DOI 10.47176/alkhass.5.4.1

Short Report

SRPH

ALKHAS, 2023; 5(4): 1-2

Testing Two Chromosome Doubling Agents for in vitro Tetraploid Induction on Ginger Lilies, Hedychium gardnerianum Shepard ex Ker Gawl. and Hedychium coronarium J. Koenig

Mohammad Mehdi Habibi [1,*]. Musavvara Kh. Shukurova [1,2]. Kazuo N. Watanabe [3,4]

[1] Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Japan
[2] Institute of Botany, Plant Physiology and Genetics of the National Academy of Sciences of Tajikistan, Dushanbe, Tajikistan
[3] Faculty of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Japan
[4]Tsukuba Plant Innovation Research Center, University of Tsukuba, Tsukuba, Japan

***Corresponding Author:**
mehdihabibi9@gmail.com

Received: 10 September, 2023
Accepted: 15 December, 2023
Published: 25 December, 2023

ABSTRACT

The present study examined the effect of different reagents with various concentrations on polyploidy induction of two ornamental accessions of Hedychium for horticultural purposes with possible different morphological and biological characteristics.

Keywords: Drought stress, *At.TC* gene, Rapeseed, Transgenic plants

Introduction

The genus Hedychium consists of about 80 species, which are identified by attractive foliage as well as various dramatic and fragrant flowers. Some species are cultivated for edible flowers, and others for medicinal or industrial properties [1]. Most species of Hedychium are native to Central and Southeast Asia, with high concentrations in southern China and the Himalayas. Induced polyploidy is a valuable tool for breeding that gives some advantages for horticultural, pharmaceutical and agricultural improvement of plants. The in vitro induction of polyploids with growth regulators such as colchicine or oryzalin has been published in many plant species. Increased ploidy level resulted in increased flower size in Gerbera jamesonii Bolus cv. Sciella [2] and intensified flower colours in cyclamen. Establishing optimum in vitro cultural conditions is indispensable for the efficient in vitro induction of polyploid plants. Chromosome doubling of diploid in ornamental plants is key to increased organ size, prolonged flowering period or increased resistance to abiotic stresses, diseases, and pests [3]. The present study examined the effect of different reagents with various concentrations on polyploidy induction of two ornamental accessions of Hedychium for horticultural purposes with possible different morphological and biological characteristics.

Materials and Methods

On polyploidization of Hedychium coronarium and Hedychium gardnerianum, application of colchicine and oryzalin with altered concentration to the in vitro shoot tips was carried out to induce tetraploid plants. Ex plants from in vitro plantlets were cultured on callus induction

[Downloaded from alkhass.srpub.org on 2026-11-18]

[DOI: 10.47176/alkhass.5.4.1]

Publisher: Scientific Research Publishing House (SRPH), Shirvan, Iran
http://srpub.org
Email: alkhas@srpub.org

medium: Murashige and Skoog (MS) medium supplemented by reagents for six weeks (subculture every two weeks). The obtained adventitious shoots out from calli were transferred to basal MS medium for three months for plantlets development. The ploidy level was examined by flow cytometry [2], chloroplast counting and chromosome counting [3].

Result & Discussion

The survival rate of the explants after colchicine or oryzalin treatments depended on the concentration evaluated. The ploidy was evaluated by flow cytometry, stomatal observation, counting chromosomes and chloroplasts in guard cells. Polyploidization by using explant degeneration with growth regulators can result in chimeric that may be detached by forcing lateral bud sprouting, enhancing histogenetic instability and induction of adventitious bud [1]. In the case of Hedychium coronarium, 15 mM oryzalin showed the highest rate of survival explants after callogenesis and shooting number. The highest percentage of tetraploid regeneration was observed with 1250 μM colchicine treatment for Hedychium gardnerianum over independent treatment of other reagents, while no tetraploid by oryzalin was generated. In H. coronarium, four mixoploids by 15 μM oryzalin were verified, and no-shoot was obtained from colchicine. The results showed that the in vitro chromosome doubling is optimized with the two Hedychium species, which could reference other Zingiberaceae species.

References

1.Eng WH, Ho WS (2019) Polyploidization using colchicine in horticultural plants: *A review*. Sci Hort 246:604–617.
https://doi.org/10.1016/j.scienta.2018.11.010
2. Dhooghe E, van Laere K, Eeckhaut T, Leus L, van Huylenbroeck J (2011) Mitotic chromosome doubling of plant tissues in vitro. *Plant Cell Tiss Org Cult* 104:359–373. https://doi.org/10.1007/s11240-010-9786-5
3. Watanabe J, Orrillo M, Watanabe KN (1999) Evaluation of In Vitro Chromosome- doubled Regenerates with Resistance to Potato Tuber Moth [Phthorimaea opercullella (Zeller)]. *Plant Biotechnol. J* . 16:225–230

ALKHAS

Copyright: © 2023 The Author(s); This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Habibi MM, Shukurova MK, Watanabe KN. Testing Two Chromosome Doubling Agents for in vitro Tetraploid Induction on Ginger Lilies, Hedychium gardnerianum Shepard ex Ker Gawl. and Hedychium coronarium J. Koenig. ALKHAS. 2023; 5(4): 1-2.

https://doi.org/10.47176/alkhass.5.4.1

[Downloaded from alkhass.srpub.org on 2026-11-18]

[DOI: 10.47176/alkhass.5.4.1]