Assessment of the change in the phenological characteristics of the postpyrogenic bog

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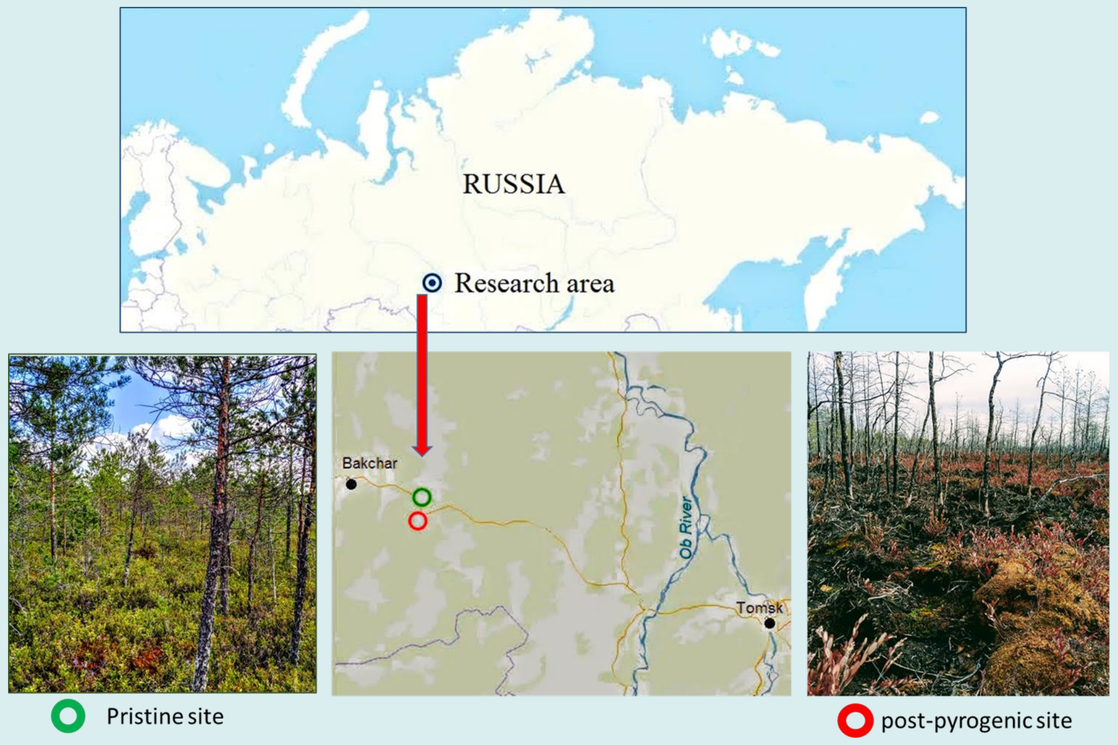
Relevance

Fires in raised bogs transform biogeocenoses as a result of burning out of vegetation and the upper layer of peat deposits.

Purpose

The purpose of this work is also to assess the changes in the phenological characteristics of the post-pyrogenic bog, in comparison with the pristine one.

Before the fire, the vegetation of the studied areas of the bogs was similar and represented a pine-shrub-sphagnum plant community.



The fire occurred in 2016. As a result of the fire, trees died, the above-ground part of the grass-shrub layer and most of the moss cover burned out.

Methods

A study was conducted at two sites in the period from 2017 to 2021 using the method of complex phenological characteristics. In the process of field work, the phenological phases of the main species (*Chamaedaphne calyculata, Andromeda polifolia, Rhododendron tomentosum, Vaccinium uliginosum, Eriophorum vaginatum,* and *Rubus chamaemorus*) were noted, the timing and depth of freezing, temperature the top layer of the peat deposit. The significance of the difference between the samples was determined using the Mann-Whitney test, the degree of correlation was estimated using the Spearman correlation coefficient.

Results

In 2017 and 2018, all species vegetated on the post-pyrogenic site, regrowth from preserved underground shoots was observed. By July 2018, the projective cover of the arboreal layer was less than 5%, the herbaceous-shrub layer was 30%, and the moss layer was 10%.

In September, 2020 a later onset of autumn seasonal phenomena was noted in the post-pyrogenic bog, which correlated with the temperature of the peat deposit.

In 2019, flowering and fruiting of all the studied species began, spots of *Sphagnum fuscum* appeared under the canopy of *Polytrichum strictum*. The projective cover of the tree layer increased up to 5%, grass-dwarf shrub up to 40%, moss up to 20%. In 2020, the first shoots of pine appeared, the projective cover of the moss layer reached 30%.

In 2021, the projective cover of the tree layer reached 5%, the moss layer 45%, and the herb-shrub layer became 40%. The depth of freezing in the first years was greater in the post-pyrogenic area (U test, $p < 0.05$), but the difference decreases every year.

From April to June 2019 and 2020, the maximum differences (U test, $p < 0.05$) in the timing of the onset of the generative phase were noted (earlier in the post-pyrogenic bog). Despite the deeper freezing in March, the peat in the post-pyrogenic bog warms up faster, and therefore flowering is observed earlier than in the pristine bog.

In 2021, differences in the timing of the onset of phenophases and the temperature of the peat deposit in the post-pyrogenic and natural areas persisted, but became unreliable.

Conclusions:

In the first 5 years after the fire, in comparison with the undisturbed one, the following was noted in the post-pyrogenic bog:

- lengthening of the growing season;
- earlier onset of the generative phase in all studied species due to better heating of the upper part of the peat deposit.