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Organic wild species crops: a tool to recover traditional knowledge, and to enhance biodiversity, food security and sustainable rural development

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In the context of intense ecological and socioeconomic changes on Mediterranean regions, we performed semi – structured interviews to recuperate the traditional knowledge of plants. We analyse the reported species (and those added from the literature) to evaluate their ecological appropriateness for cultivation, and their ecological and market value. We selected the 46 species (35 of them reported by the informants) that scored high for organic cultivation. These results indicate the high potential of wild species to develop new ecological and economical valuable crops, and the high value of traditional knowledge as an information source.

Keywords: Agroecology, NUS (Neglected and Underutilized Species), ethnobotany, organic farming, Mediterranean landscape

1 Introduction

In the Mediterranean area of Central Catalonia (NE Spain), like in other Mediterranean regions, from mid twentieth century an intense transformation on rural societies and landscape utilization has token place. Gradual forest expansion, decreasing of grassland and shrubland, rural abandonment and population ageing, and agronomic intensification are general processes. This leads to landscape homogenization (Geri et al., 2010), biodiversity loss (Cirujeda et al., 2011), traditional knowledge erosion (Vallés, 2007), and food security and sovereignty lose (FAO, 2011). This makes crucial the development of applied research projects that focus on the reversion of these processes. Our aim is to use the extant traditional knowledge to select the most appropriate wild species to develop organic crops that have a similar functionality to that of the uncultivated open areas. This will turn into a tool to promote sustainable rural development, food security and sovereignty, to enhance biodiversity and also to recover and revalorize traditional knowledge.

2 Material and Methods

We performed semi–structured interviews to 68 informants (36 men and 32 women) of the region, owing substantial traditional knowledge on plants coming from oral transmission of their elders. Interviews were, when possible, complemented with participant observation. All the information was video-recorded, transcribed, ingressed into a database, and analysed. Comparative analysis of the wild species led to an assessment on their requirements to be a potential crop for economic and ecological values, and on their appropriateness for cultivation. The information obtained was complemented and integrated with literature data. The potential ecological appropriateness for cultivation was based on six parameters (local distribution, regional distribution, general distribution, altitudinal range, phytosociology adscription and life-form), whereas the potential ecological value of the crop was derived from the phytosociology adscription of each species. The potential market value was calculated through 14 parameters (productivity, number of parts used, number of main uses of each part, processing time by farmer, processing efforts by farmer and by consumer,

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harvesting costs, period of harvesting, time from plantation to harvest, shelf life, position on the Mediterranean food pyramid, visual quality, organoleptic quality, and shelling price). The 46 species that scored higher for organic cultivation trials on 4 m^2 plots, with two treatments for each species and four replicates were selected. The treatments are a) organic conventional crops and b) organic crops following the principles of natural farming, i.e., minimum intervention on the crops. Seeds of the selected species where collected from wild populations with attributes as similar as possible to those expected on the experimental crops. When possible, seeds were collected from 60 individuals or more from each population, to maintain genetic variability. Experimental cultivation began on February 2015 and will finish on February 2017 or later, so no results are available yet. Our main focus is to determine which of the species selected and treatments score the highest socioeconomic and ecological variables, hence the best species for being introduced as new crops.

3 Results

Informants reported information on 137 wild species through 1,572 use reports, mainly on medical and human alimentary uses, and with IUC values lower than 50% in all groups (Figure 1). We then added 68 wild species more not reported in the interviews, but known from literature to have been traditionally used, which gave an amount of 205 species as candidates to be cultivated. The 46 species selected for cultivation (35 reported by the informants, 11 from literature) are reported and globally characterized.

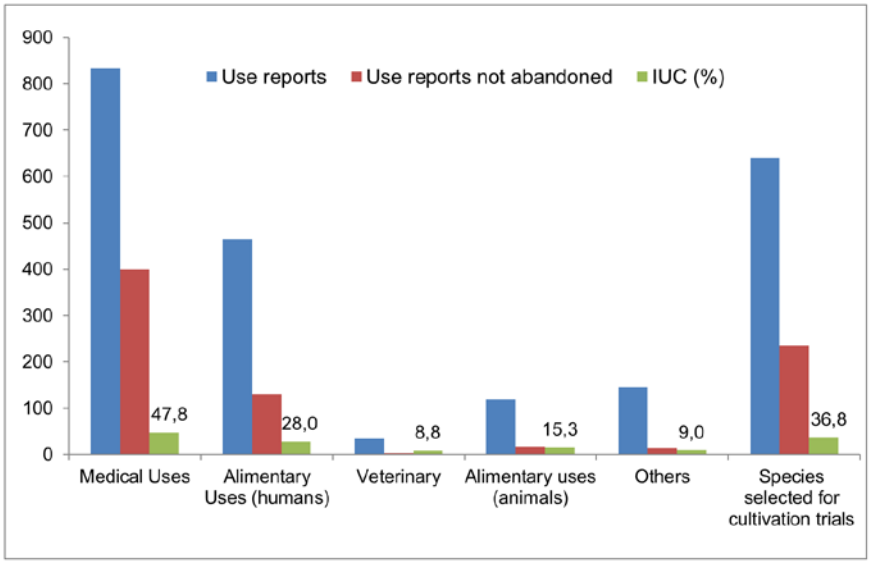

Figure 1 Number of total use reports, not abandoned use reports, and Index of Utilization (IUC), or ratio between the number of not abandoned use reports by the total number of use reports

Achillea millefolium
Agrimonia eupatoria
Asparagus acutifolius
Atriplex halimus
Borago officinalis
Calendula officinalis
Chondrilla juncea
Chrysanthemum coronarium
Cichorium intybus
Cynara cardunculus
Matricaria recutita
Muscari comosum
Origanum vulgare
Papaver rhoeas
Plantago coronopus subsp. *coronopus*
Plantago lanceolata
Portulaca oleracea
Reichardia picroides subsp. *picroides*
Rosa canina subsp. *canina*
Rosmarinus officinalis

Diplotaxis muralis	*Rubus ulmifolius*
Diplotaxis tenuifolia	*Sanguisorba minor subsp minor*
Emex spinosa	*Santolina chamaecyparissus* subsp. *squarrosa*
Foeniculum vulgare	*Satureja montana*
Humulus lupulus	*Scolymus hispanicus*
Hyoseris radiata	*Silene vulgaris* subsp. *vulgaris*
Hypericum perforatum	*Silybum marianum*
Inula helenoides	*Sonchus oleraceus*
Jasonia saxatilis	*Sonchus tenerrimus*
Lactuca serriola	*Taraxacum officinale*
Lathyrus tuberosus	*Thymus vulgaris* subsp. *vulgaris*
Leontodon tuberosus	*Tragopogon porrifolius* subsp. *sativus*
Malva sylvestris	*Verbascum thapsus*

4 Conclusions

In spite of the intense socioeconomic transformation occurred in developed societies, it is still possible to recuperate an important amount of traditional knowledge from appropriate elderly people, although this knowledge is generally not in use. However, this traditional knowledge represents the highly valuable information for the development of applied research projects that focuses on the promotion of sustainable rural development, food security and sovereignty, and also on the conservation of biodiversity, agrobiodiversity, and agroforestal landscape functionality.

This is demonstrated by the circumstance that most of selected species for cultivation trials (35 out of 46), and their uses, were reported by the informants. The selected species have a combination of ecological appropriateness, ecological value and market value that provide them a high potentiality to become in future real alternative crops that can improve the environment but also rural economy and society, while ancient uses of plants are recuperated and readapted to XXI century. This also demonstrates the high importance of wild vegetation to mitigate and overcome both environmental and socioeconomic changes. Therefore, it is necessary to carry on transversal projects in local areas but with regional application, and it is crucial to communicate the research results to non-scientific community, to involve society in this transversal transformation, and to work side by side with farmers, as they may be the main actors of these transformations.

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