

# THE O. A. C. REVIEW,

PUBLISHED MONTHLY DURING THE COLLEGE YEAR BY THE LITERARY  
SOCIETY OF THE ONTARIO AGRICULTURAL COLLEGE,  
GUELPH.

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Annual Subscription, 50 cents; 75c. if not paid before 1st February  
Single copies, 5 cents.

Advertising rates on application.

Ex-Students are requested to contribute to our columns.

FEBRUARY, 1897.

## Humus as a Factor of Soil Fertility.



WHILE there is so much discussion among agriculturists at the present time in regard to the best means of maintaining and increasing the soil fertility a few notes on the composition and importance of this factor of soil fertility cannot be amiss. We know that the humus must not be allowed to decrease or the plant will suffer. What is this humus?

By the term "humus" is generally understood any animal or vegetable matter in the soil which is in the process of decay. The name signifies a whole group of compounds and not a single chemical compound of definite composition. It originates from the dead leaves and roots of previous vegetation, or from organic manures, and is composed of carbon, hydrogen, oxygen, nitrogen and ash.

Although the humus itself is so imperfectly understood it has been ascertained that the carbon ranges from 40 to 65 per cent, oxygen from 25 to 35, the hydrogen from 3.5 to 5, while the nitrogen ranges from 6 to 10 per cent.

When the humus is extracted from the soil it is a black or brownish-black liquid, which yields a hard slimy black mass. Along with the humus materials, potassium, iron, aluminum, phosphorus and calcium are extracted, and the term humates has been applied to these compounds resulting from the union of the potash, iron, etc., with the humus.

When this humus or decaying vegetable matter becomes decomposed by the bacteria of nitrification the constituents are rendered available as plant food. The humates spoken of can also be utilized as plant food. With oats it has been found that they will grow and produce fertile seeds when all the food was supplied in the form of humates, assisted by the organisms present in the soil which carry on the work of fermenting the humus.

Aside from the distinct value as plant food, the humus absorbs

and retains moisture much more readily than any other ingredient, so that a soil which is rich in humus will withstand drought very much better. It fixes ammonia in the soil, and thus prevents loss by leaching, or evaporation, and it improves the mechanical condition of a heavy soil, making such soils lighter, more porous and less adhesive. On a sandy soil humus seems to bind together the loose particles of sand and so prevents the excessive leaching of plant food. It also increases the power of the soil to retain water and withstand the drought, thus affording at the same time a cooling influence on the soil.

A virgin soil has generally a good supply of humus, but continued cropping and the cultivation of grain crops without farm manures or a proper rotation of crops soon exhausts this supply, and the soil loses its fertility. The plowing down of green crops or crop residues, and the application of farm yard manures are the common means of retaining the humus. The muck from peat bogs is sometimes used along with manure as an absorbent and fertilizer, and at the same time for the purpose of supplying humus. The crops that leave the most residues in the field are the most favorable for its maintenance. Root crops leave very little of such matter.

The presence of much water about the humus prevents oxidation and consequent loss of food to the plant; but if circumstances were such that the plants could obtain this food in the presence of the water it would be favorable for the retention of the humus.

It is sometimes the practice to plow down green crops to serve as humus, and this will do so if the green matter be left long enough to properly decay. In this manner weeds would to some extent serve the same purpose. Good crops of grain always produce more humus by their residues than poor ones. On the other hand, circumstances which tend to decrease the plant food must be avoided, e. g., the leaching of the soil by water, the growing of crops not properly rotated, and the continued cropping and cultivation of the soil without due return of organic matter. In a rotation of crops, summer-fallowing should not be included, because plowing the land several times during the summer season adds nothing to its fertility and is particularly destructive upon the humus and nitrogen.

## The Restoration of the Consistency of Pasteurized Cream.



THE pasteurizing process as a means for purifying milk for commercial purposes, from germ life of all sorts, is rapidly growing in favor; and as the greater purity and better keeping qualities of these products become more generally recognized the demand for them will increase quickly. The only serious objection raised against these products is that their consistency is reduced when compared with normal milk or cream (they have a more watery appearance). This objection has seriously prejudiced the consumer against these products, especially at the present time when it is on trial in many places.

At the Wisconsin Experiment Station they have been carefully studying for some time on this subject in order to discover the cause, and determine a remedy to overcome this difficulty. Last August