SUMMARY

Semihumid environmental conditions of the study area have a direct bearing on the characteristics of soils developed there, being a key factor vegetation on the physical, chemical and biological soil parameters.

These relationships are manifested in different soil parameters so that:

Gravimetric values throughout the year humidity have direct relationships with average rainfall recorded, and reverse with average air temperatures obtained from the meteorological station.

The annual average gravimetric moisture content of the soil are always higher under herbaceous species, followed by the soils that supports vegetation of medium size (*Ulex parviflorus* and *Santolina chamaecyparissus*), with the lowest levels of gravimetric moisture obtained in the hallways.

In the months of December, February, April and July and a decrease is observed in volumetric moisture levels, with a few exceptions especially in soils under the species *Rosmarinus officinalis*, *Santolina chamaecyparissus* and *Ulex parviflorus* (in December), and on rocky corridor and low herbaceous species *Brachypodium retusum* (in June). But from August to November moisture contents are increasing progressively in most sampling points except under the species *Rosmarinus officinalis*, *Cistus albidus* and *Brachypodium retusum* (in August) and low *Ulex parviflorus* (in October).

Textural values denote a medium high clay content in all sampling points, and a low deviation. Most clay micropores and water causes an elevation tightly held by the soil structure (*Juniperus oxycedrus*), while slight changes of these parameters cause a decrease in water content of useful (*Lavandula latifolia*, *Ulex parviflorus*, *Brachypodium retusum* and *Santolina chamaecyparissus*).

The state of aggregation of the soil is a synthetic parameter able to explain soil quality of the area to be influenced by the processes of soil evolution, erosion by vegetation, the use and the physical and chemical properties of soil.

The results of soil aggregation indicate that the average monthly values of the different fractions of the samples of surface soil (A_1 horizon) have a predominant distribution of aggregates during the year following the pattern 5-2 mm > 2-1 mm > <1 mm > 10-5 mm > > 10 mm. Seasonally, the highest percentages of older fractions (> 10 and 10-5 mm) predominate in the subsurface horizons (A_2). In the intermediate fraction 5-2 mm this occurs in the summer months (June to August), and in the months of February and May, being in the remaining months of the year where surface soils (A_1) have higher values the subsurface (A_2). In contrast, smaller fractions (2-1 mm and <1 mm), for every month of the year, higher percentages are recorded in the surface horizons (A_1).

The root aggregating action occurs in the summer and spring, when it increases the mucilaginous layer that exists around the roots that gives the land a cementing action on the particles produced by the roots and bacteria from the root zone.

The results obtained show different microenvironments for both dry and wet soil, the increased stability for the species *Brachypodium retusum*, followed by low aromatic soils and finally corridors. Increasing moisture content increases the stability of aggregates (pF 1), a fact that is also evident in the months in which there is increased rainfall (January to October), with a sharp decline in dry months (July).

Similar to the results obtained with an average diameter of microaggregates, the highest average values of water stable microaggregates are reached in soils under *Brachypodium retusum* and *Santolina chamaecyparissus*, followed with somewhat lower values soils under *Cistus albidus*, *Lavandula latifolia* and *Ulex parviflorus*, showing lower values in soils under *Rosmarinus officinalis*, *Juniperus oxycedrus* and hallways.

From the mean values of fine fraction microaggregated, it appears that the ground under *Lavandula latifolia* is the one with the highest percentage, down to the soil under *Brachypodium retusum*, *Santolina chamaecyparissus*, *Thymus vulgaris* and *Ulex parviflorus* with very similar values between them, *Juniperus oxycedrus* still low, *Rosmarinus officinalis* and hallways where they have obtained the lowest percentages. In soils group corridors highest percentages of microaggregated fine fraction obtained in the rocky corridor in the nude.

The relative aggregation rate established according to the particular texture of each horizon, indicates the proportions in which the primary mineral (texture) are arranged to form "clusters of particles" larger or microstructural units, yielding the highest average values soils under *Brachypodium retusum*, followed by soils under *Lavandula latifolia*, *Ulex parviflorus* and *Santolina chamaecyparissus*, being under *Juniperus oxycedrus*, *Rosmarinus officinalis* and hallways where the lowest index values relative aggregation are observed.

The mean values of bulk density are low in general, and tend to increase with great variability in the cold months and lower in the warmer months (minimum in the months of June and July and peaks in September and January), more localized values high in the corridors and on the species *Juniperus oxycedrus*, *Thymus vulgaris* and *Cistus albidus*. Intermediate bulk density values correspond to soils under *Santolina chamaecyparissus* aromatic species and herbaceous species under *Brachypodium retusum* being soils under aromatic species *Rosmarinus officinalis* and *Lavandula latifolia* those with the lowest average values of bulk density. The greatest variability observed in the bare floor hallway and under the aromatic species *Thymus vulgaris*, while the lowest variability is obtained in the stony soil and under *Juniperus oxycedrus*.

The maximum values of apparent density occurring in the soils of the halls correspond to the most compacted soils, and coincide with minimum values of porosity, making patent the favorable effect of vegetation on soil compaction, to encourage the roots formation of pores and cracks in the ground which increase the porosity and the air passage and solutes.

Continuous coverage of vegetation cover as *Brachypodium retusum* favors decreased bulk density and moisture retention in the soil and the stability of the structure.

Aromatic plants also promote the reduction of bulk density, possibly by the plant contribution that performs a protective effect on soil structure, improving stability and the formation of larger aggregates.

The annual average porosity values have little variability, and generalized manner, the deviations are very similar throughout the year. Aromatic species (*Rosmarinus officinalis*, *Lavandula latifolia* and *Santolina chamaecyparissus*) grasses (*Brachypodium retusum*) provide high values. While the lowest percentages are obtained in hallways and under the species *Juniperus oxycedrus* and *Thymus vulgaris*. Soil without vegetation corridors have low porosity, further decreasing with increasing pedregosidad. Inverse relationships have been obtained with bulk density values, given the decreased porosity due to compaction.

Temporarily lower average porosity values in the cold months and an increase from March to June, starting this month values down again, with the months of September and January is observed which have the lowest porosity values.

To summarize the chemical properties we can highlight the high proportion of the most advanced fractions of organic matter, fulvic acids and humin in soil under *Santolina chamaecyparissus* and *Brachypodium retusum* respectively. Similarly, the highest contents of humic acids are also obtained under *Brachypodium retusum*, which indicates that it is a genre of enriching the soil for plants, which provides a fairly constant and continuous vegetation cover in much of the year, high evolution of organic matter takes place under it.

The results obtained in the different rates of humic composition indicate that the rate of polymerization is considered normal under the most species, although the corridors, *Juniperus oxycedrus* and *Santolina chamaecyparissus* down slightly from this value, indicating that the humification could slow in the early stages of the transformation process.

The structural stability index reveals a predominance of humin, humic fraction better structuring activity. Although the values obtained in different microenvironments are not high, but they are accompanied by appropriate levels of humic and fulvic acids.

The ranges of the degree of humification are slightly below normal average values of agricultural soils, indicating a certain accumulation of fresh organic matter provided by the vegetation that could produce a weak organic evolution in these soils.

The total organic matter content is high for all sampling points, manifesting itself again the contrast between the species *Brachypodium retusum* and some aromatic versus lower values in the aisles, with significant differences between these soils in contrasting times of year (summer and winter).

The effect of vegetation is evident in the different microenvironments, as regards the relationship between the aggregate stability and different levels of annual and temporary organic matter. Seasonal changes in the transformation of organic matter mineralization due to its higher in summer, directly affect this parameter.

With respect to other chemical parameters, means total nitrogen content are low and elevated assimilable phosphorus. Despite the low productivity of these soils, consider the state of neglect in some cases is 50 years, which has allowed a recovery of their property, while taking into account the current livestock use in some of the paddocks.

CIC values are high, which corresponds to the high organic content and sometimes the fine fraction of the soils. In exchange complex calcium is always the dominant cation as befits calcareous soils, reaching normal values other exchange cations.

The values of pH and electrical conductivity as well as total carbonates show discussed basic soil salinity smoothly.

The recovery of the organic content of soils in the study area after the abandonment of farming practices in marginal areas of humid Mediterranean climate and calcareous lithology, depends on the type of plant cover recolonizes the ground. Compared to bare soil, herbaceous cover type *Brachypodium retusum* favors the accumulation of organic matter and humus of it than others hedges and aromatic woody type subarbustivas. However, great variability is detected in these two types of coverage suggesting a

different contribution of each type of plant, possibly because of the amount and composition of litter that is incorporated into the soil.

The assessment by the chemical oxidation method to analyze the differential behavior of the soil in a gradient from low to high content of organic matter in different seasons. This differential behavior has also been able to verify by studying microscopy/RX and IR. Quantification of C in each fraction is needed to understand the process of humus in the soil, and this depends on the type of plant residues but also the microclimate and soil biological activity in each edaphic microenvironment.

Within the arthropods that make up the diversity of soil fauna inhabiting the sampling points, the predominant and most representative individuals are springtails, followed by oribatid mites and mites gamásidos being captured in greater numbers in the topsoil than in the subsurface. Other arthropod found in lower amounts in both horizons are pselafognatas, craspedosomidos, grubs, acarididae mites, thrips and weavers, and other individuals caught in small quantities are arachnids, chilopodas and bugs (only in the most superficial horizon A_1), and Diptera and aphids (only in the subsurface horizon A_2).

Collembola are mainly more abundant in soils under *Lavandula latifolia* spices, *Rosmarinus officinalis* and *Thymus vulgaris*. As for oribatid mites predominate in soils under *Lavandula latifolia*, *Cistus albidus* and *Ulex parviflorus*, while mites abound gamásidos *Ulex parviflorus* mostly low, *Thymus vulgaris* and *Lavandula latifolia*.

In principle, any negative external influence on the ground such as removing vegetation or vegetation cover, reduced mesofauna by soil microorganisms produced by the influence of the type of coverage (improvers plants physical soil properties), weather conditions, higher values of moisture content, differences in extreme temperatures, temperature range, influenced by topographic slope in the different points of study, or variation of certain chemical properties as the amount of calcium carbonate cementation favors aggregates, increased electrical conductivity by the presence of salts that produce dispersion aggregates or increase of divalent cations like calcium to increase the aggregation and flocculation occur structure, etc., may alter this parameter.

In the study of cluster two distinct groups, the first of which corresponds to the microenvironments more coverage included in the first soil under *Brachypodium retusum* and plants as *Lavandula latifolia*, *Ulex parviflorus*, *Santolina chamaecyparissus*, *Thymus vulgaris*, *Rosmarinus officinalis* and *Cistus albidus*, with great hedge against the group of naked stones and covered by soil. The ground beneath *Juniperus oxycedrus* marks the link between both types of environments.

The principal component analysis shows two factors denominated factor 1 factor indicator of plant nutrition more weight on the variance (40,77%), which includes variables directly as the basis of change (Ca and Mg) CIC, the carbonate content and humidity, along with parameters such as clay, pH and aggregate size > 10 mm, and reverse with sand and silt content, electrical conductivity, aggregates of intermediate sizes (10-5 mm, 5-2 mm and 2-1 mm) and sodium exchange. Factor 2 called organic factor that explains 34,34% of the variance, groups directly and significantly the nutrients nitrogen and phosphorus, organic matter and humic fraction being inversely with fractions of humic and fulvic acids.

In the basin of study Cocoll saw the influence of the age of abandonment of agricultural practices lead to changes in the physical, chemical and biological soil properties, depending on the time of abandonment and recovery of the quality of agricultural land

compared to the levels of natural soil uncultivated. Under humid Mediterranean climate, the vegetation recovery and increased organic matter in the soil increases exponentially with age of abandonment of agricultural practices.

The dominant soils in the area correspond to Luvisols, Calcisols and Leptosols on the slopes, all with high content of organic matter. Most of the properties analyzed soil profiles follow a pattern of exponential variation with age of abandonment, increasing the quality during the first 15 years after abandonment, and increasing rapidly with levels above 25% vegetation cover. In these weather and experimental conditions, the recovery of the quality of agricultural soils to levels of natural soil occurs at 60-90 years of cessation of farming practices.

The results of the statistical analysis in soil profiles show many significant correlations between biological parameters, chemical and soil. The calcium carbonate content has relationship with the values of moisture (moisture directly at the point of permanent wilting and reverse with moisture at field capacity). The organic matter content is directly correlated with the available water, moisture at field capacity and aggregates 5-2 mm, and inversely with the contents of sand and silt. Also useful soil water has direct relationship with the values of pH in water and the magnesium content of change, while the inverse correlation with the contents of sand and silt. As for the contents of nitrogen and phosphorus, they are directly related to the values of electrical conductivity, as well as silt content (in the case of nitrogen) and aggregate 5-2 mm (in the match). pH values also correlate directly with smaller aggregates (<1 mm), and inversely with the silt content. In relation to exchange bases, magnesium is indirectly related to the moisture in the wilting point and the sand content, however sodium correlates directly with 5-2 mm aggregate and phosphorus contents.

The results of the application of EUROSEM 2010 pricing model erosion in the watershed study, combining data from infiltration and soil moisture for two different times of the year, show the highest values of surface runoff in the winter time when the soil moisture content is higher and the soil infiltration capacity is less.

Polygons have increased runoff in the lower hillside areas are characterized by high cohesion, lower percentage of rocks, texture rather fine, relatively high humidity despite having high levels of infiltration and topographical layout with very low slopes. Based on the results we can say that the hydrological response is regulated primarily by the values of infiltration and the initial moisture content, and with minor effect hydrophobia. That is, only in cases in which the three parameters follow a parallel trend, highlights the importance and differences involving significant changes in the coefficient of rabies in the first moments of simulation of rain.

The exposure of the slopes is manifested as an important factor in soil loss since modifies vegetation cover and interference and, therefore, the surface runoff.

The information derived from the application of the model manifests EUROSEM critical points where erosion, important to implement remedial measures, specific phenomena are presented according to the problems of each area, to prevent and mitigate soil erosion and its effects on the territory.