# Callus cultures of *Cucumis melo* L.


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## Introduction

**Species Overview:**

- *Cucumis melo*, commonly referred to as melon, is an economically significant fruit crop in various global regions,
- originally from Africa and the Middle East, now extensively cultivated worldwide.

**Applications & Significance:**

- nutritional value: *Cucumis melo* L. is globally recognized for its health benefits,
- by-product utilization: peels, seeds, and other by-products are used in producing extracts, flours, and oils, all rich in valuable phytochemicals,
- health benefits: by-products exhibit properties such as analgesic, anti-inflammatory, antioxidant, anticancer, antimicrobial, diuretic, hepatoprotective, and immunomodulatory due to bioactive compounds,
- environmental impact: utilizing these by-products helps minimize environmental waste, promoting sustainability.

**Our Study's Focus:**

- induce and characterize growth parameters of callus cell biomass derived from different tissues,
- io determine the optimal combination of growth regulators that maximizes callus formation..

## Methods

**STEP 1: Sterilization and germination of seeds in in vitro culture**

Selection of suitable sterilization conditions for introducing seeds into in vitro environments, serving as a source of explants

**STEP 2: CALLUS INDUCTION**

Initiation, cultivation and maintenance of cell cultures on solid culture media

- application of different concentrations and combinations of plant growth regulators

**STEP 3: CALLUS CULTURE**

Characterization of cell cultures on solid culture media

- **1st phase:** prescreening
  - visual evaluation
    - colour and structure of the callus
  - percentage of callus formation
  - different ratio of hormones
  - **goal:** to determine the most suitable ratio and combinations of plant growth regulators

## Results

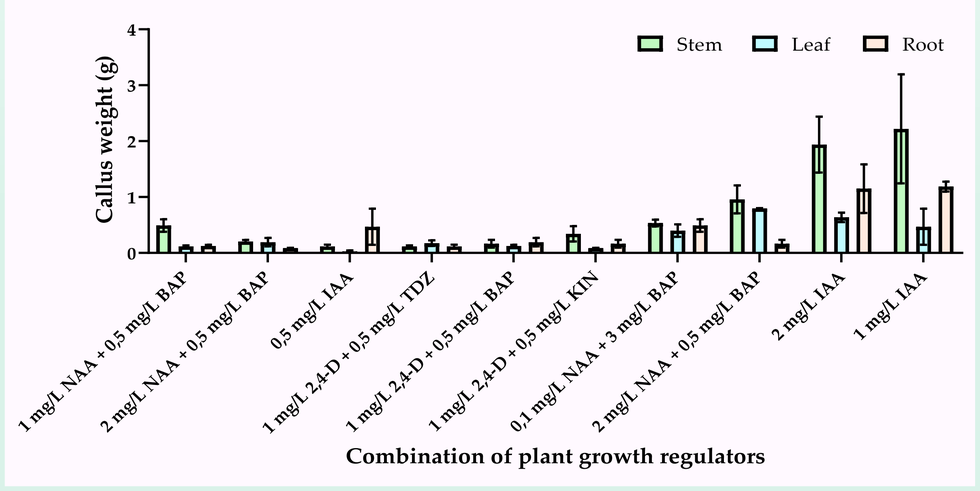


**Figure 1:** Induction of callus after 4 weeks of cultivation on media with different combinations of plant growth regulators. Data are presented as means ± SDs (n = 5).

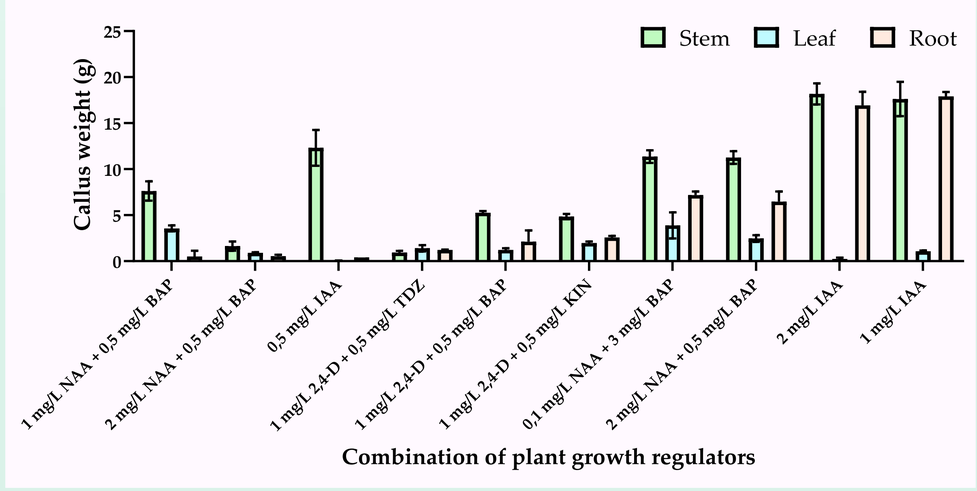


**Figure 2:** Production of callus cell biomass after 8 weeks of cultivation on media with different combinations of plant growth regulators. Data are presented as means ± SDs (n = 5).

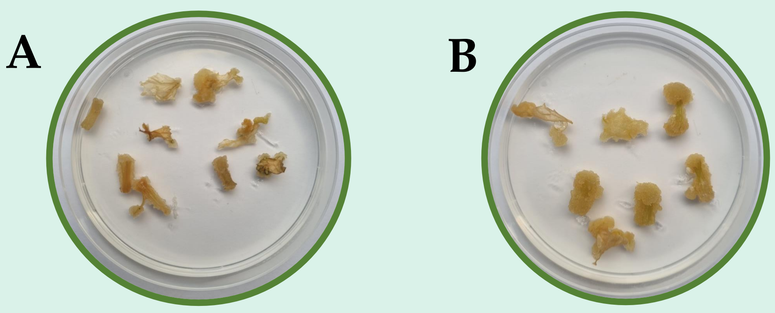


**Figure 3:** Appearance and biomass structure of Cucumis melo callus cells grown on MS medium supplemented with 0.1 mg/L NAA + 3.0 mg/L BAP, after 4 weeks of induction from leaf and root explants (A) and stem explants (B).

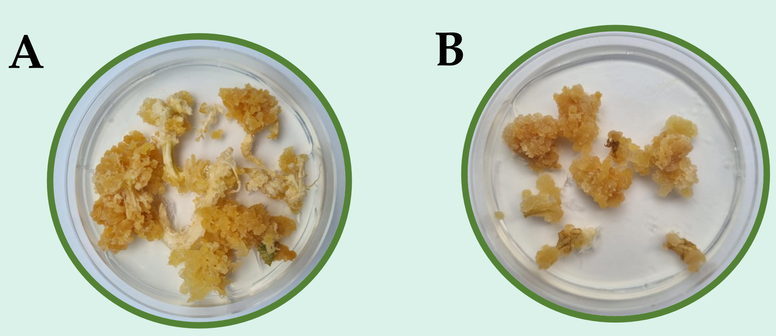


**Figure 4:** Appearance and biomass structure of Cucumis melo callus cells grown on MS medium supplemented with 0.1 mg/L NAA + 3.0 mg/L BAP, after 8 weeks of induction from stem and root explants (A) and leaf explants (B).

## Discussion

The plant species, type of explant, and composition of the cultivation medium, especially the content of growth regulators, are well-known crucial factors affecting the initiation of callus development and growth in vitro [1].

Optimal combinations of growth regulators were identified for each type of explant. For root-derived callus, 0.1 mg/L NAA and 3.0 mg/L BAP proved most effective, highlighting the importance of tailored PGRs balances (Figure 1 and 2). For leaf and stem explants, combinations of 0.1 mg/L NAA with 3.0 mg/L BAP and 1.0 mg/L NAA with 0.5 mg/L BAP also promoted robust callus formation without necrosis (Figure 1 and 2). These combinations successfully induced robust callus formation without signs of necrosis, crucial for the long-term maintenance of callus tissue.

Callus coloration varied from white to multicolored, including yellow, orange, and brown (Figure 3 and 4). Textures ranged from firm and compact to friable and watery, indicating significant heterogeneity (Figure 3 and 4).

## Conclusion

The study provides insight into the optimal conditions for cultivating *C. melo* L. callus, supporting its use in micropropagation and molecular studies. Future research will focus on the long-term monitoring of these cultures, the introduction of viroids into in vitro conditions, and the molecular analysis of viroids in callus cultures.

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## References


1. Ikeuchi M, Sugimoto K, Iwase A. Plant callus: mechanisms of induction and repression. Plant Cell. 2013 Sep;25(9):3159-73. doi: 10.1105/tpc.113.116053.