COLL-RAPE

NEW TREATMENT FOR RAPE SEEDS BASED ON COLLAGEN HYDROLYSATES, IN ORDER TO INCREASE THE DROUGHT RESISTANCE OF THE RAPE SEEDLING

Program: European and international cooperation

Project type: EUREKA

Project code: E!10760 / PN-III-P3-3.5-EUK-2016-0029

Funding contract: 93/2017

Contracting authority: Executive Agency for Higher Education, Research, Development and Innovation Funding - UEFISCDI

Acronym: COLL-RAPE

Project duration: July 2017-August 2020

Contractor: PROBSTDORFER SAATZUCHT ROMANIA SRL

Project Manager: Dr. eng. Doru Gabriel Epure, Executive Director,
doru.epure@probstdorfer.ro /
Dr. eng. Marius Becheritu,
marius.becheritu@ probstdorfer.ro

Partner 1: INCDTP-Division Leather and Footwear Research Institute, Bucharest

Responsible project: Dr. eng. Mihaela-Doina Niculescu, CS I,
mihaelaniculescu59@yahoo.com

Other Partners:

Partner 2: University of Agronomic Science and Veterinary Medicine, Bucharest

Partner 3: National Institute for R&D in Chemistry and Petrochemistry-ICECHIM, Bucharest

Paetner 4: RESEARCH NETWORK ŁUKASIEWICZ - Institute of Leather Industry, Lodz, Poland

Partner 5: Pestila II Sp.zo.o.Sp.k., Wolborz, Poland

Project objective:

The overall objective of the project is implementation on the market of new products and technology for pelleting rape seeds, based on collagen hydrolysates, in order to increase the resistance to drought and to pests during germination of seeds and emergence of seedlings.The coating properties of collagen extracts related to the film forming capacity of collagen is connected to medium to high weight of collagen molecules. The bioactivity of collagen hydrolysate is connected to the amino-acid content.

Technical objectives associated with the goal of project are the following:

- Creating the collagen-based bio-active additive for applications in seed surface treatment;
- Monitoring the quality indicators for the collagen-based bio-active additive;
- Developing of new compositions based on bioactive collagen for development of multifunctional pelleting layers; of rape seed;
- Implementing rape seed treatments with multifunctional coatings supplemented with collagen based material;
- Developing rape crops using seeds with multifunctional coatings supplemented with collagen hydrolysates.

Estimated results:

Short term expected results:

New product for pelleting of rape seed, developed by consortium and integrated in production by SME from Poland;

Medium term expected results:

-New product for pelleting seed for rape crop, registered in UE selling in Poland by SME from Poland, and in Romania by PSRO (selling of rape seed treated with third product).

-Increasing of incomes of the SMEs from Poland and PSRO, and increasing market share;

-Reducing the quantity of rape seed per Ha;

-Reducing the risk on non-emerging of rape crop due to drought of soil during rape sowing season;
-Increasing rape crop yield.

The achievement of estimated results is 100%:
http://www.probstdorfer.ro/cercetare/proiect-coll-rape/
The following presentation shows the results of INCDTP-Division Leather and Footwear Research Institute in the COLL-RAPE project. The specific objectives of the project stages have been fully achieved.

Stage I (2017)

- New possibilities for collagen extraction from leather industry by-products were evaluated;
- New models of collagen extracts with bio-active properties have been developed for applications in agriculture to rape seeds treatment.
- Technologies have been developed to obtain collagen, gelatin and hydrolyzed extracts from leather by-products;
- ICPI participated in the workshop in Poland for the international project opening;


EUREKA

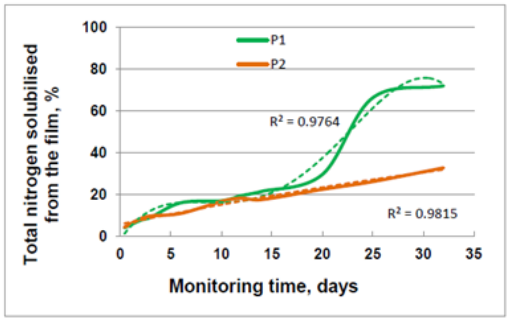
COLL_RAPE
KICK-OFF MEETING AGENDA

19 of September 2017 r.
Hotel Ambasador Central
Estonian room

10.00	Welcome words *Organizers*
10.10	Presentation of project *Doru Epure - Director of the project*
10.50	Presentation of partners: *IPS* (presentation of Company and activities/tasks do to in project)
11.10	Presentation of partners: *Prolit* (presentation of Company and activities/tasks do to in project)
11.30	Lunch break
12.30	Presentation of partners: *UNAPIEL* (presentation of Company and activities/tasks do to in project)
12.50	Presentation of partners: *ICECHIM* (presentation of Company and activities/tasks do to in project)
13.10	Presentation of partners: *ICPI* (presentation of Company and activities/tasks do to in project)
13.30	Presentation of partners: *PSRO* (presentation of Company and activities/tasks do to in project)
13.50	Conclusion and communication channel to be use

- The COLL-RAPE project, in starting phase of research, was promoted at international events at Sichuan University China and the ISER-246th International Conference on Agricultural and Biological Science (ICABS) in Guangzhou, China.

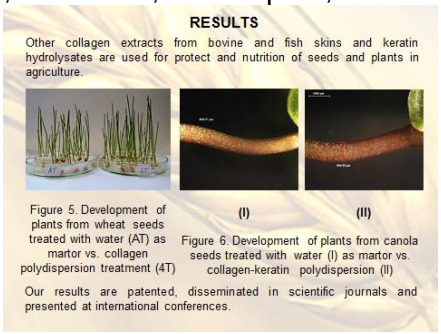
Stage II (2018)
- New collagen extracts with bio-active properties were made, for the treatment of rapeseed, from leather by-products from the leather industry;
- New technologies for making collagen extracts for applications in rapeseed treatment were experimented with and pilot batches of collagen extracts were made, which were characterized by chemical, physical analyzes and biodegradation tests and were submitted for testing. to partners in Poland and Romania.
- The initial technical specification was elaborated: FILMOGENIC COLLAGENIC EXTRACTS (research products) and their functionality has been demonstrated.



Evolution of control seedlings and treated with collagen and keratin extracts

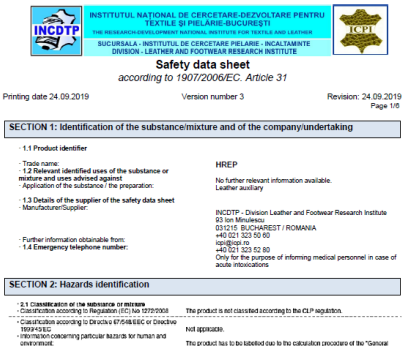
- The ISI article has been published “Experimental Observations About Improving the Properties of Collagen Extracts for Applications in Agriculture” authors: M. D. Niculescu, C. Gaidau, D.-G. Epure, M. Gidea, Rev. Chim.-Bucharest, 69(2), 2018, 379-385..
- Has been published in Proceedings (pp. 135-140, DOI: 10.24264/icams-2018.I.20) the article “New compositions with crosslinked and uncrosslinked collagen polydispersions for systemic treatments in agriculture” authors: Mihaela-Doina Niculescu, Edyta Grzesiak, Carmen Gaidau, Doru Gabriel Epure, Claudiu Sendrea, Mihai Gidea, presented as a poster at ICAMS 2018 – 7th International Conference on Advanced Materials and Systems, Bucharest, Romania.

- The COLL-RAPE project was promoted during an international event, organized by Shaanxi University of Science and Technology, Xi'an, China, in the presentation of the paper "Extraction of proteins from by-products for valorisation as bio-composite with low environmental impact" authors: M. Niculescu, De. Simion, C. Gaidau, D.-G. Epure, D. Berchet.

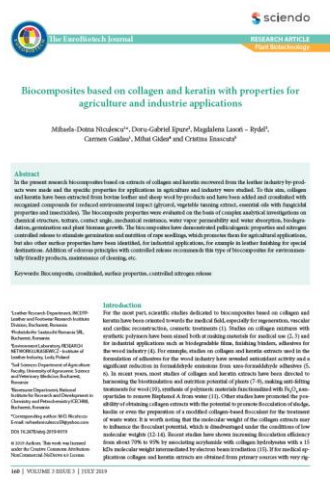


Stage III (2019)

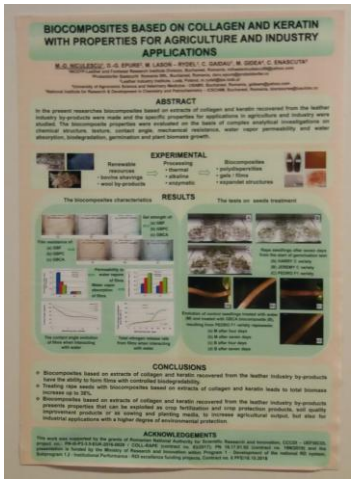
- Technical Documentations were developed for collagen extracts (gelatin and hydrolyzate) and for keratin hydrolyzate.
- The Technological Sheets for collagen and keratin extracts were elaborated: concentrated gelatin, dry collagen hydrolyzate, concentrated keratin hydrolyzate, used in rape seeds pelleting formulas.
- The Manual for the Presentation of collagen extracts with applications in rape seeds pelleting was elaborated.
- New extracts of collagen and keratin were made, with bio-active properties, from leather industry by-products, which were made available to partners in Poland and Romania, to prepare compositions for rape seeds pelleting layers and a new version of the Safety Data Sheet for collagen hydrolyzate shipped to Poland was developed.



- The ISI article has been published "Multifunctional Biocomposites Based on Collagen and Keratin with Properties for Agriculture and Industry Applications", authors: **M. D. Niculescu,** D.-G. Epure, M. Lasoń – Rydel, C. Gaidau, M. Gidea, C. Enascuta, in The EuroBiotech Journal, 3(3), 160-166.
- The ISI abstract of the poster presented at European Biotechnology Congress 2019, Valencia, Spania, has been published in Journal of Biotechnology, 305 Supplement, S84-S85.
- A new patent application was registered at OSIM (A 00741 / 14.11.2019) "Process for obtaining biocomplexes based on collagen and keratin to stimulate seed germination and rape plant nutrition", authors: Mihaela-Doina Niculescu, Cristina Emanuela Enascuta, Mihai Gidea, Doru-Gabriel Epure, Carmen Gaidau, Marius Becheritu.


sciendo
The EuroBiotech Journal
RESEARCH ARTICLE
Plant Biotechnology

Biocomposites based on collagen and keratin with properties for agriculture and industrie applications

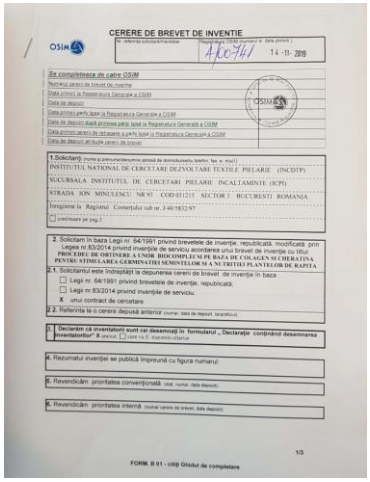

BIOCOMPOSITES BASED ON COLLAGEN AND KERATIN WITH PROPERTIES FOR AGRICULTURE AND INDUSTRY APPLICATIONS

ABSTRACT

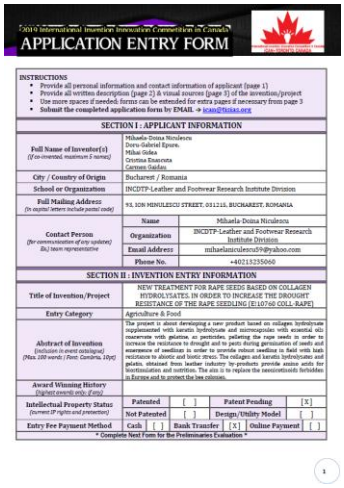
EXPERIMENTAL

RESULTS

CONCLUSIONS


CERERE DE BREVET DE INVENTIE

- The COLL-RAPE project, has been presented for The 4th International Invention Innovation Competition in Canada, iCAN 2019 (iCAN 2019, TORONTO, CANADA), where he was awarded with silver medal.


2019 International Invention Innovation Competition in Canada
APPLICATION ENTRY FORM

INSTRUCTIONS
- Provide all personal information and contact information of applicant (page 1)
- Provide all written description (page 2) & visual sources (page 3) of the invention/project
- Use more spaces if needed; forms can be extended for extra pages if necessary from page 3
- Submit the completed application form by EMAIL → ican@tisiacs.org

SECTION I : APPLICANT INFORMATION		
Full Name of Inventor(s) (If co-invented, maximum 5 names)	Mihaela-Doina Niculescu Doru-Gabriel Epure, Mihai Gidea Cristina Enascuta Carmen Gaidau	
City / Country of Origin	Bucharest / Romania	
School or Organization	INCDTP-Leather and Footwear Research Institute Division	
Full Mailing Address (In capital letters include postal code)	93, ION MINULESCU STREET, 031215, BUCHAREST, ROMANIA	
Contact Person (for communication of any updates) (By team representative)	Name	Mihaela-Doina Niculescu
	Organization	INCDTP-Leather and Footwear Research Institute Division
	Email Address	mihaelaniculescu59@yahoo.com
	Phone No.	+40213255060

SECTION II : INVENTION ENTRY INFORMATION				
Title of Invention/Project	NEW TREATMENT FOR RAPE SEEDS BASED ON COLLAGEN HYDROLYSATES, IN ORDER TO INCREASE THE DROUGHT RESISTANCE OF THE RAPE SEEDLING (EI10760 COLL-RAPE)			
Entry Category	Agriculture & Food			
Abstract of Invention (Inclusion in event catalogue) (Max. 100 words / Font: Cambria, 10pt)	The project is about developing a new product based on collagen hydrolysate supplemented with keratin hydrolysate and microcapsules with essential oils coacervate with gelatine, as pesticides, pelleting the rape seeds in order to increase the resistance to drought and to pests during germination of seeds and emergence of seedlings in order to provide robust seedlings in field with high resistance to abiotic and biotic stress. The collagen and keratin hydrolysates and gelatin, obtained from leather industry by-products provide amino acids for biostimulation and nutrition. The aim is to replace the neonicotinoids forbidden in Europe and to protect the bee colonies.			
Award Winning History (If applied/ awarded, why, if any)				
Intellectual Property Status (current IP rights and protection)	Patented	[ ]	Patent Pending	[X]
	Not Patented	[ ]	Design/Utility Model	[ ]
Entry Fee Payment Method	Cash [ ]	Bank Transfer [X]	Online Payment [ ]	

* Complete Next Form for the Preliminaries Evaluation *


CERTIFICATE OF AWARD

HEREBY CERTIFIES THAT
Mihaela-Doina Niculescu Doru-Gabriel Epure
Mihai Gidea Cristina Enascuta Carmen Gaidau
INCDTP-Leather and Footwear Research Institute Division
HAS BEEN AWARDED
SILVER MEDAL
FOR THE INVENTION • INNOVATION OF
NEW TREATMENT FOR RAPE SEEDS BASED ON COLLAGEN HYDROLYSATES, IN ORDER TO INCREASE THE DROUGHT RESISTANCE OF THE RAPE SEEDLING (EI10760 COLL-RAPE)

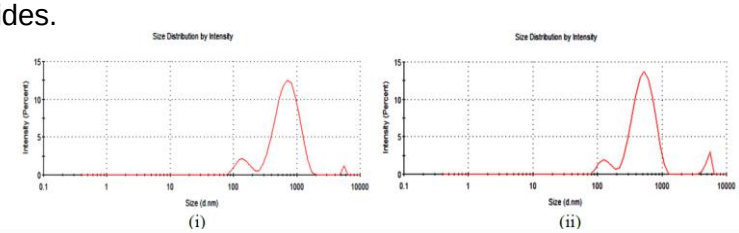
ICAN 2019
INTERNATIONAL INVENTION INNOVATION COMPETITION IN CANADA, iCAN 2019
TORONTO INTERNATIONAL SOCIETY OF INNOVATION & ADVANCED SKILLS (TISIAS)
AUGUST 24TH, 2019
TORONTO, CANADA
MOONSUK CHANG
ORGANIZING CHAIRMAN
BOB HUYBRECHTS
CO-CHAIRMAN OF THE JURY

ACKNOWLEDGEMENTS

Stage IV (2020)

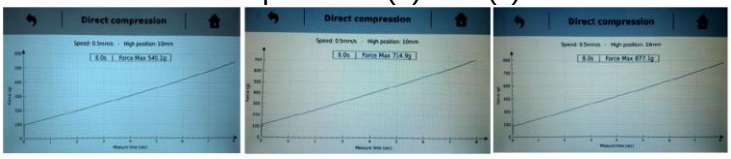
- Technical Documentations were developed for processes to obtained research products Gelatin A and Collagen hydrolyzate W.
- The final technical specification was elaborated for filmogenic collagen extracts (research products) for seed pelleting compositions.
- Experimental batches of gelatin, collagen hydrolyzate and keratin hydrolyzate were made and characterized for integration in the rape seeds coating.

Analysis of collagen (i) and keratin (ii) hydrolysates by Dynamic Light Scatering (DLS) reveals the presence of small peptide fragments, in the "nano" domain specific in this case for free amino acids and oligopeptides.



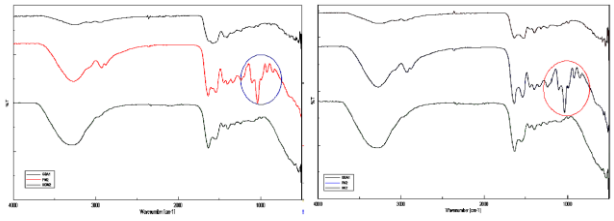
(i) (ii)

Texture studies have shown that the addition and crosslinking of gelatin (a) leads to the formation of better structured, more consistent compositions (b) and (c).



(a) GBA1 (b) GW 2.2 (c) GK 2.2

The obtaining of the new compounds based on collagen (I) and collagen-keratin (II) is confirmed by IR spectral analysis.



(I) (II)

- Two abstracts were submitted and accepted for presentation at scientific events scheduled for October-November 2020: ICAMS 2020 Bucharest, Romania and SIPS 2020 Phuket, Thailand.
- The thematic patent RO 132575 B1, Process to obtaining a collagenic film composition, granted in March 2020, associated with the COLL-RAPE project, was presented at the international invention fairs The 24th International Exhibition of Inventics “INVENTICA 2020” Iasi, Romania and The 5th International Invention Innovation Competition in Canada, iCAN 2020 (iCAN 2020, TORONTO, CANADA), where was awarded with gold medal and TISIAS special innovation award.

CERTIFICATE OF AWARD

THIS CERTIFICATE IS PROUDLY PRESENTED TO

Mihaela-Doina Niculescu
Carmen Cornelia Gaidau Doru-Gabriel Epure
INCDTP-Leather and Footwear Research Institute Division

FOR THE ACHIEVEMENT OF

GOLD MEDAL

FOR THE INVENTION/ INNOVATION ENTITLED:

Process to obtaining a collagenic film composition

AT THE 5TH ANNIVERSARY EDITION OF THE INTERNATIONAL INVENTION INNOVATION COMPETITION IN CANADA - ICAN 2020

ORGANIZED BY TORONTO INTERNATIONAL SOCIETY OF INNOVATION & ADVANCED SKILLS (TISIAS)

HELD ON AUGUST 29TH, 2020 IN TORONTO, CANADA.

TISIAS
certificate of achievement

SPECIAL AWARD

Presented to

Mihaela-Doina Niculescu
Carmen Cornelia Gaidau Doru-Gabriel Epure
INCDTP-Leather and Footwear Research Institute Division

in recognition of excellent invention/innovation of

Process to obtaining a collagenic film composition

exhibited and presented at

The 5th International Invention Innovation Competition in Canada
<ICAN 2020> held on August 29th, 2020 in Toronto, Canada

- Research results of the COLL-RAPE project were capitalized through the application for a new project, „Multifunctional Bio-pesticides for the protection of orchards and seeds, in order to increase agricultural production”, BIO-PLANT-Protect, PN-III-P3-3.5-EUK- 2019-0250, within the competition of EUREKA projects session II 2020, in which INCDTP-ICPI Division is a partner, being on the first place in the ranking of Eureka projects evaluated in session II 2020.

The activity of the COLL-RAPE project is in accordance with the roadmap to the circular economy, contributing to the increase of the efficiency from the point of view of the use of natural resources and of the protection of the environment.