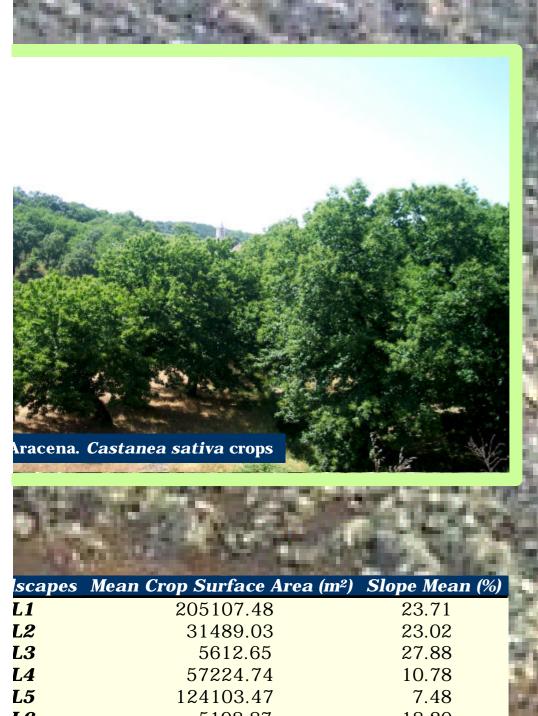
Classification of Marginal Landscapes by Cluster Analysis Alcántara Manzanares, J¹., Muñoz Álvarez, J.M¹., Quijada Muñoz, J²., Moreira Madueño, J.M². ¹Department of Plant Biology, Botany Division. University of Cordoba. Spain ²Environmental Department. Andalusian Regional Council. Spain





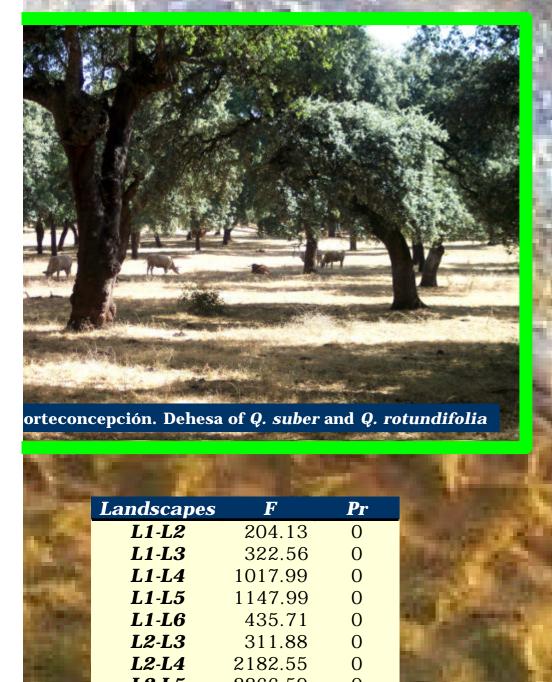


Table 3. Results obtained from			
	The same of		100
	L5-L6	1208.70	0
	L4-L6	862.01	0
	L4-L5	159.87	0
а	L3-L6	1277.73	0

Hotelling's T Squared Test

329.07

4441.18

3976.24

L2-L6

L3-L4

INTRODUCTION



arge areas, and to show that the spa

lected for study, western Sie

culture, sometimes repla

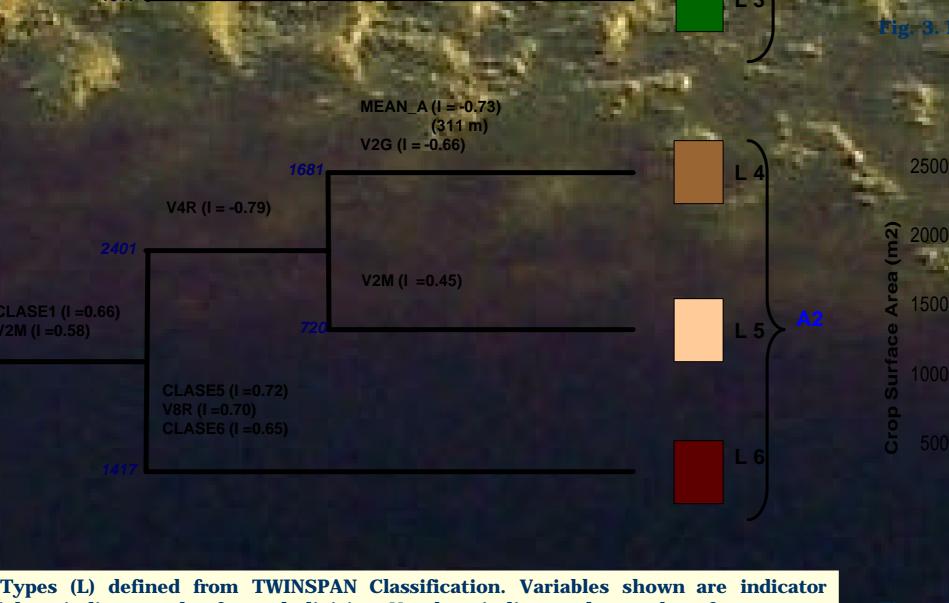
shown that multiva

lard, 1997), the

dscapes: rugged terrain; unpro

ical implications.

ETHODS



Surface with class 3 ruggedness

Surface with class 4 ruggedness

Surface with class 5 ruggedness

Surface with class 6 ruggedness Surface with class 7 ruggedness

Surface with class 8 ruggedness

Green areas and leisure facilities

Rivers and watercourses

Dryland woody crops: Olive

Other Dryland woody crops **Irrigated Herbaceus crops** Forced crops under plastic

Irrigated woody crops

Mixed dryland farming

Dense Quercus stands

Dense Conifers stands

Pastures with Quercus Pastures with Conifers

Dense Eucaliptus stands

Pastures with Eucalyptus

Dense shrub stands with Quercus

Dense shrub stands with Conifers Dense shrub stands with Eucalyptus

Scattered shrub stands with Quercus Scattered shrub stands with Conifers

Felled trees and recent reforestation

Scattered shrub stands with Eucalyptus

Pastures without trees

Rocks and bare soil

Dense shrub stands

Scattered shrub stands

Slates and quartzites **Granite-like rocks**

mixtures

Limestones

Loams **Snds**

Abandoned crops

Mixed irrigated farming

Slag heaps, dump sites and construction sites

Dams, reservoirs and continental lagoons

Mosaic of dryland and irrigated farming Mosaic of crops and natural vegetation

Other open areas with little or not vegetation

Dense shrub stands with Broad-leaves and other

Scattered shrub stands with Broad-leaves and other

Urban fabric

Urbanizations Industrial or

Mining areas

Citrics

infraestructures

V1C

V2C

V17C

V21C

V22C

V23C

V26C

V27C

V28C

V29C

V30C

V37C

V39C

V43C

V47C

V3G

V4G

Fig. 2. Landscape Types in western Sierra Morena (Huelva, Spain) obtained by Multivariate Classification Methods (TWINSPAN

MEAN_A (I = -0.78).

V8M (I = -0.72)

V25C (I = -0.51)

V5M (I =0.8)

V4M (I =0.54)

V31C (I = -0.63) V44C (I = -0.62)

RNG_A (I = -0.76) CLASE5(I = -0.67)

ape is defined as a heterogeneous land area composed of a cluster of interacting ecosystems that is

similar form throughout (Forman & Godron, 1986). Turner (1990) justifies the existence and

developing science, landscape ecology, whose aim is to attempt to understand the ecological

location of ecosystems, habitats and/or communities has

livestock-raising activities.

Huelva, Spain), displays features characteristic of

soil with low nutrient content; and extensive

ethods can readily be applied to landscape

changes (Jobin et al., 2003) and the

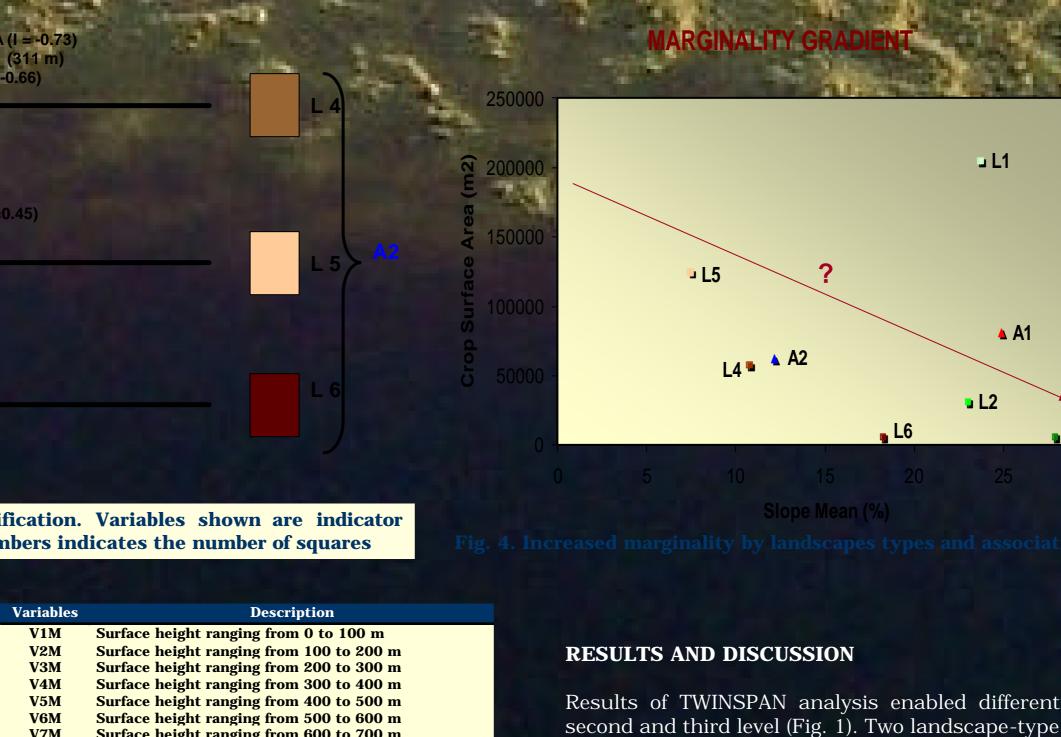
ation analysis), on the basis

ing continental waters),

 $MEAN_A (I = -0.48)$

(532 m)





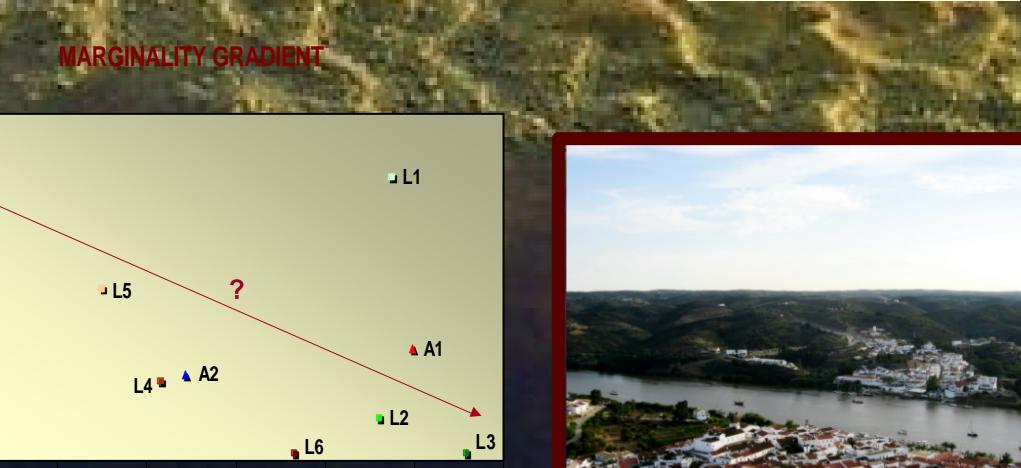


Table 4. Results obtained from analysis of

Mahalanobis Distance

L5. Paymogo. Dryland herbaceous crops

Landscapes Ordered by Distance

Table 5. Landscapes ordered by

degree of marginality

to L3

0.87

2.61 3.48

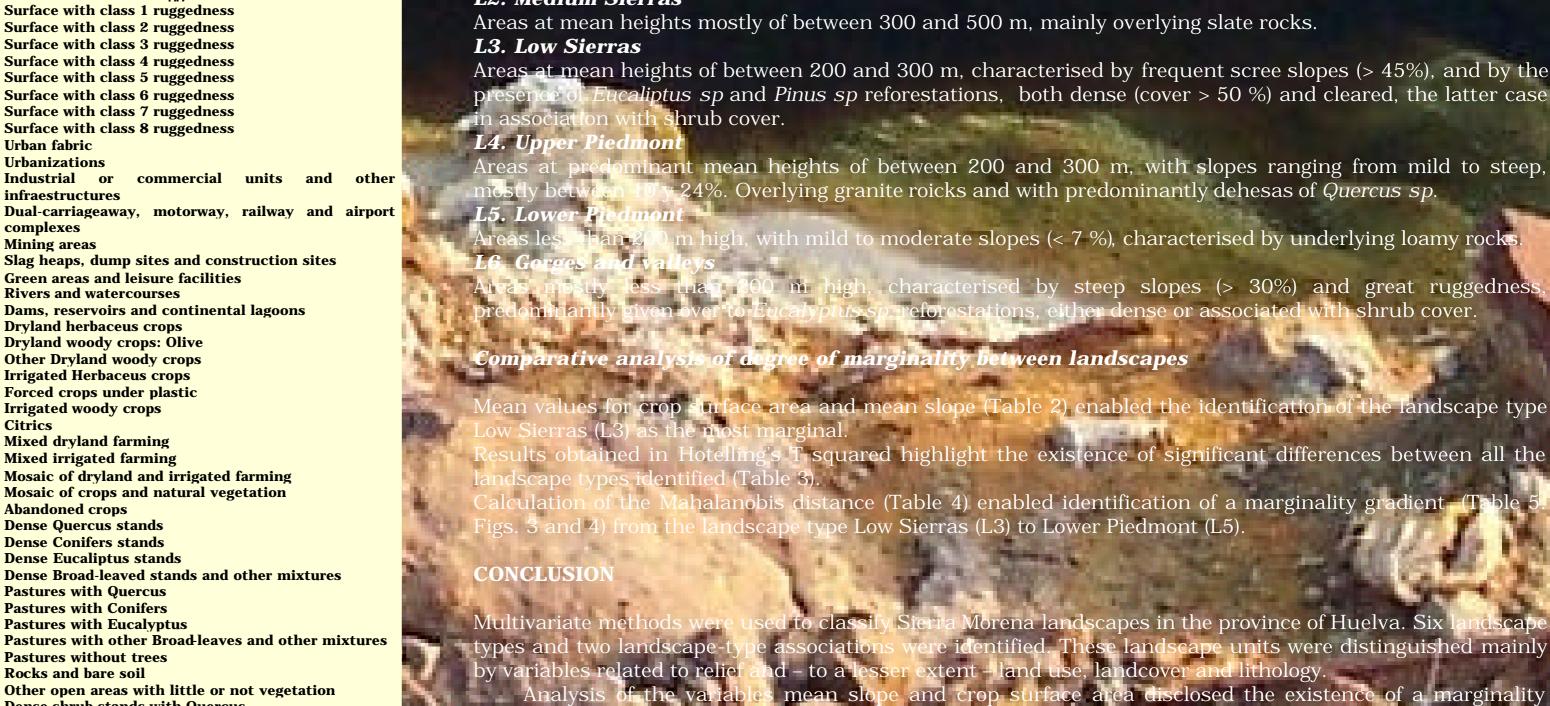
11.14

16.30

Degree of Marginality

Results of TWINSPAN analysis enabled differentiation of six marginal landscape types (L), generated at second and third level (Fig. 1). Two landscape-type associations(A) were also identified (Fig. 1 and Fig. 2): V7M Surface height ranging from 600 to 700 m Surface height ranging from 700 to 800 m Surface height ranging from 800 to 900 m A1. Association of Sierra Landscape Types V9M Surface height ranging from 900 to 1000 m V10M Areas of sharper relief: height ranges are greater (97-243 m) than those of Piedmonts and Valleys; greater MEAN_A Mean height frequency of slopes between 30 and 45% and heights between 400 and 500 m. Difference between maximum and minimum height CLASE1 Surface slope < 3 % A2. Association of Piedmont and Valley Landscape Types CLASE2 **Surface slope ranging from 3 to 7 %** Landscapes characterized by less marked relief, slopes < 3%, and predominance of heights between 100 and Surface with slope ranging from 7 to 15 % CLASE3 Surface with slope ranging from 15 to 30 % CLASE4 Surface with slope ranging from 30 to 45 % CLASE5 CLASE6 Surface slope > 45 % MEAN P Mean slope The following Landscape Types were identified: **Unoriented surface (Flat areas)** V10 **Surface oriented to North** L1. High Sierras **Surface oriented to North-East Surface oriented to East** Areas at mean heights of between 620 and 800 m, overlying limestone and granite-like rocks, characterised **V50** Surface oriented to South-East by the abundance of crop mosaics with natural vegetation and olive-groves, and by the presence of broad-**Surface oriented to South V60** V70 **Surface oriented to South-West** leaved tree species, both as dense stands (Castanea sativa crops) and in association with pastures and **Surface oriented to West** shrubs. **V90 Surface oriented to South-West** Surface with class o ruggedness L2. Medium Sierras Surface with class 1 ruggedness Surface with class 2 ruggedness

gradient for the



dentified. The landscape-type association Sierras (A1)

1996. ITE Merlewood Lar