GOCE DELCEV UNIVERSITY - STIP
FACULTY OF AGRICULTURE

Journal of Agriculture and Plant Sciences

YEAR 2017 VOLUME 15, Number1/2

GOCE DELCEV UNIVERSITY - STIP, REPUBLIC OF MACEDONIA
FACULTY OF AGRICULTURE

UDC 63(058)
ISSN 2545-4447 print
ISSN 2545-4455 on line

Journal of Agriculture and Plant Sciences, JAPS, Vol 15
Successor of the Yearbook of Faculty of Agriculture of GDU, Vol 14

YEAR 2017 VOLUME XV, Number 1/2

CONTENT

Journal of Agriculture and Plant Sciences, JAPS, Vol 15, No. 1/2, 2017

Manuscript received: 12.10.2017
Accepted: 06.11.2017

In print: ISSN 2545-4447
On line: ISSN 2545-4455
UDC: 635.649.076:581.192
Short communication

COMPARATIVE ANALYSIS OF CAPSAICIN CONTENT IN PEPPERS (*CAPSICUM ANNUUM* L.) GROWN IN CONVENTIONAL AND ORGANIC AGRICULTURAL SYSTEMS

Olivera Bicikliski[1], Krste Tashev[2], Fidanka Trajkova[1], Ljupco Mihajlov[1], Liljana Koleva Gudeva[1]
[1]*Faculty of Agriculture, Goce Delcev University, Krste Misirkov 10-A, PO box 201, 2000 Stip, Republic of Macedonia;*
[2]*State Phytosanitary Laboratory, Aleksandar Makedonski bb, 1000 Skopje, Republic of Macedonia*
obicikliski@gmail.com; tkrste@gmail.com; fidanka.trakova@ugd.edu.mk; ljupco.mihajlov@ugd.edu.mk; liljana.gudeva@ugd.edu.mk

Abstract

According to their chemical structure capsaicinoids are phenethylamine group of alkaloids and they are produced exclusively in the secondary metabolism of genus Capsicum, fam. Solanaceae. Pepper (*Capsicum annuum* L.) is economically one of the most important vegetable crop in the Republic of Macedonia. There is no methodical and long-term research in organic production of vegetables in the Republic of Macedonia until today. Still, largely speaking, there are current debates about the advantage of organic production as compared to conventional one in terms of morphology of products and especially their quality characteristics.

The aim of this paper is comparative analysis of capsaicin content in fruit extracts from (*Capsicum annuum* L.) produced in organic and conventional cultivation systems. Pepper genotypes Strumicka Kapija, Strumicka Vezena, Piran, Zupska Rana, Duga Bela and Kurtovska Kapija were subject of this study. Methanol (≥ 99.9%) was used as capsaicin solvent for extraction of capsaicin from dried pepper fruit material. The determination of capsaicin content was performed by chromatographic analyses with High Pressure Liquid Chromatography (HPLC).

Organically grown pepper fruits were characterized with higher capsaicin content than the conventional one. The genotype Strumicka Vezena was characterized with the highest capsaicin content in the both cultivation systems.

Key words: *Capsicum annuum L., pepper, capsaicin, organic cultivation system, conventional cultivation system*

INTRODUCTION

Peppers are grown because of their fruits which are used in human nutrition all year round as fresh, roasted, marinated for different dishes and salads, pickled, preserved, paste, juices and powder paprika spice. Since fruits contain capsaicin, it is used in pharmaceutical industry (Jankuloski, 1997; Bosland et al., 2012).

Organic agricultural production is an integral part of the sustainable agricultural development and it is well established in practice in the past years in Republic of Macedonia. Although the organic production is practiced on only 1% of total arable land in the country, there is a growing trend of practicing organic production which gives an expectation that organic agriculture production might be a leader in future development for the rest of the sustainable agriculture systems (National Plan for organic production, 2013-2030). As part of the sustainable agriculture, organic agriculture utilizes methods and practices which enhance soil fertility and in the same time minimize harmful impact on soil, water, air and health of farmers and consumers.

From the available literature, there is no methodical and long-term research in organic production of vegetables in Republic of Macedonia until today. Still, largely speaking, there are current debates about the advantage of organic production as compared to conventional one in terms of morphology of products and especially their quality characteristics.

This is a report about the first comparative research in Republic of Macedonia on peppers (*Capsicum annuum* L.) grown in organic and conventional production systems.

The aim of this research is a comparative analysis of capsaicin content in extracts from fruits of six different pepper genotypes (Capsicum annuum L.) grown in organic and conventional system.

The capsaicin (8-Methyl-N-vanillyl-trans-6-nonenamide), a major metabolite in *Capsicum* species, is the most common representative of broad family of capsaicinoids. It is a strong and stable crystal alkaloid which does not change the characteristics on temperature, thus it keeps the original strength in long-terms when heated or frozen. It is produced mainly in the placenta of *Capsicum* fruits. Different content of capsaicinoids in pepper fruits gives diversity of their flavour, from sweet to very hot (De Witt, 1999; Tod and Catt, 2002; De, 2004; Maksimova et al, 2014). The capsaicin owns high antioxidative activity which gives high recommendation for pepper consumption in everyday nutrition (Maksimova et al. 2013; Maksimova et al. 2014). The clinical trials have shown that the biological potential of capsaicin is due to its structure of alkaloid with different inhibitory effects: analgesic and redactor of pain (Bernstein, 1991; Tominaga, 1998; Cheng et al., 1999; Holt, 1999; Bunk, 2000; Ying-Yue et al., 2001; Košťálová, 2002); antimicrobial (Kurita, 2002); antibacterial (Kalia et al., 2012; Sinha et al., 2011; Ubulom et al., 2012); anticancer (Mori et al., 2006); cancerogenic (Dasgupta et al., 1998; Archer & Jones, 2002); anesthetic (Bernstein, 1991; De Witt, 1999; Cheng et al., 1999), cytostatic (Surh, 2002; Zhang et al., 2003). Even more, capsaicin can be used as biopesticide against the green peach aphid (*Myzus persicae* Sulz.) in organic production of different crops (Maksimova et al., 2013).

MATERIAL AND METHODS

Experiment site and design

The experiment was conducted on open field at Kamnik Bio Organic in Skopje during three successive years. The fields of Kamnik Bio Organic are certified for organic production since 2011.

Six different pepper genotypes were used as plant material in this study: Strumicka Kapija, Strumicka Vezena, Piran, Zupska Rana, Duga Bela and Kurtovska Kapija. All genotypes were sweet peppers, except Strumicka Vezena which is hot pepper.

The experiment was set up in completely randomized design in three replicates for both organic and conventional system. The experimental conventional and organic plots were in the near vacancy. Each genotype was represented with 45 plants in total for both production systems. During the vegetation period, conventional and organic production practices were accordingly applied. The described experimental design was applied during the three experimental years.

Plant material

Fruits from six genotypes of pepper (*Capsicum annuum* L.) grown under organic and conventional practices were used for determination of capsaicin content. For each extraction sample of five pepper fruits was used from each genotype, organically and conventionally grown respectively. Fruits from genotypes Strumicka Kapija, Kurtovska Kapija and Strumicka Vezena were collected in botanical maturity (deep red color of fruits), while fruits from genotypes Piran, Zupska Rana and Duga Bela were collected in horticultural maturity (greenish to yellow color of the fruits). The phenological phenophases of fruit collection was chosen according to pepper genotype characteristics and their utilization for human consumption.

Extraction method

The fruit pericarp with placenta was dried on 40°C until constant weight in laboratory oven with proper ventilation system.

A plant tissue extractor with semipermeable bags for extraction was used in the extraction procedure. Pure methanol with High Pressure Liquid Chromatography (HPLC) grade (≥ 99.9%) was used as solvent; 2 g of dry pepper tissue was extracted with 5 ml pure methanol with HPLC grade. The extraction has been performed at room temperature, for 24 hours minutes in dark conditions. The extract was filtrated through 0.45 um filter before injection in High Pressure Liquid Chromatography (HPLC) instrument.

Instruments for capsaicin content determination

Determination of capsaicin content was performed on Varian Pro Star HPLC system (pump model 230, autosampler model 410, PDA detector model 330 and column thermostat model 500). The separation of capsaicin from the other extracted components was performed with C18 column: Perkin Elmer C-18 150x4.6, 5 um. The mobile phase was methanol : water = 60:40 (v/v) with isocratic flow of 1.3 ml/min. Determination was performed on wavelength of 222 nm, injected volume 10 µl for total analysis time of 20 min.

Preparation of standard dilutions of capsaicin

Standard stock solution of capsaicin with concentration of 650 mg/l was prepared in methanol with HPLC grade (≥ 99.9%). Standards with concentrations 1.3 mg/l; 3.25 mg/l; 6.5 mg/l;13.0 mg/l; 16.25 mg/l; 50 mg/l; 100 mg/l; 200 mg/l and 300 mg/l capsaicin in methanol were prepared from the standard stock solution. For determination of the limit of detection (LOD) and limit of quantification (LOQ), we used calibration in low concentration area of calibration curve in range 1.3-13 mg/l. Maximum time for usage of the standards was one day.

Validation properties of the method

The calibration curve characteristics of applied methodology were $y=21567x+130756$ with correlation characteristics $p < 0.998$.

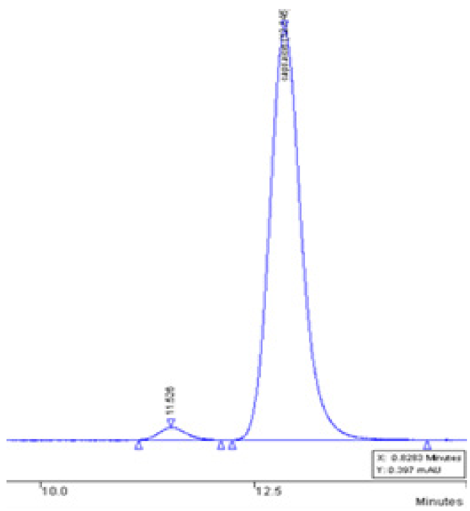

Figure 1. Chromatogram of standard capsaicin solution with concentration of γ = 10 mg/ml.

Detection of relative standard deviation (RSD) of the method is calculated from the calibration curve with extraction of 6 parallel repetition of pepper fruit samples from the same genotype and it is RSD 3%, while the LOD and LOQ are 0.5 mg/l and 1.5 mg/l, respectively (Fig. 1). Analytical yield of the method is calculated from the calibration curve, where the analytical yield on both levels with two parallel repetition with standard addition is determined. The analytical yield in both cases < 95%.

The results of the capsaicin content in six different in pungency pepper genotypes are expressed in mg capsaicin in dry matter.

Statistical analysis of data

The statistics of capsaicin content was done by the software programme IMB SPSS Statistics Software 19.0 (IBM SPSS Statistics 19 Brief Guide, 2010). The significance of differences between tested cultivation practices is established by the Duncan's Multiple Range Test. The evaluation of the effect of pepper genotypes and the effect of cultivation practices on capsaicin content in the three years experiment was made by the statistical analysis of univariance for each pepper genotypes and both growing practices. Additionally, pairwise comparison was applied for estimation of significance between capsaicin content of the two applied cultivation practices.

RESULTS AND DISCUSSION

Many researchers reported High Pressure Liquid Chromatography (HPLC) as an excellent method for determination of capsaicin content in pepper fruits (Perucka & Oleszek, 2000; Othman et al., 2011; Reyes-Escogido et al., 2011).

The capsaicin content in the organic system varied from 0.31 mg/g (Kurtovska Kapija) to significantly the highest 9.57 mg/g (Strumicka Vezena) (Tab. 1).

On the other hand, the capsaicin content in the conventional production system ranged from 0.41 mg/g (Strumicka Kapija) to 7.22 mg/g (Strumicka Vezena) (Tab. 2).

As expected the hot genotype Strumicka Vezena has shown the highest capsaicin content in both cultivation systems. The capsaicin content was influenced by the maturity of the fruits, since they were not harvest in the same maturity stage. Several studies have concluded that levels of capsaicinoids increase with maturation, remain constant or decrease slightly up to 60% after the maximum is reached. Yet, at all stages of growth, the total or individual capsaicinoids based on dry weight is far higher in the placenta than in the pericarp. This statement allows the conclusion that the main site of capsaicinoids synthesis is the placental tissue of the fruits (De, 2004).

Table 1. Capsaicin content in different pepper genotypes grown in organic production system.

Genotype	Capsaicin (mg/g dry matter)
Strumicka Kapija	3.96bc
Strumicka Vezena	9.57a
Piran	0.75c
Zupska Rana	1.24c
Duga Bela	0.79c
Kurtovska Kapija	0.31c

Means within the column having different letters are significantly different according to Duncan's test at $p<0.05$.

Table 2. Capsaicin content in different pepper genotypes grown in conventional production system.

Genotype	Capsaicin (mg/g dry matter)
Strumicka Kapija	0.41c
Strumicka Vezena	7.22b
Piran	0.79c
Zupska Rana	2.33c
Duga Bela	0.62c
Kurtovska Kapija	0.47c

Means within the column having different letters are significantly different according to Duncan's test at $p<0.05$.

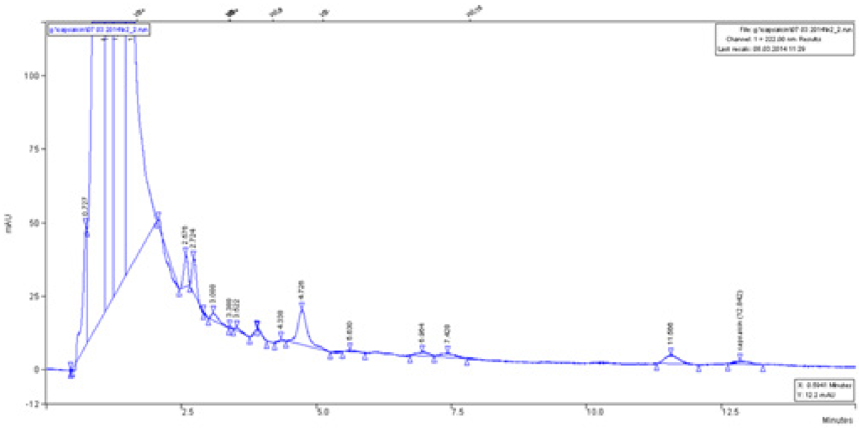

Figure 2. Chromatogram of analyzed sample of capsaicin content in Strumicka Kapija fruits.

The F test of the pepper genotypes effect on capsaicin content showed significant difference among tested genotypes during whole experiment, regardless cultivation practices applied (Tab. 3). When the same test was applied for the effect of cultivation practices (organic and conventional) on capsaicin content in pepper fruits, capsaicin content was higher in fruits obtained by organic then by conventional cultivation practices in all pepper genotypes but without significant difference (Tab. 4).

Table 3. Univariate analysis of the effect of six pepper genotypes on capsaicin content in their fruits.

Dependent Variable: Capsaicin						
	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pepper genotypes	551.095	5	110.219	13.349	.000	.527
Cultivation practice	11.464	1	11.464	1.388	.243	.023

The F tests the effect of **Pepper genotypes** and **Cultivation practice**. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Table 4. Pairwise comparison between capsaicin content in pepper fruits and cultivation system applied.

Dependent Variable: Capsaicin				
(A) Cultivation system	(B) Cultivation system	(A-B) Mean difference	Std. error	Significance
Organic	Conventional	.798	.677	.243

Estimated marginal means of capsaicin of tested genotypes in organic and conventional cultivation systems showed higher capsaicin content in most of pepper genotypes under study (Figure 3).

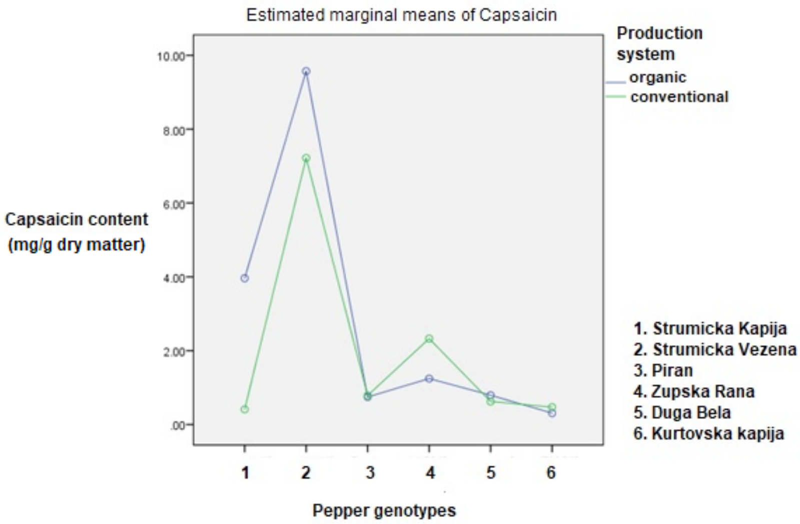

Figure 3. Estimated marginal means of capsaicin in six tested genotypes cultivated in organic and conventional production system.

Pepper fruits are rich with high number of bioactive compounds such as vitamin C and vitamin E, carotenoids and other polyphenolic compounds, but still the most of health beneficial and pharmaceutical properties and potential of peppers is due to capsaicin (Tominaga, 1998; Ying-Yue et al., 2001; Kurita 2002). There is a lack of research related to the content of nutritional and biologically active compounds as proteins, vitamins, ascorbic acid, minerals, fats and oils, phenolic compounds, aromatic substances in the fruits of varieties of *Capsicum* spp. in the Republic of Macedonia.

Maksimova et al. (2016) reported high capsaicin content in 13 hot pepper genotypes under study. Furthermore, they have not detected capsaicin in sweet pepper genotypes (Kurtovska Kapija and Zlaten Medal) when extraction was performed by maceration with 96% ethanol, which is opposite to our findings. Simonovska et al., 2014 reported detailed composition of red hot pepper fruits including capsaicinoids content in pericarp (5.38 mg/g), seeds (2.36 mg/g) and placenta (10.48 mg/g) of pepper genotype Horgoshka grown in Macedonian conditions which is in agreement with capsaicin content found in the pericarp and placenta of Strumicka Vezena. However, capsaicin content varies depending on pepper genotype, cultivation conditions and fruit phenological stage (Maksimova et al., 2016; De, 2004; Govindarajan & Sathyanarayana, 1991). Kraikruan et al. (2008) informed that capsaicin and dihydrocapsaicin contents were the highest in the first harvest in all cultivars and then they decreased in the subsequent harvests. The highest capsaicin content in fruits was found in cultivars grown at a high temperature and in nutrient-rich soils (Sung et al., 2005; Rahman & Inden, 2012).

CONCLUSION REMARKS

The capsaicin content found in six pepper genotypes grown in organic and conventional cultivation systems varies due to pepper genotypes diversity and applied cultivation practices. The highest capsaicin content was found in Strumicka Vezena grown in both cultivation systems. Overall, the capsaicin content found in organically cultivated genotypes was higher compared to conventionally grown which justifies the organic cultivation of pepper.

REFERENCES

Archer, E.V. Jones, D.W. (2002). Capsaicin pepper, cancer and ethnicity. *Medical Hypotheses*. 59(4): 450-457.

Bernstein, J.E. (1991). Method and composition utilizing capsaicin external analgetic - with anesthetic desensitize. Galenpharma Inc. US 4997853.

Bosland, P. W., Votava, E. J., Votava, E. M. (2012). Peppers: vegetable and spice capsicums (Vol. 22). CABI.

Bunk, S. (2000). Cloning the Capsaicin Receptor. *The Scientist* 14 (2): 19.

Cheng, C.L., Liu, J.C., Chang, S.Y., Ma, C.P. De Groat, W.C. (1999). Effect of capsaicin on the micturition reflex in normal and chronic spinal cord-injured cats. *Am. J. Physiol* 277 R7: 86-94.

Dasgupta, P., Chandiramani, V., Parkinson, M.C., Beckett, A., Fowler, C.J. (1998). Treating the human bladder with capsaicin: Is it safe? *Euro Urol* 33(1): 28-31.

Davison, M.W. (2000). Capsaicin – Molecular Expressions: Phytochemical Gallery National High Magnetic Field Laboratory, Florida State University, USA.

De Witt, D. (1999). The nature of capsaicin: The Chile Pepper Encyclopaedia, Morrow Cookboks, NY, USA.

De, A. K. (Ed.). (2004). Capsicum: the genus *Capsicum*. CRC Press.

Govindarajan, V.S., Sathyanarayana, M.N. (1991) Capsicum production, technology, chemistry and quality - Part V. Impact on physiology, pharmacology, nutrition and metabolism; structure, pungency, pain and desensitization sequences. *CRC Crit. Rev. Food Sci. Nutr*. 29, 435–473.

Holt, S.D. (1999). Pain reliever and method of use – capsaicin entrant analgesic. *Medical Merchandising Inc,* US 5856361.

Jankulovski, D. (1997). Pepper and eggplant. NIP "BAS-TRADE", Skopje, pp. 126 (in Macedonian).

Kalia, N. P., Mahajan, P., Mehra, R., Nargotra, A., Sharma, J. P., Koul, S., Khan, I. A. (2012). Capsaicin, a novel inhibitor of the NorA efflux pump, reduces the intracellular invasion of Staphylococcus aureus. *Journal of antimicrobial chemotherapy*, *67*(10), 2401-2408.

Koleva-Gudeva, L., Mitrev, S., Maksimova, V., & Spasov, D. (2013). Content of capsaicin extracted from hot pepper (Capsicum annuum ssp. microcarpum L.) and its use as an ecopesticide. *Hemijska industrija*, *67*(4), 671-675.

Košťálová, D. (2002). Topical capsaicin in dermatological and peripheral pain disorders, Katedra farmakgnózie a botaniky Farmaceutická fakulteta UK, Bratislava.

Kraikruan, W., Sukprakarn, S., Mongkolporn, O., Wasee, S. (2008). Capsaicin and dihydrocapsaicin contents of Thai chili cultivars. *Kasetsart J. (Nat. Sci.)*, 42, 611–616 (2008).

Kurita, S. (2002). Studies on the antimicrobial mechanisms of capsaicin using yeast DNA microarray. *Biosci Biotechnol Biochem* 66(3): 532-536.

Maksimova, V., Gudeva, K. L., Ruskovska, T., Gulaboski, R. (2014). Determination of total antioxidative capacities of capsaicinoids in Capsicum sp. cultivated in Republic of Macedonia. *Yearbook 2014 Goce Delcev University – Stip, Faculty of Agriculture* 14, 36-48.

Maksimova, V., Gudeva K. L., Serafinovska, A. Z., Shishkovska, M. (2016). Precentage ratio of capsaicinoids at the fruits of *Capsicum sp.* cultivated in Republic of Macedonia. *Yearbook 2016 Goce Delcev University – Stip, Faculty of Agriculture* 14, 36-48.

Maksimova, V.,Gudeva, K. L., Ruskovska, T., Cvetanovska, A., Gulaboski, R. (2013). Correlation between antioxidative potential of pure capsaicin and capsicum oleoresins, *8th CMAPSEEC, Albania, Abstract book*, 229

Ministry of Agriculture, Forestry and Water Management (2013). National Plan for Organic Production, 2013-2030, Skopje, 2013, pp. 47 (In Macedonian).

Mori, A., Lehmann, S., O'Kelly, J., Kumagai, T., Desmond, J.C., Pervan, M., McBride, W.H., Kizaki, M., Koeffler, H.P. (2006). Capsaicin, a component of red peppers, inhibits the growth of androgen-independent, p53 mutant prostate cancer cells. *Cancer Res*. 66(6): 3222-3229.

Othman, Z. A. A., Ahmed, Y. B. H., Habila, M. A., Ghafar, A. A. (2011). Determination of capsaicin and dihydrocapsaicin in Capsicum fruit samples using high performance liquid chromatography. *Molecules*, *16*(10), 8919-8929.

Perucka, I., Oleszek, W. (2000). Extraction and determination of capsaicinoids in fruit of hot pepper Capsicum annuum L. by spectrophotometry and high-performance liquid chromatography. *Food Chemistry*, *71*(2), 287-291.

Rahman, M. J., Inden, H. (2012). Effect of nutrient solution and temperature on capsaicin content and yield contributing characteristics in six sweet pepper (Capsicum annuum L.) cultivars. *J. Food, Agri. Environ..* 10, 524–529.

Reyes-Escogido, M. D. L., Gonzalez-Mondragon, E. G., Vazquez-Tzompantzi, E. (2011). Chemical and pharmacological aspects of capsaicin. *Molecules*, *16*(2), 1253-1270.

Simonovska, J., Rafajlovska, V., Kavrakovski, Z., Srbinoska, M. (2014). Nutritive and bioactive compounds in hot fruits of Capsicum annuum L. from Macedonia. *Macedonian Journal of Chemistry and Chemical Engineering*, *33*(1), 97-104.

Sinha, R. K., Hahn, G., Singh, P.K., Suhane, R. K., Anthonyreddy, A. 2011. Organic Farming by Vermiculture: Producing Safe, Nutritive and Protective Foods by Earthworms, *American Journal of Experimental Agriculture* 1(4): 363-399.

Sung, Y., Chang, Y., Ting, N. L. (2005). Capsaicin biosynthesis in water-stressed hot pepper fruits. *Bot. Bull. Acad. Sinica*, 46, 35–42.

Surh, J. 2002. More than pain: capsaicin in hot chili peppers makes tumour cells commit suicide. *J Nat Cancer Inst.* 94(17): 1263-1265.

Tod, J. and N. Catt. (2002). Red “why are they so hot” chili peppers, Keble College, Oxford.

Tominaga, M. (1998). The cloned capsaicin receptor integrates multiple pain product stimuli. *Neuron* 21(3): 644-645.

Ubulom, P.M.E.N.G., Imandeh, C.E., Udobi Ilya, I. (2012). Larvicidal and Antifungal Properties of *Picralima nitida* (Apocynaceae) *Leaf Extracts, European Journal of Medicinal Plants* **2**(2): 132-139.

Ying-Yue, W, H. Chi-Tzong, C. Wen-Ta, F. Jia-You. (2001). I*n vitro* and *in vivo* evaluations of topically applied capsaicin and nonivamide from hydrogels. *Int J of Pharmaceutics* 224: 89-104.

Zhang, J., M. Nagasaki, Y. Tanaka, S. Morikawa. (2003). Capsaicin inhibits growth of adult T-cell leukemia cells. *Leukemia Research* 27(3): 275-283.

КОМПАРАТИВНА АНАЛИЗА НА СОДРЖИНАТА НА КАПСАИЦИН ВО ПИПЕРКИ (*CAPSICUM ANNUUM* L.) ОДГЛЕДУВАНИ ВО КОНВЕНЦИОНАЛЕН И ОРГАНСКИ СИСТЕМ

Оливера Бичиклиски[1], Крсте Ташев[2], Фиданка Трајкова[1], Љупчо МИхајлов[1], Лилјана Колева Гудева[1]

[1]Универзитет „Гоце Делчев" – Штип, Земјоделски факултет, „Крсте Мисирков", 10-А, П. фах 201, 2000 Штип, Република Македонија

[2]Државна Фитосантарна Лабораторија, Александар Македонски, бб, 1000 Скопје, Република Македонија

obicikliski@gmail.com; tkrste@gmail.com; fidanka.trakova@ugd.edu.mk; ljupco.mihajlov@ugd.edu.mk; liljana.gudeva@ugd.edu.mk

Резиме

Капсаициноидите кои според својата хемиска структура припаѓаат кон фенилетиламинската група на алкалоиди се создаваат од секундарниот метаболизам исклучиво на растенијата од родот Capsicum, фамилија Solanaceae. Пиперката (*Capsicum annium* L.) по своето стопанско значење е една од водечките градинарски култури во Република Македонија. Досега во Република Македонија нема методолошко и долготрајно истажување за органско производство на зеленчук. Сè уште се водат дебати во поширока смисла на зборот за предностите на органското производство во споредба со конвенционалното во однос на морфологијата на продуктите и посебно нивниот квалитет.

Целта на овој труд беше да се направи компаративна анализа на застапеноста на капсаицин во екстракти од плодови одгледувани во органски и конвенционални системи. Генотиповите на пиперки кои се опфатени во истражувањето се: *струмичка капија*, *струмичка везена*, *пиран*, *жупска рана*, *дуга бела* и *куртовска капија*. Како екстрактант на капсаицинот беше користен метанол (≥ 99.9%) за екстракција на капсаицинот од сушени плодови на пиперка. Детерминацијата на содржината на капсаицин беше направена со хроматографска анализа со HPLC (високопритисочна течна хроматографија).

Плодовите од пиперка одгледувани во органско производство се одликуваа со повисока содржина од конвенционалните. Генотипот *струмичка везена* се одликува со највисока содржина на капсаицин и во двата системи на производство.

Клучни зборови: *Capsicum annium L., pepper, капсаицин, органски систем на одгледување, конвенционален систем на одгледување.*