# The Impact of Over-grazing on woody vegetation characteristics in Sub-zone of Ostryo - Carpinion

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## Introduction

The present work deals with the impact of overgrazing in degraded ecosystems in sub-zone of Ostryo-carpinion in Greece. The objectives of the research are:

1. The impact of over-grazing on silvicultural characteristics of woody species,
2. The research on differences between diversity, abundance-cover and density of vegetation among the overgrazed and protected sites.

## Materials and Methods

The research area is divided into two divisions. The first one, named *protected*, which is protected from grazing and the second one, named *over-grazed*, where the impact from overgrazing is obvious. Each of them was divided into three belts: upper slope (800 – 980 m), middle slope (600 – 800 m) and foot slope (400 – 600 m). For each of the investigated belt three sample plots were selected, of dimensions 10X10 m representatives of the area. Silvicultural characteristics of woody species, such as total height (H, m), diameter (at breast height DBH, cm) for trees (height > 3 m), root collar diameter (D, cm) for shrubs (height <3 m), and crown length (L, m) were measured. For the complete imprinting of woody vegetation were also created two profiles, with dimensions 10X30 m. Additionally, for woody species there were recorded the number of the species (richness), the number of individuals of each species (density) and the abundance cover in order to obtain a clear perspective of the vegetation and to estimate and compare the Shannon-Wiener index (H) in the three belts.

For statistical data analysis and comparisons of the average characteristics of forest vegetation, applied the t-test (one-way ANOVA).

## Results

**Table 1.** Silvicultural characteristics of woody vegetation and *Q. coccifera* (dominant species)

| | Total Height (m) | | | Diameter (cm) | | |
|---|---|---|---|---|---|---|
| Storey | Pd | Od | pv | Pd | Od | pv |
| Trees | 4,18 (0,07)* | 3,51 (0,09) | 0,0005 | 11,00 (0,32) | 9,34 (0,37) | 0,02 |
| Shrubs | 1,93 (0,20) | 1,45 (0,05) | 0,02 | 4,36 (0,18) | 3,60 (0,12) | 0,0005 |
| *Q. coccifera* | | | | | | |
| Arborescent form | 4,14 (0,08) | 3,47 (0,10) | 0,0005 | 11,91 (0,31) | 9,46 (0,35) | 0,005 |
| Shrubby form | 1,81 (0,06) | 1,46 (0,05) | 0,0005 | 6,40 (0,28) | 4,00 (0,16) | 0,0005 |

**Table 2**. Species richness and density/ storey

| | Richness | | | Density | | |
|---|---|---|---|---|---|---|
| Storey | Pd | Od | pv | Pd | Od | pv |
| Trees | 2,44 (0,44)* | 1,00 (0,37) | 0,024 | 14,88 (2,20) | 3,44 (1,21) | 0,005 |
| Shrubs | 4,66 (0,40) | 4,33 (0,37) | ns | 38,44 (3,69) | 34,66 (6,29) | ns |

**Table 3.** Species richness and density, per belt

| | Richness | | Density | |
|---|---|---|---|---|
| Belt | Pd | Od | Pd | Od |
| Upper slope | 6,66 (2,80)* | 6,33 (0,33) a | 41,66 (6,48) a | 27,66 (12,71) |
| Middle slope | 8,88 (0,88) | 5,33 (0,33) a | 56,66 (4,37) a | 32,00 (5,50) |
| Foot slope | 6,66 (0,88) | 4,00 (0,57) b | 65,00 (1,52) b | 54,33 (4,66) |

**Table 4.** Abundance -cover in Protected (Pd) and Over-grazed division (Od).

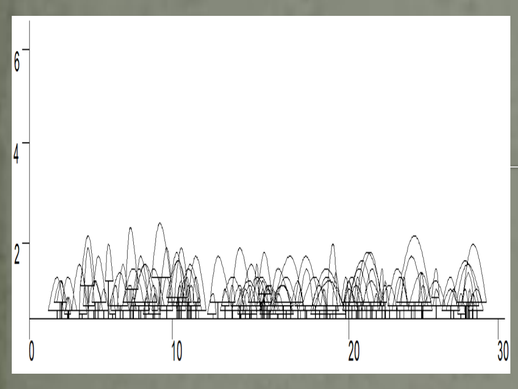
| | Vegetation cover (%) | | |
|---|---|---|---|
| Storey | Pd | Od | pv |
| Trees | 44,44 (6,94)* | 15,83 (5,78) | 0,006 |
| Shrubs | 54,54 (7,01) | 30,00 (3,75) | 0,007 |

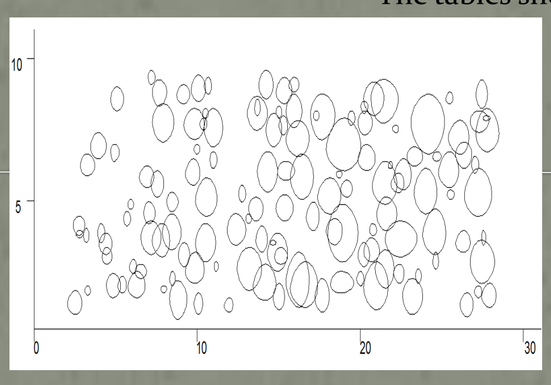
**Table 5.** Shannon-Wiener Index, per slope belt

| | Shannon – Wiener Index | | | | | |
|---|---|---|---|---|---|---|
| | Upper slope | | Middle slope | | Foot slope | |
| | Shrubs | Trees | Shrubs | Trees | Shrubs | Trees |
| Pd | 1,37 | 0.83 | 1,4 | 1.09 | 1,72 | 0.74 |
| Od | 1,72 | 0.72 | 1,32 | 0.26 | 0,81 | 0 |

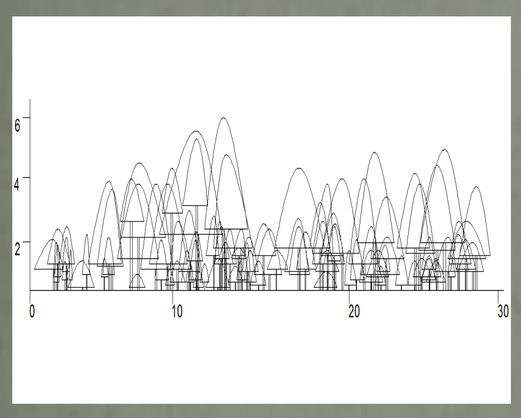
The tables shows the means and their standard errors

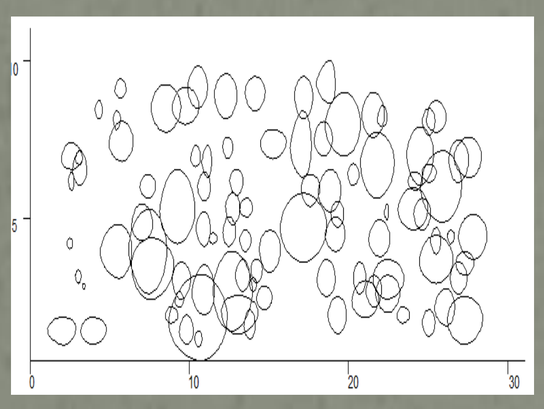
Where Pd: Protected and Od: Over-grazed division





Profile (vertical and horizontal) of vegetation in Over-grazed division.



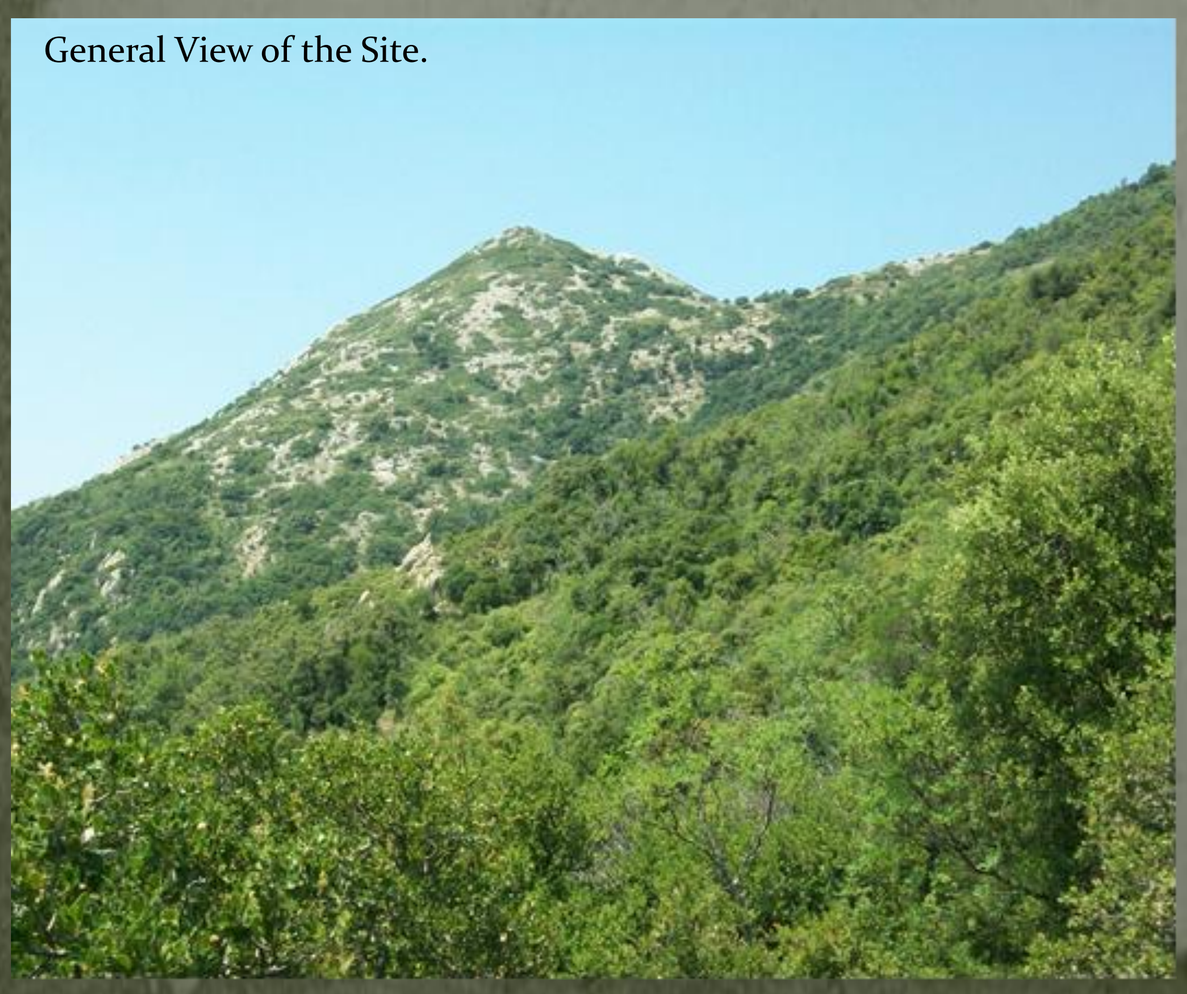


Profile (vertical and horizontal) of vegetation in Protected division.

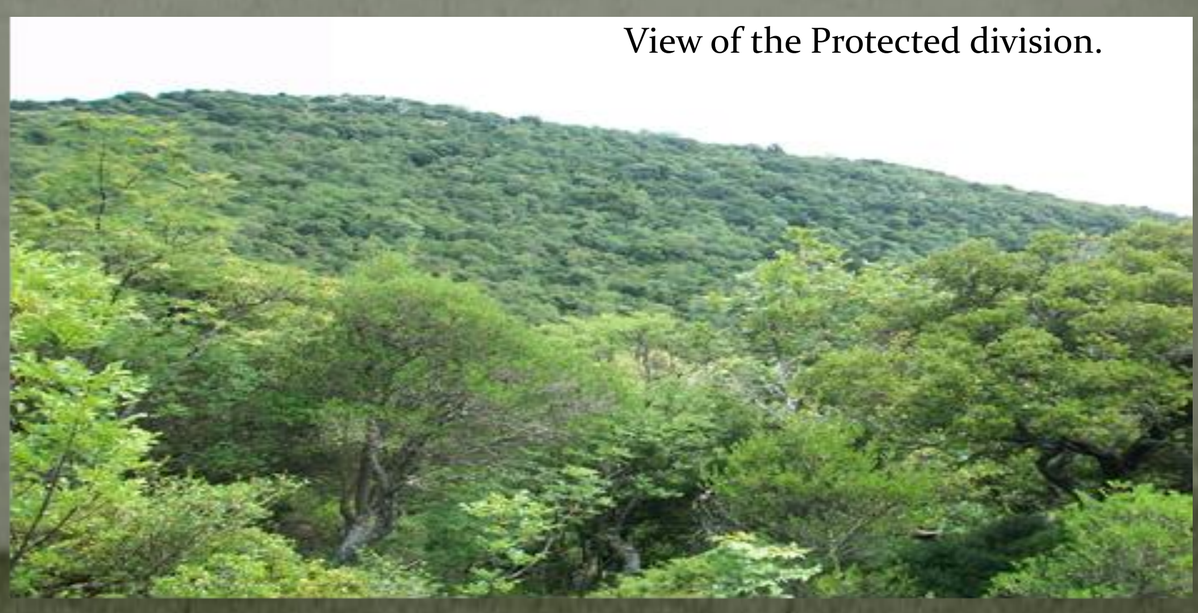
View of the Over-grazed division.

## Conclusions

- The over-grazed areas differ in silvicultural and vegetation characteristics. That leads the ecosystem to a regressive succession. The research showed that both height and diameter of individuals differ significantly in both divisions, as over-grazing pressure prevents plants growth in height and diameter.
- In the tree storey of the protected division it has been found a greater richness, density, abundance –cover, while in shrub storey there were not found any significant differences between the two divisions.
- The Shannon - Wiener index, is higher in the protected division than the over-grazed division because of a number of the species is preferred by most animals and thus their proportion in the vegetation composition is reduced in the over-grazed division.
- Finally, the slope position (belt) is a factor that affects richness, density, abundance–cover and diversity as there been found significant differences between the upper and middle slope and foot slope in both divisions.



General View of the Site.



View of the Protected division.