

THE EFFECT OF NITROGEN FERTILIZATION ON THE HUMIFICATION OF THE PEAT IN CULTIVATED SPHAGNUM BOGS

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Received January 18, 1962

In a previous publication the author has reported his studies on the volume weight of the organic matter in the plough layer of cultivated peat lands (4). The investigation revealed, among other things, that the volume weight of the organic matter in the plough layer was higher in the cultivated fields which had been given fertilizers or soil improving agents than in the unfertilized soils and those without addition of soil improving agents. In connection with cultivation, plant residues and root substances are added to the soil and the peat of cultivated bog areas is therefore less unadulterated than that of uncultivated bogs. It is obvious, however, that the differences in volume weight observed on cultivated bog areas are certainly to a large extent due to changes in the structure of the peat itself. As a fairly strong correlation is known to exist between the volume weight and the degree of humification of peat (1, 5), it is thought justifiable to conclude that both fertilization and soil improvement act in favour of the humification of peat. In the said investigation, inferences concerning the effects of various nutrients could only be made with respect to potassium fertilization, which was found to have an increasing effect on the volume weight of the organic matter in fen peat in the tests at Leteensuu.

As the mobilization of nitrogen is quite minimal in Sphagnum peat, which is the reason why nitrogen fertilization occupies a key position in the cultivation of Sphagnum bogs, for instance, it is to be expected that nitrogen fertilization also has its significance with respect to the activity of micro-organisms and thus to the humification of Sphagnum peat. This question was studied in some detail in connection with a nitrogen fertilization test at Leteensuu, the results of which will be described in the present paper. In the investigation the volume weight of the organic matter in the plough layer was determined in the same manner as in the author's earlier investigation (4). Differences in volume weight have been interpreted as showing also a difference in degree of humification of the peat on the strength of the correlation between the two quantities. The soil samples were taken in the summer of 1960. They were treated in the manner described in a previous publication (3).

Test area and results

The test area was cleared for cultivation in 1921. The peat on the area was poorly humified *Sphagnum fuscum* peat. The test was started in 1923, in which year clay was spread on the field as soil improving agent at the rate of 300 m³ per hectare. The area was limed in the same year (with 4000 kg slaked lime per hectare).

The results from the test up to 1959 have been described before (2). The said publication also contains detailed information on the test. The test was originally a combined nitrogen fertilization and stable manure application test. One of two strips had received stable manure in a quantity of 20 tons per hectare in 1923—24, 30.6 tons per hectare in 1929, 30 tons per hectare in 1930 and 30 tons per hectare in 1933. The same fertilizer treatment was applied to both strips, namely: 0, PK, NPK, 2NPK and 3NPK (N = 15 kg N, P = 40 kg P₂O₅, K = 100 kg K₂O, all per hectare). In 1949 the fertilizing plan was changed so that the strip previously treated with stable manure was given the fertilizations 0, PK, 3NPK, 6NPK and 9NPK, respectively. These artificial fertilizers were given annually except in the year 1948. Calcium nitrate, superphosphate and potassium salt were used. As the objects of the investigations were taken the treatments PK, NPK, 2NPK and 3NPK without stable manure. These treatments have been the same since the beginning of the test.

The volume weight of the peat was determined separately for each replicate. The results were subjected to an analysis of variance.

Volume weight of the ash-free, dry peat in the plough layer found in the different treatments.

Fertilization	Volume weight	Increment
PK	0.262	—
NPK	0.288	+0.026
2NPK	0.288	+0.026
3NPK	0.316	+0.054
	F-value 5.39*	

The results of the investigation presented in the accompanying table reveal that the volume weight of the ash-free, dry peat was higher in the treatments with nitrogen fertilization than in the PK treatment. This seems to justify the conclusion that nitrogen fertilization has been conducive to greater microbial activity and has thus furthered the humification of the peat.

S u m m a r y

The paper is a report on the volume weights of the ash-free, dry peat on the cultivated *Sphagnum* bog at Leteensuu found in connection with different degrees of nitrogen fertilization. The volume weight attained higher values under nitrogen fertilization than in the treatments with mere potassium and phosphate fertilization. As the volume weight of peat also increases with increasing humification, the conclusion was drawn from the results that nitrogen fertilization has favoured the humification of *Sphagnum* peat.

REFERENCES

- (1) KAILA, A. 1956. Determination of the degree of humification in peat samples. Selostus: Turpeen maatumisasteen määrittäminen. Maatal.tiet.aikak. 28: 18—35.
- (2) PESSI, Y. 1960. Fertilization of Sphagnum bogs, on the basis of certain field experiments at Leteensuu. Selostus: Rahkasuon lannoitus eräiden Leteensuon kokeiden perusteella. Ibid. 32: 144—157.
- (3) — 1961. The ash content of the plough layer of peat lands cultivated by different methods. Selostus: Viljeltyjen turvemaiden muokkauskerroksen tuhkapitoisuudesta. Ibid. 33: 215—222.
- (4) — 1961. The volume weight of the organic matter in the plough layer of peat lands cultivated by different methods. Selostus: Viljeltyjen turvemaiden muokkauskerroksen orgaanisen aineen tilavuuspainosta. Ibid. 33: 248—255.
- (5) PJATVTSHENKO, H. 1958. Turpeen maatumisasteen määrittely (Finnish translation).

TYPPILANNOITUKSEN VAIKUTUKSESTA RAHKATURPEEN HUMIFIOITUMISEEN

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Tutkimuksessa on selostettu Leteensuon rahkasuoviljelyksen muokkauskerroksen tuh kattoman ja kuivan turpeen tilavuuspainoja eri suuristen salpietarilannoitusten yhteydessä. Kun salpietarilannoitus on annettu vuosittain lähes neljänkymmenen vuoden ajan fosfori- ja kalilannoituksen lisäksi, on muokkauskerroksen turpeen tilavuuspaino muodostunut suuremmaksi kuin pelkän fosfori- ja kalilannoituksen johdosta. Kun turpeen tilavuuspaino suurenee turpeen maatuessa, tehtiin tulosten perusteella päätelmä, että typpilannoitus edistää rahkaturpeen humifioitumista.