelling the bottom of the drain. At least one inch should be removed with the scoop in bottoming for three-inch tile (more for the larger sizes), in order that the tile may lay perfectly solid. Water should be used to get the bottom perfectly even. A fall of one inch in a hundred feet is sufficient if work is properly done.

In laying the tile commence at the outlet, standing upon the tile as you proceed, and give each tile as laid a sharp blow from the heel of the boot, which drives it up tightly against the last one laid. Surface soil should be used to fill the drains for the first six inches, then they may be plowed in. Used a long doubletree and place a horse on each side of the drain.

Select the driest time of the year for draining quicksand soils. Allow the water to run out after each successive spading, and drain those soils as deeply as possible. If the outlet will allow, and it is possible to reach a clay bottom at a reasonable depth, it is better to do so. The deeper the drain is put the more it will accomplish. Cover joints of tile with a tough sod. One thousand tiles will lay sixty rods of drain. Cost of digging and laying ordinary size tile, twelve and a half to fifteen cents per rod with board.

MUNGO McNAB.

Choice Clover Hay.

Seeding, planting, and haying follow in quick succession this season, owing to the peculiarly favorable weather. It is pleasant to realize that haying operations will not be so lightly disposed of this year as has been the case too often lately. On land in good heart, where a good stand of clover or grass has been secured, haying will demand attention within a very few weeks. The folly of leaving the crop standing until the late blooming stage is evident from several standpoints. As the crop approaches maturity it becomes more and more woody and is less palatable and nutritious. This has been proved experimentally and by observation. By cutting early, a good aftermath is assured, and the crop is less exhaustive to the land and injurious to the roots. There is also less loss from heads and leaves breaking off. The object should be to get as much hay as possible in a condition as nearly as can be resembling June pasture, which we all know is the food *par excellence* for milking, growing and fattening stock. Very little, if any, improvement can be made on June pasture for a milch cow. Feed her on dry timothy hay and her milk yield will decrease decidedly; change this to straw, and she will do worse yet, for the same reason.

In cutting clover it is well to take narrow strips parallel with the furrows, which is easier on the machine and team, and the field can be tedded, raked, and drawn more conveniently than when the whole field is gone round and round. While a soaking rain on partially cured clover is very destructive, over-drying in the scorching sun is very little less harmful. To hasten evaporation the tedder should be set to work a few hours after cutting, and when wilted it should be raked into windrows, where the drying may continue if the weather is just right. From these it may be drawn in. This saves the labor of cocking and answers well generally. The matter of saving a little labor, however, is not as important as to secure what will produce fat, milk, and muscle to the best advantage. When the weather is at all uncertain, the surest way to make hay excellent in color, aroma, and feeding is to cock it in the field. This should be done before it is ready to draw, as the curing process will continue in this condition. After each cock is made, having placed each successive forkful directly on top of the others, the sides should be raked down by the inverted fork, leaving the outside stems pointing downwards. If rain is impending, all the energy of the hands should be applied to getting the hay into cock. Avoid its getting wet, if possible, as it means extra time and labor and a poor quality of fodder.

As the hay was put up too green to haul, the cocks should be opened out to the sun and wind a few hours before commencing to take in. This requires a little extra work, but the difference between hay allowed to cure in the swath by exposure to the sun and that made by cocking early well repays all the extra labor involved. The stalks are soft and sweet, the leaves are not broken off, and the entire crop is of a beautiful color and as tempting as June pasture. The hay loader will not work so satisfactorily in heavy clover that is not almost over-dried, even if left in the windrow, but a horse-fork or sling in the barn saves much heavy labor and hastens the hauling. Even though considerable sap is not evaporated, there is very little danger of its becoming musty, provided there is no

dew or rain upon it. A good means of deciding whether or not hay is ready to haul is to take a few stalks and twist them like rope with all your might. If no little drops of sap fall from it the hauling may commence, provided the day is bright and breezy.

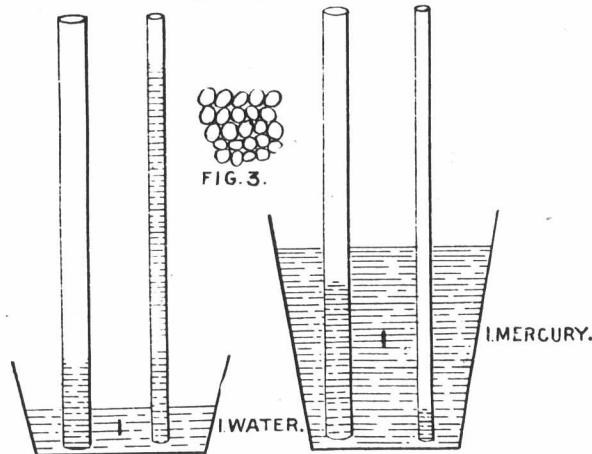
It is generally conceded now that there is very little gain in salting even quite green hay, because unless far more is applied than the stock should have it cannot aid the keeping. It is well to avoid tramping clover to any extent in the mow when it is being drawn in. It should be pitched around level, and tramped the next morning before adding any more. When the hay is all in, close the doors and windows and trust to all being well. The mow will certainly heat up to a high temperature, but the hay will not suffer in consequence, but will come out with a flavor and color just right.

With the long-continued early warm weather much of the red clover has rushed into bloom while yet very short, and unless more moisture falls the first crop must of necessity be on the short side. Would it not be wise to mow very early and thus insure a heavy aftermath, which will make up to a large extent the deficiency of the first cut?

Water Supply for Crops in Drought.

BY E. F. WHITE, B. S. A., ALGOMA.

If we put the end of a small glass tube into water, the water will rise in it. If, instead of being put in water, a tube is put into a very heavy liquid, such as mercury, instead of rising above the surrounding liquid it will not rise up in the tube to its level (see Fig. I. and II.). The finer these tubes



are the higher the water will rise, while the opposite will be the result in the case of the mercury. That which causes the water to rise is called capillary attraction. That which prevents the mercury from rising is called capillary repulsion.

Before going any further it might be interesting to some to explain the meaning of capillary. Capillus means hair. Capillary means resembling a hair: fine, minute, small in diameter, though long. Thus a capillary tube means a tube that is hair-like.

A glass tube has been taken for purposes of illustration, but you must not think that such a tube is necessary before water will rise. A sponge soaks up water; that is, water rises through and fills the minute spaces which exist in the structure of the sponge. Those large spaces which we so plainly see in it are not filled with water. The oil rises in the lamp-wick by capillary attraction. The minute spaces between the fibers of the wick serve the same purpose as the small hole in a glass tube. The finer the material in the wick, the smaller and more numerous the holes will be and the higher the oil will rise through it. When house plants are watered, very often the water is put into the saucer of the flowerpot. We say the soil soaks the water up; in fact, the water rises through the spaces between the particles of soil (see Fig. III.).

The finer the soil the smaller these spaces will be and the higher the water will rise, as it did in the glass tubes.

It is well known that plants on a sandy soil suffer during a dry season much more than those on a clay or loamy soil do. This is due to the spaces in the latter being much finer than those in the sand, as the particles are not nearly so large. This being the case, they hold water much better when they have it, and then the water will rise much more readily from the water level. In this way, during a dry time the plants on clay may be getting water from below, while those on sandy land may die for want of it.

Now, if we understand some of the forces which influence the rise of water in a substance, we need to know two more things, and then this knowledge may be useful on the farm. First: What can we do to put the soil into a condition that is favorable to the rise of water from the water level; then what can we do to prevent it from evaporating at the top, so that the crop may get the benefit of the moisture?

The spaces need to be small. Thus, to roll land that is too loose, as sand or other land that has been plowed in the spring, is a benefit. Again, many will have noticed that land that is drained never suffers as much during a dry season as does undrained land. I have seen places where a person could distinctly notice that the crop beside a drain was better during a drought than the crop farther off. What is the reason of this? An underdrain never takes water away that rises by capillary

attraction, but that which lies in the larger spaces, and which, if allowed to remain, is injurious to plant growth. Land that is not drained will often be water-soaked during part of the season; and when it does dry out, will leave the land full of cracks, which tend to prevent the water from coming up, and allow it to evaporate more quickly. On the other hand, land that is well drained is left in a condition much more favorable to the rise of water by capillary attraction from the water level.

After doing as much as we can to put the soil into a condition favorable to the rise of this moisture, we need to do as much as we can to hinder its evaporation at the surface. Most farmers have seen a mulch of rubbish, chips, straw, or some other loose material put around fruit trees to keep the ground moist in dry weather. The water does not rise through this loose stuff, and is largely protected from the wind and sun's rays and does not evaporate: as a consequence the soil keeps moist. A well-worked summer-fallow, on clay or loamy soil, will be moist even if rain has not fallen for some weeks. The same way with land in roots or corn if they are suffled every few days. Not so if they are only cultivated now and then, when the weeds seem to demand it.

Now, some may say that land that is worked up dries out. That is true in regard to the portion of the soil that is worked; but this need be only one, two or three inches, and these few inches of loose soil at the top serve the same purpose as the chips and the like around the fruit trees. It prevents the moisture from coming right to the top and protects it from being evaporated by the wind and sun. In this way we keep it in the proper place for the plant to make use of it. This explains the reason that there is such an advantage in surface cultivation during dry weather. The drier the weather, the oftener will it pay us to cultivate such crops as permit of it.

For instance, take corn. It is a very simple and easy thing to plant it so that it can be cultivated both ways with a horse. Last year I helped to plant corn. Shortly after it came up we commenced to cultivate it, and during the dry season it was cultivated every week. It grew straight ahead and did not suffer in the least from the dry weather. I saw many other fields that seemed to have been cultivated only now and then to keep down the weeds, and they certainly showed to have suffered. Potatoes and roots were the same. By constant stirring of the surface soil much can be done to compensate for a lack of rain.

Generally speaking, if the rainfall is abundant during the summer we have good crops; if not, our crops are poor. People often think of the moisture in the soil as altogether due to the rainfall; and as they cannot control this, they have thought that they could not guard against loss by drought; but by understanding capillary attraction and how to avail ourselves of its aid, we will be able, in many cases, to greatly lessen the evils which result from a lack of rain.

Turnips.

Owing to a rush in the direction of corn growing and the use of the silo, the very important turnip crop has been to some extent lost sight of. Nor is this to be wondered at when the two crops are considered side by side. While the turnips furnish a large amount of succulent, healthful food which can be only a supplement to other fodders, siloed corn supplies in itself almost all the ingredients necessary to a perfect stock diet. Not only are the elements present in about the right proportion, but succulence and palatability are also found in the ensiled food. While this is a great advantage on many farms, we would never think of dispensing with the few acres of Swedes. For dairy cows they are not so desirable, but all other stock, especially the growing animals, from the inhabitants of the hog pen to the noble horse, are the better of a few turnips during the winter season. Especially is this true where the silo is not in use, because then the succulence found in the turnip does much in providing a relish and in aiding the digestion of the dry foods, such as hay, straw, and grain. So highly are Swede turnips valued in England and Scotland, nothing could induce stock farmers in those countries to replace them with any other crop. In the course of fattening heaves almost all the Scottish feeders make turnips the principal part of the diet. These, with good oat straw, fed wisely, bring many of the "prime Scots" to almost the finishing period, when a little "cake" and crushed oats are added to the ration. Many of the the most extensive Clydesdale breeders, too, place great dependence upon "neaps" in the bringing up of their favorites.

The two crops are alike valuable as land cleaners, and they are also alike in requiring well-manured land in order to yield a heavy return. By the time this reaches our readers the corn crop will or should have all been planted. Turnip drilling next claims attention. In former times the rule with our best turnip growers was to sow from the 10th to the 20th of June, and, indeed, not a few still hold to that plan, on the ground that early-sown turnips are more liable to be eaten off by the beetle or fly, and also that they are more liable to rot during the winter season when they finish their growth so much earlier. They are also more liable to infestation by lice during dry autumns. The old practice is, however, being changed in some districts, as many exceedingly successful turnip raisers are now sowing during the last week in May or as soon as they can get the ground ready.