

# AMOROSA UNIT



## Genetic and morphological notes

The unit occupies the linear slopes and the slopes connecting the alluviums and the terraced alluviums. The subsoil is made up of very fine lime and sandy sediments, often high in skeleton, that rest on Pliocene sands with abundant rounded pebbles. These soils are often in contact with clay and lime-clay sediments of the Pliocene. The soils have an Ap1-Ap2(Bg)-C profile, where the suffix Ap2 takes into account that the dig has also touched the Bg horizon: they are moderately deep with a common skeleton, moderate, until about 90 cm / 35 inches, and abundant to small, from 90 to 130 cm / 35 to 50 inches.

- Ap1 0-25 cm / 0-10 inch: light olive brown, moderately-developed, medium, sub-angular, polyhedral structure; a sandy loam texture, very calcareous, with pH of 8.09.
- Ap2(Bg) 25-90 cm / 10-35 inches: olive brown, ranging from a weakly- developed medium prismatic structure, to a moderately developed medium sub-angular polyhedral structure, reflecting the trenching; sandy texture, calcareous, with pH 8.13.
- C 90-130 cm / 35-50 inches: light olive brown, massive, with pebbles and a sandy loam texture, very calcareous, with a pH of 8.1. As depth increases, organic matter and C.E.C. decrease.

## Hydromorphy

Evident signs of hydromorphy due to bad internal drainage are found on the second horizon.

Profile P1			
Pedological Unit: AMOROSA AM			
Classification ( <i>Soil Taxonomy</i> ): Acquic Xerochrepts, loose and fine on sandy skeleton.			
Horizon	AP1	AP2 (Bg)	C
Very coarse sand	1.26	1.19	10.17
Coarse sand	3.78	3.57	4.52
Medium sand	7.56	7.14	7.91
Fine sand	24.4	23.1	34.7
Very fine sand	20	19	23.2
Silt	25	27.5	7
Clay	18	18.5	12.5
pH	8.9	8.13	8.1
C.E.C.	22.7	22.2	21.3
Total lime	24	14	23
Active lime	3.3	2.7	3.1
Organic matter	22.4	18.9	8.62
Nitrogen	1	—	—
Exchang. potassium	116	68	71
Exchang. magnesium	45	32	29
Exchang. sodium	4	5	4
Electrical conduct.	0.142	0.071	0.072

See Unit of Measurement Method on page 55.



# TAVERNELLE UNIT



## Morphological and genetic notes

This unit occupies terraces and convex slopes with a weak incline and weak superficial erosion. The subsoil is made up of sandy and calcareous-sandy sediments with conglomerated layers. The soils have an Ap1-Ap2(Bw)-C profile, where the suffix Ap2 takes into account that the trenching has also touched the Bw horizon; they are moderately deep, with skeleton ranging from scarce to medium in the first 50 cm / 20 inches, and abundant from 100-110 cm / 39-43 inches downward.

- AP1 0-15 cm / 0-6 inches: the surface is yellowish-brown, with a moderately-developed medium angular polyhedral structure, with a clayey loamy texture, weakly calcareous, pH factor 8.21.
- Ap2(Bw) 15-45 cm / 6-18 inches: the underlying horizon, dark yellowish-brown, presents a weakly developed medium prismatic structure, with a clayey loamy texture, weakly calcareous, with pH 8.15.
- C 45-100 cm / 18-39 inches: the yellowish-brown subsoil is massive and unaltered, with a sandy clayey loam texture, calcareous, with pH 8.26. Organic matter decreases as depth increases, while the C.E.C. changes according to the texture.

## Hydromorphy

No signs of hydromorphy are evident. Internal drainage is good. The available water content (AWC) is low.

## Notes

The soils belonging to this unit are of the sandy variant, having a sandy loam or fine loam texture. These are pedologically younger soils than the preceding ones.

## Profile P15

Pedological Unit: TAVERNELLE TA

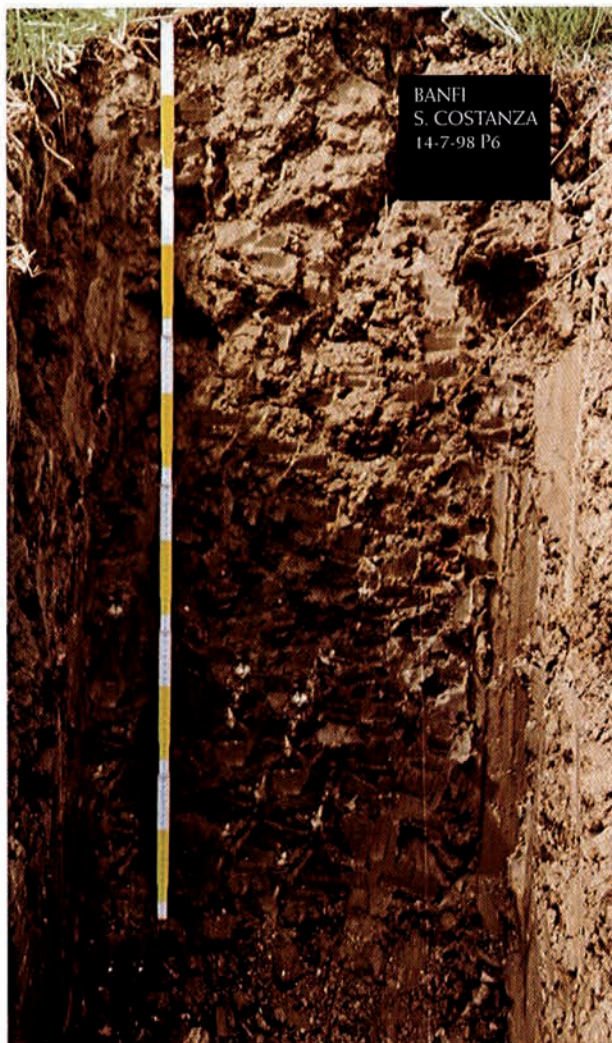
Classification (*Soil Taxonomy*): Typic Xerochrepts, loose, fine.

Horizon	AP1	AP2 (BW)	CB
Very coarse sand	3.67	2.76	6.9
Coarse sand	2.16	2.3	4.6
Medium sand	4.77	4.14	11.5
Fine sand	6.9	13.4	27.6
Very fine sand	27.5	18.9	18.4
Silt	17.5	24	10
Clay	37.5	34.5	21
pH	8.21	8.15	8.26
C.E.C.	33.2	35.4	27.6
Total lime	4	2	12
Active lime	1.5	1.1	2.3
Organic matter	18.96	13.79	12.06
Nitrogen	1.1	0.8	0.6
Exchang. potassium	117	81	79
Exchang. magnesium	104	87	80
Exchang. sodium	65	6	4
Electrical conduct.	0.17	0.197	0.098

See Unit of Measurement Method on page 55.



## S. COSTANZA UNIT



### Morphological and genetic notes

The unit occupies the convex and linear slopes with a slight incline. The texture goes from fine silty to fine clayey above the Pliocene sands. The subsoil is made up of silty clay and clayey silt sediments of the Pliocene. The soils have the Ap1-Ap2(Bg)-Cn profile; they are not deep, with evident signs of salinity and high sodium content, mostly near the deeper horizon.

- AP1 0-10 cm / 0-4 inches: light olive brown, with a structure ranging from weakly-developed medium prismatic to moderately-developed medium angular polyhedral, with a clayey loam texture, very high in lime, pH 8.18.
- Ap2(Bg) 10-50 cm / 4-20 inches: light olive brown, moderately developed medium prismatic structure, loamy texture, very high in lime, with pH 8.07.
- Cn 50-130 cm / 20-51 inches: gray, massive structure, very compact, clayey loam texture, very high in lime, with pH 8.25. Organic matter decreases as depth increases; the increase in C.E.C does not consistently follow depth.

### Hydromorphy

Because of the texture and the presence of grayish-blue patinas due to hydromorphy already evident on the surface, it is clear that there is poor internal drainage.

The available water content (AWC) is low; during summer these soils tend to crack.

### Field Observations

Soil layers with a clay or fine clay texture, high in salt and sodium, are found in this unit, mostly in the areas of La Marchigiana and S. Costanza, where these soils prevail. They belong to the Aquic Xerothents, soils in which the saline, sodic and clay subsoils appear.

Profile P6			
Pedological Unit: SANTA COSTANZA SC			
Classification ( <i>Soil Taxonomy</i> ): Aquic Xerochrepts, fine silts.			
Horizon	AP1	AP2 (BG1)	CN
Very coarse sand	0.56	0.61	0.1
Medium sand	1.08	0.99	0.18
Fine sand	6.28	8.18	1.35
Very fine sand	35.6	32.4	25.6
Silt	32.98	34.5	35.27
Clay	23.5	23.32	37.5
pH	8.18	8.07	8.25
C.E.C.	25.3	24.2	27.2
Total lime	27	27	29
Active lime	3.1	3.2	3.5
Organic matter	22.4	20.68	15.51
Nitrogen	0.9	—	—
Exchang. potassium	129	150	84
Exchang. magnesium	137	98	421
Exchang. sodium	41	21	543
Electrical conduct.	0.229	0.262	0.837

See Unit of Measurement Method on page 55.



# POGGIO ALLE MURA UNIT



## Morphological and genetic notes

This unit occupies slightly concave linear slopes. The subsoil consists of polygenic conglomerates of sandy matrix, sometimes diagenized. Rounded to sub-rounded skeleton is present. The soils have an Ap-CB-R puddingstone profile (reference profiles P 318) and a compact layer of gravel at 90 cm / 35 inches. There are moderately deep soils with skeleton ranging from common to abundant in depth. Sometimes moderately structured, light blue clay-silty layers are found.

- AP 0 - 40/50 cm / 0 - 16/20 inches: The surface is brown, with moderately developed medium sub-angular polyhedral structure, clayey-sandy-loam texture, fine loam, calcareous, with common pebbles with pH 8.16.
- CB 40/50 - 90 cm / 16/20 - 35 inches: the underlying horizon is pale brown, ranging from a slightly developed medium sub-angular polyhedral structure, to one that has a sandy-loam texture, coarse loam high in skeleton, and is calcareous with abundant pebbles, with pH 8.2.
- R 90+ cm / 35+ inches: The horizon is formed by a gravel that is often fused.

## Hydromorphy

The skeleton causes a fairly high permeability and a good-to-excessive internal drainage.

## Profilo P318

Pedological Unit: POGGIO ALLE MURA PM

Classification (*Soil Taxonomy*): Typic Xerochrept, loose.

Horizon	AP	CB
Coarse sand	21.7	26.3
Fine sand	29.1	52
Limo grosso	3	3
Limo fine	14.7	8.5
Clay	31.5	10.2
pH	8.16	8.2
C.E.C.	30.4	20.1
Total lime	18	49
Active lime	2.3	3.9
Organic matter	25.8	18.9
Nitrogen	1.3	0.7
Exchang. potassium	122	113
Exchang. magnesium	82	60
Exchang. sodium	53	22
Electrical conduct.	0.185	0.125

See Unit of Measurement Method on page 55.



# PIANO D'ORCIA UNIT

*High skeleton type*



## Morphological and genetic notes

This unit occupies slightly inclined colluvia that connect to the valley floor. The subsoil consists of sediments with pebbles originating from floods of the Ombrone river area of transition with the Casanuova Unit. Rounded to sub-rounded skeleton present. The soils have an Ap-C profile (reference profiles P 202-203). They are deep soils with skeleton ranging from common to abundant in depth, and calcareous. At times, light hazel colored, moderately structured silty layers, lacking skeleton, are found.

- AP 0-40 cm / 0-16 inches: The surface is brown, with moderately developed medium sub-angular polyhedral structure, sandy loam texture, coarse loam, calcareous, with pebbles with pH 8.14.
- C 40-100 cm / 16-39 inches: the underlying horizon is pale brown, with a slightly developed fine polyhedral structure in a loose sand; skeleton-rich, sandy loam to sandy, skeleton-rich, texture, calcareous with abundant pebbles, with pH 8.16.

## Hydromorphy

The skeleton determines an elevated permeability and excessive internal drainage.

### Profilo P202-203

Pedological Unit:

PIANO D'ORCIA

HIGH SKELETON TYPE-POS

Classification (*Soil Taxonomy*): Xerofluvents, skeletal, sandy.

Horizon	AP	C
Coarse sand	25	43
Fine sand	44	32
Limo grosso	8	11
Limo fine	12	4
Clay	11	10
pH	8.14	8.16
C.E.C.	21.3	21.9
Total lime	37	40
Active lime	3.5	3.9
Organic matter	15.4	10.3
Nitrogen	0.5	0.4
Exchang. potassium	99	86
Exchang. magnesium	32	49
Exchang. sodium	39	22
Electrical conduct.	—	—

See Unit of Measurement Method on page 55.



## PASCENA II UNIT



### Morphological and genetic notes

The unit occupies weakly inclined slopes characterized by moderate tillage shaping, with poor or no skeleton. Silty sediments of the Pliocene that rest on sands of marine origin form the subsoil. The soils had the Ap1-Ap2(BCK)-C profile, where the suffix Ap2 takes into account that the trenching has also touched the BCK horizon; they are deep, with medium small skeleton, ranging from absent to scarce.

- AP1 0-20 cm / 0-8 inches: the surface is light olive- brown, with a moderately developed medium, sub-angular polyhedral structure, with a sandy loam texture, very calcareous, pH factor 8.19.
- Ap2(BCK) 20-80 cm / 8-31 inches: the underlying horizon, olive-brown, has a moderately developed medium sub-angular polyhedral structure, as evidence of the trenching; with a loamy texture; very calcareous, with pH 8.16.
- CB 80-130 cm / 31-51 inches: light olive-brown, sub-angular polyhedral structure; with a loamy texture, calcareous, with pH 8.14.

### Hydromorphy

Signs of hydromorphy on the surface indicate poor internal drainage. The available water content (AWC) is low. This unit was mapped separately from the La Pieve Unit (LP-P4), because it has less skeleton and is typical of a different environment. The soils of P11 profile have been described in order to provide indications of their present use; in the past, these soils were subject to soil leveling that physically impoverished the highlands, where the P11 profile was opened, carrying material towards the valley. The soils of the profile are pedologically young, Aquic Xerothents, with a useful depth of 60 cm / 24 inches and a compact, massive horizon, strongly hydromorphic from 60 cm / 24 inches downwards.

### Profile P8

Pedological Unit: PASCENA PS II

Classification (*Soil Taxonomy*): Calcixerollic Xerochrepts, fine silts.

Horizon	AP1	AP2 (BCK)	CB
Very coarse sand	0.78	1.68	0.65
Coarse sand	0.97	2.24	0.67
Medium sand	2.15	7.28	1.98
Fine sand	4.29	14.9	5.2
Very fine sand	24.31	22.4	29.5
Silt	43	27.5	42.5
Clay	24.5	24	19.5
pH	8.19	8.16	8.14
C.E.C.	28.2	26.4	23.5
Total lime	38	37	27
Active lime	3.9	3.7	3.2
Organic matter	12.06	10.34	10.34
Nitrogen	0.6	0.5	0.5
Exchang. potassium	62	61	60
Exchang. magnesium	38	137	302
Exchang. sodium	5	4	5
Electrical conduct.	0.793	0.821	0.816

See Unit of Measurement Method on page 55.



# PASCENA UNIT



## Morphological and genetic notes

The unit occupies structured terraces and the linear slopes with a slight incline. The subsoil is made up of sandy sediments of marine origin with conglomerate levels of the Pliocene. It also has an abundant, rounded skeleton. These soils are often in contact with clay and silty-clayey sediments of the Pliocene. The soils have an Ap1-Ap2(Bk)-C profile (reference profile is P9-12) with pebbly layers with an Ap1-Ap2-C profile (reference profile P10). The suffix Ap2 of P9 takes into account that soil trenching has touched the deep Bk horizon; they are moderately deep with skeletons ranging from frequent to abundant: medium until 60/70 cm / 24/28 inches, and abundant from 60/70 to 110/120 cm / 24/28 to 43/48 inches.

- AP1 0-20 cm / 0-8 inches: the surface is yellowish-brown, with a moderately developed, medium sub-angular polyhedral structure, a sandy loam texture, calcareous, pH factor 8.03.
- Ap2(Bk) 20-60 cm / 8-24 inches: the underlying horizon, dark yellowish-brown, moderately developed medium prismatic structure, to medium angular polyhedral. The subsoil consists of sandy marine sediments with conglomerate levels of the Pliocene; there is an abundant, rounded skeleton, with a loamy texture, from calcareous to very calcareous, with pH 8.07.
- C 60+ cm / 24+ inches: deep horizon is often very pebbly, weakly structured, sometimes high in calcium carbonate (profile P 12). As depth increases, organic matter and C.E.C. decrease.

## Hydromorphy

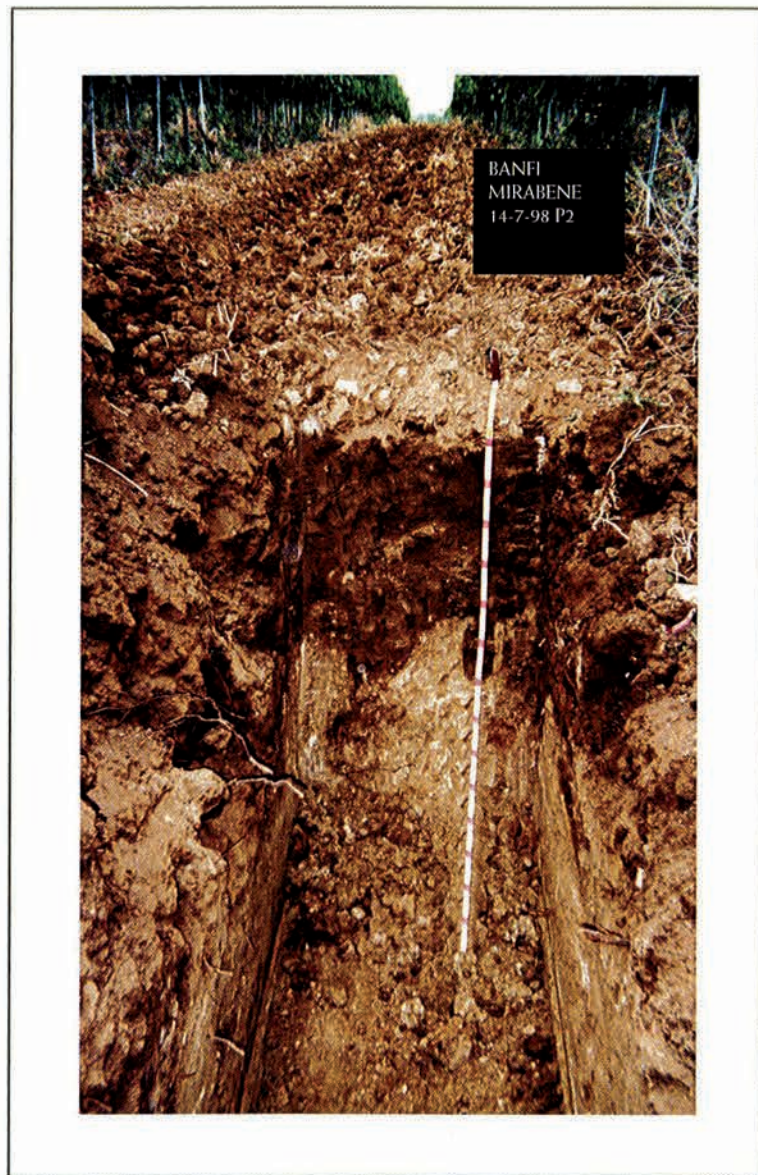
The presence of skeleton and lack of signs of hydromorphy are proof of good internal drainage. The available water content (AWC) is moderate, only 74 mm / 3 inches for a soil volume of 70 cm / 28 inches in depth. A variant of the Pascena Unit was identified where the calcium carbonate and fine sand contents increased with depth, with soils belonging to the Xerochrets calcixerollics, borderline between fine loamy and fine silty soils.

Profile P9		
Pedological Unit: PASCENA PS		
Classification ( <i>Soil Taxonomy</i> ): Typic Xerochrepts, (calcixerollic) skeletal, loose, coarse.		
Horizon	AP1	AP2 (BK)
Very coarse sand	2.79	2.8
Coarse sand	0.93	1.68
Medium sand	5.58	6.72
Fine sand	24.4	25.5
Very fine sand	24.8	13.8
Silt	25	35
Clay	16.5	14.5
pH	8.03	8.07
C.E.C.	21.8	21.3
Total lime	15	26
Active lime	2.4	3.2
Organic matter	13.79	17.24
Nitrogen	0.6	0.8
Exchang. potassium	66	8
Exchang. magnesium	90	161
Exchang. sodium	4	4
Electrical conduct.	0.483	0.223

See Unit of Measurement Method on page 55.



# MIRABENE UNIT



## Morphological and genetic notes

The unit occupies terraces that are high and flat or with a slight incline. Sandy sediments of marine origin with conglomerate levels form the subsoil. The soils have an Ap1-Ap2(Bg)-C profile, where the suffix Ap2 takes into account that the trenching has also affected the Bg horizon: they are moderately deep with a common skeleton, moderate, until about 60-70 cm / 24-28 inches, and absent from 60-70 cm to 110 cm / 24-28 to 43 inches.

- AP1 0-25 cm / 0-10 inch: dark yellowish-brown, moderately developed, medium polyhedral angular structure, loamy texture, weakly calcareous, pH 8.03.
- AP2 (Bg) 25-70 cm / 10-28 inches: dark yellowish-brown, structure ranging from weakly developed medium prismatic to moderately-developed medium angular polyhedral, reflecting trenching; with a sandy-loam texture, slightly calcareous, pH 8.07.
- C 70-110 cm / 28-43 inches: yellowish-brown, massive, with a clayey loam texture, very calcareous, with pH 8.1. As depth increases, both organic matter and C.E.C. decrease.

## Hydromorphy

Evident signs of hydromorphy due to insufficient internal drainage are found on the second horizon.

Profile P2			
Pedological unit: MIRABENE MI			
Classification ( <i>Soil Taxonomy</i> ): Aquic Xerochrepts, fine loams.			
Horizon	AP1	AP2 (BG)	C
Very coarse sand	1.09	2.65	3.57
Coarse sand	2.18	3.97	5.35
Medium sand	7.63	19.08	2.98
Fine sand	10.68	5.25	8.27
Very fine sand	25	36.8	24.83
Sili	29.5	20.1	26.5
Clay	24	12.15	28.5
pH	8.03	8.07	8.15
C.E.C.	24.5	21.8	23.6
Total lime	4	5	29
Active lime	1.7	1.8	3.4
Organic matter	20.6	18.9	10.3
Nitrogen	0.9	—	—
Exchang. Potassium	70	78	71
Exchang. Magnesium	29	31	29
Exchang. sodium	4	5	4
Conduct. eletrtrical	0.065	0.066	0.077

See Unit of Measurement Method on page 55.



# MADONNINO UNIT



## Morphological and genetic notes

This unit occupies alluvial terraces that are level or have a slight incline. The subsoil is made up of terraced alluvial deposits that are prevalently silty and sandy silty. The soils have an Ap1-Ap2 (Bw)-Bw2k profile, and are deep and lacking, or nearly lacking, skeleton.

- AP1 0-35 cm / 0-14 inches: brown, with a structure ranging from moderately developed big prismatic to moderately developed medium angular polyhedral, loamy texture; weakly calcareous, with pH 8.14.
- Ap2(Bw) 35-90 cm / 14-35 inches: from brown to dark brown, has a medium, moderately developed prismatic structure, loamy texture; weakly calcareous, with pH 8.28.
- Bw2K 90-110 cm / 35-43 inches: yellowish-brown, with a fine moderately developed prismatic structure, even though this layer proved to be very compact and impenetrable for roots, with a loamy texture, very calcareous, with pH 8.31. Organic matter varies with depth and the C.E.C. increases unevenly with depth.

## Hydromorphy

The accumulation of calcium carbonate in depth and the presence of a grayish-blue patina indicate an imperfect internal drainage and suggest that water stagnates at 90 cm / 35 inches and deposits the carbonate through evaporation. These soils have a slight tendency to crack and form superficial crusts. The available water content (AWC) is moderate.

## Profilo P18

Pedological Unit: MADONNINO MA

Classification (*Soil Taxonomy*): Typic Xerochrepts, fine silts.

Horizon	AP1	AP2 (Bw)	Bw2k
Very coarse sand	2.05	1.92	1.62
Coarse sand	1.64	1.54	1.08
Medium sand	4.51	4.24	2.7
Fine sand	8.8	7.5	7.8
Very fine sand	26.5	29.8	31.3
Silt	30	35.5	29.5
Clay	26.5	19.5	26
pH	8.14	8.28	8.31
C.E.C.	25.7	24.2	26.6
Total lime	2	2	15
Active lime	1.1	1.2	2.7
Organic matter	18.96	22.4	17.24
Nitrogen	0.9	1	0.8
Exchang. potassium	82	80	79
Exchang. magnesium	91	90	108
Exchang. sodium	4	6	8
Electrical conduct.	0.103	0.122	0.116

See Unit of Measurement Method on page 55.



# LECCINI UNIT



## Morphological and genetic notes

The unit occupies the convex slopes mostly cultivated with specialized tree crops; in the area with greater incline, one observes moderate channel erosion. The subsoil is made up of coarse sandy sediments of the Pliocene. The soils have an Ap-C profile; they are moderately deep, high in lime; when in contact with clays they may show signs of hydromorphy due to stagnation from contact.

- AP 0-30 cm / 0-12 inches: yellowish-brown, with a polyhedral, sub-angular structure, medium, weakly developed, sandy loam texture, high in lime, with pH 8.12.
- C 30-110 cm / 12-43 inches: yellowish brown, massive and compact structure, with a sandy loam texture, high in lime, with pH 8.38. As depth increases, organic matter and C.E.C. decrease.

## Hydromorphy

Relative to the structure and texture, the internal drainage is excessive. The available water content AWC (soil survey of England and Wales) is moderate to high.

## Profile P5

Pedological Unit: LECCINI LE

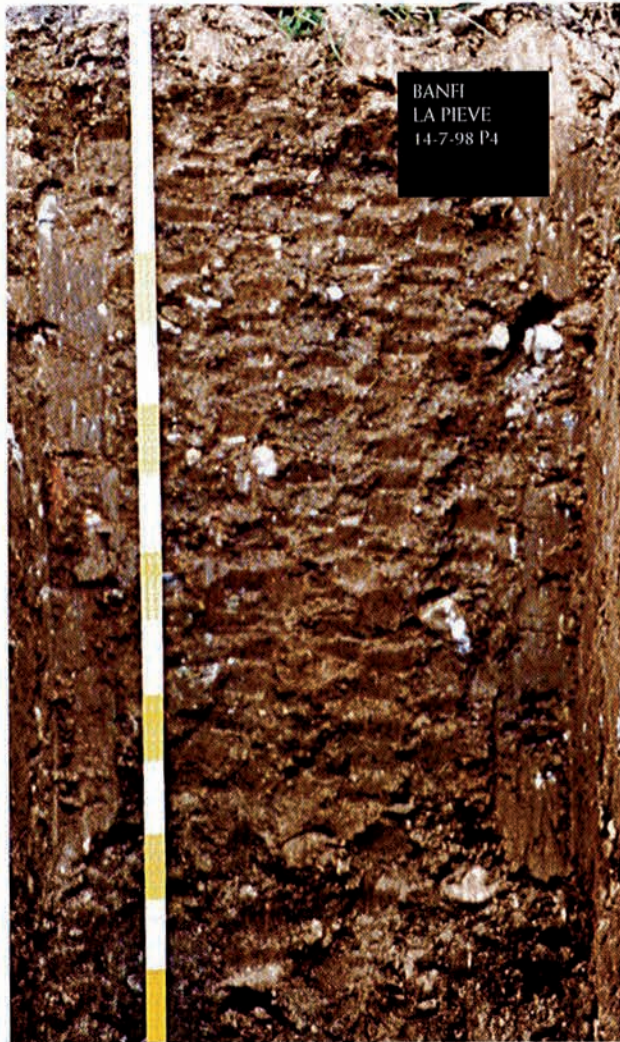
Classification (*Soil Taxonomy*): Xerochrepts, loose, coarse.

Horizon	AP1	C
Very coarse sand	1.4	1.4
Coarse sand	1.96	3.25
Medium sand	2.24	2.55
Fine sand	37.7	39.3
Very fine sand	16.7	16.9
Silt	24.5	24.6
Clay	15.5	12
pH	8.12	8.38
C.E.C.	24.8	22.6
Total lime	17	16
Active lime	2.8	2.6
Organic matter	20.8	13.7
Nitrogen	0.9	—
Exchang. potassium	204	73
Exchang. magnesium	115	419
Exchang. sodium	4	5
Electrical conduct.	0.197	0.274

See Unit of Measurement Method on page 55.



# LA PIEVE UNIT



## Morphological and genetic notes

The unit occupies the slopes shaped as terraces and the linear slopes with a slight incline. The subsoil is made up of silty sediments, high in skeleton, resting on the sands of the Pliocene. The soils have an Ap1-Ap2(Bg1)-Bg2 profile, where the suffix Ap2 takes into account that the trenching has also touched the Bg1 horizon; they are deep, with frequent skeleton, medium structure, up to 60-70 cm / 24-28 inches and scarce-medium from 60/70 cm to 110 cm / 24/28 to 43 inches.

- AP1 0-25 cm / 0-10 inch: light olive-brown, with a moderately-developed medium sub-angular polyhedral structure, loamy texture, very high in lime, pH 8.25.
- AP2 (Bg1) 25-70 cm / 10-28 inches: light olive brown, moderately-developed medium prismatic structure, clayey loam texture, very high in lime, pH 8.23.
- Bg2 70-110 cm / 28-43 inches: light olive brown, with a structure ranging from moderately developed medium prismatic to moderately developed angular polyhedral, clayey loam texture, very high in lime, pH 8.28. Organic matter decreases as depth increases, and the C.E.C increases with depth.

## Hydromorphy

Evident signs of hydromorphy due to bad internal drainage are already found on the surface. The available water content (AWC) is moderate.

### Profile P4

Pedological Unit: LA PIEVE LP

Classification (*Soil Taxonomy*): Aquic Xerochrepts, fine silts.

Horizon	AP1	AP2(BG1)	C
Very coarse sand	0.98	2.57	1.77
Coarse sand	1.56	4.12	0.51
Medium sand	1.36	3.61	5.98
Fine sand	3.56	9.96	3.94
Very fine sand	32.1	23.3	22.3
Silt	34	25	32.5
Clay	26.5	31.5	33
pH	8.25	8.23	8.28
C.E.C.	25.8	26.4	26.8
Total lime	26	23	27
Active lime	3.2	3	3.3
Organic matter	18.9	18.6	13.7
Nitrogen	0.8	—	—
Exchang. potassium	98	72	81
Exchang. magnesium	75	227	105
Exchang. sodium	31	32	69
Electrical conduct.	0.106	0.14	0.195

See Unit of Measurement Method on page 55.



# LA PIEVE LPS UNIT

## Profile P13

Pedological unit: LA PIEVE LPs • thin, skeleton-rich variation

Classification (*Soil Taxonomy*) Xerochrepts acquici.

Horizon	AP1	AP2 (BG1)	C
Very coarse sand	0.98	2.57	1.77
Coarse sand	1.56	4.12	0.51
Medium sand	1.36	3.61	5.98
Fine sand	3.56	9.96	3.94
Very fine sand	32.1	23.3	22.3
Silt	34	25	32.5
Clay	26.5	31.5	33
pH	8.25	8.23	8.28
C.E.C.	25.8	26.4	26.8
Total lime	26	23	27
Active lime	3.2	3	3.3
Organic matter	18.9	18.6	13.7
Nitrogen	0.8	—	—
Exchang. potassium	98	72	81
Exchang. magnesium	75	227	105
Exchang. sodium	31	32	69
Electrical conduct.	0.106	0.14	0.195

## Hydromorphy and genetic notes

Loose soil with abundant skeleton, strong channel erosion, severe in the highly slanted areas, characterize the soils of the thin, skeleton-rich, variation of La Pieve unit (P4 profile). These are similar but finer (thinner) soils, with more skeleton. The soils of the P.13 profile belong to the Acquici Xerochrepts, borderline between clayey-loam and silty-clay, even though, due to their physical and hydrological characteristics, they have been marked on the map within the above-mentioned unit belonging to the fine silts. There is a lithological discontinuity typical of these soils that rest on coarse sands. In fact, they are in close contact with the sands. The available water content (AWC) is moderate.

See Unit of Measurement Method on page 55.



# COLLORGIALI UNIT



## Morphological and genetic notes

The unit occupies weakly convex or linear slopes with moderate incline and signs of human activity. Soils have a fine clayey texture. The subsoil is made up of clays with calcareous stones associated with gypsum crystals. The soils have an Ap-CBn-Cn profile, and they are moderately deep with evident signs of salinity and sodicity.

- AP 0-35 cm / 0-14 inches: light olive brown, with a weakly developed medium sub-angular polyhedral structure, with a clayey loam texture, calcareous, pH factor 8.11; the electrical conductivity is slightly high.
- CBn 35-85 cm / 14-33 inches: clear olive brown, presenting a weakly developed medium sub-angular polyhedral structure, with clayey loam texture; calcareous, with pH 8.28, high E.C. and very high sodium content.
- Cn 85-110 cm / 33-43 inches: grayish-brown, with a massive and very compact structure, a clayey loam texture, calcareous, with pH 8.22. The electrical conductivity is very high, as is the sodium content. Organic matter decreases as depth increases, while the C.E.C. varies unevenly with depth.

## Hydromorphy

Even a superficial inspection reveals a grayish-blue patina that indicates poor internal drainage. The available water content (AWC) is moderate. During summer many of these soils tend to crack. In areas where human impact or pedogenesis, together with superficial erosion, caused the deep salty and sodic horizons of the Collorgiali Unit to emerge, the artificially modified phase of this unit was mapped.

### Profile P16

Pedological Unit: COLLORGIALI CO

Classification (*Soil Taxonomy*): Xerarents, fine saline-sodium clay.

Horizon	AP1	CBn	Cn
Very coarse sand	1.3	2.16	0.84
Coarse sand	1.3	1.44	0.63
Medium sand	3.9	3.6	2.73
Fine sand	4.6	3.13	1.24
Very fine sand	18.4	28.17	23.56
Silt	34	26.5	33.5
Clay	36.5	35	37.5
pH	8.11	8.28	8.22
C.E.C.	31.3	23.6	30.3
Total lime	20	24	20
Active lime	3.2	3.5	3.1
Organic matter	22.41	18.36	13.79
Nitrogen	1.2	1	0.8
Exchang. potassium	180	91	99
Exchang. magnesium	143	392	417
Exchang. sodium	72	400	460
Electrical conduct.	0.73	1.187	1.452

See Unit of Measurement Method on page 55.



# CERRETALTO SORRENA UNIT



## Morphological and genetic notes

This unit occupies linear slopes or slightly convex slopes with signs of human impact. The subsoil consists of polygenic conglomerates of clayey-sandy matrix. Rounded to sub-rounded skeleton is present. The soils have an Ap1-C profile (reference profiles P320), with pebbly layers and a compact layer of gravel at 90 cm / 35 inches. They are moderately deep soils with abundant skeleton.

- AP1 0 – 40/50 cm / 0 - 15/20 inches: the surface is dark yellowish brown, with a moderately developed medium sub-angular polyhedral structure. Sandy loam texture, sandy high in skeleton, calcareous, loose, with pH 8.1.
- CB 40/50 - 90 cm / 15/20 - 35 inches: the underlying horizon is pale brown, with a structure ranging from weakly developed fine sub-angular polyhedral to loose sandy loam texture, sandy, skeleton-rich, calcareous with abundant pebbles, pH 8.2.

## Hydromorphy

The skeleton shows evidence of high permeability and excessive internal drainage.

## Profile P320

Pedological Unit: CERRETALTO SORRENA CS

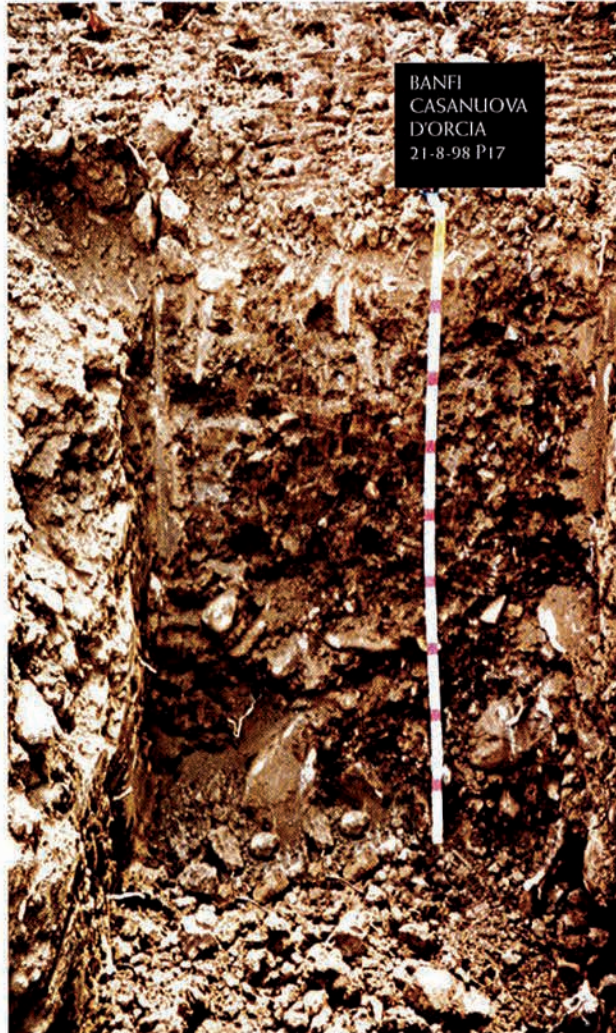
Classification (*Soil Taxonomy*): Typic Xerorthent, skeletal, sandy.

Horizon	AP1	C
Coarse sand	43.4	62
Fine sand	24	17.5
Sand silt	2.3	1.6
Fine silt	15.1	10
Clay	15.2	9.3
pH	8.1	8.2
C.E.C.	22.1	19.2
Total lime	40	49
Active lime	3.6	3.8
Organic matter	20.6	18.9
Nitrogen	0.9	0.7
Exchang. potassium	122	114
Exchang. magnesium	63	50
Exchang. sodium	49	22
Electrical conduct.	0.291	0.075

Unit of Measurement Method		
Very coarse sand	%	Hydrometer
Coarse sand		
Medium sand		
Fine sand		
Very fine sand		
Silt		
Clay		
pH		1:2.5 in water
C.E.C.	meq/100g	BaCl <sub>2</sub> +Tea
Total lime	%	Volumetric Gas
Active lime	%	Drouineau-Gehu
Organic matter	g/kg	Walkley/Black
Nitrogen	g/kg	Kjeldahl
Exchang. potassium	mg/kg	BaCl <sub>2</sub> +Tea
Exchang. magnesium	mg/kg	BaCl <sub>2</sub> +Tea
Exchang. sodium	mg/kg	BaCl <sub>2</sub> +Tea
Electrical conduct.	mS/cm	1:2.5 in water



# CASANUOVA D'ORCIA UNIT



## Morphological and genetic notes

The unit occupies the slightly sloped colluvia, flow fan formations that are flat or have a slight incline. The subsoil is made up of alluvial deposits with soils of silty and fine sandy texture with pebbles. The soils have an Ap-Bw-Cr profile, and they are moderately deep, with medium-large skeleton ranging from frequent to abundant as depth increases.

- AP 0-25 cm / 0-10 inches: light olive brown, with a moderately-developed medium sub-angular polyhedral structure, with a loamy texture, calcareous, pH factor 8.21.
- Bw 25-60 cm / 10-24 inches: olive brown, with a weakly developed medium angular polyhedral structure, with a loamy texture, calcareous, with pH 8.23.
- Cr 60+ cm / 24+ inches: The gravel is sometimes fused.

## Hydromorphy

As depth increases, organic matter and C.E.C. decrease. Texture, presence of skeleton, and absence of the bluish-gray patina of hydromorphy indicate a fairly good internal drainage. The total available water content (AWC) is low.

## Profile P17

Pedologic unit: CASANUOVA D'ORCIA CNO

Classification (*Soil Taxonomy*): Fluventic Xerochrepts, loamy skeleton resting on pebbles.

Horizon	AP1	Bw
Very coarse sand	2.02	1.73
Coarse sand	1.21	1
Medium sand	4.87	6.37
Fine sand	13.7	7.6
Very fine sand	16.7	22.8
Silt	39.5	39
Clay	22	21.5
pH	8.21	8.23
C.E.C.	26.3	24.8
Total lime	5	5
Active lime	1.5	1.4
Organic matter	25.86	24.13
Nitrogen	1.2	1.1
Exchang. potassium	129	78
Exchang. magnesium	105	90
Exchang. sodium	4	4
Electrical conduct.	0.235	0.106

See Unit of Measurement Method on page 55.



# CASACCIA UNIT



## Morphological and genetic notes

This unit occupies alluvial plain or slightly inclined terraces. The substratum is made up of terraced alluvial deposits that are mostly sandy, with pebbles. The soils have an Ap1-Ap2 (Bt)-CB-Cr profile, and range from deep to moderately deep, with medium-big skeleton, ranging from common to abundant in depth.

- AP1 0-20 cm / 0-8 inches: yellowish-red, moderately developed medium sub-angular polyhedral structure, clay-loam texture, ranging from lightly calcareous to non-calcareous, pH factor 7.25.
- Ap2(Bt) 20-60 cm / 8-24 inches: reddish-brown, has a medium slightly developed prismatic structure, with a clayey-loamy texture, from lightly calcareous to non-calcareous, with pH 6.6.
- CB 60-110 cm / 24-43 inches: dark reddish-brown, with a disjointed structure, abundant skeleton, clayey-loamy texture, non-calcareous, with pH 7.25. From 110 cm / 43 inches downward, there is a layer of compact gravel. Organic matter varies with depth and the C.E.C varies unevenly with depth.

## Field Observations

When the deep skeleton emerges, the variations of the Casaccia P30 soils are revealed.

## Profile P30

Pedological Unit: CASACCIA CA

Classification (*Soil Taxonomy*): Typic Haploxeral-fs, loose, fine.

Horizon	AP1	AP2 (Bt)	CB
Very coarse sand	1.04	0.9	2.75
Coarse sand	2.25	0.72	2.2
Medium sand	4.68	6.98	6.05
Fine sand	7.3	8.4	4.7
Very fine sand	24.4	25.5	26.8
Silt	29	25	21
Clay	31.4	32.5	36.5
pH	7.25	6.66	7.25
C.E.C.	29.7	30.8	28.6
Total lime	2	2	2
Active lime	1	1	1
Organic matter	22.41	13.7	13.7
Nitrogen	1.1	0.7	0.8
Exchang. potassium	94	77	78
Exchang. magnesium	116	122	136
Exchang. sodium	5	4	4
Electrical conduct.	0.159	0.045	0.044

See Unit of Measurement Method on page 55.



# CARDETA UNIT



## Morphological and genetic notes

This unit occupies slightly inclined slopes towards the terraces of the Madonnino and Casaccia Units. The subsoil is made up of preneogenic deposits consisting of clays, marlschists and marl calcareous saddles. The soils have an Ap1-Ap2 (Bss)-CB profile, and range from deep to moderately deep, with medium-large skeleton ranging from common to scarce in depth.

- AP1 0-30 cm / 0-12 inches: from light olive brown and grayish-brown, with a structure ranging from moderately developed big prismatic to moderately developed medium angular polyhedral, clayey loamy texture, calcareous, with pH 8.06.
- Ap2(Bss) 30-70 cm / 12-28 inches: clear olive brown, with a large moderately- developed prismatic structure, clayey loamy texture, and fine clayey, very calcareous, with pH 8.55. Gypsum is present.
- CB 70-110 cm / 28-43 inches: from light olive brown to grayish-brown, with a massive, compact structure, loamy and clayey-loamy texture, very calcareous, with pH 8.7. Gypsum is present in crystals. Organic matter varies with depth and the C.E.C decreases unevenly with depth, and also in relation to the texture.

In the legend there are also some soil descriptions reported according to their pedological profiles (Pian d'Orcia, Collupini). Their nature will be the subject of dedicated studies in successive work regarding areas of interest for future vineyards. The soils of the Collupini Unit, profile reference P.31 and P.32, belonging to the Xerochrepts Acquici, can be found on the same pedogenetic subsoil, but on regular, linear slopes with a slight incline. These soils range from deep to moderately deep, rich in skeleton, well structured.

Profilo P20			
Pedological Unit: CARDETA CD			
Classification ( <i>Soil Taxonomy</i> ): Vertic Xerochrepts, fine silts and fine clay.			
Horizon	AP1	AP2 (Bss)	CB
Very coarse sand	1.29	1.32	2.84
Coarse sand	0.86	1.06	1.42
Medium sand	2.15	2.92	2.84
Fine sand	3	2.9	2.7
Very fine sand	27.2	26.8	24.2
Silt	33.5	29.5	39
Clay	32	35.5	27
pH	8.06	8.55	8.7
C.E.C.	30.3	30.9	27.2
Total lime	20	23	30
Active lime	3.1	3.4	3.8
Organic matter	17.24	15.5	15.5
Nitrogen	0.7	0.7	0.8
Exchang. potassium	82	79	7
Exchang. magnesium	246	207	80
Exchang. sodium	30	51	85
Electrical conduct.	0.136	0.068	0.196

See Unit of Measurement Method on page 55.