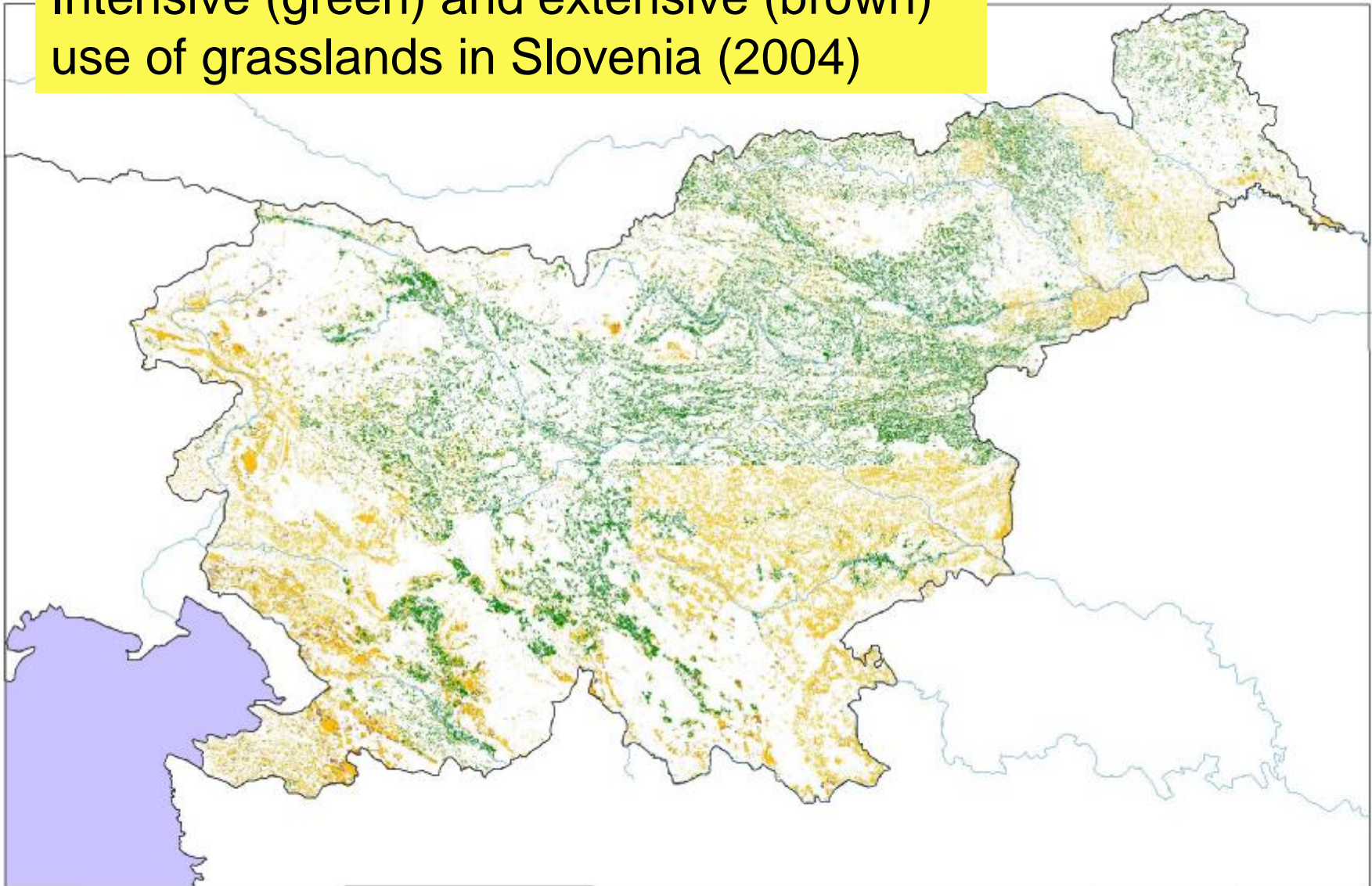


# **Vegetation and soil characteristics of Karst pastures grazed by sheep**

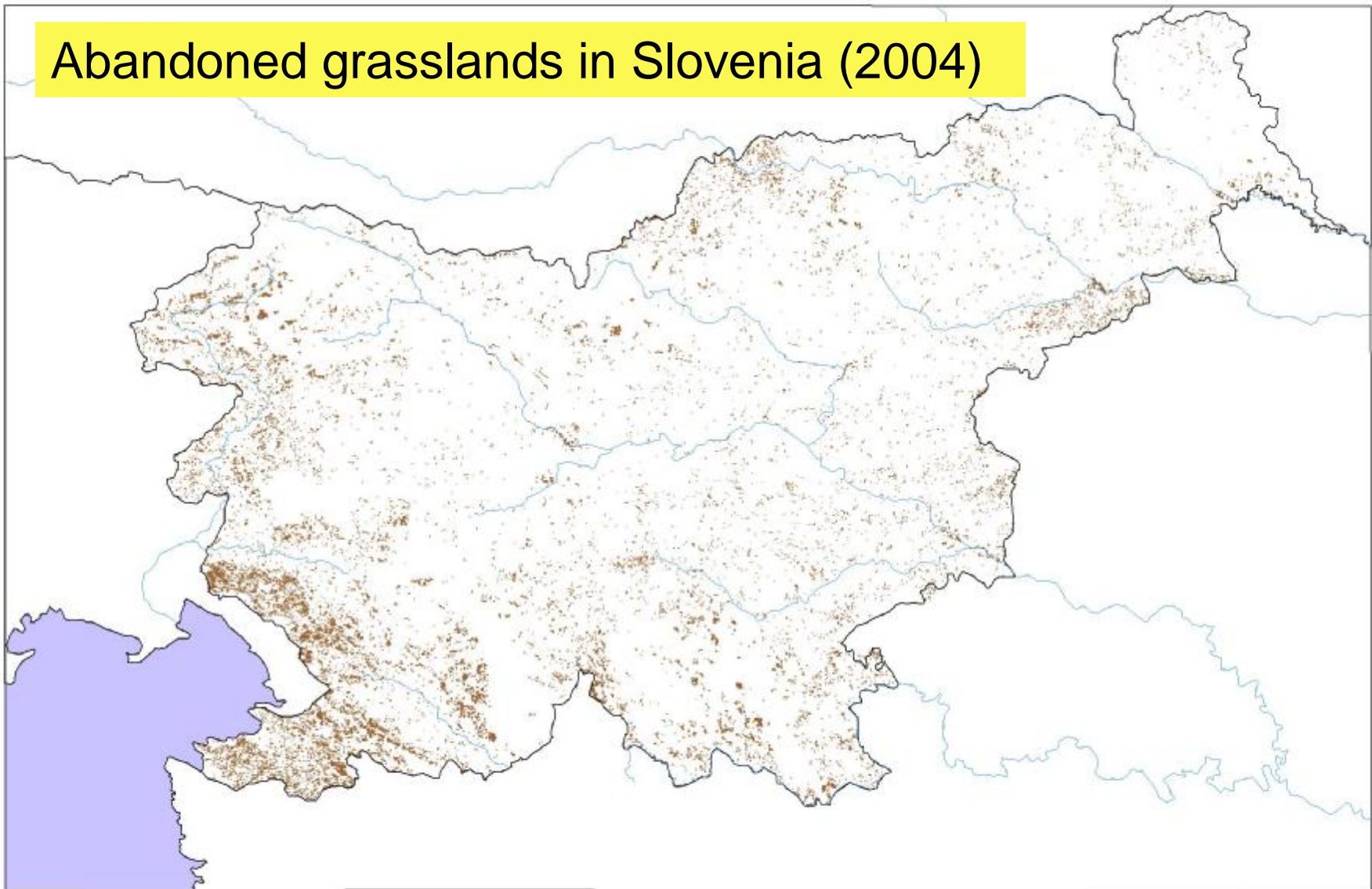
***Vidrih M., Batic F., Prus T., Eler K.***

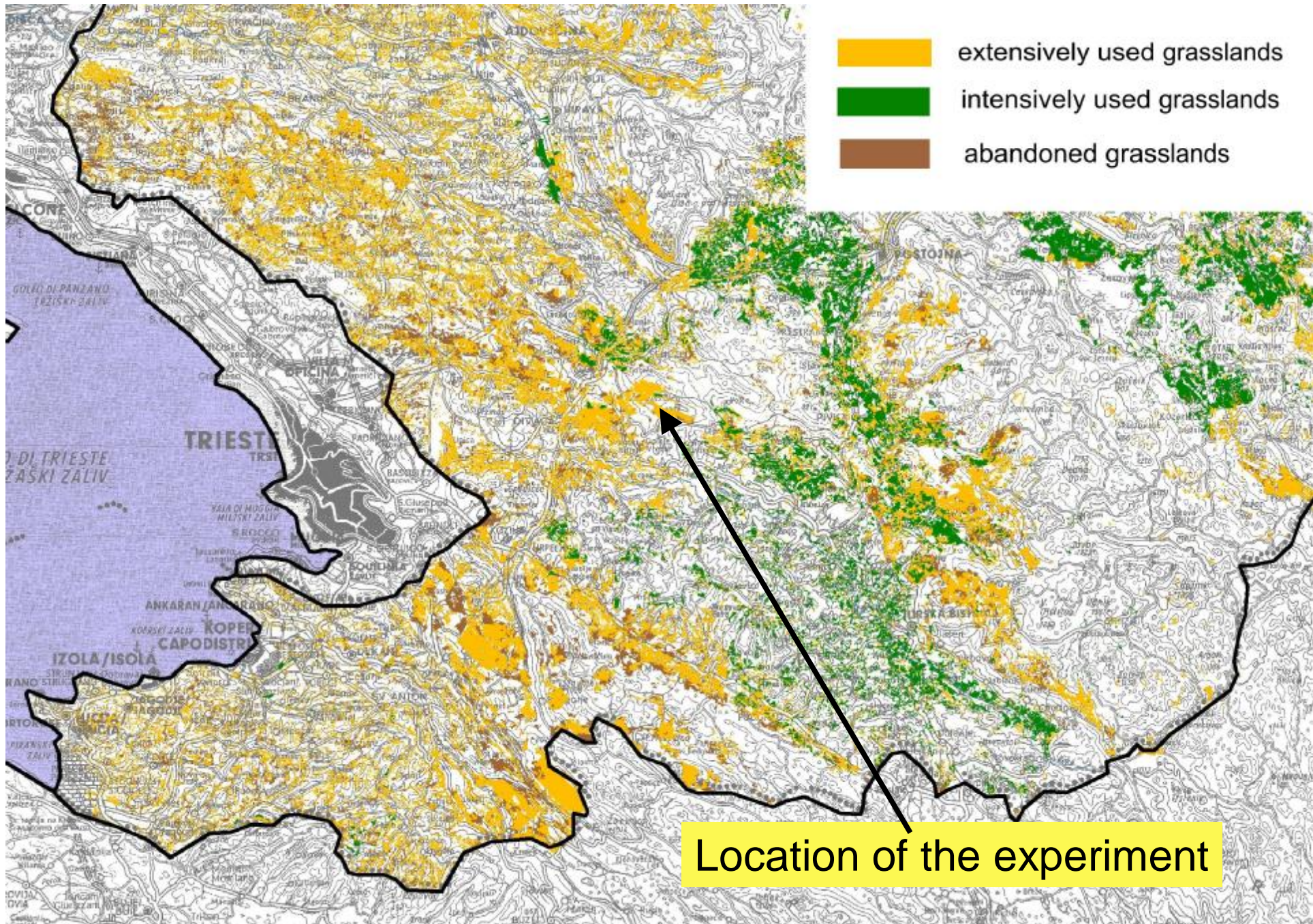
University of Ljubljana, Biotechnical faculty, Agronomy department

Intensive (green) and extensive (brown)  
use of grasslands in Slovenia (2004)



## Abandoned grasslands in Slovenia (2004)





# 1. INTRODUCTION

## Characteristics of Dinaric karst in Slovenia

Phytosociological surveys of karst grassland are very sparse because:

- of its large heterogeneity;
- this land never played any great role in national economy.



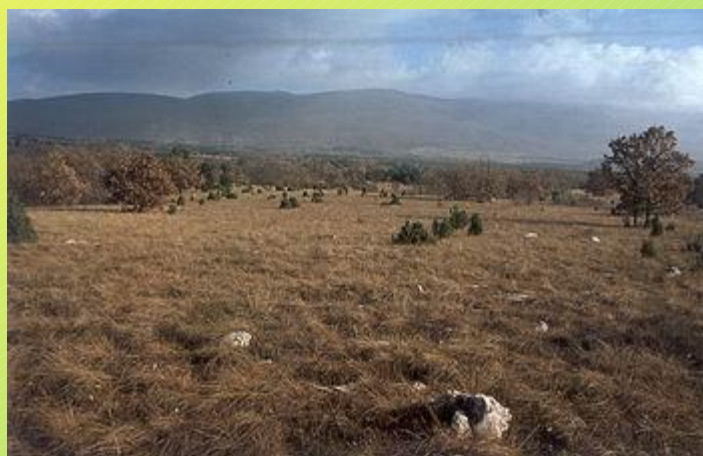
High number of grass associations were found because of great variability in:

- soil depth;
- water holding capacity;
- surface exposition;
- inclination.

Meadows at elevation between 300 m and 1000 m are mainly covered with ass. *Carici (humulis) - Centaureetum rupestris* Ht.

Natura 2000 code = 62A0

Physis code = 34.75



The sward is dense, very reach from floristic point of view and with higher yield potential than the other swards with same association.

| Grassland type                     | Grassland classification     | Characteristic plant species   | Soil characteristics  | Risk for grassland ecosystem                                      | Traditional land use                    | Proposed alternative land-use systems   |
|------------------------------------|------------------------------|--|---|---|---|---|
| .....                              |                              |  |   |   |   |   |
| Submediterranean-illyrian pastures | <i>Satureion subspicatae</i> | <i>Carex humilis</i> ,<br><i>Festuca rupicola</i> ,<br><i>Bromus erectus</i> ,<br><i>Centaurea rupestris</i> ,<br><i>leucanthemum liburnicum</i> ,<br><i>Polygala nicaeensis</i> , ... | Shallow, humus rich soil, top layer acidic, lower layer(s) alkaline | Abandonment of pastures followed by rather slow bush-encroachment | Transhumant low-intensity sheep grazing | Controlled low-intensity sheep and goat grazing, Low-intensity horse and cattle grazing |
| .....                              |                              |  |   |   |   |   |

## SHORT GREEN and LONG DRY SEASON



## 2. OBJECTIVES

- recultivation of abandoned marginal land;
- use of animals as tool for recultivation;
- investigation of plant - animal relationship through botanical composition and vegetation dynamics;





### 3. MATERIAL AND METHODS

Vegetation mapping was conducted on pastures:

- at the Center for sustainable recultivation Vremscica (820m a.s.l.; 45<sup>0</sup>41'N;14<sup>0</sup>12'E);

- from spring 2002 to spring 2003 in three vegetation aspects.

Soil sampling (profiles and analysis) were done in 2001.





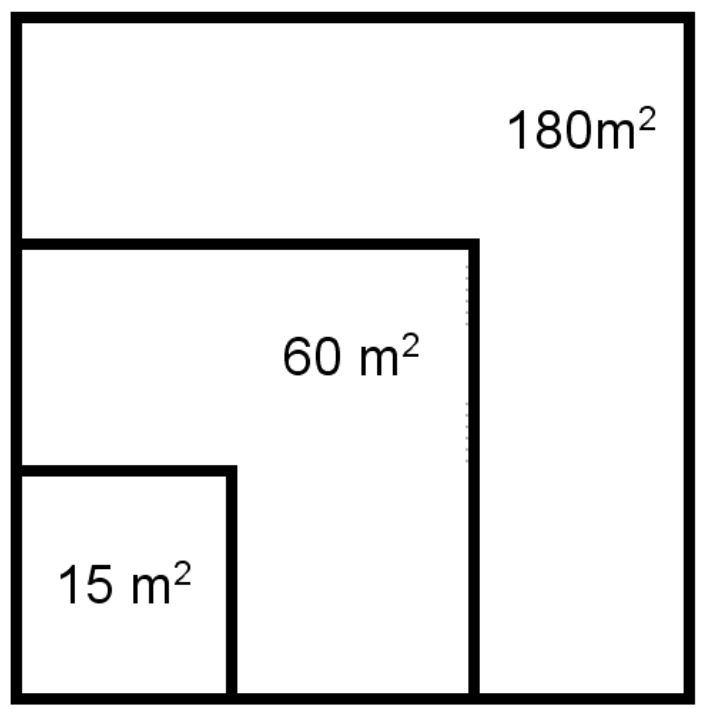
**Location 1**



**Location 3**

**Location 4**





Within each quadrat size (15, 60 and 180  $\text{m}^2$ ) two parameters were measured: % cover of each species present and the sociability of each plant species (Braun-Blanquet, 1964).

# 4. RESULTS

**Table 1: Partly ordered phytocenological table**

| Species                                      | fr | share  | spv    | class | vr-2002/1-1 | vr-2002/2-1 | vr-2003/1-1 | vr-2002/1-2 | vr-2002/2-2 | vr-2003/1-2 | vr-2002/1-3 | vr-2002/2-3 | vr-2003/1-3 | vr-2002/1-4 | vr-2002/2-4 | vr-2003/1-4 |
|--|----|--------|--------|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Plantago argentea Chaix in Vill.             | 12 | 100,00 | 0,1000 | V     | +           | +           | +           | +           | +           | +           | +           | +           | +           | +           | +           | +           |
| Thymus praecox Opiz s.str.                   | 9  | 75,00  | 1,7167 | IV    | +           | +           | +           |             |             |             | 1           | 2           | 1           | +           | +           | +           |
| Campanula glomerata L.                       | 9  | 75,00  | 0,0750 | IV    | +           | +           | +           |             |             |             | +           | +           | +           | +           | +           | +           |
| Coronilla vaginalis Lam.                     |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Galium corrudifolium Vill.                   |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Leucanthemum liburnicum (Horvatić) Horvatić  |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Lotus corniculatus L.                        |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Trifolium montanum L.                        |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Festuca valesiaca agg.                       |    |        |        |       |             |             |             |             |             |             |             |             | 1           | 1           | 1           | +           |
| Cerastium holosteoides Fries em. Hyl.        |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           |             |             |
| Taraxacum officinale F. Weber in Wiggers     |    |        |        |       |             |             |             |             |             |             |             |             |             | +           |             |             |
| Potentilla erecta (L.) Räuschel              |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           |             |             |
| Potentilla australis Krašan                  |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Biscutella laevigata L.                      |    |        |        |       |             |             |             |             |             |             |             |             |             | +           | +           | +           |
| Carex montana L.                             |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           |             | +           |
| Bromus erectus Huds.                         |    |        |        |       |             |             |             |             |             |             |             |             | 1           | 2           | 3           | 3           |
| Koeleria lobata (MB.) Roem. & Schult.        |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           | +           | +           |
| Ranunculus oreophilus MB.                    |    |        |        |       |             |             |             |             |             |             |             |             |             |             | +           | +           |
| Brachypodium rupestre (Host) Roem. & Schult. |    |        |        |       |             |             |             |             |             |             |             |             | +           | +           |             |             |
| Carlina acaulis L.                           |    |        |        |       |             |             |             |             |             |             |             |             |             |             | +           | +           |
| Centaurea triumfettii All.                   |    |        |        |       |             |             |             |             |             |             |             |             | +           |             |             | +           |
| Crocus vernus subsp. vernus                  | 6  | 50,00  | 0,0500 | III   | +           |             | +           |             |             |             | +           |             | +           | +           |             | +           |
| Globularia cordifolia L.                     | 6  | 50,00  | 0,0500 | III   | +           |             | +           |             |             |             | +           | +           | +           |             | +           |             |
| Hippocrepis comosa L.                        | 6  | 50,00  | 0,0500 | III   | +           | +           | +           |             |             |             | +           |             | +           |             | +           |             |
| Narcissus radiiflorus Salisb.                | 6  | 50,00  | 0,0500 | III   | +           |             | +           |             |             |             | +           |             | +           | +           |             | +           |

**166 species found:**

**I class – 82**

**II class – 38**

**III class – 33**

**IV – 12**

**V - 1**

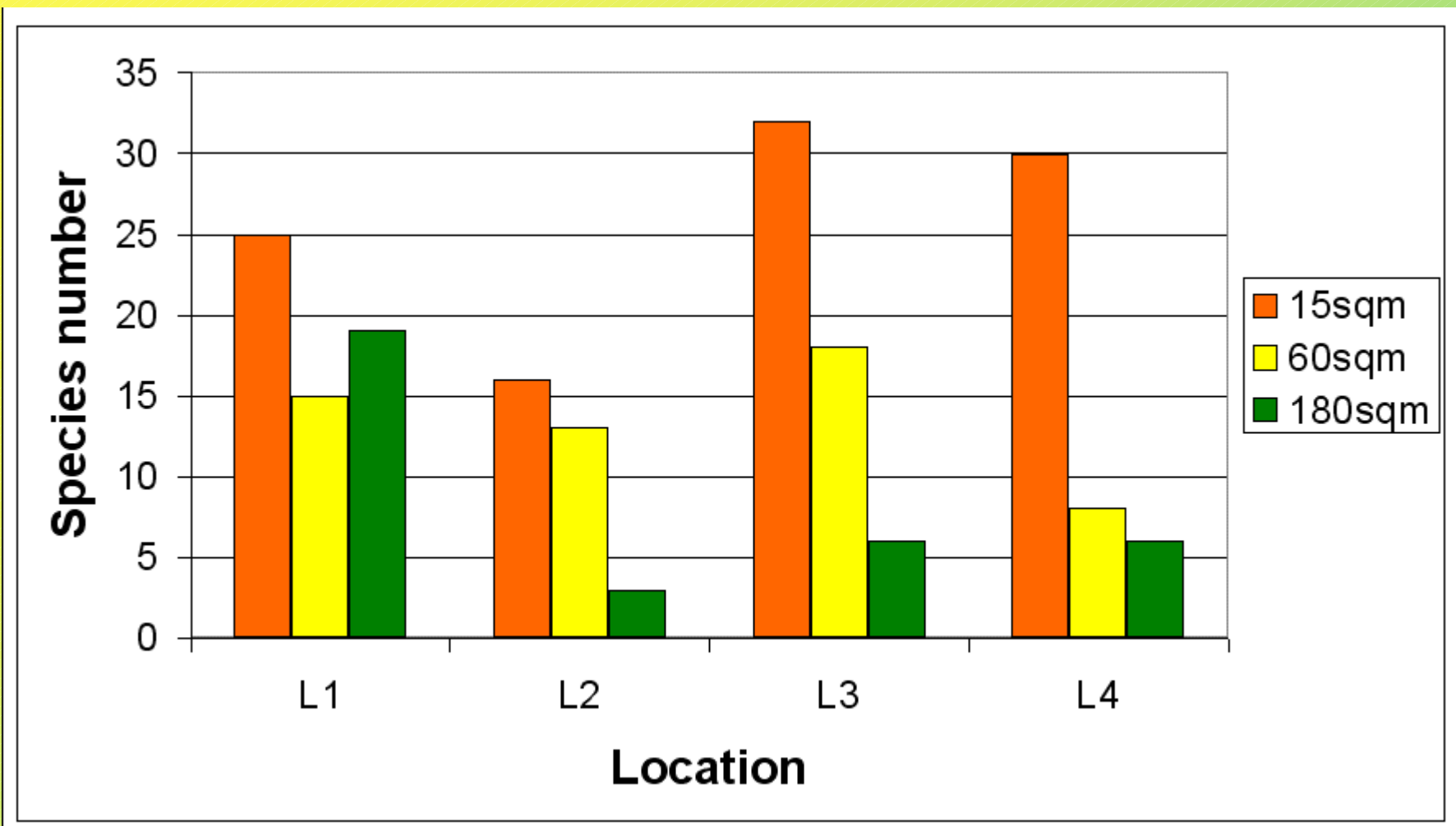
**Table 2: Soil characteristics**

| Location       | soil Type        | Soil depth (cm) | pH (0-6 cm) | P-AL (mg/100g) | K-AL (mg/100g) |
|----------------|------------------|-----------------|-------------|----------------|----------------|
| L <sub>1</sub> | Rendzic Leptosol | 28              | 4,6         | <0,1           | 8,0            |
| L <sub>2</sub> | Cambisol         | 100             | 4,5         | 3,1            | 7,5            |
| L <sub>3</sub> | Rendzic Leptosol | 21              | 5,0         | <0,1           | 9,5            |
| L <sub>4</sub> | Rendzic Leptosol | 15              | 4,8         | <0,2           | 12,5           |

| Location       | OM (%) | C (%) | C:N  | N total (%) |
|----------------|--------|-------|------|-------------|
| L <sub>1</sub> | 11,6   | 6,7   | 16,8 | 0,40        |
| L <sub>2</sub> | 9,7    | 5,6   | 13,3 | 0,42        |
| L <sub>3</sub> | 18,7   | 10,8  | 14,8 | 0,73        |
| L <sub>4</sub> | 23,2   | 15,2  | 15,1 | 0,83        |

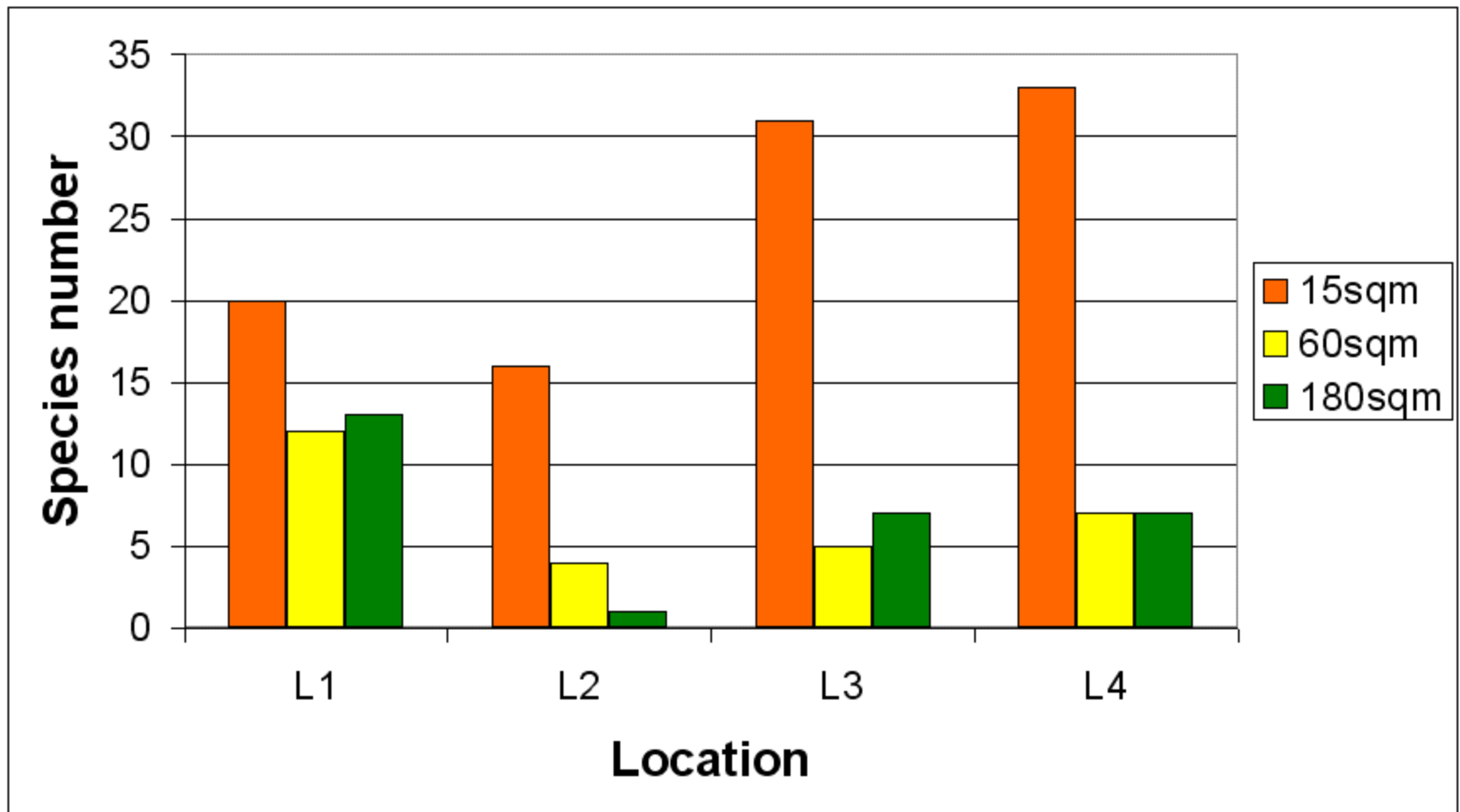
**Table 3:** Species richness of herbaceous plants at different locations at all three aspects

| Location/aspect | Spring 2002 | Summer 2002 | Spring 2003 |
|-----------------|-------------|-------------|-------------|
| L <sub>1</sub>  | 59          | 45          | 71          |
| L <sub>2</sub>  | 32          | 21          | 38          |
| L <sub>3</sub>  | 56          | 43          | 54          |
| L <sub>4</sub>  | 44          | 47          | 42          |

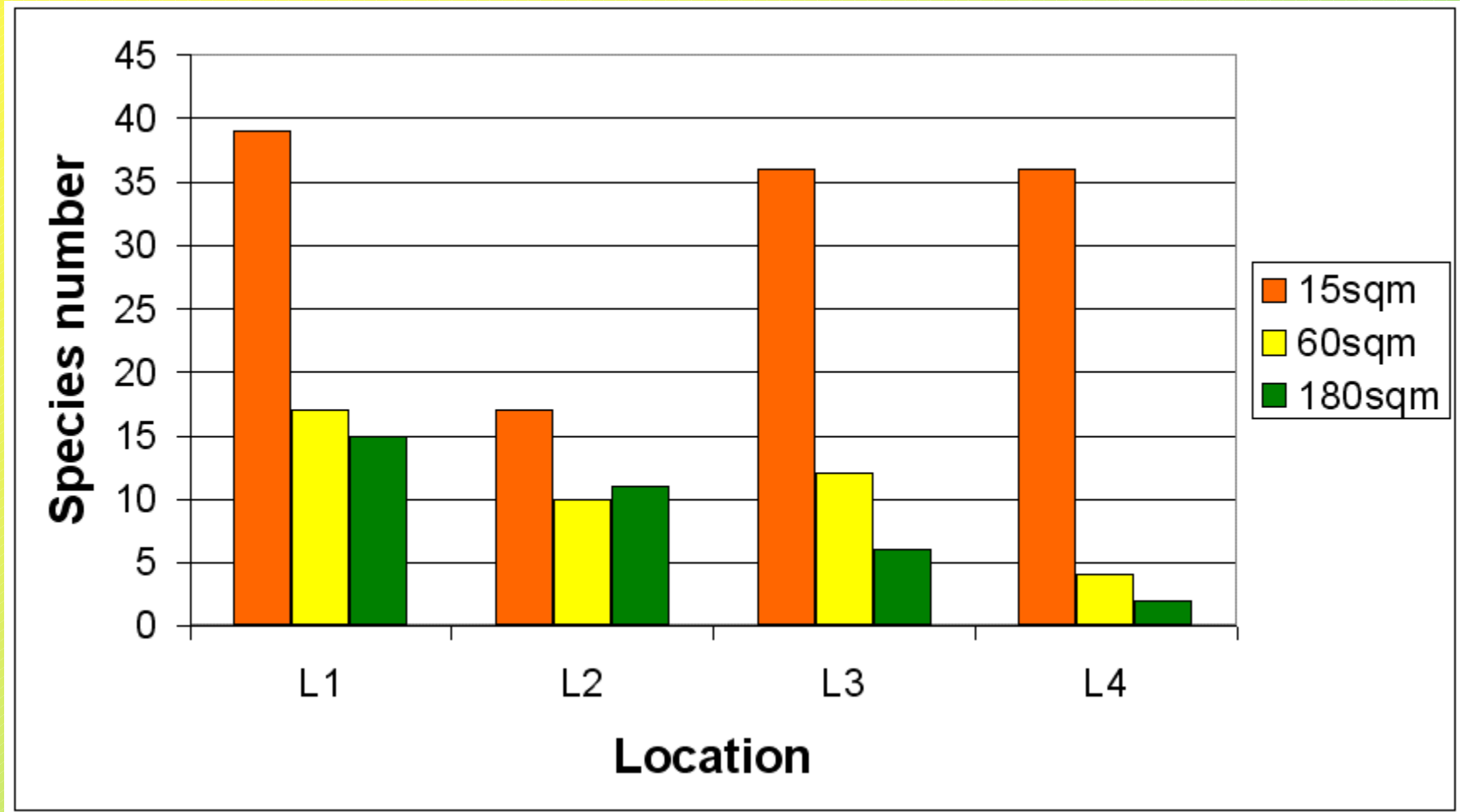


**Figure 1:** Species richness at different locations at spring 2002 aspects according to quadrat size

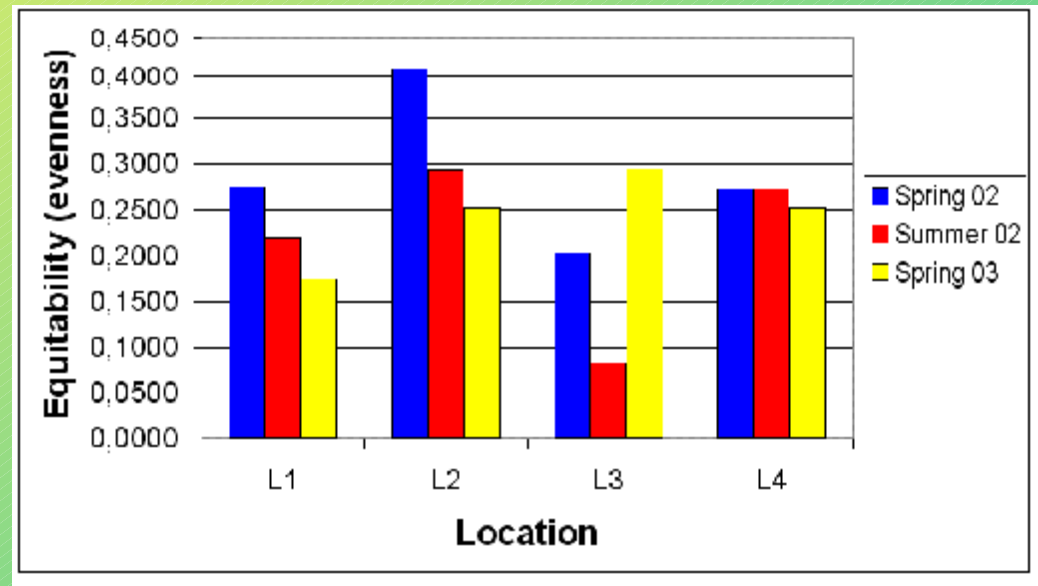
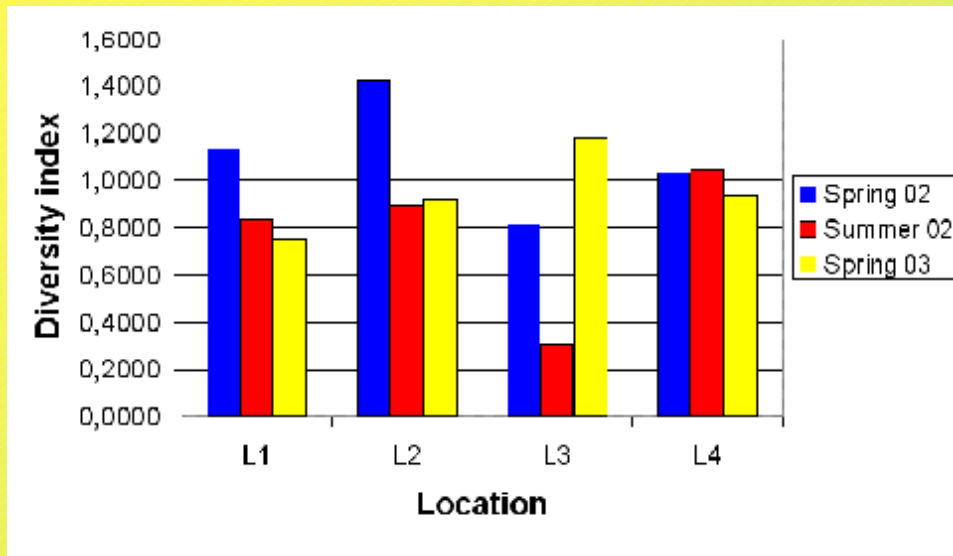




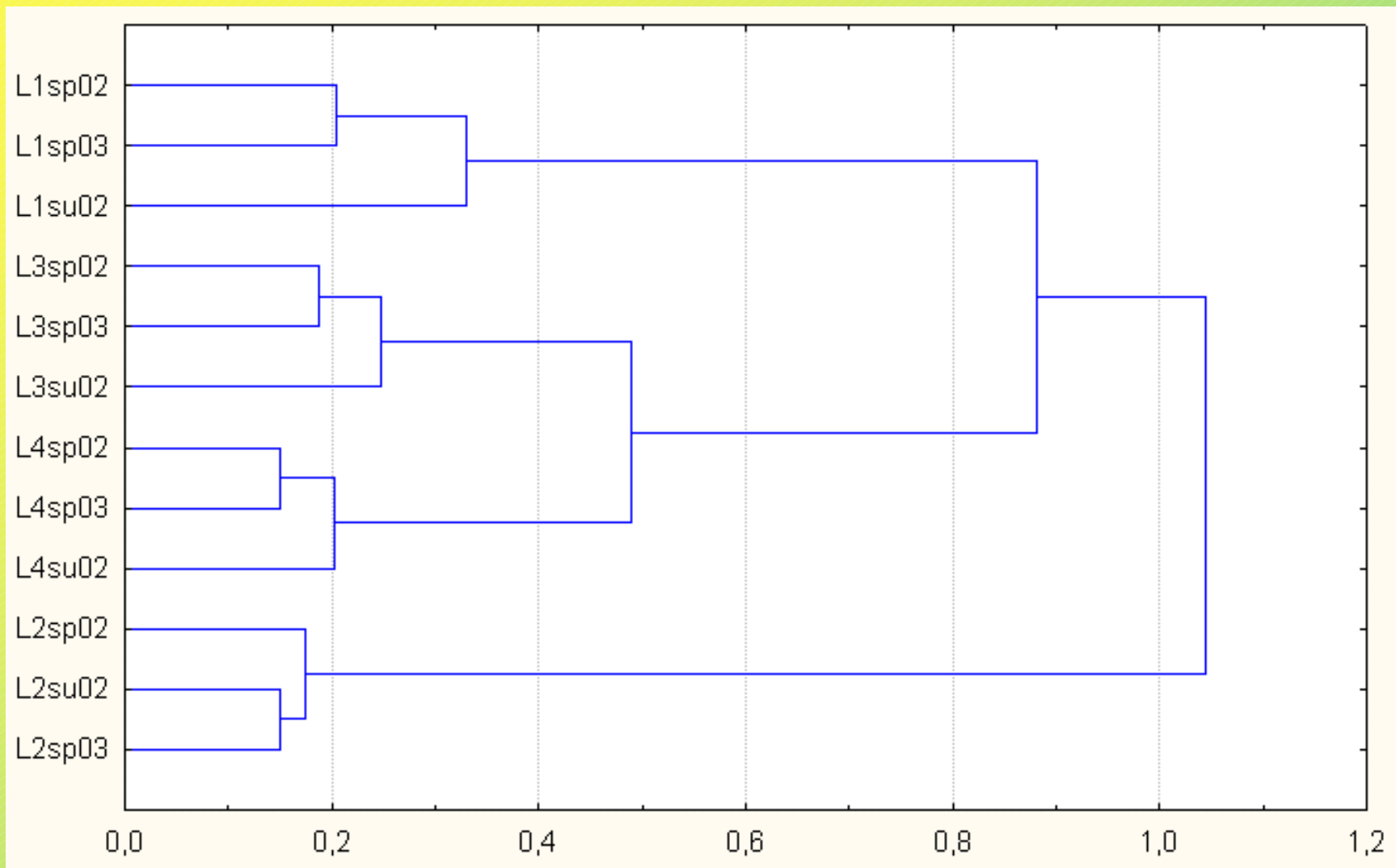
**Figure 2:** Species richness at different locations at summer 2002 aspects according to quadrat size



**Figure 3:** Species richness at different locations at spring 2003 aspects according to quadrat size



**Figure 4 and 5: Shannon diversity index and equitability**



**Figure 6:** Dendrogram of surveyed locations

## 5. CONCLUSION

An appropriate management of calcareous grassland:

- prevents deterioration of the heterogenic plant community;
- increase species diversity;
- provides economic productivity.

Results suggest that grazing and establishment of semi-natural pastures increase species diversity.