

### **1. CARYOLOGIA** Vol. 54, no. 4: 313-317, **2001**

Modal karyotype of continuous cell line A2058 (human metastatic melanoma) and its evolution in culture

Balik Dzhambazov<sup>1\*</sup>, Dafinka Asparuhova<sup>2</sup>, Lyubka Koleva<sup>2</sup> and Nikola Popov<sup>2</sup>

**Abstract** – A subject of the current study was the karyotype of continuous cell line A2058, which is characterized by considerable karyotype heterogeneity. By means of cytogenetic analysis it was established that at the earlier stages of cultivation, the cells of A2058 have a threemodal number of chromosomes – 43, 44, 48. After a longer period of cultivation, the modal number of chromosomes is stabilized around the diploid - 43. The present study established the chromosomes with typical morphology and high frequency of occurrence, that could be considered as markers for the cell line A2058. The cell line karyotype evolution shows a tendency towards reduction in the number of cells with a small number of chromosomes, decrease of variability in the number of chromosomes, increase in the number of cells with a near-diploid modal number of chromosomes, stability of the polyploid cells and marker chromosomes, and a gradual elimination of the Y-chromosome.

Key words: A2058, Cell Culture, Karyotype, Modal Number of Chromosomes.

### **2. Folia Biologica** (Praha) 49, 87-94 (**2003**)

Morphological, Genetic and Functional Variability of a T-Cell Hybridoma Line

B. Dzhambazov, I. Teneva, L. Koleva, D. Asparuhova, N. Popov

**Abstract.** The variability in the morphology, modal number of chromosomes, TCR expression and functional reactivity of a CII-specific T-cell hybridoma at continuous subcultivation have been investigated. As the number of passages increased, besides the oval semiadherent cells (normal phenotype), fibroblast-like cells (transformed phenotype) were also observed. The two cell subpopulations differed in their karyotype characteristic, as well as in their functional reactivity. The cell population with a normal phenotype was characterized by a tetramodal number of chromosomes (30, 40, 48 and 70) and trisomies of chromosomes 6 and 14, while the cell population with a transformed phenotype was characterized by a trimodal number of chromosomes (11, 68 and 74) and trisomy of chromosome 12. A nullisomy of sex chromosomes was established in both types of cells. In the initial passages of subcultivation, 73.04% of the cells with a normal morphological phenotype expressed TCR-CD3 complexes on their surface and possessed high functional reactivity. After a two-week subcultivation, the values of these indices went down considerably: 46.11% of the cells expressed functional TCR-CD3 complexes, as a result of which their functional reactivity decreased. Only 2.71% of the cells with a transformed morphological phenotype expressed functional TCR-CD3 complexes on their surface. In these cells, a total loss of reactivity towards the specific antigens was established. The achieved results show that at continuous subcultivation the T-cell hybridomas are unstable, and with the increase in the number of passages there appear chromosome rearrangements, leading to loss of their functional reactivity.

Key words: T-cell hybridoma, variability, chromosome number, reactivity, TCR, mouse

### **3. Toxicon** Volume 45, Issue 6, May **2005**, Pages 711–725

Toxic potential of five freshwater *Phormidium* species (Cyanoprokaryota)

Ivanka Teneva, Balik Dzhambazov, Lyubka Koleva, Rumen Mladenov, Kristin Schirmer

**Abstract**

Among the Cyanoprokaryota (blue-green algae), the genus *Phormidium* has thus far rarely been studied with respect to toxin production and potentially resulting human and environmental health effects. We here show that five previously unexplored freshwater species of this genus (*Ph. bijugatum*, *Ph. molle*, *Ph. papyraceum*, *Ph. uncinatum*, *Ph. autumnale*) are indeed capable of producing bioactive compounds. *Phormidium* extracts caused weight loss as well as neuro/hepatotoxic symptoms in mice, and in the case of *Ph. bijugatum* even death. Very low levels of saxitoxins and microcystins, as confirmed by ELISA, were insufficient to explain this toxicity and the differing toxic potencies of the *Phormidium* species. Qualitative HPLC analyses confirmed different substance patterns and in the future could aid in the separation of fractions for more detailed substance characterisation. The results *in vivo* were confirmed *in vitro* using cells of human, mouse and fish. The fish cells responded least sensitive but proved useful in studying the temperature dependence of the toxicity by the *Phormidium* samples. Further, the human cells were more sensitive than the mouse cells thus suggesting that the former may be a more appropriate choice for studying the impact of *Phormidium* to man. Among the human cells, two cancer cell lines were more responsive to one of the samples than a normal cell line, thereby indicating a potential anti-tumour activity. Thus, the five freshwater *Phormidium* species should be considered in environmental risk assessment but as well, as a source of therapeutic agents.

Keywords: Cyanoprokaryota; *Phormidium*; Toxins; Mouse bioassay; Fish and mammalian cell cultures; Cytotoxicity

#### **4. Journal of Central European Agriculture, 2011, 12(3), p.467-476**

Cultivar Impact On The Chemical Content And Grain Technological Qualities Of Some Durum Wheat Cultivars

Tanko Kolev\*, Nurettin Tahsin, Lyubka Koleva, Kalin Ivanov, Hristo Dzhugalov, Maria Mangova, Grozi Delchev

#### **Abstract**

A comparative experiment was carried out with five Bulgarian and five foreign durum wheat cultivars. The aim of the experiment was to determine the chemical content and grain technological quality of some Bulgarian and foreign durum wheat cultivars grown under the agricultural conditions of Southern Bulgaria. The Vazhod cultivar proved to give the highest durum wheat grain yield, followed by Beloslava cultivar. Out of the foreign durum wheat cultivars the Durumko was notable for its higher productivity. The crude protein content in the grain was highest in Zagorka, Yavor and Yukon. The highest yield of gluten was reported in Beloslava, Vazhod and Zagorka.

Keywords: durum wheat, cultivars, environment, yield, grain quality

#### **5. Journal of Plant Physiology 196 (2016) 99–105 Impact Factor: 2.971**

The functional role of the photosynthetic apparatus in the recovery of *Brassica napus* plants from pre-emergent metazachlor exposure

H. Vercampt, L. Koleva, A. Vassilev, N. Horemans, G. Biermans, J. Vangronsveld, A. Cuypers,\*

#### **A b s t r a c t**

Metazachlor is a chloroacetamide herbicide, frequently used in *Brassica napus* cultivations around the world. Its primary target is the inhibition of very long chain fatty acid biosynthesis. This study included a morphological and physiological screening of hydroponically grown *B.*

napus, exposed to a concentration range of 0, 0.25, 0.50, 0.75 and 1.0 kg metazachlor per hectare. The results indicate that within a month after application, growth and development of *B. napus* are severely affected by low metazachlor doses. At intermediate metazachlor concentrations, loss of phosphorous and potassium from the plant tissues suggests destabilisation of cellular membranes, which may be a direct consequence of metazachlor application. This membrane instability could be indirectly linked with alterations of electron transport and a reduction of carbon assimilation. At increased metazachlor doses of 0.75 kg a.i. ha<sup>-1</sup>, pigment concentrations are strongly reduced. However, chlorophyll fluorescence parameters seem to remain unaffected at metazachlor doses up to 0.75 kg a.i. ha<sup>-1</sup>. At a metazachlor concentration of 1.0 kg a.i. ha<sup>-1</sup>, negative effects are observed on all tested parameters, resulting in limited survival. The results indicate photosynthesis is assured at intermediate metazachlor concentrations for the cost of growth and development. It is clear that photosynthesis plays a key role in the survival strategy of young plants to overcome initially induced chemical stress.

Keywords: Chloroacetamide herbicide Metazachlor Chlorophyll fluorescence Photosynthesis Crop injury Recovery Brassica napus Gas exchange

## **6. Environmental Toxicology and Chemistry, 2016; Impact Factor: 2.763**

Short-term phytotoxicity in *Brassica napus*(L.) in response to pre-emergently applied metazachlor: A microcosm study

Hanne Vercampt, Lyubka Koleva, Andon Vassilev, Jaco Vangronsveld, Ann Cuypers

### **Abstract**

In accordance with realistic application approaches, a short-term one-factorial experiment was set up to investigate the phytotoxic impact of pre-emergent application of the chloroacetamide herbicide metazachlor on *Brassica napus*. In addition to morphological parameters, the underlying processes that ultimately determine the extent of herbicide-induced phytotoxicity, *i.e.* herbicide metabolism and cellular antioxidant defence, were examined. The present study demonstrated that metazachlor provoked fasciation of the leaves closely after emergence, which might be linked to its mode of action whereby cell division is impaired through the inhibition of very long chain fatty acid synthesis. The increased activities of antioxidative enzymes and metabolites in leaf tissue indicated the presence of reactive oxygen species under the influence of metazachlor. This resulted in oxidative damage in the form of membrane lipid peroxidation. Simultaneously, the increased activity of glutathione-S-transferase (GST) and the shift in glutathione (GSH) redox state suggested the activation of the detoxification metabolism. This occurred however at the expense of growth, with a temporary reduction in plant height and weight after application. The results indicated that metazachlor disappeared within 3 to 4 months after application, which resulted in the recovery of the crop. In conclusion, metazachlor induces phytotoxicity in the short-term, either directly through its mode of action or indirectly through the induction of oxidative stress, which resulted in a temporary reduction in growth.

## **7. Agricultural University – Plovdiv, Scientific Works, vol. LI, 2006, 13-16**

Structural-functional study on the photosynthetic apparatus of cucumber plants (*Cucumis sativus*) at excess of heavy metals

Nikolova A., L. Koleva, A. Vassilev, Ch. Anastasov

### **Abstract**

A structural-functional study on the photosynthetic apparatus of cucumber plants, grown at increasing levels of heavy metals (Cu, Zn and Cd) was carried out at control conditions. It was established that the most sensitive to heavy metals stress are net photosynthetic rate and electron transport rate; therefore they could be used as indicators for metal toxicity in plant test systems.

### **8. Agricultural University – Plovdiv, Scientific Works, vol. LI, 2006, 9-12**

Physiological response of cucumber (*Cucumis sativus*) to increasing heavy metals levels in the medium

Koleva L., A. Nikolova, A. Vassilev

### **Abstract**

The physiological response of cucumber plants to increasing levels of Zn, Cu and Cd was studied at control condition. It was established that the applied heavy metal treatment retarded growth, enhanced root peroxidase activity and decreased photosynthetic pigments content.

### **9. JCEA Volume 8 (2007) No. 2 (135-140)**

Development of a plant test system for evaluation of the toxicity of metal contaminated soils.

I. Sensitivity of plant species to heavy metal stress

Разработване на растителен тест за оценка на токсичността на замърсени с тежки метали почви. Чувствителност на растителни Видове към стрес от тежки метали

Andon Vassilev, Lyubka Koleva, Malgozata Berova, Nevena Stoeva

### **Abstract**

The sensitivity of young bean, cucumber and lettuce plants to heavy metals stress was studied at control conditions in a climatic room. The plants were grown in pots with perlite and supplied daily by half-strength Hoagland nutrient solution. The plants were treated for 8 days with different heavy metal doses (full,  $\frac{1}{2}$  and  $\frac{1}{4}$ ) starting at appearance of the first true leaf (cucumber and bean) or the full development of the second leaf (lettuce). The full dose consisted 500  $\mu\text{M}$  Zn, 50  $\mu\text{M}$  Cd and 20  $\mu\text{M}$  Cu added to the nutrient solution. Based on the measured morphological (fresh weight, leaf area, root length) and physiological parameters (photosynthetic pigments content and activity of guaiacol peroxidase in roots), the cucumber plants presented the highest sensitivity to heavy metal stress.

### **РЕЗЮМЕ**

Проучена е чувствителността на млади фасулеви, краставични и салатни растения към стрес от тежки метали при контролирани условия. Растенията са отглеждани в съдове с перлит. В съдовете ежедневно е добавян  $\frac{1}{2}$  хранителен разтвор на Хогланд, като излишъкът на разтвора се оттича. Растенията са третирани в продължение на 8 дни с различни дози на комплекс от тежки метали (пълна,  $\frac{1}{2}$  и  $\frac{1}{4}$ ) започвайки от появата на първия същински лист на краставичните и фасулевите растения и пълното развитие на втория лист при салатните растения. Пълната доза тежки метали включва 500  $\mu\text{M}$  Zn, 50  $\mu\text{M}$  Cd и 20  $\mu\text{M}$  Cu, които са добавяни към хранителния разтвор. На базата на морфологични (свежа маса, листна площ, дължина на корените) и физиологични (съдържание на фотосинтетични пигменти и активност на гваякол пероксидазата в корените) параметри е установено, че краставичните растения проявяват най-висока чувствителност към стрес от тежки метали.

Key words: heavy metals, plant test system, photosynthetic pigments, peroxidase activity

**10. Аграрен университет - Пловдив Аграрни Науки** Година II Брой 4 **2010**, 81-84

Физиологичен тест за оценка на генотипната толерантност на домати (*Solanum lycopersicum*) към воден стрес

Physiological test for evaluation of genotypes tolerance of tomato (*Solanum lycopersicum*) to water stress

Невена Стоева<sup>1\*</sup>, Малгожата Берова<sup>1</sup>, Златко Златев<sup>1</sup>, Мирослава Каймаканова<sup>1</sup>, Любка Колева, Даниела Ганева<sup>2</sup>

Nevena Stoeva<sup>1\*</sup>, Malgorzata Beroval<sup>1</sup>, Zlatko Zlatev<sup>1</sup>, Miroslava Kaymakanova<sup>1</sup>, Lyubka Koleva, Daniela Ganeva<sup>2</sup>

**Резюме**

Целта на изследването беше да се разработи подходящ физиологичен тест за бърза и надеждна диагностика на устойчивостта на растенията към воден стрес и впоследствие да се оцени толерантността на някои генотипове при домати (*Solanum lycopersicum*). Експериментите бяха проведени през периода на засушаване, както и след отстраняване на стреса. Оценката на толерантността на растенията беше извършена с помощта на физиологичен тест. Беше установено, че засушаването оказва инхибиращ ефект върху физиологичното състояние на доматените растения. Показателите листен газообмен и хлорофилна флуоресценция бяха посочени като особено подходящи индикатори за оценка на толерантността на различни генотипове домати към воден стрес.

Ключови думи: *Solanum lycopersicum*, воден стрес, физиологичен тест.

**Abstract**

The purpose of this study was to develop an appropriate physiological test for rapid and reliable diagnosis of plant resistance to water stress and subsequently to assess the tolerance of some tomato genotypes (*Solanum lycopersicum*). Experiments were carried out during the stress period and after its recovery. Valuation of the tolerance of plants was carried out by means of a physiological test. It was observed that the water stress has an inhibitory effect on the physiological state of tomato plants. Leaf gas exchange and chlorophyll fluorescence were identified as particularly suitable indicators for assessing the tolerance of tomato genotypes to water stress.

Key words: *Solanum lycopersicum*, water stress, physiological test.

**11. Agricultural University – Plovdiv, Scientific Works**, vol. LV, book 1, **2010**, 177-182

Cultivar differences in cadmium accumulation in Organs of durum wheat

Lyubka Koleva, Andon Vassilev, Donka Staneva, Tsvetanka Bineva, Ivanka Yordanova

**Abstract**

Lab and greenhouse experiments have been conducted to study plant Cd accumulation and plant performance of five durum wheat cultivars grown in Cd-contaminated conditions. The results obtained in hydroponics experiments using <sup>109</sup>Cd radiotracer revealed that the plants from cv. Zagorka had the highest Cd accumulation in both roots and leaves, which corresponded to the higher level of grain Cd accumulation in this cultivar, when grown in pot-soil conditions. On the contrary, the plants from cv. Vazhod had the lowest grain Cd accumulation, which was in accordance with its leaf <sup>109</sup>Cd accumulation. The soil Cd concentration of 10 mg/kg did not induce any physiological disorders in wheat plants as

judged by leaf gas exchange parameters, chlorophyll content, plant dry biomass and grain production, but provoked grain Cd accumulation 16-28 fold higher than the accepted limit value.

Key words: durum wheat, cadmium, cultivars, photosynthesis, productivity

### **12. Journal of Phytology 2011, 3(6): 58-62**

Effects of Excess Zn on Growth and Photosynthetic Performance of Young Bean Plants  
Andon Vassilev<sup>1\*</sup>, Anna Nikolova<sup>2</sup>, Lyubka Koleva<sup>1</sup> and Fernando Lidon<sup>3</sup>

#### **Summary**

*Phaseolus vulgaris* L. cv. Lodi plants were grown in a medium containing 200-500 µM of Zn to surpass the threshold of toxicity and assess the inhibitory action on growth, following anatomical changes, the photosynthetic pattern, and Mg, Fe and Mn accumulation. It was found that with increasing Zn accumulation in root and shoot tissues the decreased fresh mass and leaf area correlated with the inhibition of the net photosynthetic rate, transpiration, stomatal conductance, rate of apparent photosynthetic electron transport and isoprenoids accumulation. Additionally, the ratio of variable and maximum fluorescence also remained slightly inhibited with increasing Zn accumulation in the leaves. These alterations further accomplished with a decreasing stomatal index and a thickness of leaf lamina, whereas in the roots the bark, the radius of the central cylinder and diameter of the largest tracheae also diminished. Additionally, the contents of Mg, Fe and Mn in root and shoots tissues also became affected at different levels. It is concluded that excess Zn triggers disturbances in the waters relations, which affect photosynthesis, namely stomatal conductance and therefore plants growth. It is also pointed that as the accumulation of Mg and Fe is affected chlorophylls and carotenoids synthesis become inhibited.

Key Words: Excess zinc; Iron accumulation; Fluorescence; Magnesium accumulation; Manganese accumulation; *Phaseolus vulgaris* L.; Photosynthesis

### **13. Растениевъдни Науки (България), 2011, Том 48, Брой 5, Страници 495-498**

Testing of fertilizer for foliar feeding with triticale.

T Kolev, Zh Todorov, L Koleva

#### **Abstract:**

During the period 2005-2008 in training experimental basis and implementation of the Department of Plant Growing Agricultural University in Plovdiv was put polish experience, which was investigated following the influence of fertilizers for foliar feeding NutriSi Company Belgium: Azzuro NPK 21-21-21 + TE micronutrients B - 0.01%; Fe - 0.04%; Mn - 0.02% Cu - 0.01%; Mo - 0.001%; Zn - 0.02% at a dose 5000 g/ha, Azzuro NPK 16-8-34 + TE micronutrients B - 0.01%; Fe - 0.04%; Mn - 0.02% Cu - 0.01%; Mo - 0.001%; Zn - 0.02% at a dose 5000 g/ha on the yield of triticale variety Sarnitsa. There was an untreated control. Treatment is carried out independently in tillering phase and spindling and twice in the same phases tested fertilizers. Experience is set after the predecessor in sunflower block method in four replications with a vintage size 15 plots. As a result of the experience the following findings: Studied fertilizers for foliage feeding are positively affect the productivity of triticale variety Sarnitsa. The biggest increase in yield of grain is obtained by double treatment at tillering stage with Azzuro NPK 21-21-21 + TE micronutrients B - 0.01%; Fe - 0.04%; Mn - 0.02% Cu - 0.01%; Mo - 0.001%; Zn - 0.02% at a dose 5000 g/ha and phase spindling with

Azzuro NPK 16-8-34 + TE micronutrients B - 0.01%; Fe - 0.04%; Mn - 0.02% Cu - 0.01%; Mo - 0.001%; Zn - 0.02% at a dose 5000 g/ha in which option received a higher average grain yield for the study period with 480 kg/ha 12.4% over the untreated control. Sprayed with the following options: Azzuro NPK 21-21-21 + TE self tillering phase average with 400 kg/ha 10.4%; Azzuro NPK 16-8-34 + TE self spindling phase average with 320 kg/ha 8.3%; Azzuro NPK 21-21-21 + TE self spindling phase average with 270 kg/ha 7.0% over the untreated control. Fertilizers for foliar feeding contributed to increasing values of the structural elements of production such as spikelets number, number of grains and grain weight per plant and the performance of 1000 grain weight and specific weight.

**14. Изд-во ИрГСХА, 2011. Иркутск 2 Стр. 60-63**

Influence of the growth stimulator “Immunocitofit” on the productivity of the durum wheat.  
Влияние стимулятора роста “Имуноцитифит” на урожайность твердой пшеницы  
Т. Колев, Ж. Тодоров, Л. Колева

**INTRODUCTION**

The effectiveness of the use of growth stimulators for the grain plants is expressly proven during a series of precise experiments performed abroad [7, 8], and in our country [1, 4]. In the scientific literature there is information about preparations, which increase the resistance of the plants towards various stress factors as high and low temperatures [2, 3, 6].

In the present experiment we set ourselves the goal to find out the influence of the growth stimulator “Immunocitofit” on the productivity of the Durum wheat of variety Vazhod.

**15. Младежка научна конференция „Климентови дни“ 22-23 ноември, 2011, 2, 107-109**

Effect of oil spills on certain physiological parameters in tomato plants  
Gergana Stoilkova1\*, Lyubka Koleva2, Slavka Paunova1

**Abstract:** The study investigated the effect of oil polluted soil on certain plant growth parameters and photosynthesis in tomato plants *Lycopersicum esculentum* Mill (cv. Trapezica). The soil samples were collected from a region of Ilienci (Sofia) where Lukoil Bulgaria has an oil base. The samples were collected from 0 – 20 cm of the topsoil and were mixed with soil contained 10 % turf. The control plants grew in soil without oil. All the plants were grown for 75 days at controlled conditions. For the growth parameters shoot and root length, shoot and root weight, FW and DW the mean of values were higher for control and decreased for tomato plants in polluted soil. The presented data show that the oil contamination caused a significant reduction in the number of leaves and in the leaf area. With decreasing growth, a reduction in chlorophyll contents and consequently, a reduction in photosynthetic rate were observed, too. We hope that this study would be useful in developing means of overcoming these effects in the field practice.

Key words: growth, oil spills, photosynthesis, tomato plants

**16. Agrarni Nauki 2012 Vol. 4 No. 11 pp. 183-187**

Comparative study of the effect of nitrogen deficiency on growth, photosynthetic parameters and enzyme activity of young sunflower (*Helianthus annuus* L.) and corn (*Zea mays* L.) plants.

Petkova, V.; Yusmen, M.; Koleva, L.; Berova, M.

## **Abstract**

A comparative study of the effect of nitrogen deficiency on the physiological status and growth of young sunflower plants (*Helianthus annuus* L. cv. Biser) and corn (*Zea mays* L. cv. Knezha 613) was done. The experiment was carried out in a climatic room under controlled conditions. The plants were grown in pots as sand cultures in two variants: control plants grown in full-strength *Knop* nutrient solution and experimental group plants grown in *Knop* without nitrogen supply. The growth and physiological parameters were measured for corn and sunflower respectively two and three weeks after growing the plants under nitrogen deficiency conditions. A significant decrease in all measured parameters was recorded for the plants grown in nitrogen deprivation.

**17. Agrarni Nauki 2012** Vol. 4 No. 8 pp. 39-46 Proceedings of the 2nd Scientific Seminar on "Stress in plants: theoretical and applied aspects", Agricultural University - Plovdiv, Bulgaria, 10 January 2011.

Comparative study of cadmium and zinc toxic effects on the cell redox status of durum wheat plants.

Koleva-Valkova, L.; Vasilev, A.; Cuypers, A.; Vangronsveld, J.

## **Abstract**

Cadmium (Cd) and zinc (Zn) were applied to durum wheat seedlings on hydroponics in concentrations of 50  $\mu$ M and 600  $\mu$ M respectively, causing about 50% relative growth inhibition (RGI) at the end of a 10-day-exposure period. Both metals provoked visual toxicity symptoms such as root browning and leaf chlorosis in Cd-exposed seedlings and root colour lightening and leaf necrotic spots in Zn-exposed seedlings. On a biochemical level, the apparent phytotoxicity was accompanied by oxidative stress-related responses such as increased lipid peroxidation and electrolyte leakage as well as increased activities of superoxide dismutase and catalase.

**18. Journal of Mountain Agriculture on the Balkans** 17 (2), 2014, 316 – 327

Cultivar impact on the productivity and grain quality of some Bulgarian and foreign durum wheat cultivars

Kolev T., N. Tahsin, L. Koleva

## **Summary**

An experiment was carried out in the period 2009 – 2012 on the experimental field of the Agricultural University in Plovdiv. The following Bulgarian durum wheat cultivars were tested: Progress (standard), Zagorka, Beloslava, Vazhod, Yavor as well as the foreign ones Beleno, Durumko, Yukon, Duetto, Duramar.

The block method was applied to the field trial in four replications, the yielding plot being 15 m<sup>2</sup>. The aim of the experiment was to ascertain the productivity and grain quality of some Bulgarian and foreign durum wheat cultivars grown under the agricultural conditions of the Plovdiv region. The Vazhod cultivar proved to give the highest durum wheat grain yield – 3.92 t/ha (11.7%), which surpassed the standard by 410 kg/ha. Second ranked the Beloslava cultivar – 3.86 t/ha (9.7%), which surpassed the standard by 350 kg/ha. Out of the foreign durum wheat cultivars Durumko was notable for its higher productivity – 3.67 t/ha (4.6%) which was 160 kg/ha of grain more than the Progress cultivar yielded. The content of crude protein in the grain was highest in Zagorka, Yavor and Yukon. The highest yield of gluten was reported in Beloslava, Vazhod and Zagorka.



**19. Agricultural Sciences / Agrarni Nauki . 2014, Vol. 6 Issue 15, p55-60.**

Influence of some triazoles and imidazoles on the growth and photosynthetic activity of rape plants (*Brassica napus*).

Berova, Malgozhata; Stoeva, Nevena; Koleva, Lyubka; Kaymakanova, Miroslava

**Abstract:**

The purpose of this study was to study the growth and photosynthetic activity of young rape plants (Clearfield hybrid PX100) after treatment with Folicur 250 EW fungicides (of the triazoles group) and Caramba Turbo (of the imidazoles group) at a dose of 100 ml da-1. Growth inhibition of the aerial organs of the treated plants was observed as well as accelerated root formation. The photosynthetic activity, determined by the amount of photosynthetic pigments and leaf gas exchange parameters, was higher in the plants treated with Folicur 250 EW and Caramba Turbo. The obtained results show that the application of fungicides with growth regulating properties may increase the economic efficiency of rapeseed production.

**20. Turkish Journal of Agricultural and Natural Sciences Special Issue: 2, 2014; 1812-1817**

Effect of Silicon on Activity of Antioxidant Enzymes and Photosynthesis in Leaves of Cucumber Plants (*Cucumis sativus* L.)

Adelina Harizanova, Zlatko Zlatev, Lyubka Koleva

**Abstract**

The effects of exogenous silicon (Si) on changes of photosynthesis and the activities of major antioxidant enzymes such as guaiacol peroxidase (GPOD), siringaldazine peroxidase (SPOD) and antiradical activity (DPPH) as well as the content of polyphenols and photosynthetic pigments were investigated in leaves of young cucumber plants (*Cucumis sativus* L.), cv. Gergana. Plants were grown as a water culture in climatic boxes, under a PPFD of 350  $\mu\text{mol m}^{-2} \text{s}^{-1}$ . Five treatments consisting of a control (basic Hoagland nutrient solution without Si) and basic nutrient solution with 0.5 mM Si, 1.0 mM Si, 1.5 mM Si and 2.0 mM Si, were investigated. Plants were grown 15 days and analyses were performed at the end of experiment on the third leaf, which was fully developed. It was established that Si treatment increased photosynthetic activity of leaves. The variant with 1.5 mM Si has shown the highest photosynthetic rate. Activity of main antioxidant enzymes decreased in plant leaves and roots. The content of polyphenols was changed insignificantly in roots and in leaves of Si-treated plants. The content of pigments increased and highest values were established in variant with 1.5 mM Si. These results suggested that exogenous Si application in nutrient solution was useful to increase young cucumber antioxidant capacity and photosynthesis.

**21. Евразийский Союз Ученых (ЕСУ) Ежемесячный научный журнал № 4 / 2014; 57-59 (ЧАСТЬ 13) ISSN 2575-7999**

Comparative study of biochemical response of two groups vine varieties to infection with downy mildew (*Plasmopara viticola* Berk. & Curt./ Berl. & de Toni )

Koleva-Valkova<sup>1</sup> Lyubka, Semerdjieva<sup>2</sup> Ivanka, Roychev<sup>3</sup> Venelin

**Abstract**

The biochemical response in the leaves of several vine varieties from two groups after infection with *Plasmopara viticola* (Berk. & Curt./ Berl. & de Toni) as regards to the content of total polyphenols, antiradical activity and the activity of syringaldazine peroxidase was studied. Depending on biological features, the largest increase in the content of total

polyphenols in infected leaves was recorded in a variety Corinth white with 47 %, followed by Bolgar with 12 % and Sultanina with 10 %. Statistically significant differences in activity of SPOD in infected compared with healthy leaves in all tested vine varieties were established. The most large extent, this was expressed in Sultanina (115 %) and Cabernet Sauvignon (90 %). In the case of antiradical activity, significant decrease in infected leaves was detected in almost all tested varieties, with the exception of Sultanina, which has been found an increase in this indicator with a 16 %, in comparison with the healthy leaves.

**22. Agricultural University – Plovdiv, Scientific Works, vol. LVII, 2014, 241-247**

Effect of foliar fertilizers on young sunflower and corn plants under nitrogen deficiency

Petkova V., M. Yusmen, L. Koleva-Valkova

**Abstract**

The effect of foliar fertilizers on young sunflower (*Helianthus annuus* L. cv. Biser) and corn (*Zea mays* L., cv. Knezha 613) plants under nitrogen deficiency was studied. The experiments were conducted in controlled conditions as sand culture. The plants were grown for 3 weeks separated in 2 groups – control with complete Knop nutrient solution and plants under nitrogen deficiency with Knop without nitrogen. After that period the stressed plants were recovered with foliar fertilizers trade mark Aveikan and Poly-plant in concentrations of 0,3%. Three weeks later the biometrical and physiological parameters were analyzed. On the ground of the obtained results the foliar fertilizers Aveikan and Poly-plant were suggested as a reliable tool which improves the growth of sunflower and corn plants under nitrogen deficiency.

**23. Научни трудове на Съюза на учените в България – Пловдив, Серия В. Техника и технологии, том XII, 2014, 290-293**

Изследване на остатъчни количества хербициди в селскостопанска продукция

Investigation of herbicide residues in agricultural products

Любка Колева-Вълкова

**Abstract**

A method for detection of pyroxsulam in plant samples of wheat with the use of reversed phase high performance liquid chromatography (RP-HPLC) with analytical column “Supelcosil”LC – 18 was established. Gradient regime of separation was used with following parameters: mobile phase: A=30 acetonitrile : 70 water, B=80 acetonitrile : 20 water (v/v). The gradient elution was applied for 20 min (0 min – 100% A : 0% B, 10 min - 50% A : 50% B, 20 min – 0% A : 100% B), with flow 1 ml/min. The detection was conducted at 215 nm wave length and room temperature. The retention time obtained at the above mentioned parameters was 8,4 minutes. The limit of quantification (LOQ) was 1,1 µg/ml and the limit of detection (LOD) – 0,4 µg/ml was obtained. The recoveries obtained at the concentration range from 1,25 to 20 ppm pyroxsulam were between 80 – 100%.

**24. Иркутск: Сибирский филиал ФГУНПП “Росгеолфонд”, 2015 – 29 - 33с.**

УДК 633.31/37:633.13:631.53.04(571.53)

The Influence Of Natural Organic Products On The Productivity Of Durum Wheat

1Tanko Kolev, 2 Iliyana Petrova, 1Zhivko Todorov, 1Lyubka Koleva-Valkova

**Abstract**

During the period 2009-2012, in the Study, experimental and implementation base of the Department of Plant growing of the Agricultural University – Plovdiv a field experiment is

carried out that explores the influence of some natural organic products: X-80 (800 ml/ha); T-100 (2500 ml/ha); H-40 (300 ml/ha); H-40 (500 ml/ha); XH-100 (1000 ml/ha); XH-100 (1200 ml/ha); TH-140 (2500 ml/ha); TH-140 (2800 ml/ha) on the productivity of the Durum wheat variety Progress. The experiment includes one untreated control plot. The treatment is done in the phase of tillering. The experiment is performed after predecessor sunflower, according to the block method, repeated four times, with dimensions of the land plot 10m<sup>2</sup>. As a result of the conducted experiment, the following is found out: The tested natural products have positive influence on the productivity of the Durum wheat Progress. The highest grain yield obtained from the Durum wheat Progress is achieved in the variant treated in the phase of tillering with the organic product XH-100 (1000 ml/ha), in which the increase of the productivity averagely for the three-year period is with 400 kg/ha (11.4 %) more than the untreated control. Next follow the variants sprayed with XH-100 (1200 ml/ha) averagely for the experimental period with 330 kg/ha (9.4 %); TH-140 (2800 ml/ha) with 250 kg/ha (7.1 %); TH-140 (2500 ml/ha) with 200 kg/ha (5.7 %); H-40 (500 ml/ha) with 180 kg/ha (5.1 %); H-40 (300 ml/ha) with 140 kg/ha (4.0 %); X-80 (800 ml/ha) with 120 kg/ha (3.4 %) and T-100 (2500 ml/ha) with 90 kg/ha more than the control. The new natural organic products contribute for the higher values of the structural elements of the yield, such as: number of wheat-ears, number of grains and grain weight in one plant. Key words: Durum wheat, natural organic products, productivity.

## **25. Аграрен университет – Пловдив Аграрни Науки Година VII Брой 18 2015**

Влияние На Торенето С Органичен Тор Върху Съдържанието На Някои Биохимични Показатели При Картофи

Influence Of Fertilization With Organic Fertilizer On The Content Of Some Biochemical Parameters In Potatoes

Любка Колева-Вълкова\*, Веселин Петров, Гергана Станкова

Lyubka Koleva-Valkova\*, Veselin Petrov, Gergana Stankova

### **Abstract**

Potatoes are a valuable source of carbohydrates, vitamins and minerals and therefore have a particular significance to human diet. Different varieties suitable for cooking, baking, preparation of chips, etc., have been developed, which are characterized with specific biochemical composition of the tubers. Apart from the methods of selection, the technology of cultivation and in particular the applied fertilization approaches also influence the quality of the crop yield. This is especially important, since the current worldtrend is high-quality food production with minimal negative impact on the environment. The utilization of organic fertilizers is one of the prerequisites for achieving that goal. Moreover, the requirements for high quality are valid also when the production should be stored for certain periods. Therefore, the aim of the current study is to investigate the influence of different rates of fertilization with vermicompost on the content of ascorbic acid and monosaccharides in potatoes from the Agria variety. The experiments were performed with fresh production and with tubers stored under different conditions. The potatoes were grown in the fields in four variants, each with three replication and every replication on 10 m<sup>2</sup>. The variants included: a control with non-treated plants and 3 fertilization rates – 50, 100 and 150 ml per cluster, respectively. The fertilizer was applied once during planting. The experimental results demonstrated that the highest content of ascorbic acid and monosaccharides was observed in the fresh samples treated with 100 ml fertilizer per cluster. On the other hand, a change in the concentrations of those metabolites was found after storage at 200 C and 60 C. Key words: ascorbic acid, fertilizer, potato, storage, sugars.

## **26. Аграрен университет – Пловдив Аграрни Науки Година VII Брой 18 2015**

Физиологични Параметри При Млади Растения Памук, Отглеждани На Замърсени С Тежки Метали Почви

Physiological Parameters Of Young Cotton Plants, Grown On Heavy Metal Contaminated Soils

Любка Колева-Вълкова\*, Андон Василев

Lyubka Koleva-Valkova\*, Andon Vasilev

### **Abstract**

Metal contamination of the soils is a pressing ecological problem all over the world. A part of the heavy metal contaminated soils in Bulgaria are situated around the Non-ferrous Metals Smelter near Plovdiv (KCM Plovdiv). Implementation of adaptable agriculture (technical crops cultivation) is recommended in this region as a way of reducing human health risk. Cotton is one of the suitable crops for that purpose; therefore the aim of our study was to evaluate the physiological state of young cotton plants, grown on heavy metal contaminated soils from this region. Pot experiments were carried out in climatic rooms at the Department of Plant Physiology and Biochemistry. Young cotton plants (cv. Darmi) were grown on representative soil samples taken around KCM Plovdiv under controlled conditions [(light intensity  $250 \mu\text{mol m}^{-2} \text{s}^{-1}$  (PPFD), temperature  $25^{\circ}/20^{\circ}\text{C}$  (day/ night), relative air humidity 60% and photoperiod 16/8 h (light/dark)]. The experimental design included 5 treatments and each treatment was set at 4 replications (3 plants per pot). Four of the treatments represented soils containing Cd, Pb, Zn and Cu in levels exceeding the permissible soil limits, while the fifth contained uncontaminated soil sample (control). Prior to the sowing all pots were fertilized with equal amounts of  $\frac{1}{2}$  strength Hoagland nutrient solution. The physiological status of the plants was evaluated three weeks after germination. The analyses included the following parameters: plant biometrics, content of heavy metals in the plant organs, leaf gas exchange, chlorophyll fluorescence, photosynthetic pigments content, etc. The obtained results showed that the physiological state of the cotton plants was differently affected by the metal contamination of the soil. The most significant variations were reported for the plants grown in the soil of the highest metal content. Key words: cotton, growth, heavy metals, photosynthesis, photosynthetic pigments.

## **27. Международная Исследовательская Организация „COGNITIO“, Москва 2016, (2) 101-104**

Total polyphenol content and antioxidant activity of fresh grape berries, raisins and wine from *Vitis vinifera* var. *Alicante Bouschet*

Lyubka Koleva-Valkova

### **Abstract**

Comparative investigation of total polyphenol content and antioxidant activity of fresh grape berries, raisins and wine produced from "teinturier" vine variety Alicante Bouschet was made. The fresh grape berries were analyzed separately to skin, pulp and seeds. The naturally sun dried raisins were analyzed as whole and the wine was analyzed once after wine making and again after 2 years of storage. The results showed highest amount of total polyphenols in seeds from the fresh grape berries and in the raisins, which corresponds with highest antiradical activity. The storage of the wine resulted in decreased concentration of polyphenols as well reduced radical scavenging activity.

**28. Международная Исследовательская Организация „COGNITIO“, Москва 2016, (July) 11-14**

Comparative study of methods for polyphenol extraction from raisins *Gamay Freaux*  
Lyubka Koleva-Valkova

#### **Abstract**

Raisins are known to be a delicious and valuable food. Their quality depends on the amount of polyphenols they contain. In most cases, the method for quantitative determination of the polyphenols is the same (based on the reaction with the Folin's reagent). The approaches for sample preparation, however, may substantially differ in various studies. The aim of the present work was to compare two methods for raisin polyphenol extraction using three different extracting solutions. The highest values were obtained with a method of extraction by grinding with acidic methanol as extractant, followed by a soaking-sonication method with the same extractant. Using the first approach, high polyphenol concentrations were obtained with distilled water as the extractant as well.

**29. Растителна защита & семена и торове 2015, № 8-9, 6-17**

Качество на растениевъдната продукция при норма и стрес: биохимична характеристика и зависимост от минералното хранене  
Любка Колева-Вълкова, Веселин Петров, Златко Златев

#### **Абстракт**

Стресът при растенията представлява състояние на напрежение, причинено от променящи се условия на външната или вътрешната среда, което предизвиква отговор. При вегетационния период растенията често са подложени на стресови въздействия от различен характер. Традиционни абиотични стресови фактори за растенията са ниските и високите температури, засушаването и преовлажняването на почвата, нарушеното минерално хранене и др., които в значителна степен влияят върху формирането на добивите и качеството на растениевъдната продукция.

**30. Природа и Сельскохозяйственная Деятельность Человека, Иркутск  
Издательство Иркутского ГАУ 2011, 2, Стр. 69-72**

Comparative testing of the European varieties of durum wheat (*Triticum durum* DESF.) in South Bulgaria.

Сравнително испытание европейских сортов твердой пшеницы (*Tr. durum* Desf.) в условиях южной болгарии

Т. Колев, Ж. Годоров, Л. Колева

#### **INTRODUCTION**

During the past several years we observe a tendency of spreading of varieties of Durum wheat imported from the European Union in Bulgaria. The soil and weather conditions exert considerable influence on the realization of the genetic abilities with regards to productivity [1, 9] and the quality of the grain [4, 8], due to which in a certain region the most suitable varieties of Durum wheat should be grown [2, 3, 7, 8]. During the experiment we set ourselves the goal to test the productivity of European varieties of Durum wheat in the conditions of South Bulgaria.

**31. Научно-практический журнал “Вестник ИрГСХА”. Выпуск 51, 2012, 24-29**

Testing italian varieties of durum wheat (*Tr. durum* Desf.) In the ecological conditions of plovdiv region

1Tanko Kolev, 1Zhivko Todorov, 1Lyubka Koleva, 2Mariya Mangova

### **Abstract**

During the period 2006-2009 we tested the following Italian varieties of Durum wheat: “Saragola”, “Latinur”, “Meridiano” and “Svevo” in a field experiment performed in the region of the Study and Experimental field of the Department of „Plant growing” at the Agricultural University of Plovdiv. The experiment was performed in compliance with the block method; it was repeated four times, whereas the size of the crop field was 15 m<sup>2</sup>. We compared the tested varieties with the Bulgarian standard for productivity Progress. The purpose of this experiment was to find out the productivity of some Italian varieties of Durum wheat in the ecological conditions of Plovdiv region. It was found out that the highest yield of grain was achieved by the Italian variety of Durum wheat “Meridiano” – 3.36 t/ha with 290 kg/ha (9.4 %), next followed the variety “Svevo” – 3.25 t/ha with 180 kg/ha (5.9%) more than the standard. With regards to productivity, the variety “Saragola” was equal to Progress, while variety “Latinur” achieved lower yield quantities.

**32. Agrarni Nauki** 2012 Vol. 4 No. 11 pp. 89-92

Comparative study of Austrian durum wheat varieties.

Kolev, T.; Todorov, Z.; Mangova, M.; Koleva, L.

### **Abstract**

During the period 2007-2010 a field experiment was performed in the experimental field of the Department of Plant Growing at the Agricultural University in Plovdiv. The following Austrian varieties of Durum wheat were studied: *Superdur*, *Auradur*, *Logidur* and *Lunadur*. The experiment was performed in compliance with the block method; it was repeated four times, and the size of the cultivated field was 15 m<sup>2</sup>. We compared the tested varieties with the Bulgarian standard for productivity of the *Progress* variety. The aim of the research was to determine the productivity of some Austrian varieties of Durum wheat in South Bulgaria. The highest grain yield was achieved with the Austrian variety of Durum wheat *Superdur* - 3.56 t/ha with 190 kg/ha (5.6%), next was *Auradur* - 3.45 t/ha, with 80 kg/ha (2.4%) more grains than *Progress*. The productivity of the other two Austrian Durum wheat varieties - *Logidur* and *Lunadur* is lower than the standard.

**33. ECOLOGIA BALKANICA** 2014, Vol. 5, Special Edition April 2014, pp. 101-106

Anatomical Changes in Peach Leaves Infected by *Taphrina deformans* (Berk.) Tul.

Ivanka B. Semerdjieva\*<sup>1</sup>, Neshka G. Piperkova<sup>2</sup>, Mariya V. Zarkova<sup>3</sup>, Lyubka H. Koleva-Valkova<sup>4</sup>

**Abstract.** Light microscope study of *Prunus persica* (L.) Batsch. (Fayette cultivar) leaf anatomical structure, naturally infected by *Taphrina deformans* (Berk.) Tul. has been conducted. In the infected leaves histological changes were observed such as increase of the total thickness of the mesophyll and a loss of its differentiation to palisade and spongy parenchyma. An increase in the size of the upper epidermis was established as a result of fungus localization. The results were supported by morphometric and statistical analysis.

**34. Иркутск: Сибирский филиал ФГУНПП “Росгеолфонд”, Издательство Иркутского ГАУ** 2015, 33 – 38

Productivity Of New Bulgarian Varieties Of Durum Wheat

Kolev Tanko, Todorov Zhivko, Koleva Lyubka, Zlatev Zlatko, Mangova Mariya

### **Abstract**

The experiment is performed in the Study, experimental and implementation base of the Agricultural University of Plovdiv, according to the block method, repeated four times, with dimensions of the harvested land plot 15 m<sup>2</sup>, during the period 2008 – 2011. The following new Bulgarian varieties of Durum wheat are tested, which have been selected in the Institute of field 34 agricultural plants in the town Chirpan, namely: Victoria, Zvezditsa, Predel, and Deyana, in order to find out their productive capacity. The variety Progress is used as a standard. As a result of the performed experiment, it is found out that: The productivity of the new Bulgarian varieties of Durum wheat is higher than that of the standard variety Progress. The grain yield by variety Deyana is with 440 kg/ha (12.8%), by variety Predel with 380 kg/ha, by variety Zvezditsa with 340 kg/ha, and by variety Victoria with 280 kg/ha more than variety Progress. The plants of the new varieties of Durum wheat form larger number of grains with bigger weight of the grains in the wheat-ear compared to the standard. With regards to the weight of 1000 grains, the highest values are registered for variety Zvezditsa 52.4 g, followed by standard Progress with 51.9 g. The other varieties have lower weight of 1000 grains compared to the standard. Regarding the indicator hectoliter weight there are no significant differences between the standard and the tested varieties.

Key words: Bulgarian varieties of Durum wheat, productivity

**35. Материалы международной научно-практической конференции**, посвященной 65-летию Победы в Великой Отечественной войне 13-15 апреля 2010 года; *Издательство Иркутского ГАУ 2010, 42- 48*

УДК 504.062 УДК 621.311.1.004.18(-22) Часть 1

Productivity Of Durum Wheat Varieties In The Ecological Conditions Of Central South Bulgaria

T. Kolev, Zh. Todorov, L. Koleva

### **Abstract**

During the period 2006-2009, in the Study, Experimental and Implementation premises of the Department for Plant-growing in the University of Agriculture – Plovdiv, a field experiment was conducted, according to the block method that was performed repeatedly four times, with size of the harvest lot – 20 sq.m. The following sorts of durum wheat were tested:

Progress (Bulgaria) – standard, Victoria (Bulgaria), Auradur (Austria), Levante (Italy), Karur (France). As a result of the held experiment, the following has been found out: The tested varieties of durum wheat in the ecological conditions of Central Southern Bulgaria surpass in respect of grain yield the standard sort Progress. During the experimental period, the durum wheat variety Victoria produced in average the highest harvest 3,49 t/ha, and the produced grain crop surpassing the standard amounts to 370 kg/ha (11,9 %). The productivity of the varieties Karur, Auradur and Levante is respectively 3,42 t/ha, 3,29 t/ha and 3,26 t/ha, which means respectively 300 kg/ha (9,6 %), 170 kg/ha (5,4 %) and 140 kg/ha (4,5 %) more grain compared to Progress. The increase in the yield of the tested varieties happens mainly as a result of the formation of larger number of grains in the spike compared to those of the standard. The standard variety Progress is characterized by higher values of the physical properties than the other sorts of hard wheat included in the experiment.

Key words: durum wheat, new varieties, ecological conditions, yield.