Title

Autopolyploidization and in vitro regeneration of three highbush blueberry (Vaccinium corymbosum L.) cultivars from leaves and microstems

Abstract

Abstract: Blueberries are a fruit with an increasing global demand due to their phytochemical and bioactive compounds content. They are promoted worldwide because of their health benefits. For optimal growth and productivity, blueberry crops need acidic soil pH, specific chilling hours, and an adequate atmospheric temperature. This delicate production equilibrium is under severe threat from climate change, potentially leading to reduced yields and increased cultivation costs unless new cultivars are developed for each edafoclimatic zone. Therefore, considering varietal replacements with more productive cultivars offering higher quality and better adaptability to local conditions is imperative. In this study, we employ polyploidization and in vitro tissue culture to promote variability and lay the foundation for new cultivar development. We report the successful induction of octoploids in three blueberry cultivars, namely ‘Biloxi’, ‘Legacy’, and ‘Duke’, through whole-genome duplication. Leaves and microstem explants were exposed to 0.1% colchicine for 24 and 48 hours in in vitro culture. After analyzing the polyploid level of 160 regenerated shoots using DNA flow cytometry, we obtained a total of 18 mutants, consisting of 8 mixoploids and 10 octoploids. The number of chloroplasts in the stomata was analyzed by fluorescence microscopy, revealing the duplication of these organelles in the induced octoploid plants. To our knowledge, this represents the first successful induction of octoploids in three blueberry cultivars -‘Biloxi,’ ‘Legacy,’ and ‘Duke’- achieved by exposing leaves and microstem explants to colchicine in in vitro culture. This technique holds promise as a valuable tool for the development of improved blueberry cultivars. Key message: This study presents

the first successful induction of octoploids of three blueberry cultivars ‘Biloxi’, ‘Legacy’, and ‘Duke’ by inducing polyploidization exposing leaves and microstems explants to colchicine in in vitro culture.

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Author(s) ID

59204140100; 57205673767; 26647042900; 6602667391

Year

2024

Source title

Plant Cell, Tissue and Organ Culture

Volume

158.0

Issue

1

Art. No.

18

DOI

10.1007/s11240-024-02810-9

Link

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85197511246&doi=10.1007%2fs11240-024-02810-9&partnerID=40&md5=fd6e6fc141899caa77838dc04a847f43

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Author Keywords

Adventitious shoot regeneration; Colchicine; DNA flow cytometry; Polyploidy breedin; Vaccinium corymbosumL; Whole genome duplication

Index Keywords

Colchicine; Cultivation; Development; Equilibrium; Explants; Fruits; Leaves; Tissue Culture; Climate change; Cultivation; Flow cytometry; Fruits; Plants (botany); Tissue culture; Adventitious shoot regenerations; Blueberry cultivars; Colchicine; DNA flow cytometry; Genome duplication; In-vitro; Polyploidy breedin; Vaccinia corymbosuml; Vitro culture; Whole genome duplication; Fluorescence microscopy

Funding Details

Pontificia Universidad Católica de Chile, UC; Agencia Nacional de Investigación y Desarrollo, ANID; Consejo Nacional de Humanidades, Ciencias y Tecnologías, Conahcyt, (739582); Consejo Nacional de Humanidades, Ciencias y Tecnologías, Conahcyt

Funding Texts

Funding text 1: The authors thank Alex Cabrera and Sergio Bustos for their technical assistance in the flow cytometry service, Pamela Naulin for her supervision in the plant experimentation unit center of the UC Faculty of Biological Science, and Nicole Salgado for her technical support with the confocal microscope in the advanced microscopy facility UMA UC, of the Pontificia Universidad Cat\u00F3lica de Chile.; Funding text 2: GJT was supported by Agencia Nacional de Investigaci\u00F3n y Desarrollo (Chile) 21191617 PhD scholarship and the 2018 Doctoral Scholarship from Vicerrector\u00EDa de Investigaci\u00F3n of Pontificia Universidad Cat\u00F3lica de Chile. VMB was supported by Consejo Nacional de Ciencia y Tecnolog\u00EDa (M\u00E9xico) 739582, and Agencia Nacional de Investigaci\u00F3n y Desarrollo (Chile) 21200394 PhD scholarships.

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Publisher

Springer Science and Business Media B.V.

ISSN

01676857

CODEN

PTCED

Language of Original Document

English

Abbreviated Source Title

Plant Cell Tissue Organ Cult.

Document Type

Article

Publication Stage

Final

Source

Scopus

EID

2-s2.0-85197511246