KEY PARAMETERS FOR THE MANAGEMENT AND DESIGN OF FIELD MARGINS AIMING TO THE CONSERVATION OF BENEFICIAL INSECTS.

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INTRODUCTION

• Experimental farm CIFEA
• Experimental farm Torreblanca
• Experimental farm IMIDA
• Commercial farm Arroyo

The management of natural vegetation in agricultural land is utterly important because wild plants may serve both as eco-systemic service providers (e.g. pest control and pollination), and as reservoirs for crop pests and diseases (Willmer, 2011). The services plants provide vary with the species, depending also on other factors such as their fitness and phenological state. In spite of the importance of plants as service providers, little information is available for their management and the design of vegetation margins to serve for such a scope.

This work aims to emphasize some key parameters (e.g. germination rates, coverture and blossoming) to take into account when designing vegetation margins for the conservation of natural enemies and pollinators.

MATERIAL AND METHODS

Laboratory

Growth chambers under controlled conditions (25°C and 75% RH).

Emergence

The plates were revised every 3-4 days during 30 days and the emerged seeds were counted and removed. This experiment was repeated three times for each plant species.

Herbaceous species

· *Borago officinalis*
· *Chrysanthemum coronarium*
· *Coriandrum sativus*
· *Diplotaxis catholica*
· *Echium vulgare*
· *Salvia verbenaca*
· *Silene vulgaris*
· *Vicia sativa*
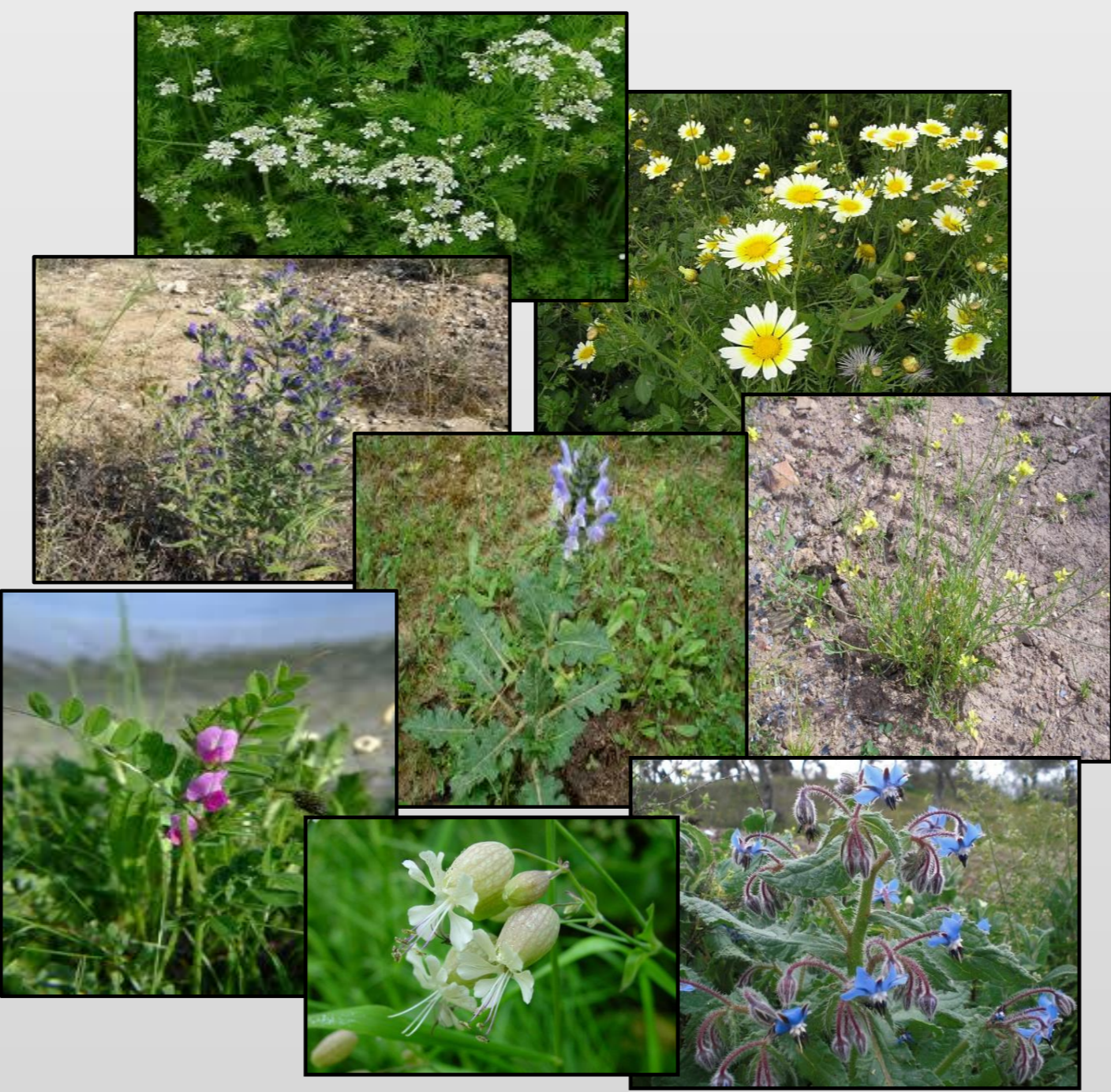
Field

The assays of germination in field conditions were conducted in four localities in the Region of Murcia (SE Spain). In each locality, a strip of approximately 100 m2 was sown manually in autumn using the eight plant species.

Emergence
Trend

The emergence of plants in each strip was estimated by counting the number of seedlings in a 1x1 m square on the first week of January. This procedure was repeated three times randomly on each of the four margins. Three more samplings were carried out in every locality, from February to April, to assess the abundance of each plant species using the same procedure as for the plant emergence.

Coverage
Bloom

The percentage of coverage and individuals in bloom of each plant species was estimated every one or two weeks from January to July within a 2x2 m square. The sampling was repeated three times for each margin at each date.

RESULTS

High emergence (*S. vulgaris*, *C. sativum*, *V. sativa*, *S. verbenaca* and *B. officinalis*)
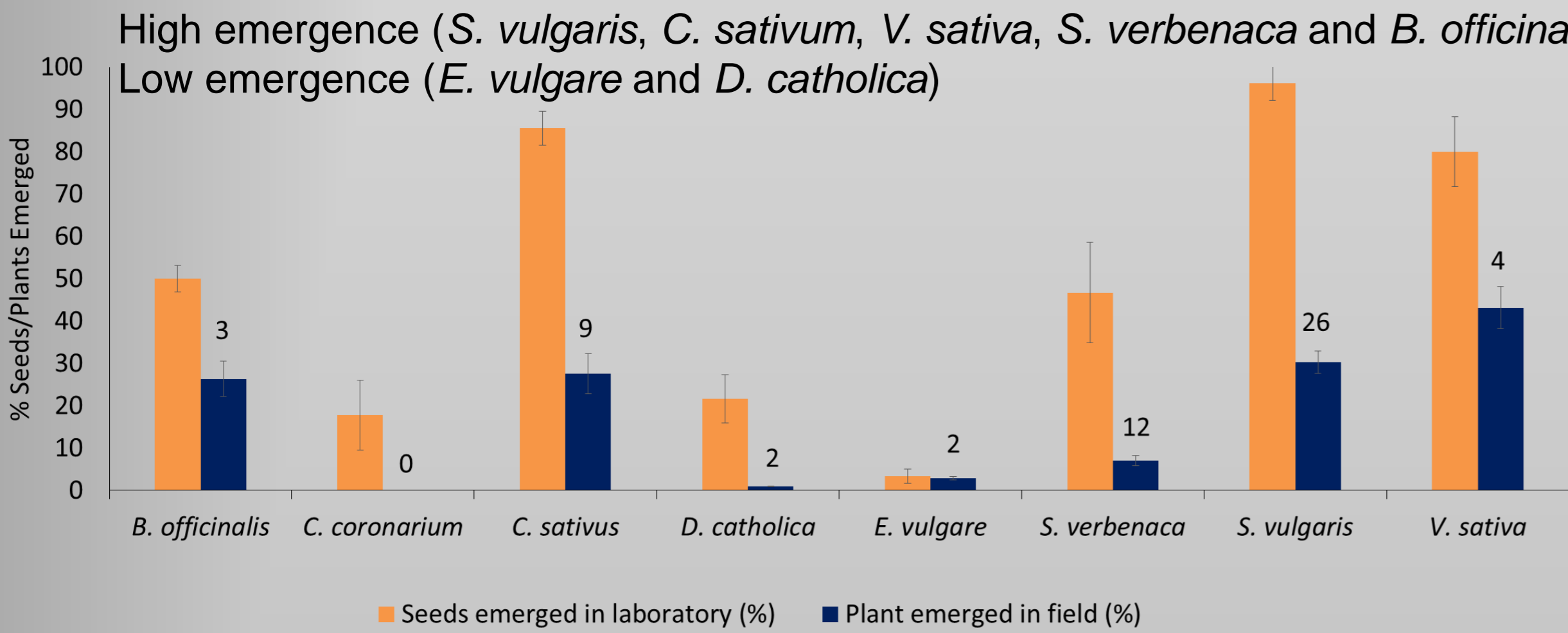Low emergence (*E. vulgare* and *D. catholica*)

Figure 1. Percentage of seeds germinated in the laboratory and emerged in the field (Number of seeds emerged/Number of seeds sown). The figures on top of the bars represent the average number of plants per m² emerged in the field.

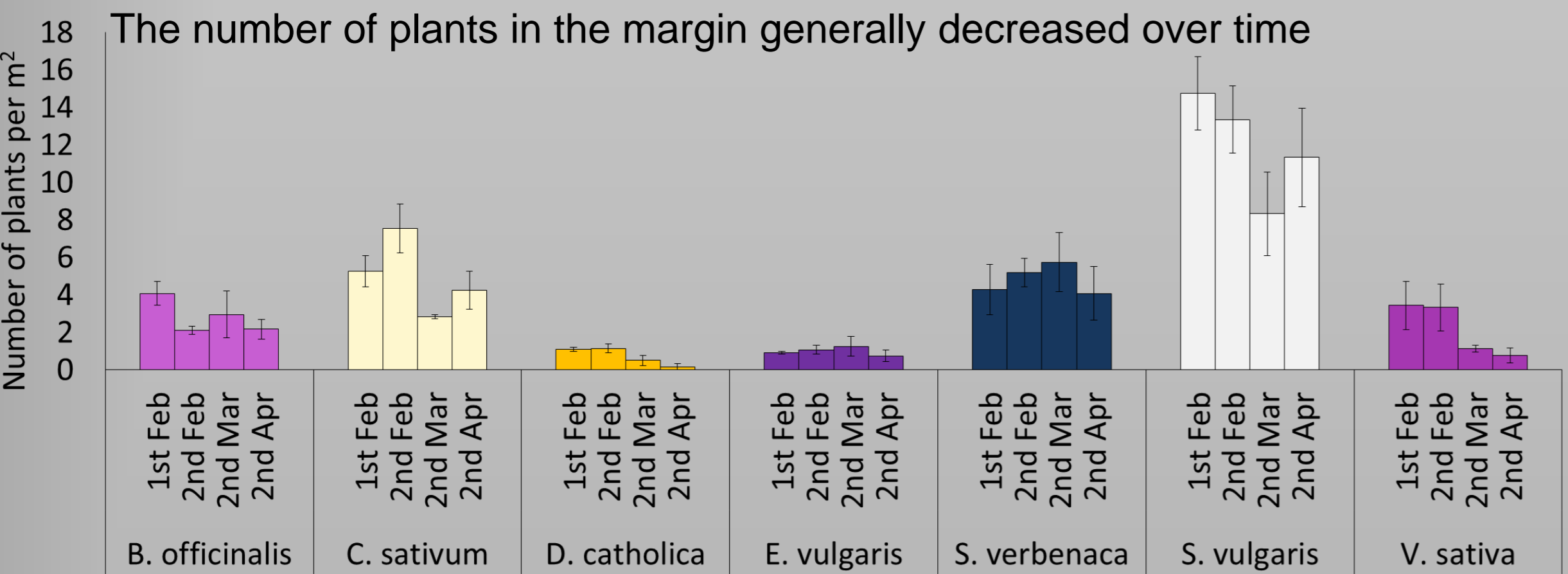The number of plants in the margin generally decreased over time

Figure 2. Abundance per m² (Number of plants±SE) of each plant species on several sampling dates (1st and 2nd are first and second week of the month).
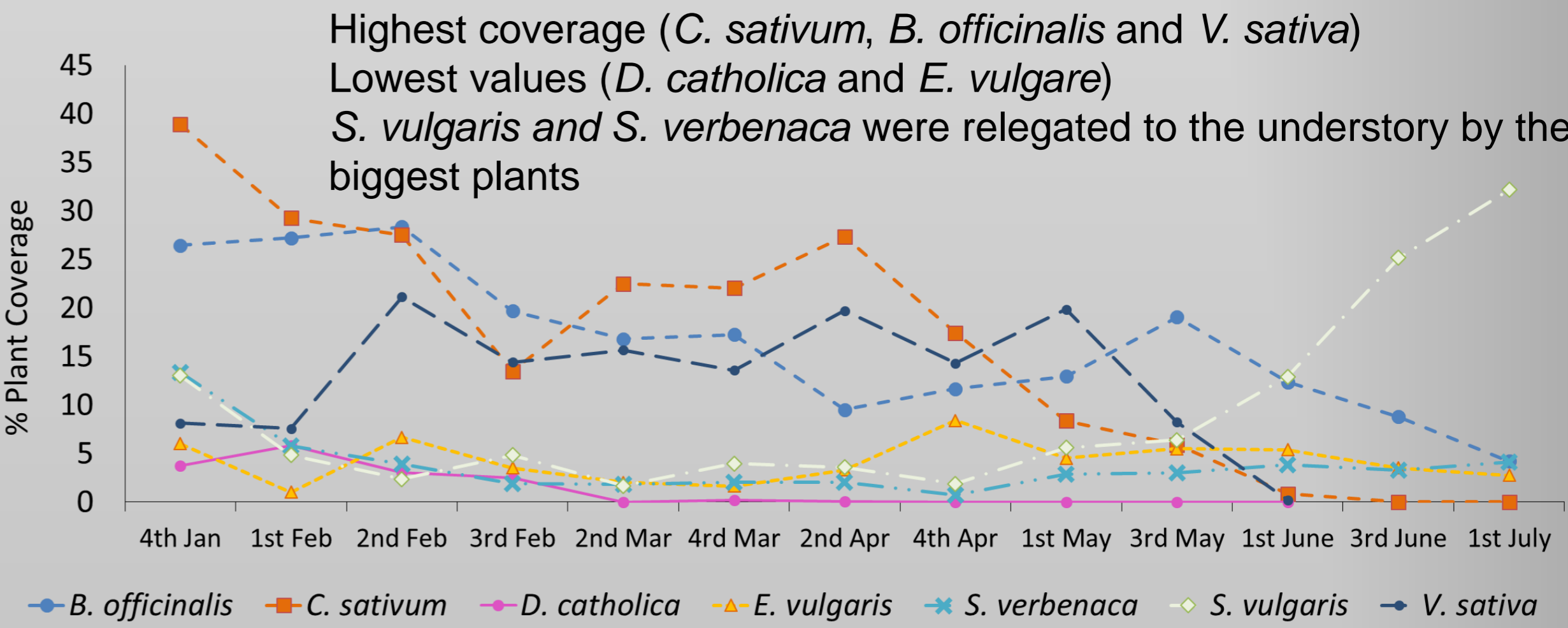
Highest coverage (*C. sativum*, *B. officinalis* and *V. sativa*)
Lowest values (*D. catholica* and *E. vulgare*)
S. vulgaris and *S. verbenaca* were relegated to the understory by the biggest plants

Figure 3. Percentage of plant coverage over time.

Extended blossoming periods (*B. officinalis* and *E. vulgare*)
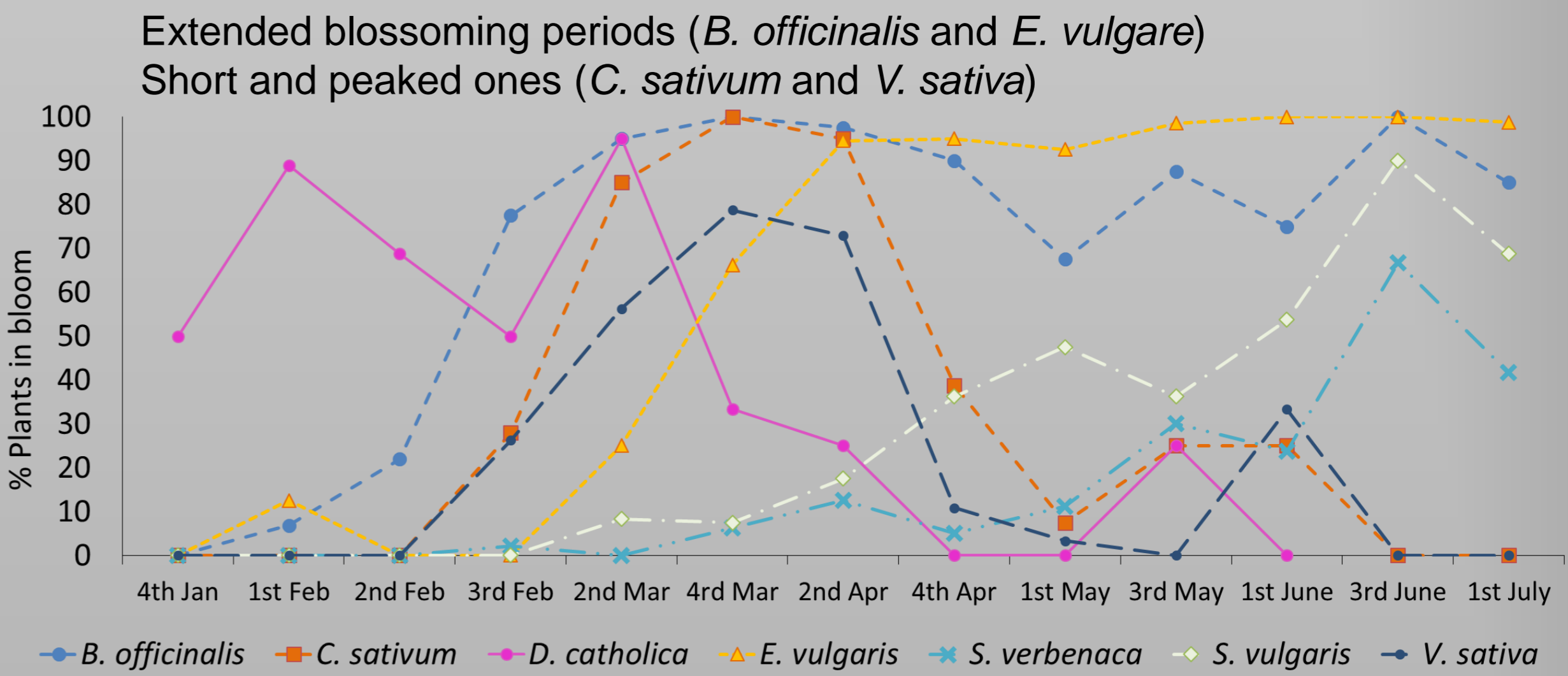Short and peaked ones (*C. sativum* and *V. sativa*)

Figure 4. Percentage of plant blossoming over time.

Aspects to be taken into account in relation to the choice and management of plants when designing margins of vegetation for the conservation of beneficial insects and other arthropods:

- Take into account the viability and field emergence of the seeds in order to predict the density of each plant species on the margin.
- Do not use excessively high densities and consider the size that each plant may reach.
- Do not mix plants that are very different in size or growth rates because smaller and less vigorous plants will be displaced.
- Try to provide extended periods of blossoming using different plant species that will cover the requirements of the targeted beneficial organisms.
- Identify a mixture of plants species that increase eco-systemic services without competing with the crop or serving as pest or disease reservoirs.