though this gas has no direct fertilizing value, it increases the solvent power of the water, thereby making insoluble plant food more soluble. Rain also furnishes small quantities of sulphuric acid and alkaline substances, but these are too unimportant for consideration in a brief series of articles.

We desire specially to urge upon farmers the importance of nitrogen in its relation to drainage, for this is not only the most costly article of fertiliiy, but also the most liable to be wasted in the handling of farm-yard manures. We have previously pointed out how the nitrogenous substances can be preserved in the manure heap; you can now see how to preserve them in their relation to drainage.

With regard to the relation of phosphoric acid and potash to drainage little need be said. These salts are furnished by the soil and feed the plants through the roots. They are rarely found in drainage water, owing to the absorptive and retentive power of most soils for them, and to the fact that they are retained in the soil by chemical affinity and not by mere mechanical adhesion, as is the case with the nitrates. Sandy soils, being coarse, have less retentive power than clay, so that clay is always richer in phosphoric acid and potash than coarser soils, but nitric acid is easily washed out of all soils—except when a growing crop has sufficient luxuriance to appropriate it.

Value of Cisterns.—How to Make a Cheap one.

The quality of water, like that of food, varies with the locality, and custom educates the tastes in both cases. Water is water only when pure; it is the impurities that change the quality and do the flavoring. Canadian farmers, as a rule, would rather drink unwholesome spring water than wholesome rain water; they are educated in this manner, and believe that the water which has the brightest appearance is the most palatable and healthful. The clearest and most silvery looking spring water may be tainted with impurities. What then must be said with reference to the water in a large percentage of our wells? When dug in the neighborhood of barnyards or water closets, wells are a convenient receptacle for many impurities which filter through the soil into them, and are a fruitful hot-bed of disease to those who drink the water. Streams are apt to be impregnated in the same way, and running, as well as stagnant, waters contain organic impurities, the product of decaying vegetable matter, which are injurious to the health.

In some countries spring or well water is not drunk by the inhabitants, even when found in its purest state, rain water being preferred When the taste becomes educated to the latter, the former is not relished, it being too saline to the palate. The prejudice against rain water is mainly caused by the filthy condition in which the cisterns are kept. Rain water, in the usual method of preservation, is often impurer and filthier than the water from ordinary wells, springs or streams. Cistern water can be controlled by the farmer; other waters cannot, as a rule. Many farmers have good enough water for family use, but rest satisfied with impure water for their stock, forgetting that the dairy products from cows which drink filthy water may be about as injurious to the health of the consumer as if the impurities had been consumed directly. No farmer can make an excuse for having impure water for his family or his stock.

If the cistern is to be dug in a stiff clay soil, the best plan is to dig bottle-shaped; that is, make an opening about the size of an ordinary well, greater or less, according to the dimensions of the proposed cistern, and when the excavation is two or three feet deep, commence to widen by degrees until the desired diameter of the cistern is reached; then proceed in a perpendicular line to the proposed depth.

In this kind of soil no brick or stone work need be built, but a good mortar of lime and sand mixed with cement, and plastered on the sides of the cistern, will make a cheap and durable structure. Even the lime may be dispensed with, and a durable material made by using one part cement to four or five of clean sand. A second coating may be made of a mortar consisting of half sand and half cement, and then a finishing coat of pure cement should be applied. If greater hardness and durability are required, less sand must be used in the cement. When the soil is sandy or otherwise loose, a wall of brick or stone must be built, using ordinary mortar; but the plastering must be done with cement.

The next precaution is the arrangements for keeping the water pure. If it is allowed to stand long in the cistern in dry, warm weather it acquires an offensive odor, which can be prevented by proper ventilation and filtration. Put a bushel or two of broken charcoal into the bottom of the cistern. This will aid somewhat, but when greater purity is desired, the water should be strained through some sort of filter. A good filter is as cheap as an inferior one. Take an ordinary water-tight barrel with perforated bottom and lay in a layer of gravel; upon this put a layer of fine, clean sand, and then a layer of broken charcoal—the thicker the stratum of charcoal the purer will be the water that filters through; then put on another layer of sand, and finally another layer of clean gravel. This barrel may be kept near the cistern and the water filtered through in the quantities required. The chief value of drinking water is its character as a solvent, and pure rain water has the greatest solvent power When you become accustemed to drinking it, you will relish it even when kept at a comparatively high temperature, and there will be no necessity for the use of ice. Proper ventilation can easily be secured by means of a tube inserted below the cover of the cistern, covering the outside end with wire gauze, so as to prevent the ingress of extraneous matter. Wire gauze should also be securely fastened to the ends of the eave-troughs, or to the tops of the sprouts connecting them with the cistern, so as to prevent insects or other injurious matter from entering into the cistern. The cistern cover should be so tight that there will be no danger of obnoxious matter falling into the water. For household purposes, the cistern should be cleaned out at least once a year, but when the water is used for stock, there will be no danger in leaving them untouched for several years.

Deep vs. Shallow Plowing.

This question has been discussed threadbare, and yet there are many farmers who adhere tenaciously to the one or the other side of the question without taking the various conditions into consideration. In our last article onthe subject, we treated of it with special reference to the cleaning of the land; we shall now refer to other important considerations.

The first inquiry should be: what is the character of the soil and the subsoil? What is the quantity and nature of the manure, if any be applied? The last question is auxiliary to the first. It must also be borne in mind that fall rains and winter frosts only act in the clayey portion of the soil; the vegetable portion is converted into plant food by the action of heat and moisture. It will now be seen that the clay fields should be the first object of attention, and that the beneficial effects depend (1) upon the quantity of clay exposed on the surface, and (2) upon the depth loosened up to the action of the frost, so that the rougher the surface the greater will be the area exposed, and the deeper the plowing the greater will be the cubic dimensions acted upon by the frost, and a minimum frost will produce a maximum effect in the unlocking of the insoluble constituents of plant food. These remarks are based upon the presumption that the subsoil is not inferior to the soil on the surface; a small quantity of stiff bottom clay will receive the greatest benefit by being exposed to the surface over winter.

When farmyard manure is spread over the field before it is plowed, it will, by leaving the clay more open, make the soil more susceptible to the action of the frost; but if the manure lies spread evenly over the field until it has received a considerable quantity of rain, the soluble matter in the manure will be more evenly distributed in the soil than when plowed in before any rainfall. Manures are not beneficially acted upon by frost; like the vegetable portion of the soil, they require heat for their conversion to plant food. From these considerations it will also be seen that late plowing is more beneficial than early, for the soil will not likely be so compact; the more compact the soil the more frost proof it will be. In order that the frost may have its greatest effect water must not be allowed to stagnate; and even if the soil is not drained, the water will usually escape at least to the depth of the plowing. The better the land is drained the more it will be benefited by deep plowing.

No farmer can plow intelligently now without knowing what the succeeding crop is to be. It takes twice as much manure to fertilize the soil ten inches deep as five inches, and if the coming crop is a surface feeder, and if the manure is scarce, there may be an advantage derived from shallow plowing. It will take twice as long to exhaust ten inches of soil as five, other conditions being equal. But then it must be remembered that shallow soils are favorable to drouth. In many respects feeding soil is like feeding stock, and it is a bad practice to stunt it for several years and then cram it all at once.

The main points, therefore, for the farmer's consideration are: pay attention to the stiff fields in the fall, leaving the mixing of the soil and the getting of it into proper mechanical condition for the spring work.