

## СПИСЪК

на научните публикации с резюметата  
на доц. д-р Хриска Ботева за участие в конкурса за ПРОФЕСОР  
в професионално направление 6.1. Растениевъдство, научна специалност  
Зеленчукопроизводство, обявен в ДВ, бр. 71/13.09.2016

### 1. МЕЖДУНАРОДНИ ИЗДАНИЯ

#### 1. 1. В списания с импакт фактор, изчислен чрез Science Citation Index Expanded, Thomson Reuters

1. **Boteva H.**, Ts. Dintcheva, St. Masheva, V. Yankova, D. Markov. 2011. Opportunities for growing *Tribulus terrestris* L. as semi-culture. Biotechnology & Biotechnological Equipment. ISSN: 1310-2818, 25 (2), p.2388-2390. **IF: 0.760.**

**ABSTRACT:** Some opportunities for the use of *Tribulus terrestris* L. as a semi-culture were investigated in the field of the Maritsa Vegetable Crops Research Institute, Plovdiv, during the period 2009-2010. The trials were carried out in the open field. *Tribulus terrestris* L. seedlings were grown in an unheated greenhouse from the end of March until the end of April. The plants were transplanted in the open field at the beginning of May. Two schemes of growing were applied in the open field on a high bed in one and two rows, with 1 m distance between the plants. Two drip irrigation regimes were used: 77.5 m<sup>3</sup>/ha and 310 m<sup>3</sup>/ha for two rows, 38.7 m<sup>3</sup>/ha and 77.5 m<sup>3</sup>/ha for one row. It was established that growing on high bed in two rows, with 310 m<sup>3</sup>/ha irrigation rate was more suitable for growing *Tribulus terrestris* L. in the open field.

2. Masheva St., V. Yankova, D. Markova, **H. Boteva**, Ts. Dincheva. 2011. Diseases and pests on *Tribulus terrestris* L. - wild growing plant and semi-crop. Biotechnology & Biotechnological Equipment. ISSN: 1310-2818, 25 (2), p.2391-2393. **IF: 0.760.**

**ABSTRACT:** Surveys for identification of diseases and pests at tacking in natural habitats and cultivated sowing of *Tribulus terrestris* L were conducted. Damages caused by mildew (*Phytophthora* spp.) were observed during the vegetation period. Colonies of a mixed population (larvae and adults) of cotton aphid (*Aphis gossypii* Glov.) and damage from caterpillars (*Lepidoptera: Noctuidae*) were established. Caterpillars of the cotton boll worm (*Helicoverpa armigera* Hb.) and *Leucanithis stolidus* F. were observed from July to August. An attack of spider mite (*Tetranychus urticae* Koch.) both in natural habitats and cultivated sowing was observed during the whole vegetation period.

3. Vlahova V., V. Popov, **H. Boteva**, Z. Zlatev, D. Cholakov. 2014. Influence of biofertilizers on the vegetative growth, mineral content and physiological parameters of pepper (*Capsicum annum* L.) cultivated under organic agriculture conditions. Acta Scientiarum Polonorum, Hortorum Cultus 13, (4), 199-216. **IF: 0.220.**

**ABSTRACT:** In recent years, biofertilisers have emerged as a promising component of an integrated nutrient supply system in agriculture. Biofertilisers are ready to use formulation of beneficial microorganisms, when amended to seed, root or soil, they mobilize the availability of microorganisms and thus soil health. The objective of this study was to examine the influence of selected biofertilisers on the vegetative growth, the content of the mineral elements (N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O) in

the formed vegetative mass, i.e. leaves and stems, and on the physiological parameters of pepper of the variety of "Sofiiska Kapiya" cultivated under organic agriculture conditions. This experiment was carried out from 2009 to 2011 on the experimental fields of the Agroecological Centre at the Agricultural University-Plovdiv, situated on the territory of a certified ecological farm. The study included the following biofertilisers- Boneprot, Lumbrical, Baikal EM, Emosan and Bio One, included in the list of the permitted substances for soil maintaining fertility according to Regulation (EC) No. 889/2008. Study parameters: Vegetative growth; Mineral content; Physiological parameters (PN; E; gs). The study observed the biometric parameters (at the mass fruit yield stage) and physiological parameters on well-developed leaves at two stages of growth, i.e. 'flower bud' and 'mass fruit yield'. The combined application of biofertilisers as vegetative feeding (by liquid formulation) on both basic fertilisations (by solid formulation) influenced the increase of pepper vegetative growth in comparison with the single application of basic fertilisation in an optimum concentration (2009 and 2010). The results of the biometric measurements of the average plant height at the end of the vegetative period showed the highest values for the variant treated with Emosan on the Boneprot basic fertilisation (62,60 cm- 2009; 64,80 cm- 2010, and 63,87 cm- 2011). Upon feeding with the biofertilisers Emosan and Baikal EM on basic fertilisation with Boneprot (2009, 2010 and 2011) at the pepper mass fruit yield stage, plants showed higher values of net photosynthesis that were also similar to the high values observed in the flower bud stage. This can be related to the observed overall increase of the pepper vegetative. The highest intensity of transpiration was observed for the variants treated with the biofertilisers Baikal EM (2009 and 2011) and Emosan (2010) on basic fertilisation with Boneprot. It was concluded that the feeding with Emosan stimulated the vegetative growth of the pepper plants due to the high concentrations of nutrient-providing proteins contained in this biofertiliser. The highest N content was found in the plant leaves and in the plants treated with the biofertiliser Emosan on the basic fertilisation with Boneprot, i.e. 29,2 g.kg<sup>-1</sup>.

The results showed that biofertilisers do not significantly impact the P content of the pepper leaves and stems, but changes were more obvious in the leaves. The fertilisation with the studied biofertilisers increased the K<sub>2</sub>O content in leaves and stems compared to the control (non-fertilised) plants; the values were higher for the leaves.

4. Kostova D., A. Detcheva, **Hr. Boteva**, D. Mehandjiev. 2013. Influence of of fertilizing on Fe, Zn, Cu, Pb and Cd content in tomato fruits. Influence Comptes rendus de l'Académie bulgare des sciences: sciences mathématiques et naturelles (CR ACAD BULG SCI). vol. 66, №12, 1529-1534, **ISSN: 1310-1331, IF: 0.220.**

**ABSTRACT:** The content of Fe, Zn, Cu, Pb and Cd is determined in tomato fruits. The role of fertilization on the content of these elements is also studied. The investigated fertilizers (K<sub>2</sub>SO<sub>4</sub> and KNO<sub>3</sub>) facilitate the extraction of Cu and its accumulation. The contents of Zn and Fe in tomato fruits is not influenced by their amounts in the fertilizer, but only by their amounts in the soil. The increase of K<sub>2</sub>SO<sub>4</sub> content leads to an increase of Pb content in tomato fruits, while the Cd content remains unchangeable. On the other hand, the increase of KNO<sub>3</sub> content leads to a decrease of Pb and Cd content.

**1. 2. В списания с импакт фактор, изчислен чрез Global Impact Factor (GIF) и International Scientific Indexing (ISI)**

5. **Boteva Hr.**, Ts. Dintcheva, B. Arnoudov. 2016. Application of organic products to reducing mineral fertilization in pepper. Journal of the Scientists Union «ESU»: «Actual problems of modern science and their solutions» № 3(24), 94-96, ISSN 2411-6467; **GIF: 0.388** (2015); **ISI: 0.833** (2015), Eurasian Union of Scientists, <http://www.euroasia-science.ru>

**ABSTRACT:** Field experiments for the effect of organic fertilizers: Labin, Bio One, Tecamin, Agriful, Humustim and Biohumus on yield and quality production of pepper, variety pepper Kurtovska kapia were performed on strongly leached meadow cinnamonic soil at the experimental field of the Maritsa" Vegetable Crops Research Institute during the period 2009-2011.

After mineral fertilization the total pepper yield is the highest averagely for the period of study. An increase of the yield in pepper with reduced mineral fertilization is established after application of organic products from 8,9% /after fertilization with Labin /to 22,8%/ after fertilization with Agriful/ towards the control. Established a positive effect of fertilization with fertilizes on the content of vitamin C in the fruit of pepper. The influence of fertilizers on the content of dry matter and sugars in fruit is incidental. Organic fertilizers application results in reduction of the synthetic fertilizers use that is a prerequisite for the production of safety production

6. **Boteva Hr.** 2016. Effect of mineral fertilization on productivity and quality of early potato. Journal of the Scientists Union «ESU»: «Actual problems of modern science and their solutions» № 3(24), 96-99, ISSN 2411-6467; **GIF: 0.388** (2015); **ISI: 0.833** (2015), Eurasian Union of Scientists, <http://www.euroasia-science.ru>

**ABSTRACT:** The effect of mineral fertilization on the biological manifestations, yield and dry matter content in potato tubers form variety Nadejda suitable for early field production, was studied during three years in the "Maritsa" Vegetable Crops Research Institute, Plovdiv on heavy leached meadow-cinnamon soil.

A field experiment with increasing nitrogen rates: 0, 80, 160 и 240 kg/ha input separately and at background of phosphorus: 0, 80, 160 and 240 kg P<sub>2</sub>O<sub>5</sub>/ha and chosen variants for potassium: 0, 80 and 160 kg K<sub>2</sub>O/ha is carried out in order to established the optimal rates and N:P:K proportions. Equations of the curved lines expressing the relationship between the rates and nitrogen, PK background and yield are found by regression analysis.

The purpose of the study is to optimize the nutrient regime in potatoes - early field production for obtaining of high yields and produce with high biological value, satisfying the requirements of the organic agriculture.

7. Arnoudov B., **Boteva Hr.**, Dintcheva Ts., 2016. Comparative study of greenhouse cucumber varieties. Journal of the Scientists Union «ESU»: «Actual problems of modern science and their solutions» № 3(24), 105-108, ISSN 2411-6467, **GIF: 0.388** (2015); **ISI: 0.833** (2015), Eurasian Union of Scientists, <http://www.euroasia-science.ru>

**ABSTRACT:** Our objective is to test and compare different varieties of greenhouse cucumbers. The experimental work is carried out with eight cucumber varieties of Enza Zaden (The Netherlands) and one cucumber variety selected by the Maritsa Vegetable Crops Research Institute (VCRI Maritsa) grown as soil cultures. The average results of the three experimental years registered differences in the growth and yield of the plants of the tested varieties. Under the conditions of the experiment (planted in April in a steel-glass greenhouse; sparsely

controlled microclimate factors) the only difference which was proven was the growth pace of the tested parthenocarpic varieties. The Carlin and Voreas varieties displayed the most rapid growth and leaf formation pace; at the same time, the weakest growth pace was found out with the Imea and Defense varieties. The plants of the Voreas and Carlin varieties have the best productive qualities among the greenhouse cucumbers. The Imea variety formed the lowest yields. Voreas has the highest quantity of first quality production. The rate of first quality production to the total yield in the greenhouse varieties is the highest in Defense and the lowest in the Carlin variety.

8. Dintcheva Ts., **Boteva Hr.**, Arnaoudov B. 2016. Effect of vermicompost and system of cultivation on tomatoes seedlings. Journal of the Scientists Union «ESU»: «Actual problems of modern science and their solutions» № 3(24), 100-104, ISSN 2411-6467, **GIF: 0.388** (2015); **ISI: 0.833** (2015), Eurasian Union of Scientists, <http://www.euroasia-science.ru>

**ABSTRACT:** Effects of dosage levels for vermicompost and system of growing of tomatoes seedlings were observed to establish optimal conditions for young plants. The experiments were carried out with tomato cv. Nikolina F1, in Maritsa VCRI, Plovdiv, Bulgaria, during period 2014-2015 years. Two systems - traditional seed bed and modified floating system in five treatments were used: Control 1 - without fertilizers; Control 2 – with mineral fertilizers; Vermicompost 25% of substrate mixture; Vermicompost 50 % of substrate mixture; Vermicompost 75% of substrate mixture. Vermicompost 50% of substrate affected very well habit of plants from traditional seed bed: plant height 18,33 cm, stem fresh weight 3,47 g, diameter of stem 4,56 mm, 3,98 leaves with weight 2,51 g. Vermicompost 25% of substrate affected very well habit of plants from modified floating system: plant height 4,94 cm, stem fresh weight 0,29 g, diameter of stem 2,69 mm, 2,60 leaves with weigh 0,38 g. Seedlings from traditional seed bed have a strong plant habit than those grown in modified floating system.

### 1. 3. В списания с импакт ранг – SCImago Journal Rank (SJR)

9. **Boteva Hr. 2008.** Effect of mineral fertilization on the yield and quality of the spinach produce. Acta Horticulturae. Vol 2: 413-418, **SJR 0.269**, **H Index–42**, <http://www.scimagojr.com/journalsearch.php?q=26209&tip=sid>

**ABSTRACT:** The effect of nitrogen fertilization with 0, 50, 100, 150 and 200kg N/ha at P<sub>50</sub>K<sub>50</sub> P<sub>100</sub>K<sub>100</sub> and P<sub>150</sub>K<sub>150</sub> background on the yield and quality of the spinach produce from variety “Zimen edar” was studied during 3 years in field experiment on heavy leached meadow-cinnamon soil, in the Maritsa Vegetable Crops Research Institute, Plovdiv. The effect of increasing nitrogen rates on the size of yield, mineral composition, dry matter and nitrogen content in spinach produce was established.

It is established that the fertilization with N<sub>100</sub>P<sub>100</sub>K<sub>100</sub> is economically the most effective in the conditions of heavy leached meadow-cinnamonic soil, where the yield is high and nitrate content of the produce is below nitrate content accepted admissible amount limit (ACL) for Bulgaria.

10. Dintcheva, Tz, I. Dimov, **H. Boteva. 2008.** Study of vegetable biological production systems on yield and dry matter content in tomato fruit. Acta Horticulturae. Vol 2: 613–618, **SJR 0.269**, **H Index–42**, <http://www.scimagojr.com/journalsearch.php?q=26209&tip=sid>

**ABSTRACT:** The study was carried out in the period 2004-2007 for established influence of new biological production systems on yield and content of dry matter in the fruit of tomato. There were 4 tomato cultivars used – Trapezitsa, Olga, Dofin and Pio Grande and 4 variants on systems: without fertilizer, with fertilizer, biohumus and humustim. As a result of the investigation, it was found that each variety has a specific reaction to the systems for organic vegetable – growing. It was found that in this type of organic agriculture is not to be relied only on natural soil fertility. When we use organic substance the yield is equal or higher than the system with fertilizer.

#### 1. 4. В списание без ипакт фактор

11. **Boteva Hr.**, T. Cholakov, 2010. Study the influence of biofertilizers for growing of tomato in field conditions. Journal of International Scientific Publications; Ecology&Safety, Volume 4, part 3. ISSN 1313 -2563, pp. 153-161

**ABSTRACT:** Field experiments for the effect of organic fertilizers: Labin, Bio One, Tecamin, Agriful, Humustim and Biohumus on biological manifestations and productivity of determinant tomato variety Trapezitsa were performed on strongly leached meadow cinnamonic soil at the experimental field of the "Maritsa" Vegetable Crops Research Institute during the period 2008-2009.

Results from the study demonstrate that plants treated with mineral fertilization - 1,102 kg/plant are with the greatest vegetative mass, followed by fertilization with Bio One and Labin 0,980 kg and 0,963 kg/plant, respectively at 0,677 kg/plant for the control as the difference between the two treatments is not significant. The fruit number per tomato plant is increased up to 4.2 pieces/plant towards the control (without fertilization) by using of organic fertilizers Tecamin and Agriful.

The application of organic fertilizers in reduced mineral fertilization has a positive influence on certain economic indicators of the fruit quality. Increase of the average fruit weight is established in fertilization with Tecamin and Agriful - 167 g/fruit and Humustim -166 g/fruit. The increase towards the control (without fertilization) is 10 g /fruit, averagely. After mineral fertilization the total tomato yield is the highest averagely for the period of study. An increase of the yield in tomato with reduced mineral fertilization is established after application of organic products from 7.1% /after fertilization with Labin / to 23.5% /after fertilization with Tecamin/ towards the control. Organic fertilizers reduce the percentage of non-standard production. Organic fertilizers application results in reduction of the synthetic fertilizers use that is a prerequisite for the production of safety production.

12. Antonova, G., I. Dimov, Tz. Dintcheva, **Hr. Boteva**, St. Masheva, V. Yankova, V. Kanazirska, G. Pevicharova, I. Tringovska, M. Mihov, O. Georgieva. **2010**. Evaluation of the stability and the adaptability on the yield of broccoli cultivars grown under condition in monoculture and intercropping system. Cruciferae Newsletter, vol. 29, 16-18

**ABSTRACT:** The present study was made with the purpose of evaluating the stability and adaptability of the production from the central flower heads of five broccoli hybrids tested in two cultivation systems – as monoculture and in intercropping system growing together with tomatoes and pepper. It was established that the hybrids broccoli Coronado F1 and Kermit F1 showed good productivity 7430-8800 kg/ha and stability ( $bi < 1$ ) expressed in both of cultivation system and the abilities for adaptation was good. In monoculture system for

Shadow F1 was read high yield 9730 kg/ha but in the intercropping system the productivity was significant lower 6500 kg/ha. In both systems the genotype showed low stability ( $b_i > 1$ ). The genotype was demonstrated good adaptability in self-cropping system but the abilities for adaptation in intercropping system was poor. The hybrids Belstar F1 and Lucky F1 independence of the kind of cultivation systems were lower productively 6000-6430 kg/ha and unstable ( $b_i > 1$ ) with poor abilities for adaptation.

13. Vlahova V., Hr. Boteva, T. Cholakov. 2011. Influence of biofertilizers of pepper yield (*Capsicum annuum* L.) cultivated under the conditions of organic agriculture. Journal of International Scientific Publications; Ecology&Safety, Volume 5, part 2, ISSN 1313 - 2563, pp. 206-213.

**ABSTRACT:** The experiment was carried out in 2009-2010 in the biological farm at the Agroecological Centre at the Agricultural University - Plovdiv. The research included pepper of the variety "Kurtovka Kapia 1619", as the following biofertilizers were tested: BioOne and Baikal EM-1Y, applied on two backgrounds, namely: Boneprot and Vermicompost, approved by the Certifying Body "Balkan Biocert" LTD. The aim of the study was to examine the impact of organic manures on the productivity of the pepper cultivated under the conditions of biological production.

The positive effect of the biofertilizers was established on the number of fruits per plant and the average mass of the fruit in comparison with the control sample – unmanured, which was expressed more intensely on the Boneprot background. The use of organic manures increased the pepper yield by 5% to 42%. Organic manuring proved to decrease the percentage of non-standard production.

14. Vlahova V., Z. Zlatev H. Boteva. 2011. Study on the impact of biofertilizers on the leaf gas-exchange of pepper (*Capsicum annuum* L.) cultivated under the conditions of organic agriculture. Journal of International Scientific Publications ; Ecology&Safety, Vol. 5, part 2, p. 214-223, [http:// www.sciencebg.net](http://www.sciencebg.net), ISSN 1313-2563,

**ABSTRACT:** The use of biofertilizers, in combination with organic manures, offers a great opportunity for increasing the production of agricultural crops, as it also achieves sustainability. The purpose of the study is to establish the influence of biofertilizers on changes in physiological indicators upon the biological production of pepper. The experiment was carried out in 2009 in the biological farm at the Agroecological Centre at the Agricultural University- Plovdiv. The study included pepper of the variety "Kurtovska Kapia 1619", as the following biofertilizers were tested: Boneprot, Lumbrical, BioOne and Baikal EM-1Y. Leaf gas exchange parameters are: Net photosynthetic rate, Transpiration rate and Stomatal conductance. Measurements have been taken on normally developed leaves from the central floors of the plants, as the first measurement has been at the butonization phenophase, 15-20 days after importing the biofertilizers- Bi One and Baykal EM-1 Y, as the second one has been at the phenophase of fruit yield. All data have been statistically analyzed using Student's t-test. At the butonization phenophase, the highest value of the dynamics of the net photosynthesis has been reported for plants cultivated on the Boneprot background (50%) and fed with the biofertilizer Baikal EM-1Y. The study shows that the combination between the reduced fertilizer norm and the additional feed with biofertilizer Baikal EM-1Y has a better effect of impact. It has been established that the intensity of transpiration has the highest values in the variants with additional import of Baikal EM-1Y on both backgrounds, with an expressed maximum on the Boneprot

background, followed by the application of the same fertilizer on the Lumbrical background. Regarding the indicator Stomatal conductance, there has been an expressed maximum reported of the values of plants cultivated on the Boneprot background and additionally fed with the biofertilizer Baikal EM-1Y, followed by the variants with combined import of the Lumbrical background with the biofertilizer Baikal EM-1Y. We may draw the general conclusion that the additional feed with Baikal EM-1Y and BioOne has resulted in the increase in the intensity of the indicators under comment, and this is most probably due to the more favourable combination between a background and a biofertilizer, comparing to the independent application of a background, even in optimum concentration.

The additional feed ensures a reserve of nutritional substance during the vegetation period, which itself gives grounds for recommending the combined use of biofertilizers, which will ensure the more fluent release in the soil environment, on the one hand, and the better absorption by plants, on the other hand

15. Cholakov T., **Hr. Boteva**. 2011. Influence of fertilization by vermikompost on the yield from early potatoes. Journal of International Scientific Publications Ecology&Safety, Volume 5, part 3, ISSN 1313 -2563,p. 198-205

**ABSTRACT:** During the period 2008 – 2010, a trial to investigate the influence of organic manure (vermikompost) on productive capacity of early potatoes grown after a preceding green beans crop was conducted in the Institute of Vegetable Crops “Maritza” – Plovdiv. Plants were grown according to a biological method with no use of conventional fertilizers and pesticides.

It was established that the introduction of 100 – 400 ml vermicompost per plant could lead around the 60- th day of germination to an early, average yield of biologically grown potatoes ranging from 10.92 t/ha to 18.09 t/ha depending on the potato variety used. When compared to options with conventional fertilization (N16,P12,K12), the obtained early yields of tubers using vermikompost (400 ml) were from 39.8 to 43.1% lower. In later harvesting of the crops (the 75th day following germination) yields in the studied varieties increased respectively and reached from 13.54 to 20.46 t/ha.

Among the studied varieties fertilized with vermikompost, the early yield of tubers from variety Marine is the highest (treated with 400 ml vermikompost per plant). This trend is retained at the 75th day as the differences towards the varieties Trezor and Rozhen are statistically significant in the two terms of yield recording.

16. Kostova D., **H. Boteva**. 2011. Comparative study of the level of potassium in soil upon its amassment in plants of tomatoes. Journal of International Scientific Publications; Ecology&Safety, Volume 5, part 1, p. 110-120

**ABSTRACT:** A comparative analysis is done about the content of the potassium in stems, leaves and fruits of tomatoes. The influence of the level of potassium is investigated, as well as the kind of the potassium fertilizer upon the content of the assimilated potassium by plants. The experimental data show that the biggest amount of potassium is accumulated in fruits of tomatoes in a level of potassium in soil K16 notwithstanding the form of potassium fertilizer K<sub>16</sub> (K<sub>2</sub>SO<sub>4</sub>) or K16 (KNO<sub>3</sub>) introduced in soil. The results indicate that the leaf feeding-up with 1% KNO<sub>3</sub> solution stimulates the amassment of potassium in fruits oftomatoes to the highest extent. In this way of fertilization the content of potassium is highest in comparison with all the tested variants.

A subordination is investigated between the content of potassium in the fruit of tomatoes and the content of antioxidants in them. The content of lycopen and

$\beta$  carotene changes insignificantly when applying  $K_2SO_4$ . After fertilization with  $KNO_3$  their change is more significant.

17. **Boteva Hr.**, T. Cholakov, V. Vlahova. 2012. Productivity and quality of pepper depending on the applied biofertilizer and variety. Journal of International Scientific Publications ; Ecology&Safety, Volume 6, part 2, ISSN 1313 -2563, pp. 329-337

**ABSTRACT:** A field experiment was performed during the period 2009 - 2010 year in the open field of the Maritsa Vegetable Crops Research Institute, Plovdiv. The influence of biofertilizers Montera Maltz and Lumbrikal (used as background) and Emosan and Seasol (applied in vegetation) on the biological manifestations and fruit quality of pepper – varieties Kurtovska kapiya 1619 and Sofiiska kapiya, grown in the conditions of biological production was studied.

The results of study at two background of fertilization with Montera Maltz and Lumbrikal showed that peppers plants, grown on a background Lumbrikal and fertilization with Emosan are with the greatest vegetative mass. Changes are essential for a variety Kurtovska kapiya 1619. Variety differences concerning the effect of biofertilizers on the vegetative plant weight were not established.

Fertilization with Emosan has a positive effect on standard fruit number and weight per plant. Greater increase of these characters was observed in plant growing on background Montera Maltz. Differences between the two backgrounds are statistically significant in variety Kurtovska kapiya only. Fertilization with Emosan increases the vitamin C content among the studied biochemical characters of pepper fruits. The variation of this character is more considerable when the background is Montera Maltz.

18. Cholakov, T., **Hr. Boteva**. 2012. Influence of biological fertilization on productivity of early potatoes. Journal of International Scientific Publications; Ecology&Safety, Volume 6, part 3, ISSN 1313 -2563, p. 137-143

**ABSTRACT:** During the period 2009 – 2010, a trial for investigation of the influence of organic manures: Vermikompost, Montera malc and liquid fertilizer Emosan on the yield of early potatoes grown after a preceding green beans crop was conducted in the VCRI Maritsa– Plovdiv. Plants were grown according to a biological method without application of conventional fertilizers and pesticides.

It was established that the fertilization with Montera malc exert the greatest effect on the productivity of early potato and the liquid fertilizer Emosan is on the second phase. The yield obtained in fertilization with Vermikompost (400 ml/plant) is considerable lower than the corresponding ones obtained as a result of use of Montera malc (2000kg/ha) and Emosan (300 L/ha).

Variety Marine showed the greatest productivity among the studied ones followed by the variety Trezor. The greatest yield was obtained in variety Marine (early - 28369 kg/ha and total - 34608 kg/ha) after use of Montera malc. Differences in the yield that were observed between the variants fertilized with Montera malc and Emosan are in the limits of 1309 to 1902 kg/ha in variety Marine and from 1902 to 2489 kg/ha for variety Trezor, respectively. The established differences in the yield under the influence of different biofertilizers are statistically significant. In view of the fact that the liquid fertilizer Emosan is considerable cheaper than Montera malc it is an adequate alternative for biological growing of early potato.

19. **Boteva Hr.**, 2014. Quality of tomato seedling in application bioproducts. Turkish Journal of agricultural and natural sciences. 2, 2014, 167-1665-1675



**ABSTRACT:** The study was performed during the period 2009 - 2011 in the "Maritsa" Vegetable Crops Research Institute, Plovdiv. The effect of organic products Baikal EM – 1Y, Biogloblin and Biolan on the quality of seedlings from tomato, variety Yana was studied in unheated glasshouses ro-ON type. Plants were grown on two substrates: peat-perlite substrate and substrate with Lumbrikal. The post-effect of the applied bioproducts on the plant productivity was studied in field conditions.

Tomato seeds from Yana variety treated with Biogloblin and Baikal EM1 have a stronger influence on biometric indexes of the seedlings. The best expressed of this is established in weight of a plant and the diameter of the stem, which is decisive for the quality of seedlings. Using substrate with Lumbrikal and treatment of seeds with bioproducts result in increased of plant bio mass to 38.6% compared to the untreated.

The greatest increase of yield compared to the control is observed in seeds treated with Biogloblin and Baikal EM1 - with 31.0 % and 29.8 %, respectively. Analogous results are obtained for number and weight of fruits per plant.

20. **Boteva Hr.** 2014. Optimizing of systems for nutrition in biological pepper production. Turkish Journal of agricultural and natural sciences, 2, 1665-1670

**ABSTRACT:** The effect of organic fertilizers on the growth and productive manifestations of pepper variety Kurtovska kapia 1 was studied in field conditions. Organic products Amalgerol and Biofa were tested on the basic fertilization with Lumbrikal and Biosol. The studies were conducted during the period 2011-2013 in the "Maritsa" Vegetable Crops Research Institute, Plovdiv.

Bioproducts have a positive impact on the number and average weight of the fruit. Fertilization with bioproducts Biofa and Amalgerol on background Biosol results in increase of the number of fruits in pepper averagely with 3.1 fruits plant<sup>-1</sup>.

It was established an increase of the yield in pepper from 6.2% /background Lumbrikal/ to 16.9% /background Biosol +Amalgerol/ towards the control. Feeding with Amalgerol and Biofa on background Biosol results in further increase of the value of this index, as yields are statistically unproven towards that grown on Lumbrikal background. Bioproducts have a positive effect on the average fruit weight. The results in the biochemical analyzes of fruits demonstrate more remarkable variations in the vitamin C content.

21. **Boteva Hr.** 2016. Productivity and quality of open field tomato after application of bio-fertilizers. Agricultural science and technology. Vol. 8, № 2, 140-143.

**ABSTRACT.** Field experiments for the effect of bio-fertilizers: Labin, Bio One, Tecamin, Agriful, Humustim and Biohumus on productivity and fruit quality of determinant tomato, variety Trapezitsa were performed on strongly leached meadow cinnamonic soil at the experimental field of the "Maritsa" Vegetable Crops Research Institute during the period 2008-2010.

The fruit number per tomato plant is increased up to 38,2 % towards the control (without fertilization) by using of bio-fertilizers Tecamin and Agriful. Similar results for the mass of fruits per plant, where the increase up to 33.3% towards the control.

After mineral fertilization the total tomato yield is the highest averagely for the period of study. An increase of the yield in tomato with reduced mineral fertilization is established after application of bio-fertilizers average 12,1 % from 7,8% /after fertilization with Labin/ to 18.3% /after fertilization with Tecamin/ towards the control. Is established a positive effect by fertilization with Tecamin (38,8%) and

Agriful (36.3%) on early production. In mineral fertilization this index is lower - 23,7%.

Bio-fertilizers Tecamin and Agriful have a positive effect on the content of vitamin C and dry matter.

22. Cholakov, T., **Hr. Boteva**, Sv. Sofkova. 2015. Yield of green beans in organic farming - Journal of Mountain Agriculture on the Balkans, vol. 18, 1, 2015, (214-223) Research Institute of Mountain Stockbreeding and Agriculture, Troyan

**ABSTRACT:** During the period 2011-2013, at the Vegetable Crops Research Institute "Maritza"-Plovdiv, field trials with 2 Bulgarian varieties Tangra and Nikos and the hybrid Dutch variety Lodi, fertilized with the liquid organic fertilizer Emosan – 20 l/da were carried out. The seeds were sowed after a predecessor - spinach. They were tried two schemes of sowing with a width between the rows 60 and 80 cm and distance between plants in rows 10-11 cm. The plants were grown in conformity with the principles of the organic production.

It was found that the level of yields of green beans in organic production largely depends on the varietal characteristics and the technological element - width between the rows has less impact. The received data are statistically proven.

Variety Lodi has the highest yields in both schemes of sowing from 1705.3 till 2057.4 kg/da. It is appropriate for receiving of organic production and recommended for growing in the organic farms. Variety Tangra has comparatively lower productivity but it can be used for organic production too while Nikos variety is not recommended for organic farming

23. Машева Ст., В. Янкова, Т. Чолаков, **Хр. Ботева**. 2012. Нападение от болести и неприятели при отглеждане на ранни картофи под полипропиленови покрития. Аграрни науки. Акад. Издателство на Аграрен университет. Година IV, Бр.10, 47-51

**РЕЗЮМЕ:** През периода 2004-2006 г. в ИЗК "Марица"- Пловдив е изведен опит с картофи сорт Надежда, отглеждани по схема за ранно полско производство, покрити с полипропиленово покритие, на фон торене с N<sub>16</sub> P<sub>12</sub> K<sub>12</sub>. През вегетацията растенията са подхранвани листно със солифид и с KNO<sub>3</sub>. Установена е по-висока степен на нападение от чернихлистни петна (*Alternaria solani* Ell. et Mart.) при покритите с полипропилен варианти, а торенето с KNO<sub>3</sub> и солифид ограничава развитието на заболяването. Най-ниска е плътността от възрастни и ларви на колорадски бръмбар (*Leptinotarsa decemlineata* Say) при вариантите с полипропиленово покритие и листно подхранване със солифид и с KNO<sub>3</sub>.

#### 1. 5. В сборници от международни форуми

24. **Ботева Хр.**, Д. Костова. 2009. Биологичен износ на калий с растителната маса на домати под влияние на калиевото торене. International Scientific Conference "Development of economy and society based on knowledge, 4-5 June Satara Zagora. Volume I, 536-540

**ABSTRACT:** Field experiment for establishment of the effect of potassium rate and form on absorption of nutrient elements by the yield of determinate tomato variety Marti was performed on strong leached meadow-cinnamon soil in the Maritsa Vegetable Crops Research Institute, Plovdiv during the period 2005 – 2007.

The experiment was made in 8 treatments at potassium fertilization rate: 0, 8, 16, and 24 kg K<sub>2</sub>O/da and two potassium sources (potassium sulphate and potassium nitrate) were tested.

Regression equations for establishment of the effect of potassium rate and form on potassium absorbed by plants were worked out. Plants export more potassium quantities in fertilization with potassium nitrate (averagely 28.1 kg/da) as increasing of fertilizer rate result in decrease in absorption of this element. It is necessary from 4.08 kg to 7.23 kg potassium for formation of a unit of tomato produce. Increase of the fertilizer rate result in decrease of potassium amount used for formation of a unit of produce.

25. **Ботева Хр.** 2009. Съдържание на ликопин в доматиите плодове при различни нива на калиево торене. Proceedings of IIIth International symposium "Ecological approaches towards the production of safety food", X. Plovdiv, 199-204

**ABSTRACT:** A field experiment was performed during a three year period in the Maritsa Vegetable Crops Research Institute, Plovdiv on strongly leached meadow cinnamonic soil with tomato varieties Marti and Topaz.

Experience was carried out in 8 treatments at two levels of potassium fertilization, as two sources of potassium - potassium sulphate and potassium nitrate was tested. Growing tomato and productivity manifestations as well as the biochemical composition of the fruit are investigated.

Fertilization with potassium nitrate increases the average fruit weight in both varieties, as it is the greatest in application of 24 kg K<sub>2</sub>O/da. In variety Marti the fruit number per plant increases with increase of potassium fertilizer rate as it is strongly expressed in the use of 24 kg K<sub>2</sub>O/da in the form of potassium nitrate.

There are differences in the lycopene content in the fruits of variety Marti where the influence of potassium nitrate is more strongly on the variation of this indicator, especially in the higher fertilization rate. In variety Topaz there is no significant difference in the fruits lycopene content, both in the treatments and between the two potassium forms.

26. **Boteva Hr.**, T. Cholakov, O. Georgieva. 2010. Agrobiological characteristics and quality evaluation of some determinate tomato varieties. II Международной научно-практической конференции «Современные тенденции в селекции и семеноводстве овощных культур. Традиции и перспективы», Материалы докладов, сообщений, Москва, том 2, 119-128. (English)

**РЕЗЮМЕ:** В результате трехлетних полевых исследований 2005 - 2007 г. сделана агробиологическая характеристика и качественная оценка семи новых детерминантных сортов и линий томатов болгарской и иностранной селекции, подходящих для свежей консумации и переработки. Определены такие показатели как продолжительность вегетации, раннезрелость, общая продуктивность, средняя масса плода, твердость плодов и полевая устойчивость к основным грибным болезням – фитофторозу *Phytophthora infestans* и альтернариозу *Alternaria solani*.

Установлено, что для выращивания в условиях климата Тракийской низменности наиболее подходящи крупноплодные сорта Николина F<sub>1</sub> и Елена F<sub>1</sub> и новый болгарский сорт Импульс, предназначенный для консервной промышленности.

Длина вегетационного периода гибридных сортов Николина F<sub>1</sub> и Елена F<sub>1</sub> равна 151-154 дня, общая продуктивность – 28700 kg - 30630 kg/ha, средняя масса плодов - 254-262 g. Полученная средняя стандартная

продукция крупноплодных сортов варьирует от 25600 kg/ha у сербского сорта Novosadski до 30630 kg/ha у Николина F<sub>1</sub>. Из сортов иностранной селекции наиболее продуктивным является сорт Dora F<sub>1</sub> турецкой селекции, приближающийся по своей продуктивности до сорта Елена F<sub>1</sub> - 29000 kg/ha. Период от массовых всходов до созревания у всех крупноплодных сортов 129-130 дней.

Установлено наибольшее потребление тепловых единиц активных сумм воздушных температур (выше 10°C) в период от рассаживания до снятия последней продукции у сортов Елена F<sub>1</sub> (2633°C) и Импульс (2617°C).

Анализ продолжительности вегетационного периода показал, что из группы сортов для переработки сорт Импульс имеет наиболее краткий период вегетационного развития (147 дней), период от рассаживания до созревания 126 дней, высокую продуктивность 42400 kg/ha и относительную толерантность к фитофторозу и альтернариозу. По показателям продуктивности итальянский сорт Сан Марцано уступает болгарскому сорту Импульс - 37310 kg/ha, но более толерантен к болезням.

27. Dintcheva Ts., **H. Boteva**, I. Dimov, 2010. Effect of vermicompost from cow manure on seed production of Tomato (*Lycopersicon esculentum*), Proceeding of 45 Croatian and 5 International Symposium on Agriculture, Vol 1, 60 – 64

**ABSTRACT:** The aim of this research was to determine the effect of vermicompost on the seed production of tomato under field condition. There were four varieties of determinate tomatoes included in the study. It was established that vermicompost is suitable for organic production of seeds. The application of this organic manure resulted in increase of seed yield from 24.3 % in a variety Trapezitza up to 45.9 % in variety Dofin. Germination of seeds was increased to 96.5 % (max) in variety Rio Grande and to 90.5 % (min) in variety Olga as a result of manuring with vermicompost.

28. Чолаков Т., **Ботева Хр.**, Попов В., 2011. Продуктивность раннего картофеля при различных способах удобрений и схемы посадки. Материалы XIV международной научно-практической конференции, Аграрна наука – сельскохозяйственному производству Сибири, Монголии, Казахстана и Болгарии, часть 1, 186-189

**РЕЗЮМЕ:** В период 2009-2010 гг. в Институте овощных культур „Марица”- Пловдив, на аллювиально-луговых почвах были проведены эксперименты для изучения влияния органического удобрения – вермикомпоста и схемы посадки на размер урожайности раннего картофеля, выращенного в поле после предшественника зеленых бобов. В исследования включены три сорта картофеля, выращиваемых в соответствии с принципами органического метода. Для контроля закладывались и варианты с минеральными удобрениями. Установлено, что при обычном внесении минеральных удобрений (N16 P12 K12), при обеих схемах посадки, средняя урожайность значительно выше, чем в самых лучших вариантах органического выращивания картофеля. Выражено в абсолютных единицах, это выглядит так: (больше в разы) от 1,55 до 1,62 для сорта Рожен; от 1,65 до 1,72 для сорта Трезор и от 1,69 до 1,73 для сорта Марине. Среди испытанных схем посадки, более высокие урожаи получают для схемы 70 x 25см. Самая высокая урожайность клубней при обоих способах удобрений наблюдается у сорта Марине (Франция).

При органическом выращивании раннего картофеля, влияние большого расстояния между растениями в ряду по отношению к среднему урожаю клубней четко не прослеживается. В условиях биологического производства при увеличении нормы биогумуса до 400 ml/растение наблюдается положительный эффект – ранний урожай клубней возрастает.

29. **Ботева Хр., Т. Чолаков.** 2011. Ефективност на биоторове върху вегетативните и продуктивни прояви на средноранни домати. Научни доклади от Международна Научна Конференция „100 години почвена наука в България“, 16-20 май, София, I част, 461-465.

**ABSTRACT:** A field experiment was performed during the period 2009 - 2010 year, on strongly leached meadow cinnamonic soil in the open field of the Maritsa Vegetable Crops Research Institute, Plovdiv. The influence of bio-fertilizers Montero and Lumbrikal (used as background) and Emosan and Sison (applied in vegetation) on the vegetative mass and productivity of determinate tomato, varieties Trapezitza and Yana was studied.

The results of study at two background of fertilization with Montero and Lumbrikal showed that tomatoes plants, grown on a background Lumbrikal and fertilization with Emosan are with the greatest vegetative mass. Changes are essential for a variety Trapezitsa. Differences between the treatments are statistically more significant regarding the leaves mass compared to the stems.

Fertilization with Emosan increased number of red fruit per plant, regardless of background. The increase in variety Trapezitsa was averagely with 7.2 fruit number/plant compared to the control (without fertilization). Effect of biofertilizers on the same index was more slightly expressed in variety Yana.

30. **Ботева Хр., Т. Чолаков.** 2011. Технологични елементи при биологично производство на пипер. Научни доклади от Международна Научна Конференция „100 години почвена наука в България“, 16-20 май, София, I част, 466-470

**ABSTRACT:** Field trials were conducted in 2009-2010 on the experimental area of the Maritsa Vegetable Crops Research Institute, Plovdiv aiming at establishing of the effect of bio-fertilizers on the yield and quality of katiya type pepper – varieties Kurtovska kapiya and Sofiiska kapiya, grown in the conditions of biological production. Bio-fertilizers Montera and Lubrikal were used as background in this study and Emosan and Sisol were applied in vegetation.

The greatest increase in pepper yield (by 18.8% to 22.6 % compared to the control) was proven statistically after use of Montera as background and applying of Emosan. It was established the positive effect of fertilization with Emosan on the average fruit weight. The effect of bio-fertilizers on the yield was stronger expressed in Variety Kurtovska Kapiya.

Clear expressed variety response to the influence of the applied fertilization on pepper fruit quality was established. Fertilization with Emosan has a positive effect on

the biochemical indexes. Variations in vitamin C and dry matter content are better expressed in variety Kurtovska kapiya

31. **Ранков В., Хр. Ботева.** 2011. Влияние на азотното торене върху продуктивните прояви и качеството на добива от спанак, сорт Матадор. Сборник доклади от IV Международен симпозиум „Екологични подходи при производството на безопасни храни“, 9 юни, Пловдив, 191-194

**ABSTRACT:** In a model experience in polyethylene greenhouse in a strong leached meadow-cinnamon soil under controlled conditions (temperature 22-25 °C and soil humidity 60-65% of PPW) was examined the impact of nitrogen fertilization on plant matter formed and the quality of eggplant variety "Matador." The impact of fertilization with  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ ,  $\text{KNO}_3$ ,  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{Ca}(\text{NH}_2)_2$  doses: 0, 100, 200, 300 and 400 mg N /1000g soil was examined. The study was based on 200 mg  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$ /1000g soil imported as triple superphosphate and potassium sulphate.

The results obtained show that in the included in the study nitrogen fertilizer in dose of 400 mgN/1000g soil reduce the plant matter in comparison with the dose 300 mg N/1000g soil. Under the influence of nitrogen fertilization changes in mineral composition of vegetable matter occur, more pronounced in the nitrogen content and nitrate markedly better after fertilization with  $\text{NH}_4\text{NO}_3$ ,  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{KNO}_3$ .

32. **Boteva H.**, Cholakov T., E. Valcheva. 2012. Effect of rate and form of potassium on the yield and quality of determinate tomatoes. Научные исследования и разработки к внедрению в АПК. Сборник статей международной научно-практической конференции молодых ученых (19-20 апреля 2012 г.), Иркутск .p 85-90. (English)

**ABSTRACT:** A field experiment was performed during period 2005-2007 year in The "Maritsa" Vegeta-ble Crops Research Institute, Plovdiv on strongly leached meadow cinnamonic soil with tomato varieties Martill and Topaz. Experience was carried out in 8 treatments at two levels of potassium fertilization, as two sources of potassium - potassium sulphate and potassium nitrate was tested. Growing tomato and productivity manifestations as well as the biochemical composition of the tomato fruits are investigated.

Relationship has been found between the potassium rate and form on the yield from determinate tomatoes. Potassium fertilization increases the yield up to 26.2% in variety Marti and 20.3 % in variety Topaz. Potassium form has not a significant impact on yield in variety Marti, whereas in variety Topaz, the yield is higher after fertilization with potassium nitrate.

Fertilization with potassium nitrate has a positive effect on the studied biochemical characters of the tomato fruits. The influence of potassium nitrate is more strongly in variety Marti, especially in the higher fertilization rate. In variety Topaz there is no significant difference on the variation of these indicators.

33. **Ботева, Хр.**, Т. Чолаков. 2013. Установление подходящей схемы удобрений для выращивания раннего картофеля под полипропиленовым покрытием. Сборник научных трудов от Международной научно-практической конференции «Научное обеспечение картофелеводства, овощеводства и бахчеводства: достижения и перспективы», Алматы, Казахстан. УДК 635.1/ 7 ББК, 143-148.

**РЕЗЮМЕ:** Экспериментальная работа проведена на сильно излуженной аллювиально-луговой почве на опытном поле ИОК „Марица”-Пловдив с ранним сортом картофеля „Надежда”, выращенном на высокой гряде с и без полипропиленового покрытия /PP/. В период 2004-2006 г. на фоне  $\text{N}_{16}$   $\text{P}_{12}$   $\text{K}_{12}$  было испытано влияние двух листовых удобрений: солифида и нитрата калия. Целью исследования является оптимизирование питательного режима раннего картофеля, выращенного под полипропиленовым покрытием, путем балансируемого удобрения почвенными и листовыми удобрениями, что обеспечит растения

необходимыми доступными питательными элементами при более неблагоприятных условиях их усвоения при раннем производстве.

Установлено, что листовая подкормка со Солифид и  $KNO_3$  влияет положительно на вегетативную массу растений, независимо от способа выращивания. Эффект внесения листового удобрения проявляется сильнее в вариантах с полипропиленовым покрытием. Использование полипропиленового покрытия увеличивает массу клубней в среднем на 10,8 %, при этом, внесение листового удобрения Солифид и  $KNO_3$  приводит к дополнительному повышению этих показателей в среднем на 12,7 % в сравнении с контрольным вариантом.

Доказано увеличение урожайности раннего картофеля, выращенного под полипропиленовым покрытием и с внесением листовой подкормки Солифид и  $KNO_3$  на 11,2 % и 10,7 % в сравнении с контрольным вариантом. Листовое удобрение имеет доказанный эффект на общую урожайность - (72,95 %). Влияние способа выращивания (приложение РР покрытия) - недоказано. Полипропиленовое покрытие и листовое удобрение повышает содержание сухого вещества в клубнях картофеля, причем это более выражено при внесении  $KNO_3$ .

34. Kostadinov K., S. Filipov, H. Boteva. 2013. Effect of the substrate on the productivity of greenhouse tomato. Сборник научных трудов от Международной научно-практической конференции «Научное обеспечение картофелеводства, овощеводства и бахчеводства: достижения и перспективы», Казахский НИИ картофелеводства и овощеводства, 294-296. (English).

**ABSTRACT:** The experimental work was carried out in the glass-and-steel greenhouses on the experimental field of the Agricultural University – Plovdiv with indeterminate tomatoes of the *Fado F<sub>1</sub>* variety. The containers for the plants were of 15-litre capacity and the amount of the mix – 12 litres. Drip irrigation was applied. Biological control was used as plant protection treatment. Four variants with *Lumbrikompost* (biohumus) were tested: 1. *Lumbrikompost*<sub>30+</sub> *Perlite*<sub>70</sub> – control; 2. *Lumbrikompost*<sub>40+</sub>*Perlite*<sub>60</sub>; 3. *Lumbrikompost*<sub>50+</sub>*Perlite*<sub>50</sub>; 4. *Lumbrikompost*<sub>60+</sub> *Perlite*<sub>40</sub>. The plants were grown from seedlings in a heated glass-and-steel greenhouse, the sowing time being the first decade of February and planting time – the third decade of March.

The early and total yield is high in application of mixture with 50 and 60 % *Lumbrikompost*. The substrate from *Lumbrikompost* and *Perlite* could be used in a great degree as an alternative of the soil growing concerning the plant productivity.

The percentage increase of the yield towards the control in relation to the early yield reaches to 56.6 % in LC <sub>50+</sub> *Perlite* <sub>50</sub> and regarding the total yield LC <sub>60+</sub> *Perlite* <sub>40</sub> – to 49.8 %. The morphological indexes of the fruit depend on the percentage of *Lumbrikompost* in the substrate. The largest fruits with the thickest pericarp are formed in 60 % of this component in the mixture.

35. Boteva H., S. Filipov, K. Mihov. 2013. Effect of amount of *Lumbrikompost* on the vegetative manifestations of greenhouse tomato. Сборник научных трудов от Международной научно-практической конференции «Научное обеспечение картофелеводства, овощеводства и бахчеводства: достижения и перспективы», Казахский НИИ картофелеводства и овощеводства, 149-151. (English).

**ABSTRACT:** The experimental work was carried out in the glass-and-steel greenhouses on the experimental field of the Agricultural University – Plovdiv with indeterminate tomatoes of the *Fado F<sub>1</sub>* variety. The containers for the plants were of 15-litre capacity and the amount of the mix – 12 litres. Drip irrigation was applied. Biological control was used as plant protection treatment. Four variants with *Lumbrikompost* (biohumus) were tested: 1. *Lumbrikompost<sub>30</sub>+ Perlite<sub>70</sub>* – control; 2. *Lumbrikompost<sub>40</sub>+Perlite<sub>60</sub>*; 3. *Lumbrikompost<sub>50</sub>+Perlite<sub>50</sub>*; 4. *Lumbrikompost<sub>60</sub>+ Perlite<sub>40</sub>*.

The biometric manifestations of the plants were influenced by the presence of *Lumbrikompost* expressed in percentages. The highest values obtained at 60%-presence of *LK*. The container-type growing applying an *LK+Perlite* mix. can be successfully used as an alternative for the organic production of greenhouse tomatoes. The tested mixes *LK<sub>30</sub>+Perlite<sub>70</sub>*, *LK<sub>40</sub>+Perlite<sub>60</sub>*, *LK<sub>50</sub>+Perlite<sub>50</sub>* and *LK<sub>60</sub>+Perlite<sub>40</sub>* exerted a different influence upon the tomato-plant growth and productivity. *LK<sub>60</sub>+ Perlite<sub>40</sub>* exhibiting a slight superiority.

During the stage of *mass fruit production*, fruits of the largest mass were obtained in *LK<sub>60</sub>+Perlite<sub>40</sub>*. The figures for fruit number and mass were higher in the variants grown in *LK<sub>50</sub>+Perlite<sub>50</sub>* and *LK<sub>60</sub>+ Perlite<sub>40</sub>* as compared to the ones grown in *LK<sub>30</sub>+Perlite<sub>70</sub>* and *LK<sub>40</sub>+Perlite<sub>60</sub>*.

36. Arnaoudov B., Hr. Boteva. 2014. Study of the influence of some bioproducts over the glasshouse cucumber's growth expressions and productivity. ЖК «Scientific Information Centre» The modern science and scholar The collection of scientific articles on materials of International scientific practical conference (May 15, 2014, Almaty City), 113-117

**ABSTRACT:** The study was conducted with glass house cucumber variety Defense, which were grown as a hydroponic crop in non-heated steel-glass house Venlo type in Maritsa VCRI Plovdiv during the period of 2005 -2007.

The purpose of the research work was to investigate the influence of some bioproducts over the glasshouse cucumbers' growth expressions and productivity as a hydroponic crop. A slight increase in the central stem growth pace was observed, as it was within the range of 0,3% to 15,1% in comparison to the control in all treated plants. The leaf formation pace was close in values to the control variant and no statistical differences were proved. Yield increase was observed to the third week with from 3,5% to 8,4% in comparison to the control variant. The biological effect from the use of the bioproducts was best expressed when the bioproduct Biolife was applied. With that scheme for fertilizing, glass house cucumbers were showing best production qualities with total yield 11421,8 kg/da average and standard production exceeding the control variant with 55,3%.

37. Чолаков Т., Хр. Ботева, Цв. Динчева. 2012. Влияние на торенето и схемата на отглеждане върху масата на семената от праз *Allium porrum* L., Сборник доклади от Трети международен научен конгрес, 50 години технически университет, 4-6 октомври, Технически университет, Варна, стр. 76-80

**РЕЗЮМЕ:** През периода 2008 - 2011 г. в Института по зеленчукови култури „Марица“– Пловдив върху алувиално-ливадна почва бе изведен опит с два сорта праз. Изследвано е влиянието на схемата на засаждане и торене върху продуктивността на растенията при отглеждането им за семена.

Най-висока семенна продуктивност при схема на засаждане 80 x 20 cm е установена във варианта с минерално торене (NPK). Средният добив семена от растение е 10,65 g при сорт Старозагорски камуш и 11,06 g при



сорт Старозагорски - 72. С най-ниска продуктивност и при двата сорта са растенията от контролния вариант - без торене (3,79 и съответно 3,50 g).

От изпитваните биологични торове с най-добър ефект върху семенната продуктивност на растенията е Монтера малц. Във вариантите с вътрередово разстояние 20 cm между растенията при сорт Старозагорски 72 са получени 8,63 g, а при Старозагорски камуш съответно 8,42 g семена. Установи се, че при торене с Емосан продуктивността на растенията е по-ниска (6,70 –7,75 g) спрямо вариантите с внасяне на Монтера малц, но значително по висока отсъответната при торене с вермикомпост. Количеството получени семена при торене с вермикомпост в зависимост от схемата на отглеждане е от 4,73 до 5,69 g/растение. Семенната продуктивност на растенията при схема на засаждане 80 x 15 cm е по-ниска и в зависимост от сорта и торенето варира от 4,73 до 6,93 g.

38. **Ботева Хр.**, 2016. Ефективност на системи за торене с органични продукти върху вегетативните и продуктивните прояви на средно ранни домати. Международна конференция "Балканска икономическа реконструкция и екология - 2016 г." Балканиреко '16, 7 – 8 април, София, /под печат/.

**РЕЗЮМЕ:** Проучен е ефектът на органични торове върху растежа и продуктивните прояви на домати, сорт Водолей при полски условия. Изпитани са биопродуктите Лумбрикал и Биосол за основно торене и Амалгерол и Биофа за подхранване. Проучванията са проведени през периода 2011-2013 в Институт по зеленчукови култури "Марица", Пловдив.

С най-голяма вегетативна маса са растенията, отгледани на фон Лумбрикал с приложение на Биофа и Амалгерол, съответно – 1,213 kg/растение и 1,152 kg/растение срещу 0,869 kg/растение при контролата. Същата тенденция е установена и на фон Биосол, като ефектът от допълнителното подхранване с биоторовете е по-слаб. Подхранването с Амалгерол и Биофа на фон Биосол увеличава броя на плодове при домати средно с 6,0 бр./растение. Най-голям е броят на плодовете на растение след приложение на Биофа на двата фона - Биосол и Лумбрикал, като увеличението е съответно с 9,6 и 6,2 бр./растение. Аналогични са резултатите и за теглото на плодовете.

39. **Boteva Hr.**, 2016. Morphological and economic characteristics of foreign eggplant varieties. XIII Международная научно-практическая конференция «пища. екология. качество» тематика: «Продовольственная безопасность России: Пути. Проблемы. Решения» г. Красноярск 18-19 мая, 165-168 (English).

**ABSTRACT:** The experimental work was performed in the period 2008-2010 on the experimental area of the Maritsa Vegetable Crops Research Institute, Plovdiv. Seven Bulgarian and foreign varieties eggplants have been included in the study: Patladjan 12 (Bulgaria); Melana F<sub>1</sub>, Avan F<sub>1</sub>; Prosperosa; Gitana F<sub>1</sub>; Rotonda bianka and Classic F<sub>1</sub> (Italy). The shortest vegetation period was recorded for variety Avan F<sub>1</sub> (149 days), and the longest vegetation – in varieties Patladjan 12 and Prosperosa (155 days). According to the experiment it was established that the yield from foreign eggplant varieties is averagely with 8,8 % higher compared to that of the control. The highest yield was obtained in variety Avan F<sub>1</sub>, followed by Gitana F<sub>1</sub> and Melana, as the increase towards the control is with 119,6 %, 114,9 % and 110,5 %, respectively. The biggest fruit weight - 493 g was recorded in variety Tonda Bianca, followed by Avan F<sub>1</sub> - 472

g. The foreign eggplant varieties possess better chemical and technological properties compared to the control.

## 2. НАЦИОНАЛНИ ИЗДАНИЯ

### 2.1. Реферирани научни списание

40. Митова Ив., Ив. Димитров, **Хр. Ботева**. 2010. Качество на домати в зависимост от сорта и приложеното торене. Почвознание, агрохимия и екология. Год. XLIV. №2. 45-51

**ABSTRACT:** A field experiment on an Arenic Fluvisol (WRBSR, 2006) with a three different type of tomato plants - Prekos F1, Bakini and Pink Charm is made. The influence of specific nitrogen norm 30 kg N da<sup>-1</sup> in form of mineral and organic compost, on a PK-bas is over quality characteristics of the production from the chosen variety was traced. The experiment proof that in the most cases the fruits of organic compost plants were richer on absolute dry matter compare to these from plants treated with fertilizer. The higher quantity of dry matter after the first analyse was found in variety Pink Charm treated with organic compost - 6.8%, and after the second analyse in the analogical experiment with variety Bakini - 7.74%.

The fruits from the plants treated with organic compost are in general larger, with higher vitamin C quantity and mutual sugar compare to those treated with fertilizer. The coefficient of determination (R<sup>2</sup>) from the equilibration describing the dependence of fruit weight and fruit number, and fruit weight and absolute dry matter, mutual sugar, lycopen and carotene are high reliable numbers.

41. **Ботева Хр.**, М. Камбурова. 2011. Зависимост между съдържанието на магнезий в плодовете от домати и качеството им при различно калиево торене. Научни трудове УХТ, том LVIII, свитък 1, 391-396

**ABSTRACT:** A field experiment with tomato variety Marty grown in different potassium fertilization was conducted. It was studied two potassium sources (potassium sulphate and potassium nitrate) for three fertilization rates: 0, 8, 16 и 24 кг K<sub>2</sub>O/da. The results demonstrate that both the potassium rate and form have an influence on magnesium absorption by tomato fruits.

The relationship between magnesium content in the fruits and their biochemical composition was established by regression equations. Higher magnesium concentrations have a positive effect on the content of vitamin C, β-carotene, lycopen in tomato fruits grown with potassium nitrate fertilization.

42. **Ботева Хр.**, М. Камбурова. 2011. Влияние на калиевото торене върху съдържанието на магнезий в растителната маса от домати. Научни трудове УХТ, том LVIII, свитък 1, 397-402

**ABSTRACT:** The effect of potassium fertilization on yield and vegetative mass formation was studied in determinate tomato variety Marti. It was established the relationship between the rate and form of potassium on the magnesium absorption by the plant mass of the tomato.

The magnesium leached by the plants after fertilization with potassium nitrate is more and the vegetative mass and yield are the highest. It was established that the increase of fertilizer's rate with potassium nitrate results in increase of absorption of this element while in applying of potassium sulphate this ratio is inversely.

43. Михов М., **Хр. Ботева**. 2012. Влияние на биопродуктите върху енергийната продуктивност на пипер тип „Капия”. сп. Селскостопанска техника, бр. 1,14-19

**РЕЗЮМЕ:** Проучването е проведено в периода 2008-2010 година в ИЗК“Марица“ на силно излужена ливадно-канелена почва с пипер, сорт Куртовска капия 1619. Проведеното е изследване за влиянието на биопродуктите Лабин, Аминоацид 24%, Био 1, Текамин и Агрифул върху енергийната продуктивност при редуцирано минерално торене. Установено е, че при отглеждане на пипер чрез редуцирано минерално торене и добавка на биопродукти за подобряване на почвеното плодородие се реализира енергийна печалба от 6336,12 MJ/ha при използване на Текамин и 6099,52 MJ/ha при използване на Агрифул, а енергийната продуктивност на културата нараства до 0,66 kg/MJ.

При употреба на Текамин и Агрифул се намалява количеството на нестандартната продукция съответно с 28,6 и 30,0 %.

44. Михов М., Хр. Ботева. 2012. Влияние на биопродуктите върху енергийната продуктивност на полски домати. сп. Селскостопанска техника, бр. 1, 5-13

**РЕЗЮМЕ:** Целта на изследването е да се дифинират енергийните разходи при производство на полски домати чрез прилагане на биопродукти за поддържане на почвеното плодородие и определи влиянието на биопродуктите върху енергийната продуктивност на културата.

Проучването е проведено в периода 2008-2010 година в ИЗК“Марица“ на силно излужена ливадно-канелена почва с домати, сорт Трапезица. Проведеното е изследване за влиянието на биопродуктите Лабин, Аминоацид 24%, Био 1, Текамин и Агрифул върху енергийната продуктивност при редуцирано минерално торене.

Резултатите показват, че отглеждане на полски домати с редуцирано минерално торене с химични торове и добавка на биопродукти за подобряване на почвеното плодородие общите енергийни разходи намаляват с 18,21% при употреба на Био 1 и с 16,96 % при внасяне на Текамин и Агрифул. При прилагане на Текамин и Агрифул се получава най-високо стандартен добив и по-малко количество нестандартна продукция, което води до подобряване на стопанския ефект при производството на домати. Енергийната продуктивност на полски домати с приложената схема на редуцирано минерално торене и добавка на биопордукти е в диапазона 0,74-0,89 kg/MJ и е най-ниска при прилагането на Вермикомпост. При внасяне на Текамин е 0,89 kg/MJ, а на Агрифул - 0,87 kg/MJ.

45. Чолаков Т., Хр. Ботева, Д. Димова. 2012. Добиви от ранни картофи при конвенционално и биологично производство. сп. Растениевъдни науки . год. L., №2, 43-46

**РЕЗЮМЕ:** През периода 2010 – 2011 г. в полето на ИЗК“ Марица-Пловдив е изведен опит с три сорта картофи отглеждани за ранно производство в съответствие с принципите на биологичния метод. Изследвано е влиянието на биологичните торове Монтера малц, Емосан и Вермикомпост върху продуктивността на растенията. При отглеждането на посевите не са прилагани конвенционални пестициди. Само в контролния вариант ранните картофи са отглеждани както при конвенционално производство - с използване на минерални торове (N16P12K12).

Установи се, че най-високи добиви (ран и общ) се получават във вариантите торени с Монтера малц (200 kg/da). Разликите спрямоконвенционалното производство в зависимост от сорта са от 10,2 до 28,1% в полза на минералното торене. Влиянието на течния тор Емосан върху стопанската продуктивност на растенията е по-слабо изразено в

сравнение с това на Монтера малц. Съответните разлики са в диапазона от 15,6 to 30,3 %. Това доказва, че и при нашите агроклиматични условия течния биотор Емосан определено има перспективи за органичното производство на ранни картофи. Сортът Марине е подходящ за включване в системи за биологично отглеждане. Разликите между добивите от конвенционалното и биологичното производство при този сорт са най-малки и са статистически доказани. Самостоятелното торене с вермикомпост при биологично отглеждане на ранни картофи е със значително по-слаб ефект в сравнение с биоторове Монтера малц и Емосан.

46. **Ботева Хр.,** О. Георгиева. 2013. Приложение на биопродукти за подобряване качеството на разсада от пипер. сп. Растениевъдни науки, год. L., №2, 38-42

**ABSTRACT:** The experimental work was performed during the period 2009 - 2011 in the "Maritsa" Vegetable Crops Research Institute, Plovdiv. Attempts for establishment of the effect of the bioproducts: Lumbrikal, Baikal EM, Biogloblin, Biolan and Ivin on the quality of the seedlings and field experiments were conducted with purpose to study their effect on the biological manifestations, productivity and quality of the pepper produce from variety Kurtovska kapiya 1619.

Seeds treated of pepper, variety Kurtovska 1619 with Biogloblin and Baikal EM1 has more influence on biometric parameters of seedlings. This is better expressed increase in mass of a plant, the stem diameter, number and mass of leaves, determining indexes for seedlings quality.

Using substrate with Baikal EM1 and seeds treated with bioproducts increased yield of pepper from 10.9% to 28.4%. The greatest increase in yield of seed treated with Baikal EM1 and Biogloblin, respectively by 28.4 and 27.5% compared to control. Analogous results for the number and weight of fruits per plant.

47. Чолаков Т., **Хр. Ботева.** 2013. Добиви при биологично производство на семена от праз /*Allium porrum* L./, Сп. "Ново знание" - издателство на ВУАРР-Пловдив, год.II, № 1, с. 223 -225.

**РЕЗЮМЕ:** През периода 2008 – 2011 г. в опитното поле на ИЗК "Марица"- Пловдив, върху алувиално-ливадна почва и при спазване принципите на биологичното земеделие бяха изведени опити с два сорта праз. Целта на изследването е да се получи информация за влияние на торенето с биоторове върху добивите от семена при климатичните условия на Западната Горнотракийска низина.

Установено е, че в зависимост от сорта и използвания биологичен тор получените добиви превишават контролния вариант (N0, P0, K0) от 43,4 до 146,4%. След торене с Монтера малц и при двата сорта се получава най-висок добив (от 45,320 до 46,620 kg/da) биологично произведени семена. Наблюдаваните разлики спрямо контролата след торене с Монтера малц са от 122,0 % (сорт Старозагорски камуш) до 146,4% (сорт Старозагорски - 72) и са статистически доказани на най-високо ниво - 0,1%. На второ място с значително предимство пред вариантите с вермикомпост са добивите от площите торени с Емосан. Неговото влияние върху продуктивността на посева е по-слабо изразено от това на Монтера малц. Разликите в добивите от семена между вариантите с Монтера малц и Емосан са от 17,8 до 30,5%. След торене с вермикомпост добивите от декар са най-ниски. В сравнение с вариантите с Монтера малц получените количества от семена са по-малки от 72,0 до 93,3%. При четири от вариантите с вермикомпост са използвани

допълнително и биопродукти - Триходермин и Поливерзум. Наблюдаван е положителен ефект върху добива от приложението на биопродуктите само при сорт Старозагорски 72, а при другия сорт различията са несъществени.

48. **Ботева Хр.** 2013. Зависимост между добива и усвоените хранителни вещества от ранни картофи при нарастващи норми на минерално торене. Почвознание, агрохимия и екология. XLII, кн. 4. 54-59.

**ABSTRACT:** A field attempt with early potatoes variety Nadezda was carried on Strongly Leached Meadowcinnamon Soil, in the Maritsa Vegetable Crops Research Institute, Plovdiv. It was tested the following rates: 0, 80, 160 and 240 kg N/ha that are input separately and rates on phosphorus background: 0, 80, 160 and 240 kg P<sub>2</sub>O<sub>5</sub>/ha and also selected variants for potassium: 0, 80, and 160 kg K<sub>2</sub>O/ha.

As a result of the experiment was established that for the formation of a unit potato produce it is necessary: nitrogen – from 3.07 kg to 8.52 kg; phosphorus – from 1.72 kg to 2.97 kg and potassium – from 5.91 kg to 10.85 kg.

The correlation between yield and absorbed amount of nutrients being necessary for obtaining of the yield was established by regression equations.

49. Тодорова Д., **Хр. Ботева.** 2014. Ефект на подхранващото торене с органичен птичи тор върху добива и качеството на главесто зеле. Сп. Растениевъдни науки, ГОД. LII, №3, 52-5.

**ABSTRACT:** Biological efficiency of organic poultry manure in head cabbage for later field production was investigated during the period 2010-2013 in the Institute of Agriculture, Kyustendil. As a result, the diameter of the heads cabbages increases compared with non fertilized control with 2.3 and 3.0% in varieties Balkan and Pazardjishko podobreno. In variety Balkan organic fertilization induces increasing yields by 13.6%, while the increase in Pazardjishko podobreno was only 2%. The results about vitamin C content are diverging, with a low increase in values has Balkan and a significant reduction in Pazardjishko podobreno (15.4%). The dry matter content ranged from 10.8 to 11.1%.

50. **Ботева Хр.,** 2016. Оптимизиране на системи за хранене при биологично производство на домати. Списание за наука „Ново знание“, ISSN 2367-4598. ГОДИНА V, БР. 1, януари - март, 79-83.

**РЕЗЮМЕ:** В полски условия са проведени проучвания през периода 2011-2013 г. в опитното поле на Института по зеленчукови култури Марица, Пловдив, насочени към установяване на ефекта на биоторове върху добива и качеството на детерминантни домати, сорт Водолей, отглеждани в условията на биологично производство. На фон основно торене с Лумбрикал и Биосол са изпитани биопродуктите Амалгерол и Биофа.

Приложените биопродукти увеличават добива от домати, сорт Водолей от 9,9% до 25,8% спрямо контролата – неторено. Най-голямо е повишението след основно торене с Биосол и подхранване с Биофа и Амалгерол, съответно с 25,8% и 23,7 % спрямо контролата. Ефектът на биопродуктите приложени на фон Лумбрикал върху добива е по-малък.

Теглото на плода при сорт Водолей е най-голямо във вариантите, торени на фон Биосол при използването на Биофа и Амалгерол. Увеличението спрямо контролата е съответно с 16,9 g и 15,0 g/плод. Не са установени статистически значими различия между вариантите, където фонвете /Лумбрикал и Биосол/ са внесени самостоятелно.

Резултатите от биохимичните анализи на плодовете от сорт Водолей показват по-съществени измененията в съдържанието на витамин С и сухо вещество на фон Биосол.

## 2.2. Сборник трудове от национални форуми

51. **Ботева Хр.**, Тенчо Чолаков, М. Камбурова. 2010. Влияние на биоторове върху продуктивността на пипер, средноранно производство. Сб. доклади от VIII Научно-техническа конференция с международно участие „Екология и здраве”, Пловдив, 201-206

**РЕЗЮМЕ:** През периода 2008 - 2009 г. в ИЗК " Марица"- Пловдив, върху силно излужена ливадно-канелена почва е изведен полски опити с пипер, сорт Куртовска капия за установяване ефекта от биоторове върху биологичните прояви и продуктивността на растенията. Проучвани са органичните торове: Лабин, Bio One, Tecamin, Агрифул, Хумустим и Биохумус. В резултат от прилагането на биопродукти се увеличава количеството на червените плодове средно с 2,7 бр./растение, като най-голям е техният брой след използването на Tecamin - 7,4 бр./растение. Изследваните биоторове оказват по-слабо влияние върху масата на плодовете на пипера.

Биоторовете увеличават добива при пипера с 6,5% (след торене с Лабин) до 27,4% (след торене с Агрифул) спрямо контролата - неторено. Органичните торове намаляват и процента на нестандартната продукция. Получените резултати определят биоторовете като предпоставка за редуциране приложението на минерални торове и възможност за производство на екологично по-чиста продукция.

52. **Ботева Хр.**, Галина Антонова, Тенчо Чолаков, Иванка Тринговска, Емилия Начева. 2014. Технологии за биологично производство на зеленчуци и картофи. Национална конференция с международно участие „Биологични растениевъдство, животновъдство и храни”. Троян. 27-28. XI.

**РЕЗЮМЕ:** В резултат на дългогодишни, комплексни изследвания проведени през периода 2006-2013 г. в Института по зеленчукови култури “Марица”- Пловдив са разработени: „Технология за биологично производство на късно зеле”, “Технология за биологично производство на семена от праз” и “Технология за биологично производство на разсад от домати и краставици”. В тях са представени подходящи за посочените култури: сортов състав, схеми на засаждане и торене, създаващи благоприятни условия, обезпечаващи повишена устойчивост на растенията към неблагоприятни фактори на околната среда и по-високи и стабилни добив. Представени са и нови технологични решения за биологичен контрол на вредителите в полето и при оранжерийното производство. Извършена е и оценка на икономическата и енергийната ефективност при биологичното производство.

25. 11. 2016 г.  
Пловдив

Изготвил:  
/доц. д-р Хр. Ботева/

## СПРАВКА ЗА УЧАСТИЕ В КНИГИ, БРОШУРИ, РЪКОВОДСТВА И ДОПЪЛНИТЕЛНИ ПУБЛИКАЦИИ

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