PLENARY REPORTS

Status and perspectives for development of the agricultural production in Republic Bulgaria

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General Status of Agriculture in Turkey

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Abstract: Even if Turkey is a rich country in respect of agricultural lands, the fragmentation of the lands into small pieces of land ownership makes difficult to benefit from the economy of scale in particularly annual arable crops and livestock. In Turkey, cultivated agricultural land (including long life plants such as fruit trees) of 23.4 million hectares existed in 2017. Arable lands - on which grains and vegetables, excluding long-life plants are cultivated - constitute 19.7 million hectares of the total cultivated agricultural lands. It is observed that the number of the cultivated agricultural land considerably recessed particularly in 2007-2017. In Turkey, in accordance with the legal situation, 3,076,650 farms cover total land of 18.4 million hectares. Average size of the land for these farms is 6 hectares and this size is below the average farm sizes of Europe and USA, being successively 17.4 and 18.0 hectares. However, it should be emphasized that the land sizes also visibly differ from each other in EU. The farms, the sizes of which are below 10 hectares, correspond to 85% of the total number of farms. One of the most important problems in transition from extensive agriculture to the intensive agriculture is the ownership of the fragmented small pieces of land. Turkey is on the top lines in the listing of numerous agricultural products in the world. Grain production has an important role in agriculture of Turkey in terms of product range. Wheat is cultivated on 67% of the land on which grain is cultivated. Although there is higher domestic consumption potential in oily seeds, the production is inadequate; the most cultivated plant in oily seeds is the sun flower. Turkey has an important position relating to a great number of fruits and vegetables; however, production corresponds only 4% of the cultivated agricultural lands.

Key words: Turkey, Agriculture, Agricultural Land, Agricultural Products
Effects of Heat Stress in Animal Production

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Abstract: Heat stress is now considered to be the largest financial burden to the world’s animal sector. The annual production pattern of production in animal industry is characterized by a marked reduction in summer both production parameters and fertility. For many reasons high performance animals are being reared to an increasing extent in the tropics and sub-tropics. By understanding the principles of the physiological reactions of domestic animals to heat, scientists and animal breeders are able to alter housing, feeding and managements conditions accordingly or select different breeds and crosses, in order to keep animals under economically feasible production conditions. Any method to reduce the negative effects of heat stress without compromising animal performance would be economic importance to the animal industry. Supplementing nutraceuticals can manipulate rumen environment and can maximize production of glucose precursors in the rumen or enhance insulin sensitivity that could be the possible strategy to decrease the adverse effects of heat stress. The present article aims to give a complete amount of all test results on animal reactions to heat stress and summer feeding programmes to diminish the negative effects of heat stress.

Key words: Heat stress, animal, nutrition, nutraceuticals
Evaluation of carcass characteristics, organ weights and cost-benefits of feeding broiler chickens with raw or processed tropical sickle pod (*Senna obtusifolia*) seed meal based-diets.

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Abstract: A feeding trial was conducted for eight (8) weeks to evaluate the effects of feeding raw or processed *Senna obtusifolia* seed meal (SOSM) based-diets on carcass yields, organ weights and economic performance of broiler chickens. Six experimental diets were compounded to contain 0% and 20% each of the raw, boiled, soaked, sprouted and fermented SOSM designated as T1, T2, T3, T4, T5 and T6, respectively. Two hundred and sixteen (216) broiler chickens were randomly allotted to the six dietary treatments in a randomized complete block design with pen location serving as the blocking factor. The chicks were replicated three times with each replicate containing twelve chicks. Data were collected on live weight, dressed weight, dressing percentage, cut-up parts (drumstick, thighs, wings and breast), organ weights (gizzard, heart, pancreas and liver). Cost-benefits of using SOSM as feed ingredient for broiler chickens was also assessed. The results indicated that groups of broiler chickens fed the neutral (0% SOSM) and 20% fermented SOSM based-diets significantly (P<0.05) recorded the best dressing percentage of 78.08% and 75.44%. The lowest dressing percentage (58.13%) was observed in the group of broiler chickens fed the raw SOSM based-diet. The cut-up parts showed similar trend as that of the dressing percentage. The highest yields for cut-up parts for thighs, drumstick and breast (10.87, 9.09 and 17.71%) and (11.09, 8.76, and 16.96%) were observed in the groups of broiler chickens fed the 0% and 20% fermented SOSM based-diets. The lowest cut-up yields for thighs, drumstick and breast (7.23, 5.65 and 10.34%) were observed in the group of broiler chickens fed the raw SOSM based-diets. The weights of organs were significantly (P<0.05) affected by the dietary treatments. The highest weights for liver were observed in the groups of broiler chickens fed the raw SOSM based-diet. The cut-up parts showed similar trend as that of the dressing percentage. The highest yields for cut-up parts for thighs, drumstick and breast (10.87, 9.09 and 17.71%) and (11.09, 8.76, and 16.96%) were observed in the groups of broiler chickens fed the 0% and 20% fermented SOSM based-diets. The lowest cut-up yields for thighs, drumstick and breast (7.23, 5.65 and 10.34%) were observed in the group of broiler chickens fed the raw SOSM based-diets. The weights of organs were significantly (P<0.05) affected by the dietary treatments. The highest weights for liver were observed in the groups of broiler chickens fed the raw (2.64 g), soaked (2.30 g), and sprouted (2.19 g) SOSM based-diets. On economic grounds, the use of processed SOSM especially the fermented SOSM is cost-effective because it indicated the lowest feed cost (₦208.0) per kilogram body weight gain. However, raw the SOSM which indicated the lowest feed cost per kilogram (64.72) was observed to record the highest feed cost per kilogram body weight gain (₦260.17). In conclusion, the groups of broiler chickens fed the fermented SOSM indicated better carcass yield and economic benefits and is therefore recommended for feeding of broiler chickens.

Key words: Carcass evaluation, broiler chickens, *Senna obtusifolia* seed meal, cost-benefits.
Economic Structure And Marketing Problems Of The Animal Production In Turkey

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Abstract: The livestock industry has an important place in Turkey's agriculture. However, there are significant problems of sheep and livestock enterprises. The Turkish livestock business should be given a special importance in terms of economy and food security for European Union harmonization process. Therefore, production and marketing structures should be organized, especially businesses should be supported to organize. Relations of livestock industry with the food industry should be developed. It is necessary to improve the care and feeding requirements and develop, develop new methods and technologies, ecology to develop appropriate training systems, creating alternative feed sources for increase production and to improve the quality in various livestock branches.

Key words: animal production, farm management, marketing, economic analysis

An analysis of energy use and input level for tomato production in Turkey

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Abstract: The purpose of this study was to determine energy equivalents of inputs and output in tomato production in Bursa province. The data in this study were collected from tomato farms in Bursa province, Karacabey and Mustafakemalpasa district. Questionnaires were administered through face-to-face interview in 2011-2012. The results of the study show that diesel have the highest rate of energy equivalency of all the inputs used in tomato production at 60,07 and the energy equivalent rate of water is 0,87%. The energy equivalent rates for human power, machinery, chemicals and water for irrigation were determined to be low in tomato production. According to the output/input ratio calculated, the energy ratio is 1,50 in tomato production in the research area. This ratio implies that the inputs used in tomato production have not been used effectively. Ineffective use of these resources also causes environmental problems.

Key words: Tomato production, energy ratio, energy input, Turkey
Determination of Fertility Loss of Holstein Cattle in Bursa Province

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Abstract: In dairy cattle, the calving interval should be 12 months or the birth rate should be 100% to reach ideal fertility rate. However, in many dairy farms, some cows give birth to healthy calves in one year whereas for some cows it takes much longer. Thus fertility rate decreases. As a result, economic losses occur. This is why 90% calving rate or 13 months (400 days) should be targeted. The aim of this study is to determine the fertility loss of Holstein cattle raised in Bursa province. For this aim, a total of 13079 cows were evaluated in terms of breeding performance. Data was obtained from records of 65 farms registered to Bursa Livestock Breeders Association (DSYB) in 2016. 30 of those farms had more than 100 cows (large herd) and 35 of them had less than 100 cows (small herd). For large herds, the minimum, maximum and average number of cows were found as; 103, 1647 and 404.8±76.1, respectively, for small herds those values were; 13, 94, 39.5±3.53 respectively. Birth rates, due to calving intervals and service periods are used to measure the fertility in farms. The minimum, maximum and average values for calving interval, service period and birth rate in large herds were found as; 401, 620, 465.1±9.71 days, 121, 340, 185.1±9.71 days, 58.9%, 91.0%, 79.3±1.42 respectively, whereas in small herds those values were; 399, 539, 465.1±6.51 days, 119, 259, 185.1±6.51, 67.7%, 91.5%, 79.0% respectively. No significant difference found between large and small herds. According to these results, it can be said that loss of fertility is one of the major problems for dairy farms and precautions should be taken.

Key words: Holstein, reproduction performance, economic loss
Additional Fibrolytic Enzyme Effects on Dry Matter Intake, Milk Production and Composition and Some Rumen Parameters to TMR for Dairy Cows

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Abstract: This study was carried out to determine the effects of dietary fibrolytic enzymes supplementation to TMR diets of lactating cows on dry matter intake, milk yield and composition and some rumen parameters. The effects were evaluated using 4 multiparous lactating Holstein Cows in 4x4 Latin-square design. The cows were fed in 4 different diets; 1. Group: TMR (Control), 2. Group: TMR+10 g enzyme/day/head added diets, 3. Group: TMR+20 g enzyme/day/head added diets, 4. Group: TMR+30 g enzyme/day/head added diets. As a result of this research it was determined that TMR and dry matter intake were determined statistically significant for periods and cows respectively; 19,245, 21,581, 23,687, 25,683 kg/day/cows and 9,869, 11,148, 12,414, 12,621 kg/day/head (P<0.01). On the other hand daily milk yield of cows were found to be statistically significant for periods and increased level of enzyme respectively; 24,041, 26,232, 26,762, 27,237 kg/day/head and 25,112, 26,103, 26,895, 27,162 kg/day/head (P<0.05). In addition, while increasing additional level of enzyme as an 0, 10, 20, 30 g/day/head increased amount of propionic acid in rumen liquid respectively; 24,975, 27,685, 28,320 and 29,400 mmol/L and determined statistically significant (P<0.05). As a result of this experiment, additional fibrolytic enzymes have potential positive effects on dry matter intake, milk yield, composition and some rumen parameters to lactating dairy cows.

Key words: Fibrolytic enzyme, dairy cows, milk yield and composition
Study On The Continuity Of Farmer’s Breeding Activity With Patch Faced Maritza Sheep Breed

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Abstract: The aims of this study were to analyze tendencies in the population Patch Faced Maritza sheep breed and estimation of sustainability of breeding program for this breed by analyze continuity of farmer’s breeding activity. Data for breeders and population structure of the breed during 27 years (1991-2017) were provided by the breeding association of Maritza sheep breed. The changes in the population structure during the 2005-2017 were tracking. The number of breeders included in the breeding program was increase from 10 to 88 herds. This positive trend in the population and increased farmer’s interest to participate in the breeding program were due to government programs for supporting sheep farming and preserve many indigenise sheep breeds that is part of agricultural heritage. The increased number of herds included in the breeding program led up to enlarge active population in three main reproductive categories: ewes, rams and breeding lambs. Comparatively small number of ewes, rams and breeding lambs which in 2005 were respectively 375, 13 and 180 run to 7678, 493 and 1868 in 2017. This enlarge of active population was achieved by three ways: joining farmers which kept Patch Faced Maritza sheep but not participating in official breeding program of the breed, increasing the breeding lambs for replacement rate and limited upgrade crossing. On the based breeding activity contracts with farmers it was estimated continuity of breeding activity in two category of breeders: finished breeding activity with the breed and continuing with active breeding activity with the breed. The causes for discontinuing of active farmers breeding work were analysed. Total number of farmers which finished breeding activity were 54 for 27 years. Averaged continuity of farmer’s breeding activity was 4.26 years. The analysis of this information find out 5 reasons for discontinuing farmers breeding activity: disinterest, death, old age, switching to another business, and changing the breed. From the listed 5 reasons for discontinuing farmer’s breeding activity the most important are switching to another business 23 farmers and disinterest for active breeding work 17 farmers. The most important fact results nowadays is the fact that Patch Faced Maritza sheep is spread already in 11 regions, although 74.11% of the population is situated in 2 regions Plovdiv and Pazardzhik.

Key words: continuity, breeding activity, trend, sheep farming
Investigation of lysozyme and total protein levels in haemolymph of worker bees depending on the degree of expression of hygienic behaviour
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Abstract: A total of 26 bee colonies of apiaries with different business orientation were tested for the degree of expression of hygienic behaviour (HB). To define the test field a square 5 x 5 cm (100 worker bee cells) was stuck onto a section of a honey comb with sealed worker brood. The pin-killing method was used for evaluation of the HB. The bee colonies are divided into two groups: hygienic (cleaned over 95 of the cells in the testing area on 48th hour). Haemolymph have been taken from worker bees from each bee colony and levels of lysozyme and total protein has been defined. LSD test was used to establish significant differences between hygienic and nonhygienic colonies. The results obtained show significant differences between both groups at 3h, 24h and 48h (p < 0,05) according to percent uncapped and cleaned cells after killing the brood. Bivariate correlation was applied to investigate the impact of HB onto lysozyme and total protein levels in haemolymph. Moderate correlation (r=0,33) between total protein and hygienic behaviour was established but between HB and lysozyme levels weak correlation (r=0,13) was found. Regression models for both investigated parameters was calculated. They can be used to predict hygienic behaviour of bee colonies based on the lysozyme and total protein levels in haemolymph.

Key words: honeybees, hygienic behaviour, haemolymph, lysozyme level, total protein level

Effectiveness of Oxalis Bee and Ecostop for prophylaxis and control of varroosis in honey bees (Apis mellifera L.)
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Abstract: The study was conducted at the end of the 2017 Beekeeping Season of the Beekeeping Experimental Training Center at the Faculty of Agriculture of the Trakia University – Stara Zagora. Two preparations were used: Ecostop containing peppermint oil (2 ml / plate) and timol (5 g / plate), and Oxalis Bee - zootechnical feed additive for bees, including plant extracts, organic acids and invert solution from bio-sugar. The dosing of the preparations was in accordance with the instructions of the producers Primavet-Sofia Ltd. and the company “Ever Bees” Ltd. The development and infestation level of bee colonies at the beginning and the end of the study and the effectiveness of the applied preparations were determined. It has been established that the development of bee colonies is normal for the end of the beekeeping season. The comparative analysis of the acaricidal effect of the test preparations against Varroa destructor shows 98.55 ± 0.30 for Oxalis Bee. The reported difference in efficacy of both preparations is reliable at P≤0.05.

Key words: honey bees, Varroa destructor, alternative preparations, effectivenes
Polymorphism Of Prolactin Receptor (Prlr) Gene In Danube White And Landrace Swine Populations

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Abstract: The frequency of gene and genotype at PRLR locus were studied in populations of Danube White and Landrace breeds of swine. Detection of PRLR genotypes (143 sows, 54 gilts and 19 boars) were performed by the PCR-RFLP method. The PRLR locus showed polymorphism in tested pigs. There was difference in allele frequency at PRLR locus between two breeds, different groups of breeding animals and different genealogical groups of sows. The A allele of PRLR locus was with higher frequency in Landrace (0.72) compared to that in Danube White (0.49). There were not sufficient differences in PRLR allele and genotype frequencies between the different groups of breeding animals in the breeds, except gilts and sows in Danube White. It was estimated higher variation in alleles and genotypes frequency between different genealogical groups of sows – allele frequency of allele A varied from 0.33 to 0.83 in Landrace and from 0.25 to 0.88 in Danube White. The results could be good background to evaluate the relationships between PRLR genotypes and reproduction and production traits in the swine populations.

Key words: PRLR locus, PRLR allele frequencies, PRLR genotype frequencies.

Some Behavioral Characteristics of Chicken Reared in Enriched Environment

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Abstract: In this study, some behavioral characteristics of 12 week-aged Australorp and Plymouth Rock chickens were observed for four weeks in enriched cage areas with free range system. Behavioral observations were made on the same hour and day each week and furthermore evaluated regarding the lying, sewing, tanning, dust bathing, pecking, eating and water drinking activities of the chickens. Australorp chickens were found to exhibit mostly standing behavior with the ratio of 33.34. On the other hand, Plymouth Rock chickens exhibited mostly the standing behavior with the ratio of 29.29. During these observations, it was determined that the Plymouth Rock chickens did not exhibit perching and dust bathing behavior. Regarding the monitoring period no pecking behavior was observed in Australorp chickens, while pecking was observed in Plymouth Rock chickens. As a result, it was determined that the effect of strain difference on poultry behavior was statistically significant.

Key words: Australorp, Plymouth Rock, Cage, Free Range System, Behavior
Effective rumen degradability and intestinal digestibility of DM and CP in high-protein fraction from sunflower meal (SUNPRO – 46).

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Abstract. The objective of this study was to evaluate the ruminal degradability and intestinal digestibility of high protein fraction from sunflower meal (HPSFM). Three non-lactating Jersey cows with an average body weight of 436 ± 18 kg, fitted with a fistula in the dorsal rumen and a T-duodenal cannula were used to estimate rumen degradability and intestinal digestibility of dry matter (DM) and crude protein (CP). The HPSFM was produced by mechanical processing of sunflower meal and the first company which developed and implemented this new technology for separation of sunflower meal in low and high protein fractions was Bonmix Ltd., Lovech, Bulgaria. Five samples (HPSFM1 to HPSFM5) from different batches produced in interval of 20 days were collected and incubated in the rumen for 0, 2, 4, 8, 16, 24 and 48 h in 6 replications.

The values for the rapidly degradable fraction $a$ of DM ranged from 21% to 24%, but no difference was observed among individual batches ($P = 0.42$). The effective degradability of DM of HPSFM at outflow rate 0.06/h ranged from 64% to 72% and was lower for HPSFM1 ($P < 0.05$) compared to other batches. The fraction $a$ of CP in all of the samples was within the ranges from 17% to 21% with a significantly lower value in HPSFM1 ($P < 0.05$). Effective degradability of the CP of HPSFM at different outflow rates was relatively high (from 60% to 78%). The intestinal digestibility of the DM measured by mobile bag technique varied from 49% to 55% as being lowest for HPSFM2 ($P < 0.05$). The intestinal digestibility of CP was relatively high and reached 94 - 95%. The average value for Protein Digestible in the small Intestine (PDI) according to the Bulgarian Protein System (calculated using 618 g Fermented organic matter, for well dehulled sunflower meal), at a rumen outflow rate 0.06/h, was 205 g/kg DM, and the Protein Balance in the Rumen (PBR) was 187 g/kg DM. The results of the present study could be used in formulating rations for ruminant animals. The data shows possibilities for improvement of the protein value of HPSFM (SUNPRO – 46) by applying stem-heating toasting or other effective technologies for decreasing degradability in the rumen.

Key words: rumen degradability, intestinal digestibility, protein value, high-protein fraction from sunflower meal
Particulate Matter Concentrations in Summer Season in a Broiler House

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Abstract: According to the FAO database, Turkey has one of the largest broiler populations with 293 million head in 2014 in the world. This amount is equal to 16% of the European broiler inventory. Broiler production is a significant source of livelihood for Turkish people, especially in western Turkey, and is one of the largest livestock sectors. Broiler production in Turkey has steadily improved, as evidenced by the recent emergence of large broiler farms with modern houses in the Bursa region. The aim of this study is to determine the summer time concentration of particulate matter (PM) in a commercial broiler houses in the Bursa region of western Turkey. In this study, PM concentrations and indoor environmental conditions such as temperature, relative humidity was measured continuously for four consecutive days in summer months. A pDR-1500 Aerosol Monitor (Thermo-Fisher Scientific, USA) was used for particulate matter concentrations measurements. The daily average exhaust PM concentrations overall of study were 1.25 mg/m3. The obtained PM concentrations were exceed limit values (20µg/m3) for livestock houses published in European Directives “Air Quality Directive”.

Key words: Broiler, Concentration, Particulate Matter
Modern aspects of poultry nutrition

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Abstract: The report overviews numerous topics associated to modern scientific accomplishments in the following fields: 1. Protein and amino acid nutrition; and 2. Non-starch polysaccharides (NSPs) and enzyme additives, without giving specific universal solutions in the majority of cases, which is practically impossible having in mind the great variety of feed sources, genetic material, housing conditions, effect of stress factors and bird species. A true advancement in amino acid nutrition of animals has occurred in the 1930s when Rose W. (1938) classified amino acids into essential and non-essential from nutritional point of view. Reserach results from the several last decades on non-essential amino acids are summarised, which allows evaluating their importance as a considerable part of amino acid nutrition and their role for intestinal health, absorption and utilisation of nutrients from the diet. A positive effect on productive performance was exerted mainly by conditional amino acids. The knowledge on the function of intestinal mucosa and mucins is essential for elucidation of the role and needs from non-essential amino acids. At this stage, the threshold where the lines of crude protein reduction at the expense of an expanding list of synthetic amino acids intersect has not yet been reached. The reduction of crude protein in compound feeds leads to relatively higher reduction of conditional (glycine, serine, proline) than of non-essential amino acids (asparagine, glutamine). There are reserves for crude protein level reduction through expansion of synthetic amino acid list. A special attention is paid on the utilisation of enzymes as feed additives in the rations of non-ruminants and birds; one of the greatest opportunities for improving the utilisation of feed nutrients, better intestinal health and limitation of adverse effects on the environment.

Key words: poultry, protein, essential amino acids, non-essential amino acids, enzyme additives, amino acids
Feeding wheat distillers dried grains with solubles to turkeys: effect on energy and nutrient availability

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Abstract: Effects of five different batches of wheat distillers dried grains with solubles (DDGS) produced by a single production plant were used to investigate bioavailability of energy and nutrients for turkeys. The laboratory analysis of the DDGS showed variation among the different batches. Largest coefficients of variation were observed for soluble non-starch polysaccharides, oil and ash (standard deviations 12.28, 5.64 and 4.66, respectively). Birds were fed one of six mash diets. A basal diet was prepared that had major ingredients of 535.0 g/kg wheat and 300 g/kg soybean meal (SBM), and contained 247 g/kg CP and 12.57 MJ/kg metabolisable energy. Another five diets containing 200 g/kg of each of five experimental DDGS samples in replacement for basal diet were also mixed. Each diet was fed to eight pens with two female Premium turkeys following randomisation. The N-corrected apparent metabolisable energy (AMEn) and the nutrient retention coefficients of the pure DDGS samples were obtained using the substitution method. The AMEn of the DDGS from batch A was higher (P = 0.048) compared to those from batches B and C, but did not differ (P > 0.05) from DDGS samples D and E. There were no differences (P>0.05) in DMR, NR and FD between the DDGS samples from different batches used in this study. The AMEn of the DDGS samples correlated positively (P<0.05) to the starch (r=0.895), the red index of lighting (a) (r=0.916) and the NSPn contents (r=0.940), respectively. The step-wise regression technique identified the chemical components of the wheat DDGS samples, and the colour measurements, that minimised the residual mean squares for AMEn. The statistically significant explanatory variables were the red index of the colour measurement, and the oil content of the wheat DDGS samples (P < 0.05). In general, findings from this study indicate bioavailability of energy and most nutrients to be in the range of published data with turkeys, and to vary between batches.

Keywords: Turkeys; Wheat distillers’ grains with solubles; Metabolisable energy; Digestibility
Concentration of carbon dioxide in semi-open freestall barns for dairy cows

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Abstract: Studies on the concentration of harmful gases, including carbon dioxide in semi-open type buildings built in recent years, are few. The objective of this study was to determine the concentration of carbon dioxide in the different animal service zones in semi-open freestall barns for dairy cows and the dependencies and variations of these concentrations due to the influence of various factors. The study was conducted in 3 dairy cattle farms, with buildings with different capacities - for 120 and 500 cows. The microclimate indicators were reported: temperature, relative humidity and speed of airflow. The average values for carbon dioxide in the three buildings surveyed ranged from 434.85 to 635.27 ppm, with a maximum deviation up to 2130 ppm. The highest concentrations of carbon dioxide were recorded in the building with the largest capacity - 500 cows and respectively with the largest width, regardless of the larger volume per cow (m3) provided. In the building with a capacity of 120 cows and with the automation of all technological processes- cleaning, fans and sidewall openings, and the largest motion interval of cleaning scraper, a trend for the lowest levels of carbon dioxide and the least variation during the day was reported. In the summer the lowest values of carbon dioxide in the area above the stalls – 515.9 ppm were reported and in the winter the highest – 626.2 ppm. Highest values of carbon dioxide in the morning and afternoon were recorded when the animal's locomotor activity was greatest associated with eating, drinking, and other activities. The correlation between the values of the temperature-humidity index and the concentration of carbon dioxide was significant and negative (-0.23). The lowest concentrations of carbon dioxide were reported at values of temperature-humidity index 68-72.

Key words: carbon dioxide, dairy cattle, cow welfare, freestall barn
Effects of aflatoxin B1 on pathohistopathological structure immunocompetent organs in mulard ducks

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Abstract: The aim of the present experiment was to investigate the toxic effects of aflatoxin B1 (AFB1) on immunocompetent organs (thymus, spleen, bursa of Fabricius) morphology. Also, the possibility for prevention of toxic effects of AFB1 by feed supplementation of a mycosorbent (Mycotox NB) was studied. The experiments were conducted with 4 groups of 20 10-day-old mulard ducks: group I – control, fed a standard compound feed according to the species and the age; group II – experimental, whose feed was supplemented with 0.5 mg/kg. AFB1, group III – experimental, supplemented with 0.8 mg/kg AFB1 and group IV – experimental, supplemented with 0.5 mg/kg AFB1 and 2 g/kg Mycotox NG. The duration of the experiments was 42 days. Atrophy and degenerative changes were observed in immunocompetent organs of birds from groups II and III. The supplementation of the feed with 2 g/kg Mycotox NG resulted in partial neutralisation of deleterious effects of AFB1 on severity of histological lesions (interfollicular oedema, considerably slighter lymphoid follicle rarefaction).

Key words: Aflatoxin B1, mallard ducks, pathohistological lesion (spleen, bursa of Fabricius and thymus), Mycotox NG

Effect of *Taraxacum officinale* (L.) Weber ex F.H.Wigg extract on growth performance, biochemical blood parameters and meat quality of rainbow trout (*Oncorhynchus mykiss* W.) cultivated in a recirculating system

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Abstract: Plant extracts are natural products, safe for fish and the environment and also are not expensive supplements. The purpose of this study is to determine the effect of the dandelion (*Taraxacum officinale*) extract on the growth performance, meat quality and biochemical (glucose, urea, creatinine, total protein, albumin, ASAT, ALAT, ALP, Ca, P, Mg, triglycerides, cholesterol) blood parameters of rainbow trout (*Oncorhynchus mykiss*). For the experiment a recirculating system in the Aquaculture Base of the Faculty of Agriculture at the Trakia University was used. A control group (no added) and an experimental (with added 1 higher average final weight compared to control (P>0.05). The blood biochemical parameters urea, creatinine, albumin, ALP, ALAT, cholesterol and triglycerides in control variant were higher compare to the experimental (P>0.05). Better growth performance and blood parameters were measured in rainbow trout fed with dandelion supplement.

Key words: biochemical blood parameters, dandelion, growth, meat quality, rainbow trout
Investigations on haematological parameters and bone marrow morphology in mulard ducks with experimental aflatoxicosis

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Abstract: Summary. In this experiment, the toxic effects of AFB1 on some haematological parameters were investigated in mulard ducks, namely red blood cell counts (RBC), haemoglobin content (HGB), haematocrit (HCT), platelet counts (PLT), white blood cell counts (WBC), differential white blood cell counts (WBC %), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and bone marrow morphology. Experiments were conducted with 4 groups of 20 10-day-old mulard ducks each. The groups were as followed: group I – control, fed a standard compound feed according to the species and the age; group II – experimental, whose feed was supplemented with 0.5 mg/kg AFB1, group III – experimental, supplemented with 0.8 mg/kg AFB1 and group IV – experimental, supplemented with 0.5 mg/kg AFB1 and 2 g/kg Mycotox NG. The duration of the experiment was 42 days. Haematological analysis performed on the 21st day of the trial showed reduction in RBC, HCT, HGB and PLT and increased total WBC in groups II and III. The percentages of the different leukocyte classes (differential leukocyte counts) demonstrated increased proportion of heterophils and lower percentages of lymphocytes. The observed changed tended to become more pronounced on the 42nd day of the experiment. There were no statistically significant changes in MCV, MCH, and MCHC, as well as in eosinophil, basophil, and monocyte percentages between control and treated groups (p>0.05). Bone marrow of birds from experimental group II and III showed an initial form of hypocellularity, reduction of haemopoietic stem cells and early fatty replacement. The supplementation of the feed with mycosorbent – Mycotox NG (experimental group IV) reduced partly the harmful effect of AFB1 on studied haematological indices and hypocellularity in bone marrow.

Key words: Aflatoxin B1, haematological changes, bone marrow, mallard ducklings Mycotox Ng.
Effect of monosodium glutamate dietary supplementation on some productive traits of common carp (*Cyprinus carpio* L.), cultivated in net cages

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**Abstract:** The aim of the study was to determine the effect of a monosodium glutamate dietary supplementation on the survival rate, growth performance, feed conversion ratio and economic efficiency of common carp (*Cyprinus carpio* L.), cultivated in net cages. Two hundred carps were allotted into two experimental variants, each of them comprising two replications (CG, CG1, EG and EG1), with 50 fish in a group. The average initial live weight of fish from the control and experimental groups was 1141.62±79.62 g and 1129.54±71.47 g, respectively (P>0.05). The carps were cultivated in net cage with size 3m/3m/2m. The fish were fed with extruded feed "Aqua VITAL", a product of "Aqua garant", with 6 mm size of pellets. Monosodium glutamate in amount of 1 of the total biomass. The trial period was 60 days, control catch at 30th days were done in order to study the influence of the monosodium glutamate supplementation on the weight gain and feed conversion ratio of the common carp (*Cyprinus carpio* L.), cultivated in net cages. The initial, control and final live weights (g) were determined by individual weighing. The final live weight of the fish from both replications of the experimental and the control groups was as follows: 1699.36±78.43 g and 1597.27±74.66 g, the differences were significant (P<0.001). The survival rate of carps from both control and experimental group replications was 100 monosodium glutamate was 569.82±3.75 g which was higher than that of controls by 20.04 monosodium glutamate was 1.76±0.12 e.g. by 25.57 lower than that of the non-supplemented groups.

**Key words:** common carp, monosodium glutamate, feed conversion ratio, weight gain, survival rate, economic efficiency
The effect of diet supplemented with Proviotic® on growth, blood biochemical parameters and meat quality in rainbow trout (Oncorhynchus mykiss), cultivated in recirculation aquaculture system

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Abstract: In 2006, the European Union banned the use of all types of therapeutic antibiotics as growth promoters in livestock farming. This lead to the need for alternative growth supplements to be found. Such a possibility is the development of new nutritional strategies with the participation of probiotics. The purpose of this study was to trace the growth performance, meat quality and blood parameters of rainbow trout (Oncorhynchus mykiss W.), fed with additive of probiotic Proviotic®. The fish were given two feeds: individuals from the control group (CF) - without addition of supplement and these ones from the experimental with addition of 460 mg.kg⁻¹ Proviotic (EF). The stocking density of rainbow trout in recirculation system was 50 pcs.m⁻³. The initial average weight of fish in CF variant was 13.43±2.9 g and in EF - 13.35±3.4 g, without differences being statistically significant (P≥0.05). The continuation of experiment was 60 days. Trouts were individually weighted at the start, middle and end of the trial period. The average final weight, meat quality and blood biochemical parameters were analyzed at the end of the trial. Fish from the experimental group fed with supplement of Proviotic® had with 5.38% higher average final weight compared to the parameter value in trout from the control variant, but without difference being statistically significant (p≥0.05). The blood biochemical parameters in experimental fish were not significantly affected by supplementation of probiotic Proviotic® (p≥0.05). This supplement added to feed for feeding of rainbow trout increases the growth of fish, but differences in the growth between groups were not significant and did not affect significantly the blood parameters (p≥0.05).

Key words: Proviotic®, blood biochemical parameters, growth, meat quality, rainbow trout
Growth performance, biochemical blood parameters and meat quality of rainbow trout (*Oncorhynchus mykiss* W.) fed with feed supplemented with extract of licorice (*Glycyrrhiza glabra*)

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**Abstract:** Licorice (*Glycyrrhiza glabra*) is a medicinal plant characterized with sweet flavor which has been used in Bulgarian traditional medicine to improve the condition of digestive tract and could positively affect digestibility and assimilation of feed nutrients in human and animal organisms. The studies connected with the effect of licorice in fish are limited. The aim of current study was to find the effect of feed supplemented with licorice *Glycyrrhiza glabra* on growth performance, blood parameters and meet quality in rainbow trout (*Oncorhynchus mykiss* W.). The fish were fed with two feeds: control feed (CF) - without addition of supplement and experimental feed (EF) (with supplementation of mg.kg\(^{-1}\) licorice in fish feed. The stocking density of rainbow trout in recirculation system was 50pcs.m\(^{-3}\). The initial average weight of fish in CF variant was 13.3 ±3.07g and in EF variant was 13.4±3.55g without differences being statistically significant (P≥0.05). The continuation of experiment was 60 days. The average final weight, meat quality and blood biochemical parameters were measured at the end of experiment. The SGR and FCR were also calculated. Experimental group fed with supplement of licorice had with 8.54 compared to the value of SGR in fish from CF variant. The blood biochemical parameters in experimental fish were not significantly affected by supplementation of licorice extract. The average values of glucose, ASAT and ALAT in control variant were higher respectively with 3.96 and 10.3% compared to values in these parameters measured in the blood of fish from experimental variant, but differences were not statistically proven (p≥0.05). The extract from licorice added to feed for feeding of rainbow trout increases the growth of fish and did not affect significantly the blood parameters.

**Key words:** licorice, rainbow trout, blood biochemical parameters, growth, meat quality
Effect of *Artemisia annua* L. extract on growth performance, biochemical blood parameters and meat quality of rainbow trout (*Oncorhynchus mykiss* W.) cultivated in recirculating system

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**Abstract**: Medicinal herbs can be used as feed additives to improve animal growth performance and also to play a role to optimize physiological processes. The purpose of this study is to determine the effect of the sweet wormwood (*Artemisia annua*) extract on the growth performance, meat quality and biochemical (glucose, urea, creatinine, total protein, albumin, ASAT, ALAT, Ca, P, Mg, triglycerides, cholesterol) blood parameters of rainbow trout (*Oncorhynchus mykiss*). In a recirculating system in the Aquaculture Base of the Faculty of Agriculture at the Trakia University, a control group (no added) and an experimental (with added 3 mg/kg of sweet wormwood extract) option were set, each of them with two replicates and mean initial weight 13.32±3.07 g and 13.37±2.76 g, respectively. Forty specimens’ rainbow trout with in good health condition were placed in each tank and cultivated for 60 days. At the end of the experiment were calculated average final weight, specific growth rates, feed conversion ratio, meat quality and blood biochemical parameters. Experimental group fed with supplement had with 5.5% higher average final weight compared to control (P>0.05). The blood biochemical parameters glucose, ASAT and ALAT in control variant were higher compare to the experimental (P>0.05). Electrolytes of blood such as phosphorus (P) have a higher level in experimental group (P>0.05). Better growth performance and mostly blood parameters were measured in carp fed with sweet wormwood supplement.

**Key words**: haematological and biochemical blood parameters, growth, meat quality, rainbow trout, sweet wormwood
Growth performance, biochemical blood parameters and meat quality of rainbow trout (*Oncorhynchus mykiss* W.) fed with additive *Cnicus benedictus* L. extract

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**Abstract:** Aquaculture development is influenced by various environmental factors and nutrition with herbal additives can affect the growth in aquaculture and to improve indicators such as digestibility, nutrition effectiveness and food taste. The purpose of this study was to trace growth performance, meat quality and biochemical (glucose, urea, creatinine, total protein, albumin, ASAT, ALAT, Ca, P, Mg, triglycerides, cholesterol) blood parameters of rainbow trout (*Oncorhynchus mykiss* W.) fed with additive blessed thistle (*Cnicus benedictus* L.) extract. To achieve the objective a control group (no added) and an experimental (with added 15 mg/kg of blessed thistle extract) option, each with a two repetition, were set in a recirculating system in the Aquaculture Base of the Faculty of Agriculture at the Trakia University. Forty specimens from the fish species rainbow trout with an average weight of 13.32+3.07 g (control) and 13.33+2.58 g (experimental) in good health condition were placed in each tank and cultivated for 60 days. At the end of the experiment were calculated average final weight, specific growth rates, feed conversion ratio, meat quality and blood parameters. Experimental group fed with supplement had with 8.52 and 44 compared to control group (P>0.05). Carps fed with blessed thistle supplement have better growth performance and mostly blood parameters.

**Key words:** blessed thistle, haematological and biochemical blood parameters, growth, meat quality, rainbow trout
**Steam-Flaked Grains for Ruminants Nutrition**

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**Abstract:** Grains are an important element of ruminant diets. The most important reason why grains are an important element in ruminant diets is that the energy values are high due to the rich starch contents. Grains are used extensively not only in ruminants but also in people. Whether they are used as human food, or because their production is difficult and expensive, it is necessary to make the best use of the grain in the feeding of ruminants, especially considering the needs of the growing world population. For this reason, physical (grinding, breaking, crushing, etc.) and chemical (NaOH, urea application, etc.) processes are applied to the grains used in animal nutrition.

One of these processes is a steam-flake process. In this process, the grains are first steamed and then crushed into flakes. The steam-flaking process results in a more efficient degradability of starch in the rumen by increasing the gelatinization of the starch granules. The steam-flaking process improves energetic efficiency of grains. For corn and sorghum, most of the benefit from steam-flaking is due to improved ruminal and total tract digestion of starch. For barley and wheat, the principal advantage from steam-flaking is higher feed intake, due to improved physical attributes of the grain. Steam-flaked grains have been used extensively since the 1960's, particularly in cattle breeding. For this reason, many topics such as the effects of technological changes in flake production systems on the performance of animals fed with steam-flaked feed, were investigated.

In this review, some research results of the use of steam-flaked grains in ruminant nutrition have been summarized.

**Keywords:** Grains, Steam-flaking, Ruminants, Animal nutrition.
Correlation and Cluster Analysis in Wheat Genotypes to Estimate Genetic Variability

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Abstract: This research was carried out at an experimental field at the Field Crops Department of the Faculty of Agriculture at Uludag University. A randomized complete block design with three replications was used under the Mediterranean-type environment of Turkey during the 2014-2015 and 2016-2017 growing seasons. Twenty two lines and a wheat cultivar were used as the experimental material of the study. The objectives of this study were to compare the grain yields and other yield components of wheat such as plant height, spike length, number of spikelets per spike, number of grains per spike, grain weight per spike, 1000-grain weight and test weight by correlation and cluster analysis. According to the mean results for the two years, significant differences among the lines were obtained in regard to all traits investigated in the study. For lines and cultivar, the means ranged from 106.8-65.8 cm for plant height, 10.2-8.4 for spike length, 18.6-15.2 spikelet for the number of spikelets/spike, 43.5-33.1 grains for number of grains/spike, 1.93-1.39 g for grain weight/spike, 48.2-37.0 g for 1000 grains weight, 78.9-70.7 kg for test weight and 390.5-274.7 kg/da for grain yield. When the relations between the features for the combined years were examined, significant relations were between plant height and spike length, spikelet for the number of spikelets/spike and test weight, significant relationships between grain weight/spike and grains for number of grains/spike and 1000 grain weight. Significant relations between test weight and 1000 grains weight and the correlations between traits revealed that significant relations between grain yield and spike length, grains for number of grains/spike and test weight were found. Twenty two clusters formed in the dendogram belonging to cluster analysis depending upon the agronomic traits of the genotypes. The similarity level of the genotypes range between -189.78 – 94.61. Cluster XXII and XXI were most similar while cluster I and II were most diverse.

Key words: Wheat genotypes, correlation, cluster analysis, agronomic traits
Determination of Combining Ability and Hybrid Performance of Some Pea (*Pisum sativum* L.) Line Obtained by Crossing With LinexTester Analysis Method

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**Abstract:** This research was conducted to determine the general and specific combining ability, heterosis and heterobeltiosis of some pea (*Pisum sativum* L.) genotypes obtained by crossing with linextester analysis method. The hybridization by linextester analysis method between three lines (USA5, Vesela, Urunlu) and three tester (Ates, Taskent, Ozkaynak) were made. The three lines, three tester and F1 hybrids were used in this experiment. Field study was carried out between 08.11.2016 and 04.07.2017 at Uludag University, Faculty of Agriculture, Agricultural Research and Application Center in Bursa, Turkey. The experimental design was a randomized complete block design with three replications. In this trial, biological yield per plant, seed yield per plant, straw yield per plant, harvest index per plant and 1000 seeds weight were determined. According to the annual results, Vesela variety was the best parent in both seed and straw yields. At the same time, Ozkaynak variety increased the straw yield such as Vesela variety. USA5 x Taskent, Vesela x Ates, Vesela x Taskent and Urunlu x Ozkaynak were the best crosses for seed and straw yields according to annual year results. So, it should work with these varieties and genotypes in future years.

**Key words:** Pea, linextester, general combining ability, specific combining ability, heterosis and heterobeltiosis
Effects of Increasing Application Doses of Nitrogen on Growth and Some Nutrient Element Contents of Sunflower (*Helianthus Annuus* L.) Varieties

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Abstract: Sunflower (*Helianthus annuus* L.) is known as one of the most important and preferred vegetable oil producing plant, because of its high yield and quality. Nowadays, fatty acid composition of vegetable oil has become important due to its positive effects on fat quality and health. Fatty acid compositions of oil seed is not always constant and have characteristic differences between the species. On the other hand nutrition of the plants is important for healthy growth, high yield, and oil quality and may differ between the plant species and varieties. We aimed to determine the effects of increasing application doses of nitrogen (N) on growth and on some nutrient element contents of sunflower (*Helianthus annuus* L.) varieties in a greenhouse located in the Agricultural Research and Application Centre of Uludag University, Bursa/TURKEY. The experiment was conducted in randomized plots design with three replicates. Four sunflower varieties were grown under five different nitrogen doses (0, 16, 32, 48, and 64 mg kg⁻¹ N). Two of them ESNovamis CL, and LG 5542 CL, are indicated as linoleic type, and two others Oliva CL and ESGrafic CL are indicated as high-oleic type. According to the results; increasing doses of nitrogen has statistically significant effects on dry matter and nutrient uptake of sunflower varieties (p<0.01). Increasing doses of nitrogen elevated the dry weight, nitrogen and other nutrients uptake of all tested sunflower varieties. The increases were found maximum at 32 mg kg⁻¹ N dose. Significant differences were also determined between the varieties and among the tested sunflower varieties ESGrafic CL was selected as the variety which has higher nutrient uptake capacity.

Key words: Sunflower, nitrogen, plant nutrients
Analysis of the Profitability and Constraints of Rain fed Rice Production in Adamawa and Taraba States, Nigeria

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Abstract: The study was conducted to analyze the profitability and constraints of rain-fed rice production in Adamawa and Taraba States, Nigeria. Primary data were collected from 300 rice farmers with the aid of structured questionnaire. Multi-stage sampling technique was adopted. Data collected were analyzed using descriptive statistics and budgetary technique. The result of the gross margin analysis revealed that the total variable cost and gross margin per hectare were ₦28,796.92 and ₦34,306.68. The major constraints to rain-fed rice production in the study area include, high cost of labour, which ranked first (20.58%), followed by inadequate/high cost of fertilizer, high cost of ploughing, high cost of seed, inadequate loan, pest and diseases, while clashes with pastoralist and ineffective extension delivery been the least (2.94%). The study recommended that Rain-fed rice farmers should be given adequate assistance through training, extension services, cooperative groups, input subsidy, improved seeds, as well as timely and efficient input distribution.

Key words: profitability, budgetary technique, constraints, rice
GENETIC INTERRELATIONSHIP AMONG QUANTITATIVE TRAITS AND PATH ANALYSIS OF WEST AFRICAN OKRA (*Abelmoschus cailleii*) GENOTYPES

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Abstract: Thirty-six entries of a half diallel cross were evaluated at the Teaching and Research Farm, Adamawa State University, Mubi in 2012 and 2013 under rain fed conditions. The investigation was conducted to study inter-character correlations and path coefficient analyses of yield related traits in West African okra. Fresh pod yield exhibited highly significant positive correlation with pod length, pod diameter, leaves/plant, branches/plant and pods/plant. Pod length recorded a highly significant (P≥0.01) and positive correlation coefficient with plant height, pod diameter, number of leaves/plant, branches/plant, pods/plant and fresh pod yield. Similarly, pod diameter had a high significant and positive correlation with plant height, number of leaves, branches and pods/plant including pod yield. Furthermore, number of leaves/plant, branches and pods/plant recorded highly significant and positive correlation among all yield related traits. The path coefficient analysis of fresh pod yield and yield related traits showed that number of pods/plant gave the highest percentage yield contribution of 47.83%, followed by pod diameter which contributed 4.58%. Also the highest combined contribution of 14.43% came from pod number/plant and pod diameter. Residual percentage contribution was 30.64% revealing that pod yield attributes in this study explained 69.36%. This investigation suggests that pods/plant and pod diameter can be considered as selection criteria for the improvement of West African okra genotypes.

Key words: Correlation, Path analysis, direct effect, *Abelmoschus cailleii* and pod yield
Scope for improvement and opportunities in sorghum production: Economic analysis of Adamawa State

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Abstract: This study examined the Scope for improvement and opportunities in sorghum production in Adamawa State Nigeria with the objective of the studying the resources used efficiency in sorghum production. Data for the study were collected using questionnaires which were administered to 240. Data collected were analyzed using stochastic frontier production function analysis. The study revealed the coefficient of farm size, labour and seed had expected a priori sign of positive and were statistically significant at 1 and 5% level while coefficient of fertilizer and chemical were not significant for Sorghum producer in the study area. Variance parameters were both statistically significant at 1% level. The sigma squared shows good fit and correctness of distributional form assured for composite error term while gamma (γ) shows the degree of variation in technical efficiency of the farms. Mean technical efficiency was 0.76. From the research findings, it is observed that resource adjustment is paramount for increased productivity since the farmers operate far below frontier level. The inefficiency in the use of some of these resources may be as a result of inaccessibility, unavailability and/or unaffordability. So individual or cooperate entrepreneurs can take advantage of this resource adjustment and efficient use of this resource to increase sorghum productivity therefore taking the available opportunities.

Key words: scope for improvement, sorghum, Adamawa State, Nigeria

Effects of some additional substances on in vitro mass production of Heterorhabditis bacteriophora HBH strain

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Abstract: Entomopathogenic nematodes (EPNs) have been commercially mass produced for several years in some countries. EPNs are being cultured as liquid or solid in vitro condition for the production, and then they are formulated and well used in controlling of insect pests in agriculture. The in vitro produce is made with using of many substances containing of nutrient broth, agar, yeast extract, soy-flour and plant oil for solid media, and additional to solid media; peptone and some salt substances. In order to increase mass production yield, some compounds should be added into the media. Thus, more producing of EPNs is targeted by this way. In this study; lecithin, egg yolk and the both together were used in solid medium and effects of these additional compounds were examined on mass production of hybrid Heterorhabditis bacteriophora HBH strain hybridizing with Turkish isolates. Firstly, hermaphrodites (HMs) and then infective juveniles (IJs) that reproduced from the HM of the strain were targeted as mass production criteria. According to the results, all treatments except control statistically increased reproduction of HMs, and lechitin was the best compound for production of IJs.

Key words: Heterorhabditis bacteriophora HBH, in vitro, substance, solid media
Internal parity of prices of the raw tobacco classes

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Abstract: Tobacco, along with other agricultural crops, is important segment of the productional structure of individual producers. Depending on crops prices, the farmers plan and direct their activities toward one or several cultivars that will guarantee the highest income. This relationship is called parity ratio of the prices of agricultural crops. According to this quality, farmers make decision to which agricultural structure they will direct their economy. In practice, it is about parity between two and more crops due to differences in their prices, also referred as disparity. Disparity is an indicator to which crop and to which extent will the farmers direct their activities. This is also valid for tobacco crop in terms of its market price compared to other cultures. Beside this, there is also internal parity. In tobacco, it is a parity between different tobacco types and varieties as well as different classes within the variety. In determining and creating the prices of tobacco, internal parity should be carefully considered because it affects the need to increase or decrease the quality of tobacco depending on market demand. In the first case, parity between different types and varieties of tobacco can lead to increase of tobacco production, which can result in possible market surplus of one tobacco type of and lack of another. In the second case - internal parity of classes within certain variety has a significant role in stimulating and maintaining the quality of tobacco, taking care not to cause high approximation (equalization) of quality between tobacco classes. Parity and internal parity will be discussed and analysed in the content of this paper.

Key words: crops, prices, classes, quality, parity
Genetic diversity between male fig genotypes

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Abstract: Caprifigs are crucial for high quality fig production and for fig breeding but assessment of genetic relationship among caprifigs has not been studied well. Therefore, the purpose of this study was to assess genetic diversity among 45 caprifigs from Turkey using simple sequence repeat (SSR) markers. 23 SSR markers amplified polymorphic 82 alleles. The number of polymorphic alleles per SSR marker ranged from 2 to 7. The observed heterozygosity (Ho) differed from 0.18 to 0.76 and expected heterozygosity (He) was between 0.24 and 0.81. The polymorphism information content (PIC) varied from 0.42 to 0.98. A UPGMA analysis based on Dice similarity matrix clustered fig genotypes into two main groups and similarly, STRUCTURE analysis placed fig genotypes into two different gene pools (K=2). The fig genotypes didn’t cluster on the basis of their collection sites. Our results demonstrated that caprifigs and female figs are not genetically distinct and they clustered together in a group. All fig genotypes had distinct SSR marker profiles suggesting that there was no synonyms or homonyms. Finally our results illustrated that the genetic variation among fig genotypes was high and SSR marker system is suitable for genetic analysis in fig.

Key words: Ficus carica L., caprificg, genetic variation, SSR marker, STRUCTURE analysis
The possible usage of wild relatives in sunflower breeding

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Abstract: Sunflower (Helianthus annuus L.) is the fourth most important oilseed crop in the world in terms of total annual production, after soybean, rapeseed, and groundnut (Branković ve ark., 2012). The hybrid seeds are almost used in sunflower production in Turkey but narrow genetic base in sunflower causes a major problem at breeding and selection of desired sunflower lines. The inbred parental lines contained different genetic resources for selecting desired characters in breeding is needed. The preservation of wild relatives of sunflower has been seen as a promising source for uncover always new and useful features. It is possible to select high yield, resistance to diseases, resistance to stress conditions, etc. important characters by using annual and perennial wild species of sunflower genotypes as starting material and make interspecific hybridization between them afterwards selection by modern breeding technics. In sunflower plant without a change in oil quality and yield, many characters such as cytoplasmic male sterility, herbicide tolerance, resistance to biotic and drought stress, fatty acids were transferred from wild species to the gene pool of cultivated varieties. However, the utilization of the vast genetic potential in the wild type is usually very difficult. The cross incompatibility, embryo abortiveness, sterility and reduced fertility restrict the use of wild types in sunflower. Tissue culture is one the most common method to overcome breeding problems in sunflower. The environmental conditions may prevent the disclosure of alleles with superior characteristics during determination of allele families with superior characteristics. In addition, transfer of the superior alleles into breeding gene pool to create new varieties is very slow and expensive. In this study, problems in sunflower breeding and using of modern breeding methods to overcome these problems and obstacles will be discussed.

Key words: sunflower, tissue culture, wild types
The Genotype X Environment Interactions In Wild Sunflower Species (*Helianthus* L. spp.)

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Abstract: The field trials were conducted for four years (2014 and 2017) to determine the genotype X environment interactions in some wild sunflower species in terms of morphologic and phenologic characters at the Research and Training Centre of the Agricultural Faculty, Uludağ University, Bursa, Turkey. The 26 wild sunflower genotypes supplied from different sources (USDA-America; Germany, Canada) were used in the study. One month seedlings germinated with mechanical drawing application in a 1:1 portion soil and peat mixture violin were grown in field conditions. Some of the morphologic (plant height, head diameter, number of leaves per plant, stem thickness, number of branches) and phenologic (ray flower color, head angle, head shape, uniformity of flowering, uniformity of maturity, bract shape, pollen fertility, pubescence at general appearance, disk flower color, petiole position, branching, type of branching) characters were observed and measured during four years. The majority of the morphologic characters influenced by genotype year and genotype X year interactions while there was no clear difference within observed phenologic characters

Key words: wild type sunflower, genotype, phenologic and morphologic characters
Effects of Different Nitrogen Fertilization on Plants Growth of Some Warm Season Turfgrasses

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Abstract: This research was conducted to determination of the effects of different nitrogen sources and nitrogen rates on turfgrass color, quality and clipping yield at Uludag University Research Farm, Bursa. The experimental design was a split-split plot with turfgrass species as a main plot, nitrogen sources as the sub plots and nitrogen doses as the sub sub plots. The main plots consist of three warm season turfgrass species, hybrid Bermudagrass (*Cynodon transvaalensis* × *Cynodon dactylon*), seashore paspalum (*Paspalum vaginatum* Sw.), zoysiagrass (*Zoysia japonica* Steud.) and one cool season turfgrass species, tall fescue (*Festuca arundinacea* Schreb.). Sub plots consist of four nitrogen sources; S₁: Floranid, S₂: Biosmart, S₃: Sewage sludge and S₄: Hexaferm. Monthly applications were carried out at rates of N₁: 0.0 (control) g m⁻²; N₂: 2.0 g m⁻²; N₃: 3.0 g m⁻² and N₄ 4.0 g m⁻². Monthly turf color and quality of each plot were evaluated visually and clipping weight determined. Results of this study showed that Biosmart and Hexaferm had significantly higher ratings of color and quality and clipping yields compared with other fertilizers. Zenith gave the best turf color and quality for the Biosmart (S₂) and hexaferm (S₄) treatments under 4.0 g/m² rate. The S₂N₄ and S₄N₄ treatment gave sufficiently dark turf color and quality.

Key words: slow-release fertilizer, sewage sludge, warm-season turfgrasses, color, quality
Determination of Yield and Quality Characteristics of Some Rapeseed Genotypes in Different Environments

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Abstract: Within the scope of this research promising rapeseed lines (F9 generation) developed by Uludag University Faculty of Agriculture Department of Field Crops together with witness cultivars (Orkan, Süzer, Excalibur and NK Caravel) were examined for seed yield and oil quality based on yield trials with multiple locations (Bursa, Edirne and Samsun) in a randomized complete block design with four replications. When compared to grain yields of the rapeseed genotypes used in this study on the average of three locations (Bursa, Edirne and Samsun), Excalibur variety owned by the highest grain yield (505.4 kg/da), advanced generation of rapeseed lines BC-12 and QC-25 which takes place in the same statistical group with Süzer, NK Caravel and Elvis varieties and left behind the Orkan variety were determined. When oil rates of rapeseed genotypes located in this study ranged between 36.0-41.0 ) obtained from Excalibur rapeseed variety. According to the results of the adaptation-stability analysis, the lines BC-12 and CB-16 were found to be very stable.

Key words: Adaptation, Brassica napus L., seed yield, stability, oil quality
Effect of the Rainfall Humidity and Temperature at Various Growth Stage on Yield and Quality in Bread Wheat

(*Triticum aestivum* L.) Cultivars

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**Abstract:** Fluctuation of temperature and rainfall may influence bread wheat yield and quality during heading and grain filling stages in Trakya region, Turkey. Various environment conditions could cause some abiotic stress factors. In the study it was investigated effect of temperature and rainfall, from Z24 to Z89 growth stage, on yield, quality and some agronomic characters in bread wheat cultivars. This research was established with 25 genotypes in randomize complete block design with 4 replications at two locations, from 2011 to 2016 growing seasons. Five cultivars were selected and grain yield, 1000-kernel weight, test weight, protein ratio, gluten, gluten index, hardness, sedimentation, plant height and days of heading were investigated. According to results it was found various relations among investigated parameters. It was very favourable year 2012 for grain yield, TKW, TW, and gluten value. The highest protein ratio, gluten index and sedimentation were obtained in 2011. There was negatively relation between grain yield with mean temperature during Z24 and Z89 growth stage. TKW was positively affected by increasing in mean temperature during Z31-49, Z51-75, and Z77-89 growth stage. Mean temperature during Z77-89 growth stage had significant effect and increased test weight ($r=0.917^{**}$). Increasing in maximum temperature during Z31-49 and Z77-89 was positively affected test weight. The mean temperature during Z24-30 ($r=-0.926^{**}$), Z31-49 ($r=-0.632$), and Z51-75 ($r=-0.499$) growth stage had negatively effect and caused various decline on protein ratio. Also, there was similar correlation among mean temperature and gluten value. The higher temperature during Z24 to Z89 growth stage led to various level reductions in gluten index and sedimentation value. Increasing in mean and maximum temperature during Z24 and Z89 caused shortened in days of heading and reduced plant height. Mean humidity from Z24 to Z89 plant growth stage had a various positively effect on grain yield and 1000-kernel weight. The increasing in mean humidity during Z24-30 growth stage negatively affected and reduced protein ratio and gluten value. The rainfall during Z24-30 and Z77-89 growth stage negatively affected and slightly reduced test weight, protein ratio and gluten value.

**Key words:** Bread wheat, temperature, rainfall, yield, quality characters
Effects of Salts Stress on Germination and Seedling Growth of Hulles Barley Varieties

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Abstract: This study was conducted in order to determine the effects of salt stress on hulless barley varieties. Study was set up in a laboratory at 24±1°C for 7 days. In the study, seven salt concentrations (0, 50, 100, 150, 200, 250 and 300 mM) were tested. Ozen and Yalın were used as a plant materials. Completely randomized plot design was used with four replications. Seeds of the selected cultivar were sterilised in 5% sodium hypochlorite for 15 min and then washed several times with distilled water. Four replicates of 20 seeds were then placed in 15 cm petri dishes with double-layer filter paper. In the experiment, some characters such as germination percentage, plumule and radicle length, plumule and radicle fresh weights, plumule and radicle dry weights, salt tolerance index were examined. According to the results, different salt concentrations had negative effects on germination characters of hulles barley varieties. Germination percentage decreased with the increasing concentrations of salt. Therefore, the highest germination percentages occurred at control as 100 % and the lowest value at the 300 mM NaCl as 46.67 %. Salt tolerance index of barley varieties was similar.

Key words: Hulless barley, salt stress, germination, stress tolerance index
Effects of Sowing Methods and Plant Densities on Grain Yield and Yield Components in Dent Corn (Zea mays indentata Sturt.)

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Abstract: Irrigated field experiment was conducted in the Marmara region of Turkey in 2017 to compare alternate 45:25 cm row spacing and conventional 70 cm with four different plant densities (65000, 85000, 105000 and 125000 plants ha\(^{-1}\)) of corn hybrid (DKC 6630). The experimental design was a randomized complete block in a split-plot arrangement with three replications. The plant height, ear height, ear length, ear diameter, the number of seed per ear, 1000 seeds weight, hectoliter weight and grain yield were determined in this study. The experiment showed that row spacings and plant densities significantly affected some morphological traits and grain yield. Average grain yield of alternate row spacing was 15269 kg ha\(^{-1}\), while 14718 kg ha\(^{-1}\) in conventional row. Alternate 45+25 cm row spacing system resulted 3.7 % more grain yield than conventional row system. Grain yield increased with increasing plant densities up to 85000 plants ha\(^{-1}\) (1565.5 kg ha\(^{-1}\)) and then decreased in higher plant densities.

Key words: Dent corn, sowing method, plant density, yield and yield components
Opportunities for growing of garden pea in organic production systems

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Abstract: The purpose of this study was to undertake an assessment of garden pea lines to evaluate a complex of characteristics and determine opportunity for their growing in organic farming conditions. A three-production systems (two organic and conventional) field experiment evaluated the productivity, disease and pest infestation and seed quality in four garden pea accessions. The experiment was conducted in the “Maritsa” Vegetable Crops Research Institute, Plovdiv, Bulgaria in the period 2016-2017. The expression of the studied characteristics in the three experimental variants was different and was determined by the genetic features of studied peas. Lines 18573 and 101i realized a higher average yield of green grain in the variant by fertilizing plants with bio-products allowed for use in the organic production and use of bio-pesticide products for plant protection. Low degrees of defeat of Fusarium spp., Ps. syringae pv. pisi, Alternaria spp., Peronospora pisi and species of Laspeyresia spp. were established in the garden peas grown in different variants organic and conventional production. The degree of assault from Ascochita pisi and Bruchus in the organic systems was higher. The influence of pathogens and pests on the studied lines was limited after fertilization with bio-humos and biological plant protection treatment. Seeds of garden pea growing in organic systems are generally with lower absolute seed weight compared to conventional production, but saved high germination.

Key words: Pisum sativum, organic farming, varieties, breeding, characteristics

Study on in vitro propagation of white oil-bearing rose (Rosa alba L.)

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Abstract: The influence of major factors such as explant sterilization, plant growth regulators in the multiplication and rooting media and the genotype on the in vitro multiplication of White Oil-Bearing Rose (Rosa Alba) was studied. Explants used in the experiment were 1.0 to 1.5 cm long nodal segments from specially cultivated mother plants. The combination of two disinfectants in the following order: 0.2 NaClO solution for 20 min and 0.25 on average for both genotypes) was obtained in ex vitro conditions by direct rooting in a soil mixture.

Key words: in vitro propagation, white oil-bearing rose
Effects of Different Doses of Organo Mineral and Composite Fertilizer Application on Herbage Yield and Quality of Rangelands

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Abstract: The aim of this study was to determine the variability in herbage yield and quality of rangelands depending on the application of organo mineral and composite fertilizers. The experiments have been carried out in the years 2010 and 2011 in Gerlengeç Village of Biga District situated in Canakkale Province, Turkey. The research was established according to the randomized complete block design by using 4 replications. Organo mineral (5–10–0) and composite (20–20–0) fertilizers were used as fertilizers, whereas 0, 50 and 100 kg N/ha as doses. Hay crude protein, crude ash, NDF, ADF and ADL along with the yield of dry hay ratios have been investigated in this research. The ratio of hay crude protein, crude ash as well as the yield of dry hay of rangelands have been increased depending on fertilizer application, but this increase was significantly important upto 50 kg N/ha. On the other hand, the ratios of NDF, ADF and ADL have been decreased. In addition, the ratio of NDF, ADF and ADL increased, while the crude protein and ash amounts of hay decreased depending on plant development. As a result, it is recommended to apply 50 kg N/ha for both fertilizers in terms of yield and quality of hay in rangelands.

Key words: Rangeland, fertilizer application, hay yield, hay quality
Effects of the Mixtures of Hairy Vetch and Hungarian Vetch with Italian Ryegrass on Upper and Sub Soil Development
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Abstract: This research was conducted to see the growth of Hungarian vetch and hairy vetch along with the cultivation of annual grasses that would be an option for mixed cropping with legumes and forage grasses, which would be a way to provide high yield and quality forage production from the unit area, and also check the variation among yields according to simple cropping. The research was established in flower pots using randomized complete block design with 3 replications. In the experiment; 1, 2, 4 numbers of annual grasses, Hungarian vetch and hairy vetch along with their double mixture were obtained from per flower pot. The effects of simple and mixed cropping on vegetative (plant height, number of branches, total dry and green weights, and root weight) and nutritional (NDF, ADF, ADL, total fiber, ratio of crude protein and crude ash, and the digestibility of dry and organic matters) characteristics have been examined. According to obtained data, total dry and green weights along with root mass have been increased as the number of plants per flower pot enhanced. This increase was particularly appeared in mixed cropping. The ratios of NDF, ADF and fiber decreased, while the ratios of crude protein and crude ash along with the digestibility of hay have been increased in mixed cropping of legumes with forage grasses. The ratios of NDF and ADF increased, while the ratio of crude protein and crude ash of hay have been decreased in mixed cropping of forage grasses with legumes. It is concluded that the winter cultivation of annual grasses along with the mixture of hairy vetch and Hungarian vetch, and the presence of 1 vetch along with 2 or 4 perennial grasses would be suitable to provide more organic matter to soil and also for obtaining high hay production.

Key words: Italian ryegrass, hairy vetch, Hungarian vetch, hay yield, root weight, hay quality
Abstract: The aim of this study is to determine a complex of morphological and physiological traits correlating with higher productivity that can be used as the criteria for rapid screening of high-yielding durum wheat genotypes. Five durum wheat cultivars - 4 Bulgarian and one Austrian, created in different periods were studied for two growing seasons (2011-2013) by different group of traits: morphological traits characterizing the roots and flag leaf, physiological traits related with chlorophyll fluorescence and agronomic traits related with productivity. The chlorophyll fluorescence was measured on flag leaves during the grain filling stage with a portable chlorophyll Fluorometer - MINI-PAM –WALZ-GmbH – Germany. The obtained results are statistical processed by analysis of variance (ANOVA), correlation analyses and PCA. There is a significant variation between the genotypes of each of the studied traits. Correlations between different group of traits and yield are established: positive correlations between all morphological traits related to roots and yield, between flag leaf width and yield and between the physiological parameter quantum yield (Y) and productivity. Some negative correlations between the physiological parameters: momentary fluorescence yield (Fo) and maximal fluorescence yield (Fm) and productivity and between momentary fluorescence yield (Fo) and maximal fluorescence yield (Fm) and roots traits were found, too. Established correlations should be checked for other genotypes and environments (years) and if confirmed, may be applied in our durum wheat breeding program for rapid screening of high-productive genotypes.

Key words: durum wheat, productivity, roots trait, chlorophyll fluorescence, correlations
Abstract: The main problem in breeding improvement of cold resistance in winter cereals is related to the difficult selection of appropriate genotypes in field conditions due to the lack of permanent action of the stress factors over years. This requires searching for alternative methods for rapid and reliable screening of tolerant genotypes. In this study the results for cold resistance of 16 durum wheat genotypes obtained by applying of two methods for estimation are compared. The direct method of freezing of plants was carried out in IPGR - Sadovo in two consecutive harvest years (2014-2015). The plants were grown and hardened outdoor under natural conditions in autumn and in January were frozen in freezing chamber at two temperature – 13° C and -18 ° C for 24h. The indirect method is based on the negative correlation between the seedlings growth rate at low positive temperatures and the cold resistance and was conducted at the Field Crops Institute – Chirpan. The statistical processing of the results obtained was done by calculation of confidence intervals, analysis of variance (ANOVA), Duncan multiple range test, correlation and cluster analysis. In 2014, after the freezing at -13 ° C, surviving plants were observed for all varieties, ranging from 94.7 for breeding line D-7281. No surviving plants were observed after freezing at -18 ° C for any genotype. In 2015, after the first freezing at -13 ° C, surviving plants were detected at 9 genotypes, and after freezing at -18 ° C - at 8 genotypes. The varieties Deni, Deiana, A-233 and Victoria were distinguished with the highest survival rate. When applying the indirect method, the highest coefficients of seedling growth depression and the highest cold-resistance respectively were observed for Denny and Deiana varieties. The results of the correlation analysis show the presence of an average positive correlation between the parameters that characterize the cold resistance by the two used methods (r = 0.52%). It was confirmed that the indirect method for detecting depression in seedlings growth at low positive temperatures could be used for a rapid initial screening of cold resistance at large number of durum wheat genotypes.

Key words: durum wheat, cold resistance, direct freezing method, indirect method
2. SECTION "CROP SCIENCE" POSTER PRESENTATION

Determination of Yield and Yield Components of Some Soybean (*Glycine max.* L) Varieties in the Conditions of Osmaniye Region

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**Abstract:** This study was carried out to determine yield and yield components of some soybean varieties, conducted with 3 replicates according to the Randomized Block Experimental Design, in the Osmaniye region in 2016 growing season. In this study, Blaze, Ataem-7, Bravo, İlksoy, Çetinbey, Nova, Atakişi, Cinsoy, Adasoy, Umut-2002, Türksoy, Arısoy, HA.16-21, SA-88 soybean varieties were used as material. Plant height, seed number per pod, first pod height, number of branches per plant, number of pods per node, number of pods per plant, harvest index, protein content, oil content, hundred seed weight, seed yield and fatty acid composition were examined in this study. The highest plant height obtained from HA.16-21 (101.83 cm); seed number per pod obtained from Blaze (2.21 units/pods) and Arısoy (2.19 units/pods). First pod height was the highest at Umut-2002 (22.53 cm); number of branches was highest at Nova (3.00 unit/plant) and number of pods per node was highest at Adasoy (4.81 units/node) soybean varieties; Adasoy soybean variety had the highest pods per plant (47.73 unit/plant); Çetinbey had the highest protein content (39.17%), Türksoy and Arısoy had the highest oil contents (19.82% and 19.73%). The highest 100 seed weight given by Çetinbey (19.18 g) and seed yield given by Adasoy (3280.03 kg/ha) soybean varieties.

**Key words:** Soybean, varieties, yield and yield components.
Changes in soil respiration, cellulase, betaglucosidase and soil carbon due to addition of wheat straw and cellulose degrading fungi of genus trichoderma

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Abstract: Due to the intensive soil exploitation and increased mineral fertilization, the degradation of plant residues in the soil is becoming more difficult and slower over the years. This disturbs the structure of the soil and the nutritional balance and leads to a reduction in soil fertility. To solve the problem, microorganisms capable of degrading plant residues in the soil can be used. The purpose of this study was to investigate the effect of seven isolates of fungi of genus Trichoderma on the biodegradation of wheat straw in the soil by observation of the change in cellulase enzyme activity in the soil and the increase in soil biological activity. The experiment was performed in growth chamber for 123 days and consisted of seven treatments: two controls - K1 - soil and K2 - wheat straw and soil; and soil with wheat straw inoculated with five isolates of Trichoderma - T6, T4, T2TUR, T1UKR and T1I. The sampling was performed at 24, 48, 72, 96, 144, 192, 240, 288, 336, 504, 624 and 2952 h. The highest basal soil respiration was noted at T2TUR (65.76 µgCO2) and T6 (53.69 µgCO2). During the entire straw degradation period, the highest endoglucanase activity was observed at T4 (285.0 µgGlu) and T6 (275.56 µgGlu), whereas the highest β-glucosidase was noted at T6 (5220.3 µgPNP/g/h) and T1UKR (5020.0 µgPNP/g/h). The presence of cellulose-degrading fungi positively affected the increase in the total amount of microbial biomass at the end of the study period, whereas the amount of Corg was increased in all straw amended variants. At the beginning of the process, carboxymethyl cellulase activity correlated with the microbial carbon (r=0.896 for Cmic) and β-glucosidase activity was closely connected with both soil organic carbon and microbial carbon (r=0.819 for Corg and r=0.866 for Cmic). At the end of the investigated period a stronger correlation with Corg was observed.

Key words: Trichoderma, soil respiration, endoglucanase, β-glucosidase, bioconversion of lignocellulose
Influence of sowing norms and fertilization on the productivity of triticale

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Abstract: The study was conducted in the experimental field of EK - Karnobat in the period 2015 - 2017, with the Respect variety, after the predecessor peas - sunflower mixture. The experience includes 20 variants - 5 sowing and 4 fertilizer norms. The results of previous studies on triticale (Tanchev et al., 1998, 1990, 1996, 2006) showing its superiority over traditionally growing crops - wheat and barley have prompted its in-depth study. The aim is to study the influence of sowing standards and fertilization on the productivity of triticale. In addition to the accepted optimal norm (500 hp), there are four more seeded norms - 550, 600, 650 and 700 hp. As a result of soil and phosphorus fertilization, unilateral nitrogen fertilization was applied to all sowing standards - N0 (without fertilizing), N4 (4kg of active nitrogen), N8 (8kg of active nitrogen), N12 (12kg of active nitrogen). Biometrics and yield from all experimental variants were analyzed. The saturation norms of triticale have been optimized for the various nitrogen fertilization options.

Key words: triticale, productivity, seed and fertilizer rate

Influence of the sowing norm and fertilization on the yield of grain of Kaloyan oat variety

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Abstract: The study was conducted in the experimental field of the IZ - Karnobat in the period 2015 - 2017. The soil type is a leavened reed. The subject of the survey is five sowing norms - 400, 450, 500, 550, 600 hp / m² and 4 fertilizer norms - N0 (without fertilizing), N4 (4kg of active nitrogen), N8 (8kg of active nitrogen) N12 (12kg of active nitrogen). The aim of our study is to establish the optimal sowing and fertilizing rate of Kaloyan oat variety.

Key words: oats, extraction, sowing and fertilizer
Phytosanitary monitoring of wheat crops in Bulgaria

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Abstract: Weed infestation, development of diseases and pests of the areas sown under wheat are ones of the main unfavourable factors that limit yield and quality. The aim of the study data was to identify the most common weeds, diseases and pests in crops of wheat in Bulgaria. In all explored regions of Bulgaria were found everywhere Cirsium arvense (L) Scop, Convolvulus arvensis L., Galium tricorne With, Sinapis arvensis L., Anthemis spp., Papaver phoeas L., Consolida orientaisl Schroding. In the wheat commercial fields in Bulgaria during the spring months were found four types of damaging aphids - Sitobion avenae, Schizaphis graminum, Rhopalosiphum maidis and Rhopalosiphum padi. The most damaging and wide spread in both years of monitoring is Sitobion avenae. The highest aphids number in the two years was reported in wheat fields of Southeast, North Central and Northeastern Bulgaria. Species composition of the most frequently occurring diseases in wheat was determined. Two groups of diseases were established: leaf-stem and seed borne. It was found that mainly occur were Erysiphe graminis f.sp.tritici, Puccinia recondida f.sp. tritici, Puccinia graminis and Septoria tritici.

Key words: wheat, weeds, disease, pests, phytosanitary monitoring

Phytosanitary monitoring of oats crops in south-east Bulgaria

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Abstract: In the present study are given the results of the monitoring of the weed infestation, development of diseases and pests in the oats crops. The aim of the study data was to identify the weed infestation, the development of diseases and pests. In the oats fields have registered a total of 28 weed species from 14 families. In all investigated fields are found everywhere Cirsium arvense (L) Scop, Convolvulus arvensis L., Sinapis arvensis L., Anthemis spp., Papaver phoeas L., Consolida orientaisl Schroding. It is deterinated six pests belonging to three orders: Hymenoptera, Hemiptera and Orthoptera. The representatives of the order Hemiptera are dominant. Of predators are found three species of three families - Coccinella septempunctata L. (Coccinellidae, Coleoptera), Chrysopa sp. (Chrysopidae, Neuroptera) and Syrphus sp. (Syrphidae, Diptera). Species composition of the most frequently occurring diseases in oats was determined. It was found that mainly occur were Puccinia coronata Kleb and Ustilago avenae (Persoon) Jensen.

Key words: oats, weeds, disease, pests, phytosanitary monitoring
Effect of Organic and Inorganic Fertilizers on Some Agronomic Characteristics of Orchis sancta L. cultivated in Field Conditions

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Abstract: The aromatic powder which is the main ingredient of traditional Turkish ice cream and salep drink is obtained from the tubers of wild salep orchids. It is reported that in our country, there are 38 different orchid species from 10 different genera. Despite the fact that nowadays the salep plants are protected by law, salep tubers under the ground are taken by collectors. All salep production is provided by removal of the tubers of the salep orchids from nature. 1000-4000 tubers are used for one kilogram of salep powder and it is assumed that our country produces 45 tons of saleps per year. Cultivation is required for plants with high demand for conservation and sustainable use of natural resources. Reduction of intensive collection pressure in natural population of Salep orchids can be solved by cultivation of these plants. This study was conducted in Aydin ecological condition to determine the effects of three different fertilizers (humic acid, barnyard manure and commercial fertilizer) on some agronomic characteristics of Orchis sancta L. which one of the most collected salep orchids in the Aegean region. In the experiment, effect of fertilizers were evaluated for the plant height (cm), number of tubers (number/plant), tuber diameter (mm), fresh tuber weight (g/plant), dry tuber weight (g/plant), fresh tuber yield (kg/da) and dry tuber yield (kg/da). According to the average of two year, the dry tuber yield values were found between 10.264-14.125 kg/da. The highest yield in the study was obtained with inorganic fertilizer application.

Key words: Sahlep orchid, Orchis sancta L., fertilizer, agronomy, yield
The Effect of Nitrogen Fertilizer on Some Quality Characteristics of Serapias vomeracea (Burm.Fill.) Brig. in field condition

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Abstract: Most salep tubers are obtained from of the orchid species. Salep is a name given to the tubers of the genus Orchis, Ophyris, Serapias, Platanthera, Dactylorhiza. Salep plant is native to western Asia. The plant contains two tubers. One of them is brown, small and wrinkled (main tuber). The other is larger, swelling and shiny, and used for the production of salep. Many endemic orchid species have been collected from nature for many years and now some salep species extinct others facing extinction. Orchid sancta L. and Serapias vomeracea (Burm.fill.) Brig. are most commonly collected species in the Aegean region. Although the collection of tubers and export are prohibited, salep is used extensively in the production of ice cream and salep drinks. This study was carried out to investigate the effect of different nitrogen fertilizer doses to some quality characteristics of Serapias vomeracea (Burm.fill.) Brig. species in field condition. In this study, Serapias vomeracea (Burm.fill.). Brig. was cultivated in the field for two years in the Aydın ecological conditions and starch content (), protein content (), dry matter content () values were investigated. Mucilage ratio was found between 17.6-21% for average of the two-year and the highest mucilage rate is obtained from 15 kg nitrogen fertilizer application.

Key words: Serapias vomeracea (Burm.fill.). Brig., Sahlep, cultivation, Nitrogen Fertilizer, Quality
Kneza 461 - A new maize hybrid from the middle early group

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Abstract: The article presents the biological and economic qualities of the new grain maize hybrid from middle early group. The hybrid is acknowledged in 2017, after three year testing in the territorial station of Executive Agency of Variety Testing, Field Inspection and Seed Control (EAVTFISC ) with standard American hybrid P 9494 and Knezha 435, a wide – spread in practice Bulgarian hybrid. During the period of testing under conditions without irrigation in the experimental field of the Institute of Maize the three year average of the new hybrid exceeded the standard P 9494 by 7.4 . In the ecological network of the country in 2011, under conditions without irrigation, the hybrid produced grain yield 1 above the Bulgarian standard. In EAVTFISC in conditions without irrigation by the average of four stations in 2016 exceed the standard P 9494 with 1 . The moisture contents in the harvesting time is near to that of P9494 and lower than the moisture of Knezha 435.

The new high – yielding and competitive hybrid Knezha 461 supplies deficiencies in the middle early group of Bulgarian hybrids, where the foreign ones take prevalence.

Key words: maize hybrids, maize lines, biological and economic qualities

Kneja 560 – a new mid-late maize hybrid,

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Abstract: The article presents a short characteristic of morphologic al, biological and economic qualities of a maize hybrid Kneja 560. The hybrid is a single cross, from mid-late group - FAO 500-599. It is recognized in 2017 by the Expert Commission of IASAS. At the points of ESO and IASAS it was compared with the American hybrid PR 35F 38 and the Bulgarian - Kneza 509. During the testing period in the experimental field of the Maize Research Institute (ESO) the three year average Kneja 560 exceeded the standard PR 35F38 by 12,6. In the IASAS system, the new hybrid exceeds the middle standard with 0.5 %. The hybrid is stress-tolerant and resistance of economically important diseases and pests of maize. With this high-yielding and competitive maize hybrid, the group of medium-late maize hybrids offered on the Bulgarian seed market is being filled. panicle, cob

Key words: maize, hybrid, standard, panicle, cob
Investigation of The Effects of Some Agricultural Fertilizers on Entomopathogenic Nematodes.

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Abstract: Entomopathogenic nematodes (EPNs) are used effectively in biological control, because of their virulence against soil dwelling insect pests, host seeking ability, long-term efficacy and being harmless to the environment and human health. EPNs spend most of their life cycle in the soil and cause their hosts to die by infecting them within a short period of 1-2 days. EPNs can also be applied simultaneously with some pesticides. Agricultural activities applied to the soil such as fertilization, tillage, spraying and irrigation affect the activity and vitality of EPNs. In agricultural areas, fertilizers are used intensively. Various environmental problems arise because of long-term and excessive use of inorganic fertilizers. Fertilization can affect the viability of EPNs substantially. There is an interaction between fertilizers and EPNs that share the same environment. In this study, it was aimed to determine the direct effect of fertilizers on EPNs. For this purpose, six inorganic fertilizers (NPK, NP, DAP, UREA, AN and AS) used intensively in agriculture and two strains of EPNs; Steinemema feltiae (Tur3) and Heterorhabditis bacteriophora (Hb.H), which is effective in biological control were selected. Three different dosages of fertilizers (1gr/L, 5gr/L and 10gr/L) were applied under laboratory condition and then examined over a period of ten days. It has been detected that S. feltiae (Tur3) is more resistant than H. bacteriophora (Hb.H) to inorganic fertilizers, but DAP, NPK and NP have adverse effects on both strains. The greatest lethal effect on them was shown by fertilizers containing P2O5 (DAP, NPK and NP).

Key words: Entomopathogenic nematodes, inorganic fertilizers, Steinernema feltiae, Heterorhabditis bacteriophora, nematode mortality
Sources of resistance in chickpea (Cicer arietinum L.) to ascochyta blight (Ascochyta rabiei)

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Abstract: Ascochyta blight is the major biotic stress that causes significant yield losses in chickpea (Cicer arietinum L.) all over the world. The disease is caused by the fungus Ascochyta rabiei (Pass.) Lab (telemorph Dydimella rabiei = Mycosphaerella rabiei (Kovachevski) v. Arx. The use of resistant cultivars is widely acknowledged as the most economic and environmentally friendly method for disease control. The aim of this study is to screen chickpea cultivars and lines for resistance to ascochyta blight with a view for using them in a breeding program. The investigations were carried out during 2012-2017 in DAI – General Toshevo. Twenty chickpea accessions were inoculated under field and greenhouse conditions with 30 Ascochyta rabiei isolates. Disease reaction was estimated after 14 days by using 9-degree scale. Disease incidence (DI) was calculated according to the Mc Kinney index. Cluster analysis was used to group the accessions and isolates according to the DI. Ten accessions showed middle resistance under field conditions during the three years of investigations. No immune or resistant accession to all 30 isolates was found under greenhouse conditions. The cluster analysis grouped the accessions into two major classes. One of classes consist two accessions (XOOC01CA049B0223D and XOOC01CA049B2140D) which showed middle resistance to 12 and 13 of the isolates, respectively. The cluster analysis grouped the isolates into 21 pathotypes (classes) according to their virulence to the 20 chickpea accessions. The highest virulence showed five isolates (AR 883, AR 061, AR R1, AR 1013, AR 1015) with DI from 5,40 to 9,00 in all accessions. Differences in field and greenhouse results were expected and they were due to the strong dependence of disease development to climatic conditions. The results in this investigation showed that two chickpea accessions can be used in a breeding program for ascochyta blight resistance.

Key words: Ascochyta blight, Chickpea, Resistance, Ascochyta rabiei, Cicer arietinum
The effect of Bacillus bacteria on soil biological activity and plant development

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Abstract: The aim of this study was to determine the rate of mineralization of organic matter (wheat straw and rape) in terms of increased numbers of bacteria of the genus Bacillus. In tests were used 5 different strains of the genus Bacillus. In the study were determined the rate of oxygen consumption using OxiTop Control (WTW), the activity of extracellular hydrolysis by measuring the released fluorescein and measuring the activity of cell dehydrogenases by measuring the rate of reduction of TTC to tri-formazane. In addition, we estimated the concentrations of ammonia nitrogen, nitrate nitrogen, orthophosphate and potassium in soil. The study showed a significant impact of Bacillus sp. strains on mineralization organic matter in soil.

Key words: Bacillus, PGPR

Hybrid Maize (Zea mays L.) Breeding With Doubled Haploid Lines: Hybrid Performance in Bursa Condition

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Abstract: The new phenomenon in maize breeding is called the double haploid technique, and the offspring of these plants are called double haploid lines (DHL). This technique is prevalent throughout the world and is being applied by maize breeders. Today, many private Turkish breeding firms and institutes use this method. This research was conducted at the breeding station of the Turkish breeding company Agromar A.Ş in the city of Bursa in Turkey during the 2015 growing season. The crosses were performed from four doubled line (as a female) and three testers (as a male) using by line testers.12 test crosses were evaluated with three check for their yield performance. Test crosses and check hybrids have been planted in 2015 according to randomized complete block design with three replicated. There is highly differences among hybrids. As a result, the average yield is 15280 kg ha⁻¹. Check hybrids mean is 18770 kg ha⁻¹, it indicates that check hybrids mean is higher then average yield of trial. Test crosses performance is lower than check. The highest test cross performance is 16830 kg ha⁻¹.

Key words: Maize, double haploid, line tester, yield and yield components
Yield and Agro-morphological Character Affected by Temperature and Rainfall During Various Growth Stages in Two Rowed Barley (*Hordeum vulgare* L.)

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**Abstract:** Because of the various environmental conditions biotic and abiotic stress factors varies and may cause reduction in yield and quality in barley. Temperature and rainfall are the mainly abiotic environmental factors may influence barley production in Trakya region, Turkey. This research was carried out to investigate effect of the temperature, rainfall and humidity from Z31 to Z89 growth stage, on yield, quality and leaf disease in two rowed barley cultivar. This research was established with 25 genotypes in randomize complete block design with 4 replications in Edirne locations, from 2007 to 2016 growing seasons. From the experiment one two roved barley cultivar was selected and evaluated based on yield, 1000-kernel weight, test weight, protein ratio, plant height, days of heading, net blotch and leaf rust. According to results there were various relations among investigated parameters and years. Mean grain yield ranged from 509.1 kg da⁻¹ in 2016 to 848.9 kg da⁻¹ in 2008 year. The year 2014 was very favourable for higher grain yield, TKW and TW, and year 2008 for higher protein ratio (%13.9). The lowest infection of leaf rust and net blotch occurred in 2007, 2010 and 2012 growing year. The rainfall during Z51-75 and Z77-89 growth stage had positively effect and slightly increased grain yield. TKW and TW were negatively affected by increasing rainfall during Z31-49 and Z51-75 growth stage. The higher rainfall during Z31-49 (at shooting and booting) and Z77-89 (during grain filling) growth stage caused increasing infection of net blotch and leaf rust. Mean temperature at Z51-75 and Z77-89 and maximum temperature during Z51-75 was positively affected grain yield. TKW was negatively affected by increasing in maximum temperature during Z31-49, Z51-75, and Z77-89 growth stage. Mean temperature during Z77-89 growth stage had slightly effect and increased 1000-kernel weight and test weight. There was negatively relation between maximum temperature with test weight during Z31-49 (r=-0.221), Z51-75 (r=-0.678*), and Z77-89 (r=-0.441) growth stage. Increasing in maximum temperature during Z51-75 was positively affected protein ratio. Temperature, rainfall and humidity had various effect on yield and other parameters. A better understanding of yield development and the influence of specific environmental variables on barley program is required to minimize the effects of environment on yield and quality.

**Key words:** Barley, temperature, rainfall, yield, agro-morphological characters
Effect of meta-Topolin on *in vitro* growth of *Magnolia grandiflora* L. and *Magnolia x soulangiana* Soul.-Bod.

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**Abstract:** *Magnolia* genus is the largest one in the family *Magnoliaceae*. It comprises 53 species, almost all of them being valuable ornamentals for their showy flowers and foliage. Besides, it is also grown for its timber and its leaves, fruits, bark yield a variety of extracts with potential applications as pharmaceuticals. *Magnolia* is traditionally propagated by seeds, rooted stem cuttings, layering, grafting and budding. Meanwhile, plants raised from seeds have a considerable variation and take a longer time to attain flowering age. *Magnolia x soulangiana* is a triploid or aneuploid forms are usually completely sterile. Vegetative methods could face some difficulties in root formation, transplanting and overwintering of the cuttings. Micropropagation can be a solution for these problems and gives the opportunity for mass production of good quality true- to-type plants. The most used cytokinin in micropropagation is benzylaminopurine (BAP) but sometimes it causes some physiological disorders (e.g. hyperhydricity) or inhibits rooting. To overcome some disadvantages of BAP, a new family of endogenous aromatic cytokinins, structure analogues of BAP, named meta-topolin (mT), has recently started to be used. In the present study, the influence of mT and BA on multiplication of two magnolia species - *Magnolia grandiflora* L. and *Magnolia x soulangiana* Soul.-Bod) was evaluated. Different cultural media based on both MS (Murashige and Skoog, 1962) or DKW (Driver and Kuniyuki, 1984), supplemented with cytokinins BAP or mT (0 µM; 2.5 µM; 4 µM; 5.5 µM; 7 µM; 8.5 µM) were studied. Data on in vitro plants growth, mean number of shoots per plant, length of shoots and fresh and dry weight were recorded. The best multiplication rate for *Magnolia grandiflora* L. was achieved on DKW media enriched with 7 µM mT. The results obtained from this investigation showed that mT could be a good alternative to BAP in micropropagation of *Magnolia*.

**Key words:** micropropagation, in vitro, nutrient medium, tissue culture, multiplication
Identification of initial material for cold resistance in garden pea
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Abstract: The purpose of the present investigation is to study and identify an initial garden pea material for cold resistance. The study was conducted in the experimental plot of the Maritsa Vegetable Crop Research Institute-Plovdiv, Bulgaria with six garden pea accessions with autumn and spring sowing and two norm of sowing. Garden pea materials with autumn sowing enter earlier of 8 to 16 days in the technological maturity than spring sowing and provide optimal productivity at a higher sowing norm. Three varieties were characterized by a higher degree of cold-resistance (the number of surviving plants in percentage to germinated plants before winter) in the two norms of sowing. They represent the three groups of maturity - early, mid-early and late, and confirm the results of the analysis of the variability factors for the insignificant influence of genotype in the experience. Conditions in the years of experience are a determining factor in the variability of survival and cold-resistance indicators. The middle-early variety Plovdiv was characterized by a high degree of cold resistance and optimum productivity of green pods and green grain in autumn sowing with an increased sowing norm. Garden peas could be grown in our country with autumn sowing, but in adverse climatic conditions the seed are at risk and this requires breeding in that direction.

Key words: Pisum sativum, cold stress, breeding, degree of cold-resistance, varieties

Effect of silicon on photosynthetic rate and the parameters of the chlorophyll fluorescence in hydroponically grown cucumber plants under salinity stress

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Abstract: The aim of the study was to evaluate the effect of silicon on the photosynthetic rate and the parameters of the chlorophyll fluorescence of young hydroponically grown cucumber plants (Cucumis sativus L.). cv. Gergana under salinity stress. The experiment was conducted in a climatic chamber at the Dept. of Plant Physiology and biochemistry, Agricultural University – Plovdiv. Four treatments consisting of a control, NaCl, Si and NaCl + Si were investigated. Plants were grown in a nutrient solution and treated with 50 mM NaCl and 1.5 mM Si in form of Na$_2$SiO$_3$. The results show decrease in the rate of photosynthesis in the leaves of the NaCl treated plants. Salinity has a negative effect also on the parameters of the chlorophyll fluorescence and the content of the photosynthetic pigments. It is established that the silicon supply has a beneficial influence on the photosynthetic rate, the parameters of the chlorophyll fluorescence and the pigment content of the treated cucumber plants.

Key words: chlorophyll fluorescence, cucumber, photosynthesis, salinity, stress
Productivity and adaptability of new genotypes chickpea (Cicer arietinum L.) cultivated under environmental conditions of Southern Romania

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Abstract: The study related the yield performances of 12 chickpea varieties, based on the results obtained in three years of yield trials (2015-2017), performed at ARDS Teleorman, Romania. Average yield over three years shown that lines N 326/010, N 462/010, N 279/09, N 294/09, N 472/010, N 460/010/1 and N 1200/06 was achieved the highest yield levels compared with control or average of the genotypes. Yields stability was estimated by coefficient of variability. Results obtained in this study suggest that in this region, the new chickpea genotypes will be a good choice to be spread into production.

Key words: chickpea, genotypes, yield, variability coefficient, elements of productivity

Behavior Of Some Autumn Barley Varieties Under Climatic Conditions Of Ards Teleorman

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Abstract: Research conducted in the period 2014-2017 were order to know the performance and stability of the production Romanian barley varieties tested in the climatic conditions of the S.C.D.A. Teleorman. During this period, the agricultural years differentiated from the meteorological point of view, thus having the possibility of studying the characters under different conditions. Average barley yields during the analyzed period were 5598 kg / ha (Dana) and 7048 kg / ha (Andreea). For the conditions in the southern area, it is recommended to cultivate the Andreea, Cardinal and Dana varieties, which during the three years of testing showed high productivity and higher production stability (CV), highlighted during the experimentation period.

Key words: barley, adaptability, productivity, coefficient of variation
Behavior Of The Variety Cotton Dorina In The Conditions Of South Of Romania Comparative To Other Cotton Varieties

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Abstract: The variety Dorina was registered in 2010 and represents a novelty in cotton breeding as regards its quality. The variety Dorina combines the fiber length with fiber content in crude cotton. As refers to fiber content in crude cotton, the variety Dorina is a very good one, exceeding significantly the checks Cirpan 539 and Avangard-264. The quality fiber is also superior. The quality indices were determined with automatic equipment HVI and AFIS. As viewpoint of both crude cotton and cotton for fiber yields: this variety exceeds the checks Cirpan 539 with 2,0-4,8.

Key words: cotton, quality, production, fiber

Seed Dormancy in Vegetables Crops

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Abstract: Seed dormancy is an ordinary phenomenon that blocks or delays seed germination of number of species. Mainly in vegetables, seed dormancy can be a crucial problem related to seed production and seed quality. Seed dormancy can be caused by several different factors; such as external or internal factors and unfavorable environmental conditions. These main categories can be recognized as primary dormancy and secondary dormancy. It is very important to understand dormancy mechanism of plants in order to alleviate it. There are different methods to overcome seed dormancy and promote seed germination. The seeds are subjected to different pre-sowing treatments such as scarification, stratification and after ripening. Besides these applications, gibberellic acid, ethylene or light can be used to stimulate seed germination and to release seed dormancy. This presentation will categorize the major types of seed dormancy occurs in vegetables and describe some applicable examples of overcoming methods for seed dormancy.

Key words: Dormancy breaking, ethylene, gibberellic acid, scarification, seed germination stratification
EARLY PERFORMANCE OF TWO SOUR CHERRY CULTIVARS GRAFTED ON CLONAL ROOTSTOCKS

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Abstract: The growth-development performances and fruit quality characteristics of two sour cherry cultivars grafted on clonal rootstocks were investigated in this study. The experiment was performed in Uludağ University Faculty of Agriculture at Bursa, Turkey. Montmorency cultivar grafted on CAB 6P and PHL-C rootstocks and Early Richmond cultivar grafted on Piku 3 and MaxMa 14 rootstocks were used. The results showed that rootstocks were effective in vigour of the Montmorency cultivar whereas there were no differences in Early Richmond cultivar. The fruit weight, fruit size, double fruit ratio and yield were found higher on CAB 6P rootstock than PHLC rootstock for Montmorency cultivar. As a result, when all parameters evaluated for two years, CAB 6P rootstock showed better performance than PHLC rootstock for Montmorency cultivar while there was no significant differences among rootstocks for Early Richmond cultivar.

Key words: Prunus cerasus, clonal rootstocks, growth performance, productivity

PRELIMINARY RESULTS OF NEW FLAT PEACH (P. persica var. platycarpa) AND NECTARINE (P. persica var. nucipersica) CULTIVARS

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Abstract: First results of the 11 flat peach and 3 flat nectarine grafted on GF 677 grown in Bursa, Turkey are reported. Phenological traits included bloom and harvest dates, leaf curl and powdery mildew rate, while quality traits encompassed fruit size, weight, firmness, soluble solids concentration (SSC), titratable acidity (TA) and ripeness index. The result showed that, Plane Ring, Plane Super, Platerina 126 and Plane 222 were the earliest blooming cultivars, while Plane Silver was the latest blooming cultivars. Also Plane Silver which the longest blooming time among the cultivars. Because of spring late frost which happened in blooming and fruit set stages, it has not been obtained fruit from some cultivars. Most varieties had sweet taste, low titratable acidity (less than 0.4 g/100 ml) and very high sugar content (soluble solids content of 13.16-18.96 °Brix). SSC value was found higher on flat nectarines and the highest value was obtained Platerina 126 (18.96 °Brix) cultivars while the lowest value was obtained Plan Ring (13.16 °Brix). The Plane Gem cultivar had lower acidity and very high-quality tasting fruit (high SSC/TA ratio). Plane Silver had a high calibre fruit and weight (116.76 g), high firmness (6.71 kg/cm2), high ripeness index (76.71%) and high quality taste.

Key words: peach, flat nectarine, phenological characters, pomological characters
Study on the ecological stability and plasticity of maize hybrids in different groups of ripeness
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Abstract: It was evaluated ecological stability and plasticity of maize hybrids in different groups of ripeness Knezha 307, Knezha 435, Knezha 509 and Kneza 625M by the traits grain yield and length of the ear. The ecological parameters are determined by using the method of Eberhart and Russell (1966). In the period of study (2014 – 2017) the hybrids demonstrate different plasticity and stability by the examined traits. The hybrids Knezha 307 and Knezha 509 demonstrate lack of stability and are plastic towards better growth conditions. Knezha 435 and Knezha 625M are stable at yield. High stability of the trait ear length demonstrate the hybrids Knezha 435 and Knezha 509. Responsive to the environmental changes under this trait are Knezha M625 and Knezha 307.

Key words: Key words: hybrids, ecological stability and plasticity, traits

Seed Production in Turkey
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Abstract: Seed production is one of the most important inputs in agricultural production to get better quality food. Therefore, most countries around the world give significant importance to international seed trade. Turkey has been taking place in global seed market for long years. Turkish seed sector has also been remarkably growing after a number of legal regulations since 1980s. According to International Seed Federation (ISF), the world seed market is approximately 40 billion US Dollars. While seed imports of Turkey were 167 million US Dollars, seed exports of Turkey were 81 million US Dollars in 2016. Within world seed market, seed import and export values of Turkey approximately 1.5, respectively. Besides, seed production amount of Turkey is 325.013 tonnes in 2007 and has reached 957.925 tonnes in 2016. During last ten years, there has been a rapid increase in seed production and private seed sector provides 100% production of many crops. The aim of this report is to focus on Turkish seed sector by summarizing seed production and trade values of Turkey within global seed market.

Key words: Seed export and import, seed industry, seed production, seed trade
Seed Coating Technologies in Vegetable Crops

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Abstract: The first step of plant production is seed germination and seedling emergence. One of the major factors of determining crop yield and quality in vegetable production is to know the most suitable seed sowing and planting methods. For this reason, coating technologies have been used in seed sector since the beginning of 1940s and the importance of these technologies have been increasing significantly in recent years. Seed coating technologies consist of three main treatments; film coating, pelleting, and both film coating and pelleting. In coating industries, the seeds are coated with colored organic or inorganic substances and chemical materials which make seed sowing easier and can enhance seed germination capacity. In addition, seed coating methods provide many advantages such as faster seed germination, improved seedling emergence, uniformity, overcoming unsuitable environmental conditions, and controlling pest and diseases in small-scaled vegetable seeds like carrot, onion, lettuce, celery and parsley. Therefore, seed coating has been become an important practice in seed technology. The aim of this presentation is to give specific details about the usage and benefits of seed coating technologies in commercial vegetable production.

Key words: Enhancement treatments, film coating, pelleting, vegetable seed
Recognition Pine marten (Martes martes) from Stone marten (Martes foina) using camera traps

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Abstract: Based on 280 photos a noninvasive method for determining the Pine marten and Stone marten by camera trapping was performed. Sloping trees (similar to Leaning-Pole or Running-Pole) were used as a route for animals to pass with a purpose to be photographed. Honey and distal part of bird wings were used as a lure. The camera was set to capture the climbing animal laterally. The coat coloration and marking patterns which are proper species indicators were clearly visible in daily photos. The night photos showed the differences in body proportion but not these in throat patch coloration. Profile photographing also allows an individual determination of the stone marten and pine marten based on the shape and area of the throat patch.

Key words: morphological criteria, distinguish, bites, throat patch

Refractometric Detection Of Vegetable Product Used For Production Of Milk Products In Cow Fat, Extracted By Gerber Butyrometer Method

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Abstract: In this study is presented a new methodology which determines adulterations with vegetable product used for production of milk products by detecting of refractive index (refractive number) from cow fats, extracted by Gerber butyrometer method. Further investigations in certified laboratories are required to confirm results and to evaluate the repeatability and reproducibility of the method.

Key words: refraction, detection, vegetable product, cow milk
Refractometric Detection Of Vegetable Product Used For Production Of Milk Products In Cow Fat, Extracted By The Method Of Roese-Gottlieb

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³Laboratory for VSE at „Biopharm engineering”AD, 8800 Sliven, Bulgaria

Abstract: In this study is presented a new methodology which determines adulterations with vegetable product used for production of milk products by detecting of refractive index (refractive number) from cow fats, extracted by the method of Roese-Gottlieb. Further investigations in other certified laboratories are required to confirm results and to evaluate the repeatability and reproducibility of the method.

Key words: refraction, detection, vegetable product, cow milk

Determination Of Agricultural Characteristics of Sugar Factory Waste Products

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Abstract: In this study, chemical and physical properties of sugar factory waste (sugar beet seed wastes) were determined. The following properties were analyzed: pH, EC, organic matter, C:N ratio, total concentrations of N, P, K, Ca, Mg, Fe, Mn and and heavy metals (Cd, Cr, Ni, Pb, Cu, Zn). The EC values of waste material was 8,96-10,25 dS m⁻¹. pH value varied from 4,96 to 7,30. Organic matter content was changed between 86,54 and 89,02. Waste material contains different quantities plant nutrients. The physicochemical characterization is important when planning the use and management of organic waste. Heavy metal concentrations of seed waste were below the regulatory limits of Turkey and European Union. When the waste material is composted, quality compost can be obtained for agricultural usage.

Key words: sugar beet seed, waste, compost, heavy metal
Allelopathic effect of six genotypes of Sorghum sudanense (Piper.) Stapf. on the germination and initial development of Lactuca sativa

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Abstract: Aim of this study was to evaluate the allelopathic effect of cold aqueous extracts of dry biomass of Sorghum sudanense (Piper.) Stapf. on the test-plant Lactuca sativa L. Six genotypes of Sorghum sudanense (Piper.) Stapf. (Endje-1-BG, Kazitachi-Japan, M300/43-BG, M200/86-BG, Vercors-USA, and Zemljachka-Russia) were studied in order to compare their allelopathic activity. Ex-situ experiment was carried out as follows: 10 seeds of test plant were put in Petri dishes between filter paper, cold extracts of dry biomass in concentrations 0.1, 0.2, 0.4, 0.8 and 1.6 % w/v were pipetted at a ratio of 1:20 as against the seed mass and then were placed in a thermostat-operated device at a temperature of 22 ± 2°C. Distilled water was used as a control. Some qualitative and biometric parameters were measured after 7 days period – number of germinated seeds, % of germination, length of the seedling (mm) and fresh biomass of the seedling (g). Percentage inhibition (IR), Index of plant development (GI), Growth rate and Biomass accumulation (μ), Seedling vigor index (SVI) were calculated for assessment of the allelopathic effect of S. sudanense on the early seedling growth, biomass synthesis and initial development of test plant. Highest IR values (>45% inhibition) were found for genotype Zemljachka, medium (30%<IR<45%) – for Kazitachi-Japan and M200/86-BG, and the rest three genotypes were with low values (IR<30%). According to the GI, strongest inhibition was proved for genotype M200/86-BG, followed by Vercors-USA, and the stimulatory effect on the test plant development was observed only by the genotype M300/43-BG. Data for the SVI revealed that the genotype M200/86-BG exerted significant inhibitory effect in all studied concentration, while the other genotypes were toxic only in highest doses. Our study confirms the effectiveness of such type ex-situ experiments in the assessment and selection of allelopathic plant species, both with their practical application in the organic farming.

Key words: allelopathy, Sorghum sudanense, Lactuca sativa, germination, initial development
Chemical Composition and Bioactive Lipids of Aquaculture Black Mussel from the North Bulgarian Coast

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Abstract: Black mussel (Mytilus galloprovincialis) is the most important marine aquaculture species in Bulgaria. The aim of this study was to determine proximate composition, lipid classes and bioactive lipid components such as fatty acids, cholesterol, fat-soluble vitamins (A, E and D3), carotenoids (astaxanthin, beta-carotene) and essential elements in market ready mussels from the northern part of the Bulgarian Black Sea coast. Proximate composition (moisture, crude protein and total lipid) was determined using standard procedures. Lipids were extracted from mussel tissue by solvent extraction and purified by chromatographic techniques. Gas chromatography–mass spectrometry (GC-MS) was used for the analysis of fatty acid composition of phospholipid and neutral lipid fractions. The non-saponifiable lipids were identified by high-performance liquid chromatography (HPLC) with ultraviolet (UV) and fluorescence (FL) detectors. Essential elements such as Zn, Fe, Mn, Cr and Cu were determined by using optical emission spectrometry with inductively coupled plasma (ICP-OES) after microwave digestion procedure. Analyzed samples were characterized by high protein (19.9 g.100g⁻¹) and low carbohydrate (2.25 g.100g⁻¹) and lipid (2.34 g.100g⁻¹) content. Triacylglycerols (TAG) and phospholipids (PL) represented 33.8±2.9 of total lipid fraction, respectively. There were significant differences among fatty acids profiles of TAG and PL. In both fractions the sum of saturated fatty acids (SFA) was higher than monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA). Despite that, phospholipid PUFAs consisted almost exclusively of EPA (eicosopentaenoic acid, C20:5n-3) and DHA (docosahexaenoic acid, C22:6n-3). Together, these two fatty acids represented 65.7 of PL PUFA. Lipid fractions presented nutritionally beneficial n-6/n-3 ratio – 0.10 for total lipids, 0.16 for TAG and 0.13 for PLs, respectively. Although their total lipid content is low, mussel meat showed appreciable amounts of unsaturated fatty acids. Results from the analysis of retinol, alpha-tocopherol, cholecalciferol, astaxanthin, beta-carotene and cholesterol content showed that aquaculture Mytilus galloprovincialis could be a good source of these biologically active compounds. Concentration of retinol was 49.1 μg.100g⁻¹ wet weight (ww), α-tocopherol – 146.2 μg.100g⁻¹ ww, cholecalciferol – 40.9 μg.100g⁻¹ ww, astaxanthin – 841.1 μg.100g⁻¹ ww, beta-carotene – 315.5 μg.100g⁻¹ ww. Cholesterol content in 100 grams of wet weight was 37.8 mg. Concentration of the analyzed essential elements in mg/kg wet weight, were 0.382 for Cr, 2.25 for Cu, 103.8 for Fe, 3.143 for Mn, and 19.03 for Zn. Estimated Target Hazard Quotients (THQs) (< 1) and Hazard Index for individual elements showed that there were no potential human health risks to the Bulgarian consumers of the mussels. Shellfish is considered as inexpensive food, low in calories and high in nutrients. Results of the present study confirmed the high nutritional quality of mussel meat. It could be a valuable source of essential nutrients such as proteins, vitamin D3, phospholipids, very-long chain omega-3 PUFAs and essential elements.

Key words: Mytilus galloprovincialis, proximate composition, lipid composition, essential elements, nutrition quality
Study on the attitude of adolescents towards the management of food wastes

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Abstract: In the 21st century, with the advance of the economy, surpluses of food products treated as waste are emerging. The material aims to trace the environmental attitude towards food and nutritional resources in adolescents of different age groups and social strata, and to find solutions to reduce food waste through responsible environmental considerations. It monitors trends in family-friendly, school-friendly and circular behavioral.

Key words: ecology, food waste, environmental education, sociology
Proximate Composition, Lipid Quality and Heavy Metals Content in the muscle Tissue of Two Carp Species

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Abstract: Freshwater common carp (Cyprinus carpio) and bighead carp (Aristichthys nobilis) are commonly consumed in Bulgaria. These species are valuable sources of proteins, biologically active lipids and contain low levels of cholesterol and heavy metals. The aim of presented study was to characterize quality of edible tissue of common carp and bighead carp, based on their proximate and lipid composition (lipid classes, fatty acid profile, fat soluble vitamins, carotenoids and cholesterol). Health risk assessment was evaluated based on the analysis of some toxic elements (As, Cd, Ni, Pb and total Hg). Proximate composition (moisture, crude protein and total lipid) was determined using standard procedures. Lipids were subsequently separated into neutral (NL) and polar lipids: phospho- (PL) and glycolipids (GL) by means of column and thin-layer chromatography. To identify and quantify the fatty acids, lipid classes were derivatized into fatty acid methyl esters (FAMEs) which were analysed by gas chromatography–mass spectrometry (GC-MS). Vitamins A, D3 and E, beta-carotene, astaxanthin and cholesterol were analysed simultaneously using high performance liquid chromatography (HPLC) with ultraviolet and fluorescence (for vitamin A and E) detectors. Heavy metals such as As, Pb, Cd, Hg and Ni were determined by using optical emission spectrometry with inductively coupled plasma (ICP-OES) after microwave digestion procedure. Protein content was higher in bighead carp (18.5), whereas lipid content showed opposite trend. Similarity in lipid classes distribution were observed for both species: NL>GL>PL. Neutral lipids constituted approximately 70% of TL in both species, as FAs profile was dominated by monounsaturated fatty acids (MUFA), whereas polyunsaturated FAs (PUFA) prevailed in polar fractions. Palmitic (C16:0), oleic (C18:1n-9), eicosapentaenoic (C20:5 n-3) and docosahexaenoic (C22:6 n-3) acids were the main FAs found in all classes of both carp species. Omega-3 PUFAs were higher in all lipid classes compared to omega-6 PUFAs. Cholesterol contents was lower (17-24mg/100gww) than recommended amounts in both species. Astaxanthin was detected only in bighead carp tissue, whereas beta-carotene, vitamin D3 and vitamin A showed similar concentrations in both samples. Vitamin E content was two-fold higher in bighead carp (10.4 mg/100gww) compared to common carp (5.52mg/100g ww). Trace elements content was higher in bighead carp showing a maximum value of As (0.312 mg/kg w.w). All determined toxic elements (Pb, Cd, Hg and Ni) were found below recommended value in carp muscle. Calculated Target Hazard Quotients (THQs) for each toxic element (<1) and Hazard Index showed that there is no possible health risk to consumers. Results of the present study confirmed the high quality and safety of common carp and bighead carp meat. These freshwater species are valuable sources of essential nutrients as proteins, vitamin D3 and long chain omega-3 PUFAs. Together with the nutrients, the information for low concentrations of toxic elements makes them valuable components of a healthy human diet.

Key words: Common carp, bighead carp, proximate composition, lipid composition, essential elements, nutrition quality, health risk assessment
Colour and Rehydration Properties of Bay Leaves Dried by Convective and Microwave Methods

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Abstract: This study aims to evaluate the effect of the convective and microwave drying methods on the colour parameters ($L^*$, $a^*$, $b^*$, $C$, $\alpha$ and $\Delta E$) and rehydration ratio of bay leaves. Drying experiments were conducted using 360 and 450 W of microwave powers and air temperatures of 50, 60 and 70 °C. Different microwave powers show significant effect on colour of dried bay leaves and $a^*$ (redness/greenness) values increased whereas $L^*$ (lightness), $b^*$ (yellowness/blueness), $C$ (chroma), $\alpha$ (hue angle) and $\Delta E$ (total colour changes) decreased with an increase power. For the convective drying, although there are changes values of colour parameters ($L^*$, $a^*$, $b^*$ $C$ and $\alpha$), there is no significant differences value of total color changes statistically ($P>0.05$). The effect of air temperature and microwave power levels on rehydration characteristics was determined. The rehydration ratio values were found to decrease with an increasing temperature and decreasing power levels. The highest rehydration ratio was recorded for the samples dried at 350 W and lowest at 70 °C. Microwave energy may be an feasible drying method, an alternative to conventional sun or hot air drying, with which to obtain dried bay leaves with good colour and rehydration.

Key words: Bay leaves, colour, convective drying, microwave drying, rehydration ratio.
Bioaccumulation of polyaromatic hydrocarbons (PAHs) and cadmium (Cd) and its negative effects on zebra mussel (Dreissena polymorpha Pallas, 1771)

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Abstract: Cadmium (Cd) is non-essential and one of the most toxic metals which poses a serious threat to aquatic organisms (MCGEER et al., 2011) because of its persistent nature and slow elimination from the environmental compartments (SANDHU et al., 2014). Polycyclic aromatic hydrocarbons (PAHs) are known to result from the incomplete combustion of organic matter, especially fossil fuels (pyrolytic origin), from the discharge of petroleum and its products (petrogenic origin), as well as from the post-depositional transformation of biogenic precursors (diagenetic origin). Under this consideration, the United States Environmental Protection Agency (USEPA) classified 16 of them as priority pollutants (QIAO et al. 2006). This study was designed to examine the possible negative effects which cadmium (Cd) and polyaromatic hydrocarbons (PAHs, mixture of 16 organic substances) could have on the lysosomal membrane stability in haemocytes of the invasive mollusk zebra mussel (Dreissena polymorpha) by applying the neutral red retention assay (NRRA). The mussels were exposed to different decreasing (average annual concentration according to the Bulgarian law, AAC; 50 below MAC) of Cd and PAHs in laboratory conditions for 96 hours (acute exposure) and 31 days (chronic exposure). Samples were taken on the 24th, 48th, 72nd and 96th hour of exposure. These toxicants are considered as priority substances in surface waters according to Directive 2008/105/EC. In addition, we aimed to determine the levels of bioaccumulation of PAHs and Cd in the gills of zebra mussels by applying chemistry analysis and also link these levels to the observed cellular alterations. We found lysosomal membrane destabilization in all mussels treated with Cd and PAHs, including the concentrations which were lower than the allowable ones. In addition, we determined lower retention time in the mussels treated with Cd compared to PAHs, although no significant differences were overall proved (p>0.05). In terms of bioaccumulation, higher concentrations of bioaccumulated PAHs and Cd were determined in the samples treated with higher toxicant concentrations. Their levels of bioaccumulation were higher after 31 days of exposure compared to 96 h. Moreover, the organic substances which showed higher bioaccumulated levels in both, short and long term experiment were phenantrene, benzo[b]fluoranthene and naphthalene. Overall, the results confirmed that the neutral red retention assay could be used a cheap, fast and reliable biomarker for Cd and PAHs effects on freshwater mollusks, and zebra mussel could be suggested as a freshwater bioindicator for water contamination. The results also confirmed the high bioaccumulation potential of PAHs and Cd in biota, and their negative effects respectively. We suggest that further investigation is required in order to better understand the negative effects of PAHs and Cd on this particular bivalve species.

Key words: water pollution, zebra mussel, neutral red
Karyological and morphological variations within Petrosimonia brachiata Bunge in Bulgaria

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Abstract: The karyological and morphological variability of the only representative of genus Petrosimonia Bunge (Chenopodiaceae) in Bulgaria were studied and the current state of the species' populations were evaluated. The results demonstrated that Bulgarian populations of Petrosimonia brachiata Bunge have diploid chromosome number 2n = 16. In population from the Pomorie lake the karyotype consists of 6 pairs of metacentric and 2 pair of sub-metacentric chromosomes and in population from the Atanasovsko lake satellites were seen on one pair of submetacentric chromosomes. The results from statistical analysis demonstrated that the main source of phenotype variation in the species is the intrapopulation one. Vegetative traits are more variable than generative ones. Significant variability in studied quantitative characteristics and pollen morphology has not been found. The status of the two populations of P. brachiata, given the annual biological type of the species and its limited distribution in Bulgaria, could not be regarded as stable and a potential threat for them in the future is not excluded.

Key words: Petrosimonia brachiata; karyotype; chromosome number; morphology; chorology

Antibacterial activity of methanol and water extracts from different plant parts of Stevia rebaudiana grown in Bulgaria

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Abstract: The purpose of the study is to evaluate the antimicrobial activities of extracts from different plant parts of Stevia rebaudiana (Asteraceae) grown in Bulgaria. Methods: Solvent extracts (methanol and water) of Stevia rebaudiana’s blossoms, leaves, stem, root and tubers were investigated against Staphylococcus aureus, Escherichia coli and Bacillus subtilis, by using agar well diffusion method. As positive control gentamycin (12.5 µg/ml) was used. Results: Among the two solvents tested, only leaves and blossoms methanol extracts had effective antibacterial potential against Gram positive bacteria (S. aureus and B. cereus), with MICs for S. aureus extracts 16 mg/ml for leaves and 8 mg/ml for blossoms, respectively. One of the three leaves water extracts investigated demonstrated antibacterial activity against S. aureus and B. cereus at high concentration (270 mg/ml). The different extracts variations did not have any activity against Gram negative bacteria (E. coli).

Key words: Stevia rebaudiana, antibacterial activity, plant extracts
DETERMINATION OF SOME KINETIC AND THERMODYNAMIC PARAMETERS OF CATALASE ENZYME IN SOILS

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Abstract: Numerous studies have been carried out on the kinetics of enzymatic processes of soils. In these studies, the kinetic parameters \( V_{\text{max}} \) and \( V_{\text{max}} \) are determined using the Michaelis-Menten equation. Here, as the value of the reaction rate, either the enzyme activity values of the reaction, or (very rarely) the initial velocity values over a short period of time from the start of the reaction, are usually used. In the latter case, a graphical method is often used. In contrast to these studies, we used analytical methods to determine the initial rate of the enzymatic reaction. Further, based on these values, analytical methods are also used to determine the kinetic parameters \( V_{\text{max}} \) and \( V_{\text{max}} \). Calculations are made for determining the values of the initial velocity and kinetic parameters of the enzyme catalase in the soil. To understand the mechanism of action of soil enzymes, in particular when identifying the causes of their high activity and specificity, it is necessary to study the values of enthalpy, entropy and free energy. We also calculated the values of these thermodynamic parameters from the kinetic parameters. The importance of finding these thermodynamic parameters lies in the fact that they are determined by the specific molecular forces of the formation and decomposition of enzyme-substrate complexes (ESC).

In the studied soil for the catalase reaction, the changes in \( \Delta H \) and \( \Delta S \) in the formation of ESC are positive values, and, consequently, the formation of ESC is endothermic (\( \Delta H > 0 \)) and is accompanied by a marked loosening of the active center structure or by dehydration (\( \Delta S > 0 \)). As the temperature increases, the endothermal energy increases, i.e. more heat is absorbed, and as a result, the structure of the active center is loosened more intensively. All this leads to the fact that as the temperature rises, the potential activity of the enzyme increases to a certain level. Thus, the kinetic and thermodynamic parameters obtained provide useful information on the nature, direction and intensity of enzymatic reactions in soils and are one of the main diagnostic indicators of soils.

Key words: soil, enzymatic processes, catalase, kinetic and thermodynamic parameters
Determination of People’s Consciousness on Collecting Vegetable Waste Oils in Bursa, Turkey

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Abstract: The amount of vegetable waste oil has been increased by increasing the world population. Vegetable waste oils are hazardous wastes and cause negative effects such as clogging of wastewater expenditure when uncontrolled settlement, undesired living formation in sewerage line, increase of operating costs of treatment plant, pollution of drinking water from underground water from garbage fields. To prevent the environment pollution, the authorized public institutions should improve the solution proposals for the vegetable waste oil problem. The municipalities should inform the public about waste oils by creating social projects. Vegetable waste oil collection centers should have been opened to collect vegetable waste oils and avoid time and energy loss. The public should be encouraged with various campaigns on waste oil collection.

In this study, the environmental effects of vegetable waste oils and recovery methods have been investigated. The studies on waste oil collection in Turkey and the world have been evaluated. In addition, a survey is held in order to determine the opinion of Bursa people about the consciousness on waste oil collection. Various questions related to personal information and evaluation of vegetable waste oils have been asked to the 384 persons in the central districts of Bursa city in Turkey. At the end of the survey, it has seen that Bursa people are not informed about Vegetable Waste Oil Collection Centers. According to the people the number of these centers is insufficient.

Key words: Bursa, recovery, survey, vegetable waste oil, vegetable waste oil collection center
Fatty Acid Composition and Calorie Values of Chicken Breast and Thigh Meats from Different Breeding Systems

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Abstract: Breeding systems are known to affect the quality and composition of chicken meat. In this study, the main aim was to investigate the fatty acid composition and calorie values of the chicken breast and thigh meat samples obtained from conventional (intensive), organic and free range breeding systems. In terms of the fatty acid composition, conventional and organic chicken breast and thigh meats are richer than that of free range chicken meats. The major fatty acids of the conventional and organic chicken meats are stearic and oleic acids similar results are observed free range chicken thigh meats. On the other hand, the fatty acid composition of free range chicken breast meats is remarkably low. The calorie values of the conventional, organic and free range chicken breast meats were 3320.2, 3975.9 and 3026 cal/g, while those of the thigh meats were 3383.15, 3945.30 and 3501.80 cal/g, respectively. In conclusion, conventional and organic chicken meats were found to be higher than free range chicken meats in terms of fatty acid composition and calorie values.

Key words: fatty acid composition, chicken meat, breeding systems

FREE RADICAL SCAVENGING EFFECT OF GELATIN OBTAINED FROM Merlangius merlangus

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Abstract: Fish skin, bones, fin and pulp are important by-products of fisheries processing. The evaluation of these by-products is of great importance for the sustainability of fisheries and aquaculture industries. It is of significance to evaluate these by-products and wastes, in order to obtain value-added products. Studies conducted in recent years show that gelatin obtained from fish may be equivalent in quality to gelatin obtained from other sources, such as cattle and poultry by-products. Therefore, fish gelatin can be used in the food industry as an alternative. Gelatin is a valuable protein used in many industries, especially in food industry. At the same time fish process wastes have been evaluated by producing fish gelatin. In this study, gelatin was obtained from Merlangius merlangus and the antioxidant activity of this gelatin product was investigated.

Key words: Fish waste, Merlangius merlangus, gelatin, free radical scavenging
Free Radical Scavenging Capacity and Phenolic Content of Green Almonds and Plums

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Abstract: Fruits are the indispensable food products that are of vital importance for human nutrition, since they are not only the main sources of vitamins, but they also contain bioactive components such as phenolics and flavonoids. In early spring, the main naturally abundant fruits, besides those cultivated in green houses, are green almonds and plums. In Turkey, green almonds and plums consumption and thus their market availability is widespread. Thus nowadays these fruits are emerging as economically significant agricultural products. Having in mind the increasing consumption and interest towards these mostly traditional fruits, the main objective of the present study was to investigate the bioactive compounds composition as well as 1,1'-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging capacity of green almonds and plums. Extracts from the flesh of the fruits were prepared with ethanol (70%, v/v). Afterwards, the phenolics, flavonoids and condensed tannins content of the fruit extracts were determined. In the present study, it was found out that green almonds and plums contain substantial amounts of bioactive components. The free radical scavenging assay revealed that, green almond and plums were better than \( \alpha \)-tocopherol in scavenging free radicals such as DPPH. Therefore, consumption of these naturally available fruits in early spring can be significant in terms of human nutrition.

Key words: green almonds, green plums, free radical scavenging, phenolics
Effects of Different Types of Feed And Bedding Material to Population Growth and Biochemical Composition
On White Worm (Enchytraeus albidus Henle, 1837).
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Abstract: In aquaculture, protein sources from animal plays an important role in carnivourous fish feeding. Especially live feeds used for marine and some special freshwater fishes as first feed. White worms (Enchytraeus albidus Henle, 1837), which is the preferred source because they include high-protein, easily cultivated, low production costs, have no risk of carrying aquatic pathogenic bacterium and parasites. In this study, growth performance and nutritional composition of white worm that constituted with different foods (commercial feed and fish meal) and different bedding environments (paddy, soil peat, coconut peat, garden soil) were investigated. As a result, it has been determined that commercial feed, which is quite high in terms of nutrient content, can be used as nutrients in white wolf production and garden soil can be used as the material for the bedding environment. Results of nutritional composition were taken into consideration, it was determined that the best protein value was found in groups fed with fish feed and lowest performance was in groups fed with commercial feed.

Key words: Enchytraeus albidus, population growth, nutritional composition

Antioxidant Activity of Brown Algae from Çanakkale Strait
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Abstract: This study was conducted to determine antioxidant activity of brown algae Cystoseira barbata, Scytosiphon lomentaria and Padina pavonica. Brown algae collected from Çanakkale Strait, Turkey in February 2018. The antioxidant activity, total carotenoids, condensed tannins, contents of total phenolics and flavonoids were quantified in ethanol extracts. P. pavonica showed the highest antioxidant potential with a low IC50 (3.96 µg/g Ext.). Also, the maximum phenolic content (760 µg/g Ext.) and total carotenoid (3.96 µg/g Ext.) were measured in P. pavonica. The total flavonoid contents changed 1.38 µg/g Ext. (C. barbata) to 2.25 µg/g Ext. (S. lomentaria). The highest condensed tannins value was found in C. barbata as 130 µg/g Ext. According to our results, C. barbata, S. lomentaria and P. pavonica possess antioxidant activity and they could be use in food and feed industries.

Key words: brown macroalgae, antioxidant activity, total phenolics, total flavonoids, tannins
Abstract: In recent years, the population of a number of major cities in Bulgaria, particularly in Ruse, has often expressed a civil protest against the failure of the responsible authorities to deal with the problem of polluted urban air. The aim of the study is to clarify the extent to which the protests are justified in terms of morbidity in the Ruse district, whose inhabitants are mainly concentrated in the city of Ruse. Data on annual morbidity in Rousse region (in classes from International Classification of Diseases – 10-th revision), data on meteorological parameters and air pollutant concentrations in Ruse for the interval 2009 - 2015 from a land-based automatic station and satellite data from a NASA site were used. The data were processed using the statistical method of correlation analysis. Pre-hospital morbidity. Between the pre-hospital morbidity for Ruse on the one hand and the concentrations of the air pollutants in combination with the meteorological parameters on the other, 27 statistically significant correlation dependencies were identified, among which several positive correlations with the frequency of wind from east to the city are clearly visible. These are the correlations with: Circulatory Diseases Class, with a correlation coefficient of 0.967, with a statistical significance level of 0.01; Respiratory Diseases Class, with a correlation coefficient of 0.949, with a statistical significance level of 0.05; Nervous System Diseases Class, with a correlation coefficient of 0.916, with a statistical significance level of 0.05. Hospitalized morbidity. Between the hospitalized morbidity for Ruse on the one hand and the concentrations of the air pollutants in combination with the meteorological parameters on the other, 90 statistically significant correlation dependencies were found. Again, as with pre-hospital morbidity, several positive correlations with the frequency of wind from east to city are clearly visible. These are the correlations with: Eye Disease and Appendices Class, with a correlation coefficient of 0.979, with a statistical significance level of 0.01; Skin and Subcutaneous Tissue Diseases Class, with a correlation coefficient of 0.985, with a statistical significance level of 0.01; Disorders of the Genitourinary System Class, with a correlation coefficient of 0.972, with a statistical significance level of 0.01; Endocrine System Disorders, Nutrition and Metabolism Disorders Class, with a correlation coefficient of 0.892, with a statistical significance level of 0.05. There is no association of morbidity in disease classes with the annual concentration of fine particulate matter in the air above the city. The hospitalized morbidity was correlated with a satellite parameter ultraviolet aerosol index indicating the dependence of the hospitalized morbidity on the combination of air pollutants and solid particles in the air - soot and dust. The morbidity from some socially significant diseases in the Rousse region correlates with the wind from the East, a likely carrier of polluted air to the city from the city Eastern Industrial Zone. The nature of migrated harmful pollutant is unknown but there is some clues that it is probably a bouquet of hydrocarbons with the presence of aerosols.

Key words: Ruse, Urban Air Pollution, East wind, morbidity
Abstract: The modern history of climate change and the fight against climate change most closely respond to the question whether what we call the "weather change" recently are temperature anomalies, or are the progressive temperature trend, an expression of a common planetary climate change? Global temperature trends are just one of the hundreds of indicators of global climate change - rising sea levels, melting of polar and alpine ice, droughts, forest decline, desertification, coral reefs, viral pandemics, destroyed agricultural crops, waves. The temperature indicator in question was observed with trepidation and alarm from several generations of climatologists and scientists with nobel-grade qualities. The temperature changes are one of the elements of the ongoing climate change debate, arguably led, at least after 1827, when the French enroute Jean Baptist Joseph Fourier discovered the greenhouse effect.

Key words: climate change, climate change, "weather change" temperature anomalies, rising sea levels, melting of polar and alpine ice, drought, forest decline, desertification, destroyed agricultural crops, migratory waves
A Natural Sweetener: Stevia

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Abstract: In recent years, food industry have been affected by increased demands for healthy, mainly low-sugar or sugar-free products along with researches on the effect of sugar intake on health. To meet this demand, many kinds of artificial sweeteners have been presented to the market. However, the word 'artificial' left a lot of question marks over minds. At this stage, natural and calorie-free Stevia rebaudiana takes the stage. Stevia rebaudiana is an herbal shrub belonging to the Asteraceae family and native to Paraguay and Brazil. Six sweet-tasting compounds have been reported in the leaves of S. rebaudiana; stevioside, rebaudiosides A, D and E, dulcosides A and B. Stevioside, a high intensity non-nutritive sweetener, is extracted from the leaves of Stevia rebaudiana Bertoni and is a white, crystalline, odorless powder, approximately 300 times sweeter than sucrose. The use of S. rebaudiana as a sweetener can be found in many parts of Central and South America, where this species is indigenous, as well as in Japan. People in Japan have been using Stevia as a sweetener in products such as seafood, soft drinks, and candies. This plant has been used in several areas of the world, such as in Brazil and Paraguay, as a natural control for diabetes also has been used to help control weight in obese persons. The word ‘natural’ does not actually make S. rebaudiana harmless. The complete chemical composition of Stevia species is not yet available. FDA has received many GRAS Notices for the use of high-purity (95% minimum purity) steviol glycosides. The use of stevia leaf and crude stevia extracts is not considered GRAS and their import into the United States is not permitted for use as sweeteners. Main purpose of this study is to create awareness about properties, utilization, and conscious consumption of Stevia rebaudiana plant and its different forms.

Key words: Stevia, Stevia rebaudiana, Sweetener, Sugar
A Local Flavor: Kavut Flour and Evaluation Forms

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Abstract: Being situated in east Karadeniz region, Artvin has a wide variety of agricultural products thanks to its climate and various floras. These conditions have an indispensable significance for the economic and social development of Artvin and its districts. Within this diversity, rice, wheat, maize, pumpkin seeds, and traditional products made with them are mentioned together with Artvin and its districts and therefore it stands out among the products which increase the welfare level of the people of the region while also having an important place in the economy of the country. The share of high agricultural market value is big in the contributions of the aforementioned products to the development; because the agricultural in Artvin is quite developed and also the city and its region are important due to history and tourism. The paper aims to put forth the features of these agricultural products and one of them "Kavut Unu", which have an important place in our nutrition, and to emphasize their contribution to the economy.

Key words: Kavut flour, Wheat, Maize, Rice, Pumpkin seed

Quantitative development and species diversity of phytoplankton in Bulgarian marine areas, 2014-2017

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Abstract: The analyzes for taxonomic composition and quantitative indicators of phytoplankton in 2014-2017 in the Bulgarian marine aquatory were based on 196 phytoplankton samples from 52 hydrological stations. A total of 182 phytoplankton species belonging to 14 taxonomic classes were identified. Group Dinophyceae/Bacillariophyceae developed with 72.53% of the total taxonomic composition. The highest biodiversity of phytoplankton was recorded in May and September. In the "bloom" concentrations were found a total of 8 species in coastal and shelf and 7 species in Varna lake. The highest amounts of phytoplankton were produced during the winter-spring season. In 2017, the most intense phytoplankton development in the last ten years was established. During the monitoring period, the waters in front of the Bulgarian coast were "moderate" and in Varna Lake a "bad" ecological condition was found.

Key words: phytoplankton, seasonal dynamics, phytoplankton structure, Bulgarian coast and shelf, Varna Lake, Black Sea
Histochemical changes in liver of rodents and amphibians from Tsalapitsa rice-fields, Bulgaria

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Abstract: The Tsalapitsa rice-fields are a complex of flooded plots used for growing rice, surrounded by low dykes and canals, including the surrounding wet meadows. They are located in an area close to Plovdiv City, heavily influenced by human activities such as intensive agricultural activities, mainly for the production of rice. The main objective of the present experiment is to study the histochemical changes such as glycogen accumulation and liver fat deposits of sexually mature rodents (Apodemus agrarius, Mus macedonicus and Microtus arvalis) and amphibians (Pelophylax ridibundus) from Tsalapitsa rice-fields. Cryostat (Leica CM 1520) was used to cut the liver samples. Multiple sections of each specimen (n=40) were prepared and they were used for observation the intensity of PAS-reaction and Sudan Black B staining. Histochemical analyses were conducted according to a standard procedure using the commercially available kits (BioGnost Ltd.). Liver histochemical changes were appraised semi-quantitatively by using the grading system of Mishra and Mohanty (2008). We detected intense purple-magenta staining in the liver of rodents, while in the liver of amphibians, we found moderate positive staining of PAS-reaction, which is an indicator of the presence of a large amount of glycogen in the hepatocytes. Sudan Black B staining was presented in blue-black fat deposits, which were expressed in a moderate degree in rodents and amphibians liver. The obtained methods could be used as a sensitive and rapid tool for determining cell and tissue alterations in organisms due to anthropogenic impact on the environment.

Key words: histochemistry, liver, PAS-reaction, Sudan Black B staining, rodents, amphibians
Wastewater characteristics by physico-chemical parameters from different type treatment plants

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Abstract: The purpose of the present study was to made wastewater characteristics by physico-chemical parameters from two wastewater treatment plants (WTPs) – Municipal WTP (MWTP) and Meat processing enterprise WTP (MPEWTP). The investigation was carried out during 2016 and 11 wastewater parameters (ToC, pH, EC, SS, COD, BOD and totals forms of N, P, K, Na and chlorides content) were controlled in 4 monitoring points (MPs) at both WTPs: MP-1 – inlet of WTP, MP-2 – after section of biological treatment, MP-3 – outlet of vertical precipitators and MP-4 – outlet of WTP. Wastewater samples were collected every two months from each MP and were analyzed by validated Bulgarian States and ISO standards. It was found: 1) the values limits variation at the surveyed parameters and trends of their changes by MPs in both treatment plants; 2) that ToC and pH values are changed significantly as by MPs as by months; 3) unidirectional downward trend of COD, BOD5, Total N, P and K content from inlet to outlet, resulting from the microbiological processes of treatment in the biological sections of the treatment plants; 4) opposite trends in the EC, chlorides and Total Na values change in both stations: at MWTP these parameters values decreased from inlet to outlet, while at MPEWTP is the opposite; 4) positive correlation relationships (R2 0.95-1.00) between the following pairs of indicators: MWTP - EC-BOD, EC-COD, Total N-SS and Total N-Total P; MPEWTP - SS-Total N; both WTPs - EC – Total Na, EC-chlorides, COD-BOD and Total Na-chlorides.

Key words: wastewater treatment plant, wastewater, physico-chemical parameters, correlations
Polycyclic aromatic hydrocarbons and toxic metals: contamination of medicinal plants

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Abstract: In recent years, the use of medicinal plants became a trend, both globally and locally. In Bulgaria due to appropriate climatic conditions, preserved traditions and rich biodiversity, herbs are available on the local market as well as for export.

The aim of this paper is to review scientific literature related to the results on availability of toxic metals (TM) and polycyclic aromatic hydrocarbons (PAHs) in medicinal plants, herbs and spices. Data published in scientific papers of various work groups as well as data submitted by European organizations in recent ten years have been studied.

TM and PAHs can accumulate in herbs during cultivation and processing. The levels of PAHs in herbs are presented as the sum of four PAHs - benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, and chrysene or as concentrations of the individual substances. In some studies, TM was registered in significant amounts. The review also demonstrates that maximum tolerable levels should be established for PAHs, in dry as well as in fresh herbs.

Key words: PAHs, toxic metals, medicinal plants, herbs

Evaluation of Fisheries and Seaweed Wastes for Agricultural Purposes

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Abstract: Fish, crustaceans and algae are products that have economical value but cause negative effects on the environment during processing and evaluation. There are many scientific and commercial applications related to the assessment of these wastes. However, in many countries these practices are not sufficient and the rate of economic losses is also quite large. Animal products contain protein, fat and minerals. Seaweed, are also used in various industries such as macros and micronutrients as well as food, agriculture and cosmetics. In countries where there is no waste management in fisheries and aquaculture operations, these wastes cause serious environmental pollution problems and affect fisheries, aquaculture businesses and tourism activities. Processing of fisheries, aquaculture and seaweed wastes will prevent environmental pollution, as well as create new products with economic value. In this study, possible use of waste of aquatic products and seaweed biomass for agricultural proposes are discussed.

Key words: Fisheries, Seaweed, waste management, processing, biomass
EFFECTS OF ω -3 AND ω -6 FATTY ACIDS ON HUMAN HEALTH

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Abstract: Essential fatty acids (EFAs) are essential for survival of humans and other mammals, and they cannot be synthesized in the body; hence, they have to be obtained by the diet. There are two types of naturally occurring EFAs in the body, The omega-6 (-6) series derived from cis-linoleic acid and the omega-3 (ω-3) series derived from α-linoleic acid (ALA, 18 : 3 ). ω-3 and ω-6 fatty acids display a variety of beneficial effects on various organ systems and diseases. The metabolism of EFAs is altered in several diseases such as obesity, hypertension, diabetes mellitus, coronary hearth diseases, schizophrenia, Alzheimer's disease, atherosclerosis and cancer. In this review; we focused the metabolisms of fatty acids and the relationship between human health.

Key words: ω -3, ω -6, FATTY ACIDS, HUMAN HEALTH

CAVIAR PRODUCTION AND NUTRITIONAL PROPERTIES IN AQUACULTURE

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Abstract: Aquaculture hunting and aquaculture sector is of great importance in terms of food production. Today, the decrease in natural resources and the decrease in the amount of hunting are being tried to be filled with the aquaculture sector. In the aquaculture sector, species diversity is less than natural sources. For this reason, many producers increase their food possibilities by processing seafood. It developed in the caviar technique together with the industrialization of fishery. Caviar is used as a prestigious product of special dishes all over the world. Caviar quality; the egg varies depending on the type of fish used and the technological processes applied to the egg. In addition, caviar is evaluated in many industries that develop various production technologies due to its high nutritional content. The aim of our research is to provide basic and detailed information about caviar production and nutritional composition.

Key words: caviar, aquaculture, nutritional composition
The Algorithm of a Block Model for Reallocation in Land Consolidation Projects
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Abstract: In the Land Consolidation works, preparation of the technical proper blocks is one of the most important stage. Land consolidation studies conducted in our country (Turkey), blocks are prepared by the project engineer and realized. For this purpose, project engineer uses various mapping software and technology. However, these software has not any decision support system to create the block system. These programs can only support to transfer project engineers' mind about block creation to the digital media. In this case, it is necessary that block creation of the project engineer with own manpower and reconsider them again. Today, land consolidation project auctions are made by the General Directorate of Agricultural Reform (Turkey) and the General Directorate of State Hydraulic Works (DSI, Turkey) for dozens of villages located in large areas. In the wide land consolidation areas, roads, irrigation systems, drainage and other systems must be considered together. Thus, work load of project engineering will be increased. In the same time, inadequacy of used software will be result error because of escape the attention. In addition, that the project engineer has different qualifications will be result different quality land consolidation. In this study, it is intended that all factors and Geographic Information System will be used in design and apply of block plans. Here, we will present the model algorithm created for this purpose.

Key words: Land Consolidation, Block Modelling
Application of herbicides on common winter wheat (Triticum aestivum L.) at different doses and their reflection on the structural elements of spike

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Abstract: The aim of this investigation was to determine the effect of the application dose of herbicides on structural elements of spike in common winter wheat (Triticum aestivum L.). The investigations were carried out during 2015 – 2017 at Dobrudzha Agricultural Institute – General Toshevo (DAI). The following herbicides were used: Derby super WG (33 g/ha; 66 g/ha; 132 g/ha), Secator OD (100 ml/ha; 200 ml/ha; 400 ml/ha), Ergon WG (50 g/ha; 100 g/ha; 200 g/ha), Granstar super 50SG (40 g/ha; 80 g/ha; 160 g/ha), Lintur 70WG (150 g/ha; 300 g/ha; 600 g/ha) and Mustang 306.25 СK (800 ml/ha; 1600 ml/ha; 3200 ml/ha) from the group of sulfunylureas with various mechanism of action. The preparations were applied at three doses – optimal, double and quadruple, at stage 29 of common winter wheat cultivar Dragana, Zlatitsa and Kalina. The herbicide effect was determined by the quantitative weight method and evaluated by the EWRS scale. These were the followed structural elements of the wheat spike: length of spike (cm), number of spikelets per spike, number of grains per spike, weight of grain per spike (g) and weight of 1000 grains (g). Four-factor dispersion analysis was applied. The factors year conditions, cultivar, herbicide and dose were followed. The factors with highest strength of effect were the year conditions (10-95). Significantly lower was the effect of the factors applied herbicide (2-4) on the investigated structural elements of spike.

Key words: common winter wheat, cultivars, herbicides, weeds, application doses, structural elements of spike

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**Abstract:** During 2014 – 2017, the influence of some main agronomy factors on the size of the resultant agronomy effect from their application to contemporary common winter wheat cultivars was investigated. The investigation was carried out in the experimental field of Dobrudzha Agricultural Institute – General Toshevo (Haplic Chernozems). The trial was designed by the split plot method, in 4 replications, on harvest area of 12 m². Cultivars Sadovo 1, Pryaspa, Kami, Kalina, Kiara, Kossara and Katarzhina were grown after 4 previous crops (winter oilseed rape, spring pea, sunflower and grain maize) at 4 levels of nutrition regime. The nutrition regime was differentiated by using mineral fertilization with variable nitrogen norms depending on the previous crop. After spring pea, 30, 60 and 90 kg N/ha were used, and after the rest of the previous crops – 60, 120 and 180 kg N/ha. With the exception of the check variant, which represented the natural fertility of the slightly leached chernozem soil, all fertilizer variants were against background fertilization with 60 kg P₂O₅/ha and 60 kg K₂O/ha. The positive reaction from the complex interaction of the tested agronomy factors was best expressed in 2015 – 2409.2 kg/ha, while during the extremely unfavorable year 2016, the effect was only 628.2 kg/ha. The independent and combined action of the mineral fertilization and the year conditions had determining influence on the size of the agronomy effect (AE). The positive effect from the mineral fertilization on the values of AE was accompanied with slight differentiation between the tested fertilization norms. Within this investigation, the highest mean value of AE was determined after fertilization with N180P60K60 – 2274.2 kg/ha. The variation in the mean size of AE depending on the type of previous crop was high – from 900.6 kg/ha (peas) to 2031.2 kg/ha (oilseed rape). The applied agronomy practices caused differentiation in the mean values of the AE according to the type of cultivar. The cultivars Kiara (1872.9 kg/ha) and Kalina (1783.8 kg/ha) were with the highest size of AE. They exceeded the AE values of the two standard cultivars Sadovo 1 and Pryaspa with 26.99, respectively. Averaged for the investigation, it was found that AE was in positive statistically significant correlation with grain yield and its physical properties.

**Key words:** wheat, cultivar, fertilization, previous crop, agronomy effect
Изследване влиянието на вакуумния режим и пулсационните параметри на доилни апарати върху някои физико-химични показатели на млякото при машинно доене на крави

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Резюме: Настоящата разработка проучва влиянието на вакуумния режим и пулсационните параметри на доилните апарати върху някои физико-химични показатели на прясно издоено краве мляко, свързани с промяна на киселинността и съдържанието на свободни мастни киселини (преди и след въздействието на доилната машина). Експериментите и последващия анализ са извършени в интервал на работния вакуум от 40-50 кПа (със стъпка 5 кПа) при пулсови честоти от 50-60 мин^{-1} (със стъпка 10 мин^{-1}). Нулевата хипотеза, респективно очаквания извод са свързани с твърдението, че по-ниски стойности на доилния вакуум (по-високото остатъчно налягане), както и честотен режим около 60 мин^{-1} предполагат слаба динамика на наблюдаваните физико-химични показатели. В чисто приложен аспект, посоченото допускане е обвързано с по-добри технологични качества на добиваното мляко в условията на по-нисък работен вакуум.

Ключови думи: доилен апарат, вакуумен режим, пулсационни параметри, мляко, киселинност, свободни мастни киселини
4. SECTION “AGRICULTURAL TECHNIQUES AND TECHNOLOGIES” POSTER PRESENTATION

Isolation and in vitro testing of several nematophagus fungi for control of root-knot nematodes
Yanko Borisov Borisov, Melika Salihova Mohamedova, Mladen Kostadinov Naidenov, Donka Gospodinova Draganova, Iliyana Stefanova Valcheva
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Abstract: Root-knot nematodes *Meloidogyne* spp. is the major group of plant parasitic nematodes affecting cultural and wild plants. Recently the predatory fungi have been studied as biocontrol agents of phytonematodes. The aim of the present study was to isolate local nematode-trapping fungi from natural infected soils and to evaluate their possibilities to form capture structures, as well as, trapping mechanisms. Numerous plants exhibited typical symptoms of nematode infection have been collected in Plovdiv region. Three different fungi – two isolates from the *Arthrobotrys* spp. and one from *Monacrosporium* spp. have been isolated from the egg masses of the plant samples. The *Arthrobotrys* isolates successfully formed two different types of traps – constricting rings and adhesive nets. Both types of traps successfully captured second stage juveniles of *Meloidogyne* spp. The *Monacrosporium* isolate did not form traps in the conditions the experiment was conducted. However, future surveys are needed to clarify the biological control potential of these fungi to control root-knot nematodes.

Key words: *Meloidogyne* spp., *Arthrobotrys* spp., *Monacrosporium* spp., nematode-trapping fungi

Surface Roughness Map of Eastern Thrace Region in Terms of Wind Energy
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Abstract: When we take look at the resources of our country we see that Turkey can be turned into a paradise of complete natural energy and in case of this natural potential is well evaluated, we won’t have energy problem. Our hydraulic resources are in a level that most of the countries emulate. It is possible to benefit from solar energy in our country. We have geothermal resources. Our country is an agricultural country and it is also possible for us to benefit from biomass. These resources should be evaluated surely. In this research, we discussed Eastern Thrace region and we examined surface roughness to determine available points for wind tribune set up. The relation between wind speed and altitude is an important issue.

Key words: Wind, Energy, Roughness, Eastern Thracia
The successful operation and efficient development of any organization is impossible without paying special attention to the issues related to human resource management, their optimal use and high work motivation.

1. The essence of motivation.

In the conditions of extremely rapid development and improvement of technology and exchange of information, individual organizations can only develop and work effectively if they pay sufficient attention to the issues related to human resource management, their optimal use and motivation.

In economic literature, there are many and varied definitions of what motivation is, which shows the extreme relevance and importance of this concept to the management of an organization. The significance of motivation is also determined by the fact that motivated staff performs much better, overcomes all difficulties and barriers, develops their potential and achieves much better economic results.

The term "motive" has Latin origin - "motivus", and in translation it means stimulate, incite. The motive is an internal stimulus that makes people act or not, in a certain way.

2. Classification of motives.

The behavior and actions of individuals are provoked by extremely varied in power and character motives. The most common classification of motives is the one in which they are differentiated into the following two groups according to 'Material motives' and 'Non-material (spiritual) motives'. Motivation in staff management is viewed as a process of activating the motives of the employees in an organization (internal motivation) and creating of incentives (external motivation) that urges them to work efficiently. The purpose of work motivation is the formation of a set of conditions that incite staff to perform actions aimed at the achievement of objectives with maximum efficiency.
The Correlation Between Silkgland mass and Mature larva weight in some silkworm lines and their hibrids.

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Abstract: Silkworm, *Bombyx mori* L. is an economical insect that has great importance on cocoon and silk production. The development of sericultural industry depends on quality and yield in terms of some qualitative and quantitative silkworm characters. Mature larval weight and silk gland mass are important factors in silkworm breeding. Silkgland mass is significant to synthesis of silk protein in fifth larval stage. The investigation was conducted to evaluate the correlations between silkgland mass and mature larva weight of M, ZF (China), N, ZB (Japan) lines and their hibrids M x N, ZF x ZB. In this research, silkworm lines were reared in similar environmental conditions and each four line and their hibrids were replicated 3 times with 200 silkworm larva to determinate these silkworm traits. In the present study, analysis of variance indicated that the mean value in Chinese lines and hibrids were found be significant (P<0.01) for mature larva weight. Otherside, mean value of silkgland mass was determined important for Japanese lines and hibrids (P<0.01). Both mature larva weight and silkgland mass has positive correlation in Chinese lines (r=0,587) and hibrids (r=0,583) (P<0.05). Otherwise, the correlation between these characters were not found to be significant for Japanese lines. As a result, it is a necessary to search the correlation between different characters and to protect the genetic diversity in silkworm lines.

Key words: Sericulture, lines, hibrids, yield, quality.
Near infrared spectra for discrimination of Fluvisols, Vertisols and Solonchaks

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Abstract: The aim of the study is an application of some chemometric procedures on spectral data of soil in near infrared region as an new method for soil differentiation. The diffuse reflectance spectra of 177 air-dried and sieved soil samples consisting of Fluvisols, Vertisols and Solonchaks collected from grasslands and arable agricultural lands were obtained using a Spectrum NIRQuest (OceanOptics, Inc.) in the range from 900 to 1700 nm. Soft independent modelling of class analogy (SIMCA) was performed to classify samples according to their taxonomic classes. The results obtained showed that the soil samples are separated according to their soil type based on their spectral information in the range of 900 to 1700 nm, and the SIMCA models correctly classify the samples to their soil type. All this could be used in the future studies related to the application of the NIRS method as a qualitative or quantitative method for soil analysis and also for the purposes of precision farming.

Key words: near infrared spectra, SIMCA, Vertisols, Fluvisols

Evaluation of powdery mildew resistance in melon (Cucumis melo L.)

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Abstract: Powdery mildew, caused by Podosphaera xanthii (Schltl.), is one of the most important disease of melon worldwide. The need to develop resistant varieties is a challenge for every one breeding program. Leaf disks assay was used in phytopathology and breeding programs as a quick and reliable method for evaluation of disease resistance in a large number of plant materials. The purpose of this study was to determine the disease index of resistance in different melon genotypes by the leaf disc assay. Thirty two melon genotypes, including lines, varieties and hybrids from the Maritsa Vegetable Crops Research Institute - Plovdiv collection and ten differentiator lines was tested. The disease index was scored for each disc on a scale of 0–4. The experimental results indicated different response of the studied genotypes (from 0,0 to 4,0). The results showed that 13 (40,6) genotypes reacted as resistant with disease index 1. The rest 10 (31,3%) accessions showed a different degree of susceptibility to the pathogen - highly susceptible and susceptible (from 1,3 to 3,3). The result showed that the resistant genotypes can be used in the melon breeding program in Maritsa Vegetable Crops Research Institute – Plovdiv.

Key words: leaf disc, Podosphaera xanthii, races, screening method, disease index
Morphological and biochemical parameters in the blood of lactating Lacaune sheep

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Abstract: The aim of the present study was to determine the influence of the season on morphological and biochemical parameters of lactating Lacaune sheep. In order to achieve this objective, we analyzed 32 blood samples collected from milking sheep during two different seasons, divided into high and low producing groups, respectively. Analysis of the samples showed that during the winter season in both groups (high- and low-producing) of sheep, leukocytes, erythrocytes, platelets, hemoglobin, hematocrit and mean hemoglobin in erythrocytes were increased (P < 0.05 – P < 0.001). During the winter season, by analyzing the liver enzymes in blood serum we found an increase in aspartat aminotransferase (ASAT), Gamma-Glutamyltransferase and Alkaline Phosphatase. In the other morphological and biochemical parameters of the blood, no differences were observed during both seasons.

Key words: dairy sheep breed, Lacaune, blood sample, morphology parameters, biochemical parameters
Evaluating eggshell and chick quality in different weighing eggs of same broiler breeder age group

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Abstract: The objective of this research was to investigate the effect of egg weight on eggshell characteristics and chick quality in 40 wk-old broiler breeder flock. Hatching eggs were collected from Ross 308 broiler breeder flocks at 40 wk of age. The eggs were selected, weighed and coded individually and grouped as small (55g) and medium (60g) eggs. Eggs were incubated at 37.5°C and 55% RH in an incubator for 18 days. On 18th day eggs were weighed, individually to calculate egg mass loss. At hatch, chicks were individually weighed and one by one each egg was followed. Eggshells of each egg were removed and stored for the measurement of thickness and pore size density. The thickness of eggshell measurements was conducted by excluded the membranes that were adhered to the eggshell. A micrometer was used for the measurement of the broad end, equator and narrow end of individual eggs and the average of eggshell thickness was calculated. Same eggshells were used to measure the pore density of eggs. For the magnification of pores, eggshells sections were dipped in concentrated nitric acid. By using Methylene Blue dye eggshells were stained and pore density was counted under the microscope. All hatched chicks were individually weighed to determine the chick weight and chick length. The results showed that initial weight mean was significantly higher in medium eggs compared to small eggs (P ≤0.01). The minimum egg weight loss (P ≥ 0.05) was recorded between two groups. Eggshell thickness had significant (P ≤ 0.05) effect on small and medium eggs. A difference was seen in thickness of eggshell of small and medium eggs. The chick weight was improved (P ≤ 0.05) with advancing age of broiler breeder flock, while as chick length was not affected by egg weight. A significant correlation was found between initial weight and average eggshell thickness (r=0.551). similarly, between initial weight and chick weight (r=0.615), in medium weight eggs. Also a significant correlation was found between average eggshell thickness and chick weight (r=0.484), in medium weight eggs.

Key words: Egg weight, Pore density, Egg weight loss and Chick length
Качество на въздуха в град Русе, следено чрез наземен и сателитен мониторинг и връзката му със смъртността в областта – корелационно проучване

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Abstract: Introduction. In recent years, the population of a number of major cities in Bulgaria, particularly in Ruse, has often expressed a civil protest against the failure of the responsible authorities to deal with the problem of polluted urban air. The aim of the study is to clarify the extent to which the protests have a reason for the mortality rate in the Ruse district, whose inhabitants are mainly concentrated in the city of Rousse.

Material and methods. From the National Statistical Institute, data on the annual mortality rate in the Ruse region was obtained. Data on the meteorological parameters and the concentrations of air pollutants in Ruse for the interval 2005 - 2015 were received by the Executive Environmental Agency (EEA) and averaged over the year. Data on meteorological parameters and air pollutant concentrations for Ruse were derived also from a NASA website. The data were processed using the statistical method of correlation analysis. Results and discussion. For the Rousse region, the highest rate of death 65 men, 69 (17 women), symptoms, signs and abnormalities found in clinical and laboratory studies not classified elsewhere 5.3 men, 8% women) and others. For the Rousse region between the mortality rates on the one hand and the concentrations of the air pollutants in combination with the meteorological parameters measured by the Ruse station on the other hand, 101 statistically significant positive correlation dependencies (69 for men and 85 for women) were found. There are clearly several positive correlations between mortality and air quality. These are the correlations of: Fine particulate matter with an aerodynamic diameter of 10 μm PM10 (and the SIGMA-TITA parameter characterizing the degree of resistance of the ground atmosphere against vertical air movements) on the one hand, and mortality from diseases of the digestive system with a correlation coefficient of 0.906 (respectively 0.960), a statistical significance level of 0.001; Fine particulate matter with an aerodynamic diameter of 2.5 μm PM2.5 and Parkinson's disease mortality, correlation coefficient 0.940, level of statistical significance 0.001. There is a positive correlation with the measured by satellite concentration of methane in the air of Rousse and the mortality from diseases of the digestive system.

Key words: Ruse, Urban Air Pollution, East wind, mortality
Productivity and yield stability at late treatment of durum wheat (*Triticum Durum* desf.) with antibroadleaved herbicides.

I. Influence at treatment during 1-st stem node stage

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Abstract: The research was conducted during 2012 - 2014 on pellic vertisol soil type. Under investigation was Bulgarian durum wheat cultivar Victoria (*Triticum durum var. valenciae*). A total of 20 antibroadleaved herbicides were investigated: Granstar 75 DF, Granstar super 50 SG, Ally max SG, Arat, Biathlon 4 D, Derby super WG, Mustang 306.25 SC, Weedmaster 646 CL, Sunsac, Secator OD, Logran 60 WG, Lintur 70 WG, Akurat 60 WG, Akurat extra WG, Eagle 75 DF, Herbaflex, Starane 250 EK, Sanafen, Dicotex 400 and Herby 675. All herbicides were treated in 1-st stem node stage of durum wheat. During 1-st stem node stage of durum wheat can to be used the antibroadleaved herbicides Arat, Biathlon, Derby super, Mustang, Weedmaster, Secator, Lintur, Akurat, Akurat extra, Eagle, Starane, Sanafen, Dicotex and Herby. These herbicides do not have a negative influence on grain yield. The most unstable are herbicides Granstar, Granstar super, Ally max, Sunsac, Logran, Herbaflex and Herby. Their selectivity to durum wheat is influenced most strongly by weather conditions during the vegetation period. From the viewpoint of technology for durum wheat growing, during 1-st stem node stage technologically the most valuable are herbicide Derby super, Arat, Biathlon, Secator, Akurat, Akurat extra and Lintur. They combine high grain yield with high stability with relation to different years. The herbicides Granstar, Granstar super, Ally max, Sunsac, Logran and Herbaflex can not to be used during 1-st stem node stage of durum wheat.

Key words: durum wheat, herbicides, late treatment, grain yield, stability
Productivity and yield stability at late treatment of durum wheat (Triticum Durum desf.) With antibroadleaved herbicides

II. Influence at treatment during 2\textsuperscript{nd} stem node stage

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\textbf{Abstract:} The research was conducted during 2012 - 2014 on pellic vertisol soil type. Under investigation was Bulgarian durum wheat cultivar Victoria (Triticum durum var. valenciae). A total of 20 antibroadleaved herbicides were investigated: Granstar 75 DF, Granstar super 50 SG, Ally max SG, Arat, Biathlon 4 D, Derby super WG, Mustang 306.25 SC, Weedmaster 646 CL, Sunsac, Secator OD, Logran 60 WG, Lintur 70 WG, Akurat 60 WG, Akurat extra WG, Eagle 75 DF, Herbaflex, Starane 250 EK, Sanafen, Dicotex 400 and Herby 675. All herbicides were treated in 2\textsuperscript{nd} stem node stage of durum wheat. During 2\textsuperscript{nd} stem node stage of durum wheat can to be used the antibroadleaved herbicides Arat, Biathlon, Derby super, Mustang, Secator, Lintur, Akurat, Akurat extra, Starane, Dicotex and Herby. These herbicides do not have a negative influence on grain yield. The most unstable are herbicides Granstar, Granstar super, Ally max, Sunsac, Logran, Eagle, Herbaflex and Herby. Their selectivity to durum wheat is influenced most strongly by weather conditions during the vegetation period. From the viewpoint of technology for durum wheat growing, during 2\textsuperscript{nd} stem node stage technologically the most valuable are herbicide Derby super, Arat, Biathlon, Secator, Akurat, Akurat extra and Lintur. They combine high grain yield with high stability with relation to different years. The herbicides Granstar, Granstar super, Ally max, Sunsac, Weedmaster, Logran, Eagle and Herbaflex can not to be used during 2\textsuperscript{nd} stem node stage of durum wheat.

\textbf{Key words:} durum wheat, herbicides, late treatment, grain yield, stability
PRODUCTIVITY AND YIELD STABILITY AT LATE TREATMENT OF DURUM WHEAT (TRITICUM DURUM DESF.) WITH ANTIBROADLEAVED HERBICIDES.

III. INFLUENCE AT TREATMENT DURING 3-RD STEM NODE STAGE

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Abstract: The research was conducted during 2012 - 2014 on pellic vertisol soil type. Under investigation was Bulgarian durum wheat cultivar Victoria (Triticum durum var. valenciae). A total of 20 antibroadleaved herbicides were investigated: Granstar 75 DF, Granstar super 50 SG, Ally max SG, Arat, Biathlon 4 D, Derby super WG, Mustang 306.25 SC, Weedmaster 646 CL, Sunsac, Secator OD, Logran 60 WG, Lintur 70 WG, Akurat 60 WG, Akurat extra WG, Eagle 75 DF, Herbaflex, Starane 250 EK, Sanafen, Dicotex 400 and Herby 675. All herbicides were treated in 3-rd stem node stage of durum wheat. During 3-rd stem node stage of durum wheat can to be used the antibroadleaved herbicides Arat, Biathlon, Derby super, Secator, Lintur, Akurat, Akurat extra and Starane. These herbicides do not have a negative influence on grain yield. The most unstable are herbicides Granstar, Granstar super, Ally max, Sunsac, Logran, Eagle, Herbaflex and Herby. Their selectivity to durum wheat is influenced most strongly by weather conditions during the vegetation period. From the viewpoint of technology for durum wheat growing, during 3-rd stem node stage technologically the most valuable are herbicide Derby super, Arat, Biathlon, Secator, Akurat, Akurat extra and Lintur. They combine high grain yield with high stability with relation to different years. The herbicides Granstar, Granstar super, Ally max, Sunsac, Weedmaster, Logran, Eagle, Herbaflex, Sanafen, Dicotex and Herby can not to be used during 3-rd stem node stage of durum wheat.

Key words: durum wheat, herbicides, late treatment, grain yield, stability
Effect of savory and nutmeg extracts supplementation on some productive traits and economic efficiency of rainbow trout (*Oncorhynchus mykiss* W.) cultivated in recirculation system

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**Abstract:** The aim of the present study was to evaluate the effect of the dietary savory and nutmeg extracts supplement on the survival rate, growth performance, feed conversion ratio and economic efficiency of rainbow trout (*Oncorhynchus mykiss* W.), reared in a recirculation system. Two hundred and forty rainbow trout were divided into three groups, one control (K) and two experimental, as followed: savory (E) and nutmeg (F), each of them comprising two replications with 80 fish in a group. The average initial live weight of fish from the control group (K) and experimental groups E and F were 13.43±2.95 g, 13.53±3.16 g and 13.46±2.60 g, respectively (P>0.05). Fish were kept in concrete tanks with efficient water volume of 0.8 m³, elements of the recirculation system. Rainbow trouts were fed with extruded feed “Aqua UNI”, a product of “Aqua garant”, with 2 mm size of the pellets. The feed of fish from the E and F were supplemented with 1 powdered nutmeg extract, respectively, after lubricating the pellets with 5 ml sunflower oil per 100 g feed. Control group received the same amount of sunflower oil-lubricated feed. Fish from all groups were fed 4 times/daily with the diet, based on 3 , E – 95.00. The average weight gain of trouts in the control group (K) was 30.74±8.63 g and it was lower than the values of fish from the experimental variant E with 5.01, as the differences were significant (P<0.05) between K and F. At the end of the trial, the analysis of consumed feed amount showed that feed conversion ratio of trouts from the control group was 1.27±0.37 and it was higher than that of the group E with 4.96, as the differences were significant between K and F (P<0.01). The group that received 1 and 19.76%, respectively.

**Key words:** rainbow trout, savory extract, nutmeg extract, feed conversion ratio, weight gain, survival rate, economic efficiency
Influence of foliar feeding of varieties of common wheat on the nutritional value of the grain

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Abstract: The research was conducted during 2015 - 2016 in the experimental field of the Department of Plant Production in Agriculture Faculty at Trakia University, Stara Zagora, Bulgaria. The aim of this study is to investigate the effect of leaf fertilizer on the productivity of common wheat. In this study has examined the nutritional value of two common wheat. A comparative analysis of the results obtained from the treatment of varieties of common wheat with leaf fertilizers was made. Energetic and protein nutrition of ruminant wheat was evaluated in 1 kg of dry matter. Protein value of feed is extremely important for their nutritional value. The protein value of the feed is related to the bioavailability of the protein contained therein. The boundaries in which the protein values of the various feeding variants with different leaf fertilizers.

Key words: common wheat, protein, nutrition, ruminants, non-ruminants
The influence of NuPro® on the growth performance, biochemical blood parameters and meat quality of rainbow trout (Oncorhynchus mykiss W.), grown in recirculation system

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Abstract: Increasing fish production requires large quantities of fishmeal. Therefore, substitutes for fishmeal are highly limited, one such yeast-derived protein additive is Nu Pro®. The purpose of this study was to trace growth performance, meat quality and blood parameters of rainbow trout (Oncorhynchus mykiss W.) fed with fishmeal substitution with Nu Pro®. To achieve the objective an trial with a control group (CG) (no added) and two experimental variants –with added 7 of Nu Pro® (EG2) each with three repetitions, were set in a recirculating system in the Aquaculture Base of the Faculty of Agriculture at the Trakia University. Twenty five specimens from rainbow trout with an average weight for CG, EG1 and EG2 respectively 24.3 ± 7.3g, 24.3 ± 7.3 and 24.4 ± 8.5 without significant differences (P≥0.05), in good health condition were placed in each tank and cultivated for 60 days. Fish were individually weighted at the start, middle and end of the trial period. At the end of the experiment were calculated average final weight, SGR, FCR and a meat quality and blood biochemical parameters were analyzed. Experimental trouts from the group, fed with Nu Pro 15 higher average final weight, compared to the value of this parameter in fish from the control group, but differences were not significant (p≥0.05). Partial substitution with Nu Pro® did not effect the blood and meat quality indicators of individuals from different variants (p≥0.05). The growth rate of fish from experimental group fed with feed containing 15), respectively with 8.98, without differences being statistically proven (p≥0.05).

Key words: Nu Pro®, blood biochemical parameters, growth, meat quality, rainbow trout
Influence of dietary phytoextracts supplementation on growth performance, chemical composition and fatty acid profile of rainbow trout (Oncorhynchus Mykiss W.), cultivated in recirculation system

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Abstract: The present research aimed to examine the effect of dietary phytoextracts supplementation on the growth performance, chemical composition and fatty acid profile in the meat of rainbow trout (Oncorhynchus mykiss W.), cultivated in a recirculation system. The fish were divided into 6 groups with 20 fish each as followed: one control (C) and five experimental groups in whose food was added phytoextracts of curcumin (EC), paprika (EP), thyme (ET), oregano (EO) and garlic (EG). Each trial variant was run in two replications. During the investigation period, trouts from experimental groups were fed with extruded pellets enriched with 1 (EC), 13.22 (EO) and 2.47 (EG) % (P<0.05). At the end of feeding trial the survival rate of fish from control and experimental groups were: C–90, EP–83, EO–93. Economic conversion ratio of phytoextracts supplementation to the feed of rainbow trout, reared in a recirculation system was lowest in experimental group, fed thyme extract – 2.00. It is lower vs ECR values of fish from other groups by 7.73 (EC), 19.70 (EO) and 9.97% (EG). At the end of the trial period, four fish of each group were randomly selected for evaluation of the chemical and fatty acid composition in the fillets. No statistically differences on the water content were observed in the meat of rainbow trouts from control and the experimental groups (P > 0.05). The addition of phytoextracts had no significant effect on the protein content of the fish from the control and all experimental groups, however the lowest value of this parameter was found in trouts from EG group. A tendency of increase the lipids was observed in the meat of fish from groups, receiving thyme, oregano and garlic compared to those from C, EC and EP groups, although the difference between groups were insignificant (P>0.05). Statistically significantly higher value of the dry matter was established for rainbow trout from ET group in comparson with the fish of the C, EC, EP, EO and EG groups (P≤0.001). The phytoextract supplementation to the diet of rainbow trout from all experimental groups led to significant lower values of the ash compared to those from control. The inclusion of phytoextracts did not affect the contents of C14:0, C16:0, C18:0, C16:1, C18:1 and C18:2 in the fillets of rainbow trout (P>0.05). The same tendency was observed regarding the amounts of C20:2, C20:3, C20:4, C20:5 and C22:6. The fish fed extruded pellets supplemented with curcumin and thyme extracts had the lowest value of C18:3n-3 α-linolenic acid compared to those from C group (P≤0.05, P≤0.001). The amounts of SFA in the fillets of trout were higher in C group as compared to those from EC, EP, ET, EO and EG groups, with no differences between groups (P>0.05). No significant differences were established in the contents of UFA, MUFA and PUFA in the fish received phytoextracts compared to control group, although the values of these fatty acids were higher in EC, EP, ET, EO and EG groups than C. The addition of phytoextracts in the diet of rainbow trout led to higher values of n-6/n-3ratio compared to control group, but the differences between groups were insignificant (P>0.05).

Key words: rainbow trout, phytoextracts, growth performance, chemical composition, fatty acid profile
Comparative study of hematological parameters in lambs from Central Balkan Mountain and Koprivshtica sheep breeds

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Abstract: At the Experimental center of the Institute of Mountain Agriculture and Livestock in Troyan was carried out an experiment which aim was to compare the hematological parameters of lambs from Central Balkan Mountain and Koprivshtica sheep breeds. In order to achieve this objective, we collected and analyzed 20 blood samples from each breed of lambs divided into two groups, 5 males and 5 female lambs, respectively. All animals were housed in loose boxes on a dry straw bedding. The free-choice diet consisted of compound feed (CF180), certified and produced by feed factory in Lovech, was offered in a combination feeders for sheep. The blood samples were analyzed and it was found an increase in leukocytes and monocytes (P < 0.05) in lambs from Central Balkan Mountain sheep breed. Analysis of the other morphological and all biochemical parameters of the lambs from both breeds showed that they remain in a physiological level.

Key words: native Bulgarian breeds, lambs, morphology parameters, biochemical parameters

Production and quality of production in tomatoes, greenhouse production, under the influence of different levels of fertilization and different irrigation regimes

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Abstract: Experimental field experience was conducted during the period 2016-2017 in an unheated polyethylene greenhouse. The object of the study was tomato, variety "Vitelio". The influence of different irrigation regimes and different levels of fertilization was investigated. The productivity of tomatoes, greenhouse production under the influence of different cultivation conditions was established. The impact of water deficiency and fertilization levels on the quality of production was established.

Key words: tomatoes, irrigation regime, fertilization, ANOVA
Herpetofauna of Stara Zagora, species composition and distribution along the natural habitat gradient – urban areas

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Abstract: The Herpetofauna of city Stara Zagora is characterized with exceptional species diversity. In the city and its territory are established 21 species of reptiles, from ten families and four orders of class Amhibia and class Reptilia. From the species established in the region, 19 can be found in the suburban zones of Stara Zagora. Ten of the species or 50% of the established species in the region can be found in the zones with apartment buildings and the spaces around them. An increase in the number of the species and their spread in the outer and center parts of the city are evident. In this particular process the role of one ecological factor cannot be deemed as absolute nor is it possible to comment only the gradient of one variable, as the various factors of the environment have too diverse values. Smallest is the number of species (5) in the construction sites and the zones with intensive crops for which are established only two common species (Coluber caspius and Lacerta viridis).

Key words: Herpetofauna, Coluber caspius, Lacerta viridis, urban areas

MORPHOLOGICAL STUDIES OF RICE WEEVIL S. ORYZAE (LINNAEUS) AND GRANARY WEEVIL, S. GRANARIUS (LINNAEUS) (COLEOPTERA: CURCULIONIDAE) – A MAJOR PESTS OF STORED PRODUCTS

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Abstract: Infestation of stored products by insects causes various damages and economic losses. *Sitophilus* species are among the most widespread and destructive primary pests of stored cereals in the world. The rice weevil *S. oryzae* (Linnaeus), granary weevil, *S. granarius* (Linnaeus), maize weevil, *S. zeamais* Motschulsky and tamarind weevil, *S. linearis* (Herbst) are very similar in appearance. These species can be distinguished morphologically by examining rostrum, elytra, pro, meso, metathorax and aedeagus of males. The studies concerning some morphological aspects of rice weevil *S. oryzae* (Linnaeus), granary weevil, *S. granarius* (Linnaeus), completed by original photos and a detailed study of the adult stage of female and male species.

Key words: stored products, rice weevil, granary weevil
MORPHOLOGICAL STUDIES ON MALE GENITALIA OF FRUIT PESTS CYDIA POMONELLA (L.), GRAPHOLITA MOLESTA (BUSCK) AND GRAPHOLITA FUNEBRANA TREITSCHKE (LEPIDOPTERA: TORTRICIDAE)

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Abstract: Three tortricid species are of major economic importance on deciduous fruit tree crops in Bulgaria. These are, Cydia pomonella (L.), Grapholita molesta (Busck) and Grapholita funebrana Treitschke, (Lepidoptera: Tortricidae). They can be distinguished by examining male genitalia, which have the most consistent diagnostic value. The invagination of the ventral margin at the base of the male cucullus is variable among species and depends on the orientation of the genitalia in the slide preparation. For males, the most diagnostic feature is the tip of the aedeagus. The studies concerning some morphological aspects of male genitalia of the fruit pests Cydia pomonella (L.), Grapholita molesta (Busck) and Grapholita funebrana Treitschke, completed by original photos and a detailed study of the male genitalia.

Key words: male genitalia, tortricid species