Influnce of windbreak development on selected soil properties

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Introduction

Windbreaks (protective anti-erosion forest strips formed by rows of trees and/or bushes) are an important group of linear elements in agricultural ecosystems. They play a vital role in improving landscape stability (Burel 1996), protecting soil from erosion and creating local microclimate islands with improved air and soil temperature, humidity and evapo-transpiration conditions (Litschmann and Rožnovský, 2005; Podhrázská et al., 2008). The aim of this project was to record and compare selected soil properties at two windbreak systems, one new and one long-established, and thereby highlight the importance of different vegetation elements in the landscape.

Methodology

The two study are situated in south Morava (Czech Republic), the first being an 80-year-old windbreak, east of the town of Břeclav, and the second a three-year-old newly-established forest vegetation belt south of Vyškov (Figs. 1, 2). These field studies build on previous laboratory-based analyses addressing the impact of vegetation elements in the countryside.

Figure 1 - Map of areas of interest.

Figure 2 - Newly established forest vegetation belt near Vyškov.

Soil samples were collected in the spring of 2022 from a depth of 0-10 and 20-30 cm inside and outside the windbreak in four transects, with three of the transects comprising six sampling points and one transect two sampling points. At each site, physical and hydrophysical soil parameters were determined for 40 intact soil samples. In addition, 40 broken soil samples were taken, which were then dried, sifted through a 2 mm sieve and used to determine soil pH. Other parameters examined included soil volume and specific gravity, porosity and selected hydrolimits (RVK and BV), proportion of organic matter, soil texture and the carbon/nitrogen ratio (C/N).

Figure 3 – Degraded chernosol, location windbreak.

Results

Tukey tests indicated significant differences in N content at 0-10 cm differed at sites inside and outside the wind-breaks, as did N and C content at 0-10 cm outside the wind-break and 20-30 cm inside the windbreak. Neither C nor N content was found to be signifi-cant for NFV at any depth.
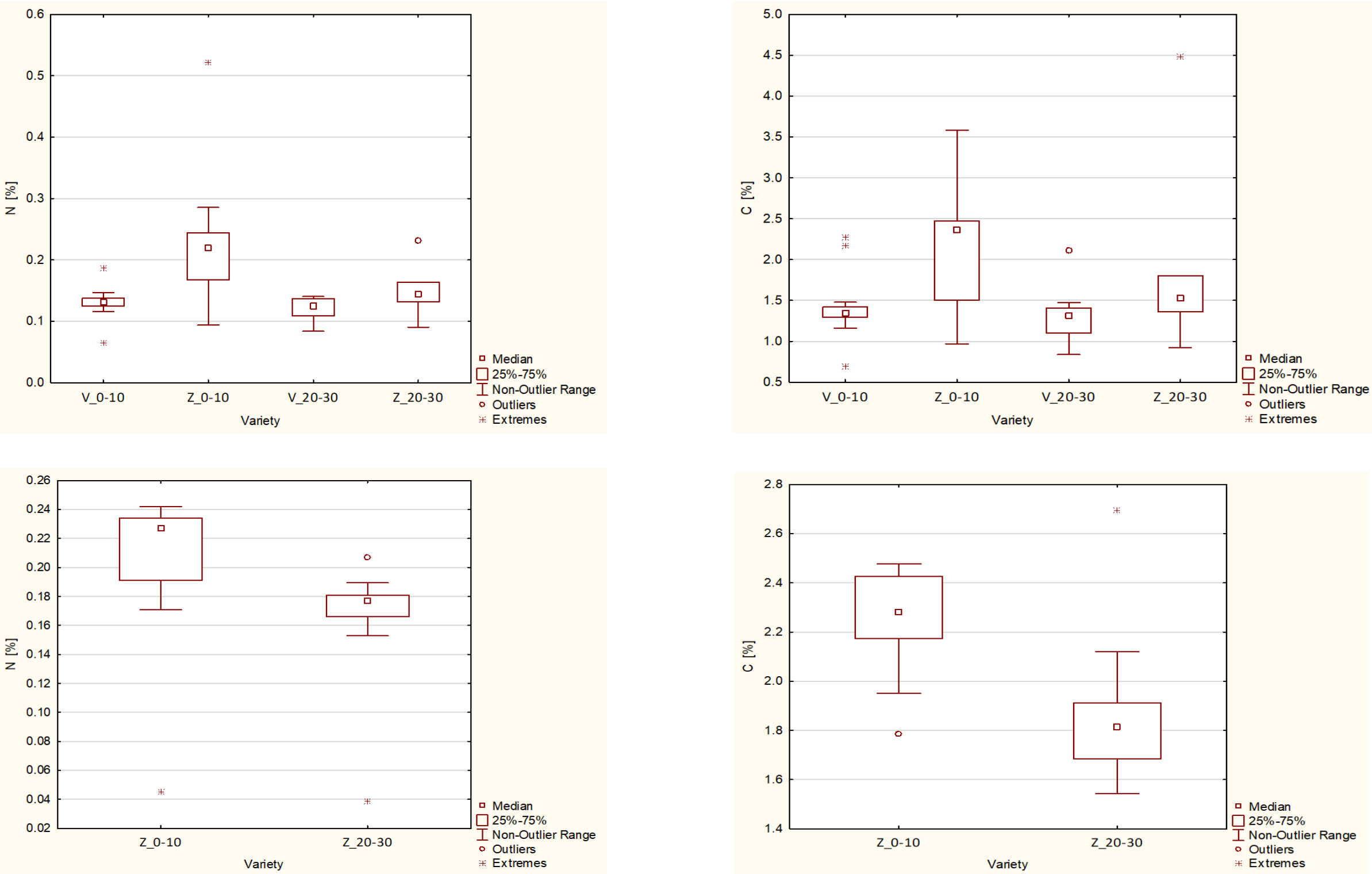

Figure 4. C/N content at 0-10 and 20-30 cm. V = in windbreak; Z = outside windbreak
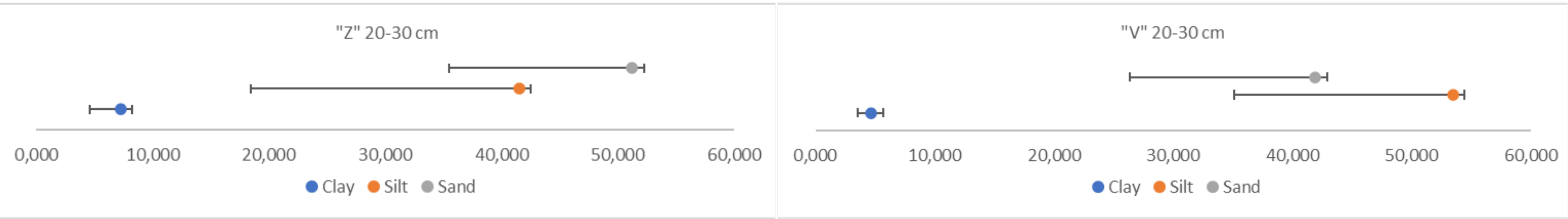

Figure 5 - soil grain size at 0-10 a 20-30 cm at the old windbreak locality

Preliminary results for soil grain size indicate that the mean representation of clay, silt and sand fractions at 0-10 cm were similar inside and outside the sites. However, the variation (range) for sand at 20-30 cm differed noticeably between habitats, sand having a greater range than silt at 20-30 cm outside the windbreak, and the silt fraction having a wider range at 20-30 cm inside (Fig. 5). Further quantification for the other soil analysis parameters will be completed after repeat measurements, which will take place by the end of 2022.

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