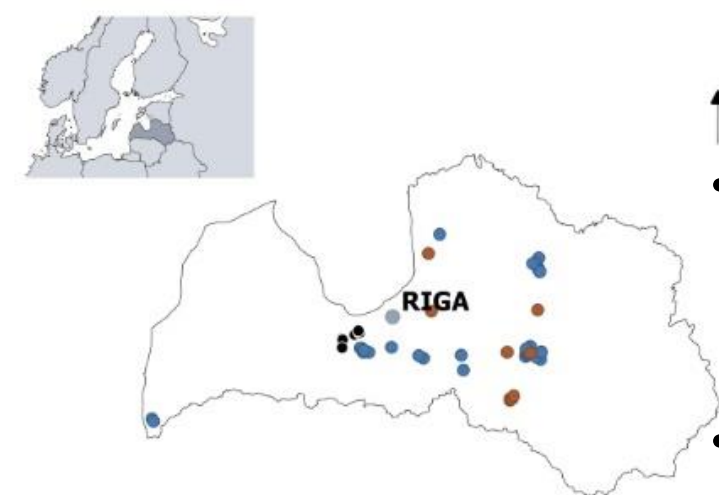


Introduction

Forest soil is one of the terrestrial carbon pools, and changes in forest management practices can affect the carbon stock in forest soil. Forest soil fertilization can improve the growth of trees and reduce deficiency of nutrients. The topicality of this study is based on necessity to increase CO₂ removals in forest ecosystem and considerable short- and long-term GHG mitigation potential of forest fertilization in hemi-boreal forest stands.

The **objective** of the study is to estimate temporal fertilization impact on soil organic carbon stock.

Study area



- 63 research objects
- Tree species: Norway spruce, Scots pine and birch
- Fertilizers: wood ash (WA), ammonium nitrate (N), combined fertilizer (WAN)
- Soil: dry mineral soil, wet mineral soil, drained mineral soil and drained organic soil

Methods

The organic carbon (C_{ORG}) stock was calculated according to the equation:

$$CS = \frac{SBD \times H \times (100\% - P_{2mm})}{100 (cm)} \times \frac{SOC}{1000}, \text{ where:}$$

CS - content of C_{ORG} in 1 ha of the soil/O horizon (t C_{ORG} ha⁻¹), **SOC** - C_{ORG} content (g kg⁻¹), **SBD** - bulk density (kg m⁻³), **H** - thickness of a soil/O horizon layer (cm), **P_{2mm}** - volume of the fraction of > 2 mm particles in the sample (%).

Results

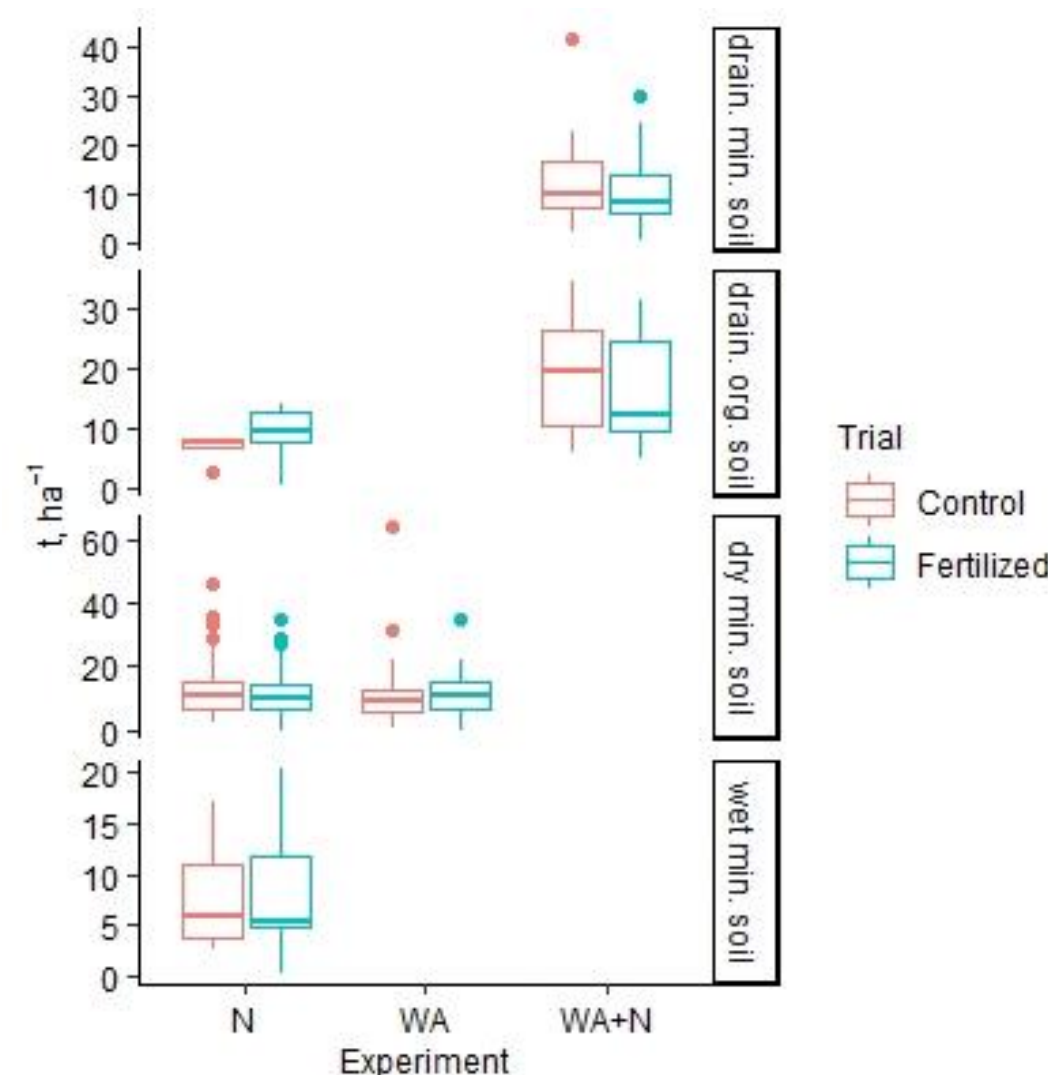


Fig. 1. The average C_{ORG} stock in O horizon

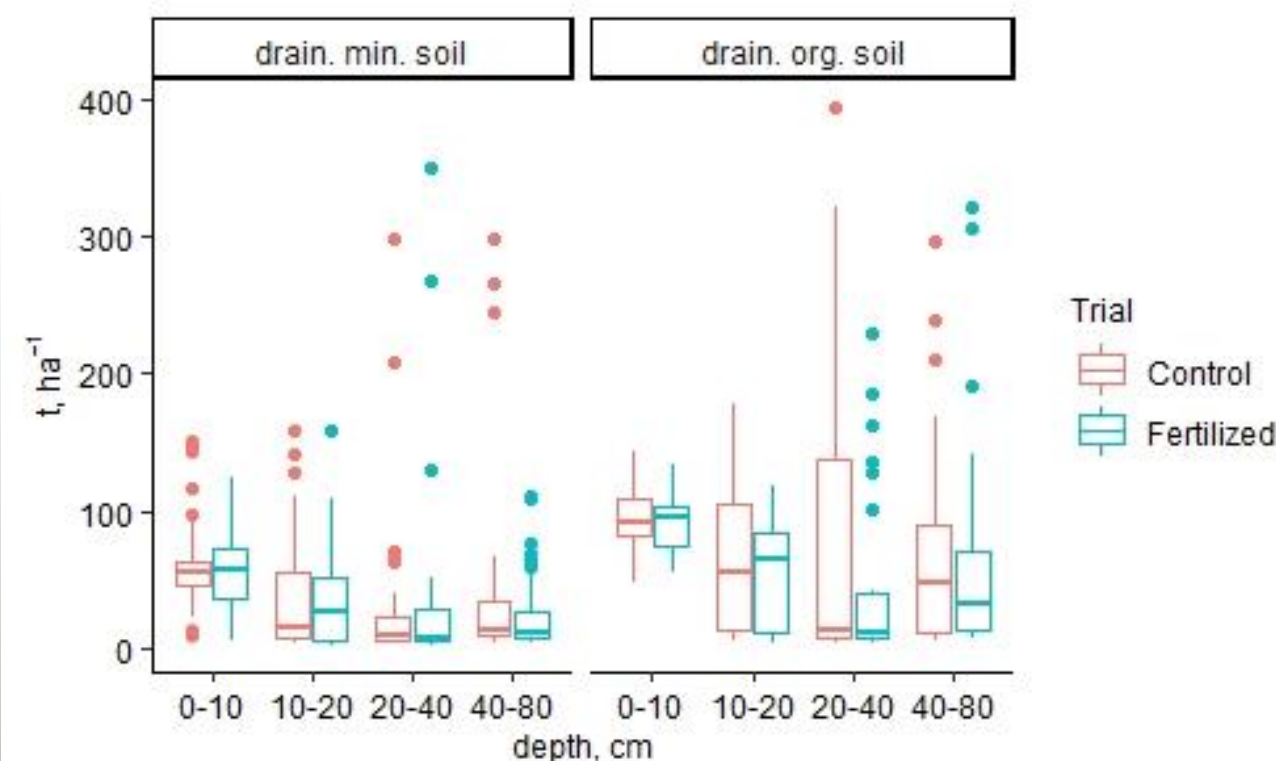


Fig. 3. The average C_{ORG} stock in soil horizons at WAN experiment objects

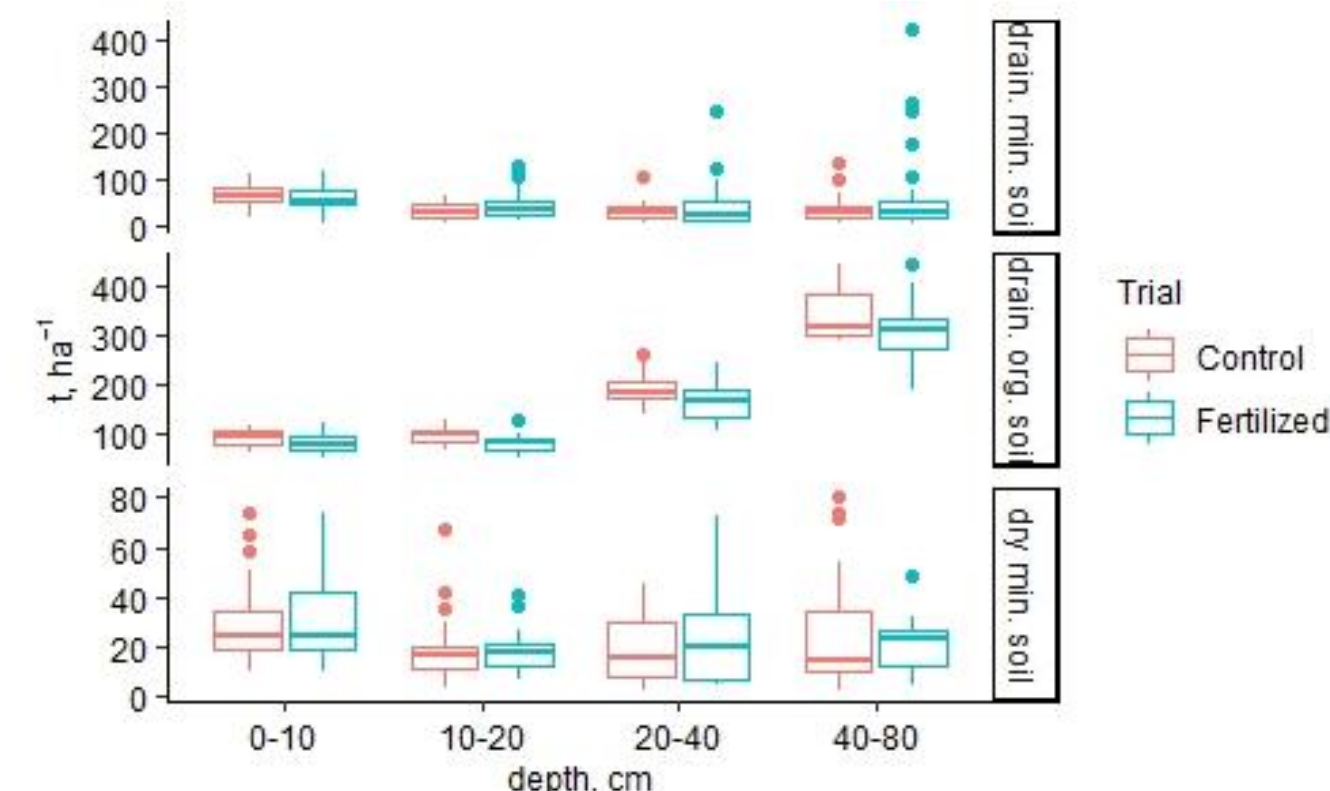


Fig. 2. The average C_{ORG} stock in soil horizons at WA experiment objects

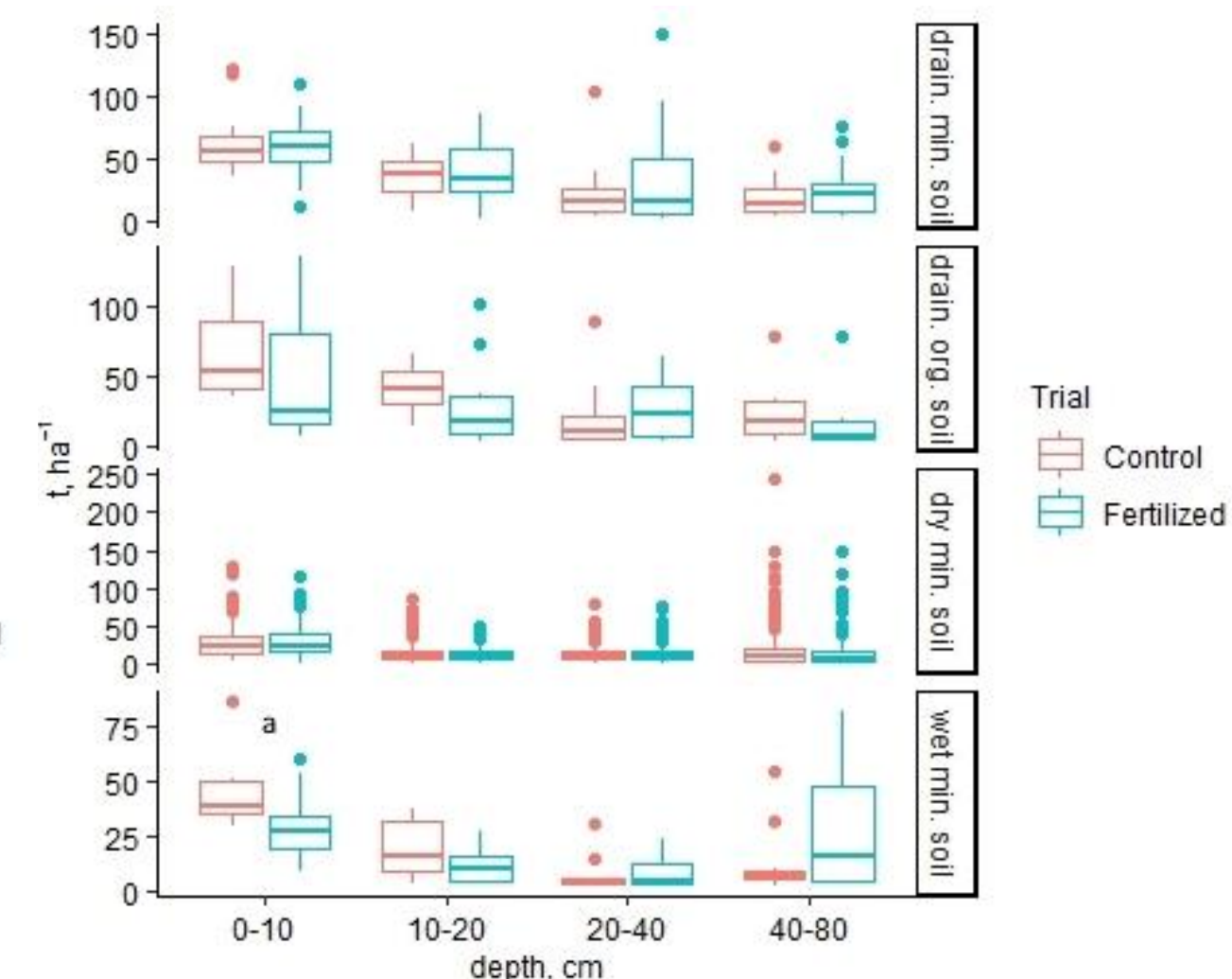


Fig. 4. The average C_{ORG} stock in soil horizons at WAN experiment objects (^a p < 0.05)

Conclusions

1. No significant trends were found in average carbon stock in O horizon among experimental groups or different growth conditions.
2. A statistically significant difference between control and fertilized plots was found in upper soil layers of birch stands with wet mineral soil, indicating a possible impact of ammonium nitrate on mineralization of organic matter.
3. On average, forest fertilization with wood ash and/or ammonium nitrate does not have a significant impact on C_{ORG} stock in mineral soil 2-5 years after the fertilization.

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