Uses of Native Plant Species of a Communal Rangeland within 'Sierra de Huautla' Protected Area, México

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Abstract
Sustainability of communal rangelands has become a major concern at national and international levels because land use conflicts and associated social conflicts allows for over-utilization of selected species making a high pressure on them and given away their places to species with no use at all becoming lands degraded and unproductive. The objective of the study was to determine floristic composition and native plant uses by local peasants. The range surface is of 4262 ha, belongs to the communal land 'El Limon', in Tepalcingo, Morelos, Mexico, and it is within the Natural Reserve Area "Sierra de Huautla". Native vegetation is mainly of deciduous shrubs, high temperatures year round and a rainy season of 4 months. Local peasants were surveyed on uses of the collected and previously identified plants. Number of species was 456, distributed in 266 and 76 botanical genders and families, respectively. Of the species identified 66, 22 and 12% had one, two or more than two uses according to local peasants. Among uses: 59% of the species were used as forage, 8% eatable, 7% firewood or ornamental, 6% medical herb, lumber or other use 4 %, construction material 3 % and for resin or handcraft 1%. The range showed a very high plant biodiversity, this feature allows for a high resiliency toward human activities.

Introduction
Land use and social conflicts are taken communal rangelands to be overstocked, with poor planning of resting periods and without the implantation of rehabilitation protocols, these have been driving forces to land and vegetation degradation in these ecosystems. Poor livestock grazing planning is leading to over-utilization of selected forage and browse species, which under this high pressure surrender their places on the range to plant species livestock don´t consume and to bare ground, areas of the range with no vegetation cover, both conditions drive to unproductive rangelands (Selemani, 2014; Ibarra et al., 2018).

Government and Non-government agencies and organizations promote changing communal rangelands into protected areas, in which conservation and rehabilitation protocols could be applied, providing benefits to local people and securing the conservation of all natural resources within these ecosystems. Multiple use of the rangeland and grazing control go hand in hand in this effort to preserve nature and benefit local people (Fernández et al., 1998).

'Huautla Sierra' protected area incorporates within its extension some communal rangelands, in the south of the state of Morelos, Mexico, and goes along these lines of benefit local people and preserve nature for future generations. Rangeland multiple use approach requires to know and identify actual native plant species (Cabrera y Gómez, 2005) and uses by local people. Then, the objective of the study was to describe a plant species inventory and uses by local people to provide basic information to build a multiple use of the communal rangeland.

Methods and Study Site
This study was done in 'Ejido El Limón de Cuauchichinola' a communal rangeland of 4,262 ha, located in the county of Tepalcingo, Morelos state, Mexico within the Huautla Sierra protected area; native vegetation is tropical deciduous shrubs (Fernández et al., 1998).

From 2005 to 2007 there were field collection of plant species every 14 days, these field expeditions were done with local people with extensive knowledge of plant species. Plant identification was done by plant identification guides, comparing against plant materials in different herbariums and plant collections in the University of Chapingo, Polytechnic National Institute and National Autonomus University of Mexico.

Plant uses were recorded from interviews with local people and key informants, and grouped in ten categories. One plant could have more than one use so plants were grouped by number of possible uses in one, two three or more.

Results

Plan species inventory was made out of 456 species from 76 botanical families, three botanical families provided 41% of the plant species found in the communal rangeland. None of the other 73 botanical families provided 10% or over of the plant species found (Figure 1). The three major botanical families were: Asteraceae, Fabaceae and Poaceae.

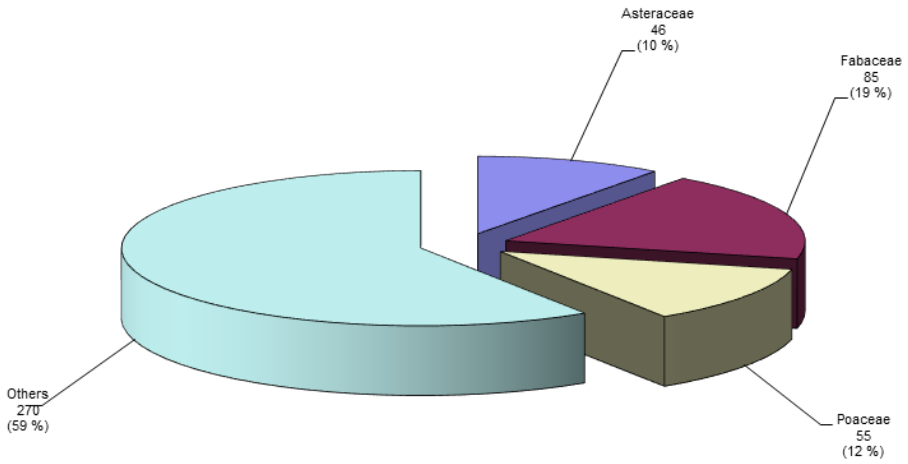

Figure 1. Distribution of botanical families by proportion of plant species provided in a communal rangeland within de Huautla Sierra protected area, state of Morelos, Mexico.

Distribution of plant species by number of uses is shown in Table 1, out of the 456 plant species found, 431 (94.5%) showed from one to more uses, as told by local people interviewed. Among plant species with at least one use, over half of them was identifies with just one use. A little over 10% of the plant species were identified to have over two uses

Table 1. Distribution of native plant species of a communal rangeland by number of uses

Number of uses	Plant species	
	Number	Proportion (%)
1	286	66.3
2	93	21.6
3 or more	52	12.1
Total	431	100

Native plant uses were grouped into major nine specific uses, out of these nine, forage/browse use was found to be applied to 388 plant species, which provided up to almost 60% of the plant species with at least one use (Table 2). Suitable for human consumption and ornamental were the other two uses that grouped a good amount of the plant species.

Table 2. Distribution of plant native species found in a communal rangeland distributed by use identified by local people

Local use	Number of species	Proportion (%) of species
Forage/browse	388	59
Eatable	55	8
Ornamental	48	7
Firewood	43	7
Traditional medicine	38	6
Fence posts	27	4
Building	18	3
Handcrafts	6	1
Oils and plant resin	6	1
Other	27	4

Discussion [Conclusions/Implications]

The common rangeland under study has a plant species inventory able to support livestock grazing; however, the great diversity in plant species and the local knowledge of other uses besides forage/browse allow for the implantation of multiple use strategies in which uses as food and ornamental are something that should be worked out.

The large proportion of plant species in the Fabaceae family opens the horizon to the introduction of soil rich biological nitrogen and then the establishment of plant species that could take advantage of this source of nitrogen.

It was concluded that the plant inventory and knowledge of local uses of plant species are two major inputs to develop a plan for multiple use of the communal rangeland and then be a factor in the goal of having rangeland management that benefit local people at the same time that preserve the ecosystem

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