Challenges and opportunities for growing table grapes in subtropical/tropical regions

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Summary

1. Tropical and subtropical Viticulture around the world
2. Tropical viticulture on dry climates
3. Environment characterization
4. Viticulture characterization
5. Technical challenges
6. Overcoming the challenges
7. Final Considerations
1. Tropical and subtropical Viticulture around the world

Five types of viticulture according the Multicriteria Climatic Classification (Tonnieto and Carbonneau, 2004):

✓ Tropical dry: two seasons rather similar and dry enough, without any winter, ie: Petrolina, Brazil.

✓ Tropical wet: two seasons rather similar but wet enough without any winter, ie: India, Thailand.

✓ Tropical alternatively dry/wet: two seasons, one dry and one wet, with a mild winter: ie: Colombia, Equator.

✓ Subtropical alternatively dry/wet: two seasons, one dry and one wet, with a temperate winter, ie: South Brazil, Uruguay.

✓ Subtropical wet: two seasons, wet anytime, with a mild winter, ie: China, Japan.
2. Tropical Viticulture on Dry Climates

- Petrolina, Brazil: 9° 23′S and 40° 30′ W, 380m
- Piura, Peru: 05°12′S and 80°38′W
- Zulia, Venezuela: 10°57′N and 71°44′W
2.1. Tropical Dry Viticulture in Brazil

- Area = 982,563.3 km²
- 10 states and 1,133 municipalities
- 11.8% Brazilian population
3. The Environment in Northeastern region of Brazil

3.1. Natural vegetation: ‘Caatinga’
3.2. The Climate

- **Annual Average Temperature:** 26.7°C
- **Annual Average Maximum Temperature:** 32°C
- **Annual Average Minimum Temperature:** 20.8°C
- **Annual Average Relative Humidity:** 60.7%
- **Annual Average Rainfall:** 505mm
3.3. The Soils

Sandy soils of low fertility, shallow and may have compacted layers and high salt content. More than 15 types of soils can be founded.
4. Viticulture Characterization

4.1. Evolution of grape Production area and exportation

✓ Production in 2013: 284,887 tons
✓ Harvested Area in 2013: 9084 ha
✓ Volume exported in 2013: 43,085 tons

Source: SECEX, BRASIL, 2014
4. Viticulture Characterization

4.2. Phenology

- **Bud swelling (Bsw): Pruning**
- **Sprouting (Spr)**
- **Bloom (Bl)**
- **Fruit set (FS)**
- **Veraison (Ver)**
- **Ripening: Harvest (HA)**

**Source:** Leão et al. (2013)
4. Viticulture Characterization

4.3. Bud Fertility and fruitfulness

The most table grape cultivars shows low bud fertility on basal buds of the cane.

Average bud fertility in cane for Thompson Seedless = 13.5%

Average bud fertility in cane for Sugraone = 12.0%

Source: Leão et al., 2002
The buds do not come into physiological dormancy;
- They are apt to burst at any time of the year that pruning is performed;
- The grower can decide what is the most convenient time of the year for pruning and harvesting grapes.
Vines are pruned twice per year in lateral long canes (8-12 buds) and spurs on base. 

*Seedless grape cultivars should be pruned in lateral shoots*
4. Viticulture Characterization

Canopy Management

SUMMER PRUNING

Topping, tipping, defoliation, shoot, inflorescences and clusters thinning.
4. Viticulture Characterization

**Bunch Management**

Inflorescence tipping, bunch and berry thinning and PGRs application to increase bunch and berry size

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**IMPROVING BUNCH QUALITY**
5. Technical Challenges

5.1. Breaking dormancy and reducing apical dominance

- Hydrogen Cyanamide (2.45 to 2.94%) or 5 to 6% of the commercial product
- Demand for researching of new methods and alternative products

Means followed by the same letter do not differ by Duncan test (p < 0.05)

Source: Leão et al., 2010
5. Technical Challenges

5.2. Controlling of vigour and vegetative growth

- Using rootstocks suitable for each cultivar
- Reducing the amount of water supply before and after harvest
- Providing balanced amounts of fertilizers, especially nitrogen
- Doing summer pruning: topping, shoot thinning, defoliation, etc
- Supplying the carbohydrates reserves to the vines during a rest period
5. Technical Challenges

5.3. *Rational water and nutrients management*

- Choosing drip irrigation systems
- Using efficient irrigation management
- Applying the amount of water and nutrients required for each phenological phase of the vine
5. Technical Challenges

5.4. Phytosanitary control

✓ Diseases: Fungus (downy mildew, powdery mildew, Lasiodiplodia theobromae), Bacteria (Xanthomonas campestris pv. viticola), nematodes, Virus

✓ Pests: mites, thrips, mealybugs, fruit fly, Cryptoblabes gnidiella, etc
5. Technical Challenges

5.5. Controlling of ripening and ideal time to harvest

Source: Lima et al. (2000).

\[ Y = 12.308 - 0.578X + 0.0123X^2 - 0.0000622X^3 \]

\[ R^2 = 99.75\% \]

Days after fruit set

Source: Lima et al. (2000).
6. Overcoming the challenges

New Table Grape Cultivars

- High fertility in the basal buds;
- High and stable yield for two crops/year;
- Grower friendly: Loose bunches;
- Large natural berry size;
- Small or no seed trace;
- Crunchy berry texture;
- Excellent colour without use of Ethephon or ABA;
- Adapted to wet conditions (crack resistant);
- Good taste/flavour;
- Tolerance/resistance to diseases;
- Good storage ability
6. Overcoming the challenges

New Table Grape Cultivars

Embrapa Grape Breeding Program:
✓ Since 1977
✓ “The objective has been develop cultivars adapted to the Brazilian soil and climate condition, producing quality grapes for different purposes and that are resistant and tolerant to the main vineyard diseases”

Introducing Foreign Patented Cultivars:
Grapegrowers have established commercial partnerships with private foreign breeding companies
6. Overcoming the challenges

New Table Grape EMBRAPA Cultivars

**BRS Isis**
- Adapted to tropical/subtropical climate
- **Yield:** 25 t/ha/harvest season
- **Bud fertility:** 2.0 - 3.0 bunch/shoot
- Medium cylindrical **bunch:** 375g
- **Large berry:** 18.5mm X 28.5mm
- Trace seeds
- Neutral taste
- SS: 16 to 21°Crix
- Tolerant to *Plasmopora viticola*

**BRS Vitoria**
- Adapted to tropical/subtropical climate
- **Yield:** 25 tons/ha/harvest season
- **Bud fertility:** 2.0 bunch/shoot
- Medium cylindrical shape bunch: 290g
- **Small berry:** 17mm X 19mm
- Trace seeds
- Foxy taste
- SS: 19 to 23°Crix
- Tolerant to *Plasmopora viticola*

**BRS Nubia**
- Adapted to tropical/subtropical climate
- **Yield:** 25 t/ha/harvest season
- **Bud fertility:** 1.0 to 1.5 bunch/shoot
- Large and conical bunch: 450 g
- **Large berry:** 24mm X 34 mm
- With seeds
- SS: 16°Crix to 20°Crix
6. Overcoming the challenges

Foreign Patented Cultivars: some examples

ARRA 15®

Magenta®

Midnight Beauty®

Sweet Globe®
6. Overcoming the Challenges

**Viticulture Sustainability**

- Reducing Production costs
- Improving Fruit Quality
- Increasing Yield

- New cultivars
- Precision viticulture
- New products and technics
- Minimum canopy management
Tropical viticulture has advantages and disadvantages compared to more traditional subtropical and temperate viticultures in the world. The challenges are a consequence of differences in physiology and general metabolism of the vine in tropical condition.

Good business management coupled with scientific knowledge and research are the keys to overcoming the challenges.
Thank You!

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