

Rock Roses - *Cistus*

Components of the shrub vegetation and their usefulness in soil conservation

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The parts of California with chaparral and live oaks dominating the natural vegetation, are not the only regions in the world with rains in winter. Nor are they the only regions with extreme drought during the summer, causing plant cover in non-irrigated areas to be dry and susceptible to fires. There are climatically similar areas in the Mediterranean, South Africa, Australia and Chilean regions. Indeed, parts of the Mediterranean region have especially similar conditions, since the distribution of rainfall and the history of vegetation is highly comparable to the situation in certain areas of California.

TABLE 1

Climatic conditions in some Mediterranean and California stations
(data after Schenck 1939)

TEMPERATURE (averages in Fahrenheit)

	Jan.	July	Year
Sevilla	50	84	67
Palermo	50	76	63
Adana (Turkey)	51	82	66
Ojai (Calif.)	50	71	61
Sierra Madre (Calif.)	51	71	62

PRECIPITATION (averages in inches)

	Jan.	Feb.	Mr.	Ap.	May	Jn.	Jul.	Ag.	Sep.	Oct.	Nov.	Dec.	Year
Sevilla	2.6	2.0	2.6	1.8	1.7	.6	0	.1	.8	2.4	3.1	2.5	20.4
Salerno	3.2	2.4	2.8	1.9	1.1	.6	.2	.4	1.8	3.2	3.3	2.7	23.8
Adana (Turkey)	6.4	5.6	3.6	2.0	.4	.2	0	0	.2	1.2	4.8	6.4	30.8
Ojai (Calif.)	5.6	4.6	3.0	1.3	.6	.08	0	0	.4	.7	1.3	3.0	21.7
Sierra Madre (Calif.)	4.8	4.6	4.7	2.2	1.2	.6	0	0	.4	1.1	1.7	2.8	23.9

Near the Mediterranean coast, the slopes of the mountains are often covered by evergreen shrubs with rather small, thick, sclerophyllous or even needle-like leaves. The rock roses, species of the genus *Cistus*, are important components of this shrub vegetation. These plant communities, comparable to California chaparral, are called "macchia". It may be emphasized that the Mediterranean macchia does not usually cover such large, uninterrupted areas as California chaparral. This is due to the higher density of rural population in the areas adjacent to the Mediterranean. The slopes of the mountains are used cultivation of olives and other plants. For this purpose, terraces are often constructed by man on the slopes to prevent soil erosion and to promote an accumulation of top soil. But areas for grazing of goats, sheep and other livestock are still more important in the Mediterranean mountains. As a result of such grazing, the macchia can be replaced by open plant communities of grasses and small low shrubs with branches pressed close to the ground. This deterioration of vegetation cover can result in heavy soil erosion.

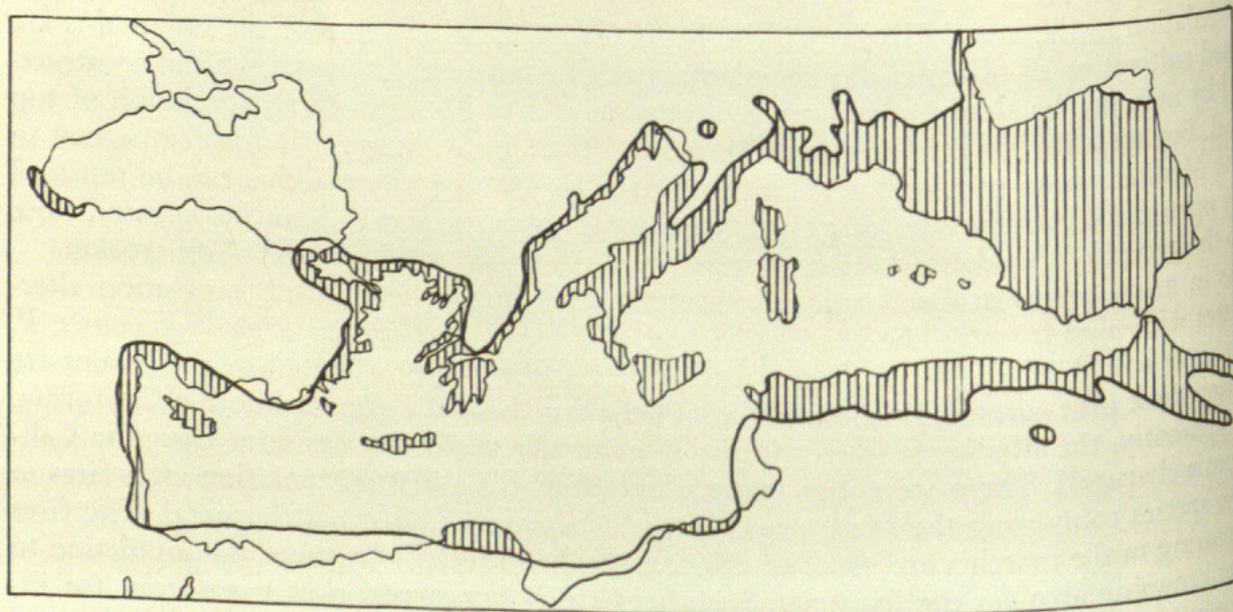
As in many places in California, Mediterranean sclerophyllous shrub vegetation alternates with pine forests. The most important of its pine species are: *Pinus halepensis*, *P. pinaster* and *P. pinea*. When fires occur, the vegetation most affected by the flames are often these pine forests. This is a different behavior than with the situation in California. Apparently, the Mediterranean macchia is generally more fire resistant than the California chaparral. There are not so many adaptations for a fast regeneration after fires in the species composing the Med. macchia, as there are in California chaparral. The fires occurring in the macchia are, in most cases, made intentionally by the rural population to get browsing area for the livestock. Such fires are rather common in some areas, for instance in the island of Corsica. New species, more fit for pasture, develop on the burned areas. Also, the young shoots of some macchia shrubs appearing after the fires are preferred for browsing.

Table 2, gives an idea of the species composition of the macchia. Some genera represented here are quit lacking in California. It is remarkable that a number of the most important California chaparral genera are totally absent in the macchia, for instance, *Ceanothus* (mountain lilac), *Arctostaphylos* (manzanita), *Adenostoma* (chamise), and *Dipylacus*.

TABLE 2

SPECIES COMPOSITION OF SOME STANDS OF MEDITERRANEAN MACCHIA

1. MYRTUS-CISTUS MACCHIA on siliceous soil near Bordighera (Italy) at 200 m elevation on SW slope, 20° inclination. (Knapp 1953)
 - a) Vegetation covering 85% of soil surface.
 - b) More than 25% of surface covering: *Calycotome spinosa*, *Rosmarinus officinalis*.
 - c) Five to 25% covering: *Cistus salviifolius*, *Dorycnium suffruticosum*.
 - d) Other evergreen shrubs: *Myrtus communis*, *Daphne gnidium*, *Pistacia lentiscus*, *Phillyrea angustifolia*, *Chamaerops humilis*, *Arbutus unedo*, *Lavandula stoechas*, *Erica scoparia*, *Cistus albidus*, *Cistus monspeliensis*, *Juniperus oxycedrus*, *Spartium junceum*, *Euphorbia spinosa*.
 - e) Lianas: *Clematis flammula*, *Smilax aspera*, *Lonicera implea*, *Rubus ulmifolius*, *Rubia spinosa*.
 - f) Other plant species: herbs, grasses, chamaephytes, etc., 16 species.
2. RHAMNUS ALATERNUS-PISTACIA MACCHIA on limestone soil near Andora, Italy at 40 m elevation on S slope, 30° inclination. (Knapp 1953)
 - a) More than 25% of surface covered by *Pistacia lentiscus*.
 - b) Five to 25% covering: *Rhamnus alaternus*, *Euphorbia spinosa*, *Pinus halepensis* (young plants).
 - c) Other evergreen shrubs: *Myrtus communis*, *Phillyrea angustifolia*, *Coriaria myrtifolia*, *Spartium junceum*, *Calycotome spinosa*.
 - d) Lianas: *Smilax aspera*, *Rubia peregrina*, *Asparagus acutifolius*, *Clematis flammula*.
 - e) Other plant species: 13.
3. CISTUS MACCHIA between Ceuta and Teutuan, Morocco, North Africa (Rubel 1930)
 - a) Only evergreen shrubs mentioned: *Cistus ladaniferus* (dominant), *Cistus monspeliensis*, *Quercus coccifera*, *Chamaerops humilis*, *Lavandula stoechas*, *Phillyrea variabilis*, *Pistacia lentiscus*, *Cistus clusii*, *Daphne gnidium*, *Calluna vulgaris*, *Erica scoparia*, *Erica umbellata*, *Juniperus phoenicea*.
4. CISTUS MACCHIA near Chania, Creta, Greece (Rubel 1930)
 - a) *Cistus salviifolius* (dominant), *Cistus crispus*, *Erica vericillata*, *Arbutus unedo*, *Calycotome villosa*, *Lavandula stoechas*, *Poterim spinosum*.



Map. 1. Distribuiton of a rock-rose species, *Cistus salviifolius* (hatched areas) in the Mediterranean region. (after Rikli 1943/48)

(This map copy sent in reverse form from European source.—Ed.)

Among the genera lacking in California, *Cistus* is the most important. The rock roses are distributed in several species over the whole Mediterranean flora region from sea level to considerable altitudes. Table 3, shows the altitudinal range of some *Cistus* species. The distribution of *C. salviifolius* is demonstrated by Map 1. *C. salviifolius* is one of the species with the largest area. The other *Cistus* species are represented only in smaller parts of the Mediterranean region.

TABLE 3

ALTITUDINAL RANGE OF SOME CISTUS SPECIES IN SOUTHERN FRANCE AND CORSICA

(AFTER FOURNIER 1946)

<i>Cistus laurifolius</i>	0 to 1600 m (5248 ft.)	<i>Cistus albidus</i>	0 to 1200 m (3936 ft.)
<i>Cistus salviifolius</i>	0 to 1350 m (4428 ft.)	<i>Cistus crispus</i>	0 to 500 m (1640 ft.)
<i>Cistus monspeliensis</i>	0 to 1200 m (3936 ft.)	<i>Cistus villosus</i>	0 to 300 m (948 ft.)

Some *Cistus* species prefer soil originating from silicatic rocks, while others are found in limestone soils. There are vast areas with *Cistus* species absolutely dominating the vegetation. In many cases, *Cistus* appears only as an admixture in vegetation mainly composed of other evergreen shrub species. Often, the rock roses appear only as a few individuals in macchia stands. There are also macchia communities without *Cistus*. (See Table 2).

Compared with a number of chaparral shrubs and other plants of the macchia, *Cistus* affords a relatively dense vegetation cover especially in certain dry, rocky situations. The rather broad leaves are green over the whole year. Plant communities with predominating *Cistus* have a considerable influence on the microclimate (Knapp and Linskens, 1953).

Cistus stands destroyed by intentionally burning, regenerate well. *Cistus* appears more fit for regeneration after such fires, than many other macchia plants. Compared with a number of California chaparral plants, the fire resistance of the rock rose seems to be much better, as was demonstrated by the experiments of Martin and Juhren (1954).

These are properties very desirable for the purpose of soil conservation in the mountains of Southern California. Therefore, the successful experiments and plantations carried out by G. Juhren (1956, 1958) and continued by Stewart, Ching, *et al* seem to be very important.

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