Universitatea Tehnică a Moldovei

Valorificarea compușilor biologic activi din usturoi fermentat (*Allium sativum*) în scopul obținerii produselor alimentare funcționale

Student: **Mașcauțan Zina**

Conducător: **Capcanari Tatiana**

Chișinău, 2022

Rezumat

al tezei de master cu titlul „ Valorificarea compușilor biologic activi din usturoi fermentat (*Allium sativum*) în scopul obținerii produselor alimentare funcționale”

În cadrul tezei de master a fost cercetată oportunitatea utilizării usturoiului negru fermentat în calitate de ingredient în industria alimentară în scopul obținerii ciocolatei funcționale cu adaos de usturoi negru (fără adaos de zahăr) și promovarea acestuia ca produs autohton, datorită conținutului sporit de compuși biologic activi. Conținutul de compuși biologic activi a fost determinat prin conținutul total de polifenoli, flavonoide, taninuri, vitamina C, de asemenea au fost determinați și alți parametri : conținutul de proteină, zaharuri, pH. A fost elaborat procedeul de obținere a usturoiului negru, în urma căruia au fost cercetate modificările compușilor biologic activi în dinamica procesului de fermentare. În urma cercetării tehnologiei de obținere a usturoiului fermentat, s-a demonstrat un potențial funcțional sporit a usturoiului negru, comparativ cu usturoiul alb proaspăt.

A fost elaborată tehnologia de obținere a ciocolatei funcționale cu adaos de usturoi negru (fără adaos de zahăr), după care a avut loc cercetarea produsului funcțional finit în baza parametrilor de control, care corespund documentelor normative în vigoare.

S-a demonstrat că ciocolata funcțională cu adaos de usturoi negru obținută, prezintă indici fizico-chimici, microbiologici și organoleptici ce sunt în limitele documentației normative pentru produsul elaborat.

Cuvinte-cheie: usturoi (Allium sativum), usturoi negru, compuși biologic activi, parametri fizico-chimici, ciocolată funcțională.

Résumé

du mémoire de maîtrise intitulé "Valorisation de composés bioactifs à partir d'ail fermenté (Allium sativum) en vue d'obtenir des aliments fonctionnels"

La thèse de maîtrise a étudié l'opportunité d'utiliser l'ail noir fermenté comme ingrédient dans l'industrie alimentaire afin d'obtenir du chocolat fonctionnel avec l'ajout d'ail noir (sans sucre ajouté) et sa promotion en tant que produit local, en raison de la teneur élevée en composés bioactifs. La teneur en composés biologiquement actifs a été déterminée par la teneur totale en polyphénols, flavonoides, tanins, vitamine C, d'autres paramètres ont également été déterminés : teneur en protéines, sucres, pH.

A été élaboré le processus d'obtention de l'ail noir, à la suite du'quel ont été étudiées les modifications de composés bioactifs dans la dynamique du processus de fermentation. Les recherches sur la technologie d'obtention de l'ail fermenté ont montré un potentiel fonctionnel accru de l'ail noir par rapport à l'ail blanc frais.

A été développée, la technologie d'obtention de chocolat fonctionnel avec ajout d'ail noir (sans sucre ajouté), après quoi a été effectuée la recherche du produit fonctionnel fini sur la base des paramètres de contrôle, qui correspondent aux documents normatifs en vigueur. Il a été démontré que le chocolat fonctionnel additionné d'ail noir obtenu présente des indices physico-chimiques, microbiologiques et organoleptiques qui se situent dans les limites de la documentation normative du produit élaboré.

Mots-clés : ail (Allium sativum), ail noir, composés bioactifs, paramètres physico-chimiques, chocolat fonctionnel.

Cuprins

Bibliografie

[1]- Yuan H, Sun L, Chen M, Wang J. The comparison of the contents of sugar, Amadori, and Heyns compounds in fresh and black garlic. J Food Sci 2016;

[2] -Bradley C. New black magic: black garlic is new food sensation. Herald Times.

[3] - Chirsanova A., Reșitca V., Siminiuc R., Suhodol N., Popovici C., Deseatnicova O., Capcanari T., Gutium O., Covaliov E., Grosu C., Paladi D., Mija N., Coșciug L., Ciumac J. Produse alimentare inovative. Univ. Tehn. a Moldovei, Fac. Tehnologia Alimentelor, Dep. Alimentaţie şi Nutriţie. Chişinău: Tehnica UTM, 2021. 455 p. ISBN 978-9975-45-704-0. DOI: 10.5281/zenodo.5563412

[4] -Park C, Park S, Chung YH, Kim GY, Choi YW, Kim BW, Choi YH. Induction of apoptosis by a hexane extract of aged black garlic in the human leukemic U937 cells. Nutr Res Pract 2014;

[5]- Kim, J. H., Nam, S. H., Rico, C. W., & Kang, M. Y. (2012). A comparative study on the antioxidative and anti-allergic activities of fresh and aged black garlic extracts. International Journal of Food Science & Technology, 47(6), 1176–1182. https://doi.org/ 10.1111/j.1365-2621.2012.02957.x

[6]- Martínez-Casas, L., Lage-Yusty, M., & López-Hernández, J. (2017). Changes in the aromatic profile, sugars, and bioactive compounds when purple garlic is transformed into black garlic. Journal of Agricultural and Food Chemistry, 65(49), 10804–10811. https://doi.org/10.1021/acs.jafc.7b04423

[7] -Sato, E., Kohno, M., & Niwano, Y. (2006). Increased level of tetrahydro-β-carboline derivatives in short-term fermented garlic. Plant Foods for Human Nutrition, 61(4), 175–178. https://doi.org/ 10.1007/s11130-006-0028-2

[8]- Zhang, X. Y., Li, N. Y., Lu, X. M., Liu, P. L., & Qiao, X. G. (2016). Effects of temperature on the quality of black garlic. Journal of the Science of Food and Agriculture, 96(7), 2366–2372. https://doi.org/ 10.1002/jsfa.7351

[9]- Bae, S. E., Cho, S. Y., Won, Y. D., Lee, S. H., & Park, H. J. (2014). Changes in S-allyl cysteine contents and physicochemical properties of black garlic during heat treatment. LWT—Food Science and Technology, 55(1), 397–402. https://doi.org/10.1016/j.lwt.2013.05.

[10]- Liang, T., Wei, F., Lu, Y., Kodani, Y., Nakada, M., Miyakawa, T., & Tanokura, M. (2015). Comprehensive NMR analysis of compositional changes of black garlic during thermal processing. Journal of Agricultural and Food Chemistry, 63(2), 683–691. https://doi.org/10.1021/jf504836d

[11]- Petrovska, B. B., & Cekovska, S. (2010). Extracts from the history and medical properties of garlic. Pharmacognosy Reviews, 4(7), 106– 110. https://doi.org/10.4103/0973-7847.65321

[12]- Al-Nagdy, S. A., Abdel-Rahman, M. O., & Heiba, H. I. (1988). Evidence for some prostaglandins in Allium sativum extracts. Phytotherapy Research, 2(4), 196–197. https://doi.org/10.1002/ptr.2650020410

[13]- Clement, F., Pramod, S. N., & Venkatesh, Y. P. (2010). Identity of the immunomodulatory proteins from garlic (Allium sativum) with the major garlic lectins or agglutinins. International Immunopharmacology, 10(3), 316–324. https://doi.org/10.1016/j.intimp.2009.12.

[14]- Rahman, K. (2003). Garlic and aging: New insights into an old remedy. Ageing Research Reviews, 2(1), 39–56. https://doi.org/ 10.1016/S1568-1637(02)00049-1

[15]- U. S. Department of Agriculture (USDA). (2018). Agricultural research service. FoodData Central ("Garlic, raw"). Washington, DC: USDA. Retrieved from https://fdc.nal.usda.gov/ fdc-app.html#/food-details/169230/nutrients

[16]- Zhao, Y. Q. (2017). Evaluation on the quality of garlic bulbs in different production areas in china and its relationship with the environment of producing areas (MS dissertation). Northwest A&F University, Shanxi, China.

[17]- Horníčková, J., Kubec, R., Cejpek, K., Velíšek, J., Ovesna, J., & Stavělíková, H. (2010). Profiles of S-alk(en)ylcysteine sulfoxides in various garlic genotypes. Czech Journal of Food Sciences, 28(4), 298–308. https://doi.org/10.1080/19476330903450282

[18]- Jeong, Y., Ryu, J., Shin, J. H., Kang, M., Kang, J., Han, J., & Kang, D. (2016). Comparison of anti-oxidant and anti-inflammatory effects between fresh and aged black garlic extracts. Molecules, 21(4), 430. https://doi.org/10.3390/molecules21040430

[19]- Kim, H. K., Choi, Y. W., Lee, E. N., Park, J. K., Kim, S. G., Park, D. J., … Yoon, S. (2011). 5-Hydroxymethylfurfural from black garlic extract prevents TNFα-induced monocytic cell adhesion to HUVECs by suppression of vascular cell adhesion molecule-1 expression, reactive oxygen species generation and NF-κB activation. Phytotherapy Research, 25(7), 965–974. https://doi.org/10.1002/ptr.3351

[20]- Eidi, A., Eidi, M., & Esmaeili, E. (2006). Antidiabetic effect of garlic (Allium sativum L.) in normal and streptozotocin-induced diabetic rats. Phytomedicine, 13(9–10), 624–629. https://doi.org/ 10.1016/j.phymed.2005.09.010

[21]- Sangeetha, T., & Quine, S. D. (2009). Preventive effect of S-allyl cysteine sulphoxide (Alliin) on mitochondrial dysfunction in normal and isoproterenol induced cardiotoxicity in male Wistar rats: A histopathological study. Molecular and Cellular Biochemistry, 328(1–2), 1–8. https://doi.org/10.1007/s11010-009-0066-9

[22]- Avci, A., Atli, T., Ergüder, I. B., Varli, M., Devrim, E., Aras, S., & Durak, I. (2008). Effects of garlic consumption on plasma and erythrocyte antioxidant parameters in elderly subjects. Gerontology, 54(3), 173– 176. https://doi.org/10.1159/000130426

[23]- Yoo, J. M., Sok, D. E., & Kim, M. R. (2014). Anti-allergic action of aged black garlic extract in RBL-2H3 cells and passive cutaneous anaphylaxis reaction in mice. Journal of Medicinal Food, 17(1), 92– 102. https://doi.org/10.1089/jmf.2013.2927

[24]- Nwokocha, C. R., Owu, D. U., Nwokocha, M. I., Ufearo, C. S., & Iwuala, M. O. (2012). Comparative study on the efficacy of Allium sativum (garlic) in reducing some heavy metal accumulation in liver of Wistar rats. Food and Chemical Toxicology, 50(2), 222–226. https://doi.org/10.1016/j.fct.2011.11.003

[25]- Galeone, C., Pelucchi, C., Levi, F., Negri, E., Franceschi, S., Talamini, R., … La Vecchia, C. (2006). Onion and garlic use and human cancer. The American Journal of Clinical Nutrition, 84(5), 1027–1032. https://doi.org/10.1093/ajcn/84.5.1027

[26]- Sahu, S., Das, B. K., Mishra, B. K., Pradhan, J., & Sarangi, N. (2007). Effect of Allium sativum on the immunity and survival of Labeo rohita infected with Aeromonas hydrophila. Journal of Applied Ichthyology, 23(1), 80–86. https://doi.org/10.1111/ j.1439-0426.2006.

[27]- Ye, H. Y., & Zhang, Z. Y. (2003). Study progress on immune regulation effect of garlic. Journal of Chinese Medical Pharmacology, 3(3), 54–56.

[28]- Corzo-Martínez, M., Corzo, N., & Villamiel, M. (2007). Biological properties of onions and garlic. Trends in Food Science & Technology, 18(12), 609–625. https://doi.org/10.1016/j.tifs.2007.07.011

[29]- Hardy, J.; Parmentier, M.; Fanni, J. Functionality of nutrients and thermal treatment of food. Proc. Nutr. Soc. 1999, 58, 579–585

[30]- Nursten, H. The Maillard Reaction: Chemistry Biochemistry and Implications; The Royal Society of Chemistry: Cambridge, UK, 2005; pp. 2–4.

[31]- Billaud, C.; Maraschin, C.; Nicolas, J. Inhibition of polyphenoloxidase from apple by Maillard reaction products prepared from glucose or fructose with L-cysteine under various conditions of pH and temperature. LWT-Food Sci. Technol. 2004, 37, 69–78.

[32]- Santhosha SG, Jamuna P, Prabhavathi SN. Bioactive components of garlic and their physiological role in health maintenance: a review. Food Biosci 2013;

[33]- Amagase H, Petesch BL, Matsuura H, Kasuga S, Itakura Y. Intake of garlic and its bioactive components. J Nutr 2001.

[34]- Choi S, Cha HS, Lee YS. Physicochemical and antioxidant properties of black garlic. Molecules 2014;

[35]- Hwang IG, Kim HY, Woo KS, Lee J, Jeong HS. Biological activities of Maillard reaction products (MRPs) in a sugareamino acid model system. J Food Chem 2011;

[36]- Vokk R, Tedersoo E, Lougas T, Valgma K, Rosend J. Comparative study on anti-oxidant activity of garlic grown in different regions. Agro Res 2014;

[37]- Sato E, Kohno M, Hamano H, Niwano Y. Increased antioxidative potency of garlic by spontaneous short-term fermentation. Plant Foods Hum Nutr 2006;

[38]- Gorinstein S, Leontowicz H, Leontowicz M, Namiesnik J, Najman K, Drzewiecki J, Cvikrova M, Martincova O, Katrich E, Trakhtenberg S. Comparison of the main bioactive compounds and antioxidant activities in garlic and white and red onions after treatment protocols. J Agric Food Chem 2008;

[39]- Ioannou I, Hafsa I, Hamdi S, Charbonnel C, Ghoul M. Review of the effects of food processing and formulation on flavonol and anthocyanin behavior. J Food Eng 2012;

[40]- Sasaki, J. I., Lu, C., Machiya, E., Tanahashi, M., & Hamada, K. (2007). Processed black garlic (Allium sativum) extracts enhance anti-tumor potency against mouse tumors. Medicinal and Aromatic Plant Science and Biotechnology, 1(2), 278–281

[41]- Choi, D. J., Lee, S. J., Kang, M. J., Cho, H. S., Sung, N. J., & Shin, J. H. (2008). Physicochemical characteristics of black garlic (Allium sativum L.). Journal of the Korean Society of Food Science and Nutrition, 37(4), 465–471. https://doi.org/10.3746/jkfn.2008.37.4.465

[42]- Lu, X. M., Li, N. Y., Qiao, X. G., Qiu, Z. C., & Liu, P. L. (2017). Composition analysis and antioxidant properties of black garlic extract. Journal of Food and Drug Analysis, 25(2), 340–349. https://doi.org/10.1016/j.jfda.2016.05.011

[43]- Toledano-Medina, M. A., Pérez-Aparicio, J., Moreno-Rojas, R., & Merinas-Amo, T. (2016). Evolution of some physicochemical and antioxidant properties of black garlic whole bulbs and peeled cloves. Food Chemistry, 199, 135–139. https://doi.org/ 10.1016/j.foodchem.2015.11.128

[44]- Zhang, Z., Lei, M., Liu, R., Gao, Y., Xu, M., & Zhang, M. (2015). Evaluation of alliin, saccharide contents and antioxidant activities of black garlic during thermal processing. Journal of Food Biochemistry, 39(1), 39–47. https://doi.org/10.1111/jfbc.12102

[45]- Yuan, H., Sun, L., Chen, M., & Wang, J. (2018). An analysis of the changes on intermediate products during the thermal processing of black garlic. Food Chemistry, 239, 56–61. https://doi.org/ 10.1016/j.foodchem.2017.06.079

[46]- Sato, E., Kohno, M., & Niwano, Y. (2006). Increased level of tetrahydro-β-carboline derivatives in short-term fermented garlic. Plant Foods for Human Nutrition, 61(4), 175–178. https://doi.org/ 10.1007/s11130-006-0028-2

[47]- Li, N. Y., Lu, X. M., Pei, H. B., & Qiao, X. G. (2015). Effect of freezing pretreatment on the processing time and quality of black garlic. Journal of Food Process Engineering, 38(4), 329–335. https://doi.org/10.1111/jfpe.12156

[48]- Kim, J. S., Kang, O. J., & Gweon, O. C. (2013b). Changes in the content of fat-and water-soluble vitamins in black garlic at the different thermal processing steps. Food Science and Biotechnology, 22(1), 283– 287. https://doi.org/10.1007/s10068-013-0039-3

[49]- Kang, O. J. (2016b). Physicochemical characteristics of black garlic after different thermal processing steps. Preventive Nutrition and Food Science, 21(4), 348–354. https://doi.org/10.3746/pnf.2016.21.4.348

[50]- Bayan, L., Koulivand, P. H., & Gorji, A. (2014). Garlic: A review of potential therapeutic effects. Avicenna Journal of Phytomedicine, 4(1), 1–14

[51]- Jung, I. C., & Sohn, H. Y. (2014). Antioxidation, antimicrobial and antithrombosis activities of aged black garlic (Allium sativum L.). Microbiology and Biotechnology Letters, 42(3), 285–292. https://doi.org/10.4014/kjmb.1407.07002

[52]- Lee, Y. M., Gweon, O. C., Seo, Y. J., Im, J., Kang, M. J., Kim, M. J., & Kim, J. I. (2009). Antioxidant effect of garlic and aged black garlic in animal model of type 2 diabetes mellitus. Nutrition Research and Practice, 3(2), 156–161. https://doi.org/10.4162/nrp.2009.3.2.156

[53]- Kim, S. H., Jung, E. Y., Kang, D. H., Chang, U. J., Hong, Y. H., & Suh, H. J. (2012). Physical stability, antioxidative properties, and photoprotective effects of a functionalized formulation containing black garlic extract. Journal of Photochemistry and Photobiology B: Biology, 117, 104–110. https://doi.org/1

[54]- Ryu, K., Ide, N., Matsuura, H., & Itakura, Y. (2001). N α-(1-deoxyd-fructos-1-yl)-l-arginine, an antioxidant compound identified in aged garlic extract. The Journal of Nutrition, 131(3), 972S–976S. https://doi.org/10.1093/jn/131.3.972S

[55]- Park, C., Park, S., Chung, Y. H., Kim, G. Y., Choi, Y. W., Kim, B. W., & Choi, Y. H. (2014). Induction of apoptosis by a hexane extract of aged black garlic in the human leukemic U937 cells. Nutrition Research and Practice, 8(2), 132–137. https://doi.org/ 10.4162/nrp.2014.8.2.132

[56]- Dong, M., Yang, G., Liu, H., Liu, X., Lin, S., Sun, D., & Wang, Y. (2014). Aged black garlic extract inhibits HT29 colon cancer cell growth via the PI3K/Akt signaling pathway. Biomedical Reports, 2(2), 250–254. https://doi.org/10.3892/br.2014.226

[57]- Wang, X., Jiao, F., Wang, Q. W., Wang, J., Yang, K., Hu, R. R., … Wang, Y. S. (2012). Aged black garlic extract induces inhibition of gastric cancer cell growth in vitro and in vivo. Molecular Medicine Reports, 5(1), 66–72. https://doi.org/10.3892/mmr.2011.588

[58]- Shin, D. Y., Yoon, M. K., Choi, Y. W., Gweon, O. C., Kim, J. I., Choi, T. H., & Choi, Y. H. (2010). Effects of aged black garlic extracts on the tight junction permeability and cell invasion in human gastric cancer cells. Journal of Life Science, 20(4), 528–534. https://doi.org/10.5352/JLS.2010.20.4.528

[59]- Kopelman, P. G. (2000). Obesity as a medical problem. Nature, 404(6778), 635–643. https://doi.org/10.1038/35007508

[60]- Seo, Y. J., Gweon, O. C., Im, J., Lee, Y. M., Kang, M. J., & Kim, J. I. (2009). Effect of garlic and aged black garlic on hyperglycemia and dyslipidemia in animal model of type 2 diabetes mellitus. Journal of Food Science and Nutrition, 14(1), 1–7. https://doi.org/10.3746/jfn.2009.14.1.001

[61]- Chen, Y. C., Kao, T. H., Tseng, C. Y., Chang, W. T., & Hsu, C. L. (2014). Methanolic extract of black garlic ameliorates dietinduced obesity via regulating adipogenesis, adipokine biosynthesis, and lipolysis. Journal of Functional Foods, 9, 98–108. https://doi.org/10.1016/j.jff.2014.02.019

[62]- Ha, A. W., Ying, T., & Kim, W. K. (2015). The effects of black garlic (Allium sativum) extracts on lipid metabolism in rats fed a high fat diet. Nutrition Research and Practice, 9(1), 30–36. https://doi.org/10.4162/nrp.2015.9.1.30

[63]- Kang, M. J., Lee, S. J., Sung, N. J., & Shin, J. H. (2013). The effect of extract powder from fresh and black garlic on main components in serum and organs of streptozotocin-induced diabet rats. Journal of Life Science, 23(3), 432–442. https://doi.org/10. 5352/JLS.2013.23.3.432

[64]- Chadwick, M., Gawthrop, F., Michelmore, R. W., Wagstaff, C., & Methven, L. (2016). Perception of bitterness, sweetness and liking of different genotypes of lettuce. Food Chemistry, 197, 66–74. https://doi.org/10.1016/j.foodchem.2015.10.105

[65]- Kim, K. W., Kim, Y. T., Kim, M., Noh, B. S., & Choi, W. S. (2014). Effect of high hydrostatic pressure (HHP) treatment on flavor, physicochemical properties and biological functionalities of garlic. LWT—Food Science and Technology, 55(1), 347–354. https://doi.org/10.1016/j.lwt.2013.08.027

[66]- Huang, Y. A., Maruyama, Y., Stimac, R., & Roper, S. D. (2008). Presynaptic (Type III) cells in mouse taste buds sense sour (acid) taste. The Journal of Physiology, 586(12), 2903–2912. https://doi.org/10.1113/jphysiol.2008.151233

[67]- Li, Z., Yi, G., Yin, J., Sun, P., Li, D., & Knight, C. (2008). Effects of organic acids on growth performance, gastrointestinal pH, intestinal microbial populations and immune responses of weaned pigs. Asian-Australasian Journal of Animal Sciences, 21(2), 252–261. https://doi.org/10.5713/ajas.2008.70089

[68]- Marnett, L. J. (2002). Oxy radicals, lipid peroxidation and DNA damage. Toxicology, 181, 219–222. https://doi.org/10.1016/ S0300-483X(02)00448-1

[69]- Millward, D. J., Layman, D. K., Tomé, D., & Schaafsma, G. (2008). Protein quality assessment: Impact of expanding understanding of protein and amino acid needs for optimal health. The American Journal of Clinical Nutrition, 87(5), 1576S–1581S. https://doi.org/10.1093/ajcn/87.5.1576S

[70]- Sadikovic, B., & Rodenhiser, D. I. (2006). Benzopyrene exposure disrupts DNA methylation and growth dynamics in breast cancer cells. Toxicology and Applied Pharmacology, 216(3), 458–468. https://doi.org/10.1016/j.taap.2006.06.012

[71]- Alasalvar, C., Shahidi, F., & Cadwallader, K. R. (2003). Comparison of natural and roasted Turkish tombul hazelnut (Corylus avellana L.) volatiles and flavor by DHA/GC/MS and descriptive sensory analysis. Journal of Agricultural and Food Chemistry, 51(17), 5067–5072. https://doi.org/10.1021/jf0300846

[72]- Baker, G. L., Cornell, J. A., Gorbet, D. W., O'Keefe, S. F., Sims, C. A., & Talcott, S. T. (2006). Determination of pyrazine and flavor variations in peanut genotypes during roasting. Journal of Food Science, 68(1), 394–400. https://doi.org/10.1111/j.1365-2621.2003.tb14171.x

[73]- Felton, J. S., Knize, M. G., Salmon, C. P., Malfatti, M. A., & Kulp, K. S. (2002). Human exposure to heterocyclic amine food mutagens/carcinogens: Relevance to breast cancer. Environmental and Molecular Mutagenesis, 39(2–3), 112–118. https://doi.org/ 10.1002/em.10070

[74]- Costalos, C., Kapiki, A., Apostolou, M., & Papathoma, E. (2008). The effect of a prebiotic supplemented formula on growth and stool microbiology of term infants. Early Human Development, 84(1), 45– 49. https://doi.org/10.1016/j.earlhumdev.2007.03.001

[75]- Capuano, E., & Fogliano, V. (2011). Acrylamide and 5- hydroxymethylfurfural (HMF): A review on metabolism, toxicity, occurrence in food and mitigation strategies. LWT—Food Science and Technology, 44(4), 793–810. https://doi.org/10.1016/ j.lwt.2010.11.002

[76]- Bozin, B., Mimica-Dukic, N., Samojlik, I., Goran, A., & Igic, R. (2008). Phenolics as antioxidants in garlic (Allium sativum L., Alliaceae). Food Chemistry, 111(4), 925–929. https://doi.org/10.1016/ j.foodchem.2008.

[77]- Wang, H. Y., Qian, H., & Yao, W. R. (2011). Melanoidins produced by the Maillard reaction: Structure and biological activity. Food Chemistry, 128(3), 573–584. https://doi.org/10.1016/j.foodchem. 2011.03.075

[78]- Kao, S. H., Hsu, C. H., Su, S. N., Hor, W. T., & Chow, L. P. (2004). Identification and immunologic characterization of an allergen, alliin lyase, from garlic (Allium sativum). Journal of Allergy and Clinical Immunology, 113(1), 161–168. https://doi.org/ 10.1016/j.jaci.2003.

[79]- Cao, R. H., Peng, W. L., Wang, Z. H., & Xu, A. L. (2007). β-Carboline alkaloids: Biochemical and pharmacological functions. Current Medicinal Chemistry, 14(4), 479–500. https://doi.org/ 10.2174/092986707779940998

[80]- Zhao, L., Chen, J., Su, J., Li, L., Hu, S., Li, B., … Chen, T. (2013). In vitro antioxidant and antiproliferative activities of 5- hydroxymethylfurfural. Journal of Agricultural and Food Chemistry, 61(44), 10604–10611. https://doi.org/10.1021/jf403098y

[81]- Severin, I., Dumont, C., Jondeau-Cabaton, A., Graillot, V., & Chagnon, M. C. (2010). Genotoxic activities of the food contaminant 5-hydroxymethylfurfural using different in vitro bioassays. Toxicology Letters, 192(2), 189–194. https://doi.org/10. 1016/j.toxlet.2009.10.022

[82]- Levin, E. D., Addy, N., Baruah, A., Elias, A., Christopher, N. C., Seidler, F. J., & Slotkin, T. A. (2002). Prenatal chlorpyrifos exposure in rats causes persistent behavioral alterations. Neurotoxicology and Teratology, 24(6), 733–741. https://doi.org/ 10.1016/S0892-0362(02)00272-6

[83]- Itoh, S., Ozumi, K., Kim, H. W., Nakagawa, O., McKinney, R. D., Folz, R. J., … Fukai, T. (2009). Novel mechanism for regulation of extracellular SOD transcription and activity by copper: Role of antioxidant-1. Free Radical Biology and Medicine, 46(1), 95–104. https://doi.org/10.1016/j.freeradbiomed.2008.09.039

[84] - Dairam, A., Fogel, R., Daya, S., & Limson, J. L. (2008). Antioxidant and iron-binding properties of curcumin, capsaicin, and S-allylcysteine reduce oxidative stress in rat brain homogenate. Journal of Agricultural and Food Chemistry, 56(9), 3350–3356. https://doi.org/10.1021/jf0734931

[85]- Tsubura, A., Lai, Y. C., Kuwata, M., Uehara, N., & Yoshizawa, K. (2011). Anticancer effects of garlic and garlic-derived compounds for breast cancer control. Anti-Cancer Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Cancer Agents), 11(3), 249–253. https://doi.org/10.2174/187152011795347441

[86]- Eberhardt, M. V., Lee, C. Y., & Liu, R. H. (2000). Nutrition: Antioxidant activity of fresh apples. Nature, 405(6789), 903–904. https://doi.org/10.1038/35016151

[87]- Green, R., Allen, L. H., Bjørke-Monsen, A. L., Brito, A., Guéant, J. L., Miller, J. W., … Ueland, P. M. (2017). Vitamin B 12 deficiency. Nature Reviews Disease Primers, 3, 17040. https://doi.org/ 10.1038/nrdp.2017.40

[88]- Rayman, M. P. (2012). Selenium and human health. The Lancet, 379(9822), 1256–1268. https://doi.org/10.1016/S0140-6736(11) 61452-9

[89]- Wang, Y., Zhang, J. L., & Jing, H. (2016). Composition analysis of black garlics prepared by different garlic types of and processing technologies. Journal of Food Safety and Quality, 7(9), 3085–3091

[90]- Tran, G. B., Dam, S. M., & Le, N. T. T. (2018). Amelioration of single clove black garlic aqueous extract on dyslipidemia and hepatitis in chronic carbon tetrachloride intoxicated Swiss albino mice. International Journal of Hepatology, 2018, 1–9. https://doi.org/10.1155/2018/9383950

[91]- Zhong, C., Xu, G. J., Wu, X. Y., Guo, Y. P., & Jia, S. R. (2014). Effect of dwell time on partial nutrients and antioxidant capacity of black garlic. Modern Food Science and Technology, 30(3), 49–52. https://doi.org/10.13982/j.mfst.1673-9078.2014.03.019

[92]- Rapusas, R. S., & Driscoll, R. H. (1995). Kinetics of nonenzymatic browning in onion slices during isothermal heating. Journal of Food Engineering, 24(3), 417–429. https://doi.org/ 10.1016/0260-8774(95)90054-F

[93]- Luo, C. X., Su, D. X., & Chen, S. Y. (2013). Optimization of liquid-fermentation technology for black garlic. Transactions of the Chinese Society of Agricultural Engineering, 29(18), 292–297. https://doi.org/10.3969/j.issn.1002-6819.2013.18.035

[94]- Fang, L. (2017). Effects of humidity on the quality of black garlic (MS dissertation). Shandong Agricultural University, Shandong, China.

[95]- Sun, Y. E., & Wang, W. (2018). Changes in nutritional and bio-functional compounds and antioxidant capacity during black garlic processing. Journal of Food Science and Technology, 55(2), 479–488. https://doi.org/10.1007/s13197-017-2956-2

[96]- Lv, W. (2010). Study on preparation of fructo oligosaccharides by garlic (PhD dissertation). Nanchang University, Nanchang, China.

[97]- Labuza, T. P., & Saltmarch, M. (1981). The nonenzymatic browning reaction as affected by water in foods. In L. B. Rockland & G. F. Stewart (Eds.), Water activity: Influences on food quality (pp. 605–650). Pittsburgh, PA: Academic Press.

[98]-AOAC. Official Methods of Analysis of AOAC International, 15th ed.; Association of Official Analytical of Official Aanalytical Communities: Washington, DC, USA, 1990.

[99]-Miller, G.L. Use of dinitrosalycilic acid reagent for the determination of reducing sugar. Anal. Chem. 1959, 31, 426–428.

[100]- Arnous, A.; Makris, D.P.; Kefalas, P. Effect of principal polyphenol components in relation to antioxidant characteristics of aged red wines. J. Agric. Food Chem. 2001, 49, 5736–5742.

[101]- Shen, Y.; Jin, L.; Xiao, P.; Lu, Y.; Bao, J. Total phenolics, flavonoids, antioxidant capacity in rice grain and their relations to grain color, size, and weight. J. Cereal Sci. 2009, 49, 106–111.

[102]-Brand-Williams, W.; Cuvelier, M.E.; Berset, C. Use of a free-radical method to evaluate antioxidant activity. LWT-Food Sci. Technol. 1995, 28, 25–30.

[103]- Re, R.; Pellegrini, N.; Proteggente, A.; Pannala, A.; Yang, M.; Rice-Evans, C. Antioxidant activity applying an improved ABTS radical cation decolorization assay. Free Radic. Biol. Med. 1999, 26, 1231–1237.

[104]- Benzie, I.F.; Strain, J.J. The ferric reducing ability of plasma (FRAP) as a measure of antioxidant power: The FRAP assay. Anal. Biochem. 1996, 239, 70–76.

[105]- Oyaizu, M. Studies on products of the browning reaction: Antioxidative activities of browning reaction products prepared from glucosamine. Jpn. J. Nutr. Diet. 1986, 44, 307–315

[106]- Sarah Brewer, Articol Beneficiile Usturoiului Negru ro.waykum.com

[107]- Yagi, H., Tan, J., Tuan, RS (2013) Polifenolii suprimă hidrogenul. Stresul oxidativ indus de peroxid în măduva osoasă umană. Journal of Cellular Biochemistry, 114,1163 – 1173.

[108]- Kamboh, AA, Arain, MA, Mughal, MJ, Zaman, A., Arain, ZM, Soomro, AH (2015) Flavonoide: substanțe fitochimice care promovează sănătatea pentru producția animală. Journal of Animal Health and Production, 3, 6 – 13.

[109]- БИРГЕР, М. Справочник по микробиологическим и вирусологическим методам исследования. Москва: Медицина, 1982. 461 с

[110]- ЕГОРОВ, Н. Основы учения об антибиотиках. Москва: Наука, 2004, 528 с. ISBN 5- 02-033595-9.

[111]- Сборник инструкций по селекции молочнокислых бактерий и бифидобактерий и подбору заквасок для кисломолочных продуктов. Москва: ВНИИМС, 1986, 100 с.

[112]- Ferri, C., & Grassi, D. (2010). Antioxidants and beneficial microvascular effects. Is this the remedy? Hypertension, 55, 1310–1311.

[113]- Franco, D. J., Sineiro, M., & Nu´ n˜ ez, M. J. (2007). Ethanolic extraction of Rosa rubiginosa soluble substances: Oil solubility equilibria and kinetic studies. Journal of Food Engineering, 79, 150–157

[114]- D. Villa˜no, M.S. Fern´andez-Pach´on, A.M. Troncoso, M.C. Garc´ıa-Parrilla. Chim. Acta 538 (2005) 391.

[115]- Cui Y, et al. (2004)

[116]- Rodica Sturza (2006), Principii moderne de analiză a alimentelor, pag.275

[117]- Bae, S.E.; Cho, S.Y.; Won, Y.D.; Lee, S.H.; Park, H.J. Changes in S-allyl cysteine contents and physicochemical properties of black garlic during heat treatment. LWT-Food Sci. Technol. 2015, 55, 397–402. [CrossRef]

[118]- Luiza Sandulachi, Silvia Rubțov, Iulia Sandu, UTM, FTA – Chișinău 2018

[119]- ГОСТ 6534-89, МЕЖГОСУДАРСТВЕННЫЙ СТАНДАРТ ШОКОЛАД Общие технические условия Chocolate. General specifications

[120]- ГОСТ 31721-2012, ШОКОЛАД Общие технические условия Chocolate. General specifications

[121]- Herrmann, K. (1989). Occurrence and content of hydroxycinnamic and hydroxybenzoic acid compounds in food. Critical Review in Food Science and Nutrition, 28, 315–347.

[122]- Dziedzic, S. Z., & Hudson, B. J. F. (1983). Hydroxy isoflavones as antioxidants for edible oils. Food Chemistry, 11, 161–166.

[123]- Jeong YY, Ryu JH, Shin JH, Kang MJ, Kang JR, Han J, Kang D. Comparison of anti-oxidant and anti-inflammatory effects between fresh and aged black garlic extracts. Molecules 2016;

[124]- Ciumac J, Reșitca V, Chirsanova A, Capcanari T, Boaghi E. Общая технология пищевых производств. Chişinău, Editura „Tehnică–UTM”, 2019. CZU.;663(664):075-8.

[125]- PALADI, Daniela, CAPCANARI, Tatiana. Toxicologia şi securitatea produselor alimentare: Note de curs. Partea 1. Univ. Tehn. a Moldovei., Fac. Tehnologia Alimentelor; Dep. Alimentaţie şi Nutriţie. Chişinău: Tehnica UTM, 2019. 84 p. ISBN 978-9975-45-585-5.

[126]- CHIRSANOVA, Aurica, CAPCANARI, Tatiana. Instrucţiuni: Prelucrarea sanitară în cadrul unităţilor de alimentaţie publică. Univ. Tehn. a Moldovei, Fac. Tehnologia Alimentelor, Dep. Alimentaţie şi Nutriţie. Chişinău: Tehnica-UTM, 2018. –33 p. ISBN 978-9975-45-559-6.

[127]-Tatiana Capcanari, Daniela Paladi. Токсикология и безопасность пищевых продуктов. Note de curs. Partea I. Chişinău, Editura „Tehnică – UTM”, 2018. – 88p. ISBN 978-9975-45-558-9. CZU 615.9:663/664(075.8), K 202.

[128]- Jorj C, Vladislav R, Aurica C, Tatiana C. Tehnologia generală a produselor alimentare: Indicații metodice privind efectuarea lucrărilor de laborator/Univ. Tehn. a Moldovei, Fac. Tehnologia Alimentelor, Dep. Alimentaţie şi Nutriţie. Ch.: Tehnica-UTM. 2019. – 147 p. ISBN 978-9975-45-586-2. CZU 663/664.0(076.5), T 32.

[129]- Paladi D, Chirsanova A, Mija N, Capcanari T. Toxicologie și securitate alimentară. Îndrumar metodic pentru îndeplinirea lucrărilor de laborator. CHIŞINĂU: Editura „Tehnică–UTM. 2017.

[130]- Aurica Chirsanova, Oxana Radu, Alina Boiştean, Tatiana Capcanari. Managementul calității aplicat în alimentație publică. Note de curs / Univ. Tehn. a Moldovei, Fac. Tehnologia Alimentelor, Dep. Alimentaţie şi Nutriţie. Ch.: Tehnica-UTM. 2021. – 136 p. ISBN 978-9975-45-736-1.

[131]- Aurica Chirsanova, Oxana Radu, Alina Boiştean, Tatiana Capcanari. Менеджмент качества в области общественного питания. Indicaţii metodice pentru lucrări practice/ Univ. Tehn. a Moldovei, Fac. Tehnologia Alimentelor, Dep. Alimentaţie şi Nutriţie. Ch.: Tehnica-UTM. 2021. – 90 p. ISBN 978-9975-45-740-8

[132]- Tatiana Capcanari, Natalia Suhodol, Alina Boiștean, Olga Deseatnicova. Организация обслуживания потребителей на предсприятиях общественного питания. Îndrumar metodic pentru lucrări practice. Chişinău, Editura „Tehnică – UTM”, 2018. – 56p. ISBN 978-9975-45-560-2. CZU642.6(076.5), K 202.

[133]- Tatiana Capcanari, Olga Deseatnicov, Daniela Paladi, Natalia Suhodol. Programa şi indicaţiile metodice cu privire la desfăşurarea practicii şi susţinerea raportului de către studenţii ciclului I – Licenţă, specialitatea 541.1 Tehnologia Alimentaţiei Publice. CHIŞINĂU: Editura „Tehnică – UTM”, 2017.

[134]- Capcanari, T., Chirsanova, A., Covaliov, E. and Siminiuc, R. (2021) Development of Lactose Free Yogurt Technology for Personalized Nutrition. Food and Nutrition Sciences, 12, 1116-1135. https://doi.org/10.4236/fns.2021.1211082

[135]- Eugenia Covaliov, Carolina Grosu, Violina Popovici, Capcanari, Tatiana, Siminiuc Rodica, Resitca Vladislav. Impact of sea buckthorn berries (hippophae rhamnoides) on yoghurt biological value and quality. The annals of the university Dunarea de Jos of Galati, fascicle VI – Food Technology 45(2) / 2021.

[136]- Chirsanova, A., Capcanari, T. and Boistean, A. (2021) Quality Assessment of Honey in Three Different Geographical Areas from Republic of Moldova. Food and Nutrition Sciences, 12, 962- 977. https://doi.org/10.4236/fns.2021.1210071.

[137]- Chirsanova, A. , Capcanari, T. , Boistean, A. and Siminiuc, R. (2021) Physico-Chemical Profile of Four Types of Honey from the South of the Republic of Moldova. *Food and Nutrition Sciences*, **12**, 874-888. doi: 10.4236/fns.2021.129065.

[138]- Eugenia Covaliov, Natalia Suhodol, Aurica Chirsanova, Tatiana Capcanari, Carolina Grosu, Rodica Siminiuc. Effect of grape skin powder extract addition on functional and physicochemical properties of marshmallow. Ukrainian Food Journal. 2021. Volume 10. Issue 2, pp. 333 – 345. DOI: 10.24263/2304- 974X-2021-10-2-10. https://nuft.edu.ua/doi/doc/ufj/2021/2/10.pdf

[139]- Chirsanova Aurica, Capcanari Tatiana, Boistean Alina, Covaliov Eugenia, Resitca Vladislav, Sturza Rodica. Behavior of Consumers in the Republic of Moldova Related to the Consumption of Trans Fat. International Journal of Food Science, Nutrition and Dietetics (IJFS) Int *J Food Sci Nutr Diet*. 2020;9(8):493-498. ISSN 2326-3350. doi: http://dx.doi.org/10.19070/2326-3350-2000086

[140]- Violina Popovici , Oxana Radu, Viacheslav Hubenia , Eugenia Covaliov, Tatiana Capcanari, Cristina Popovici. *Physico-chemical and sensory properties of functional confectionery products with Rosa Canina powder*. Ukrainian Food Journal, Volume 8, Issue 4, 2019, ISSN 2313–5891 (Online) ISSN 2304–974X, p.815-827. DOI: 10.24263/2304- 974X-2019-8-4-12

[141]-http://ufj.ho.ua/Archiv/UKRAINIAN%20FOOD%20JOURNAL%202019%20V.8%20Is.4.pdf

[142]- Tatiana Capcanari, Daniela Istrati, Felicia Dima, Camelia Vizireanu. Prospect of using the mixtures of sunflower and walnut oils for production of functional mayonnaise emulsions. Journal of Agroalimentary Processes and Technologies. Timișoara. *ISSN: 2069-0053 (print) (former ISSN: 1453-1399), Agroprint; ISSN (online): 2068-9551, 2015, pp. 296*-301. https://www.journal-of-agroalimentary.ro/admin/articole/4490346_A1_2014_Articol_Vizireanu_Capcanari_296-301.pdf

[143]- Cristina Popovici, Tatiana Capcanari, Olga Deseatnicova, Rodica Sturza. *Etude des propriétés rhéologiques et des structures de mayonnaises à une valeur biologique augmentée.* Revue de génie industriel 2012, 7, *ISSN 1313-8871*, 23-34 p. http://www.revue-genie-industriel.info

[144]- Tatiana Capcanari. *Incorporation of sweet pepper extracts to improve thermal stability of vegetable oil mixtures.* Journal Food and Environment Safety of Ştefan cel Mare University of Suceava. Food Engineering. ISSN:2068-6609. *EX ISSN 1842-4597*. Volume X, Issue 2 – 2011, pp.13-18. http://www.fia.usv.ro/fiajournal/index.php/FENS/article/view/355/353

[145]- CRISTINA POPOVICI, TATIANA CAPCANARI, OLGA DESEATNICOVA, RODICA STURZA. Study of quality indices of functional vegetal oil mixture. The Annals of the University Dunarea de Jos of Galati Fascicle VI – Food Technology 34(1), p. 18-34.

[146]- Aurica Chirsanova, Tatiana Capcanari, Alina Boistean, Imen Khanchel. Bee honey: history, characteristics, properties, benefits and adulteration in the beekeeping sector. Journal of Social Sciences. Vol. IV, no. 3 (2021), pp. 98 – 114. ISSN 2587-3490. https://doi.org/10.52326/jss.utm.2021.4(3).11

[147]- Aurica Chirsanova, Tatiana Capcanari, Alina Boistean. Palynological, physico-chemical and biologically active substances profile in some types of honey in the Republic of Moldova. Journal of Engineering Science. Vol. XXVIII, no. 3 (2021), pp. 175 – 186. ISSN 2587-3474. https://doi.org/10.52326/jes.utm.2021.28(3).14

[148]- Aurica Chirsanova, Tatiana Capcanari, Ecaterina Gîncu. Jerusalem Artichoke (*Helianthus Tuberosus*) flour impact on bread quality. *Journal of Engineering Science*. Vol. XXVIII, no. 1 (2021), pp. 131 – 143. ISSN 2587-3474. doi: 10.52326/jes.utm.2021.28(1).14 https://jes.utm.md/wp-content/uploads/sites/20/2021/04/JES-1-2021_131-143.pdf

[149]- Aurica Chirsanova, Eugenia Covaliov, Tatiana Capcanari, Natalia Suhodol, Olga Deseatnicova, Alina Boistean, Vladislav Resitca, Rodica Sturza. CONSUMER BEHAVIOR RELATED TO SALT INTAKE IN THE REPUBLIC OF MOLDOVA. *Journal of Social Sciences*. Vol. III, no. 4 (2020), pp. 101 – 110. DOI: 10.5281/zenodo.4296387 CZU 366:613.2:664.41(478). https://jss.utm.md/wp-content/uploads/sites/21/2021/01/JSS-4-2020-pp_101-110.pdf

[150]- CAPCANARI, T., POPOVICI, C., RADU, O., BOAGHI, E., POPOVICI, V. PFONATEC Project Design and Interfaces. 85 International scientific conference of young scientists and students "Youth scientific achievements to the 21st century nutrition problem solution", April 11–12, 2019, ISBN 978-966-612-213-4, p. 11.http://cris.utm.md/bitstream/5014/296/1/Part%201_24-24.pdf

[151]- CAPCANARI, T., BOAGHI, E., DESEATNICOVA, O., Paladi D. Analysis of children's nutritional status in the educational institutions of Moldova Republic. 85 International scientific conference of young scientists and students "Youth scientific achievements to the 21st century nutrition problem solution", April 11–12, 2019, ISBN 978-966-612-213-4, pp. 9.

[152]- CAPCANARI, T., POPOVICI, C, RADU, O., DESEATNICOVA, O. Potential Functional Properties of Curcubita Moschata and Curcubita Maxima. 85 International scientific conference of young scientists and students "Youth scientific achievements to the 21st century nutrition problem solution", April 11–12, 2019. pp.10. ISBN 978-966-612-213-4.

[153]- http://cris.utm.md/bitstream/5014/297/1/Part%201_22-23.pdf

[154]- POPESCU, A., BOAGHI, E. NETREBA, N., CAPCANARI, T. Bioactive compounds of pumpkin and formulation of functional pastry products, Papers of the international symposium EURO-ALIMENT, 5-6 September 2019, Galati, Romania. ISSN 1843-5114, p.38.

[155]- POPOVICI, V., COVALIOV, E., CAPCANARI, T., POPOVICI, C., RADU, O. Evolution of total carotenoid content in food products enriched. with rosehip (Rosa Canina) powder. Resource and energy-saving technologies production and packaging of food products - the basic principles of its competitiveness Proceedings of the VIII International Specialized Scientific and Practical Conference September 12, 2019, pp.170, Kyiv, Ukraine. ISBN 978-966-612-227-1.

[156]- BOISTEAN A., CHIRSANOVA A., CAPCANARI T., SIMINIUC R. Evaluation of the color as a characterization parameter of honey from Tunisia, Romania and Moldova. National scientific symposium with international participation: Modern biotechnologies - solutions to the challenges of the contemporary world. Chisinau 2021, May 20-21 (online) ISBN 978-9975-3498-7-1. p 43.

[157]- CAPCANARI, Tatiana, CHIRSANOVA, Aurica, SIMINIUC, Rodica. SOS DE COFETĂRIE FUNCȚIONAL PE BAZĂ DE PĂSTĂI DE CAROB (CERATONIA SILIQUA) AUTOHTONE FĂRĂ ZAHĂR ADĂUGAT. Innovation and Creative Education Fair for Youth ICE-USV – V th Edition, Suceava, May 2021.
http://cris.utm.md/bitstream/5014/887/1/ICE_USV_2021_Silver_Chirsanova%20A..pdf

[158]- CAPCANARI, Tatiana, CHIRSANOVA, Aurica, STURZA, Rodica. HUMMUS FUNCȚIONAL PE BAZĂ DE SEMINȚE DE CANNABIS SATIVA L. AUTOHTONE. Innovation and Creative Education Fair for Youth ICE-USV – V th Edition, Suceava, May 2021. http://cris.utm.md/bitstream/5014/886/1/ICE_USV_2021_Silver_Capcanari%20T..pdf

[159]- SUHODOL, Natalia, BOAGHI (COVALIOV), Eugenia, DESEATNICOV, Olga, CAPCANARI, Tatiana, CHIRSANOVA, Aurica, RESITCA, Vladislav. PROCESS FOR MAKING ACHLORIDE BREAD STICKS. The XXV-th INTERNATIONAL EXHIBITION OF INVENTICS INVENTICA 23-25 June 2021, Iasi, Romania.
http://cris.utm.md/bitstream/5014/966/1/Inventica_2021_Bronze_Suhodol%20N..pdf

[160]- COVACI, Ecaterina, CAPCANARI, Tatiana, LESANU, Alexandra. Traceability of wine - a criterion of quality and food safety for the consumer. In: Journal of Engineering Science. 2018, vol. 25(3), pp. 95-99. ISSN 2587-3474. eISSN 2587-3482.

[161]- BARAN, Anastasia, CAPCANARI, Tatiana, GRIZA, Ina, DESEATNICOVA, Olga. Impactului utilizării metabisulfitului pentru păstrarea strugurilor de masă. [Resursă electronică]. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 16-18 noiembrie, 2017. Chișinău, 2018, vol. 2, pp. 6-8. ISBN 978-9975-45-543-5. ISBN 978-9975-45-545-9 (Vol.2).

[162]- Cristina POPOVICI, Tatiana CAPCANARI, Olga ZAGARSCHIH, Olga DESEATNICOVA, Rodica STURZA. Antioxidant activity of plant extracts containing polyphenol compounds. Food and Environment Safety Journal of Faculty of Food Engineering, Ştefan cel Mare University, Suceava, Year IX, No 3, 2010. Online ISSN: 2559 – 6381

[163]- Capcanari Tatiana. Tehnologii de obţinere a emulsiilor alimentare din amestec de uleiuri de floarea-soarelui şi seminţe de struguri. Autoreferatul tezei de doctor în tehnică. Specialitatea 05.18.01 – Tehnologia produselor alimentare (Tehnologia produselor alimentaţiei publice). Cu titlu de manuscris C.Z.U: 664.34:664.31. Chişinău, 2012.

[164]- RADU, Oxana, FUIOR, Adelina, CAPCANARI, Tatiana. The study of biological and nutritional potential of walnut oil. In: 79 Міжнародної наукової конференції молодих вчених, аспірантів і студентів «Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті». 2013, Kiev, P. 1. pp. 472-473.

[165]- RADU, Oxana, CAPCANARI, Tatiana. Uleiul din seminţe de struguri – produs de perspectivă în fabricarea alimentelor funcţionale. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 15-17 noiembrie, 2012. Chișinău, 2013, vol. 2, pp. 99-102. ISBN 978-9975-45-249-6. ISBN 978-9975-45-251-9 (Vol.2).

[166]- GROSU, Carolina, CAPCANARI, Tatiana, POPOVICI, Cristina, et al. Optimizarea reţetei şi tehnologiei de fabricare a desertului din prune cu nuci în sirop. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 8 – 10 decembrie, 2011. Chișinău, 2012, vol. 2, pp. 92-93. ISBN 978-9975-45-208-3 (Vol.2).

[167]- BERNIC, Ina, POPOVICI, Cristina, CAPCANARI, Tatiana, DESEATNICOVA, Olga. Cercetarea influienţei factorilor tehnologici asupra stabilităţii oxidative a uleiurilor vegetale cu adaos de extracte naturale din ardei dulce. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 8 – 10 decembrie, 2011. Chișinău, 2012, vol. 2, pp. 17-19. ISBN 978-9975-45-208-3 (Vol.2).

[168]- CAPCANARI, Tatiana, POPOVICI, Cristina, KULICITSCAIA, Natalia, SUHODOL, Natalia, DESEATNICOV, Olga, STURZA, Rodica. Conţinutul total de polifenoli şi activitatea antioxidantă a extractelor din ardei dulce. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 17 – 19 noiembrie, 2010. Chișinău, 2011, vol. 2, pp. 8-11. ISBN 978-9975-45-065-2. ISBN 978-9975-45-159-8 (Vol.2).

[169]- BOAGHI, Eugenia, POPOVICI, Cristina, CAPCANARI, Tatiana, DESEATNICOVA, Olga, STURZA, Rodica. Cercetarea activităţii antioxidante a polifenolilor din cătina albă uscată prin diferite metode. In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 17 – 19 noiembrie, 2010. Chișinău, 2011, vol. 2, pp. 16-19. ISBN 978-9975-45-065-2. ISBN 978-9975-45-159-8 (Vol.2).

[170]- CAPCANARI, Tatiana, POPOVICI, Cristina, PALADI, Daniela et al. Microstructure and

rheological behavor of emulsions with improved nutritional value. In: Modern technologies, in the food industry–2018: proc. of the intern. conf., October 18–20, 2018. Chişinău, 2018, pp. 145-150. ISBN 978-9975-87-428-1.

[171]- CAPCANARI, Tatiana. Tehnologii de obţinere a emulsiilor alimentare din amestec de uleiuri de floarea-soarelui şi seminţe de struguri : spec.: 05.18.01 – Tehnologia produselor alimentare (tehnologia produselor alimentaţiei publice) : autoref. tz. doct. în tehnică. Cond. şt.: DESEATNICOV Olga. Chişinău, 2012. 30 p.

[172]- RADU, Oxana, CAPCANARI, Tatiana, SUBOTIN, Iurie. Alimentele modificate genetic: o problemă sau o salvare?In: Conferința Tehnico-Științifică a Colaboratorilor, Doctoranzilor și Studenților, Universitatea Tehnică a Moldovei, 17 – 19 noiembrie, 2010. Chișinău, 2011, vol. 2, pp. 104-108. ISBN 978-9975-45-065-2. ISBN 978-9975-45-159-8 (Vol.2).

[173]- Tatiana Capcanari. КАПКАНАРЬ, Т. Изучение влияния общего содержания полифенолов на антиоксидантную активность экстрактов пряной зелени. В: Meridian Ingineresc. 2010, nr. 3, pp. 74-70. ISSN 1683-853X.