

Summary report on research accreditation

I. General information

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| Name of organization | University of the Academy of Sciences of Moldova | | |
| Organization type (<i>to underline</i>) | Research institute | <u>Higher education institution</u> | Ministerial research institute |
| Research direction (s) of organization | 1. Fundamental and applied research in the field of functional genetics, genomic imprinting, and molecular screening; 2. Identification of molecular markers linked to economically valuable characters (restoring fertility, heterosis, biotic and abiotic stress resistance, etc.) | | |
| Correlation with strategic research direction (s) of activity in the field of science and innovation for 2013-2020 | 1. Biotechnology 2. Materials, technologies and innovative products 3. Health and biomedicine | | |
| Evaluated period | 2011-2015 | | |
| Web of organization | http://edu.asm.md | | |

II. Research capacity (annual average for evaluated period)

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|---|---|---|-------------------------|--|-----------------------|-------------------------|
| Total number of employees | 23.0 | | | | | |
| Number of scientific researchers | 20.0 | | | | | |
| Number of researchers who possess honorific titles, scientific degrees, scientific and scientific-didactical titles | ASM full members 0.2 | ASM corresp. members 0.4 | Professor 1.4 | Associated Professor 6.2 | Dr.hab. 2.8 | Dr. (PhD) 6.8 |
| Number of researchers involved in international projects | European Commission Programmes 2.6 | United Nations Programmes and Funds - | | Bilateral Programmes financed from the national budget 2.8 | Others - | |
| Number of young researchers (under 35 years old) | PhD students 5.2 | | | Others 6,6 | | |
| Financial resources - revenues (thousand MDL) | Public budget 1072.8 | | | Special means 396.8 | | |
| Categories of special means (thousand MDL) | National 106.5 | | | International 290.3 | | |
| Distribution of expenditures (thousand MDL) | Salary 879.7 | Procurement of scientific equipment 172.9 | | Traveling for scientific purposes (travel, accommodation, per-diems, etc.) 154.8 | Other 262.2 | |
| List of 3 basic research methods, equipments, | 1. DNA extraction and amplification; 2. Real Time PCR; | | | | | |

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| technologies (per accredited field) | 3. Unidimensional electrophoresis of native and denaturated proteins. |
| List of provided scientific services | <ol style="list-style-type: none"> 1. Isolation and quantification of proteins 2. Electrophoresis of proteins in polyacrylamide gel 3. Primer Design for PCR analysis 4. Creating, analyzing and visualizing of gene and metabolic networks 5. The bioinformatic analysis of sequences (DNA / RNA / EST / protein) 6. Isolation and purification of DNA 7. Isolation and purification of RNA 8. Electrophoresis of nucleic acids 9. Polymerase chain reaction (PCR) 10. Real-Time PCR |
| List of editorial activities | UnASM publishes in cooperation with other institutes the "Bulletin of ASM. Life Sciences" (Category B) ISSN 1857-064X |

III. Distribution of the number of research projects and themes during the evaluated period

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|--|---|------------------|------------------|------------------|------------------|
| ASM institutional projects | 2011 1 | 2012 1 | 2013 1 | 2014 1 | 2015 1 |
| ASM projects in the frame of State Programmes | 2011 - | 2012 - | 2013 - | 2014 - | 2015 - |
| ASM technological transfer projects | 2011 - | 2012 - | 2013 - | 2014 - | 2015 - |
| ASM projects for equipment procurement | 2011 1 | 2012 - | 2013 - | 2014 - | 2015 - |
| ASM projects for young researchers | 2011 1 | 2012 1 | 2013 1 | 2014 1 | 2015 - |
| ASM projects in the frame of bilateral programmes | 2011 1 | 2012 - | 2013 2 | 2014 2 | 2015 2 |
| International projects/grants | 2011 2 | 2012 - | 2013 - | 2014 - | 2015 2 |
| List of 3 representative international projects/grants | <p>144950-TEMPUS-2008-IT-JPHES: <i>Entrepreneurial University as a model for proper managerial interrelation among education, science and innovation development</i></p> <p>511275-TEMPUS-1-2010-1-GE-TEMPUS-JPCR SALiS: <i>Student Active in Learning Science</i></p> <p>06/CE-Grant Association to the European research infrastructure in the field of biology</p> | | | | |
| Research contracts | 2011 - | 2012 - | 2013 - | 2014 2 | 2015 - |
| List of 3 representative research contracts | <ol style="list-style-type: none"> 1. Molecular analysis of the parental lines and F₁ hybrid sunflower (<i>Helianthus annuus</i> L.). Contract: no. 18/14 of March 31, 2014 Beneficiary: AMG-Agroselect Company 2. Collection and analyses of <i>Orobanche cumana</i> from different geographic regions of Moldova. Memorandum of collaboration from | | | | |

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| | 18.08.2014 Beneficiary: Limagrain Company |
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IV. Scientific publications

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| Total number of publications abroad | Books 2 | Chapters in books | Journal papers 20 | Conference abstracts 47 |
| Total number of publications in ISI journals and books | Books | Chapters in books | Journal papers 6 | |
| Total number of publications in the country | Books 2 | Chapters in books | Journal papers 51 | Conference abstracts 78 |
| List of 5 representative publications (per accredited field) | <ol style="list-style-type: none"> Duca, M. <i>Plant physiology</i>, Springer International Publishing Switzerland, Biological and Medical Physics, Biomedical Engineering series, 2015, 315 p. ISSN 1618-7210 Duca, M. <i>Historical aspects of sunflower researches in the Republic of Moldova</i>, Helia, 2015, 38(62), p. 79-93. Duca, M.; Port, A.; Şestacova, T.; Siniuskaya, M.; Aksyonova, E.; Davydenko, O. <i>Microsatellite marker application in sunflower (Helianthus annuus L.) fingerprinting</i>, Biotechnology & Biotechnological Equipment. 2013, 27(3), p. 3772-3775. ISSN 1310-2818 Duca, M.; Midoni, A.; Nechifor, V.; Port, A. <i>Usefulness of the diagnostic markers for the restorer gene Rf₁ in inheritance studies at sunflower</i>, Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi, Secţia II: Genetică şi Biologie Moleculară. 2013, 14(2), p. 11-17. ISSN: 1582-3571. Anisimova, I.N.; Gavrilova, V.A.; Timofeeva, G.I.; Rozhkova, V.T.; Duca, M.V.; Port A.I. <i>Genetic diversity of sources of sunflower pollen fertility restorer genes</i>, Russian Agricultural Sciences, 2011, Vol.37, No.3, p.192-196. ISSN 1068-3674. | | | |
| List of 5 citations | <ol style="list-style-type: none"> Munkert, J.; Costa, C.; Budeanu, O. et al. Progesterone 5b-reductase genes of the Brassicaceae family as function-associated molecular markers. <i>Plant Biology</i>, 2015, 17, 1113–1122. (Citation: 3 - http://onlinelibrary.wiley.com/doi/10.1111/plb.12361/citedby) Duca M, 2014. Current situation of sunflower broomrape in the Republic of Moldova. Proc. 3rd Int. Symp. on Broomrape (<i>Orobanche</i> spp.) in Sunflower, Córdoba, Spain. pp: 44-50 (Citation: 1) <i>Cited in:</i> Leire Molinero-Ruiz, Philippe Delavault, Begoña Pérez-Vich, Maria Pacureanu-Joita, Mariano Bulos, Emiliano Altieri and Juan Domínguez, <i>History of the race structure of Orobanche cumana and the breeding of sunflower for resistance to this parasitic weed: A review</i>, Spanish Journal of Agricultural Research, 13(4), 19 pages (2015) Munteanu, V.; Gordeev, V.; Martea, R.; Duca, M. Effect of gibberellin cross talk with other phytohormones on cellular growth and mitosis to endoreduplication transition. <i>International Journal of Advanced Research in Biological Sciences</i>. 2014, 1(6), p. 136-153. (Citation: 1) <i>Cited in:</i> Shabir H. Wani, Vinay Kumar, Varsha Shriram, Saroj Kumar Sah, <i>Phytohormones and their metabolic engineering for abiotic stress tolerance in crop plants</i>, The Crop Journal 4 (2016), p. 162–176. Gisca I, Acciu A, Glijin A, Duca M, 2013. Highly virulent races of sunflower broomrape in the Republic of Moldova. Proc. Biotech. Cong. Current Opinion in Biotech. 24(1): S132. (Citation: 1) <i>Cited in:</i> Leire Molinero-Ruiz, Philippe Delavault, Begoña Pérez-Vich, Maria Pacureanu-Joita, Mariano Bulos, Emiliano Altieri and Juan Domínguez, <i>History of the race structure of Orobanche cumana and the breeding of sunflower for</i> | | | |

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| | <p><i>resistance to this parasitic weed: A review</i>, Spanish Journal of Agricultural Research, 13(4), 19 pages (2015)</p> <p>5. Anisimova, I.N.; Gavrilova, V.A.; Timofeeva, G.I.; Rozhkova, V.T.; Duca, M.V.; Port A.I. <i>Genetic diversity of sources of sunflower pollen fertility restorer genes</i>, Russian Agricultural Sciences, 2011, Vol.37, No.3, p.192-196 (Citation: 2)</p> <p><i>Cited in:</i> I. N. Anisimova, N. V. Alpatieva, V. T. Rozhkova, E. B. Kuznetsova, A. G. Pinaev and V. A. Gavrilova, <i>Polymorphism among RFL-PPR Homologs in Sunflower (Helianthus annuus L.) Lines with Varying Ability for the Suppression of the Cytoplasmic Male Sterility Phenotype</i>, Russian Journal of Genetics, 2014, Vol. 50, No. 7, pp. 712–721. 2014.</p> <p>Kaya Y., Chapter 13. Sunflower, <i>Alien Gene Transfer in Crop Plants, Volume 2: Achievements and Impacts</i>, Springer 2014, p. 281-317.</p> |
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V. Innovation outputs

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| Total number of patents | Registered in the country - | Registered abroad - | Implemented - |
| Total number of new developed methods and technologies | Registered - | Non-registered 34 | Implemented 30 |
| Total number of new scientific products | Registered 4 | Non-registered 1 | Implemented 5 |
| List of 5 representative innovation outputs (per accredited field) | <ol style="list-style-type: none"> 1. Sunflower hybrid <i>Dacia</i>, authors: Duca Maria, Gisca Ion, Cucereavii Aliona, 2013 2. Sunflower hybrid <i>Doina</i>, authors: Duca Maria, Gisca Ion, Cucereavii Aliona, 2013 3. Sunflower hybrid <i>Oscar</i>, authors: Duca Maria, Gisca Ion, Cucereavii Aliona, Chiaburu Sergiu, 2015 4. Sunflower hybrid <i>Cezar</i>, authors: Duca Maria, Gisca Ion, Cucereavii Aliona, Chiaburu Sergiu, 2015 | | |

VI. Other outputs

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| Total number of scientific outputs for central and local authorities (draft of law, strategies etc.) | 54 | | |
| Total number of scientific outputs for educational institutions | Handbooks for higher education 12 | Handbooks for pre-university institutions 28 | Number of researchers – supervisors of license and master theses 6 |

VII. Major scientific and innovation achievements

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| Short description of main scientific results and their confirmation (by awards, citations, development of international projects etc.) | The role of gibberellins in the mechanisms of reproductive development has been determined and gene networks for genes involved in key processes linked to the manifestation of male sterility in sunflower (regulation of the redox homeostasis, mitochondrial activity and biogenesis, energetic metabolism, microsporogenesis, signaling, processes of DNA repair and recombination etc.) have been created. The genes with differential expression (depending on the development stage and the |
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| | <p>action of different factors – important components of metabolic networks), which can serve as models for the study of similar processes in other vegetal species, have been identified.</p> <p>In the basis of investigation of 540 profiles of helianthine and 163 alleles by the SSR technique with 28 primers ORS the genetic fingerprinting on 21 indigenous and Belarus genotypes of sunflower were performed. Codominant markers for estimation of the hybridization degree in F₁ were identified.</p> <p>For the first time were estimated resistance potential of original sunflower germplasm through identification of 36 genotypes with <i>Pl1</i> gene, 37 – with <i>Pl6</i> gene and 24 containing both genes. Genetic studies performed at molecular level revealed new aspects regarding sunflower downy mildew resistance mechanism, including: differential expression of genes involved in maintenance of oxido-reduction homeostasis in function of infection degree; involvement of transcription factor <i>Why1</i> from <i>Whirly</i> family in insurance of sunflower response to <i>P. halstedii</i> attack.</p> <p>The intra- and interpopulational diversity (at the morphological, phytochemical and genetic level) of 90 genotypes of <i>Origanum vulgare</i> and <i>Hyssopus officinalis</i> collected from the spontaneous flora of the Republic of Moldova and Romania have been established.</p> <p>The first bioinformatic tool in the Republic of Moldova - UDaCoT (UnASM Data Collecting Tool) has been elaborated. UDaCoT was created as an interdisciplinary tool, which offers various options of the information search by proposed keywords for several biologic and medical fields through general and specialized bioinformatic databases.</p> | | | | |
| Number of researchers invited as speakers at international conferences | 2011 1 | 2012 - | 2013 - | 2014 1 | 2015 1 |
| Short description of technological transfer and innovation results and their certification by implementation | Sunflower hybrids developed by AMG-Agroselect Comert in collaboration with UnASM are highly productive and resistant to high temperatures and drought, different disease (such as broomrape, phomopsis, mildew) and are commercialized by the company, or are in the stage of testing by the State Commission for Plant Variety (Republic of Moldova, Russia, Ukraine, Kazakhstan). | | | | |
| Number of defended dr./dr. hab. theses per year | 2011 1 | 2012 - | 2013 - | 2014 1 | 2015 - |

VIII. Present/further involvement in the Horizon 2020 (FP7)

06/CE: Association to the European research infrastructure in the field of biology, project manager: Duca Maria, 2015-2016, HORIZON 2020 grant No. 2014/ 346-992, call “Connecting of Centers of Excellence in Moldova to the European Research Infrastructure”

Long Life Learning, project manager: Poting Tatiana, 2015-2016, HORIZON 2020 grant No. 2014/ 346-992 „Financial support for Moldova's participation in the EU Framework Programme Horizon 2020”.

IX. Accredited research field and its evaluation by the National Council for Accreditation and Attestation of the Republic of Moldova (very good/good/satisfactory)

Functional genetics and bioinformatics – *good*

X. Category (A/B/C) attributed by the National Council for Accreditation and Attestation of the Republic of Moldova to the organization

Category B

XI. Institutional development actions planned for the next 5 years (maximum ½ page).

- Education and training of highly qualified personnel (organization of public lectures with invited speakers, practical and theoretic trainings, stages in the foreign institutions and research centers etc.).
- Creating of attractive research environment for young people by stimulating them, even during undergraduate studies through various forms of stimulation.
- Supporting and facilitating the implementation of new research methods, contributing to the diversification of the research activities in UnASM, to advancement of investigations in the field of genetics and plant breeding and the implementation of European research standards.
- Increase the quality and applicability of the master, doctoral and postdoctoral students' research.
- Developing and exploiting of innovative ideas, improving the participation to the salon of inventions, exhibitions.
- Strengthening partnerships with the socio-economic environment at local, regional and international levels.
- Stimulating international cooperation with institutes, universities, organizations, which provide increased visibility of the results obtained by the UnASM research team.
- Improving the participation of the scientific community to national and international research projects competitions.
- Implementation of the principles of the European Charter for Researchers and Code of Conduct for the Recruitment in order to enhance the quality human resources, of research and innovation in UnASM.