

Coffee and Truffles from the Moon

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ARCHON 45

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Overview

- Panelists and what they do :0)
- Topic Intro:
 - Why high value crops end up in our luggage
 - Why the moon makes it possible for truffles and coffee
- Panelists likely have other ideas too!

High Value crops from interesting locations

- Crops that are small in mass or volume, but high in value are critical economic items to both tourist areas, and from production locations
- Rarity and Uniqueness drive price, sometimes utility.
- Tourists want to taste the local produce, and bring something home
- Crop Examples:
 - Truffles from France, Balkans, Italy
 - Saffron and similar spices
 - Aromatic compounds (frankincense, etc.)
 - Gourmet salts
 - Scotch from Scotland, Whisky from small distilleries
 - Wines based on region, age, type, and reputation
 - Olive oil from various Mediterranean spots
 - Ginseng
 - Coffees! Jamaica Blue Mountain, Ethiopian highlands, etc...
 - Cacao (chocolate) products
 - Some 'other' products....

Ideal for Space:

- Low mass input
- Uses local resources
- Customizes due to local conditions= rarity

Lunar Conditions that favor high value crops

- Regolith: Sterile, high in minerals
- Can control environment inside habitats/farms
- Water in ices and extractable from regolith
- Plentiful Solar Energy, and a good spot to use nuclear as well
- Low gravity:
 - Minimizes shipping out...once past Liberation Point, rolls downhill to Earth
 - Allows plants to grow without committing energy to support
- Locations: Lava tubes!
- Likely tourist hot spot: Close to Earth, interesting scenery, and 'guess where I went, and you didn't' spot.

Cultivating Truffles

- Truffles are yummy and expensive: \$10-\$300 per gram, depending on species, time, size, and locale
- Truffles are a sub-soil fungus that grows only in the right locations and with the right roots and plants (*Tuber* sp.)
 - Associated long lived trees (roots especially): Oak, Hazelnut, Pecan, Cherry, and others
 - Need the right soil biome too: right bacteria, bugs, worms, decaying matter, and minerals
- How do we get around growth environment on the moon?
 - Import 'chopped' trees: root systems on graft branches
 - Import cultures of specific bacteria
 - Import 'mother soil'
 - Combine treated regolith to expand culture, using pots and root beds. Regolith needs to be weathered first and checked for toxins....
 - Use combination of artificial light and piped in natural light.
 - Precise growth chamber control, clean room to prevent diseases.

First crop can take 5 years or more, but might be shortened with genetics and conditions



Coffee growth

- Coffee bushes take 3-4 years, get to 3 meters on Earth, likely larger on Moon
- Growth time can be shortened using grafting methods
- Precise control in the growth chamber can result in better products
- Unique soils developed from regolith will result in unique flavors, especially since the best coffees come from volcanic soils....
 - Bacterial biome will evolve as time progresses...
- Drying will be easier given strong sunlight and access to vacuum.

Net-Net

- High Value Crops, low mass
- Specialized to Lunar Enclosed Environment: incorporates lunar stuff (i.e. stuff from regolith, interesting-ness of $1/6^{\text{th}}$ g)
- Grow some local produce for eating there
- Value added products too: Wines, Beers, Liquors, Spices, etc.

SO, WHAT SOUVENIRS WILL YOU BRING BACK FROM THAT LUNAR CRUISE?

