

THE FORMATION OF NITRATES IN THE SOIL.

By A. W. Blair.

Plants take up the greater portion of their nitrogen in the form of nitrates, which are fairly simple substances when compared with the humus from which they are so largely drawn. These nitrates are mostly elaborated in the soil, though sometimes they are supplied directly in the form of nitrate of soda or nitrate of potash. It is important that the farmer should appreciate this, since favorable soil conditions mean the formation of large quantities of nitrates; while unfavorable soil conditions mean not only a decreased production, but may even result in a loss of nitrogen.

How Nitrates Are Formed.

Nitrogen is found in the humus of the soil, and in the animal and vegetable materials used as fertilizers, but it exists in these as complex compounds which are not soluble, and therefore cannot be directly used by plants. These complex substances must be broken up into simpler ones, and the nitrogen must become a part of a compound that is soluble, in order that it may be taken up by plants. This is effected by microscopic organisms called bacteria. They seize upon the organic matter in the soil—dead roots, stems, leaves, grass, stubble, manure, cottonseed meal, dried blood, the remains of animals, etc.—and break it up into simpler compounds, somewhat as if it had passed through a fire. Carbon oxide is given off and ammonia and water are formed. This ammonia is in turn attacked by other bacteria and converted through an intermediate stage, into nitric acid, which unites with a base (if there are sufficient bases present) to form a nitrate. If lime, potash, soda, or magnesia are present, then there may be formed nitrate of lime (or calcium nitrate), sodium nitrate, potassium nitrate, and magnesium nitrate—all of which are soluble in water and can be taken up by plants. Nitrate of soda acts more quickly as a manure than sulphate of ammonia, because the former is taken up more or less directly by the plant, while the latter probably nearly always passes, by bacterial action, indirectly into the nitrate. That sulphate of ammonia is converted into a nitrate is proved by the fact that when it is applied to the soil, there is a rapid increase of nitrates.

Conditions Favoring the Formation of Nitrates.

The following are some of the conditions requisite to the formation of nitrates in the soil: (1) the nitrifying bacteria must be present in sufficient quantities; (2) the temperature must not be below 41 degrees F. nor above 131 degrees F.—the most favorable warmth being 98 or 99 F.; (3) sunlight must be absent; (4) a reasonable supply of moisture is required; (5) there must be free circulation of air; and (6) there must be a base present with which the nitric acid that is formed may unite. In the absence of a base, this nitric acid reacts injuriously on the bacteria.

Nitrates are formed rapidly in sandy loam soils that are well supplied with humus, if other conditions are favorable. They are formed more rapidly and in larger quantities within a few inches of the surface than at a greater depth. A sample of soil taken in a pineapple field just beneath the covering of dead leaves and trash, gave 6.26 parts per million of nitrogen as nitrates, while another sample taken from the same plot including the surface and to the depth of nine inches,

gave 2.28 parts per million. Samples from the same field taken to the depth of 3 to 5 feet gave only about .34 parts per million of nitrates. This may help to explain the value of mulching. The mulch protects the surface layer from the intense light, but still allows a free circulation of air, and thus makes the conditions for bacterial development more favorable. The mulch also helps to retain the moisture and prevent sudden changes of temperature, and this favors the nitrifying organisms.

The mild winter climate which Florida has, is favorable to the formation of nitrates; but the open sandy soil, and heavy summer rains are likely to bring about their loss through leaching. The loss is not so great, however, if there is a crop growing on the land during the rainy season.

CUT WILL BE MADE ON LUMBER AND HIDES.

Washington, March 8.—A cut of one-half in the duties on lumber manufacturers of lumber is understood to be one of the changes provided by the new tariff bill, which is being printed preparatory to its final revision by the Republican members of the House Ways and Means Committee. Another change that has been made, according to information from reliable sources, is that hides have been placed on the free list. There has been much contention over the duties of these two articles, and while none of the members of the committee will verify the correctness of the reports, they are generally accepted by those who have been following the work of the committee.

During the hearings on the lumber schedule the testimony was of such a character as to lead to the impression that lumber would be put on the free list. Such action was known to have much support, it being claimed that the forests of the country could only be conserved by admitting foreign lumber to this country free of duty.

Lumbermen have been working energetically to prevent the placing of lumber on the free list. They contended that the rates of duty should be increased in order that the American industry may compete with Canada.

The effort to obtain free hides is made as often as there is a revision of the tariff. It is principally advocated by the New England shoe and leather manufacturers, and is strongly opposed by the cattle men of the West. While nothing can be learned regarding the action of the tariff farmers in regard to the duties on leather manufacturers, it is said they have been materially reduced.

An impression prevails that the plan is to have the hide and leather schedule fixed in conference after the questions have been thoroughly threshed out on the floor of the House, in the Senate Finance Committee and on the floor of the Senate.

Champ Clark, the minority leader of the House and the ranking Democrat on the Ways and Means Committee, spent considerable time today with Representative Underwood, of Alabama, of the committee, in looking over the tariff hearings and laying out the plan to be followed by the minority in its fight on the floor of the House. While Mr. Clark will make no definite statement until the tariff bill is submitted to the minority members by the Republican sub-committee, it is understood that the policy of the Democrats will be to criticize the Republican bill and offer amendments to it. They will follow a

tariff for revenue rather than a free trade policy.

Although no announcement has been made by the House Committee on Ways and Means regarding any of the schedules of the tentative bill, it has been learned on unquestionable authority that as a concession to the shoe men because of the placing of hides on the free list, the duty on shoes will be considerably reduced. While no figures were obtainable regarding the steel schedule, it was said, on the same authority, that a substantial reduction in the duty on steel rails, tools and similar products is provided for. A duty of 4 cents a pound on coffee is levied. This is by way of compromise with the Porto Ricans, who demanded a tax of 6 cents a pound.

Whiskey and beer will remain as they are at present if the sub-committee recommendations are enacted into law. It was felt that while whiskey was already carrying all the tax it could stand, in the case of beer the prohibition movement throughout the country, it was explained, had cut down the consumption of beer, and it was felt that it would be a hardship to impose any further tax.

It having become manifest to the committee that the duties derived from customs under the new bill would not produce the revenue expected, they turned to the expedient of reviving the war revenue act of 1898, which placed a tax on telegrams, bank checks, playing cards and all stocks bought or sold. That feature of the war revenue act is incorporated in the measure as drafted, it is said.

A matter which still is perplexing the committee is that of placing a tax on inheritances. President Taft wants it, it is declared, and is pressing the committee to take action along that line. Present indications are, it is said, that the committee will yield to the President's wishes.

President Taft is seeking to have a copy of the bill delivered to the Senate Committee on Finance before the special session begins in order that they may begin work on it at once, believing that much time will be saved thus and that the extra session will be materially curtailed.

LIFE.

Life! I know not what thou art,
But know that thou and I must part;
And when, or how, or where we met,
I own to me's a secret yet.
But this I know, when thou art fled
Where'er they lay these limbs, this head,
No clod so valueless shall be
As all that then remains of me.
O whither, whither dost thou fly,
Where bend unseen thy trackless course
And in this strange divorce,
Ah, tell where I must meet this compound
I?

To the vast ocean of empyreal flame
From whence thy essence came
Dost thou thy flight pursue, when freed
From matter's base encumbering weed?
Or dost thou, hid from sight,
Wait, like some spell-bound knight,
Through blank oblivious years the appointed hour
To break thy trance and reassume thy power?
Yet canst thou without thought or feeling be?
O say what are thou when no more thou'rt thee?
Life! We've been long together.
Through pleasant and through cloudy weather;
'Tis hard to part when friends are dear;
Perhaps 'twill cost a sigh, a tear;
Then steal away, give little warning,
Choose thine own time:
Say not good-night, but in some brighter clime

Bib me good morning.
—By Anna Letitia Allen Barbauld; who died March 9, 1825.

—Times-Union.

CONCISE.

"What's the difference between capital and labor?"

"Well, one owns the works and the other works the owners."—Princeton Tiger.

A POOR REMEDY.

"I notice a man who had a cold in his head has committed suicide."

"Poor fellow! Now what fool friend could have advised him to try that remedy?"—Philadelphia Ledger.

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