

The Mezcal Industry in the Altiplano Potosino-Zacatecano of North-Central Mexico

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Abstract

Agaves play an important role both ecologically and economically in the San Luis Potosi-Zacatecas region. This study describes the principal use of one of the wild species, the manufacture of the distilled liquor *mezcal*. The resource is currently overexploited, resulting in dwindling supplies of raw material. This is in turn sub-utilized, since harvest practices are not carried out in an organized manner and the technology used in *mezcal* manufacture is antiquated and inefficient.

Introduction

Pulque and Mezcal were consumed in great quantities by the indigenous people during colonial times (Cué, 1979; Guerrero, 1980). The latter was developed in Mexico after the introduction of distilling technology by the Spaniards and Filipinos during the Sixteenth Century (Bruman, 1935, 1940, as cited by Bahre and Bradbury, 1980; Guerrero, 1980). During the era of the viceroyalty a flourishing agro-industry based on mezcal liquor was established, with countless haciendas dedicated to its production and, since large profits could be gained, considerable areas were devoted to maguey cultivation (Bazant, 1975; Cabrera and Cabrera, 1978).

The mezcal industry continues to provide great economic benefits to the present day, in spite of the fact that mezcal production has diminished due to lack of raw material because of over-exploitation of wild populations and due to socioeconomic problems (Gonzalez and Scheffey, 1964).

With respect to the mezcal manufacturing techniques which were used in earlier times (Payno, 1864, as cited by Segura, 1901), the processes of cooking, milling, fermentation, and distillation were different from those used today, although the principles remain the same. The old-fashioned still was of the "drip" or "bell" type and its form determined the name of the mezcal produced, "vino de chorrera" or "vino de campanilla." Bye (1979) also gives an account of these processes, while Tello (1983) does the same for the production of "mezcal campanilla." The bell-type still is analogous to the stills used by the Huichol and Cora Indians of Nayarit and Jalisco (Bahre and Bradbury, 1980), which are of the Asiatic type with an internal receptacle. It is also similar to the modified form used in Sonora in the elaboration of mezcal "bacanora." These forms of distillation are still practiced as part of moonshine operations (Bahre and Bradbury, 1980; Tello, 1983).

Materials and Methods

The object of the present study was to describe mezcal production as it takes place today in the Altiplano Potosino-Zacatecano (Figure 4).

In order to obtain information, the general method selected was direct interview with emphasis on concrete knowledge with informants selected by judgement, as proposed by Hernandez and Ramos (1977) and modified by Aguirre (1979).

The method was applied in five of the six local mezcal factories within the study area. The information was organized according to the following sequence: (a) the descriptions and explanations were registered in a field notebook, (b) the field information was reorganized into field data files, (c) the field data files were organized by cross-reference according to practice and locality. In this

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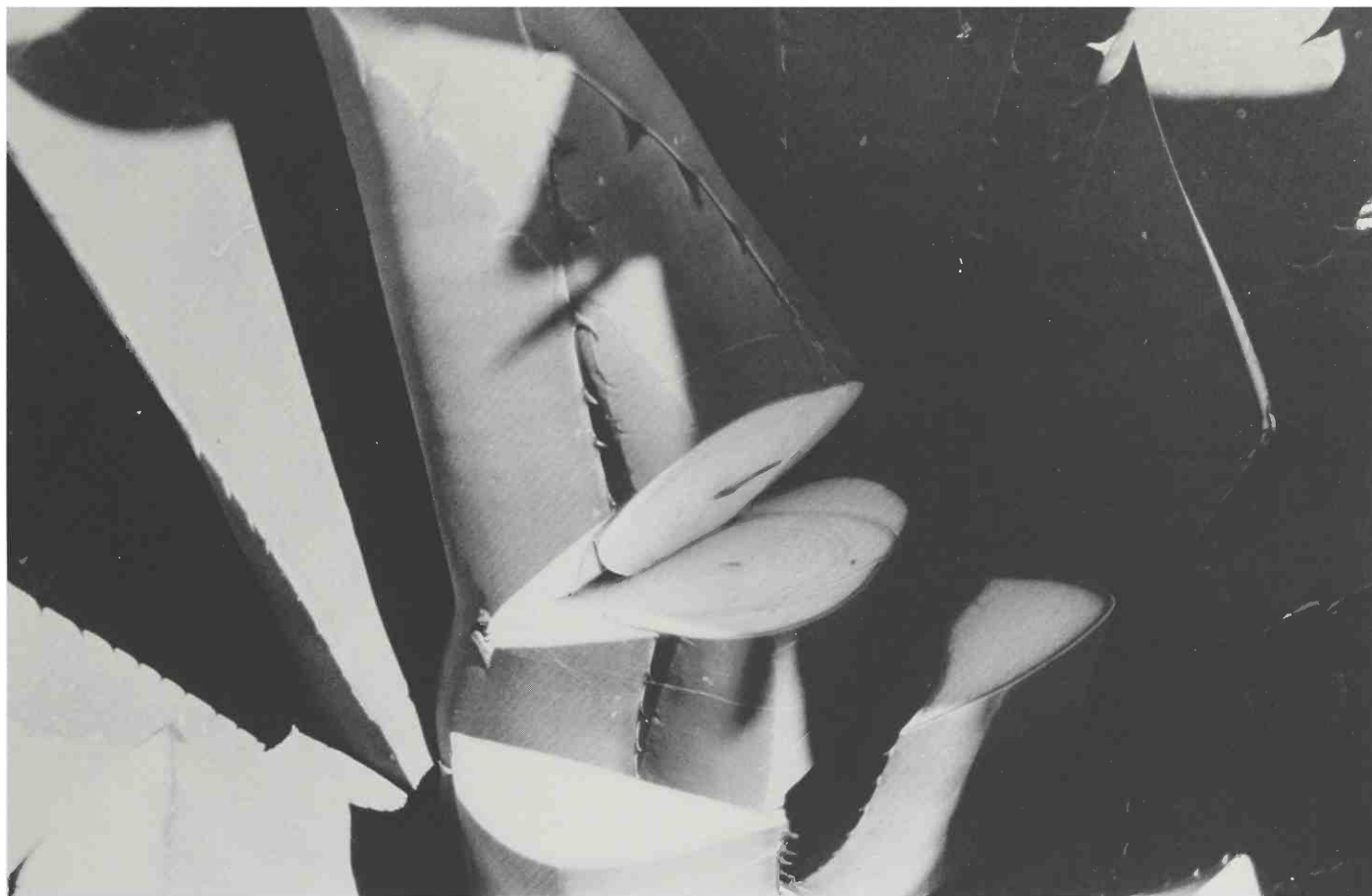


Figure 1. A worker referred to as the picador searches for plants of Maguey Verde suspected of being ready to flower. He verifies that reproductive processes have been set into motion by cutting the bud and looking for a central orifice (dark spot in photo). If this is found, the physiological chain of events has begun which will translocate polysaccharides from the extremities of the leaves into the plant base to be used in producing the massive flower stalk. After verifying that the central orifice is present, the worker then "castrates" the plant by prying out the embryonic reproductive structures to prevent flowering.

way it was possible to refer easily to the information in the preparation of the final report.

Results and Discussion

The principal zone of mezcal production in the study area is located to the northwest of San Luis Potosi, between 22°20' and 22°38' north latitude and 101°15' and 101°42' west longitude. Another small area is located to the northeast of Charcas, San Luis Potosi, at 23°08' north latitude and between 100°45' and 101°00' west longitude.

The plant used as raw material for mezcal manufacture is commonly called Maguey Verde and belongs to the taxon *Agave salmiana* Otto ex Salm, ssp. *crassispina* (Trel.) Gentry. It occurs in the wild state at densities between 1138 (González, 1982), 1584 (Tello and García unpublished), and 2775 (López *et al.*, 1979) plants/hectare. It is also used intensively for livestock forage, construction, and as human food ("aguamiel" and "golosina"). It is planted as an ornamental and hedge plant.

Presently almost all the extensive wild populations of Maguey Verde are found on communally held (ejidal) land. The mezcal factories are mostly private companies which contract with the ejidos for the supply of the raw material, since these companies are staffed only with the workers needed for the actual manufacture.

Maguey Cultivation Practices

Replanting. Replanting activities are carried out only minimally. Government programs involve contour-planting in rows, while the mezcal factory programs involve planting in mounds. Offsets for planting come from nearby wild populations and vary from 30 to 60 cm in height. In row planting the distance between plants is 2 m and between rows approximately 8 m, with a density of 650-700 plants/hectare. In mound or pit planting the plant-to-plant distance is 1.5 m and the distance between strings of mounds varies from 1.5 to 4 m.



Figure 2. The hombre wielding this extremely sharp fierro desvirador locates plants of Maguey Verde which have been "castrated" for about twelve months. By this time many of the polysaccharides which would have gone into forming the flower stalk engorge the base of the plant. Using the fierro desvirador and a machete, the worker removes the projecting portions of the leaves which now have been drained of much of their energy.



Figure 3. The cabeza (also termed piña because of its pineapple appearance) is obtained by means of a barra tumbadora which is used to strike at the base of the plant until the necessary leverage is gained to break it free from the soil. Usually two men, the tumbadores, remove the cabezas cut by a single desvirador. Together the three hombres constitute the team of workers known as the rajadores.

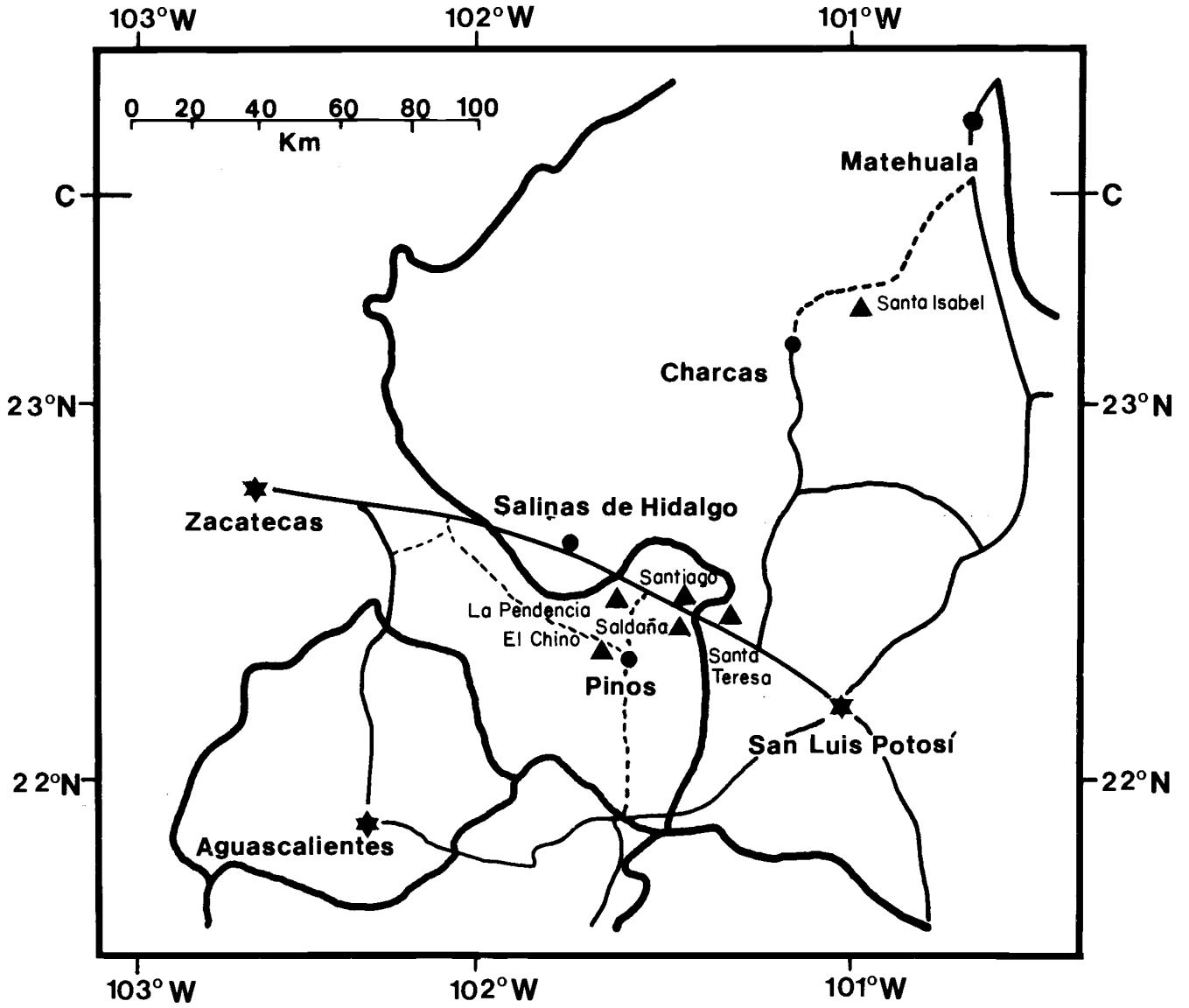


Figure 4. Location of mezcals factories in the Mexican states of San Luis Potosí and Zacatecas.

Castration. The castration or "picazon" of the maguey is a fundamental activity for obtaining raw material of top quality and consists of removing the inflorescence bud. The object is to halt the flowering process while still encouraging the transport and storage of nutrients in the "piña" (stem and leaf bases) of the maguey.

The job of the "picadores" (the people in charge of the castration) is to locate the plants which are ready to be castrated by considering certain morphological characteristics of the plant. The best indicator is that the terminal spine or "pua" of the central bud should be small, slender, and black. A plant with this characteristic is called "maguey acarrilado" and is eight to eleven years old, depending on site conditions.

Once the plant is identified as ready, a knife is used to remove enough leaves from one side to provide the necessary work space for removing the central bud, which is cut off transversely as close to the base as possible, revealing in its central portion a hollow circular orifice (Figure 1). This orifice is proof of the readiness of the plant. Castration without it simply damages the vegetative meristem and results in the premature death of the plant. Noting the orifice, the "picadores" proceed to force back the white leaves of the bud base with a prybar ("palanca") until they are able to extract the nascent inflorescence.

The period during which the plants remain castrated prior to their harvest (*rajado*) is variable, depending on the policy of the particular mezcal factory. The minimum recommended period is 18 months, which provides time for the full "seasoning" or "fattening" of the *piña* with the carbohydrates which would have been destined for the inflorescence. The common practice is for a period from six to twelve months. Castration may be carried out at any time during the year.

Collection and Transport

The people in charge of collection are called *rajadores* and usually work in teams of three. The *desvirador* is in charge of locating the castrated plants and removing the majority of the leaf tips with the aid of a *fierro desvirador* and a machete. The two *tumbadores* are in charge of extracting the *piña* from the soil by means of a *barra tumbadora* which is used to strike at the base of the plant until the necessary leverage is gained to break it free from the soil. After this the *piña* is trimmed of excess leaves and otherwise prepared for transport (Figures 2-3).

Some mezcal factories do not practice castration, utilizing plants with young inflorescences or plants which were castrated after the emergence of the inflorescence. These practices represent poor utilization of the raw material.

The monthly extraction of wild maguey plants for the production of mezcal is estimated at 50,000. Table 1 shows some characteristics of the components of harvested castrated plants.

Industrial Processes

Baking or Cooking of the Piña. Once the *piñas* which contain starchy reserve carbohydrates are subjected to long cooking, the more complex substances are broken down to simple mannose sugars. In this state, the *piña* is known as *mezcal*.

The cooking ovens are made of stone (Figure 5) generally with vaulted interiors and a basal grillwork of concrete or

Table 1. Characteristics of magueys harvested after 12 months of post-castration seasoning in the ejido of Caballerias, Villa Hidalgo, Zacatecas (n = 50).

Variable	Mean [Kg]	Standard Deviation [Kg]	Minimum [Kg]	Maximum [Kg]
Plant weight	111.2	51.4	36.0	247.5
Piña weight	65.8	31.9	21.0	166.0
Total leaf weight	45.0	23.4	8.0	110.0
Leaf number	25.3	7.0	10.0	42.0
Offsets < 60 cm	2.2	2.0	0.0	0.0
Offsets > 60 cm	0.8	1.2	0.0	0.0

wooden beams. Beneath the grill are the burner or the steam discharge tube and the catchment basins for run-off. The ovens have a front door for loading and unloading (or sometimes a front door for unloading and back door for loading) and they are provided with a circular hole above which is used to stuff in more *piñas* once the first installment has settled in cooking. Stone ladders or earth ramps are used to lift up the *piñas*. Oven capacity varies from 20-60 metric tons.

There are two types of cooking. The more rustic method uses direct flame in the lower part of the oven while the other method uses steam. The *piñas* cook from three to five days. In this period they produce run-off juices called *guixi*. Those produced during steamheating are collected and purified by boiling, while those produced by flame heat, which are limited in any case, are discarded, since they are contaminated.

The people in charge of cooking are called *fañeros* and those in charge of removing the mezcal are called *hechadores fuera* (Figure 6).

Milling. The mezcal is broken into pieces with axes in order to facilitate the milling process. There are two milling techniques. The more traditional is the stone mill (Figure 7), which consists of a "ring" or circular base of stone and cement with a slightly inclined peripheral groove in which the syrup collects and of a circular stone above, 1.7 m in diameter and 0.5 m thick, which has passing through its center a bar. One end of the bar rotates in a fixed point at the center of the ring while the other is attached to a traction source, which may be a team of oxen (Figure 8) or a tractor. The mezcal is placed in the ring; the syrup is extracted through rotary motion of the stone and is conducted by channels to the fermentation tanks. The *bagazo* (solid material) is washed in order to extract the maximum amount of syrup. The simplest but least adequate method is to wash the material *in situ* on the millstone; another method involves rinsing in vats followed by extraction in a steam-driven press. The other milling technique uses an electric press (Figures 9-10) with two conveyer belts, a shredder, and two sets of press rollers. The syrup extracted the first time through goes to the storage tanks, while the *bagazo* is given three more passes, adding water each time. The concentration of the combined syrup as measured by a Baume density meter is 6-8 degrees.

The *bagazo* is accumulated in the courtyard of the mezcal factory. It is burned or used for livestock forage. The people in charge of the milling process are called *molineros*.



Figure 5. The ovens (los hornos) used for processing the Maguey Verde occupy this stone structure. The cabezas are fed in through the arched entryways.



Figure 8. Bovine power has traditionally been harnessed to power the stone mezcal mill. Sometimes nowadays a tractor will be hooked to the stone wheel instead.



Figure 6. The hombres in charge of cooking the cabezas are termed faineros. Others who remove the cooked product are referred to as hechadores fuera.



Figure 9. Some mezcal factories now use electric presses in place of the traditional stone mill. The bagazo (fiber) is washed three times.



Figure 7. The cooked mezcal is hacked into pieces with axes and crushed with a large stone wheel. Those in charge of this milling process are termed molineros.



Figure 10. This electric press consists of a large conveyor belt, a shredder, a small conveyor belt, and two sets of press rollers.