AGAVE INTENSIVE
ARThUR BLACK
I. Little clarity on terminology

II. Little lore and brief history

III. Primary genres of agave based spirits and NOM status

IV. Agave spirit sources of flavors – Elementary/Extensive

V. Tequila nom and comparison with “other agave” spirits

VI. Bacanora – Sotol overview and tasting

VII. Agave, Taxonomy, Inulin, Notion of Terroir

VIII. Mezcal NOM, Chemical analysis – Insane Breakdown – Tasting 4 mezcal from 4 species of agave
Before we get Started
Some particular words to keep accurately in your head

- **MAGUEY** – From *Nahuatl* “Mayahuel”, Goddess of fertility
- **AGAVE** – Greek for “noble” defined by Linnaeus in 1753
- **PULQUE** – No disrespect, “agave beer” fermented largely from *Agave Mapisaga* from the southeast quadrant
- **MEZCAL** - From *Nahuatl* “ixcalli” for cooked & “metl” for agave
- **MEZCAL WINE** – Historical name prior to “Tequila Wine”, prior to “Tequila”
- **TEQUILA** – “a place of work”
- **MEZCALERO** – Anyone who produces mezcal
- **PALENQUE** – A farm with a still
- **PALENQUERO** – Anyone who produces mezcal and owns their own still
MAGUEY
MAYAHUEL

Everyone loves breasts and drunk rabbits

Zapotecos
“Cloud People”
Tequila/Mezcal Brief History

- *Agave* cultivation all over Mexico is dated by historians to 2nd century BCE. By Indian legend, much earlier
- *Pulque* is most likely North America's first fermented beverage.
- *Mezcal* is most likely 1st distillate.
- Spaniards brought the art of distillation in 1521, but *distillation precedes Spanish conquests!!!!*
- Despite a national, cultural tradition of mezcal production, the actual area that became Tequila, gained its reputation out of a growing concentration of distillers, hence the name, "a place of work"

*Tequila was officially established in 1656*
Mezcal/Tequila Brief History
• First license sanctioned by Spanish crown went to Jose Maria Guadalupe Cuervo in 1795 in Tequila
• Hundreds of species of Agave have been growing & cultivated for thousands of years. But........
• Azul (“blue in Spanish”) identified by botanist, Weber, in 1902 became that which is associated with Tequila and was adopted by the initial resemblances of a classification system in the mid-20th century.
• In 1949, Tequila’s Norma Official Mexicana was implemented, Agave Tequilana Weber Azul plant was the plant of choice.
  – Geographic boundaries and criteria became law. The Tequila Regulatory Council, or CRT, licensing approved, numbers assigned and the NOM system came to life
• International recognition of the delimited areas of Tequila was not recognized until 1996.
Agave Based Spirits
*Please come to appreciate the historical and cultural usage as “mezcal” as a category versus “mezcal” as a classified spirit

Mezcal has a NOM now, yo!!!!!!

• **Tequila** – Primarily from Jalisco and blue agave
• **Mezcal** – Most associated with Oaxaca, though 8 states make mezcal. Mostly *Espadin*, but some 28 (30-50) species can be used
• **Bacanora** – From the state of Sonora from *Augustifolio*, aka *Espadin* – some claim *pacifica* and *palmieri* agave species
• **Sotol** – From state of Chihuahua from *Dasylirion* species
• **Mezcal de Olla** – Utilizes an “olla” or a clay pot
• **Raicilla** – Made in western Jalisco from *lechuguilla, Inaeguidens* and *Maximiliana* agave species named after a region of same name
• **Tuxca** – From *Txcacuesco* in Jalisco, regional species
• **Comiteca** – From the state of Chiapas from the *atrovierns haw* agave species

*Anything without a NOM can make basic *Destilado de Agave*
Sources of Flavor in Agave Spirit Elementals

- Agave
- Water
- Fermentation
- Distillation
- Maturation
• **Agave:**
  – Agave species – Type, age, ripeness
  – Growing conditions – Temp, growing season, elevation
  – Preparation – Oven, Auto-clave, underground (earth, stone)

• **Water:**
  – Natural water – mineral content (iron, manganese, nitrogen, potassium)
    – Spring v River source
  – Processed water

• **Fermentation:**
  – Natural yeast vs. cultured yeast
  – Cultured: proprietary vs. generic strain
  – Length of fermentation, temperature of fermentation, vessel (oak, steel, animal skin?)
  – Bagasse ratio

• **Distillation:** **Influences the alcoholic character of the spirit**
  – Proof – Especially if you’re considering an oak regimen
  – Type of still – Pot (size, copper, steel), continuous, olla, oak (pine)
  – Material of still – Copper, steel, clay, wood
  – Times distilled – Impurities, esters, volume/cost drivers
  – Temperature and length of distillation – Faster = more impurities, slower = less

• **Maturation:** **Determines the finished style**
  – Joven Abocado
  – Silver/white/blanco
  – Reposado
  – Anejo
  – Extra-Anejo

These three categories are applicable to Mezcal, Sotol, Bacanora— not Extra Anejo
Tequila Defined

Location: To be called tequila, tequila must come from one of the five entitled states of production - Jalisco, Nayarit, Guanajuata, Michoacan, Tamaulipas

Production Criteria:

- Min 51% Blue Agave
- Labelled 100% = 100% Azul (otherwise – who knows?)
- Twice Distilled – Nom doesn’t specify still criteria
  - There are variations in ratios, but an acceptable volume ratio is an initial volume of 30,000 L reduces to 10,000 L of ordinario, reduced to approximately 2,500 L of tequila: thus, <1/10 of original volume at the end of the process!
- Min Alc: 35% abv
- NOM- Normas Official Mexicana – All Tequillaros have a NOM #
- CRT- Consejo Regulator de Tequila – Regulatory body that monitors production. The CRT establishes the Normas, or recognized criteria that define tequila.
- DOT- Denominacion de Origin de Tequila
- Post 2006, bulk shipments are allowed to US (joven, gold, mixto)
Other Spirits Production vs Tequila

- Agave: Many
- Harvest: Longer
- Preparation/cooking: Underground-longer
- Begasso: High ratio
- Fermentation: Longer
- Distillation: Min X2 & Longer
- Aging: Not so much

- Agave: Azul
- Harvest: Shorter
- Preparation/cooking: Oven/autoclave/now “diffusers”
- Begasso: None/optional
- Fermentation: Shorter
- Distillation: Now min1
- Aging: More employed
1 of 31 states, located in NW Mexico. Approximately 70,000 sq. miles sharing 350 miles of border with New Mexico and Arizona. Sierra Madre Occidental and Baja Peninsula define land

**West** – The coast to the Gulf of California

**Middle** – Dominated by plains and rolling hills

**East** – Mountains dominate in the east

4 recognized “regions”
Sonora River, High Sierra, Sierra Baja, Central and Southern Region
Bacanora

- Order: Asparagales
- Family: Asparagaceae
- Sub – Family: Agavoideae
- Genus: Agave
- Species: Agave Angustifolia/Espadín

Named after a small town, Bacanora, in Sonora.

Bacanora received a domestic DO on November 6th in 2000, the Bacanora NOM regulating production was passed on October 28th in 2005. In 2006, the Consejo Sonorense Promoter de la Regulation del Bacanora was formed.

Nom states Bacanora must be made from Agave Augustifolia (espadin), but wild silvestre are employed as well as Agave Pacifica aka Yaquiana

- Sourced from within the 35 municipalities making up Sonora and be distilled to no less than 38% and no more than 55%
Bacanora Production

Rancho Tepua

25,000 scattered with wild plantings of *Sylvestre* aka *Angustifolia Haw*

Vinatero: Robert Contreras, maker of *Ciejo Rojo*

Underground joven is 1.5 to 2.5 meters – brick lined, covered with metal lid, then earth and cooked for 1.5 days

Roasted agaves are broken up with axes, shredded then put into 200 l tubs

Spring water is added to surface level of bagasso.

2x distilled in 700 l still then diluted with purified water.

Tepache

La Perlas
Largest state in Mexico, very mountainous, greatest concentration of forests in Mexico and home to Copper Canyon (larger and deeper than the Grand Canyon)
Sotol

- Order: Asparagales
- Family: Asparagaceae
- Sub-Family: Nolinasceae
- Genus: Dasylirion
- Species: Dasylirion wheeleri

AKA – Desert Spoon, Dasylirion is a stem succulent related to the yucca, that has been utilized by the Apache, Tarahumara and the Paquime Indians for millennia.

NO AGAVE – means it’s not technically a mezcal

The NOM for sotol received its DO on April 15th in 2004 – NOM 159-SCFI-2004), regulated by Consejo Mexicano de Sotol.

Primarily produced in Chihuahua, can be produced in Coahuila & Durango

Yield for Dasylirion is lower than agave. You get a bottle per plant (20% of tequila and some mezcal)
SOTOL Production

**Ocho Cientos**

Largely the same process as with Bacanora, including the presence of a *pina* despite the different genus.

*Pinas* are cooked for 3 days underground, then fermented for 6-8 days.

1\(^{st}\) distillation in a 350 Copper still. 2\(^{nd}\) in 200 l still.
AGAVE

Family – *Asparagaceae, Cactaceae* (cactus)

Hundreds of species, though few are produced industrially; most are not employed in spirit production or are harvested wildly.

Monocarpic plants (semelparous organisms) reproducing iteroparitously either naturally or cultivated

No glucose or fructose, instead a complex carbohydrate compound known as *inulin* that must be hydrolized (saccharification) into fermentable sugars suited to a base alcohol suited (*tepache*) to distillation.
INULIN

By itself, inulin a sweet polymer within the sap of an agave plant that can be extracted for production of “pulque”, which is different than “tepache”

Pulque – Sap is extracted from a cavity of the plant, fermented to low alcohol proof, but not distilled.

Some other things out there with levels of Inulin

- Wheat 1-6%
- Garlic 9-11%
- Onion 2-6%
- Banana .3-.7%
- Asparagus 2-3%
- Leek 3-10%
- Artichoke 16-20%

*some 36,000 other vegetables and plants

Inulin found in the primary “agave distillates” of Mexico has a slightly different composition than that destined for pulque production
Taxonomy/Smaxonomy

• Order: Asparagales
• Family: Asparagaceae
• Sub – Family: Agavoideae
• Genus: Agave
• Species: Agave Angustifolia/Espadín

SOME MAJOR PLAYERS

<table>
<thead>
<tr>
<th>Species</th>
<th>Sub-Species</th>
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<tbody>
<tr>
<td>Tequilana</td>
<td>Azul</td>
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<tr>
<td>Angustifolia</td>
<td>Espadin</td>
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<tr>
<td>Potatorum</td>
<td>Tobala</td>
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<tr>
<td>American Oaxacensis</td>
<td>Arroquena</td>
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<tr>
<td>American Oaxacensis</td>
<td>Coyote</td>
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<tr>
<td>Rhodacantha</td>
<td>Mexican</td>
</tr>
</tbody>
</table>

Other Things to Consider

1. Mis-information
2. Cross planting
3. Cross breeding
4. Simply put, NO IDEA
5. Regional Names

12 “primary” dialects of Oaxaca

Zapotec, Chinantec, Mixe, Chatino, Trique, Cuicatec, Huave, Nahua, Zoque, Amuzgo, Chocho, Ixcatec
# Excessive Tables

<table>
<thead>
<tr>
<th>Agave Species</th>
<th>Sub-Species/Sub-Varieties</th>
<th>Brands</th>
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<tbody>
<tr>
<td>Agave Americana</td>
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<td>var. oaxacensis</td>
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<td>1. Siete Misterios, Vago</td>
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<td></td>
<td>2. Arroqueno</td>
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<td>3. Sierra Negra</td>
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<td>4. Blanco</td>
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<td></td>
<td>1. Americana – Mezcal, Serrano</td>
<td>1. Del Maguey, Vago</td>
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<td>Agave Potatorum</td>
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<td>7. Largo</td>
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<td>11. Mexicano o san martin</td>
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<td>Agave Rhodacantha</td>
<td>Mexicana Amarillo, Amarillo Grande, Penuda</td>
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<td>Mexicanito de campo, Mexicano de campo</td>
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<td></td>
<td>Mexicano</td>
<td>El Jolgorio</td>
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<td>Agave Cupreata Papalome, Papalote</td>
<td>Cupreata, Ancho, Maguey de Mezcal, Bravo</td>
<td>Mezcales de Leyenda</td>
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<td>Agave Angustifolia</td>
<td>Espadin</td>
<td>Many</td>
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<td>Pacifica (wild espadin), Rubescens</td>
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<td>Agave Salmiana Crassispina</td>
<td>Salmiana, Verde, Manso, Cinarron</td>
<td>El Tinieblo</td>
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<td>Horse Caballo</td>
<td>El Koch</td>
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<td>Agave Maximiliana</td>
<td>Lechuguilla, Manso, Tecolote, Pata de Mula</td>
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<td>Raicillia, El Real</td>
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<td>Agave Durangensis</td>
<td>cenizo</td>
<td>Mezcal El Mas pais</td>
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<td>Agave Tequilana</td>
<td>Blue agave</td>
<td>All tequila and many mezcals</td>
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<td>Agave Marmaorata</td>
<td>Tepeztate</td>
<td>El Jolgorio, Del Maguey</td>
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<td>Agave de Lumbre</td>
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<td>El Koch</td>
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<td>Agave Pasmo</td>
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<td>Agave Pasmo y Cuelo</td>
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More Still......

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<td>Bruto o Ceniza</td>
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<td>Agave Weberi Cela</td>
<td>Maguey de Cerro</td>
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<td>Agave Iophanta</td>
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<td>Agave Funkiana</td>
<td>Henequen, istle de juamave</td>
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<td>Agave Hookeri</td>
<td>Ixquitecatl, Mezcal Bravo</td>
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<td>Agave Kerchovei</td>
<td>Pasmo, Janali, Acalla, Escobeta</td>
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<td>Agave Palmeri</td>
<td>Mano Largo, Chino bermejo, Lechuuguilla</td>
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<td>Agave Scabra</td>
<td>Bruto, de Carro, Serrano</td>
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<td>Agave Seemanniana</td>
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<td>Agave Shreve</td>
<td>Mahi Totasa, Bacanora, ceniza</td>
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Lastly……

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<td>Agave Pelona</td>
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<td>Agave Pulquero</td>
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Maturation Periods:

<table>
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<tr>
<th>Type</th>
<th>Period</th>
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<tr>
<td>Espadín</td>
<td>7 - 9 years</td>
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<tr>
<td>Mexicano</td>
<td>7 - 9 years</td>
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<tr>
<td>Aroqueño</td>
<td>9 - 13 years</td>
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<td>Coyote</td>
<td>5 - 8 years</td>
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<td>Sierra Negra</td>
<td>15 - 20 Years</td>
</tr>
<tr>
<td>Tobalá</td>
<td>8 - 15 Years</td>
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</table>
Denominations Of Origin - Mezcal

- Regulation began in 1994 under 07-SCFI-1994
- Nom in Place: International DO in 1995, but took 10 years for official regulation & certification 2005
- Comercon’s inception 1997 – “Mexican Council for Quality Regulation of Mezcal” – Norma became official in 2003 and Comercon began certifying producers in 2005
- Comercon official has to be driven to the palenque for sample extraction and tanks are sealed.
- Tests are conducted for alcohol levels, acid TA and organic compounds
- Min Alc: 36 – 55%
- Twice distilled: SI
- **Typo I**: 100% agave & **Typo II**: 80% agave

### Denominations Of Origin - Mezcal

<table>
<thead>
<tr>
<th>Compound</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Alcohols Superior (fusel oils)</td>
<td>100</td>
<td>400</td>
<td>mg/100 ml</td>
</tr>
<tr>
<td>Acids</td>
<td>-</td>
<td>170</td>
<td>mg/100 ml</td>
</tr>
<tr>
<td>Methanol</td>
<td>30</td>
<td>300</td>
<td>mg/100 ml</td>
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</table>
States that can make Mezcal

1. Oaxaca
2. Guerrero
3. Guanajuato
4. San Luis Potosi
5. Zacatecas
6. Durango
7. Tamaulipas
8. Michoacán

Six Counties in Oaxaca:
Sola de Vega, Miahuatlán, Yautepec, Ocotlan, Tlacolula, Ejutla
## Brief Chemical Analysis of Mezcal

- Various Compounds: Ethanol, higher alcohols (Methanol and others), other “primary” volatile compounds like Esters, Aldehydes, Ketones, Carbonyls, Acids, Furans, Terpenes
- Ethanol – 2 carbon
- Higher alcohols – 2+ carbon alcohols
  - 1-propanol, 2-methyl-1-propanol (isobutanol), 1-butanol (amyl alcohol), 3-methyl-1-butanol (isoamyl-alcohol)
- Methanol – simplest alcohol – single carbon
- Esters – 18 identified – primarily ethyl acetate, ethyl hexanoate, ethyl octanoate, 2-phenethyl
- Carbonyls – Intermediaries when aldehydes are produced by yeast activity (acetaldehyde)
- Terpenes – Large group of organic compounds that exist in different numbers within different agave species. Primary terpenes include: cintronellol (rose oil, geranium), linalool (florality), limonene (orange oil), farnesol (aroma enhancer), α-nerolidol (woody, “bark”)
- Furans – Stable compounds not too similar benzene (noted for a sweet smell)

### Sources of Compounds

<table>
<thead>
<tr>
<th>Agave</th>
<th>Cooking</th>
<th>Fermentation</th>
<th>Distillation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terpenes, Fatty acids, saponins, inulin</td>
<td>saccharification</td>
<td>Alcohols, esters, aldehydes, terpenes, furans</td>
<td>Acetals, acids, alcohols, ketones, aldehydes, esters, phenols, furans, terpenes</td>
</tr>
</tbody>
</table>
Siembra Metl
Don Mateo Mezcal of Michoacan

- Order: Asparagales
- Family: Asparagaceae
- Sub – Family: Agavoideae
- Genus: Agave
- Species: Agave Cupreata

- Produced at the *vinata* of Don Jose Emilio Vieyra Rangel at 7500 elevation between the Rio Balsas basin and the Eje Neo-volcanico de la Sierra Madres de Sur
- The Vieyra family owns 3 ranches (“Predio” or property): El Limon, El Tularcillo and Barranca del Agua
- They also contribute and source from a communal orchard, used for nursery of new baby plants are cultivated
- Ovens are 6.5 feet deep and 20 feet in diameter, holding 12 – 14 tons of agave
Oaxaca – Terroir?

**GEOGRAPHY** – 60,000 sq miles of desert, coniferous woods, rainforests, lagoon, coastal lowlands: Divided into 5 zones – Mesa del Sur, the Sierra, southern border of Veracruz, coastal plain of the pacific, Isthmus of Tehuantepec

“**Minerality**” – Variables to consider: Agave, locality, ambient yeast, water source, fermentation, distillation methods and “colas” ratio.
Aquillino’s & Uncle Rey
MEZCAL VAGO

Aquilino Garcia López

• Producer: Aquilino García López.
• Location: Candelaria Yegolé, Oaxaca.
• Mezcals: Espadín, Elote, Cuixe, Mexicano.
Aquillino’s joven
Roasting the Agave

- Quixe
- Espadin
- Dried Bagasso
Tohona
Tepache in Tina
Distillation

PERLAS
Mexicano

- Agaves: Mexicano
- Village: Candelaria Yegole
- Grind: Stone
- Type of Still: Copper
- Distillations: Two
- Batch: 450 liters
- Fermentation Date: 
- Age: Joven
Pechuga

The Pechuga production season is limited to year end due to the special ingredients: Wild mountain apples and plums that must be in season and cannot be substituted. This mezcal is the most rare we have ever encountered.

Pechuga is begun with Minero mezcal that has already been double distilled. In preparation for a third distillation they place about 75 liters of mezcal in the still and add about 25 lbs of wild mountain apples and plums, big red plantain bananas, pineapples, a handful of almonds and a few pounds of uncooked white rice.

Next, a whole chicken breast (pechuga), skin removed, bone structure complete, is washed in running water for about three hours to remove any grease. This is then suspended by strings in the atmosphere of the still and a 24 hour, third distillation is begun. The vapor passes over the pechuga and condenses into a crystal clear liquid that has an amazing taste and smoothness.

The reason for the breast they say, is so the mezcal is not dominated by the fruit...a balance. Upon completion the pechuga is removed from the still and hung in the family Altar room...the most important space in the house.
Tobala
The Wild Mountain Maguey

This maguey is found growing naturally only in the highest altitude canyons, growing in the shade of oak trees like truffles.

Tobalá's form is different than the maguey Espadin (Sword) or maguey Azul (Blue). It is smaller and broader leafed. It takes about eight Tobala piñas (hearts) to equal one piña from either of the more commonly propagated and cultivated Magueys.

Our Tobala has a sweet, fruity nose, with a mango and cinnamon taste and long, extra smooth finish. The pueblo elevation is around 8,200 feet, with a mountainous, tropical microclimate. We keep our production limited, to not mess with nature and to continue with the traditional way... being very careful to never overharvest and allow mother nature to do her job.

Village - Teotilan del Valle
Solomon Rey Rodriguez

- Producer: Salomón Rey Rodriguez
- Location: Sola de Vega, Oaxaca
- Mezcals: Tobalá en Barro, Ensamble en Barro, Arroqueño

NO TAHONA – Mallets are used to smash the cooked pinas for 12 hour periods. “Uncle Ray” has arthritis, so his wife and children have to use the hammers……They weigh about 20 lbs.
Tobala In Nursery
Uncle Rey has 3 tina and ........a canoe
Distillation

Mezcal de Olla
MEZCAL VAGO

Coyote en Barro

- Agaves: Coyote
- Mezcalero: Salomon Rey Rodriguez
- Village: Sola de Vega
- Grind: Mallets
- Type of Still: Olla de Barro
- Distillations: Twice
- Batch:
- Fermentation Date:
- Age: Joven
CLOSING

• Pulque is America’s oldest beverage
• Mezcal is arguably America’s oldest distillate
• Agaves: A lot and we’re still figuring it out
• Brands: Probably 6 dozen out of 4,000 mezcaleros (compared to a 1,000 plus tequila)

• 2009 Exports  414,608 Liters or 46,067 9L cases
• 2010 Exports  610,685 Liters or 67,853 9L cases
• 2011 Exports  647,989 Liters or 71,998 9L cases

– Mezcal bottled with the worm was down 18% in 2011.

USA is the #1 export market with a growth rate of 30%