

THE EFFECT OF HERBIVORES ON THE ENDEMIC CANARY FLORA

By J.C. RODRÍGUEZ-PIÑERO¹ & J.L. RODRÍGUEZ-LUENGO²

SUMMARY. In this work the detrimental influence of introduced herbivores, especially goat (*Capra hircus*), sheep (*Ovis aries*), Barbary sheep (*Ammotragus lervia*), Corsican mouflon (*Ovis ammon musimon*) and rabbit (*Oryctolagus cuniculus*) on the Canary flora is analysed. The Canary Islands have more than 600 species of endemic vascular plants of which some 330 are in the categories E, V, and R, and of these, more than 130 form part of the diet of these herbivores.

RESUMEN. En el presente trabajo se aborda la influencia negativa que sobre la flora endémica canaria ejercen los herbívoros introducidos, especialmente cabras (*Capra hircus*), ovejas (*Ovis aries*), arrui (*Ammotragus lervia*), muflones (*Ovis ammon musimon*) y conejos (*Oryctolagus cuniculus*). Las Islas Canarias albergan más de 600 especies de plantas vasculares endémicas de las cuales cerca de 330 se hallan incluidas en las categorías de E, V, y R de las cuales más de 130 forman parte de la dieta de estos herbívoros.

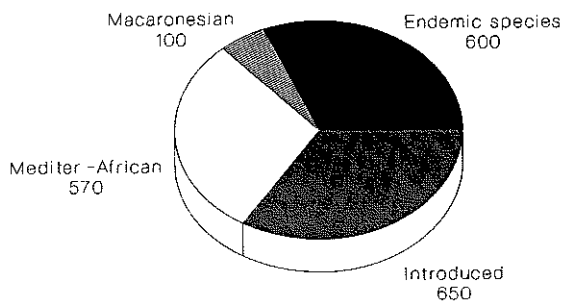
INTRODUCTION

Island ecosystems typically support unique biotic communities that are rich in endemic taxa. They are particularly vulnerable to disturbances caused by humans, such as the introduction of feral animals, because component species usually did not co-evolve with human activities (Mueller-Dombois 1981).

¹Departamento de Biología Vegetal, Universidad de La Laguna, Tenerife, Islas Canarias, España

²Departamento de Biología Animal, Universidad de La Laguna, Tenerife, Islas Canarias, España

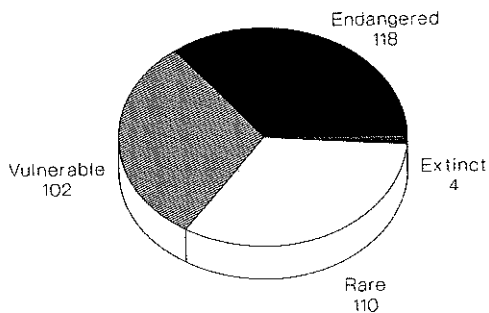
The Canary Islands Flora (Vascular Plants)



Based on: Kunkel (1980)

Figure 1

Canary Threatened Vascular Plants



Based on: Barreno (1983), UICN (1983)
Santos (1984), modified.

Figure 2

Moreover, the environmental resistance encountered by exotics on islands is usually much less than in their place of origin because of the availability of considerable forage as well as limited competition with native species (De Vos *et al* 1985).

In particular, insular plants that evolved in the absence of large herbivores may lack defences against herbivory (Carlquist 1984). The introduction of feral herbivores to islands has often led to spectacular changes in the structure and composition of vegetation (Klein 1968, Dilks and Wilson 1979, Meurk 1982), a severe reduction in the distribution and abundance of endemic plants (Van der Werf 1979 in Nogales *et al* 1986, Giffin 1975) and in some cases, extinction (Coblentz 1978). The negative influence which the presence of feral goats has had on Canary flora has been stated by various authors (Sventenius 1946, Ceballos y Ortuño 1976, Nogales *et al* in press, Dickson *et al* 1987).

THE CANARY FLORA

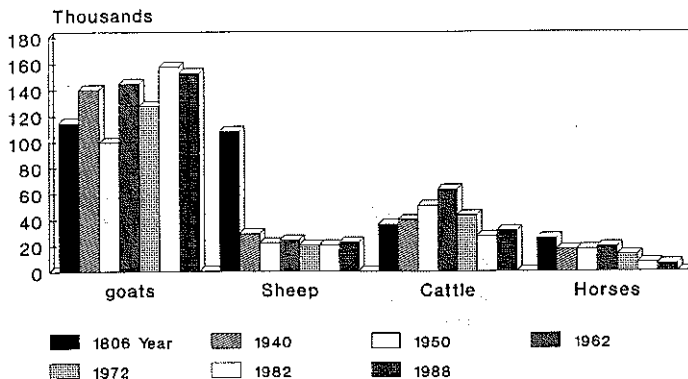
The Canary Islands are home to an extraordinarily rich flora which place them among the first-ranking biogeographical areas in the world, and the most important in Spain as regards the number of endemic species. In this regard, the vascular flora of the archipelago numbers some 600 endemic species, 100 common to other Macaronesian archipelagos, 570 Mediterranean-African, and more than 650 introduced species widely distributed elsewhere in the world (Kunkel 1980), (Figure 1).

At present, at least 4 species are considered to be extinct, about 118 in danger of extinction, 102 vulnerable and more than 120 rare and indeterminate (Barreno *et col.* 1983, Santos 1984), (Figure 2).

HERBIVORES IN THE CANARIES

The introduction of large herbivores into the Canaries goes back to the arrival of the original inhabitants about 1000-2000 B.C. who brought with them goats and sheep. It was after the Spanish conquest (15th C) with the arrival of European colonists that new herbivores such as cows, donkeys, horses, camels and rabbits were introduced. In the 16th C deer were imported to the island of La Gomera where they remained wild until the beginning of the 19th C.

Livestock Evolution in the Canary Islands (1806-1988)



Based on: Anuarios de Estadística Agraria
Censos Agrarios de Espana. Consejeria de
Agricultura. Gobierno de Canarias.

Figure 4

Threatened Plants Consumed by Herbivores

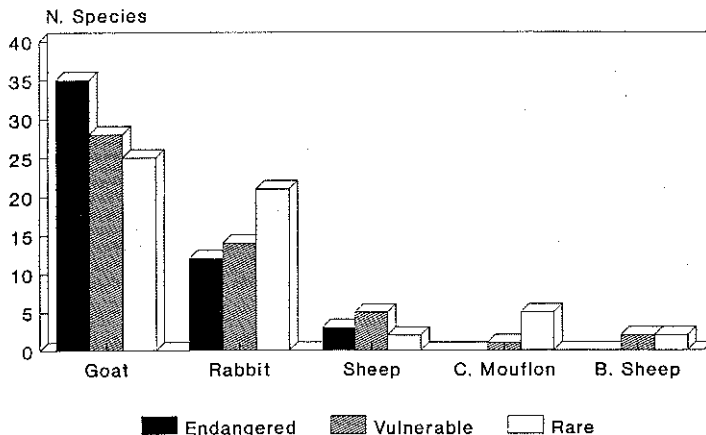


Figure 5

Finally, the Corsican mouflon and the Barbary sheep were introduced into the Canary Islands at the beginning of the seventies as game species. The Corsican mouflon was released in the Teide National Park (Tenerife Island), and Barbary sheep was released close to La Caldera National Park (La Palma Island).

In this work we shall only refer to those herbivores which live in a wild state, such as Corsican mouflon, Barbary sheep and rabbits, as well as those, such as the goat and the sheep, which graze freely over large areas of the islands.

MATERIAL AND METHODS

In this study we have used the results of the analysis of 25 stomach contents from Corsican mouflons captured during autumn of 1985 and 1986 (Rodríguez Luengo and Rodríguez Piñero, in press) and the analysis of 18 Barbary sheep stomach contents shot in autumn 1987 to 1988 (unpublished data). For the study of effects of the goat, sheep and rabbit, direct observation was made of animals grazing, as well as the footprints left in the vegetation.

RESULTS

From the analyses carried out, it becomes clear that of the large herbivores the goat is the most numerous on all the islands. On the other hand, the numbers of sheep have been reduced in the last few years, (Figure 3). Although there are no population data for the rabbit, it can be stated that is the most widely distributed, being found in all vegetative zones and from the coast to the mountain tops. As regards the Corsican mouflon and Barbary sheep, their population status is not exactly known. Concepción and Rodríguez (1986) estimate the population of the Barbary sheep at some 140 individuals.

Preliminary data obtained on the effect of herbivores on the Canary flora show that it is the goat and the rabbit which consume the largest number of plants (78 and 47 species respectively) classed as threatened (E, V, R).

Of the 18 phanerogams consumed by the mouflon, five are R and one V. The proportion of endemics in the Barbary sheep diet is less. A total of 29 taxa have been identified, two are R and another two V, (Figure 4).

The areas with high grazing pressure correspond to those with more endemic plants.

CONCLUSIONS

Herbivores appear to be one the most important factor with a negative effect on the Canary Flora. Goats and rabbits are the herbivores which include the highest percentage of threatened plants in their diet. The introduction of the Corsican mouflon and Barbary sheep poses a serious threat to endemic flora because they are so difficult to control. The survival of some plant species is in danger if stricter control is not placed on herbivores, especially in areas where a large number of endemics forms are concentrated.

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