

**Project Alpter**  
***“Terraced landscapes of the alpine arc”***  
Eu Programme Interreg IIIB Alpine Space

***Methodological cues for the analysis of the terraced  
slope in the pilot area***  
***Pianazzola-Bregaglia – Data Sheet Analysis 1:5000***

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**Trans-national Meeting**  
12-13 October 2006  
Goriska Brda (SLO)

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**Definition of selection criteria of the sub-areas for the 1:5000 analysis through:**

- Analysis of the geological and anthropic features of the pilot area**
- Analysis of the geomorphological elements of the sub- area Pianazzola such as slope, exposure, geometry of terracing, state of conservation of walls and crops**

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**Selected criteria for the choice of the sub-areas  
for the 1:5000 analysis:**

- **Average slope**
- **Slope concavity – convexity**
- **Altimetry**
- **Exposition - Aspect**
- **Land use**

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**Selected sub-areas typologies for the 1:5000  
data sheet analysis:**

- **Active / abandoned vineyard**
- **Copsy / fruit chestnut**
- **Vineyard + pasture / forage**
- **Vineyard + self-consumption horticulture /  
orchard**

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**Utilised analysis tools:**

- **Technical regional map**
- **Actual cadastral map**
- **Historic cadastral map**
- **Digital images**
- **Geomorphological map**



□ Vineyard

□ Orchard

□ Forest

□ Castle

★ Site  
te



0 100 200 300 400 500 Meters

scale 1: 5.000





# Final Products

Data sheet 1:5000 example:

*“Cultivated thalweg”*



## DATA SHEET FOR ANALYSIS OF TERRACED AREAS

Project ALPTER- Interreg Programme IIB Alpine Space

Detailed scale - 1:5000

### - Identification and cartography

Pilot area:	(2) IMPLUVIO COLTIVATO	Cartography with perimeter of terracements. Attachment (A): Position Map 
Terraced surface (Km²):	0.005	
Min altitude:	530 m s.l.m.	
Max altitude:	550 m s.l.m.	
Average slope:	60% 31°	
Notes:	The Data sheet analyses active vineyards, located closed to an seasonal drainage line and between the hairpins.	

### B - Characters of terraced area

#### B1 - Typology of terracements

Typology of terraces:		Typical wall section				
<input checked="" type="checkbox"/> Dry stone	With wood					
<input checked="" type="checkbox"/> Concrete	Solid wall					
Other (specify)						
Foundation laid on:	<table border="1"> <tr> <th>substratum</th> <th>rock</th> </tr> <tr> <td>Terrain D.G.M.</td> <td>Mixed</td> </tr> </table>	substratum	rock	Terrain D.G.M.	Mixed	The width at the top of the wall measures around 25 cm maximum.
substratum	rock					
Terrain D.G.M.	Mixed					
Used materials:	rocks, stones of granite "Metagrano del Truzzo" and scists					
Height of walls (aver.):	Aver.: 0.80 m Min: 0.40 m Max: 1.20 m	Scheme of the terraced slope 				
Linear length of walls :	Aver.: 20 m Min: 18 m Max: 22 m					
Slope of walls:	Aver.: 90° Min: 88° Max: 92°					
Width of stripes:	Aver.: 1.5 m Min: 1 m Max: 2 m					
Slope of stripes:	Aver.: 15° Min: 6° Max: 24°					
Number of stripes:	21					
Vertical links:						

## Paragraph B1

### • foundation laid on

It could be useful to add the little box for the X beside the option.

### • slope of walls (see (B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES)

We introduced a value in degrees that varies from hypothetical 0° (the wall is completely stretched towards the mountain) passing through 90° (the wall is perfectly vertical) to another hypothetical 180° (the wall is completely collapsed towards the valley).

### • slope of stripes

We introduced a value in degrees that varies from 0° (the stripe is perfectly horizontal) to 90° (hypothetical completely vertical stripe).



<input checked="" type="checkbox"/> Fixed	Number of stripes in height range (50 m)
ramp	Equivalent value calculated for $\Delta h = 20$ m 52.5
<input checked="" type="checkbox"/> stairs, parallel to wall just to the M19	
<input checked="" type="checkbox"/> stairs, perpendicular to wall	Min:                      Max:
stairs, suspended	
Movable	Notes: more details into the "Note to the data sheet":
Mixed	-(B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES

#### B2 – Hydrologic characters

Water channel system	Perpendicular channels	Parallel channels	External channels
Overlapping with paths:	Yes		No
Slope direction of stripes:	Downward		Upward
Irrigation system:	<input type="checkbox"/> Sprinkling <input type="checkbox"/> Dripping <input type="checkbox"/> Flooding <input checked="" type="checkbox"/> subterranean <input type="checkbox"/> no irrigation system <input type="checkbox"/> Other (specify)		
Notes: CHANNEL SYSTEM IS OVERLAPPING WITH THE STAIRS PERPENDICULAR TO WALLS			

#### B3 – Access to the area (actual)

Accessibility level:	Low (by path/forest road)	Medium (by local road)	High (road of regional level)
Access Modalities:	Foot    Car	Cableway    Rack railway	Other:
Internal linking level:	Low (large part not accessible)	Medium (some part not accessible)	High (fully accessible)
Access Modalities:	Foot    Car	Cableway    Rack railway	Other:
Notes:	ACCESSIBILITY FROM UPPER AND LOWER ROAD TOO		

#### B4 – Other structures

TIPOLOGY	NUMBER
Dwelling structures:	1
Shelters:	3 (ONE OF WHICH IS NEW)
Other structures (specify):	1 (NEW WOOD'S DEPOSIT)
Notes:	THE DWELLING STRUCTURES AND THE SHELTER IN IMPLUVIUM ARE IN GOOD STATE OF CONSERVATION

#### C – Land use (actual)

Soil characters	(reference to FAO soil classification) – Umbrisols (Umbric) and Cambisols (Ochric/CAmbic)
Main cultivation:	Grapevine
Other cultivations (if present):	FRUIT TREES, FORAGE GRASS
Agricultural technique:	Alternate RITTOCHINO (PERGOLA) AND GIRAPOGGIO
Vegetation cover (abandoned)	trees

## Paragraph B3

- water channel system
- overlapping with paths
- slope direction of stripes

It could be useful to add the little box for the X beside the option;  
Channel systems are intended like natural or/and anthropic?

## Paragraph B4

- access to the area (actual)

It could be useful to add the little box for the X beside the option.

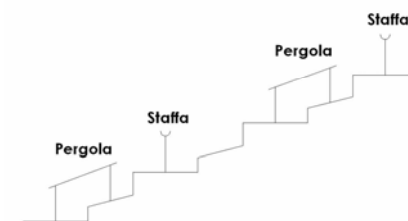


Image 3: transect of vineyard terraces.

terrain):	X	bushes
	X	grass
		mixed

Notes: On some stripes, the "girapoggio" technique has been abandoned.

#### D - State of decay

Level of decay of the walls:	All damaged	In part damaged	In good shape
Level of efficiency of water collection system:	Totally damaged	Partially damaged	Functioning
Diffusion of cultivation:	Uncultivated	Partially cultivated	Totally cultivated
Vegetation cover:	Not present	Partial	Total

#### D1 - Causes of the decay (if detectable, more than one possible)

Cause	X
<b>NATURAL</b>	
wild animals	
vegetation growth (bush/trees/grass) - at top, in the centre or at foot of the walls	X
fall of trees	
hydrostatic push	
other (specify)	
<b>ANTHROPIC</b>	
grazing animals	
wood cut	
materials damaged by ice	
Crossing of heavy machines	
other (specify)	
<b>MIXED</b>	
reduction of water drainage (obstruction)	X
ruin of walls of upper terracements	
erosion	
other (specify)	

#### E - Property and land protection

Property:	Public	Private
Number of lots:	<ul style="list-style-type: none"> <li>o 9 [Cadastral lots n. 13/286-287, 13/213-220, 13/222, 13/224-229, 13/233, 13/1001 (main representative lots)]</li> <li>o (13/206-13/223-13/230-13/234-13/718-13/764-765,13/767 (other similars)</li> </ul>	
Number of owners:	19	
Network connection:	GOOD: LOTS ARE WELL LINKED TOGETHER BY STAIRS	

Notes: The whole area is owned by members of 9 families, in this case it is relevant the land division among members of the same families, which has brought to a constant reduction of the dimension of lots and properties. Lots, indeed, are very small and often owned by several people at the same time. The properties are divided as follows:  
 -lots n. 286, 287, 213, 214, 215, 216, 217, 1001, 224, 229, 233 : 1 owner (different for each lot, except for lots 213 and 217 that are owned by the same person),  
 -lots n. 218, 219, 220, 222: same owner  
 -lots n. 225, 226: same owner  
 -lot n. 227: 4 owners belonging to the same family  
 -lot n. 228: 6 owners belonging to the same family

### Paragraph D

#### •state of decay

It could be useful to add the little box for the X beside the option.

### Paragraph E

#### •Property

It could be useful to add the little box for the X beside the option.

<b>Land protection bonds</b> (Park, Reserve, Natura2000 Zone, ...):	
<b>Other bonds (planning bonds, etc.):</b>	
<b>Notes:</b>	

#### F – Historical Data \*

<p><b>Sources:</b> Austrian Cadastre, lots n. 1800 D, 1806, 1807, 1808, 1809, 1811, 1812, 1813, 1846, 1847, 1848, 1849, 1850, 1851, 1853, 1854, 1855, 2569, 2680</p> <p><b>Year:</b> 1853</p> <p><b>Evolution of agricultural land use:</b> All the lots correspond, according to the Austrian Cadastre, to units called "ronco". It is thus probable that the whole area has been put to crops (grapevine) during the last 150 years.</p> <p><b>Historical notes:</b> With the term "ronco" we refer to a parcel of land corresponding to a traditional cultivation unit, belonging to a single property and constituting a functional (since it hosts the same mixed or specialized cultivations) and formal (being internally divided and recognizable in regard to other similar units because separated from them by physical elements and, sometime, having a peculiar internal organisation, which differs from the other units) agricultural unit. Referring to the pilot area, the term "ronco" is applied only to those lands laying on slopes and characterised by the presence of terracing. The main cultivation is grapevine, but it is possible to find other secondary cultivations such as vegetables and forage. Nowadays, the initial "ronco" can be divided in minor lots (mostly because of the hereditary divisions) and it can present very different agricultural use and state of conservation even though the original and differentiating structure is still visible, at least until a total obliteration of the earliest landmark caused by vegetation cover or decay of human products (walls, buildings etc.).</p>	<p style="text-align: center;"><b>Sample from historical land register</b></p>  <p style="text-align: center;">* Referred to the main representative lots</p>
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#### G – Iconographic documentation

	<b>Type of image:</b>	
	Photo	30
	Slide	
	Digital image	X
	Other :	
<b>Author:</b> A. G. Dal Borgo; T. Pagnoncelli		
<b>Notes:</b> more details into the "Note to the data sheet": -(G) Photographic documentation		

A note to the Data Sheet is attached with the following appendixes enclosed:

-(A) Position map

-(B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES

-(G) Photographic documentation

## **(B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES:**

### **INTRODUCTION**

**THE AIM OF THE STATISTICAL ANALYSIS IS :**

**- TO DEFINE STANDARD TYPOLOGIES OF TERRACING, USING SURVEYED GEOMETRICAL PARAMETERS**

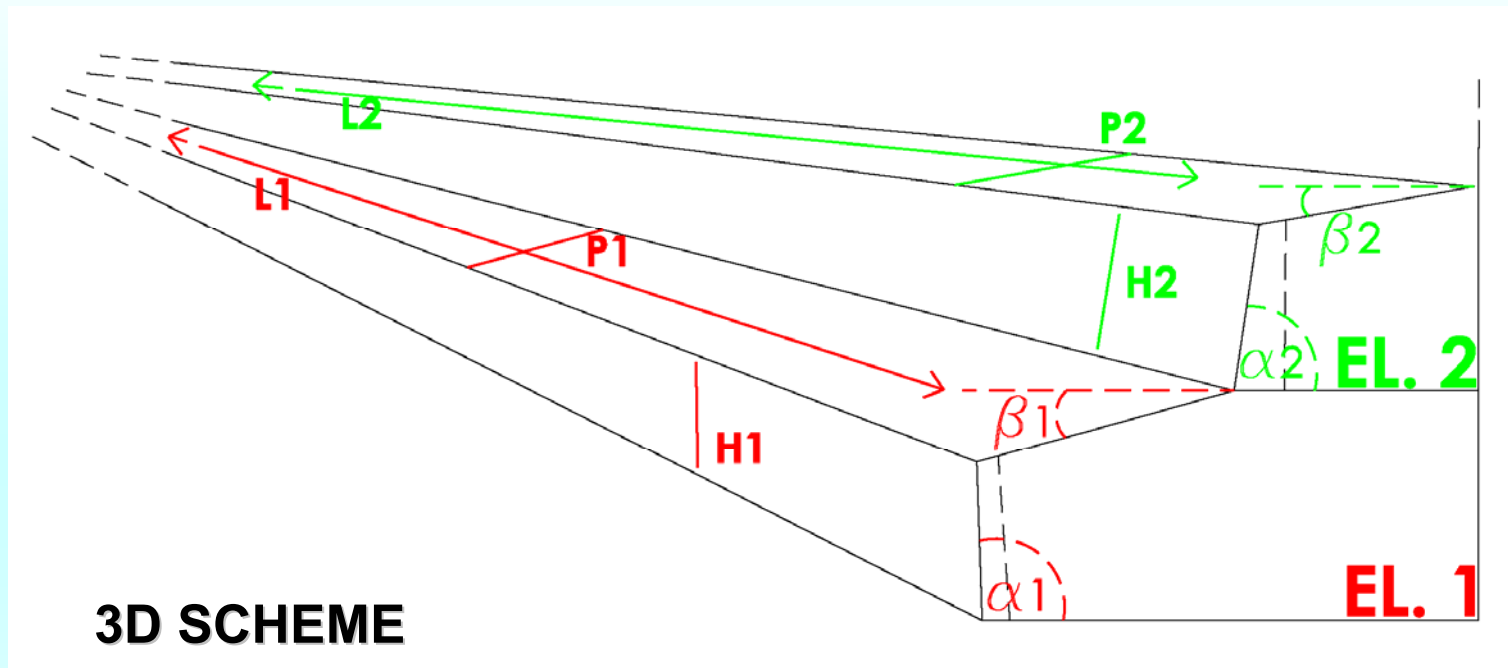
**- TO EVALUATE THE RELATIONSHIP BETWEEN THESE STANDARD TYPOLOGIES AND THE:**

- the **GEOMORPHOLOGICAL SETTING** and
- the **LAND USE**

**- TO VERIFY THE APPLIABILITY OF STANDARD TYPOLOGIES TO TERRACED AREAS LOCATED OUT OF THE PIANAZZOLA PILOT AREA.**



## (B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES:



**L = LENGTH OF THE STRIPE**

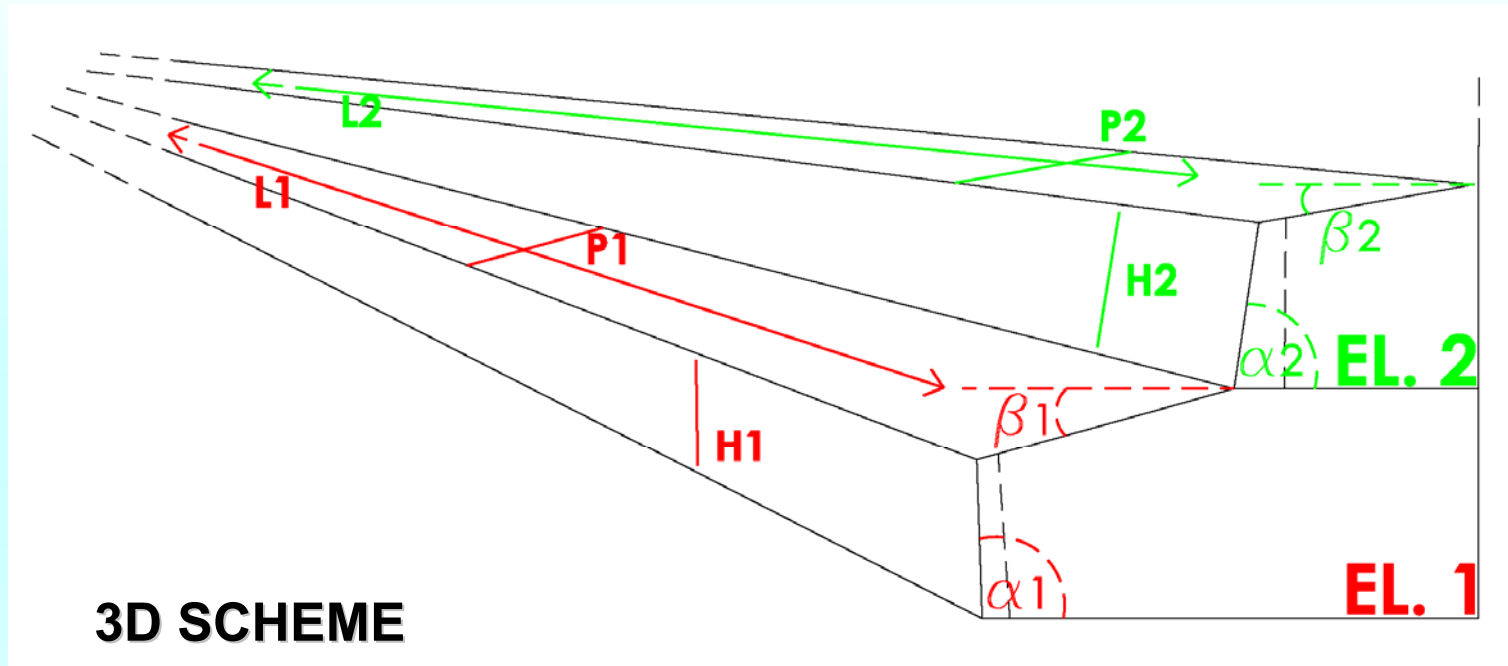
**$\beta$  = SLOPE OF THE STRIPE**

**H = HEIGHT OF THE WALL**

**$\alpha$  = SLOPE OF THE WALL\***

**P = WIDTH OF THE STRIPE**

## (B1) STATISTICAL ANALYSIS OF THE GEOMETRICAL FAETURES:



**a = SLOPE OF THE WALL\***

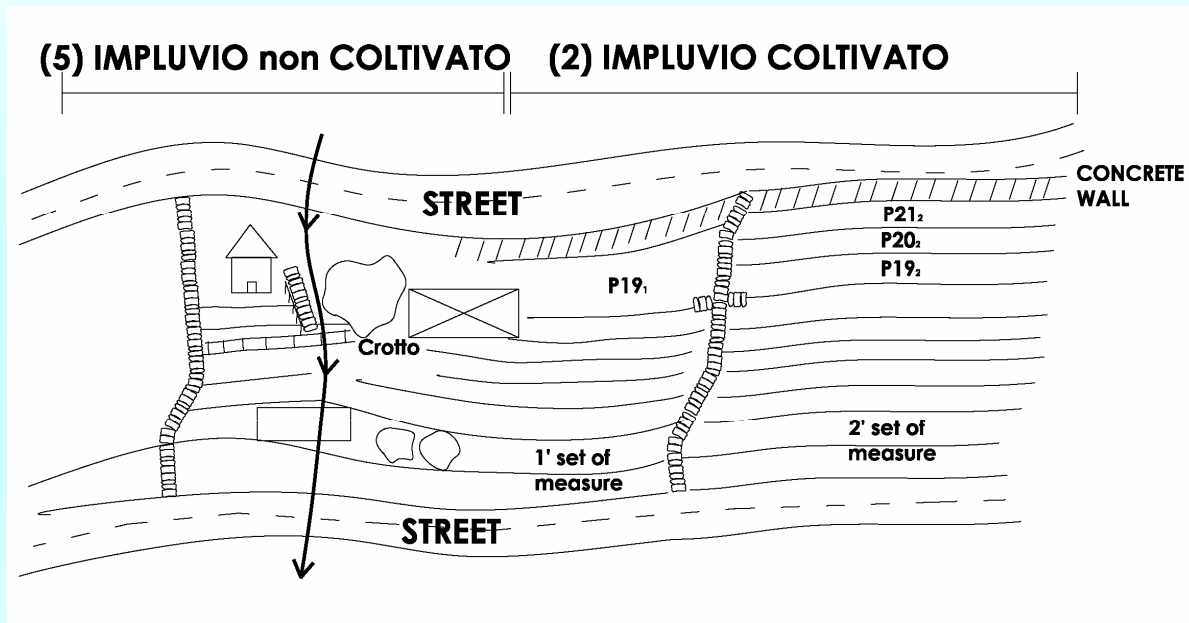
- Paragraph B - We introduced a value in degrees that varies from...
- an hypothetical  $0^\circ$  (the wall is completely stretched towards the mountain)
  - passing through  $90^\circ$  (the wall is perfectly vertical)
  - to another hypothetical  $180^\circ$  (the wall is completely collapsed towards the valley).

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H = HEIGHT OF THE WALL



### 1' SET OF MEASURES

AVERAGE VALUE = 0,82

MINIMUM VALUE = 0,4

MAXIMUM VALUE = 4,0

MODAL VALUE = 1,2

STANDARD DEVIATION = 1,03

### 2' SET OF MEASURES

AVERAGE VALUE = 1,23

MINIMUM VALUE = 0,4

MAXIMUM VALUE = 2,4

MODAL VALUE = 1,5

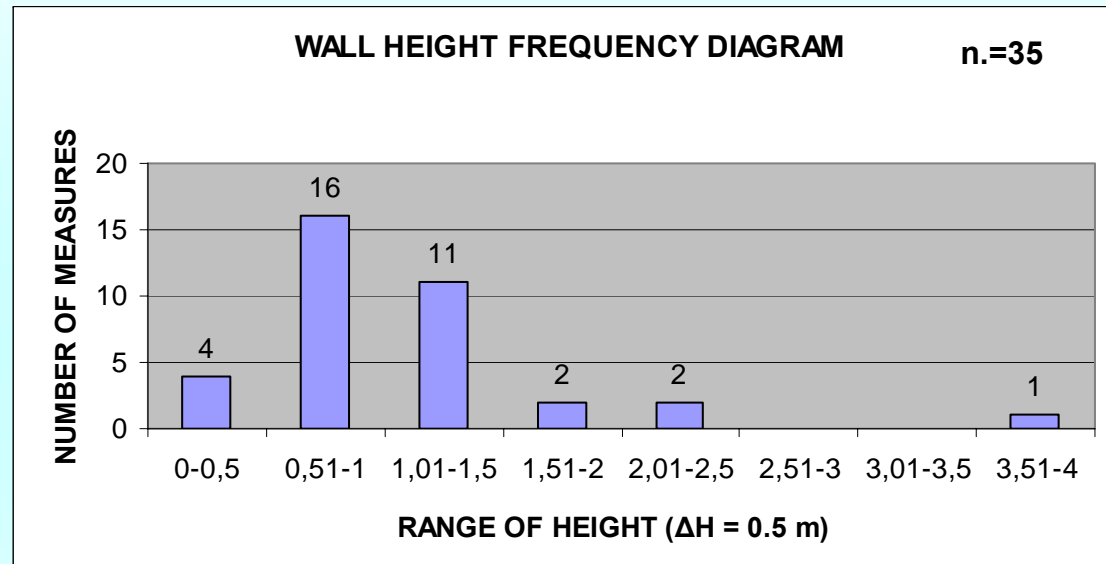
STANDARD DEVIATION = 0,59

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H = HEIGHT OF THE WALL



**AVERAGE VALUE = 1,62**

**MINIMUM VALUE = 0,4**

**MAXIMUM VALUE = 4,0**

**MODAL VALUE = 1,0**

**STANDARD DEVIATION = 0,82**

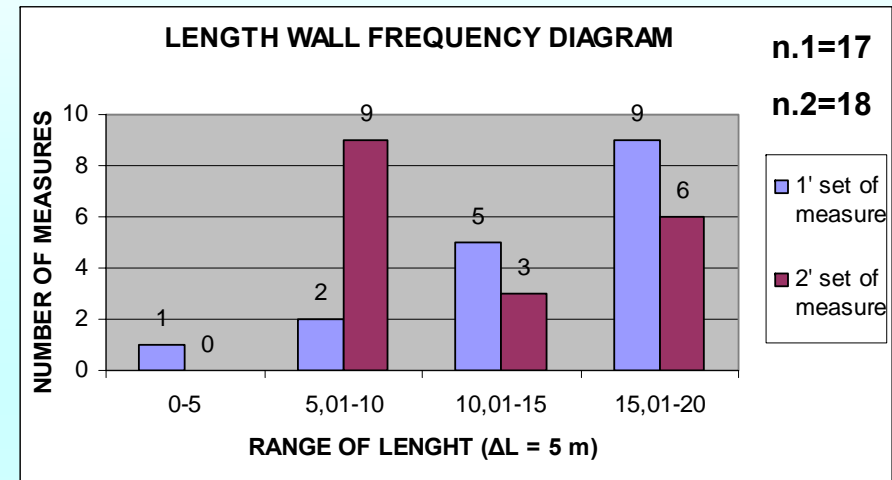
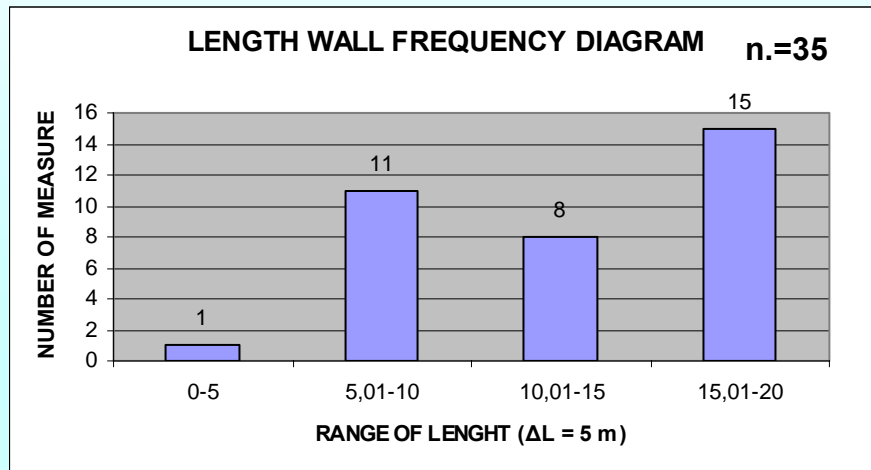


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L = LENGHT OF THE STRIP



**AVERAGE VALUE = 14,08**

**MINIMUM VALUE = 4,7**

**MAXIMUM VALUE = 20**

**MODAL VALUE = 10**

**STANDARD DEVIATION = 4,39**

**1' SET OF MEASURES**

**AVERAGE VALUE = 14,72**

**MINIMUM VALUE = 4,7**

**MAXIMUM VALUE = 14,7**

**MODAL VALUE = 20**

**STANDARD DEVIATION = 4,2**

**2' SET OF MEASURES**

**AVERAGE VALUE = 12,29**

**MINIMUM VALUE = 9**

**MAXIMUM VALUE = 19**

**MODAL VALUE = 10**

**STANDARD DEVIATION = 4,23**

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$\alpha$  = SLOPE OF THE WALL

Range of slope (angle°)

$$\Delta\alpha = 5^\circ$$

$\alpha > 90^\circ$      $\longrightarrow$     downslope

$\alpha < 90^\circ$      $\longrightarrow$     upslope

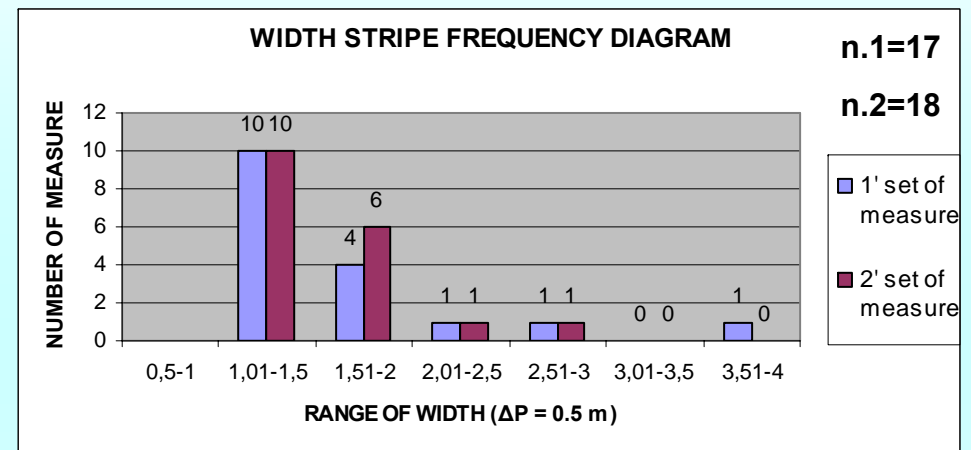
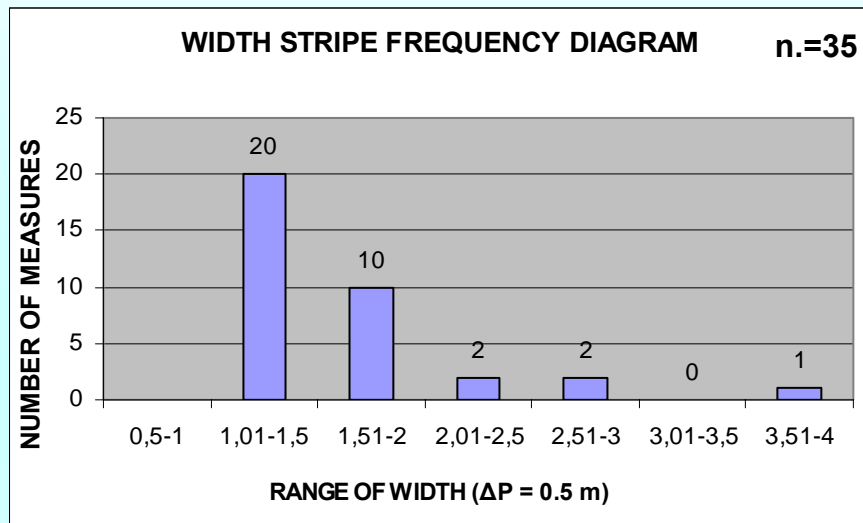


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P = WIDTH OF THE STRIPE



**AVERAGE VALUE = 1,67**

**MINIMUM VALUE = 1**

**MAXIMUM VALUE = 4**

**MODAL VALUE = 1,50**

**STANDARD DEVIATION = 0,67**

**1' SET OF MEASURES**

**AVERAGE VALUE = 1,63**

**MINIMUM VALUE = 1**

**MAXIMUM VALUE = 4**

**MODAL VALUE = 1,4**

**STANDARD DEVIATION = 0,85**

**2' SET OF MEASURES**

**AVERAGE VALUE = 1,61**

**MINIMUM VALUE = 1,20**

**MAXIMUM VALUE = 2,90**

**MODAL VALUE = 1,50**

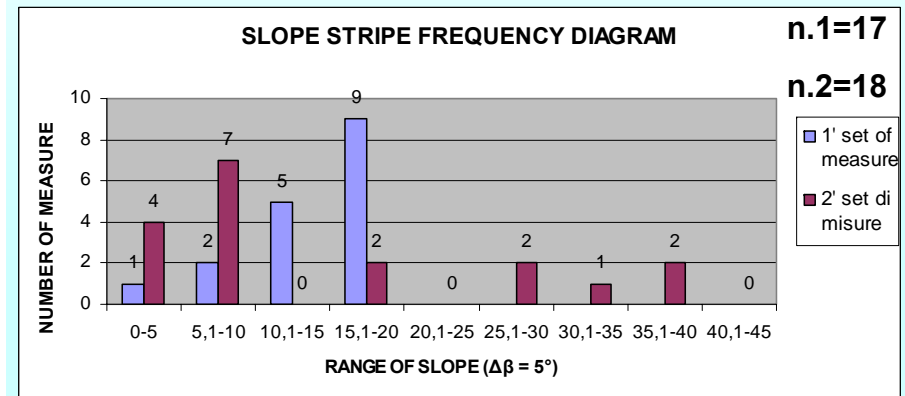
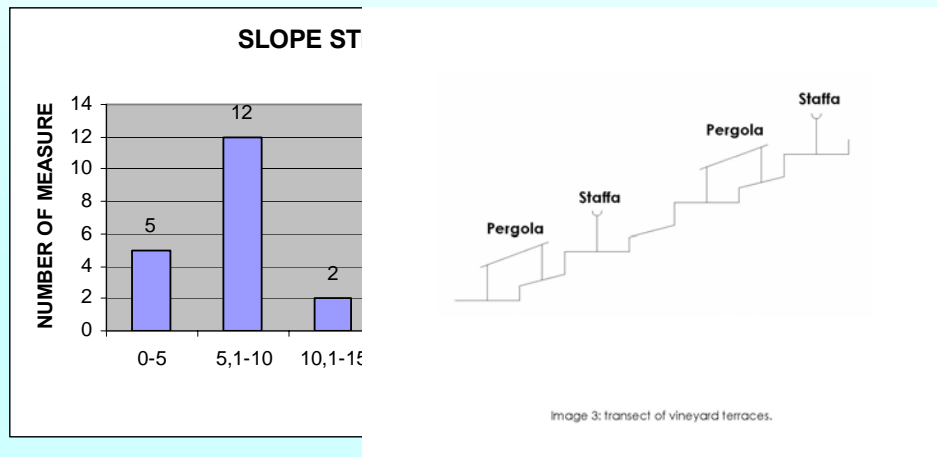
**STANDARD DEVIATION = 0,48**

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$\beta$  = SLOPE OF THE STRIPE



**AVERAGE VALUE = 17,94**

**MINIMUM VALUE = 5**

**MAXIMUM VALUE = 45**

**MODAL VALUE = 10**

**STANDARD DEVIATION = 12,38**

**1' SET OF MEASURES**

**AVERAGE VALUE = 19,58**

**MINIMUM VALUE = 5**

**MAXIMUM VALUE = 45**

**MODAL VALUE = 10**

**STANDARD DEVIATION = 12,82**

**2' SET OF MEASURES**

**AVERAGE VALUE = 15,83**

**MINIMUM VALUE = 5**

**MAXIMUM VALUE = 37**

**MODAL VALUE = 10**

**STANDARD DEVIATION = 12,17**



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**•PRODUCTS OF STATISTICAL ANALYSIS OF THE GEOMETRICAL FEATURES:**

**•GEOMETRICAL CHARACTERIZATION OF 13 SUB-AREAS –  
*COMPLETED***

**•INDIVIDUATION OF **STANDARD GEOMETRIES** AND DEFINITION OF THEIR RELATIONSHIP TO BOTH THE **GEOMORPHOLOGICAL SETTING** and the **LAND USE – *IN PROGRESS*****

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**Other activities:**

**•FIELD TESTS**

by permeability test (double ring infiltrometer)

**•LABORATORY TESTS**  
soil sampling for geo

**•Choice of a terrace**  
instruments (tensiom

**•Research of a terrace**



double ring

monitoring

ect



Thank you for the  
attention!!!

