

Composition of the Food of the Spanish Wild Goat in Sierras de Cazorla and Segura, Spain

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Martinez T., Martinez E. & Fandos P., 1985: Composition of the food of the Spanish Wild Goat in Sierras de Cazorla and Segura, Spain. *Acta theriol.*, 30, 29: 461—494 [With 5 Tables & 4 Figs.]

After examining 105 stomach contents of Spanish Wild Goat (*Capra pyrenaica* Schinz, 1838) gathered at the National Reservation of Sierras de Cazorla and Segura (Southwestern Spain) during the period April 1980 — August 1981, 313 vegetal species have been identified: 177 in spring, 202 in summer, 145 in autumn, and 164 in winter. The basic food components during the 4 seasons have been *Quercus ilex* and *Phillyrea latifolia*, except in autumn, in which the most eaten species was *Juniperus oxycedrus*. Other trophic resources of interest in the diet have gone through seasonal changes. Thus, in spring stood out *Festuca arundinacea*, *Oryzopsis paradoxa* and *Carex hallerana*; in summer, *Festuca arundinacea*, *Rubus ulmifolius* and *Oryzopsis paradoxa*; in autumn *Oryzopsis paradoxa*, *Juniperus oxycedrus* and *Olea europaea* and finally in winter, *Rosmarinus officinalis*, *Oryzopsis paradoxa* and *Hedera helix*. The most commonly eaten biotype in spring were hemicryptophytes, in summer the nanofanerophytes in a rather balanced use with hemicryptophytes, during autumn the fanerophytes (macro and nano) and in winter the nanofanerophytes. Ligneous plants were the most interesting nourishment during winter, autumn and spring, while the herbaceous were more important in spring.

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1. INTRODUCTION

The wild goat (*Capra pyrenaica* Schinz, 1838) is endemic of the Peninsula Ibérica. The present study has been realized with the ssp. *hispanica* Schimper, 1848, located in the Sierras de Cazorla and Segura.

The now existing studies on the species are few. They include only some data about nourishment (Palacios *et al.*, 1978), notes about its systematic (Clouet, 1979), ecoethology (Gonzales, 1980) and divulgative and cynegetic data (de la Cerda and de la Peña, 1962; Rodríguez de la Zubía, 1969; González Grande, 1978).

The interest of this work centers in the knowledge of the trophic resources preferred by the Wild Goat in the different seasons of the year, which, in turn, will serve as basis to subsequent studies on the relationship between availability and consume, nutritious value, alimentary habits and competence with other ungulates present in the area object of this study. Besides, it is fundamental the knowledge of

the diet in order to manage or regulate a population in its habitat, since its quality has an influence on the population. And also because the succession and development of the different stages of the vegetation will be altered by the trophic impact over the preferred nutritious resources (Knapp, 1970).

2. STUDY AREA

The National Reservation of the Sierras de Cazorla and Segura ($37^{\circ} 45' - 38^{\circ} 10' N$ and $2^{\circ} 40' - 3^{\circ} 00' W$) located in the province of Jaén, Southwest of Spain, forms a large valley surrounded by some adjacent others. It is compounded of cretaceous and jurasic limestones and a stripe of red argyls and sands of the triassic on the bed of the Guadalquivir.

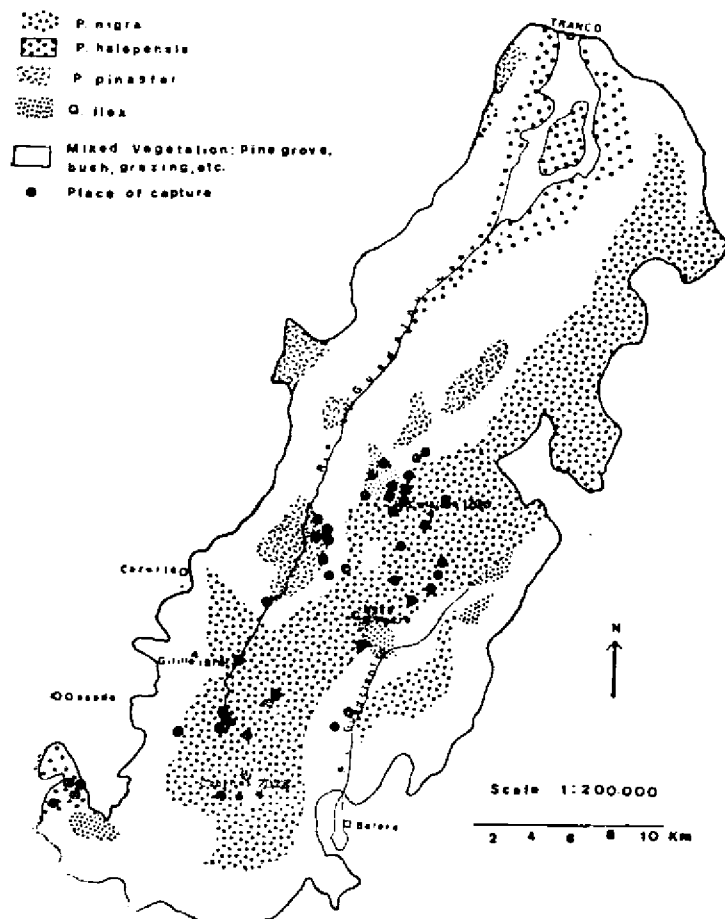


Fig. 1. Distribution of the different forest masses and exact places of capture of the individuals.

Its climatology is diverse due to the different altitudes and microclimas of the area. At the meteorologic station of Navas de San Pedro, located in the area of study at altitude of 1360 m, the registered meteorological data for a period of 10 years (1970—1980) give an annual pluviosity rate of 1129 mm, and a media temperature of 9.7°C: maximum in August 21.7°C, and minimum in January 3.4°C. The occurrence of frosts are maximal between October and March, January is the month with more days of frost (23.8) and March has the minimum (2.8). Snowfalls are frequent with an annual rate of 14.6 days.

The area is almost completely occupied by pine trees (Fig. 1), but we have seen different vegetal formations following the different altitudes:

— Lowest area (700 to 1300 m). Mainly occupied by *Pinus halepensis* with abundance of *Pinus pinaster* and *Juniperus phoenicea*. In this area are important sites of rather degraded *Quercus ilex*, also present are bush of *Pistacea lentiscus*, *Quercus coccifera*, *Phillyrea latifolia*, *Viburnum tinus*, *Arbutus unedo*, etc.

We have to mention the existence of an area of cultivation, mostly olive trees (*Olea europaea*) and different cereals, in the neighbourhood of the forest which is important to our study.

— Middle area (1300 to 1800 m). Here, the forest is mainly formed by *Pinus nigra*, with *Pinus pinaster* and *Quercus faginea* and *Quercus ilex* in some places, but with rather less frequency. There are also some *Acer granatense* and *A. monspessulanum*.

In this area are abundance of dry pastures and numerous rupicolous as: *Anthyllis ramburii*, *Teucrium rotundifolium*, *Viola cazorlensis*, *Helianthemum croceum*, *Arenaria lithops*, *Sideritis incana*, *Digitalis obscura*, etc.

— Upper area (1800 to 2100 m). Pine formations of *Pinus nigra* begins to clare or disappear and we find dwarf-shrubs like *Juniperus sabina*, *J. communis* ssp. *nana* and creeping, spiny and cushioned dwarf-shrubs like *Erinacea anthyllis*, *Astragalus sempervirens* and *Echinopartum boissieri*. This area includes limestone quarries in the top of the mountains where there are creeping plants, which form large silver-white lawns as those of *Pterocephalus spathalatus*, that may be associated to *Convulvulus boissieri* and *Fumana procumbens*. There are also pastures formed by diverse species of the genus *Festuca* and other gramineous. There are *Rhamnus myrtifolia*, *Ononis aragonensis*, etc., amid the rocks.

The study area is populated by typical mediterranean faunistic species and among the ungulates, besides the wild goat, which is autochthonous, there are red deer, fallow deer and mouflon, which are introduced species.

The human presence has some influence in some parts of the area due to pasturing, agriculture and recreation.

3. MATERIAL AND METHODS

The material used were the 105 stomach contents of wild goat gathered in the National Reservation of the Sierras de Cazorla and Segura between April 1980 and August 1981 (Table 1). In Figure 1 we show the exact capture places.

The used methodology has been the botanical analysis of the stomach contents. This method has been used by several authors to study the diet of big herbivores (Murphy, 1963; Anderson et al., 1965; Siuda et al., 1969; Dzieciolowski, 1969, 1970; Fichant, 1974; Cedernlund et al., 1980; Kałuziński, 1982; Palacios et al., 1984; Fandos et al. (in print.).

Once extracted, the stomachs were kept in an aqueous solution of 5% formaldehyde. Lately we submitted them to laboratory analysis: the contents were

weighted and volume measured. Then a sample of 1 l was taken, the result of mixing all the parts of the stomach content, and washed in a screen of thin mesh (1 mm²). From the clean sample, 100 cc was taken and placed in trays with a thin layer of water, the different species of plant groups were separated for identification and volume measure by displacement of water calibrated test tubes.

Finally, the data was registered on the basis of volume percentages and occurrence percentages of the plant species found in the mass of samples analyzed in each season.

To the identification of the different dicotyledonous species we have used herbariums of the study area by macroscopic comparison of the different anatomical characteristics of the found fragments and by stereoscopic microscopy. We have also used different botanic taxonomy treatises (Coste, 1937; Tutin *et al.*, 1964—80) and works on the flora of the study area (Fernandez-Galiano & Heywood, 1960; Rivas-Martínez, 1970; Soriano & González-Rebollar, 1975).

Identification and quantification of monocotyledonous species, mostly gramineous and cyperaceous, have been realized by means of microscopy and microphotography

Table 1
Number of individuals obtained for study and periods of capture.

	Spring		Summer		Autumn	Winter
	April	June	July	Aug.	Nov.	Febr.
1980	13		19		20	
1981		9		9		35
Total	22		28		20	35

technics, demonstrated in the diet study of different phytophagous vertebrates (Dusi, 1949; Hercus, 1959, 1960; Storr, 1961; Sparks, 1967; Hansen, 1971; Dearden *et al.*, 1975; Johnson, 1979; Chapuis, 1980; Garcia-Gonzalez, 1982; Soriguer (in print)).

These technics consist in the identification of plant species on the basis of the microanatomical structures of their epidermal cells. To that end, microscopical preparations were obtained from the epidermis of the different parts of the monocotyledonous species in the area, microscopic characters were observed (anatomic, cytologic and histologic) following the nomenclature of Metcalfe (1960), Prat (1932, 1935) and Prat & Vignal (1968), pictures were taken and a reference atlas was made.

The technic to obtain the preparations is simple; the fragments are scraped until a transparent epidermis is left. Then the fragment is put on the slide and some drops of Hertwig's liquid are added (Baumgartner & Martin, 1939), the flame of a burner is applied until the emission of vapors, this treatment produces a higher clarity in the preparation, finally, the cover glass is fixed with Hoyer's liquid or fingernails enamel.

To the quantification of the monocotyledonous, those belonging to each sample of stomach content were treated following the Cavender & Hansen technic (1970) and the relative density of the identifiable particles was expressed, being necessary to realize a counting (Dusi, 1949, 1952; Croker, 1959; Hercus, 1960; Storr, 1961; Vard & Keith, 1962; Bear & Hansen, 1966; Griffiths & Barker, 1966; Sparks,

1967; Stewart, 1967). The counting was realized in a given number of randomized microscopic fields (Hayden, 1966; Sparks & Malechek, 1968; Hubbard & Hansen, 1976) at 125X in each sample preparation, therefore, the estimated contribution of a given species is the mean value of the subsamples present in each preparation.

The list of species eaten (Tables 2, 3, 4 and 5) have been classified in accordance with the most representative biotypes established by Raunkiaer (1905) in Braun Blanquet (1979). The used classes have been: nanophanerophytes, macrophanerophytes, camephytes, hemicryptophytes, geophytes, terophytes and epiphytes.

Plant species not included in biotypes have been those undetermined and others of which we only know the genus or family, and so we are unable to know their biotypes and the cryptogamous (fungi, lichens and mosses). This group represents only 2.09% of the whole biomass.

4. RESULTS

4.1. Spring Diet

In this season, the composition of the wild goat diet consists of 177 plant species, found in 22 stomach contents (Table 2). The mean of species in each stomach content has been 24.1 and the SD \pm 8.36, being 41 the maximum and 12 the minimum.

With 28 species, the gramineous are the fundamental trophic resources, since they represent 39% of the total biomass; with 8.7%, the cyperaceous have been also important.

The species with large contribution of biomass to the diet have been: *Phillyrea latifolia* (9.6%), *Quercus ilex* (7.3%), *Festuca arundinacea* (6.4%), *Oryzopsis paradoxa* (5.4%), *Carex hallerana* (4.6%), *Helictotrichon filifolium* (4.1%) and *Carex* sp. (4.1%).

Plants that appear in a lower rate (about 2% of the biomass) are: *Jasminum fruticans*, *Brachypodium sylvaticum*, *Rosmarinus officinalis*, *Acer monspessulanum*, *A. opalus*, *Asphodelus cerasiferus* and *Pinus nigra*.

Regarding their rate of occurrence, *Quercus ilex* was found in 81.8% of stomach contents, followed in frequency by *Carex hallerana*, *Pinus nigra*, *Coronilla minima*, *Juniperus oxycedrus* and *Asphodelus cerasiferus*, with a rate between 68% and 50%.

Of the biotypes or biological forms consumed (Fig. 2), the hemicryptophytes have been the most relevant since they amounted to 41.71% of ingested total, following are the nano and macrophanerophytes which have provided 19% and 16.6% respectively. Terophytes in this season have represented the maximum of their consume, almost 8%. This is related to their phenology, since in this season begins their development. Camephytes, with 5.6% are in their lowest season. Geophytes with 5.5% have a certain interest in this season.

Table 2
Composition of wild goat diet in spring, obtained by the analysis of 22 samples of stomach contents.

Biotypes and species of plants	Volume		Frequency of occurrence		Parts consumed
	ml	%	n	%	
MACROPHANEROPHYTES					
1. <i>Quercus ilex</i> L.	160.60	7.30	18	81.82	Leaves, twigs and buds
2. <i>Acer monspessulanum</i> L.	44.00	2.00	5	23.73	Leaves and buds
3. <i>Acer opalus</i> Miller	40.50	1.84	3	16.65	Leaves, twigs and buds
4. <i>Pinus nigra</i> ssp. <i>salzmannii</i> (Dunal) Franco	37.70	1.76	13	59.00	Leaves, twigs, buds and flowers
5. <i>Pinus pinaster</i> Aiton	20.10	1.00	7	31.82	Leaves, twigs and flowers
6. <i>Pinus halepensis</i> Miller	16.00	0.72	3	13.64	Leaves
7. <i>Quercus faginea</i> Lam.	10.50	0.50	6	27.27	Leaves, twigs and buds
8. <i>Salix alba</i> L.	1.30	0.06	1	4.55	Leaves, twigs and fruits
9. <i>Prunus avium</i> L.	1.00	0.04	1	4.55	Fruits
10. <i>Acer granatense</i> Boiss.	0.80	0.04	2	9.00	Leaves
11. <i>Fraxinus angustifolia</i> Vahl. Lianes	0.70	0.03	1	4.55	Leaves
12. <i>Lonicera hispanica</i> Boiss. & Reuter	12.10	0.55	2	9.00	Leaves and twigs
13. <i>Lonicera</i> sp.	9.10	0.40	1	4.55	Leaves and buds
14. <i>Lonicera peryclimeum</i> L.	5.00	0.23	2	9.00	Leaves and twigs
15. <i>Lonicera etrusca</i> L.	2.00	0.09	1	4.55	Leaves and twigs
16. <i>Hedera helix</i> L.	0.90	0.04	2	9.00	Leaves
17. <i>Lonicera implexa</i> Aiton	0.40	0.02	1	4.55	Leaves
Total	362.70	16.63	22	100.00	
NANOPHAEROPHYTES					
1. <i>Phillyrea latifolia</i> L.	211.20	9.60	9	40.91	Leaves, twigs and buds
2. <i>Jasminum fruticans</i> L.	49.30	2.24	7	31.38	Leaves, twigs
3. <i>Rosmarinus officinalis</i> L.	43.50	2.00	9	40.91	Leaves, twigs, buds
4. <i>Juniperus oxycedrus</i> L.	25.95	1.18	11	50.00	Leaves and twigs
5. <i>Rubus ulmifolius</i> Schott.	17.20	0.80	8	36.36	Leaves, twigs and flowers
6. <i>Rosa canina</i> L.	13.20	0.60	7	31.82	Leaves, twigs and buds
7. <i>Rosa pimpinilifolia</i> L.	8.55	0.40	4	18.18	Leaves
8. <i>Pistacia terebinthus</i> L.	6.40	0.30	5	23.57	Leaves, twigs and buds
9. <i>Viburnum tinus</i> L.	6.20	0.30	4	18.18	Leaves and twigs
10. <i>Juniperus sabina</i> L.	5.20	0.23	2	9.00	Leaves and twigs
11. <i>Crataegus monogyna</i> Jacq.	5.10	0.23	6	27.27	Leaves and buds
12. <i>Juniperus phoenicea</i> L.	5.00	0.22	1	4.55	Leaves
13. <i>Berberis hispanica</i> Boiss. & Reuter	4.30	0.19	2	9.00	Leaves and twigs
14. <i>Rosa</i> sp.	4.10	0.18	4	18.18	Leaves
15. <i>Rhamnus infectorius</i> L.	2.00	0.09	1	4.55	Leaves and twigs
16. <i>Genista florida</i> L.	2.00	0.09	1	4.55	Leaves and twigs
17. <i>Cytisus reverchonii</i> Degan & Hervier	2.00	0.09	1	4.55	Leaves and twigs

18. <i>Amelanchier ovalis</i> Medicus	1.50	0.07	1	4.55	Leaves and twigs
19. <i>Juniperus communis</i> L.	1.00	0.04	1	4.55	Leaves and twigs
20. <i>Prunus</i> sp.	1.00	0.04	1	4.55	Leaves
21. <i>Prunus spinosa</i> L.	0.65	0.03	1	4.55	Leaves
22. <i>Arbutus unedo</i> L.	0.60	0.03	1	4.55	Leaves and twigs
23. <i>Rhamnus myrtifolius</i> Willk.	0.35	0.02	3	13.65	Leaves and twigs
24. <i>Cistus clusii</i> Dunal in DC.	0.30	0.01	1	4.55	Leaves
Total	416.60	18.98	22	100.00	
CHAMAEPHYTES					
1. <i>Euphorbia nicaeensis</i> All.	20.00	0.91	1	4.55	Leaves and stems
2. <i>Digitalis obscura</i> L.	18.00	0.82	2	9.00	Leaves and flowers
3. <i>Helianthemum croceum</i> (Desf.) Pers.	17.20	0.80	9	40.91	Leaves and stems
4. <i>Coronilla minima</i> L.	11.75	0.53	13	59.15	Leaves and stems
5. <i>Genista cazorlana</i> Deb., Rev.	11.50	0.52	4	18.18	Leaves, stems and flowers
6. <i>Helianthemum paniculatum</i> Dunal	10.00	0.46	7	31.82	Leaves, stems and flowers
7. <i>Satureja cuneifolia</i> ssp. <i>obovata</i> (Lag.) G. López	8.00	0.36	1	4.55	Leaves and stems
8. <i>Genista tejedensis</i> (Port., Rig) C. Vic.	3.30	0.15	2	9.00	Leaves, stems, flowers and fruits
9. <i>Thymus vulgaris</i> L.	3.00	0.14	4	18.18	Leaves, stems and flowers
10. <i>Helianthemum asperum</i> Lag. ex Dunal in DC.	2.20	0.10	3	13.65	Leaves and stems
11. <i>Thymus mastichina</i> L.	2.00	0.09	1	4.55	Leaves and stems
12. <i>Fumana paradoxa</i> Heywood in Guinea	1.70	0.08	2	9.00	Leaves, stems and flowers
13. <i>Scrophularia aquatica</i> auct. non L.	1.60	0.07	1	4.55	Leaves and stems and fruits
14. <i>Cerastium boissieri</i> Gren.	1.50	0.07	1	4.55	Leaves and flowers
15. <i>Lavandula latifolia</i> Medicus	1.50	0.07	1	4.55	Leaves and stems
16. <i>Thymus hiemalis</i> Lange	1.50	0.07	2	9.00	Flowers
17. <i>Digitalis</i> sp.	1.20	0.05	1	4.55	Leaves and stems
18. <i>Argyrolobium linneanum</i> Walpers	1.20	0.05	2	9.00	Leaves
19. <i>Teucrium carthaginense</i> Lange	1.10	0.05	1	4.55	Leaves and stems
20. <i>Thymus zygis</i> L.	1.10	0.05	2	9.00	Leaves and stems
21. <i>Helianthemum ledifolium</i> (L.) Miller	1.00	0.04	1	4.55	Fruits
22. <i>Thymus hirtus</i> Willd.	0.90	0.04	2	9.00	Leaves and stems
23. <i>Sideritis hirsuta</i> L.	0.70	0.03	1	4.55	Flowers
24. <i>Salvia lavandulifolia</i> Vahl.	0.60	0.03	2	9.00	Leaves
25. <i>Teucrium subtriphylum</i> Lag.	0.50	0.02	1	4.55	Leaves and stems
26. <i>Teucrium multiflorum</i> L.	0.50	0.02	1	4.55	Leaves and stems
27. <i>Sedum album</i> L.	0.50	0.02	1	4.55	Leaves and stems
28. <i>Santolina rosmarinifolia</i> L.	0.20	0.01	1	4.55	Capitula
29. <i>Erinacea anthyllis</i> Lynk.	0.15	+	1	4.55	Leaves and stems
Total	124.40	5.65	22	100.00	
HEMICRYPTOPHYTES					
1. <i>Festuca arundinacea</i> Schreber	140.80	6.40	10	45.45	Leaves, stems and spikelets
2. <i>Oryzopsis paradoxa</i> (L.) Nutt.	118.80	5.40	9	40.91	Leaves, stems and spikelets
3. <i>Carex hallerana</i> Ass.	101.20	4.60	15	68.18	Leaves, stems and spikes
4. <i>Helictotrichon filifolium</i> (Lag.) Henrard	91.00	4.14	4	18.18	Leaves, stems and spikelets

5. <i>Carex</i> sp.	90.70	4.12	9	40.91	Leaves, stems and spikes
6. <i>Brachypodium sylvaticum</i> (Huds.) P. B.	46.70	2.10	7	31.82	Leaves, stems and spikelets
7. <i>Sesleria argentea</i> Sav.	28.00	1.27	3	13.64	Leaves, stems and spikelets
8. <i>Poa bulbosa</i> L.	28.00	1.27	4	18.18	All parts of the plant
9. <i>Festuca rubra</i> L.	27.00	1.23	3	13.64	Leaves and stems
10. <i>Festuca</i> sp.	25.00	1.14	3	13.64	Leaves
11. <i>Dactylis glomerata</i> L.	24.00	1.09	5	23.73	Leaves, stems and spikelets
12. <i>Festuca scariosa</i> (Lag.) Ascherson & Graebner	23.00	1.04	3	13.64	Leaves, stems and spikelets
13. <i>Festuca hyxtris</i> Boiss.	23.00	1.04	2	9.00	Leaves, stems and spikelets
14. <i>Poa ligulata</i> Boiss.	21.00	0.95	3	13.64	Leaves, stems and spikelets
15. <i>Anthoxanthum odoratum</i> L.	19.00	0.86	3	13.64	Leaves, stems and spikelets
16. <i>Koeleria</i> sp.	16.00	0.73	3	13.64	Leaves, stems
17. <i>Brachypodium ramosum</i> Roem. & Schult.	15.00	0.70	2	9.00	Leaves, stems and spikelets
18. <i>Stipa aristella</i> L.	15.00	0.70	1	4.55	Leaves
19. <i>Calamintha granatensis</i> Boiss. & Reuter	10.40	0.47	6	27.27	Leaves, stems and flowers
20. <i>Rubia peregrina</i> L.	7.80	0.35	7	31.82	Leaves and stems
21. <i>Paronychia argentea</i> Lam.	6.00	0.27	1	4.55	Leaves, stems and flowers
22. <i>Festuca indigesta</i> Boiss.	5.00	0.23	1	4.55	Leaves, stems and spikelets
23. <i>Cynodon dactylon</i> (L.) Rich. in Pers.	5.00	0.23	1	4.55	Leaves, stems and rhizomes
24. <i>Erodium cicutarium</i> (L.) L'Her. in Aiton	5.00	0.23	1	4.55	Leaves and fruits
25. <i>Eryngium campestre</i> L.	4.00	0.18	3	13.64	Leaves
26. <i>Brachypodium phoenicoides</i> (L.) Roem. & Schult.	3.00	0.13	1	4.55	Leaves, stems and spikelets
27. <i>Thrinacia hirta</i> Roth.	3.00	0.13	1	4.55	Capitula
28. <i>Centurea jaenensis</i> Degen & Debeaux	2.70	0.12	3	13.64	Leaves, capitula and fruits
29. <i>Thapsia</i> sp.	2.50	0.11	1	4.55	Leaves
30. <i>Trifolium repens</i> L.	1.60	0.07	2	9.00	Leaves and flowers
31. <i>Saxifraga granulata</i> ssp. <i>granulata</i> L.	1.50	0.07	3	13.64	Leaves
32. <i>Filipendula vulgaris</i> Moench.	1.50	0.07	1	4.55	Leaves and stems
33. <i>Lactuca tenerrima</i> Pourret	1.00	0.04	1	4.55	Leaves and capitula
34. <i>Hieracium pilosella</i> L.	1.00	0.04	1	4.55	Leaves and capitula
35. <i>Bromus intermedius</i> Guss.	1.00	0.04	1	4.55	Leaves, stems and spikelets
36. <i>Astragalus incanus</i> L.	0.80	0.04	3	13.64	Leaves
37. <i>Astragalus incanus</i> ssp. <i>macrorhizus</i> (Cav.) Cheter	0.50	0.02	1	4.55	Leaves and fruits
38. <i>Sacrocapnos crassifolia</i> (Desf.) DC.	0.50	0.02	1	4.55	Leaves
39. <i>Plantago lanceolata</i> L.	0.50	0.02	1	4.55	Leaves
40. <i>Calamintha clinopodium</i> Bentham	0.30	0.01	1	4.55	Leaves
41. <i>Arenaria aggregata</i> L.	0.30	0.01	1	4.55	Leaves, stems and fruits
42. <i>Arenaria grandiflora</i> L.	0.30	0.01	1	4.55	Leaves, stems and flowers

43. <i>Anthyllis vulneraria</i> L.	0.30	0.01	1	4.55	Leaves
44. <i>Lazula nutans</i> (Vill.) Duval-Jouve	0.20	0.01	1	4.55	Flowers
Total	918.90	41.71	22	100.00	
GEOPHYTES					
1. <i>Asphodelus cerasiferus</i> Gay	34.20	1.55	11	50.00	Leaves
2. <i>Arrhenaterum bulbosum</i> C. Presl.	29.00	1.32	4	18.18	All parts of the plant
3. <i>Aphyllantes monspeliensis</i> L.	28.40	1.30	10	45.55	Leaves, stems and flowers
4. <i>Sanguisorba lateriflora</i> (Coss.) Caballero	10.30	0.47	10	45.55	Leaves, stems, flowers and fruits
5. <i>Ornithogalum umbellatum</i> L.	4.50	0.20	2	9.00	Flowers
6. <i>Biscutella variegata</i> Boiss. & Reuter	4.20	0.19	1	4.55	Leaves, stems and fruits
7. <i>Sanguisorba rupicola</i> (Boiss & Reuter) A. Br.	2.80	0.13	4	18.18	Leaves, stems, flowers and fruits
8. <i>Smilax aspera</i> L.	1.90	0.08	1	4.55	Leaves and stems
9. <i>Geum sylvaticum</i> Pourret	1.50	0.07	3	13.64	Leaves, flowers and fruits
10. <i>Agrimonia eupatoria</i> L.	1.00	0.04	1	4.55	Leaves
11. <i>Pteridium aquilinum</i> (L.) Kuhn.	1.00	0.04	1	4.55	Leaves
12. <i>Allium roseum</i> L.	0.80	0.04	1	4.55	Flowers
13. <i>Ranunculus bulbosus</i> L.	0.70	0.03	1	4.55	Fruits
14. <i>Tamus communis</i> L.	0.50	0.02	1	4.55	Leaves
Total	120.80	5.48	20	90.00	
TEROPHYTES					
1. <i>Aegilops triaristata</i> Willd.	44.00	2.00	8	36.36	All parts of the plant
2. <i>Cynosurus echinatus</i> L.	37.00	1.68	8	36.36	All parts of the plant
3. <i>Avena</i> sp.	18.00	0.82	4	18.18	Leaves and stems
4. <i>Aegilops ovata</i> L.	14.50	0.65	4	18.18	Leaves, stems and spikelets
5. <i>Eruca vesicaria</i> (L.) Cav.	10.00	0.45	1	4.55	Leaves, stems and fruits
6. <i>Medicago aculeata</i> Gaertn.	8.35	0.38	8	36.36	Leaves and fruits
7. <i>Hedypnois cretica</i> (L.) Dum-Courset	7.00	0.32	1	4.55	Capitula and fruits
8. <i>Brachypodium distachyum</i> (L.) P. B.	7.00	0.32	1	4.55	Leaves, stems and spikelets
9. <i>Medicago minima</i> (L.) Bartal	5.50	0.25	5	22.73	Leaves, stems and fruits
10. <i>Bromus sterilis</i> L.	5.00	0.23	2	9.00	Leaves, stems and spikelets
11. <i>Crucianella angustifolia</i> L.	4.00	0.18	1	4.55	Leaves and stems
12. <i>Tragopogon crucifolius</i> L.	2.50	0.11	1	4.55	Stems and capitula
13. <i>Medicago gerardii</i> Waldst. & Kit. ex Willd.	2.15	0.10	2	9.00	Leaves, stems and fruits
14. <i>Galium verticillatum</i> Danth.	1.80	0.08	4	18.18	Leaves, stems and fruits
15. <i>Trigonella gladiata</i> Steven ex Bieb.	1.50	0.07	1	4.55	Fruits
16. <i>Medicago orbicularis</i> (L.) Bartal	1.10	0.05	2	9.00	Leaves and fruits
17. <i>Trifolium stellatum</i> L.	0.95	0.04	3	13.64	Leaves, stems, flowers and fruits
18. <i>Scorpiurus sulcatus</i> L.	0.90	0.04	2	9.00	Fruits
19. <i>Lathyrus aphaca</i> L.	0.80	0.04	1	4.55	Leaves, stems and fruits
20. <i>Galium aparine</i> L.	0.80	0.04	1	4.55	Leaves and stems

21. <i>Cerastium brachypetalum</i> Pers.	0.70	0.03	2	9.00	Leaves and flowers
22. <i>Trifolium striatum</i> L.	0.70	0.03	2	9.00	Leaves, flowers and fruits
23. <i>Ranunculus muricatus</i> L.	0.50	0.02	1	4.55	Fruits
24. <i>Trigonella monspelica</i> L.	0.50	0.02	1	4.55	Fruits
25. <i>Calendula arvensis</i> L.	0.30	0.01	1	4.55	Capitula
26. <i>Carthamus lanatus</i> L.	0.30	0.01	1	4.55	Leaves and capitula
27. <i>Trifolium scabrum</i> L.	0.10	+	1	4.55	Flowers
Total	175.95	7.97	18	81.82	
EPIPHYTES					
1. <i>Viscum album</i> L.	5.50	0.25	3	13.64	Leaves and twigs
PLANTS NON INCLUDED IN BIOTYPES					
1. <i>Bromus</i> sp.	18.90	0.82	5	22.73	All part of the plant
2. <i>Scandix</i> sp.	5.00	0.23	1	4.55	Fruits
3. <i>Malva</i> sp.	4.00	0.18	1	4.55	Stems and fruits
4. <i>Erodium</i> sp.	3.45	0.16	4	18.18	Leaves and fruits
5. <i>Trifolium</i> sp.	1.30	0.05	2	9.00	Leaves
6. <i>Adonis</i> sp.	1.00	0.04	2	9.00	Leaves
7. <i>Geranium</i> sp.	1.00	0.04	1	4.55	Leaves
8. <i>Lolium</i> sp.	1.00	0.04	1	4.55	Leaves, stems and spikelets
9. <i>Anthemis</i> sp.	0.70	0.03	2	9.00	Leaves and capitula
10. <i>Astragalus</i> sp.	0.50	0.02	1	4.55	Leaves
11. <i>Plantago</i> sp.	0.40	0.02	3	13.64	Leaves
12. <i>Potentilla</i> sp.	0.30	0.01	1	4.55	Leaves
13. <i>Dianthus</i> sp.	0.25	0.01	1	4.55	Flowers
14. <i>Ononis</i> sp.	0.20	0.01	1	4.55	Leaves and stems
15. <i>Liliaceae</i>	10.00	0.45	2	9.00	Leaves
16. <i>Gramineae</i>	8.00	0.36	1	4.55	Leaves, stems spikelets and seeds
17. <i>Umbelliferae</i>	0.50	0.02	1	4.55	Flowers
18. <i>Rubiaceae</i>	0.05	+	1	4.55	Leaves
Subtotal	56.55	2.49	13	59.15	
MUSCI					
1. <i>Tortula ruralis</i> Ehrh.	9.00	0.41	7	31.82	Gametophytes
2. <i>Funaria hygrometrica</i> Hedlo	1.00	0.04	1	4.55	Gametophytes
3. <i>Lewdon sciuroides</i> (Hedw.) Schwaegr.	0.50	0.02	1	4.55	Gametophytes
Subtotal	10.50	0.47	9	40.91	
Unidentified totals	8.10	0.37	4	18.18	
Total plants non included in biotypes	75.15	3.33	15	68.18	
Grand total	2200.00	100.00	22	100.00	

Herbaceous have amounted to 55.1%, and is more interesting as a food resource than the ligneous plants, which amounted to 41.6% of the total (Fig. 3).

4.2. Summer Diet

These season has been the most varied regarding the number of ingested components (202 species) in 28 stomach contents (Table 3). The mean of plants per content has been 29.3 (SD \pm 7.28) with a maximum of 46 and a minimum of 15.

Table 3
Composition of wild goat diet in summer, obtained by analysis of 28 samples of stomach contents.

Biotypes and species of plants	Volume		Frequency of occurrence		Parts consumed
	ml	%	n	%	
MACROPHANEROPHYTES					
1. <i>Quercus ilex</i> L.	212.90	7.60	23	82.14	Leaves, twigs, buds and flowers
2. <i>Prunus dulcis</i> (Miller) D. A. Webb.	52.40	1.87	2	7.14	Leaves, barks and fruits
3. <i>Acer opalus</i> Miller	37.10	1.32	13	46.42	Leaves, twigs and buds
4. <i>Quercus faginea</i> Lam.	19.10	0.70	7	25.00	Leaves, twigs and buds
5. <i>Pinus nigra</i> ssp. <i>salmannii</i> (Dunal) Franco	12.20	0.43	12	42.85	Leaves, twigs, buds and flowers
6. <i>Olea europaea</i> L.	11.50	0.41	3	10.71	Leaves and twigs
7. <i>Sorbus torminalis</i> (L.) Crantz.	9.65	0.34	4	14.28	Leaves
8. <i>Salix alba</i> L.	7.00	0.25	2	7.14	Leaves, twigs and fruits
9. <i>Fraxinus angustifolia</i> Vahl.	6.50	0.23	1	3.57	Leaves
10. <i>Acer monspessulanum</i> L.	4.00	0.14	1	3.57	Leaves and buds
11. <i>Acer</i> sp.	3.00	0.10	2	7.14	Leaves
12. <i>Sorbus aucuparia</i> L.	1.70	0.06	2	7.14	Leaves
13. <i>Pinus pinaster</i> Aiton	0.50	0.01	2	7.14	Leaves
14. <i>Ulmus campestris</i> auct., non L.	0.20	0.01	1	3.57	Leaves
15. <i>Platanus orientalis</i> L.	0.10	+	1	3.57	Leaves
Lianes					
16. <i>Hedera helix</i> L.	67.40	2.41	17	60.71	Leaves and twigs
17. <i>Clematis vitalba</i> L.	50.30	1.80	6	21.42	Leaves and twigs
18. <i>Lonicera hispanica</i> Boiss. & Reuter	14.00	0.50	3	10.71	Leaves and twigs
19. <i>Clematis campaniflora</i> Brot.	6.20	0.22	2	7.14	Leaves and twigs
20. <i>Lonicera implexa</i> Aiton	4.30	0.15	1	3.57	Leaves and twigs
21. <i>Lonicera etrusca</i> L.	0.80	0.03	1	3.57	Leaves and fruits
22. <i>Lonicera peryclimeum</i> L.	0.20	0.01	1	3.57	Leaves
Total	521.05	18.59	28	100.00	
NANOPHANEROPHYTES					
1. <i>Phillyrea latifolia</i> L.	197.00	7.05	11	39.27	Leaves, twigs and buds
2. <i>Rubus ulmifolius</i> Schott.	141.70	5.06	17	60.71	Leaves, twigs, flowers and fruits
3. <i>Rosa canina</i> L.	102.30	3.65	20	71.40	Leaves, twigs, flowers and fruits
4. <i>Quercus coccifera</i> L.	66.00	2.35	10	35.71	Leaves, twigs and fruits
5. <i>Crataegus mongyna</i> Jacq.	61.30	2.20	17	60.71	Leaves, twigs and buds
6. <i>Jasminum fruticans</i> L.	42.00	1.50	7	25.00	Leaves, twigs and fruits
7. <i>Juniperus sabina</i> L.	37.40	1.33	7	25.00	Leaves, twigs, buds and fruits
8. <i>Rosmarinus officinalis</i> L.	35.50	1.30	4	14.28	Leaves and twigs
9. <i>Pistacia terebinthus</i> L.	33.00	1.17	7	25.00	Leaves, twigs, buds and fruits
10. <i>Viburnum tinus</i> L.	27.20	1.00	6	21.42	Leaves and twigs
11. <i>Berberis vulgaris</i> L.	24.00	0.85	8	28.57	Leaves, twigs and fruits

12. <i>Berberis hispanica</i> Boiss. & Reuter	15.50	0.55	5	17.85	Leaves, twigs and fruits
13. <i>Rosa sicula</i> Tratt.	14.40	0.50	3	10.71	Leaves and fruits
14. <i>Juniperus oxycedrus</i> L.	13.30	0.47	8	28.57	Leaves, twigs, buds and fruits
15. <i>Juniperus nana</i> Willd.	12.60	0.45	3	10.71	Leaves, twigs, buds and fruits
16. <i>Amelanchier ovalis</i> Medicus	12.40	0.44	5	17.85	Leaves, twigs and buds
17. <i>Rhamnus myrtifolius</i> Willk.	12.00	0.42	9	32.14	Leaves, twigs and buds
18. <i>Rosa foetida</i> J. Herrmann	11.00	0.40	1	3.57	Leaves and fruits
19. <i>Ilex aquifolium</i> L.	5.00	0.17	1	3.57	Leaves and twigs
20. <i>Phillyrea media</i> L.	4.10	0.15	1	3.57	Leaves and twigs
21. <i>Prunus</i> sp.	4.00	0.14	1	3.57	Leaves
22. <i>Rhamnus infectorius</i> L.	3.20	0.11	2	7.14	Leaves, twigs and buds
23. <i>Genista florida</i> L.	3.00	0.10	1	3.57	Leaves and twigs
24. <i>Pistacia lentiscus</i> L.	2.00	0.07	1	3.57	Leaves and twigs
25. <i>Juniperus communis</i> L.	1.00	0.03	1	3.57	Leaves and twigs
26. <i>Ononis aragonensis</i> Asso.	1.00	0.03	2	7.14	Leaves and twigs
27. <i>Erica arborea</i> L.	0.50	0.02	1	3.57	Leaves and twigs
28. <i>Phillyrea angustifolia</i> L.	0.40	0.01	1	3.57	Leaves and twigs
29. <i>Rosa</i> sp.	0.30	0.01	1	3.57	Leaves
30. <i>Daphne gnidium</i> L.	0.10	+	1	3.57	Leaves
Total	883.20	31.53	26	100.00	

CHAMAEPHYTES

1. <i>Euphorbia nicaeensis</i> All.	49.40	1.80	3	10.71	Leaves and stems
2. <i>Genista cazorlana</i> Deb., Rev.	30.80	1.10	14	50.00	Leaves, stems and fruits
3. <i>Marrubium candidissimum</i> L.	27.50	1.00	4	14.28	Flowers and fruits
4. <i>Teucrium carthaginense</i> Lange	22.00	0.80	4	14.28	Leaves, stems, flowers and fruits
5. <i>Helianthemum croceum</i> (Desf.) Pers.	20.40	0.72	11	39.28	Leaves, stems and fruits
6. <i>Helianthemum asperum</i> Lag. ex Dunal in DC.	19.00	0.70	12	42.85	Leaves, stems, flowers and fruits
7. <i>Coronilla minima</i> L.	15.85	0.60	15	53.57	Leaves, stems and fruits
8. <i>Helianthemum paniculatum</i> Dunal	14.70	0.52	6	21.42	Leaves, stems, flowers and fruits
9. <i>Teucrium multiflorum</i> L.	14.00	0.50	14	50.00	Leaves, stems and flowers
10. <i>Genista tejedensis</i> (Port., Rig.) C. Vic.	11.70	0.41	6	21.42	Leaves, stems, flowers and fruits
11. <i>Helichrysum stoechas</i> (L.) Moench	9.60	0.34	3	10.71	Leaves and stems
12. <i>Santolina rosmarinifolia</i> L.	7.80	0.30	5	17.85	Leaves, stems and capitula
13. <i>Lavandula latifolia</i> Medicus	5.00	0.17	1	3.57	Leaves and stems
14. <i>Sedum album</i> L.	4.40	0.15	4	14.28	Leaves and flowers
15. <i>Argyrolobium linneanum</i> Walpers	4.15	0.14	4	14.28	Leaves, stems and fruits
16. <i>Sedum sediforme</i> (Jacq.) Pau.	3.20	0.11	3	10.71	Leaves, stems, flowers and roots
17. <i>Ononis saxicola</i> Boiss. & Reuter	3.10	0.11	3	10.71	Leaves, stems, flowers and fruits
18. <i>Teucrium</i> sp.	2.00	0.07	1	3.57	Leaves
19. <i>Digitalis obscura</i> L.	2.00	0.07	1	3.57	Leaves and stems
20. <i>Thymus zygis</i> L.	1.50	0.05	2	7.14	Leaves and stems
21. <i>Sideritis hirsuta</i> L.	1.50	0.05	1	3.57	Flowers
22. <i>Dianthus brachyantus</i> Boiss.	1.00	0.03	1	3.57	Fruits

23. <i>Fumana paradoxa</i> Heywood in Guinea	1.00	0.03	1	3.57	Leaves and stems
24. <i>Thymus mastichina</i> L.	1.00	0.03	1	3.57	Leaves and stems
25. <i>Satureja cuneifolia</i> ssp. <i>obovata</i> (Lag.) G. López	1.00	0.03	1	3.57	Leaves and stems
26. <i>Thymus vulgaris</i> L.	0.80	0.03	1	3.57	Leaves, stems and flowers
27. <i>Bupleurum spinosum</i> L.	0.40	0.01	1	3.57	Leaves and stems
28. <i>Scrophularia aquatica</i> auct. non L.	0.40	0.01	1	3.57	Leaves
29. <i>Cerastium boissieri</i> Gren.	0.30	0.01	1	3.57	Leaves
30. <i>Sedum</i> sp.	0.10	+	1	3.57	Leaves
Total	275.70	9.89	27	96.42	
HEMICRYPTOPHYTES					
1. <i>Festuca arundinacea</i> Schreber	145.50	5.30	13	46.00	Leaves, stems and spikelets
2. <i>Oryzopsis paradoxa</i> (L.) Nutt.	140.50	5.01	23	82.14	Leaves, stems and spikelets
3. <i>Brachypodium sylvaticum</i> (Huds.) P. B.	69.50	2.50	14	50.00	Leaves, stems and spikelets
4. <i>Carex hallerana</i> Ass.	48.50	1.73	11	39.28	Leaves, stems and spikes
5. <i>Helictotrichon filifolium</i> (Lag.) Henrard	29.00	1.03	3	10.71	Leaves, stems and spikelets
6. <i>Anarrhinum laxiflorum</i> Boiss.	27.70	1.00	13	46.42	Leaves, stems, flowers and fruits
7. <i>Festuca scariosa</i> (Lag.) Ascherson & Graebner	25.00	0.90	3	10.71	Leaves, stems and spikelets
8. <i>Plumbago europaea</i> L.	24.00	0.85	2	7.14	Leaves, stems and flowers
9. <i>Festuca rubra</i> L.	21.00	0.75	3	10.71	Leaves, stems and spikelets
10. <i>Catananche caerulea</i> L.	19.05	0.70	7	25.00	Leaves, capitula and fruits
11. <i>Sesleria argentea</i> Sav.	19.00	0.70	5	17.85	Leaves, stems and spikelets
12. <i>Rubia peregrina</i> L.	17.30	0.63	17	60.71	Leaves, stems and fruits
13. <i>Microlonchus salmanticus</i> (L.) DC.	17.30	0.63	5	17.85	Capitula and fruits
14. <i>Cirsium</i> sp.	16.30	0.60	9	32.14	Capitula
15. <i>Calamintha clinopodium</i> Bentham	13.10	0.47	4	14.28	Leaves, stems, flowers and fruits
16. <i>Festuca plicata</i> Hack.	13.00	0.46	2	7.14	Leaves, stems and spikelets
17. <i>Dactylis glomerata</i> L.	12.00	0.42	2	7.14	Leaves, stems and spikelets
18. <i>Scabiosa tomentosa</i> Cav., non J. F. Gmelin	10.90	0.40	12	42.85	Leaves, stems, flowers and fruits
19. <i>Carlina corimbosa</i> L.	10.00	0.35	1	3.57	Leaves, and capitula
20. <i>Brachypodium ramosum</i> Roem. & Schult.	10.00	0.35	1	3.57	Leaves, stems and spikelets
21. <i>Silene inflata</i> SM.	9.70	0.34	8	28.57	Leaves, stems, flowers and fruits
22. <i>Bromus intermedius</i> Guss.	9.50	0.33	3	10.71	Leaves, stems and spikelets
23. <i>Calamintha granatensis</i> Boiss. & Reuter	8.70	0.31	10	35.70	Leaves, stems, flowers and fruits
24. <i>Lactuca tenerrima</i> Pourret	8.20	0.30	4	14.28	Leaves, capitula and fruits
25. <i>Carex</i> sp.	7.50	0.26	4	14.28	Leaves, stems and spikes

26. <i>Poa ligulata</i> Boiss.	6.00	0.21	1	3.57	Leaves, stems and spikelets
27. <i>Festuca</i> sp.	5.00	0.20	1	3.57	Leaves, stems and spikelets
28. <i>Centaurea paniculata</i> L.	4.60	0.16	6	21.42	Stems and capitula
29. <i>Koeleria</i> sp.	4.00	0.14	1	3.57	Leaves and stems
30. <i>Centaurea prostrata</i> Cosson.	3.80	0.13	3	10.71	Capitula and fruits
31. <i>Hedysarum humile</i> L.	3.20	0.11	2	7.14	Leaves and roots
32. <i>Hypericum perforatum</i> L.	3.00	0.10	3	10.71	Leaves, stems and flowers
33. <i>Poa alpina</i> L.	3.00	0.10	1	3.57	Leaves, stems and spikelets
34. <i>Arenaria grandiflora</i> L.	2.70	0.10	1	3.57	Stems, flowers and fruits
35. <i>Anthyllis vulneraria</i> L.	2.40	0.09	2	7.14	Leaves and fruits
36. <i>Pimpinella major</i> (L.) Hudson	2.20	0.07	9	32.14	Fruits
37. <i>Poa bulbosa</i> L.	2.00	0.07	1	3.57	Leaves, stems and spikelets
38. <i>Potentilla reptans</i> L.	1.80	0.06	2	7.14	Leaves, stems and flowers
39. <i>Filipendula vulgaris</i> Moench.	1.70	0.06	1	3.57	Leaves and stems
40. <i>Calamintha nepeta</i> (L.) Savi.	1.50	0.05	2	7.14	Leaves and stems
41. <i>Brachypodium phoenicoides</i> (L.) Roem. & Schult.	1.40	0.05	1	3.57	Leaves, stems and spikelets
42. <i>Pimpinella gracilis</i> (Boiss.) H. Wolff in Engler	1.10	0.03	1	3.57	Leaves and flowers
43. <i>Galium frutescens</i> Cav.	1.10	0.03	2	7.14	Leaves and stems
44. <i>Lotus corniculatus</i> L.	1.00	0.03	1	3.57	Leaves and stems
45. <i>Brunella vulgaris</i> L.	1.00	0.03	1	3.57	Leaves and calyxes
46. <i>Plantago lanceolata</i> L.	1.00	0.03	2	7.14	Leaves and seeds
47. <i>Potentilla caulescens</i> L.	1.00	0.03	1	3.57	Leaves, stems and flowers
48. <i>Centaurea jaenensis</i> Degen & Debeaux	0.70	0.02	1	3.57	Leaves, capitula and fruits
49. <i>Hypericum caprifolium</i> Boiss.	0.40	0.01	1	3.57	Leaves and flowers
50. <i>Astragalus incanus</i> ssp. <i>macrorhizus</i> (Cav.) Cheter	0.30	0.01	1	3.57	Leaves and fruits
51. <i>Psolarea bituminosa</i> L.	0.30	0.01	1	3.57	Leaves
52. <i>Hieracium pilosella</i> L.	0.30	0.01	1	3.57	Leaves and capitula
53. <i>Rumex pulcher</i> L.	0.20	0.01	1	3.57	Fruits
54. <i>Paronychia argentea</i> Lam.	0.20	0.01	1	3.57	Leaves and flowers
55. <i>Bupleurum bourgaei</i> Boiss. & Reuter	0.20	0.01	1	3.57	Leaves and stems
56. <i>Cirsium hispanicum</i> (Lam.) Pau	0.20	0.01	1	3.57	Leaves
57. <i>Astragalus incanus</i> L.	0.15	+	1	3.57	Leaves
58. <i>Aquilegia vulgaris</i> L.	0.10	+	1	3.57	Leaves
59. <i>Eryngium campestre</i> L.	0.10	+	1	3.57	Leaves
Total	789.90	28.30	27	96.42	
GEOPHYTES					
1. <i>Aphyllantes monspeliensis</i> L.	66.30	2.40	23	82.14	Leaves, stems, flowers and fruits
2. <i>Sanguisorba lateriflora</i> (Coss.) Caballero	49.60	1.78	18	64.28	Leaves, stems, flowers and fruits
3. <i>Asphodelus cerasiferus</i> Gay	15.80	0.60	9	32.14	Leaves
4. <i>Arrhenatherum bulbosum</i> C. Presl.	13.00	0.49	3	10.71	Leaves, stems and spikelets
5. <i>Sanguisorba rupicola</i> (Boiss. & Reuter) A. Br.	11.00	0.40	10	35.71	Leaves, stems, flowers and fruits
6. <i>Asplenium trichomanes</i> L.	6.90	0.24	3	10.71	Leaves
7. <i>Biscutella variegata</i> Boiss. & Reuter	6.10	0.22	8	28.57	Leaves, stems and fruits
8. <i>Mentha longifolia</i> (L.) Hudson	3.50	0.12	1	3.57	Leaves and stems

9. <i>Paeonia broteroi</i> Boiss. & Reuter	3.00	0.10	1	3.57	Fruits
10. <i>Allium polyanthum</i> Schultes & Schultes fil.	2.20	0.07	3	10.71	Leaves, stems, flowers and fruits
11. <i>Ceterach officinarum</i> DC.	2.00	0.07	1	3.57	Leaves
12. <i>Geum sylvaticum</i> Pourret	1.70	0.06	6	21.42	Leaves, stems, flowers and fruits
13. <i>Ruscus aculeatus</i> L.	0.80	0.02	1	3.57	Leaves
14. <i>Agrimonia eupatoria</i> L.	0.50	0.01	2	7.14	Fruits
15. <i>Smilax aspera</i> L.	0.50	0.01	1	3.57	Leaves and stems
16. <i>Pteridium aquilinum</i> (L.) Kuhn.	0.30	0.01	1	3.57	Leaves
17. <i>Mentha rotundifolia</i> (L.) Hudson	0.20	0.01	1	3.57	Leaves and stems
Total	183.40	6.61	28	100.00	
TEROPHYTES					
1. <i>Cynosurus echinatus</i> L.	26.50	0.97	9	32.14	All parts of the plants
2. <i>Aegilops triaristata</i> Willd.	18.40	0.65	5	17.85	All parts of the plants
3. <i>Avena</i> sp.	9.00	0.32	3	10.71	Leaves, stems and spikelets
4. <i>Trifolium stellatum</i> L.	7.90	0.30	5	17.85	Leaves, stems, flowers and fruits
5. <i>Trifolium striatum</i> L.	4.00	0.14	3	10.71	Leaves, flowers and fruits
6. <i>Hedypnois cretica</i> (L.) Dum-Courset	4.00	0.14	5	17.85	Leaves, capitula and fruits
7. <i>Nardurus</i> sp.	4.00	0.14	1	3.57	Leaves and spikelets
8. <i>Medicago lupulina</i> L.	3.50	0.12	1	3.57	Leaves, stems and fruits
9. <i>Cuprina vulgaris</i> Cass.	3.20	0.11	7	25.00	Stems, capitula and fruits
10. <i>Caucalis leptophyllus</i> L.	2.30	0.08	3	10.71	Fruits
11. <i>Rhagadiolus stellatus</i> (L.) Gartner	2.00	0.07	1	3.57	Stems and fruits
12. <i>Crucianella angustifolia</i> L.	1.20	0.04	2	7.14	Leaves and flowers
13. <i>Avena fatua</i> L.	1.00	0.03	1	3.57	Leaves and spikelets
14. <i>Medicago minima</i> (L.) Bartal	0.90	0.03	3	10.71	Fruits
15. <i>Hordeum</i> sp.	0.90	0.03	1	3.57	Leaves and spikelets
16. <i>Euphorbia helioscopia</i> L.	0.80	0.03	1	3.57	Leaves, stems and flowers
17. <i>Tragopogon crucifolius</i> L.	0.80	0.03	1	3.57	Stems, flowers and fruits
18. <i>Torilis arvensis</i> (Hudson) Link.	0.35	0.01	3	10.71	Leaves, stems and flowers
19. <i>Ranunculus muricatus</i> L.	0.20	0.01	1	3.57	Fruits
20. <i>Galium verticillatum</i> Danth.	0.20	0.01	1	3.57	Leaves
21. <i>Medicago aculeata</i> Gaertn.	0.10	+	1	3.57	Fruits
Total	91.25	3.26	21	75.00	
EPIPHYTES					
1. <i>Viscum album</i> L.	1.50	0.05	1	3.57	Leaves and twigs
PLANTS NON INCLUDED IN BIOTYPES					
1. <i>Lathyrus</i> sp.	7.00	0.25	1	3.57	Fruits
2. <i>Agrostis</i> sp.	3.00	0.10	1	3.57	Leaves and spikelets
3. <i>Lolium</i> sp.	3.00	0.10	1	3.57	Leaves, stems and spikelets
4. <i>Dianthus</i> sp.	2.20	0.07	2	7.14	Flowers
5. <i>Trifolium</i> sp.	1.00	0.03	1	3.57	Leaves
6. <i>Ononis</i> sp.	1.00	0.03	1	3.57	Leaves and stems
7. <i>Carduncellus</i> sp.	1.00	0.03	1	3.57	Capitula

8. <i>Bromus</i> sp.	1.00	0.03	1	3.57	Leaves
9. <i>Geranium</i> sp.	0.85	0.03	4	14.28	Leaves
10. <i>Erodium</i> sp.	0.30	0.01	1	3.57	Leaves and fruits
11. <i>Andryala</i> sp.	0.30	0.01	1	3.57	Stems and capitula
12. <i>Cerastium</i> sp.	0.10	+	1	3.57	Fruits
13. Gramineae	3.00	0.10	1	3.57	Leaves
14. Caryophyllaceae	0.50	0.01	1	3.57	Fruits
15. Cruciferae	0.50	0.01	1	3.57	Flowers and fruits
16. Compositae	0.40	0.01	1	3.57	Capitula
17. Umbelliferae	0.20	0.01	1	3.57	Flowers
18. Liliaceae	0.10	+	1	3.57	Leaves
Subtotal	25.45	0.83	14	50.00	
MUSCI					
1. <i>Tortula rigidula</i> Mitt.	1.05	0.03	4	14.28	Gametophytes
FUNGI					
1. Unindetermined fungi	2.00	0.07	1	3.57	
LICHENS					
1. <i>Pseudevernia furfuracea</i> (L.) Zopf.	0.10	+	1	3.57	Thallus
2. Unindetermined lichens	0.50	0.05	1	3.57	Thallus
Subtotal	0.60	0.01	2	7.14	
Unidentified totals	24.90	0.90	8	28.57	
Total plants non included in biotypes	54.00	1.84	19	67.85	
Grand total	2800.00	100.00	28	100.00	

The gramineous species found have been 27, which represent 21.4% of the total biomass consumed.

The most relevant food in this season have been: *Quercus ilex* (7.6%), *Phillyrea latifolia* (7%), *Festuca arundinacea* (5.3%), *Rubus ulmifolius* (5.1%), and *Oryzopsis paradoxa* (5.0%).

Also important are: *Rosa canina*, with a provision of biomass of 3.6% and with a contribution over 2%, *Hedera helix*, *Brachypodium sylvaticum*, *Quercus coccifera*, *Aphyllantes monspeliensis*, *Crataegus monogyna*, etc.

Regarding the frequency of occurrence, the more common plant species have been *Quercus ilex* and *Aphyllantes monspeliensis*, found in 82% of stomach contents. With a percentage between 50% and 75%, are the plants above cited as important. Besides, *Rubia peregrina*, *Sanguisorba lateriflora*, *Oryzopsis paradoxa*, *Coronilla minima*, *Genista cazorlana* and *Teucrium multiflorum* were also found.

Nanophanerophytes and hemicryptophytes have been the most consumed biological forms consumed providing a biomass of 31.5% and 28.3% respectively; the macrophanerophytes have amounted to 18.6%, followed by the camephytes with 10% of biomass provision, and the geophytes that with a provision of 6.6% have had the highest season, while the terophytes had little importance (Fig. 2).

Ligneous plants amounted to 60.1% of trophic resources in the season, while the herbaceous were 38.1% (Fig. 3).

4.3. Autumn Diet

In this season diet, 145 plant species were found in 20 stomach contents (Table 4). The mean of species per content was 25.1 (SD ± 7.98), being 49 the maximum and 17 the minimum.

The gramineous consumed have been 23 species, amounting to 22.1% of the total biomass.

Table 4
Composition of wild goat diet in autumn, obtained by analysis of 20 samples of stomach contents.

Biotypes and species of plants	Volume		Frequency of occurrence		Parts consumed
	ml	%	n	%	
MACROPHANEROPHYTES					
1. <i>Quercus ilex</i> L.	493.20	24.66	20	100.00	Leaves, twigs, flowers and fruits
2. <i>Olea europaea</i> L.	82.50	4.12	3	15.00	Leaves, twigs and fruits
3. <i>Pinus nigra</i> ssp. <i>salzmannii</i> (Dunal) Franco	14.60	0.75	13	65.00	Leaves, twigs, barks and flowers
4. <i>Prunus avium</i> L.	6.60	0.35	1	5.00	Fruits
5. <i>Pinus pinaster</i> Aiton	4.60	0.23	7	35.00	Leaves, barks and flowers
6. <i>Acer opalus</i> Miller	2.40	0.12	2	10.00	Leaves and twigs
7. <i>Pinus halepensis</i> Miller	2.20	0.11	4	20.00	Leaves
8. <i>Populus nigra</i> L. Lianes	0.30	0.01	1	5.00	Leaves
9. <i>Hedera helix</i> L.	10.70	0.53	5	25.00	Leaves and twigs
10. <i>Lonicera implexa</i> Aiton	3.80	0.20	3	15.00	Leaves and twigs
11. <i>Lonicera hispanica</i> Boiss & Reuter	0.60	0.03	2	10.00	Leaves and twigs
12. <i>Clematis campaniflora</i> Brot.	0.30	0.01	1	5.00	Leaves and twigs
Total	621.80	31.12	20	100.00	
NANOPHANEROPHYTES					
1. <i>Phillyrea latifolia</i> L.	210.00	10.50	7	35.00	Leaves and twigs
2. <i>Juniperus oxycedrus</i> L.	92.30	4.60	17	85.00	Leaves, twigs, flowers and fruits
3. <i>Rosmarinus officinalis</i> L.	35.90	1.80	9	45.00	Leaves and twigs
4. <i>Viburnum tinus</i> L.	31.60	1.60	2	10.00	Leaves and twigs
5. <i>Phillyrea media</i> L.	31.00	1.55	1	5.00	Leaves and twigs
6. <i>Rubus ulmifolius</i> Schott.	27.70	1.40	9	45.00	Leaves and twigs
7. <i>Arbutus unedo</i> L.	18.50	0.92	4	20.00	Leaves, twigs, flowers and fruits
8. <i>Rosa canina</i> L.	16.50	0.82	6	30.00	Leaves, twigs and fruits
9. <i>Juniperus phoenicea</i> L.	11.70	0.60	5	25.00	Leaves
10. <i>Quercus coccifera</i> L.	6.70	0.35	6	30.00	Leaves and twigs
11. <i>Jasminum fruticans</i> L.	5.70	0.28	6	30.00	Leaves, twigs and fruits
12. <i>Cistus clusii</i> Dunal in DC.	4.30	0.21	2	10.00	Leaves
13. <i>Cistus salvifolius</i> L.	4.00	0.20	1	5.00	Leaves

14. <i>Lygos sphaerocarpa</i> (L.) Heywood	3.50	0.20	2	10.00	Twigs and fruits
15. <i>Rhamnus myrtifolius</i> Willk.	3.40	0.18	2	10.00	Leaves and twigs
16. <i>Phillyrea angustifolia</i> Vahl.	3.00	0.15	1	5.00	Leaves and twigs
17. <i>Cistus albidus</i> L.	2.70	0.14	4	20.00	Leaves and twigs
18. <i>Juniperus sabina</i> L.	1.80	0.10	2	10.00	Leaves and twigs
19. <i>Coronilla valentina</i> L.	1.50	0.08	1	5.00	Leaves
20. <i>Pistacia terebinthus</i> L.	1.00	0.05	1	5.00	Leaves
21. <i>Prunus</i> sp.	0.70	0.03	3	15.00	Leaves
22. <i>Crataegus mongyna</i> Jacq.	0.60	0.03	2	10.00	Leaves
23. <i>Rosa sicula</i> Tratt.	0.30	0.01	1	5.00	Leaves
24. <i>Cytisus reverchonii</i> Degen & Hervier	0.30	0.01	1	5.00	Leaves and twigs
25. <i>Cistus laurifolius</i> L.	0.30	0.01	1	5.00	Leaves
26. <i>Erica arborea</i> L.	0.20	0.01	1	5.00	Leaves and twigs
27. <i>Berberis hispanica</i> Boiss & Reuter	0.20	0.01	1	5.00	Leaves and twigs
28. <i>Berberis vulgaris</i> L.	0.10	+	1	5.00	Leaves
Total	515.50	25.84	20	100.00	
CHAMAEPHYTES					
1. <i>Salvia lavandulifolia</i> Vahl.	54.20	2.71	3	15.00	Leaves
2. <i>Fumana paradoxa</i> Heywood in Guinea	21.30	1.06	4	20.00	Leaves, stems and fruits
3. <i>Helianthemum croceum</i> (Desf.) Pers.	19.00	0.95	13	65.00	Leaves and stems
4. <i>Sedum sediforme</i> (Jacq.) Pau.	11.10	0.55	8	40.00	Leaves and stems
5. <i>Sedum album</i> L.	10.30	0.51	5	25.00	Leaves and stems
6. <i>Helianthemum paniculatum</i> Dunal	9.90	0.50	7	35.00	Leaves and stems
7. <i>Helianthemum asperum</i> Lag. ex Dunal in DC.	8.90	0.44	9	45.00	Leaves and stems
8. <i>Teucrium carthaginense</i> Lange	6.80	0.34	6	30.00	Leaves and stems
9. <i>Lavandula latifolia</i> Medicus	6.60	0.33	4	20.00	Leaves and stems
10. <i>Lithospermum fruticosum</i> L.	5.10	0.25	4	20.00	Leaves and stems
11. <i>Euphorbia nicaeensis</i> All.					Leaves and stems
12. <i>Coronilla minima</i> L.	4.60	0.23	7	35.00	Leaves and stems
13. <i>Sthaelina dubia</i> L.	4.50	0.22	2	10.00	Leaves, stems and flowers
14. <i>Thymus vulgaris</i> L.	4.10	0.20	7	35.00	Leaves and stems
15. <i>Argyrolobium linneanum</i> Walpers	4.00	0.20	7	35.00	Leaves and stems
16. <i>Thymus zygis</i> L.	3.00	0.15	2	10.00	Leaves and stems
17. <i>Teucrium multiflorum</i> L.	2.50	0.12	5	25.00	Leaves and stems
18. <i>Cerastium boissieri</i> Gren.	2.00	0.10	1	5.00	Leaves, stems and flowers
19. <i>Ruta montana</i> (L.) L.	1.80	0.10	2	10.00	Leaves and stems
20. <i>Helichrysum stoechas</i> (L.) Moench	1.50	0.08	2	10.00	Leaves and stems
21. <i>Thymus hiemalis</i> Lange	1.50	0.08	2	10.00	Leaves and stems
22. <i>Genista tejedensis</i> (Port., Rig.) C. Vic.	1.30	0.06	1	5.00	Leaves and stems
23. <i>Satureja cuneifolia</i> ssp. obovata (Lag.) G. López	1.20	0.06	2	10.00	Leaves and stems
24. <i>Genista cazortana</i> Deb., Rev.	1.00	0.05	3	15.00	Leaves and stems
25. <i>Marrubium candidissimum</i> L.	1.00	0.05	1	5.00	Leaves and flowers
26. <i>Sedum</i> sp.	0.80	0.04	2	10.00	Leaves and stems
27. <i>Santolina rosmarinifolia</i> L.	0.50	0.02	1	5.00	Leaves
28. <i>Teucrium granatense</i> (Boiss.) Boiss. & Reuter	0.40	0.02	1	5.00	Leaves
29. <i>Erinacea anthyllis</i> Lynk	0.30	0.01	1	5.00	Leaves and stems
30. <i>Thymus hirtus</i> Willd.	0.30	0.01	2	10.00	Leaves
Total	194.30	9.68	20	100.00	

HEMICRYPTOPHYTES

1. <i>Oryzopsis paradoxa</i> (L.) Nutt.	124.00	6.20	14	70.00	All parts of the plant
2. <i>Sesleria argentea</i> Sav.	71.00	3.55	12	60.00	Leaves, stems and spikelets
3. <i>Carex hallerana</i> Asso.	53.00	2.65	11	55.00	Leaves and stems
4. <i>Festuca arundinacea</i> Schreber	43.00	2.15	8	40.00	All part of the plant
5. <i>Helictotrichon filifolium</i> (Lag.) Henrard	38.50	1.94	7	35.00	Leaves and stems
6. <i>Festuca</i> sp.	22.00	1.10	6	30.00	Leaves and stems
7. <i>Carex</i> sp.	20.00	1.00	6	30.00	Leaves
8. <i>Rubia peregrina</i> L.	13.60	0.70	12	60.00	Leaves and stems
9. <i>Cirsium hispanicum</i> (Lam.) Pau	12.10	0.60	5	25.00	Leaves
10. <i>Brachypodium sylvaticum</i> (Hunds.) P. B.	11.00	0.55	3	15.00	All parts of the plant
11. <i>Stipa aristella</i> L.	8.00	0.40	2	10.00	Leaves
12. <i>Brachypodium ramosum</i> Roem. & Schult.	7.00	0.35	3	15.00	Leaves and stems
13. <i>Dactylis glomerata</i> L.	7.00	0.35	2	10.00	Leaves
14. <i>Festuca rubra</i> L.	7.00	0.35	2	10.00	Leaves, stems and roots
15. <i>Festuca plicata</i> Hack.	6.00	0.30	2	10.00	Leaves and stems
16. <i>Koeleria</i> sp.	4.00	0.20	1	5.00	Leaves and stems
17. <i>Anthoxanthum odoratum</i> L.	3.00	0.15	1	5.00	Leaves
18. <i>Foeniculum vulgare</i> Miller	3.00	0.15	2	10.00	Stems and fruits
19. <i>Arenaria tetraqueta</i> L.	0.60	0.03	1	5.00	Leaves and stems
20. <i>Arenaria montana</i> L.	0.50	0.02	1	5.00	Leaves
21. <i>Sarcocapnos baetica</i> (Boiss & Reuter) Nyman	0.50	0.02	1	5.00	Leaves
22. <i>Hedysarum humile</i> L.	0.40	0.02	1	5.00	Leaves
23. <i>Arenaria grandiflora</i> L.	0.35	0.02	2	10.00	Leaves, stems and flowers
24. <i>Hypericum perforatum</i> L.	0.30	0.01	1	5.00	Leaves and stems
25. <i>Galium mollugo</i> L.	0.30	0.01	1	5.00	Leaves and stems
26. <i>Galium frutescens</i> Cav.	0.10	+	1	5.00	Leaves and stems
27. <i>Plantago albicans</i> L.	0.10	+	1	5.00	Flowers
28. <i>Thrinacia hirta</i> Roth.	0.10	+	1	5.00	Capitula
29. <i>Silene inflata</i> SM.	0.10	+	1	5.00	Leaves
Total	456.55	22.82	20	100.00	

GEOPHYTES

1. <i>Aphyllantes monspeliensis</i> L.	59.90	3.00	11	55.00	Leaves and stems
2. <i>Asphodelus cerasiferus</i> Gay	8.90	0.44	7	35.00	Leaves
3. <i>Sanguisorba lateriflora</i> (Coss.) Caballero	4.90	0.24	10	50.00	Leaves and stems
4. <i>Allium polyanthum</i> Schultes & Schultes fil.	3.00	0.15	1	5.00	Leaves and bulbs
5. <i>Sanguisorba rupicola</i> (Boiss & Reuter) A. Br.	2.50	0.12	5	25.00	Leaves and stems
6. <i>Pteridium aquilinum</i> (L.) Kuhn.	1.80	0.10	3	15.00	Leaves
7. <i>Biscutella variegata</i> Boiss. & Reuter	1.30	0.06	2	10.00	Leaves
8. <i>Ceterach officinarum</i> DC.	1.10	0.05	3	15.00	Leaves
9. <i>Arrhenaterum bulbosum</i> C. Presl.	1.00	0.05	1	5.00	Leaves
10. <i>Smilax aspera</i> L.	0.80	0.04	1	5.00	Leaves
11. <i>Geum sylvaticum</i> Pourret	0.60	0.03	2	10.00	Leaves
12. <i>Colchicum autumnale</i> L.	0.50	0.02	1	5.00	Flowers and bulbs
13. <i>Asplenium trichomanes</i> L.	0.30	0.01	1	5.00	Leaves
14. <i>Agrimonia eupatoria</i> L.	0.10	+	1	5.00	Leaves
Total	86.70	4.31	19	95.00	

TEROPHYTES						
1. <i>Triticum vulgare</i> L.	25.00	1.24	1	5.00	Leaves	
2. <i>Cynosurus echinatus</i> L.	23.00	1.15	8	40.00	All parts of the plant	
3. <i>Hordeum vulgare</i> L.	20.00	1.00	1	5.00	Leaves	
4. <i>Aegilops triaristata</i> Willd.	7.00	0.35	3	15.00	Leaves, stems and spikelets	
5. <i>Galium verticillatum</i> Danth.	1.00	0.05	1	5.00	Leaves and stems	
6. <i>Medicago minima</i> (L.) Bartal	0.50	0.02	1	5.00	Fruits	
7. <i>Medicago aculeata</i> Gaertn.	0.40	0.02	1	5.00	Fruits	
8. <i>Trifolium stellatum</i> L.	0.25	0.01	1	5.00	Flowers and fruits	
Total	77.15	3.85	13	65.00		
PLANTS NON INCLUDED IN BIOTYPES						
1. <i>Bromus</i> sp.	9.50	0.50	5	25.00	Leaves	
2. <i>Agrostis</i> sp.	3.70	0.20	1	5.00	Leaves, stems and spikelets	
3. <i>Lolium</i> sp.	3.00	0.15	1	5.00	Leaves	
4. <i>Nepeta</i> sp.	3.00	0.15	1	5.00	Leaves and stems	
5. <i>Dianthus</i> sp.	1.00	0.05	2	10.00	Flowers	
6. <i>Vicia</i> sp.	0.10	+	1	5.00	Leaves	
7. <i>Galium</i> sp.	0.10	+	1	5.00	Leaves	
8. <i>Plantago</i> sp.	0.10	+	1	5.00	Leaves	
9. <i>Liliaceae</i>	0.70	0.03	1	5.00	Leaves	
10. <i>Compositae</i>	0.30	0.01	1	5.00	Leaves	
Subtotal.	21.50	1.09	10	50.00		
MUSCI						
1. <i>Tortula rigidula</i> Mitt.	1.60	0.08	4	20.00	Gametophytes	
2. <i>Camptothecium aureum</i> Br. Enr.	1.40	0.07	1	10.00	Gametophytes	
3. <i>Pleurochaete squarrosa</i> Linds.	0.60	0.03	2	10.00	Gametophytes	
4. <i>Antitrichia californica</i> Snll.	0.50	0.02	1	5.00	Gametophytes	
5. <i>Tortula ruralis</i> Ehrh.	0.40	0.02	1	5.00	Gametophytes	
Subtotal	4.50	0.22	9	45.00		
FUNGI						
1. <i>Tricholoma</i> sp.	6.00	0.30	4	20.00		
2. <i>Tricholoma terreum</i> (Schaeff. ex Fr.) Kumm.	5.10	0.25	3	15.00		
3. <i>Lactarius</i> sp.	2.30	0.11	1	5.00		
4. <i>Russula</i> sp.	2.00	0.10	1	5.00		
5. <i>Geastrum</i> sp.	0.30	0.01	1	5.00		
6. Unidentified fungi	1.20	0.06	2	10.00		
Subtotal	16.90	0.83	11	55.00		
LICHENS						
1. <i>Collema</i> sp.	0.90	0.04	3	15.00	Thallus	
2. <i>Pseudevernia furfuracea</i> (L.) Zoppf.	0.50	0.02	1	5.00	Thallus	
3. Unidentified lichens	1.00	0.05	1	5.00	Thallus	
Subtotal	2.40	0.11	5	25.00		
Unidentified totals	2.70	0.13	4	20.00		
Total plants non included in biotypes	48.00	2.38	17	85.00		
Grand total	2000.00	100.00	20	100.00		

The trophic resources ingested in largest proportions were *Quercus ilex*, in its highest season, since it has supossed 24.7% of the total diet, the same happened to *Phillyrea latifolia*, that with 10.5% represents the maximum of the year.

Other plant species to detach in the diet were *Oryzopsis paradoxa* with a contribution of 6.2%, *Juniperus oxycedrus* (4.6%), *Olea europaea* (4.1%), *Sesleria argentea* (3.6%), *Aphyllantes monspeliensis* (3%) and in a lesser degree *Salvia lavandulifolia*, *Carex hallerana*, *Festuca arundinacea*, *Helictotrichon filifolium*, *Rosmarinus officinalis* and *Viburnum tinus*.

Regarding the frequency of occurrence, *Quercus ilex* appears in 100% of contents. With a frequency between 85% and 50% are: *Ju-*

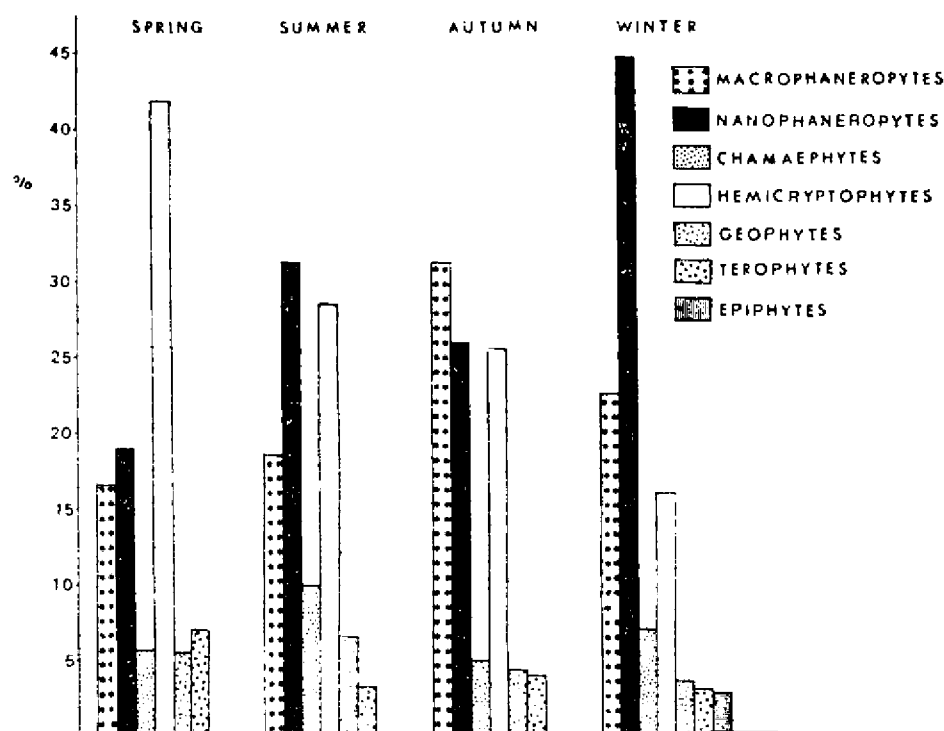


Fig. 2. Distribution of the percentages of biomass, calculated according to the volume of the different biologic forms that comprise the diet of wild goat in spring, summer, autumn and winter.

niperus oxycedrus, *Oryzopsis paradoxa*, *Pinus nigra*, *Helianthemum croceum*, *Sesleria argentea*, *Rubia peregrina*, *Carex hallerana*, *Aphyllantes monspeliensis*, *Basidiomycetes* sp. and *Sanguisorba lateriflora*.

In this season, the fungi have had some interest due to the frequency of occurrence (50%), with a provision of biomass of 0.8%. In the rest of seasons had little interest.

Regarding biotypes (Fig. 2), phaneropytes (macro and nano) amounted to 57.0% of the ingested biomass. Hemicryptophytes have provided

22.8% and camephytes 9.7%, which is of a certain interest. Finally, geophytes and terophytes amounted 4.3% and 3.8%, respectively.

Ligneous plants represented 66.7% of the diet, more that twice the rate of herbaceous (31%) (Fig. 3).

4.4. Winter Diet

It has characterized by the predominant consumption of ligneous plants. In 34 stomach contents, 164 species have been identified (Table 5). The \bar{x} of ingested species in each one of them has been 21.1 ($SD \pm 6.32$), being 33 the maximum and 8 the minimum.

The biomass provided by the 18 gramineous species has amounted to 15.4 of the ingested total.

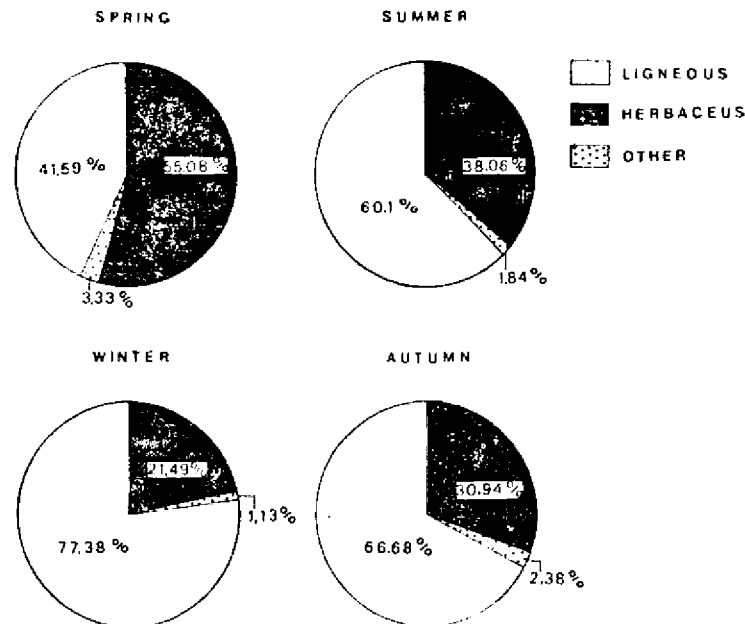


Fig. 3. Comparison of the percentages in the volume of biomass of ligneous and herbaceous plants consumed in spring, summer, autumn and winter.

The basic food resources were *Juniperus oxycedrus* with a provision of 16.8%, followed by *Quercus ilex* and *Phillyrea latifolia*, with provisions of 14% and 10.0% respectively.

Other interesting species since they provide about 4% of the biomass were *Rosmarinus officinalis*, *Oryzopsis paradoxa* and *Hedera helix* and, with lower provisions, *Viscum album*, *Rubus ulmifolius*, *Juniperus sabina*, *Sesleria argentea*, *Arbutus unedo* and *Viburnum tinus*.

Table 5
Composition of wild goat diet in winter, obtained by analysis of 35 samples of stomach contents.

Biotypes and species of plants	Volume		Frequency of occurrence		Parts consumed
	ml	%	n	%	
MACROPHANEROPHYTES					
1. <i>Quercus ilex</i> L.	490.20	14.00	33	94.29	Leaves, twigs and fruits
2. <i>Pinus nigra</i> ssp. <i>salzmannii</i> (Dunal) Franco	36.10	1.03	12	34.28	Leaves, twigs and barks
3. <i>Pinus pinaster</i> Aiton	26.00	0.74	3	8.57	Leaves and twigs
4. <i>Olea europaea</i> L.	24.00	0.70	2	5.71	Leaves, twigs and fruits
5. <i>Quercus faginea</i> Lam.	10.20	0.30	2	5.71	Leaves and twigs
6. <i>Acer granatense</i> Boiss.	2.45	0.10	5	14.29	Leaves
7. <i>Pinus halepensis</i> Miller.	1.90	0.05	3	8.57	Leaves
8. <i>Acer monspessulanum</i> L.	0.20	0.01	1	2.85	Leaves
9. <i>Acer opalus</i> Miller Lianes	0.20	0.01	1	2.85	Leaves
10. <i>Hedera helix</i> L.	138.60	4.00	19	54.30	Leaves, twigs and fruits
11. <i>Lonicera implexa</i> Aiton	44.50	1.30	4	11.42	Leaves and twigs
12. <i>Lonicera hispanica</i> Boiss. & Reuter	4.70	0.13	5	14.28	Leaves and twigs
13. <i>Clematis vitalba</i> L.	1.50	0.04	1	2.85	Leaves
Total	780.55	22.41	34	97.14	
NANOPHAEROPHYTES					
1. <i>Juniperus oxycedrus</i> L.	585.00	16.80	28	80.00	Leaves, twigs and fruits
2. <i>Phillyrea latifolia</i> L.	349.10	9.97	17	48.57	Leaves and twigs
3. <i>Rosmarinus officinalis</i> L.	179.00	5.11	17	48.57	Leaves, twigs and flowers
4. <i>Rubus ulmifolius</i> Schott.	90.70	2.60	13	37.4	Leaves, twigs and seeds
5. <i>Juniperus sabina</i> L.	80.80	2.30	11	30.42	Leaves and twigs
6. <i>Arbutus unedo</i> L.	62.50	1.78	7	20.00	Leaves and twigs
7. <i>Viburnum tinus</i> L.	61.50	1.75	8	22.80	Leaves, twigs and fruits
8. <i>Quercus coccifera</i> L.	46.00	1.31	4	11.42	Leaves and twigs
9. <i>Juniperus communis</i> L.	39.00	1.11	3	8.57	Leaves and twigs
10. <i>Rhamnus myrtifolius</i> Willk.	17.10	0.50	4	11.42	Leaves and twigs
11. <i>Juniperus phoenicea</i> L.	6.50	0.20	3	8.57	Leaves
12. <i>Phillyrea angustifolia</i> L.	6.00	0.17	2	5.70	Leaves and twigs
13. <i>Erica arborea</i> L.	4.60	0.13	1	2.85	Leaves, twigs and flowers
14. <i>Cistus albidus</i> L.	4.60	0.13	4	11.42	Leaves
15. <i>Genista scorpius</i> (L.) DC.	4.00	0.11	1	2.85	Leaves, twigs and flowers
16. <i>Pistacia lentiscus</i> L.	3.50	0.10	1	2.85	Leaves and twigs
17. <i>Ilex aquifolium</i> L.	3.30	0.10	3	8.57	Leaves and twigs
18. <i>Rosa canina</i> L.	3.00	0.08	5	14.25	Leaves and twigs
19. <i>Lygos sphaerocarpa</i> (L.) Heywood	3.00	0.08	1	2.85	Twigs
20. <i>Pistacia terebinthus</i> L.	2.30	0.06	4	11.42	Leaves and twigs
21. <i>Jasminum fruticans</i> L.	2.20	0.06	2	5.71	Leaves and twigs
22. <i>Phillyrea media</i> L.	2.00	0.05	1	2.85	Leaves

23. <i>Crataegus monogyna</i> Jacq.	2.00	0.05	2	5.71	Leaves and twigs
24. <i>Cistus laurifolius</i> L.	1.30	0.03	2	5.71	Leaves
25. <i>Berberis hispanica</i> Boiss. and Reuter	1.20	0.03	2	5.71	Leaves and twigs
26. <i>Cistus salvifolius</i> L.	1.00	0.02	1	2.85	Leaves
27. <i>Rosa</i> sp.	0.70	0.02	2	5.71	Leaves
28. <i>Ligustrum vulgare</i> L.	0.60	0.02	2	5.71	Leaves
29. <i>Daphne gnidium</i> L.	0.20	0.01	1	2.85	Leaves
30. <i>Coronilla valentina</i> L.	0.10	+	1	2.85	Leaves
Total	1562.80	44.68	35	100.00	

CHAMAEPHYTES

1. <i>Teucrium carthaginense</i> Lange	34.80	1.00	12	34.28	Leaves and stems
2. <i>Sedum sediforme</i> (Jacq.) Pau.	32.50	0.93	13	37.14	Leaves and stems
3. <i>Helianthemum croceum</i> (Desf.) Pers.	24.60	0.70	18	51.40	Leaves and stems
4. <i>Thymus vulgaris</i> L.	22.30	0.64	16	45.70	Leaves and stems
5. <i>Helianthemum asperum</i> Lag. ex Dunal in DC.	17.30	0.50	10	28.57	Leaves and stems
6. <i>Argyrolobium linneanum</i> Walpers	9.50	0.30	4	11.42	Leaves and stems
7. <i>Lavandula latifolia</i> Medicus	9.30	0.30	3	8.57	Leaves and stems
8. <i>Digitalis obscura</i> L.	8.00	0.23	4	11.42	Leaves and stems
9. <i>Teucrium multiflorum</i> L.	7.00	0.20	8	22.80	Leaves and stems
10. <i>Satureja cuneifolia</i> ssp. <i>obovata</i> (Lag.) G. López	6.50	0.20	2	5.71	Leaves and stems
11. <i>Thymus zygis</i> L.	6.00	0.17	4	11.42	Leaves and stems
12. <i>Genista cazorlana</i> Deb., Rev.	5.60	0.16	5	14.29	Leaves and stems
13. <i>Erinacea anthyllis</i> Lynk.	5.30	0.15	2	5.71	Leaves and stems
14. <i>Santolina rosmarinifolia</i> L.	5.00	0.14	6	17.14	Leaves and stems
15. <i>Fumana paradoxa</i> Heywood in Guinea	4.70	0.13	3	8.57	Leaves and stems
16. <i>Salvia lavandulifolia</i> Vahl.	4.50	0.12	3	8.57	Leaves
17. <i>Genista tejedensis</i> (Port., Rig.) C. Vic.	4.00	0.11	2	5.71	Leaves and stems
18. <i>Sedum album</i> L.	3.80	0.10	5	14.28	Leaves and stems
19. <i>Helianthemum paniculatum</i> Dunal	3.80	0.10	3	8.57	Leaves and stems
20. <i>Marrubium candidissimum</i> L.	3.00	0.08	1	2.85	Leaves
21. <i>Coronilla minima</i> L.	2.90	0.08	9	25.71	Leaves and stems
22. <i>Thymus hiemalis</i> Lange	2.50	0.07	2	5.71	Leaves and stems
23. <i>Helichrysum stoechas</i> (L.) Moench	2.50	0.07	1	2.85	Leaves and stems
24. <i>Thymus mastichina</i> L.	2.30	0.06	4	11.42	Leaves and stems
25. <i>Phlomis lychnitis</i> L.	2.20	0.06	2	5.71	Leaves and flowers
26. <i>Euphorbia nicaeensis</i> All.	2.10	0.06	1	2.85	Leaves and stems
27. <i>Sedum forsterianum</i> Sm. in Sowerby	2.00	0.06	2	5.71	Leaves and stems
28. <i>Teucrium granatense</i> (Boiss.) Boiss. & Reuter	1.50	0.04	3	8.57	Leaves
29. <i>Helianthemum</i> sp.	1.00	0.02	1	2.85	Leaves
30. <i>Sedum tenuifolium</i> (Sibth. & Sm.) Strobl.	0.90	0.02	1	2.85	Leaves
31. <i>Teucrium sotriphyllum</i> Lag.	0.80	0.02	1	2.85	Leaves and stems
32. <i>Teucrium</i> sp.	0.50	0.01	1	2.85	Leaves
33. <i>Ononis columnae</i> All.	0.40	0.01	1	2.85	Leaves
34. <i>Bupleurum spinosum</i> Gouan	0.20	0.01	1	2.85	Leaves and stems
35. <i>Lithospermum fruticosum</i> L.	0.20	0.01	1	2.85	Leaves and stems
36. <i>Sedum</i> sp.	0.10	+	1	2.85	Leaves
37. <i>Ononis saricoides</i> Boiss. & Reuter	0.10	+	1	2.85	Leaves and stems
Total	239.70	6.86	31	88.57	

HEMICRYPTOPHYTES

1. <i>Oryzopsis paradoxa</i> (L.) Nutt.	157.50	4.50	26	74.28	Leaves, stems and spikelets
2. <i>Sesleria argentea</i> Sav.	77.80	2.20	17	48.57	Leaves, stems and spikelets
3. <i>Festuca arundinacea</i> Schreber	57.00	1.63	18	51.40	Leaves, stems and spikelets
4. <i>Rubia peregrina</i> L.	49.80	1.40	25	71.40	Leaves, stems and fruits
5. <i>Brachypodium ramosum</i> Roem. & Schult.	36.50	1.04	8	22.80	Leaves and stems
6. <i>Helictotrichon filifolium</i> (Lag.) Henrard	35.50	1.00	4	11.42	Leaves and stems
7. <i>Carex hallerana</i> Ass.	35.00	1.00	15	42.80	Leaves and stems
8. <i>Brachypodium sylvaticum</i> (Huds.) P. B.	27.50	0.80	7	20.00	Leaves, stems and spikelets
9. <i>Poa bulbosa</i> L.	19.00	0.54	4	11.42	All parts of the plant
10. <i>Festuca rubra</i> L.	12.00	0.34	2	5.71	Leaves and stems
11. <i>Carex</i> sp.	11.00	0.31	4	11.42	Leaves
12. <i>Festuca</i> sp.	10.00	0.30	1	2.85	Leaves
13. <i>Cirsium hispanicum</i> (Lam.) Pau	9.70	0.30	4	11.42	Leaves
14. <i>Thapsia</i> sp.	3.80	0.10	4	11.42	Leaves, stems and fruits
15. <i>Silene inflata</i> Sm.	2.50	0.07	2	5.71	Leaves and stems
16. <i>Calamintha granatensis</i> Boiss. & Reuter	2.10	0.06	3	8.57	Leaves and stems
17. <i>Bupleurum rigidum</i> L.	2.10	0.06	2	5.71	Leaves
18. <i>Poa ligulata</i> Boiss.	2.00	0.05	1	2.85	Leaves
19. <i>Anarrhinum laxiflorum</i> Boiss.	1.40	0.04	5	14.28	Leaves and flowers
20. <i>Scabiosa tomentosa</i> Cav., non J. F. Gmelin	1.00	0.02	1	2.85	Flowers
21. <i>Saxifraga granulata</i> ssp. <i>granulata</i> L.	1.00	0.02	1	2.85	Leaves
22. <i>Arenaria grandiflora</i> L.	0.60	0.02	2	5.71	Leaves, stems and flowers
23. <i>Eryngium campestre</i> L.	0.50	0.01	1	2.85	Leaves
24. <i>Astragalus incanus</i> ssp. <i>macrorhizus</i> (Cav.) Cheter	0.45	0.01	3	8.57	Leaves
25. <i>Arenaria aggregata</i> L.	0.30	0.01	2	5.71	Leaves and stems
26. <i>Stachys alopecuros</i> (L.) Benth	0.30	0.01	1	2.85	Leaves
27. <i>Sarcocapnos baetica</i> (Boiss. & Reuter) Nyman	0.20	0.01	1	2.85	Leaves
28. <i>Anthyllis vulneraria</i> L.	0.20	0.01	1	2.85	Leaves
29. <i>Psolarea bituminosa</i> L.	0.10	+	1	2.85	Leaves
30. <i>Plantago lanceolata</i> L.	0.10	+	1	2.85	Leaves
Total	556.95	15.86	35	100.00	

GEOPHYTES

1. <i>Aphyllantes monspeliensis</i> L.	36.10	1.03	19	54.28	Leaves and stems
2. <i>Asphodelus cerasiferus</i> Gay	34.90	1.00	14	40.00	Leaves and rhizomes
3. <i>Smilax aspera</i> L.	25.50	0.71	5	14.20	Leaves
4. <i>Sanguisorba rupicola</i> (Boiss. & Reuter) A. Br.	8.70	0.25	9	25.70	Leaves and stems
5. <i>Sanguisorba lateriflora</i> (Coss.) Caballero	5.10	0.15	8	22.80	Leaves and stems
6. <i>Arrhenaterum bulbosum</i> C. Presl.	5.00	0.14	1	2.85	Leaves
7. <i>Geum sylvaticum</i> Pourret	2.80	0.08	3	8.57	Leaves
8. <i>Ceterach officinarum</i> DC.	2.60	0.07	5	14.20	Leaves
9. <i>Asplenium tichomanes</i> L.	1.20	0.03	3	8.57	Leaves

10. <i>Ruscus aculeatus</i> L.	1.00	0.02	1	2.85	Leaves
11. <i>Pteridium aquilinum</i> (L.) Kuhn.	0.50	0.01	1	2.85	Leaves
Total	123.40	3.49	32	91.42	
TEROPHYTES					
1. <i>Triticum vulgare</i> L.	43.00	1.20	1	2.85	Leaves
2. <i>Avena sativa</i> L.	20.00	0.57	1	2.85	Leaves and stems
3. <i>Cynosurus echinatus</i> L.	17.00	0.50	11	31.40	All parts of the plant
4. <i>Aegilops triaristata</i> Willd.	6.50	0.20	3	8.57	Leaves, stems and spikelets
5. <i>Avena sterilis</i> L.	6.00	0.17	2	5.71	Leaves and stems
6. <i>Aegilops ovata</i> L.	4.00	0.11	2	5.71	Leaves, stems and spikelets
7. <i>Medicago aculeata</i> Gaertn.	1.30	0.03	3	8.57	Fruits
8. <i>Medicago minima</i> (L.) Bartal	1.30	0.03	2	5.71	Fruits
9. <i>Medicago gerardii</i> Waldst. & Kit. ex. Willd.	0.60	0.02	2	5.71	Fruits
10. <i>Medicago orbicularis</i> (L.) Bartal	0.50	0.01	1	2.85	Fruits
11. <i>Calendula arvensis</i> L.	0.40	0.01	2	5.71	Leaves, stems and fruits
12. <i>Carthamus lanatus</i> L.	0.40	0.01	1	2.85	Leaves
13. <i>Medicago lupulina</i> L.	0.40	0.01	1	2.85	Fruits
14. <i>Galium verticillatum</i> Danth.	0.10	+	1	2.85	Leaves and stems
15. <i>Trifolium stellatum</i> L.	0.10	+	1	2.85	Calyxes
Total	101.60	2.87	19	54.28	
EPIPHYTES					
1. <i>Viscum album</i> L.	93.00	2.70	8	22.80	Leaves and twigs
PLANTS NON INCLUDED IN BIOTYPES					
1. <i>Juncus</i> sp.	5.00	0.14	2	5.71	Stems
2. <i>Trifolium</i> sp.	2.50	0.07	1	2.85	Leaves
3. <i>Poa</i> sp.	2.00	0.05	1	2.85	Leaves
4. <i>Lathyrus</i> sp.	0.50	0.01	1	2.85	Leaves and roots
5. <i>Erodium</i> sp.	0.50	0.01	2	5.71	Leaves
6. <i>Ononis</i> sp.	0.40	0.01	1	2.85	Leaves and stems
7. <i>Euphorbia</i> sp.	0.30	0.01	1	2.85	Stems
8. <i>Dianthus</i> sp.	0.20	0.01	1	2.85	Calyxes
9. <i>Geranium</i> sp.	0.10	+	1	2.85	Leaves
10. <i>Vicia</i> sp.	0.10	+	1	2.85	Leaves
11. Liliaceae	2.40	0.07	5	14.28	Leaves and bulbs
12. Leguminosae	1.50	0.04	1	2.85	Fruits
13. Compositae	0.90	0.02	2	5.71	Leaves, stems and capitula
14. Labiatae	0.50	0.01	1	2.85	Leaves
Subtotal	16.90	0.45	14	40.00	
MUSCI					
1. <i>Antitrichia californica</i> Snll.	2.30	0.06	4	11.42	Gametophytes
2. <i>Tortula ruralis</i> Ehrh.	1.70	0.04	4	11.42	Gametophytes
3. <i>Tortula princeps</i> De Not.	1.20	0.03	3	8.57	Gametophytes
4. <i>Tortula rigidula</i> Mitt.	0.90	0.02	3	8.57	Gametophytes
5. <i>Dicranum</i> sp.	0.10	+	1	2.85	Gametophytes
6. Unidentified musci	2.10	0.06	2	5.71	Gametophytes
Subtotal	8.30	0.21	17	48.57	
FUNGI					
1. <i>Stereum hirsutum</i> (Willd.) Fr.	1.80	0.05	3	8.57	
2. <i>Hygrophorus</i> sp.	1.00	0.02	1	2.85	
3. Unidentified fungi	1.50	0.04	2	5.71	
Subtotal	4.30	0.11	5	14.28	

LICHENS					
1. <i>Parmelia</i> sp.	5.80	0.16	3	8.57	Thallus
2. <i>Pseudevernia furfuracea</i> (L.) Zopf.	1.70	0.04	1	2.85	Thallus
3. <i>Collema</i> sp.	0.10	+	1	2.85	Thallus
4. Unidentified lichens	2.00	0.06	1	2.85	Thallus
Subtotal	9.60	0.26	5	14.28	
Unidentified totals	2.90	0.10	7	20.00	
Total plants non included in biotypes	42.00	1.13	26	74.28	
Grand total	3500.00	100.00	35	100.00	

Quercus ilex was present in 94.3% of stomach contents, followed with a frequency of presence between 80% and 50% by *Juniperus oxycedrus*, *Oryzopsis paradoxa*, *Rubia peregrina*, *Hedera helix*, *Aphyllantes monspeliensis* and *Helianthemum croceum*.

Among the biologic forms (Fig. 2) the nanophanerophytes have predominated with a biomass provision of 44.7%, followed by the macrophanerophytes (22.4%) and the hemicryptophytes (15.9%). Camephytes had their lowest season (6.8%). Geophytes and terophytes were of little importance with a provision of 3.5% and 2.9%, respectively. In this season, the epiphytes, represented by *Viscum album*, had some interest, with a provision of 2.7%.

The ligneous plants have been the basis of nourishment in this season, since they provided 77.4% of the ingested biomass. Herbaceous plants provided 21.5% (Fig. 3).

5. GENERAL ANALYSIS AND DISCUSSION

The wild goat of Sierras de Cazorla and Segura has a very diversified diet, since throughout the year 313 species of plants have been identified. Regarding the number of components found in every stomach content here are no significant seasonal differences, except between winter and summer (*t* Student, $P > 0.01$), but there have been seasonal differences regarding the different nourishment consumed and their contribution to the composition of the biomass. Besides this differences, the most important trophic resources throughout the year have been *Quercus ilex* and *Phillyrea latifolia*, which represent almost 13% and 9.26% of the total consumed, in a lesser degree, stand *Juniperus oxycedrus* and *Oryzopsis paradoxa*, followed by *Festuca arundinacea*.

Quercus ilex must be quite appreciated since the consumed biomass in all the seasons is considerable, and due to the high frequency of occurrence (almost in 90% of the analyzed contents). Both considerations agree with the results of Palacios *et al.* (1978). In winter, fruits have been frequently eaten since they have been seen in 65% of

the stomach contents and noticeable proportions. This species is widely spread in the study area. *Capra falconeri* consumes large quantities of this species in Western Pakistan (Schaller, 1977).

The frequency of occurrence of *Phillyrea latifolia* is about 40% in all seasons, except in winter that rises to 49%, the species is not widely spread in the area. It is found only in certain humid spots in which the frequency of occurrence is 86.6%, with high proportions in the biomass which suggests that it is highly appreciated. The most eaten parts were leaves and shoots, in february sprout the flower shoots, but the fruits were never seen.

Juniperus oxycedrus has been the basic nourishment in winter, and was also consumed in autumn. The fruits were seen with a frequency of 21.4% and 29.5%, respectively, the biomass provided by them was not important. Leaves and shoots were the preferred parts.

We believe that graminaceous have some importance as food resources; 40 different species were found, with a provision regarding the total consume of 23.4%. The preferred parts were mainly leaves and young stems, the presence of stems and dry leaves is seldom, but we found basal parts and small roots in some contents possibly they were torn off and ingested together with the basal leaves. Spikelets give a small proportion, with the exception of summer in which the presence is greater with the subsequent appearance of fruits.

The gramineous have a frequency of occurrence of 100% in all the seasons, but the biomass ingested has considerably changed depending on the season, and that is due to their phenology. In spring, at the beginning of their growth, were more appreciated.

Also noteworthy in the spring diet are the leaves of cyperaceous, with a provision of 8.7%. The importance of both families and mostly of gramineous for the genus *Capra* has been stated in other studies. Therefore, different genuses eaten by the *Capra pyrenaica* like *Festuca*, *Koeleria*, *Agrostis*, *Poa*, *Carex*, etc., are also eaten by the *Capra ibex walie* (Nievergelt, 1981). Species like *Festuca rubra*, *Poa alpina*, *Dactylis glomerata*, *Anthoxanthum odoratum*, etc., which occur in the diet of the *Capra pyrenaica* do also form part of the nourishment of the *Alpine ibex* (Couturier, 1962). Gramineous are basic food for the Asiatic ibex (Heptner et al., 1966; Schaller, 1977) and one of the preferred by the Cretan Wild Goat (Papageorgiou, 1974).

In spring were appreciated the shoots of diverse ligneous of genus *Quercus*, *Phillyrea*, *Rosa*, *Pinus*, *Jasminum*, etc., as well as the flowers of a great variety of herbaceous and some of their fruits. These late had some relevance in the months of July and August, the same happened with the family of the composite due to the amount of ingested

species and the noteworthy provision of cornflowers and fruits. Other species whose fruits have been notably eaten was *Aphyllantes mouspeliensis*.

The fruits of some ligneous species, we believe, are of a certain relevance due to the frequency of occurrence and also to the noteworthy proportions in the provided biomass. Thus, we have that the fruits of *Rosa canina* have been present in 65% of the stomach contents in summer, and those of the *Juniperus sabina* in 57% of cases, also noteworthy are the fruits of *Rubus ulmifolius*. Couturier (1962) has confirmed that *Capra ibex ibex* also has a preference for the fruits of these species.

Trophic resources with essence oils and aromatic compounds have been found in most of the analyzed contents, so *Rosmarinus officinalis* was quite appreciated in winter and also in spring and autumn. Other components of little contribution to the biomass but of frequent occurrence were species of the genera *Thymus*, *Calamintha*, *Menta*, *Salvia*, *Pimpinella*, *Foeniculum*, etc. many of which are also consumed by Alpine ibex (Couturier, 1962), by the contrary, they were not much liked by *Capra ibex walie* (Nievergelt, 1981). Said substances seem to play an important role in the digestibility of food and of being a critical factor regarding the palatability (Ahlén, 1965; Longhurst et al., 1968 in Goffin et al., 1976) for red deer and roe deer.

We have observed a noteworthy occurrence of species of genus *Sedum*, greasy plants that due to their water content are very appreciated by deer and roe deer (Diets, 1965) and also by Alpine ibex (Couturier, 1962).

Also noteworthy in the diet have been diverse leguminous plants like *Coronilla minima* and *Genista cazorlana* because their frequency of occurrence, as well as *Helianthemum croceum* and diverse species of the genus *Teucrium*.

Species with toxic compounds were ingested by wild goat, *Digitalis obscura*, for instance, has been found, even if not with high frequency, in all the seasons with the exception of autumn. A spring individual had ingested of the said species 16% of the total ingested. Green as well as dry leaves of *Asphodelus cerasiferus* were fairly consumed in spring, and in the rest of seasons they were always dry leaves. We have also found diverse ranunculaceous.

We suppose that certain cultivated species are quite appreciated by the wild goat, since all the individuals collected in areas near the cultivated land had consumed proportions over 20% of the said species; we found leaves and stems of the cereals *Triticum vulgare*, *Hordeum vulgare* and *Avena sativa* in February at the beginning of the growing after the seeding and in November with the growing of the seeds left

after harvest. Cereals are also appreciated by *Capra ibex*, in spring (Couturier, 1962). Of *Olea europaea* we found high proportions of leaves and fruits, this genus was one of the main nourishing products of *Capra aegagrus cretica* (Papageorgiou, 1979). Regarding *Prunus dulcis* the highest consume happened was that of leaves, followed by young stems and some epicarp of fruits.

The analysis of the diet in biotypes or biologic forms is interesting in the view of the potential indication of the vegetal stratum where the Wild Goat preferably feeds and the condition of the ingested plants (green, dry, etc.), since the plant species are included in biotypes following the adaptation, to go through the unfavourable season (Raunkiaer, 1905) in Braun Blanquet (1979). It also helps to know if the basic food is constituted by ligneous or herbaceous plants.

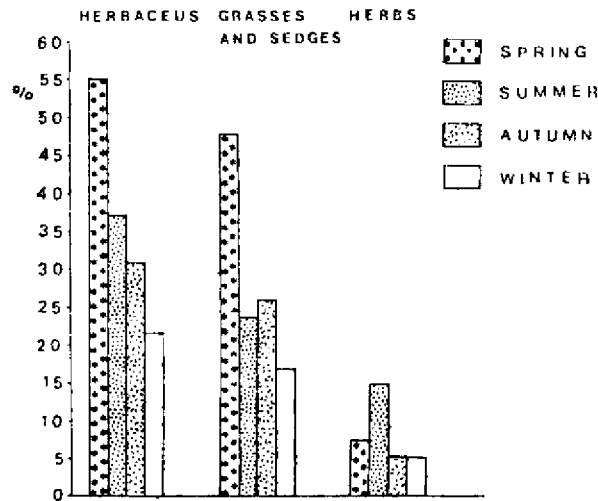


Fig. 4. Percentage in volume of the herbaceous species consumed in each season and comparison of the percentages provided by gramineous — cyperaceous with regard to the percentages provided by herbs in each season.

The consume of ligneous increases progressively from the beginning of spring until the end of winter, while the herbaceous decrease similarly (Fig. 3). This indicates that the phenological condition of trophic resources, and so its number and availability, is closely related to the variety of the seasonal diet. The richness of species in the diet has gradually increased from autumn until of end of summer.

Herbaceous plants are most important in spring, while the ligneous are more interesting in the rest of seasons (Fig. 3), mostly in autumn and winter. But among the consumed herbaceous an exception has to be made. In Figure 4, we observe that the really interesting herbaceous

are the gramineous as we have stated, and, to some extent, the cyperaceous, since the rest of herbs have provided short proportions of biomass. The only season in which these had greater interest was summer, with a percentage of 14.7% out of the total of 38.2% of all the herbaceous, while in spring of the total consume of herbaceous (55.8%), herbs provided only 7.5% (Fig. 4).

Regarding the vegetal stratum on which they get food, we noted that in spring they consume more pasture species while in summer the diet is balanced between pasture plants and the shrubby stratum, with a little advantage to this last, having some interest the arboreal stratum. In autumn it feeds equally on the three strata: herbaceous, shrubby and arboreal. In winter eats mostly on the shrubby stratum, far more than on the arboreal stratum and, by no means than on pastures.

Acknowledgements: We wish to thank Dr. Fernando Palacios for his unrestricted support to our research work and the help given in obtaining a great deal of the material. We thank also our colleagues at the Section of Applied Zoology of the INIA, Luis Cuesta, Carlos Rodriguez and Rafael Rodriguez for their participation in the collection of material and especially to Benigno Elvira for his help in the revision of the text. We also wish to record our gratitude to D. Francisco Salas, of the Instituto para la Conservación de la Naturaleza in Jaén, Spain, for the grant of the permission needed to carry through this work. We are very grateful to Dr. Maria Eugenia Ron, Dr. Gabriel Moreno and Jorge Varela for the identification of cryptogameous residues. Equally to D. Leopoldo Rodriguez for the translation of the manuscript into English.

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Accepted, April 16, 1985.

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SKŁAD POKARMU KOZIOROŻCA W SIERRA CAZORLA I SEGURA,
W HISZPANII

Streszczenie

Dokonano analizy z wartości 105 żołądków *Capra pyreneica* Schinz, 1838, odstrzelonych w różnych sezonach dwu kolejnych lat (1980—1981), w Sierra Cazorle i Segura (Ryc. 1, Tabela 1). Zidentyfikowano łącznie 313 gatunków roślin stanowiących pokarm koziorożca, z czego na wiosnę przypada 177 gatunków, w lecie 202 gatunki, w jesieni 145 gatunków i w zimie 164 gatunki. Następnie pogrupowano je w biotypy zgodnie z klasyfikacją Raunkiaera. Utworzone na tej podstawie bardzo obszerne listy preferencyjne zjadanych roślin w czterech sezonach, zawierają oprócz danych o ich średniej objętości w żołądkach i częstotliwości występowania danego gatunku, także informację o tym, która część rośliny jest przez zwierzę wybierana (liście, źdźbła, pędy, owoce itp.) (Tabela 2—5). Podstawowym składnikiem pokarmu w ciągu całego roku (za wyjątkiem jesieni) był *Quercus ilex* i *Phillyrea latifolia*. W jesieni najchętniej wybierany był *Juniperus oxycedrus*. Z innych składników roślinnych, na wiosnę chętnie jedzone były *Festuca arundinacea*, *Oryzopsis paradoxa* i *Carex hallerana*; w lecie *F. arundinacea*, *Rubus ulmifolius* i *O. paradoxa*; w jesieni *O. paradoxa*, *J. oxycedrus* i *Olea europaea*, a w zimie *Rosmarinus officinalis*, *O. paradoxa* i *Hedera helix*. Najpowszejszymi biotypami jedzonymi wiosną były hemikryptofity, w lecie nanofanerofity i na równi z nimi hemikryptofity. Jesienią jedzone były fanerofity (makro i nano), a zimą nanofanerofity (Ryc. 2). Rośliny zdrewniałe były generalnie wybierane zimą, jesienią i wiosną (Ryc. 3), podczas gdy zioła stanowiły najważniejszy składnik pokarmu na wiosnę (Ryc. 4).