Effect of Genotype on Micropropagation of *Jatropha curcas* L.

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Objective: Compare ten genotypes of *Jatropha curcas* for their ability to regenerate *in vitro*.
History and background

Jatropha *curcas* is a drought resistant, perennial plant confined to tropical and subtropical regions of the world. Today, *J. curcas* is a widely grown as a biofuel crop.

- Physic nut
- Seed contains about 30-40% of oil by seed weight
- Yields 400 gal / ha
- Pre-bearing period 2-3 years
- Life expectancy 40 years

• The genus name Jatropha derives from the Greek *jatros* (doctor), *trophe* (food)
Explants were selected from 10.0 J. *curcas* plants grown in the greenhouse.
Decontamination and Media

**Surface Sterilization**

1. **Wash** (Tween20) 10’
2. **Transfer to Laminar Flow Hood**
3. **10% bleach** (5’)
4. **Sterile water** (3x)
5. **0.1% Mercuric Chloride** (5’)
6. **Sterile water** (5-6x)

**Media**

- **CI**: MS (Murashige and Skoog, 1962) medium, 1.5 mg/L BAP, 0.05 mg/L IBA, 30 g/L Sucrose, 5.8 pH, 7.0 g/L agar
- **JSI**: MS (Murashige and Skoog, 1962), 3.0 mg/L BAP, 0.1 mg/L IBA, 30 g/L Sucrose, 5.8 pH, 7.0 g/L agar
- **JSM**: MS (Murashige and Skoog, 1962), 2.0 mg/L BAP, 0.5 mg/L Kn, 30 g/L Sucrose, 5.8 pH, 7.0 g/L agar
Inoculation

Callus Induction

Axillary Bud Culture
DAY 0

Callus induction: Dark at 25C
Shoot Induction: Light, 12 h photoperiod, at 25C
Shoot Cultures

JSM: MS (Murashige and Skoog, 1962), 2.0 mg/L BAP, 0.5 mg/L Kn, 30 g/L Sucrose, 5.8 pH, 7.0 g/L agar
Callus Development

Wk 1 ➔ Wk 2 ➔ Wk 3 ➔ Wk 4 ➔ Wk 5 ➔ Wk 6
RESULTS

Callus Induction by Week 6

Percentage of Callus Formation

Genotypes of J. curcas

- JAT1: 27.42%
- JAT2: 17.65%
- JAT3: 41.67%
- JAT4: 25%
- JAT5: 75.56%
- JAT6: 75%
- JAT7: 68.42%
- JAT8: 38.33%
- JAT9: 40%
Shoot Induction

Response by Week 2

<table>
<thead>
<tr>
<th>Genotypes of J. curcas</th>
<th>Rate of Response</th>
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<tbody>
<tr>
<td>JAT1</td>
<td>100</td>
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<td>JAT2</td>
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<td>JAT12</td>
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<tr>
<td>JAT14</td>
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</tbody>
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Shoot Proliferation

Rate of Shoot Formation

Genotype

- JAT14: 2.33
- JAT12: 2.2
- JAT11: 3
- JAT9: 2.8
- JAT7: 1.63
- JAT5: 1.83
- JAT4: 1.83
- JAT3: 1.83
- JAT2: 1.83
- JAT1: 1.83

Avg. Number of Shoots per Explant
Major Challenge: CONTAMINATION

Comparative Rates of Contamination

% of Contamination

Shoot Explants
Leaf Explants

Genotypes

JAT1  JAT2  JAT3  JAT4  JAT5  JAT7  JAT9  JAT11  JAT12  JAT14

18.18  50  25  68.75  81.25  6.25  100  0  12.5  68.75
Summary

- Smaller ( < 1.0 cm) leaf explants were more efficient in callus formation than larger ( >1.0 cm) explants.
- Callus developed at a faster rate in adaxial position.
- Midrib produced callus faster compared to lamina.
- Contamination rate varied between genotypes.
- Genotypes differed in their response to callus induction (time & rate).
- No difference between the genotypes was observed for shoot induction.
- Shoot proliferation rate varied between genotypes.
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