Cultivated Cactus as Forage in the "Mixteca Poblana" Region of Mexico

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INTRODUCTION

The Mixteca Region, as it is commonly known, covers part of the territories of the states of Guerrero, Oaxaca, and Puebla. The name comes from the Mixtecs, an indigenous people whose civilization reached great splendor in the 12th century with the building of cities (Benítez, 1971) that are today still important commercial and handcraft centers.

The "Mixteca Poblana" is in the southern part of the state of Puebla, and is divided politically into four judicial districts with 57 municipalities and an area of approximately 1,934,000 acres. The population of 424,826 (INEGI, 1992) suffers from many social problems. Unemployment is the reason that an equal number of people have emigrated to the cities of Chicago, New York, and Los Angeles in the United States. In more than 50% of the Mixteca municipalities, basic public services (water and drainage) are lacking, causing epidemic outbreaks of diseases such as cholera, measles, chicken pox, and malaria. Besides all this, agricultural production is very low due to the irrational use of the natural resources. The region is considered one of extreme poverty; the state of Puebla is the sixth poorest state of the country.

NATURAL CONDITIONS

The dominant climate in this part of the Mixteca Region is the AWo(w)(i')g type, a warm, subhumid climate with a mean annual temperature of 25°C and an average annual rainfall of 834 mm from June through October.

The soils of the Mixteca Region are Feozems, Redzinas, Regosols, and Litosols (INEGI, 1987). In general, the soils are skeletal, shallow on the slopes and moderately deep in the alluvial depressions. On the plains, the color of the soils varies from reddish brown to dark brown, with a sandy-loam or silty-loam texture. Between 10% and 70% of the soil content is rocks, making agriculture difficult.

The types of original vegetation are low deciduous jungle, scrub oak forest, and river-bank vegetation. Of these, the low deciduous jungle is the most extensive and is characterized by a height of less than 15 m and by the total loss of leaves during the dry season. The most important tree species are copal (*Bursera aloexylon*), guayacán (*Lonchacarpus rugosus*), guamuchil (*Pithecellobium dulce*), linaloe (*Bursera aloexylon*), and cuachalalate (*Amphipterygium brasiletto*) (Guizar N., 1985). This vegetation is in generalized deterioration. The irrational use of the forest for natural medicine, charcoal, and firewood has left the soil open to erosion. Some species of

economic importance are in danger of extinction.

PRODUCTIVE ACTIVITIES

Primary activities constitute the main productive activities, where agroforestry, the conjugation of agriculture, livestock, and use of forest resources, is of major importance. Agriculture is mostly rainfed. Of the 1,934,000 acres that make up the Mixteca Poblana, 296,000 is used for agriculture (corn, beans, and peanuts), 660,000 acres are used for livestock (cattle and goats), and 978,000 are considered forest (D.D.R., 1994).

Most campesino families farm rainfed land with production for their own consumption. They complement this with semi-intensive cattle and goat raising, as well as with gathering in the forest at certain periods during the year.

It is important to note that, because of its geographic location, the Mixteca Poblana has rivers, such as the Nexapa, the Mixteco, the Atoyac, and the Tizaac, which are used, on a smaller scale, for irrigating corn and vegetables, mainly onions, watermelon, cantaloupe, tomatoes, and chilis.

PARTICIPATION OF THE UNIVERSITY OF CHAPINGO

The objectives of the University of Chapingo are education at the preparatory, undergraduate, and graduate levels; research; and extension, all aimed at contributing to the development of rural Mexico. It was within the objective of extension service that the Committee on University (Extension) Service and the Prickly Pear Program of the Center for Economic, Social, and Technological Research in Agriculture and World Agriculture (CIESTAAM) approved, in 1993, the project "Introduction of Prickly Pear as a Forage Crop in the Mixteca Region of Puebla." The main objective of the project was to test the adaptation of the cactus in land that is no longer suitable for agriculture. The results were good: the cactus not only adapted to rainfed conditions, but produced one pad per month (per plant). Demonstrations were given in Barranca Estaca and Tonahuixtla, municipality of San Jerónimo Xayacatlán on November 26, 1993, with the participation of more than 300 producers from the Mixteca Region. Great interest was also shown by producers and government institutions such as the Secretariat of Social Development (Secretaría de Desarrollo Social-SEDESOL).

In 1994, a project to establish a nursery of irrigated forage cactus, which would serve to supply prickly pear to the land where it will be produced intensively, was presented to the delegation of SEDESOL in Puebla. This was done jointly with the producers organized in a Society of Social Solidarity from Tuzantlán, municipality of Tehuitzingo, Puebla. There are three responsibile parties: SEDESOL will provide the resources, the producers will contribute the labor, and UACH-CIESTAAM-Prickly Pear Program will give technical assistance. In this nursery, the adaptation of nine prickly pear fruit varieties (33-89, L-12, Montesa, T-5, Frida, Alfafayuca, Cristalina, Fafayuco, and 22-89) are being tested.

Because of the interest shown by the growers, the Prickly Pear Program of CIESTAAM presented a program of soil conservation and restoration to the National Fund of Solidarity Enterprises (FONAES). The program proposes to contribute to soil conservation and recovery and, at the same time, contribute to the sustainable development of cattle and goat raising through the cultivation of cactus forage. The Program covers 100 ha in 10 municipalities of the Mixteca Poblana. In May, 1995, N$462,000.00 in credit was approved for the project of 100 ha and the participation of 40 growers organized and (legally) constituted in a "Solidarity Enterprise." The

loan is granted with no interest, 5 years to pay and 17 months of grace. At present, the Prickly Pear Program-CIESTAAM, will conduct of the project in the *ejido* Las Nieves-Tecomate, municipality of Acatlán de Osorio, Puebla, with responsibility for technical and administrative assistance and research.

OBJECTIVES

The overall objective is to provide a feasible alternative for forage production in accord with the limiting physical-biotic and socio-economic conditions of the region and the farmers, which would allow the sustainable development of livestock-raising.

Specific objectives are:

- Reduce erosion in deteriorated soils by growing cactus forage.
- Contribute to solving the problem of feed for large and small livestock during the most critical months of the dry season.
- Increase the productivity of goats and sheep.
- Together with the prickly pear, produce other native species that can be used as forage, and in a medium term design diets for the livestock.

METHODOLOGY

- Promotion and justification, among the producers, of the importance of growing prickly pear.
- Presentation of the project, its objectives and aims, to the producers.
- Presentation of the project to government institutions such as SEDESOL, INI, State Government, etc.
- Agreement on work commitments among the producers, SEDESOL, and the University of Chapingo-CIESTAAM-Prickly Pear Program.
- Definition, together with the producers, of the area to be cultivated and the quantity to be produced.
- Evaluation and follow-up of progress and results.
- Promotion of the program through demonstrations for producers and institutions.

RESULTS

The following varieties were produced: prickly pear forage variety F1; the nopalito varieties Copena VI and Milpa Alta; and the fruit varieties 33'89, L-12, Monteza, T-5, Frida, Alfafayuca, Cristalina, Fafayuco, and 22-89.

The nopalito variety Copena VI, with an average of six to eight sprouts, produced more than the Milpa Alta variety. This production made it possible to eliminate imperfect, badly oriented, or double daughter pads. There were only two or three daughter pads on each of the mother plants.

In the forage varieties five or six sprouts on average per mother pad were observed. Of these, imperfect or badly oriented sprouts were eliminated.

The pads whose flat sides faced east and west took longer to produce and produced fewer daughter pads, which were, however, better developed with a better shape.

With irrigation, it is possible to produce up to two daughter pads per month by forcing the mother pad with constant irrigation and fertilization. At present, production is 15,000 pads of the forage varieties and 4,000 pads of the nopalito variety.

Forage plants, such as *Leucaena glauca* and *Leucaena salvadorensis*, which grow in association with prickly pear in the pastures where they are permanently established, are being produced.

On March 17, 1995, a demonstration of the progress achieved was presented to the participating institutions and interested producers. Today, there are petitions from 200 farmers for the introduction of prickly pear into approximately 500 hectares.

Production of 100 ha of cactus forage in the *ejido* Las Nieves-Tecomate will be done under the following process of production:

- The land is divided into plots of approximately 1.5 ha per member.
- Uneven land on the hillsides is being fenced with concrete posts every 20 m with five rows of barbed wire.
- Pads will be brought from Milpa Alta State of Mexico, and 4,000 pads per ha will be planted.
- An association of prickly pear with forage plants, such as *guaje* (*Leucaena*), will be established.
- Organic fertilizer will be used, mainly goat and cattle manure.
- The plots will be irrigated during the dry season with a drip system. Water will be drawn from a well on the banks of the Tizaac River, pumped more than 100 m with a 15 hp pump, and stored in a tank which will be constructed at the highest point.
- Within the same planting area, a plot has been set aside to do research on population density, fertilizer application with different varieties of forage and vegetable cactus, and the adaptation of fruit varieties.
- Work will be done by the producers collectively (in *faenas*) Thursday, Friday, and Saturday every week.

REFERENCES

Benítez, R., 1971. Los indios de México. Vol. 1, En el país de las nubes. México:ERA. pp 277-514.

INEGI, 1991. Censo de población de 1990. Estado de Puebla. México: Instituto Nacional de Estadística y Geografía.

INEGI, 1987. Mapa de suelos. México: Instituto Nacional de Estadísitica y Geografía.

D.D.R.G., 1994. Superficies dedicadas a agricultura, ganadería y forestería en la mixteca poblana, Distrito de Desarrollo Rural No. 6, Izúcar de Matamoros, Puebla. Mexico: Secretaría de Agricultura y Recursos Hidráulicos.

Ponce J., P., J. González L., E. Guizar N., and M. Cruz M. 1994. Reactivación de un vivero con la sociedad de solidaridad social (SSS) en el ejido de Tuzantlán, Municipio de Tehuitzingo, Puebla. Mexico: CIESTAAM-UACH.

Ponce J., P., C. Flores V., and M. Cruz M. 1994. Programa de conservación y recuperación del suelo mediante el cultivo de nopal forrajero, para el desarrollo sustentable de la ganadería en la mixteca poblana. Mexico: CIESTAAM-UACH.