

**SCI-CONF.COM.UA**

**INNOVATIVE DEVELOPMENT  
OF SCIENCE, TECHNOLOGY  
AND EDUCATION**



**PROCEEDINGS OF IV INTERNATIONAL  
SCIENTIFIC AND PRACTICAL CONFERENCE  
JANUARY 18-20, 2024**

**VANCOUVER  
2024**

# **INNOVATIVE DEVELOPMENT OF SCIENCE, TECHNOLOGY AND EDUCATION**

Proceedings of IV International Scientific and Practical Conference  
Vancouver, Canada  
18-20 January 2024

**Vancouver, Canada**

**2024**

## UDC 001.1

The 4<sup>th</sup> International scientific and practical conference “Innovative development of science, technology and education” (January 18-20, 2024) Perfect Publishing, Vancouver, Canada. 2024. 700 p.

## ISBN 978-1-4879-3792-8

The recommended citation for this publication is:

*Ivanov I. Analysis of the phaunistic composition of Ukraine // Innovative development of science, technology and education. Proceedings of the 4th International scientific and practical conference. Perfect Publishing. Vancouver, Canada. 2024. Pp. 21-27. URL: <https://sci-conf.com.ua/iv-mizhnarodna-naukovo-praktichna-konferentsiya-innovative-development-of-science-technology-and-education-18-20-01-2024-vankuver-kanada-arhiv/>.*

### Editor

**Komarytsky M.L.**

*Ph.D. in Economics, Associate Professor*

Collection of scientific articles published is the scientific and practical publication, which contains scientific articles of students, graduate students, Candidates and Doctors of Sciences, research workers and practitioners from Europe, Ukraine and from neighbouring countries and beyond. The articles contain the study, reflecting the processes and changes in the structure of modern science. The collection of scientific articles is for students, postgraduate students, doctoral candidates, teachers, researchers, practitioners and people interested in the trends of modern science development.

**e-mail:** [vancouver@sci-conf.com.ua](mailto:vancouver@sci-conf.com.ua)

**homepage:** <https://sci-conf.com.ua/>

©2024 Scientific Publishing Center “Sci-conf.com.ua” ®

©2024 Perfect Publishing ®

©2024 Authors of the articles

## TABLE OF CONTENTS

### AGRICULTURAL SCIENCES

1. *Hryhoriv Ya., Dmytrash T.* 14  
PROSPECTS OF USING PERENNIAL SIDA AS A RENEWABLE BIOFUEL SOURCE
2. *Liubchenko I. O., Liubchenko A. I.* 18  
ANALYSIS OF GENOMIC CHANGES IN CALLUS TISSUE OF CAMELINA SATIVA AND OBTAINED PLANT STRUCTURES
3. *Nahorni S., Chalyi O., Chalaya O., Sklyarenko O.* 22  
RESISTANCE OF YOUNG SOWS DURING LACTATION
4. *Sokolovska I. M.* 27  
TRIALS OF POTATO VARIETIES OF DIFFERENT MATURITY GROUPS IN THE CONDITIONS OF THE NORTHERN STEPPE OF UKRAINE
5. *Карбівська У. М., Дутчак О. В.* 35  
ВПЛИВ ОРГАНІЧНОГО ДОБРИВА-БІОСТИМУЛЯТОРА НА УРОЖАЙНІСТЬ ГРЕЧКИ В ОРГАНІЧНОМУ ВИРОБНИЦТВІ

### MEDICAL SCIENCES

6. *Zablotska O. S., Nikolaieva I. M., Stepanchuk I. M.* 40  
NUTRITION CONCEPTS AND THEIR IMPORTANCE FOR THE TREATMENT AND PREVENTION OF NON-COMMUNICABLE DISEASES
7. *Гайдай О. С., Уваєв Б. С., Мервінський Т. С., Мервінська Ю. В.* 45  
МОРФОФУНКЦІОНАЛЬНА ЗАЛЕЖНІСТЬ РОЗМІРІВ ШЛУНКУ ВІД БУДОВИ ТІЛА ЗА ДОПОМОГОЮ РІЗНИХ МЕТОДІВ ДОСЛІДЖЕНЬ
8. *Гончарова Н. М., Тіварі Д. С.* 47  
СУЧАСНІ МЕТОДИ ДРЕНУВАННЯ ЧЕРЕВНОЇ ПОРОЖНИНИ
9. *Клименко О. С.* 51  
ВПЛИВ COVID-19 НА ВИНИКНЕННЯ ІНСУЛЬТУ
10. *Малик Н. В., Аконова М. Х.* 57  
ДЕЯКІ ОСОБЛИВОСТІ ПЕРЕБІГУ ГЕРПЕСВІРУСНОЇ ІНФЕКЦІЇ В УМОВАХ ВІЙСЬКОВОГО СТАНУ
11. *Мамедов Азер Гейдар огли, Веснін В. В., Гаркуша М. А.* 59  
ІНФІКОВАНІ НЕЗРОЩЕНІ ПЕРЕЛОМИ ТА ХИБНІ СУГЛОБИ ГОМІЛКИ (ОГЛЯД ЛІТЕРАТУРИ)
12. *Маргітіч С. В., Пономарьова В. П., Городецький С. Г., Біла О. О., Баталова Л. І.* 65  
ДИНАМІКА ПОКАЗНИКІВ IGI У ПАЦІЄНТІВ ІЗ БРОНХІАЛЬНОЮ АСТМОЮ В СПОЛУЧЕННІ З ГІПЕРТОНІЧНОЮ ХВОРОБОЮ ПРИ ЗАСТОСУВАННІ ВОЛЬОВОГО КЕРУВАННЯ ДИХАННЯМ НА ТЛІ АЛЕРГЕНСПЕЦИФІЧНОЇ ІМУНОТЕРАПІЇ

# ANALYSIS OF GENOMIC CHANGES IN CALLUS TISSUE OF CAMELINA SATIVA AND OBTAINED PLANT STRUCTURES

**Liubchenko Inna Oleksandrivna,**

Candidate of Agricultural Sciences, Senior Lecturer

**Liubchenko Andrii Ivanovych,**

Candidate of Agricultural Sciences, Associate Professor

Uman National University of Horticulture

Uman, Ukraine

Camelina sativa is a promising crop of versatile use. Unpretentiousness to growing conditions, short vegetation period, high resistance to diseases and pests make it possible to grow it in various soil and climatic conditions [1].

Camelina has a high oil content in seeds. Due to a balanced complex of natural antioxidants and biologically active substances, it has therapeutic and dietary properties [2, 3]. Camelina seed oil is used for technical purposes for the production of varnishes, paints, soaps, plastics. It is a valuable raw material for the production of biodiesel and aviation fuel [4, 5].

Obtaining new high-yielding varieties is important for increasing the volume of camelina production. The use of biotechnological methods can significantly reduce the duration of the breeding process and increase the efficiency of creating new plant forms with desired economically valuable traits [6].

One of the main types of plant biomaterials for in vitro research is callus tissue. It is used directly in the work or as a source material for creating other objects - isolated protoplasts, suspension culture, etc.

In the process of cell dedifferentiation, somaclonal variability arises, which is the source of genetic diversity of callus tissues and regenerant plants obtained from them. This involves changes in the number and morphology of chromosomes, point mutations, transpositions of genetic elements, gene amplification, changes in expression at multigene loci and rearrangement of cytoplasmic genomes, somatic crossing over, etc. Somaclonal variability arises due to two main reasons: genetic

heterogeneity of somatic cells of the explant; genetic and epigenetic variability induced by cultivation conditions [7].

The aim of our work was to study the changes in chromosome number in the karyotype during *in vitro* cultivation of biomaterials of camelina sativa.

The experiments were carried out in the educational and scientific laboratory «Biotechnology» of the Uman National University of Horticulture. The initial material was callus tissue obtained from explants of plants of Stepovyi 1 variety.

The biomaterial was cultivated on the modified nutrient media Murashige-Skuga, at the illumination intensity of 4 kLx, 16-hour photoperiod, temperature regime 20–24°C. The identification of ploidy was carried out by counting the number of chromosomes in crushed preparations obtained from callus or somatic cells of the apical meristems of registered plants of camelina sativa.

The callus tissue of camelina is characterised by high genetic heterogeneity. In cytological analysis, cells with different ploidy were identified. For *Camelina sativa* (L.) Crantz, the diploid set is 40 chromosomes. At the end of passage, 49.1 % of callus cells had a balanced diploid set of chromosomes.

The haploid level was identified in 18.0 % of the analysed cells. Haploid cells were smaller, had an insignificant number of organelles and were characterised by a short mitotic cycle. The haploid callus may arise due to reduced mitosis or gradual elimination of chromosomes.

During dedifferentiation and proliferation of callus tissue, along with a decrease in the number of chromosomes in the cells, the occurrence of polyploidy was also observed. Of the mass of callus tissues, 10.5 % and 9.2 % of cells were triploid and tetraploid, respectively. Polyploid tissues are formed due to endoreduplication and endopolyploidy. The level of polyploidisation depends on the initial ploidy of the source explant and the influence of exogenous growth regulators.

About 13.2 % of callus cells were aneuploid and had a chromosome set not multiple to the basic number. The aneuploidy is explained by chromosome non-divergence in anaphase.

As a result of realisation of morphogenetic potential of callus tissues of

camelina, intact plants were obtained. Morphogenesis took place both by organogenesis and somatic embryoidogenesis. Compared to callus tissue, the obtained plants were characterised by a more balanced set of somatic cell chromosomes. The diploid set had 79.2 % of somatic embryoids and 76.0 % of regenerant plants obtained by organogenesis. Haploid structure was characterised by 3.2 and 2.5 % of plants, respectively. Haploid plants had reduced biometric parameters and low viability compared to diploid plants.

Polyploid forms were observed in the induced plant structures. In somatic embryoids, the number of triploids and tetraploids was 7.3 and 3.2 %, respectively. For plants obtained as a result of organogenesis, this indicator was 5.5 and 8.4 %.

The number of aneuploid plants formed during somatic embryoidogenesis was 7.1 %, and during organogenesis – 8.4 %.

By organogenesis, 5.3 % of mixoploid plants were obtained. This phenomenon is due to the fact that during organogenesis an intact plant is formed from a group of cells that may have different genetic nature. No mixoploid forms were found among somatic embryoids, as somatic embryoid develops from one vegetative proembryonic cell.

Therefore, in the process of the conducted studies it was found that the callus tissue of camelina sativa is represented by cells of different ploidy. Induced intact plants have a smaller range of genomic variability, and 76.0–79.2 % of the material is characterised by a balanced karyotype. Somatic embryos are genetically more stable compared to plants obtained through organogenesis.

#### **LITERATURE:**

1. Neupane D., Lohaus R. H., Solomon J. K. Q., Cushman J. C. Realizing the potential of *Camelina sativa* as a bioenergy crop for a changing global climate. *Plants*. 2022. Vol. 11 (6). 772. <https://doi.org/10.3390/plants11060772>.
2. Faten M. I., El Habbasha S. F. Chemical composition, medicinal impacts and cultivation of camelina (*Camelina sativa*). *International Journal of PharmTech Research*. 2015. Vol. 8. № 10. P. 114–122.

3. Очеретна А. В., Фролова Н. Е. Дослідження якісного складу олії рижію та перспектив її використання в дієтичному харчуванні. *Вчені записки ТНУ імені В. І. Вернадського*. 2020. Т. 31 (70). № 6. С. 76–814.
4. Мельничук М. Д., Демидась Г. І., Квітко Г. П., Гетман Н. Я. Рижій посівний як альтернатива ріпаку ярого для виробництва біодизеля. *Наукові доповіді НУБіП України*. 2012. Т. 31. № 2. [http://www.nbu.gov.ua/e-journals/Nd/2012\\_2/12dgi.pdf](http://www.nbu.gov.ua/e-journals/Nd/2012_2/12dgi.pdf).
5. Москва І. С. Стан та перспективи вирощування рижію ярого на півдні Степу України. *Вісник аграрної науки Причорномор'я*. 2016. № 1. С. 99-109.
6. Любченко І. О. Створення вихідного матеріалу рижію ярого стійкого до стресових чинників за використання біотехнологічних методів: Дис...канд. с.-г. наук. Умань, 2020. 197 с.
7. Бублик О. М. Чинники соматональної мінливості рослин. *Вісник українського товариства генетиків та селекціонерів*. 2011. Т. 9. № 1. С. 118-133.