

A new model of agroforestry

An increasing group of Mexican farmers is transforming their landscape and livelihoods by planting among deep-rooted, nitrogen-fixing tree species such as mesquite, a high density of fast-growing agave species (1600-2500 plants per hectare).

When the agaves are 3 years old, and for the next 5 to 7 years, farmers can prune the leaves, finely chop them with a machine and ferment the agave in closed containers for 30 days, ideally combining the agave leaves with 20% mesquite pod flour and legume branches by volume to give them a higher protein level. In Guanajuato, mesquite trees begin to produce pods that can be harvested in the fifth year.

By the seventh year, the mesquites and agaves form a fairly dense forest. From year 8 to 10, the agave "piña", weighing between 100 - 150 kilograms, is ready to be harvested to produce a distilled liquor called mezcal. In turn, the "hijuelos" produced by the mother agave plants are transplanted continuously in an agroforestry system, guaranteeing them permanent biomass growth (and carbon storage).

In this system, farmers avoid overgrazing their land by integrating rotational grazing of their livestock and supplementing their animals' diets with fermented agave forage.

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THE BILLION AGAVE PROJECT



**Revolutionary approach
to regenerate the world's
arid and semi-arid lands**

What is the billion agave project?

The Billion Agave Project is a revolutionary approach to regenerate arid and semi-arid areas and is being implemented by a growing number of farms in Northern Guanajuato State, Mexico.

This approach combines agave plants and nitrogen fixing trees such as mesquite and huizache, along with rotational ovine and goat cattle grazing. The result is a high - biomass system that works even in semi-arid degraded land.

Agave plants and legume trees require little to no irrigation, they can tolerate extreme temperatures and thrive in dry, degraded land not suitable for crop production. Agaves have a Crassulacean Acid Metabolism (CAM) photosynthetic pathway which makes them up to eight times more efficient to produce sugar compared to other plants like C3 and C4 with the same water content. During daylight hours, the opening in their leaves (the stomata) closes up, drastically reducing evaporation and captures CO₂ at night to start the photosynthesis process at dawn.

Our goal is to plant a billion agave plants all over the world, to reduce and store billions of CO₂ tons that destabilize the climate. This initiative will be funded by donations and private and public investment.



“ Agave is to the drier parts of the world what bamboo is to its wetter zones . . . ”
- Dr. Promode Kant

Livestock feed source

This system produces large amounts of agave leaves that can be pruned up to 20% from year 2-3 after being planted until they reach adulthood, which occurs from year 10-14. This allows for an annual harvest (fresh weight) that goes from 1.5 ton/ha on the second year, up to 140 ton/ha in the fourteenth year. The recommended species are Agave americana and A. salmiana and the recommended density is 2,000 plants/ha.

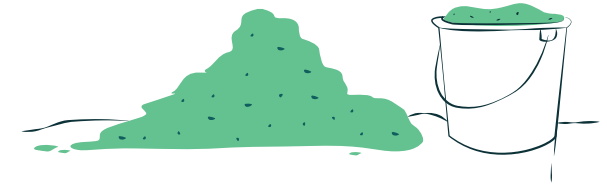
It is a common practice in some farms in Mexico to prune and chop agave leaves to feed livestock. However, the size of the leaves and the saponin content, among other substances, make it hard to digest. In this system it is recommended that the leaves are crushed mechanically and the resulting biomass is packaged under anaerobic



conditions in containers (cans, buckets, plastic bags, etc.) to produce a silage that after 30 days will be ready to be consumed by ruminants and cattle, which increases digestibility, palatability and reduces saponins. It is important to mention that if the container is not opened, this forage can be kept for up to 30 months without losing its nutritional properties.

In addition to this production, when the plants mature, the hearts or “piñas” can be used for different purposes such as distilled or fermented beverages, sweeteners and others; in the species mentioned before, “piñas” can reach an average weight of up to 300 kg (600 ton/ha).

This agroforestry system can greatly reduce grazing pressure on degraded rangelands, improve soil health, retain water, capture and sequester considerable amounts of CO₂ and represents an alternative that can be the difference between survival and absolute poverty for millions of smallholders and farmers around the world, particularly in arid and semi-arid areas.



Solution to climate change

Agave plants and nitrogen-fixing trees have the ability to reduce and isolate considerable amounts of CO₂. They also produce more biomass above and below ground on a continuous basis than any other desert or semi-desert species. It is estimated that this system can absorb and store the dry weight equivalent of 30-50 tons of CO₂/ha/year both above and below ground.

