

TEN YEARS OF RECOVERY OF *CISTUS LADANIFER* AFTER EXPERIMENTAL DISTURBANCES

ESTANISLAO LUIS-CALABUIG, REYES TÁRREGA,* AND LUZ VALBUENA

Area de Ecología, Facultad de Biología, Universidad de León, 24071 León, Spain

(Received 29 November 1999 and in revised form 15 February 2000)

ABSTRACT

The aim of this study is to compare the recovery response of *Cistus ladanifer* L. to three experimental treatments in terms of seedling growth and population dynamics. A uniform area was chosen in the province of León (NW Spain), in which *C. ladanifer* was clearly dominant with a mean cover of 70%. Three plots were established and subjected to experimental burning, cutting, and plowing in July 1989. The changes in the *C. ladanifer* population were surveyed over 10 years (from 1990 to 1999). The number of *Cistus* seedlings, the height of each, and the total *Cistus* cover percentage were recorded for every sampling period. There were no *Cistus* shoots from vegetative sprouting. The lowest density was recorded in the plowed plot and the highest in the burned one, as was expected from a species whose germination is stimulated by heat; ten years after treatments, density in the burned plot is still significantly higher. A tendency towards stabilization in cover was observed in the three plots, with the highest values in the burned plot and the lowest in the plowed one in the first years but without any differences in the last years. A continuous increase in *Cistus* plant height was observed and was highest in the plowed plot; mean height was the lowest in the burned plot because there were some small seedlings (lower than 5 cm) until the seventh year. Although the differences among treated plots decrease in time, differences in height and density can still be detected 10 years after treatments. Moreover, complete recovery of initial conditions has not yet been attained.

INTRODUCTION

Heathland ecosystems, which are typical to the Mediterranean basin, are frequently associated with repeated human impact. In addition, during the last decades the abandonment of pastures and croplands contributed to the spread of heathlands. *Cistus* communities that are associated with fires are quite frequent. *Cistus* spp. were classically described as “active pyrophytes” (Naveh, 1974): “pioneer plants spreading by seed and forming dense stands after fire”. Numerous studies showed that *Cistus* seed germination is stimulated by heat (Lopes, 1988; Thanos and Georghiou, 1988; Corral et al., 1990; Valbuena et al., 1992; Trabaud, 1995; Castro and Romero-García, 1999), and its recovery after planned burning is fast (Legrand, 1993; Santiesteban et al.,

1993). According to Keeley (1986), the rapid growth rate and early flowering of species makes them resilient to relatively frequent fires. However, Troumbis and Trabaud (1986) and Trabaud (1995) considered the survival mode of *Cistus* spp. as an adaptation to unpredictable disturbances and environmental constraints rather than adaptation to repeated fires. In any case, it seems that massive renewal of these species can only occur after a disturbance that eliminates the adult plants and competitors, and induces a dormancy break by mechanical or thermal means. In the absence of disturbances, these species are incapable of population reconstruction (Trabaud and Renard, 1999) and such stands may de-

*Author to whom correspondence should be addressed. E-mail: degelc@unileon.es

