Relationship between mire peat and its plants

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Introduction

We did fieldwork at 6 research locations across different sites in the mire of Sammuli on the shore of Lake Viljandi and studied the relationship between the mire peat and its plants
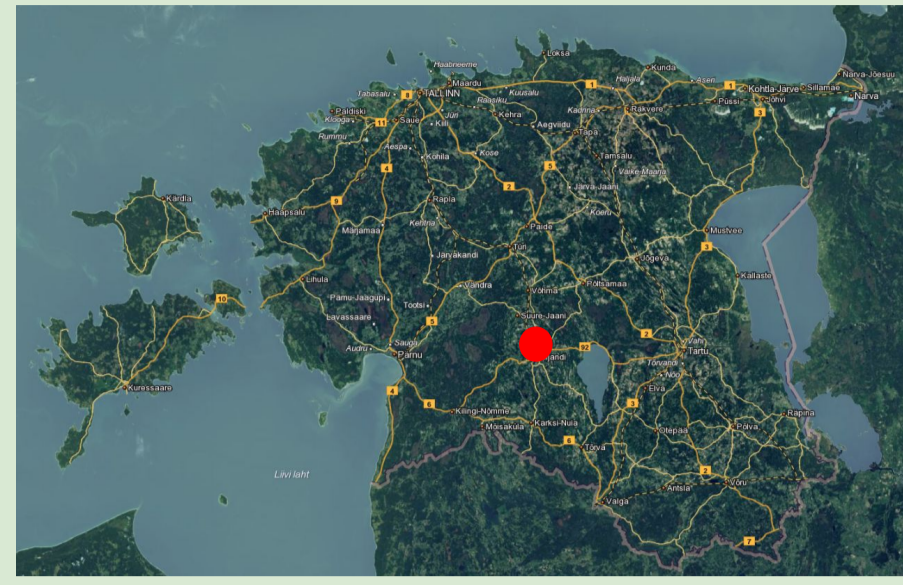

Figure 1. Study site location.

The purpose of the project

We were really interested in what species can grow in the mire, and if and how different soil indicators affect the plants and vice versa.

Research questions

- Does the mire pH depend on the plants growing there?
- How does the soil affect plants in the mire?

Hypotheses

- Bog peat pH depends on the plant species present in the mire.
- In unfavourable environmental conditions, specialist plant species grow, whereas in favourable conditions, generalist plant species grow.

Research locations

We had 6 different research locations.
- The first, third and fourth research locations were mires.
- The second location was on the shore of the lake.
- The fifth location was a ridge between former peat extraction pits.
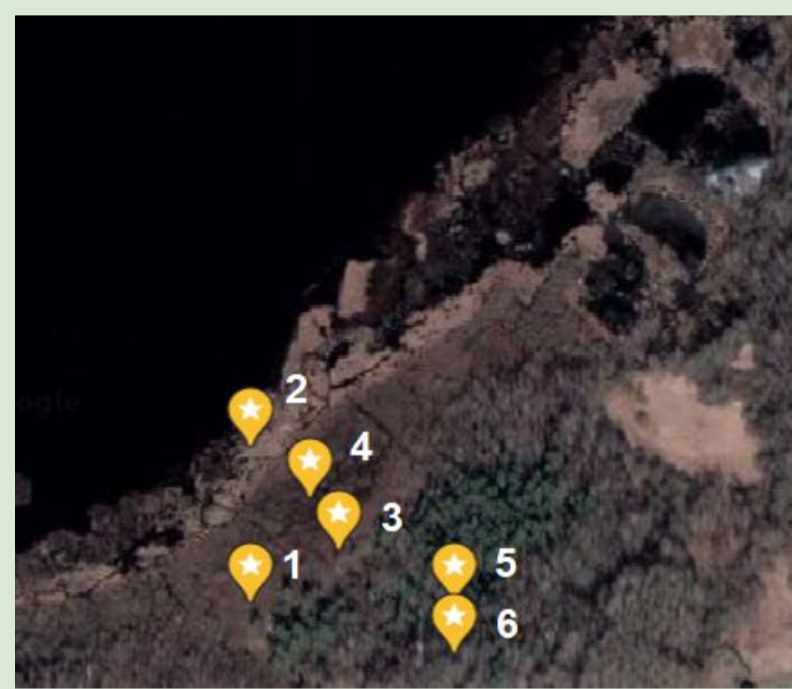- The sixth location was a former peat extraction pit.

Figure 2. Research locations.

Methods

- Fieldwork at Sammuli Bog on the 12th of August 2020.
- We identified all the plant species using identification handbooks and internet and also found the cover percentage.
- We took soil samples and measured different indicators (soil pH level, oxygen level, electric conductivity and water level).

Figure 3. Measuring the pH of the soil.

Data analyses

We divided the identified plant species into generalists (wide habitat) and specialists (narrow habitat) by using a field guide by Kukk (2020). Generalists are plants that are able to thrive in a wide variety of environmental conditions and specialists are plants that can thrive only in a narrow range of environmental conditions.

We also determined the most common plant species in each research location and the location with the highest total plant coverage.
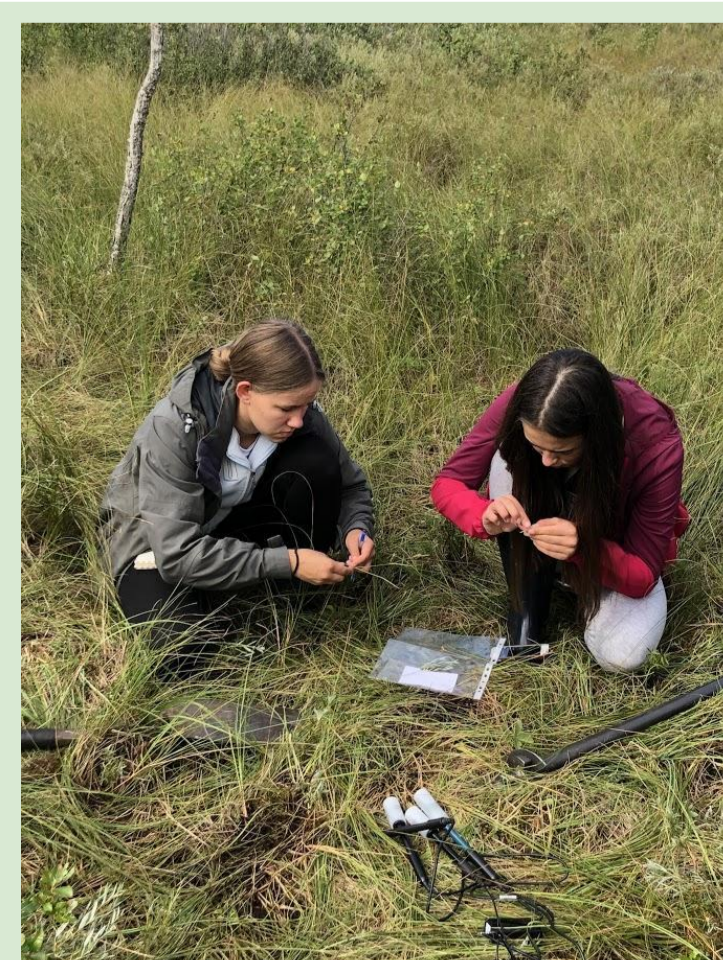

Figure 4. Identifying plants from the research location.

Results

research location	1	2	3	4	5	6
pH	6,45	7,2	6,4	6,25	6,87	5
oxygen, mg/l	0,9	1,9	1	1,2	4,7	5,6
electric conductivity, microS/cm	272	285	296	288	291	267
water level, cm	-2,5	3	-2,5	-3	-96	100

Figure 5. Measured soil indicators from the research locations.

The indicators in research locations 1-5 were similar and pretty generic. The fifth research location had a bit higher oxygen level. The sixth research location was the most different from others, it had much lower pH and the water level was very high.

We found the most common plant species in each research location.
- We identified location 1 as a transitional mire. The most common plant species were Pleurozium schreberi and Salix phylicifolia.
- Location 2 was a quagmire and the most common plant species were Salix phylicifolia and Carex pseudocyperus.
- Location 3 was a transitional mire and the most common plant species was Carex panicea.
- Location 4 was a transitional mire and the most common plant species were Carex panicea and Scorpidium scorpioides.
- Location 5 was a drained peatland forest with Pleurozium schreberi and Picea abies as the most common plant species.
- Location 6 was a eutrophic pond with Calliergonella cuspidata as the most common plant species.
- The research location with the most variety in plant species and the highest total plant coverage was research location 2.

In all research locations the peat pH was between 5.0 and 7.2 while the peat was made of similar plants - mosses and sedges.
In research location 5 (favourable bog environment) the oxygen level was high, pH close to neutral and water level was low (-96 cm). The plants that grew there were generalists dominated by Picea abies and Pleurozium schreberi.

In unfavourable bog environments the oxygen levels were low (0.9-1.2 mg/L) and the water levels were close to the ground. The plants that grew there were specialists dominated by Calliergonella cuspidata and Scorpidium scorpioides mosses, Calla palustris, Carex sedges and Salix rosmarinifolia dwarf bushes.

Conclusions

- The bog peat pH does not depend on the plant species present there.
- If the environmental conditions in the mire are unfavourable, more specialist plants grow that are more capable of surviving in the demanding environment.
- Where the environmental conditions are favourable there are many generalist plants because they have the necessary nutrients.

References

Kukk, T. Eesti taimede kukeaabits. Kirjastus Varrak, 2020. 416 pp.
Masing, V. Ökoloogialeksikon. Tln.: Eesti Entsüklopeediakirjastus, 1992. 320 pp.