SOIL COMPACTION AND VEGETATION COVER IN A SCOTS PINE STAND AT THE MEDITERRANEAN RANGELANDS

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Introduction

Right development of ROOT SYSTEMS is essential to ensure seedling survival in the initial stages of natural regeneration processes.

Soil compaction determines this development both because of its influence on soil TV & moisture dynamics and for its direct effect on soil mechanical impedance to root growth.

All these effects can be assessed as a whole through soil penetration resistance (Soil Strength) measurements.

SOIL STRENGTH has been usually evaluated in forest research in connection with severe disturbances derived from heavy machinery works during forest operations. Nevertheless, undisturbed soils are also expected to show different levels of compaction for root development.

Organic matter modifies soil structure and so on porosity, compaction and resultant soil resistance to penetration. Its concentration in surface layers is rather related to vegetation cover composition and density.

So within forest stands, a relationship is expected to be found between VEGETATION COVER density and compaction measured as resistance to penetration (soil strength).

Methodology

SITE DESCRIPTION

Private State “Monte Cabeza de Hierro” (Rascacielos, Madrid, Spain). Total area of 2.036 ha with over 1850 ha settled by a Scots pine (Pinus sylvestris) stand in an uneven-aged structure in most of the management units. Under the main stratum (pinewood), specially in the lowest parts of the hills, a layer of oak (Quercus pyrenaica) is common and abundant. Frequent shrubland presence in gaps (Genista spp.; Cylistis spp.; Pheladum aquilinum...). First Forest Management Plan in 1957, nowadays planning based on floating periodic block method and shelterwood regeneration system.

Results

- SOIL STRENGTH VALUES increase significantly with depth between 0 and 20 cm.
- STAND DENSITY INDEX (both Basal Area and GAP Fraction) show significant linear correlation with Soil Resistance to Penetration (RP)

Regarding small size cover, only %GRASS COVER and THICKNESS OF [O+A] HORIZONS seems to significantly correlate to RP.

Pearson Correlation Coefficient absolute values tend to be low due to the multifactoriality of the studied process.

In general, observed tendencies show inverse correlation between vegetation density and RP.

DENSOVEGETATION COVER ⇒ LOWER SOIL STRENGTH

Only %Grass cover shows the opposite tendency:
HIGHER %GRASS COVER ⇒ HIGHER SOIL STRENGTH

This is probably due to the effect of the peculiarities of the radical systems of this plant formation.

Conclusions

Vegetation cover density significantly affects soil compaction measured as resistance to penetration (soil strength)