Trakia University - Faculty of Agriculture

SCIENTIFIC CONFERENCE WITH INTERNATIONAL PARTICIPATION

100 years Higher Agricultural Education in Bulgaria

СБОРНИК С РЕЗЮМЕТА

BOOK OF ABSTRACTS

27 May, 2021, Stara Zagor

Trakia University - Faculty of Agriculture

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Автори: доц. д-р Д. Георгиев,

ст. експ. Ж. Кочеренко

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Секция 1. "Животновъдни науки"

Section 1. Animal Science

Доклади
Oral presentations

The effect of feeder-space allowance on behaviour, feed-sorting, and productivity in beef cattle

K.J. Heiderscheit and M.J. Haskell
Scotland's Rural College, (SRUC) Edinburgh, UK

Abstract

Beef cattle managed indoors are often fed a high concentrate diet in troughs. Feeder-space/animal is often limited, which negatively affects welfare in dairy cattle, but has not been assessed in beef cattle. This study assessed effects of feeder-space allowance for beef cattle on feeding behaviour, competition, feed sorting, and productivity. Twenty-eight Aberdeen Angus cross finishing steers were sorted into four pens of seven, two pens per treatment. Two feeder-space allowances were used: unrestricted (0.64 m/steer) (NR), and restricted (0.19 m/steer) (RES). Behaviours were recorded for each animal every 5 min for 3h following feed delivery for each pen, 1x/week for 6 weeks. Displacements from the feed-face were recorded 2x/week for 1h following feed delivery. Samples of the diet were collected 1x/week/pen when feed was delivered, 3h after feed delivery, and from the refusals the following morning and analysed for particle size. Animals were weighed 1x/week. Feeding behaviours were more frequent for NR animals (P=0.006). A week x treatment interaction (P<0.001) suggested that the RES groups had higher frequency of displacements initially, but this declined over time. Both treatments selected against long particles, but RES sorted more in the 3h post-feeding (treatment: P < 0.001, time: P=0.001). Average daily gain did not differ between treatments (P=480). The displacement results suggest that RES animals adapted to the smaller feed space allowance by altering their feeding schedules. Altered feeding schedules combined with feed sorting, could lead to ruminal acidosis. We conclude that the standard feed-space allowances are sufficient for ad libitum-fed cattle, though exclusion from the feed-trough and initial displacement frequency are welfare concerns.

Keywords: welfare, behaviour, beef cattle

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Potential consumer acceptance of meat produced from cultured cells in different countries

HOCQUETTE Jean-François, LIU Jingjing, HOCQUETTE Elise, CHRIKI Sghaier, ELLIES-OURY Marie-Pierre
INRAE, France

Abstract

By 2050, meat demand is likely to increase due to the increasing human population. In addition, consumers are more and more concerned by social issues such as animal welfare or climate change. In response, the production of meat from cultured cells is presented as a sustainable solution although it is controversial. It is based on a huge production of muscle fibers by proliferation of muscle cells initially sampled from a limited number of live animals.

An on line-survey was thus carried out in English to investigate opinions of consumers about cultured meat. The answers of more than 1,500 respondents from various countries were analyzed (including 1/3 from America and 1/3 from Europe). About 49.8% were not willing to eat cultured meat regularly. A majority of respondents (90.7%) were willing to pay less or much less (including nothing) for it compared to conventionally produced meat. The perception of "absurdity and/or disgust" (for 30% of all respondents) is associated to emotional resistance. A main concern of the current participants is unnaturalness (46.8%) followed by the risk of not enough taste (45.7%) and of a high price (43.5% of answers). Respondents would expect cultured meat to have a high nutritional quality and to be safe and tasty, but do not want it to be called meat (for 58.8% of them). To conclude, consumer acceptance of cultured meat is on average low and multifactorial.

Keywords: artificial meat

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Study of thyroid hormones and cortisol as a tool for determining the welfare of sheep

Ivelina Nedeva
Faculty of Agriculture, Trakia University

Abstract

Analysis of thyroid hormone and cortisol levels is a standard method for determining the presence of stress, metabolic changes in the body, and more recently for the well-being of sheep raised in intensive production systems. This was the purpose of the present study - to assess the degree of welfare of sheep of the breed Lacon, observed in three different seasons (summer, autumn and winter), bred in the region of Plovdiv. Animals are divided into two groups by productivity (high and low productivity). Triiodothyronine (T3), thyroxine (T4) and cortisol levels in the blood serum of 32 sheep were determined by ELISA. The influence of the autumn season was established - increased amount of T3 and T4 ($p < 0.001$), compared to summer and winter in both experimental groups. A higher level of thyroxine was found during the summer season ($p < 0.05$) compared to the winter, regardless of the level of productivity. In autumn, cortisol levels were elevated in both high- and low-yielding sheep ($p < 0.001$). In our research we did not find deviations from the norms for health and behavioral parameters, which testifies to the good welfare of the sheep of the Lacon breed bred in the specific intensive production system. Increases in levels of T3, T4, and serum cortisol correspond to the presence of stress caused by environmental factors, which require further research to clarify.

Keywords: welfare, sheep, season, triiodothyronine, thyroxine, cortisol

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Use of spiral CT scanning to quantify carcass composition and muscle distribution in Texel rams for breeding

N.Lambe, K. McLean, J. Gordon, A. McLaren
Scotland's Rural College (SRUC) Edinburgh, UK

Abstract

In-vivo X-ray computed tomography (CT) scanning of terminal sire ram lambs has been incorporated into UK breeding programmes for >20 years. Carcass composition (weights of carcass fat (CTFWT), muscle (CTMWT), bone (CTBWT)) is estimated using prediction equations including tissue areas from three cross-sectional reference scans at set anatomical positions, plus live weight (REF method). Three-dimensional spiral CT scanning now allows fast acquisition of images every few millimetres along the body, providing ~120 images per lamb. However, image analysis to remove non-carcass parts of each image, for carcass composition assessment (GutSPIRAL method), is time-consuming and limits routine use of this technique. This study investigated whether quantification of tissue weights in the entire live lamb (without removal of viscera etc.; UngutSPIRAL method) could accurately estimate tissue weights in the carcass, or muscle weights in different primal regions. Comparing measurements on 107 Texel lambs to GutSPIRAL results (as "gold-standard"), REF predicted CTFWT and CTMWT with high accuracies (both R2 0.96) and CTBWT with slightly lower accuracy (R2 0.84). UngutSPIRAL predicted CTMWT and CTBWT with high accuracies (R2 0.97 and 0.98, respectively) and CTFWT with lower accuracy (R2 0.78). Primal region muscle weights were predicted with high accuracy using the UngutSPIRAL method (R2 0.99, 0.88, 0.95, for front, middle and hind primals, respectively). Using UngutSPIRAL CT images from 578 Texel lambs, scanned across 3 years, moderate heritabilities (0.3-0.6) were estimated for muscle weights in the 3 primal regions. This suggests scope to use spiral CT scanning, without image analysis to remove the viscera, to enable fast and accurate calculation of muscle distribution across primal regions, for use in UK breeding programmes.

Keywords: CT scanning, muscle, carcass composition, heritability

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Application of scientific strategy for enhanced beef and sheep meat quality evaluation

Stoyanchev T. and Atanassova S.
Trakia University; Faculty of veterinary medicine; Faculty of Agriculture

Abstract

Live animals meat quality prediction is difficult, with low accuracy, expensive and time consuming. In the slaughterhouses there are modern practical solutions for whole carcass quality and primal cuts quality by application of computer vision technology or machine image evaluation for expected meat yield, bones, fat tissue, cuts composition. Reference data for training set and evaluation set are required from destructive laboratory ISO methods determining fat, protein, moisture, ash, fatty acids, amino acids, water holding capacity, drip loss, pH, and etc. Otherwise the consumer attitudes in eating meat quality are related to tenderness, juiciness, flavor and overall liking. In the present study we apply two alternative methods in prediction of beef meat quality based on X-ray computed tomography (CT) and hyperspectral image assay. Beef meat dry maturated steaks from Black angus cattle (ribeye, denver, top-sirloin and rump) were investigated for the fat and marbling appearance under hyperspectral spectral (AVT Goldeye CL-008, Specim, Spectral Imaging Ltd. Oulu, Finland) and CT scanning (Fidex ®Animage, USA). Spectral range 900-1700 nm was used for data evaluation. Fat layer in scanning slices in CT vary between -112 to -30 Hounsfield Unit. Spectral similar pixels are successfully recognized and reconstructed in picture in computer modulated steak in hyperspectral image.

Keywords: consumer attitudes, meat quality, prediction of beef meat quality

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Opportunities for welfare improvement in sheep by silimarin additives – a review

Nadya Bozakova, Veselin Ivanov
Department of General Animal Breeding, Faculty of Veterinary Medicine, Trakia University-Stara Zagora, Bulgaria

Abstract

Under grazing conditions, there are a number of stress factors that significantly impair the welfare of ewes and lambs - high and low temperatures, excessive solar radiation, poisonous plants, various endo- and ectoparasites, snake and insect bites, grazing infections, etc.

The purpose of this publication is to summarize and highlight the possibilities of using silymarin and Silybum marianum products as a dietary supplement to improve the welfare of sheep under pasture rearing.

A detailed analysis of numerous scientific articles related to the active ingredients, properties, and application of Silybum marianum products has been performed.

Data on the antioxidant, hepatoprotective and detoxifying effects of silymarin have been summarized. The dual hepatoprotective effect of silymarin has been emphasized particularly for its antioxidant action, associated with reducing the reactive oxygen species content and malondialdehyde properties, and for stimulating the activity of the antioxidant enzymes-glutathione peroxidase, superoxide, and heat shock protein 70 (HSP70).

The anti-stress effect of silymarin for lowering blood cortisol levels in animals is also briefly described, and pathways for detoxification of various silymarin toxins have been investigated. As a result of these mechanisms, the effect of silymarin on improving the live weight and milk yield of ruminants is explained.

Based on the review of the presented research, it can be concluded that silymarin and Silybum marianum-derivatives can be used successfully to improve sheep welfare under grazing conditions, due to their antioxidant, hepatoprotective, anti-stress, detoxifying activity, and to stimulate growth and milk production.

Keywords: silymarin, sheep welfare, antioxidant, anti-stress, detoxifying activity, and to stimulate growth and milk production.

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Ethics in experiments on live cattle: A pragmatic approach

Isabelle Veissier and Véronique Deiss
Université Clermont auvergne, INRAE, VetAgro Sup, UMR herbivores,
63122 Saint-Genes-Champanelle, France

Abstract

Most people consider that experiments on at least some animals are necessary to gain scientific knowledge when no alternatives are possible and unnecessary suffering is avoided. We describe a pragmatic approach to help experimenters decide to carry (or not) an experiment. Namely,

- one should aim at minimising the constraints on animals by looking at alternatives, reducing the number of animals to what is necessary to highlight significant effects, and alleviating all constraints before, during and after the experiment (according to the 3 Rs);
- the benefits expected from an experiment are to be assessed in terms of what they may bring to the discipline and to society;
- The experiment must be designed and described in a way to ensure obtaining results and allowing their reproducibility.

Taking such issues into account shall not be seen as a limitation to experiments but rather as a help to better perform such experiments.

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Swot analysis for supporting the development of the grazing livestock meat production sector in Bulgaria through the GREENANIMO project activities

Panayotova Milena, Krastanov Jivko, Varlyakov Ivan, Stoyanchev Todor, Marinov Ivaylo
Faculty of Agriculture, Trakia University

Abstract

The grazing livestock meat production sector in Bulgaria has shown considerable development in the last 7-8 years, but is still far from European countries in terms of production efficiency, quantity and quality of production.

The GOAL of this study is to develop the most appropriate strategies to support the development of the grazing livestock meat production sector in Bulgaria through the activities of the GREENANIMO project - knowledge transfer and implementation of innovative practices in order to achieve sustainable production of quality meat while increasing the benefits for farmers.

Primary data for the SWOT analysis were obtained by use of a survey of a representative sample of farmers rearing beef cattle, meat sheep and meat goats. A comparative index was used to rank the strengths (S) and weaknesses (W), opportunities (O) and threats (T) for the development of the grazing livestock meat production sector in our country. To calculate the metric assessments of each of the factors, an additional ranking was performed based on the average assessment on the importance of the factor by the respondents in the survey, weighted with an additional expert assessment of the possibility this factor to be influenced by GREENANIMO project activities. Matrices for estimation of the internal (IFE) and external factors (EFE) have been created. The determination of the strategy of the highest importance was made by compiling a SWOT matrix and analyzing the results of four alternative strategies SO, WO, ST and WT.

The results of the study show that the (W) and the (T) for the business prevail at almost equal value to the (O). The analysis of the SWOT matrix points at WT and WO strategies, which are the implemented actions leading to minimization of W to limit the T for the sector, as well as to support the realization of O.

The appropriate strategies and the activities for their implementation were found, which will be planned in the preparation of the "Action Plan for research and implementation of innovative practices in the grazing livestock meat production sector" within the GREENANIMO project with a view to support the development of the grazing livestock meat production sector in Bulgaria.

Keywords: SWOT analysis, beef cattle, meat sheep, meat goat,

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In situ evaluation of the ruminal and intestinal digestibility of physically treated rapeseed meal /Wisan Raps/

Krum V. Nedelkov
Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria

Abstract

The objective of this study was to determine the nutritional value of physically treated rapeseed meal /PTRSM - Wisan Raps/. Three non-lactating Jersey cows with an average body weight of 436 ± 18 kg fitted with a rumen and T-type duodenal cannulas were used in the experiment. Five samples (PTRSM 1 to PTRSM 5) from different batches produced in interval of approximately 3 wks were collected and incubated in the rumen for 0, 2, 4, 8, 16, 24, and 48 h in 6 replications. The soluble or rapidly degradable fraction a of DM ranged from 201 to 233 (SD = 11.9) g/kg. The effective degradability of DM at assumed rumen outflow rate of 0.06/h ranged from 523 to 548 (SD= 8.77) g/kg. Fraction a of CP ranged from 131 to 159 (SD = 10.3) g/kg. Effective degradability of PTRSM CP at rumen outflow rate of 0.06/h was relatively low compared to the non-treated rapeseed meal and ranged from 543 to 572 g/kg (SD = 10.8). Intestinal digestibility of PTRSM DM and CP measured by mobile bag technique varied from 429 to 447 g/kg (SD = 6.87) and from 899 to 914 (SD = 4.75), respectively. Estimated Protein Digestible in the small Intestine (PDI) was 209 to 217 (SD = 2.81) g/kg DM, and Protein Balance in the Rumen (PBR) varied from 69.8 to 80.5 (SD = 5.59) g/kg DM. This study showed that protein degradability and digestibility of commercial PTRSM samples differed considerably compared to non-treated rapeseed meal, suggesting that nutritive value may be significantly improved by proper physical treatment. The protein degradability and digestibility values obtained in this experiment can be used in formulating rations for ruminant animals.

Keywords: rumen degradability, intestinal digestibility, physically treated, rapeseed meal

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Comparative study of some exterior characteristics between the İspenç and Southwestern Bulgarian dzinka chicken breeds

Ivelina Pavlova, Demir Ozdemir, Hristo Lukanov
Trakia University

Abstract

İspenç and the Southwestern Bulgarian dzinka are two small chicken breeds, originating respectively from two neighboring countries - Turkey and Bulgaria. They are characterized by uniformity in some major mutational exterior traits, such as beard and muffs, shank-feathering, vulture hocks, and rose comb. The aim of the study was to compare some of the main exterior features of the İspenç and Southwestern Bulgarian dzinka breeds. The study was performed on 15 roosters and 25 hens of each breed. İspenç had a significantly higher live body weight, respectively by 19.65% in roosters and by 17.11% in hens, compared to the Southwestern Bulgarian dzinka ($P<0.001$). The birds of the Turkish breed are polydactyl, 5-toed, while the Bulgarian breed does not have this mutation. The length of the back, the wingspan and the length of the shank in İspenç were significantly higher in both sexes, compared to the Southwestern Bulgarian dzinka ($P <0.01$). The comb of the Bulgarian breed is more compact, with significantly lower values in terms of its width ($P<0.001$). In terms of the dimensions of the head and its formations, there are more proven differences between hens of the two breeds than between roosters. The study leads to the conclusion that the seemingly close breeds involved in the study show a number of proven phenotypic differences, which suggests differences in their genotype.

Keywords: poultry, genetic diversity, true bantam, local breed, Bulgaria, Turkey

Effect of different fattening period duration on meat productivity of domestic quails

Hristo Lukanov, Ivelina Pavlova, Atanas Genchev
Trakia University

Abstract

The study was conducted with 224 domestic quails from the specialized meat-type WG line. The duration of fattening period and sex on productive traits, slaughter traits and meat quality of quails was evaluated. The study has shown that the longer duration of the fattening period in quails from the meat-type line WG was associated with lower production efficiency, with more reduction after the 35th day of life. The production efficiency in male quails was lower compared to that in females. The dispersion analysis demonstrated that the determination of 72.2% and 69.6% of grill weight and deboned meat weight respectively, depended on fattening period duration ($P<0.001$). When fattening increased from 28 to 42 days, the amount of feed necessary for one bird increased by 73% and 87%, corresponding to increased costs by 64.5% and 77%. For production of 1 kg grill, the necessary feed increased by 42.3-45.8% on a weight basis and by 35-37.7% on a cost basis. For production of 1 kg deboned meat, corresponding increases are by 42.1-49.5% and 34.8-41.2% respectively. The period between 28 and 35 days of age was the most appropriate for planning slaughter of WG quails. During that period, the economic efficiency, although already declining, was still within acceptable limits and the increase in quantitative traits in both sexes – still relevant, making the produce more attractive for consumers. With age, the changes in color characteristics of M. pectoralis superficialis result in darkening of meat ($P<0.001$). Thus, it assumes nuances specific rather for game meat. This effect is desirable, as it improves the commercial presentation of domestic quail meat in line with consumers' attitudes.

Keywords: Japanese quail, age, gender, meat type, meat quality

Iron Deficiency Anemia (IDA) in sows – an emerging problem?

Daniel Sperling, Nicolas Guerra, S. Dimitrov
Trakia University

Abstract

The aim of this study is to provide information on the prevalence of Iron Deficiency Anemia (IDA) in sows and risk factors associated with parity for prevalence of IDA in weaning piglets in important pig-producing countries in the EU countries.

A survey was conducted in 10 EU countries (Denmark, Poland, Belgium, the Netherlands, Germany, Austria, the Czech Republic, France, Italy and Portugal). Total 637 sows of different parity were included in the assessment of hemoglobin (Hb) levels at weaning of their corresponding litters at randomly selected farms that were willing to participate in the survey. The corresponding level of Hb of 3 selected piglets per litter (small, medium, large piglet) was measured at weaning. Hb levels were measured using the portable analyzer HemoCue Hb 201+. The current criteria for assessment of anemia based on Hb levels were used: anemia < 90 g/L, subclinical status 90–110 g/L and optimal Hb level > 110 g/L for piglets and 100 g/L for sows. High level of IDA in sows was observed, where 47.1% sows (300/637 in total) were anemic at weaning. Piglets from first and second parity sows were at risk of IDA at weaning compared to higher parity sows ($p = 0.0063$), with IDA being confirmed in 17.4% of piglets from this particular sub-group.

In our study IDA is a common problem in sows on European farms, with more than 47% of sows reported as being anemic at weaning. Piglets from young sows (first and second parity) had the highest percentage of anemic piglets at weaning, so special attention should be paid to these animals.

Keywords: Anemia, IDA, sows, hematology, HemoCue

Месодайната порода овце Ил дьо Франс - етапи на интродукция и развъден процес в България, разпространение и значение

Евгения Ачкаканова
Институт по животновъдни науки – Костинброд

Abstract

Френската месодайна порода овце Ил дьо Франс е позната в България повече от 50 години. Първият внос, реализиран през 1968 г. е с експериментална цел за установяване на аклиматизационните способности на породата в България и за съпоставка с английските месодайни породи – Суфолк, Оксфорд и Хемпшир. Освен аклиматизационните, установени са и възпроизводителните способности, продуктивните качества и генеалогична структура на породата у нас. Развъдният процес с породата в България преминава през няколко етапа - Експериментално-аклиматизационен (1968-1973); Интродукция и разширено възпроизводство с последваща затворена система на селекция (1973-2003) и трети етап - внос през определени периоди до 2020 година на чистопородни мъжки и женски животни, които се развъждат в чистопородни стада или се използват за промишлено кръстосване /Димитров, 1988/. От 2005г. чистопородните животни Ил дьо Франс се контролират от Асоциацията за развъждане на породата Ил дьо Франс в България /АИлФБ/ и са вписани в Електронната родословна книга /ЕРК/. С утвърждаване и прилагане на селекционната програма за породата в България са идентифицирани основните дейности и са дефинирани основните етапи на селекционния процес. Разработена и утвърдена е методика за преценка по собствена продуктивност на млади мъжки разплодници от порода Ил дьо Франс, която дава възможност за обективизиране на селекционния процес. Провеждат се наблюдения върху разпространението на породата и използването ѝ за поглъщателно кръстосване или промишлено кръстосване с цел получаване на стокови агнета за висококачествени трупчета.

Keywords: овце Ил дьо Франс; интродукция и разпространение в България, Асоциация за развъждане на породата Ил дьо Франс в България

Comparison of Body Weight, FAMACHA © BCS and Hair Scores in Saanen Goats During Pregnancy and Birth Period

Alkan ÇAĞLI , Hasan COĞAN, Murat YILMAZ
Aydın Adnan Menderes University

Abstract

The aim of this study was to compare FAMACHA © card scores, BCS scores, body weight(BW) and hair score values at the beginning of gestation, advanced gestational and parturition periods in 22 Saanen goats whose mating was synchronized. Every 15 days from the mating period to the postpartum period, eye score scoring, BCS scoring, hair scoring , FAMACHA © card scoring of 22 had saanen goats were determined and live weights were weighed. In terms of the properties measured in the study, the averages of the early period of pregnancy and the advanced period of pregnancy and the birth periods were compared. As a result of statistical analysis, the effect of BCS on body weight was found to be statistically significant. Correlation between BCS and FAMACHA © Graphic score was found to be negative and high (-0.392) significant. In the initial period of pregnancy, the effect of BCS on Famacha and Body weight was statistically insignificant, but its effect on hair scoring was found to be significant ($P < 0.05$). The effect of BCS on BW, FAMACHA © and hair score in late pregnancy period and delivery period was found to be statistically significant ($P < 0.05$). As a result of good care and feeding practices during the pregnancy period, BCS of Saanen goats increased during the birth period and body weight and FAMACHA © were positively affected.

Keywords: Saanen goat, pregnancy, FAMACHA © card, BCS, Hair Scor, body weight

Relationship between blood RBC value and FAMACHA © and BCS scores of goat kids fed whey powdered food and supplemented with propolis

Selda Manav, Murat Yılmaz, Alkan Çağlı, Hasan Çoğan ve Kemal Çelik
Aydın Adnan Menderes University

Abstract

In this study, blood RBC rates and FAMACHA © and BCS scores were compared in goat kids fed with milk substitute feed (cow's milk + whey powder + water) and supplemented with propolis. 40 kids of the same age were used as animal material. 10 heads of goat kids are divided into each group. One control and three experimental groups were formed. The control group was kept free with their mothers; the other three groups were separated from their mothers at the age of 10 days and housed in individual pens. The control group was the group kept with their mothers and sucking their mothers continuously, Group 1: only given milk replacer feed, group 2: milk substitute feed + 4cc propolis, group 3: milk substitute feed + 2cc propolis. The animals in the other three groups, except the control group, were placed in individual chambers and bottle fed. Live weights (LW) were weighed, blood samples were taken from the animals at the beginning, middle and end of the trial, and the observed FAMACHA © and BCS scores were compared. At the beginning of the experiment, the differences between the groups for all measurements were found to be statistically insignificant. In the middle and end of the study, the differences between the RBC, LW, BCS and FAMACHA© values within the group were found to be statistically significant ($P < 0.05$). In the middle of the study, the difference between RBC values between groups and group 3 values was found to be statistically significant ($P < 0.05$). For LW, BCS and FAMACHA© values, the difference between the control group and the other groups was found to be statistically significant ($P < 0.05$). For RBC, LW, BCS and FAMACHA © values at the end of the trial, the difference between group 2 values and other groups was found to be statistically significant ($P < 0.05$). As a result of the correlation analysis, the relationship between RBC, LW, BCS values and FAMACHA © scores at the beginning, middle and end of the trial was found to be statistically significant (negative and high). At the end of this study, it can be said that after birth, feeding goat kids with cow's milk supplemented with whey and supplementing with propolis will have positive results for anemia and bcs, and body weight of the kids.

Keywords: Goat kids, whey, propolis, RBC, anemia

Goat Breeding and Determination of Its Sustainability; TURKEY- Denizli Province Pamukkale District Example

Selda AVCI, Selda MANAY, Murat YILMAZ , Turğay TAŞKIN
Aydın Adnan Menderes University

Abstract

Denizli province is located in the inner west region of Turkey and has a population of 1.040.915, measuring 12.321 km². The conditions of the region are especially suitable for hair goat breeding. Goat breeding is widespread from past to present, especially in mountainous and forested regions. Although Pamukkale region of Denizli is a region known for tourism, there are about 6750 goats raised in their villages and mountainous regions. Most Hair Goat breeds are bred in Pamukkale district. There are a few goat farms that breed Saanen, malta, halep goats and their hybrids. In this study, a survey was conducted in 25 goat farms in Pamukkale district of Denizli. This study was carried out to determine the sustainability and general situation of goat breeding in the region. As a result of the evaluation of the survey, goat breeding is carried out extensively in the region, and goats are housed in simple semi-closed shelters built on the forest edges. Goat Breeders stay in tents made of hair. Children of families in these farms, especially young people, do not breed goats and work in different areas (factories, tourism companies, etc.) with minimum wage. Despite the high monthly income of goat breeders, young people do not prefer goat breeding. The reasons for this are the social life difficulties experienced in shepherding, the desire for city life, and girls don't want to marry shepherds. It has been reported that current breeders may quit goat breeding in the near future. It has been reported that the main problems, the narrowing of the pasture areas, the increasing construction, the construction of new roads and their division of the pasture areas, the increase in urbanization have been reported to negatively affect goat breeding. This problem is not only the problem of Pamukkale district of Denizli, it is a problem of goat breeding in Turkey.

Keywords: Hair Goat, Sustainability, Pamukkale district

Estimation of environmental effects of test day milk yield in Patch-faced Maritza sheep

Petya Zhelyazkova, Doytcho Dimov
Agricultural university

Abstract

The aim of this study were to estimate environmental effects of test day milk yield in Patch-faced Maritza sheep breed. Database includes 12 955 milk yield records in the test day. Milk yield recordings were made in 18 flocks and test day milk yields were obtained from 1992 to 2015 (24 years). In the structuring the database, the following environmental effects were differentiated: flock; year-season of lambing effect (YS); parity effect (Par); litter size at birth (LS); age of ewe at lambing (AgeL); age of ewe at test day (AgeTD); suckling period (Suck); ewe test day (ETD); flock test day (FTD); flock-year-test day (FYTD); stage of lactation period (DIM); stage of lactation period defined at 3-day intervals (DIM3). The significance of describe environmental effects was tested using the GLM procedure of the SPSS 19.0 for Windows. Average TDMY was 748.59 mL. The highest test day milk yield was in the first test day of ewes (1015.80 mL) and gradually decreased to seventh test day (267.50 mL). All mentioned environmental effects have influence on TDMY and have significant effect (degree of probability $p < 0.001$). The FYTD had largest proportion (41.57 %) on the total phenotypic variation. A large part of the total phenotypic variation had the effects: AgeTD (30.95%), DIM (27.85%), DIM3 (27.14%), FTD (17.11%), ETD (21.92%) and AgeL (16.29%). Considering the significant influence of the described environmental effects on the test day milk yield in the population of Patch-faced Maritza sheep breed, they should be taken into account when estimating the genetic parameters.

Keywords: test day milk yield, environmental effects, Patch-faced Maritza sheep breed

Influence of the replacement of soybean meal with high-protein sunflower meal on "Clarcs of energy distribution/protein transformation" in fattening broiler chickens

Sashka Chobanova, Dimo Penkov
Аграрен университет – Пловдив

Abstract

Aim: To compare the net utilization of energy and protein in the eco-technical chain „feed-meat" when replacing part of soybean meal with high-protein sunflower meal in broiler fattening.

Material and methods: One control and 3 experimental groups, 4-phases fattening with isoenergetic and isoprotein combined fodders. Main protein source in the fodders for the control group – soybean meal. Replacement with sunflower meal: First group: Starter – 5%, Grower – 8%, Finisher 1 – 10% and Finisher 2 – 10%; Second experimental: 15, 18, 25 and 25% respectively; Third experimental – 34.25, 27.27, 27.27 and 26% respectively.

Clarcs of energy distribution/protein transformation (CED/CPT) - ratio between accumulated gross energy/crude protein in breast and thigh muscles and consumed metabolic energy/crude protein throughout life.

Results: CED – fodder – breast+thigh muscles: Control – 0.2430, I-st group – 0.2394, II-nd group – 0.2505, III-rd group – 0.2334; CPT – 0.6080, 0.5050, 0.5280 and 0.5490 respectively.

Keywords: broilers, Clarc of energy distribution, Clarc of protein transformation, soybean meal, sunflower meal

Постери
Posters

Feeding behaviour and activity as early-indicators of disease in pre-weaned dairy calves

C-A. Duthie, J.M. Bowen, G.A. Miller, D.J. Bell, C. Mason and M.J. Haskell
SRUC, Edinburgh, UK

Abstract

Respiratory disease is a major cause of calf mortality. In surviving calves, the resulting lung damage can result in poorer health, fertility and growth in later life. This study aimed to determine whether changes in activity and feeding behaviour can be used as early-warning indicators of disease. One hundred pre-weaned male Holstein calves were group-housed. Calves were fed milk replacer ad libitum through a computerised calf feeder and fitted with a leg-mounted activity monitor. Each calf was assessed daily using a modified version of the 'Wisconsin Scoring System' (recording rectal temperature, coughing, nasal and ocular discharge) and classed as 'Diseased', 'Intermediate' or 'Healthy' based on their cumulative score. The peak day of the most extreme illness event was identified for each calf. Data from Diseased and Healthy calves were paired for analysis based on age and body weight. Compared to healthy calves, diseased calves lay for longer with a tendency for longer lying bouts (daily lying: 17.6±0.3 vs 16.7±0.2 h, $P<0.01$; bout length: 74.8±10.6 vs 56.0±3.7 min, $P=0.09$ for diseased and healthy calves, respectively). Diseased calves fed for a shorter time and had fewer daily feeder visits (with intake) compared to healthy calves (feeding time (min): 19.3±1.4 vs 22.8±1.5; $P < 0.05$; visits: 2.1±0.2 vs 3.2±0.4; $P<0.05$). Differences between diseased and healthy calves were evident on the days prior to the peak day of disease. This study demonstrated that feeding behaviour and activity parameters differed between healthy and diseased calves. Thus measurement of feeding and activity can be utilised within early-detection systems to facilitate early intervention and optimised treatment.

Keywords: calves, disease-detection, respiratory disease

Acknowledgment

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Prediction of respiratory disease in pre-weaned dairy calves using activity and feeding behaviours

J.M. Bowen, G.A. Miller, C. Mason, D.J. Bell, M.J. Haskell and C-A. Duthie
SRUC, Edinburgh, UK

Abstract

Calf health problems throughout early life are a major source of calf and financial losses, and impact heavily on calf survival and lifetime performance. Changes in feed intake and behaviour often precede clinical symptoms of disease. The aim of this study was to assess prediction models for detecting respiratory disease in pre-weaned dairy calves. Feeding behaviour and activity data was collected from 100 male calves (~8-42 days of age). Calves were group-housed and provided ad libitum access to milk through automatic calf feeders and activity was captured using a leg-mounted accelerometer. Health status of individual calves was assessed daily using an adapted version of the Wisconsin Scoring System. Three models were assessed: (i) deviation from normal lying time based on moving averages (MA), (ii) random forest (RF) based on feeding and activity and (iii) a combination of RF and MA outputs (COMB). Within the MA model, lying time was predicted based on previous behaviour (3- and 7-day MA) and expected behaviour for the current day (based on age). Where lying time was >9% of expected lying time an "alert" was provided. Within the RF model, feeding and activity variables were included and data was split into training (70%) and test (30%) datasets. Model accuracy was assessed using sensitivity, specificity, balanced accuracy and Matthews Correlation Coefficient (MCC). Models (RF; MA) showed high specificity (0.95;0.97), moderate sensitivity (0.35;0.42), balanced accuracy (0.65,0.64) and MCC (0.25;0.29). Combining outputs (COMB) increased accuracy (specificity=0.95, sensitivity=0.54, balanced accuracy=0.75, MCC=0.36). This study demonstrated the potential for using precision livestock farming technologies within disease detection systems to facilitate optimised treatment.

Keywords: calves, prediction models, respiratory disease.

Acknowledgment

This work was supported by the Bulgarian Ministry of Education and Science under the project GREENANIMO (contract No Д01-287/07.10.2020), part of the National Programme "European Scientific Networks".

Biochemical profile of blood as an objective indicator of the welfare of Lacaune sheep

Ivelina Nedeva, Todor Slavov, Ivan Varlyakov, Veselin Radev, Dimitar Panayotov,
Faculty of Agriculture, Trakia University

Abstract

The biochemical parameters in the blood serum of 32 Lacaune sheep were studied, divided into two groups by productivity (high- and low-productivity). The surveys were conducted in three different seasons (summer, autumn and winter). An increase ($p < 0.001$) in urea in the blood serum was found during the summer season compared to the ground season in both study groups. The total cholesterol in both study groups increased ($p < 0.05$) in the autumn season compared to the summer. During the autumn season, triglycerides increase ($p < 0.01$-$p < 0.001$) in low- and high-yielding Lacaune sheep. A decrease ($p < 0.001$) in the level of ASAT was found in the summer and autumn seasons compared to the winter season in both groups of sheep studied. GGT levels decreased ($p < 0.01$) during the summer season in low-yielding sheep compared to the winter season. In highly productive Lacaune sheep, the amount of ALP in the blood serum decreased ($p < 0.01$) during the summer season compared to the other two seasons. The amount of protein in the blood serum does not affect the season in both groups of sheep studied. The studied biochemical parameters in the blood serum of sheep of the Lacaune breed are an objective factor for their welfare.

Keywords: sheep, season, ASAT, GGT, ALP

Acknowledgment

This work was supported by the Bulgarian Ministry of Education and Science under the project GREENANIMO (contract No Д01-287/07.10.2020), part of the National Programme "European Scientific Networks".

The Observer XT® Software Application for Research of Sheep and Cattle Behavior - Opportunities and advantages

Mehmed Halil, N. Bozakova
Faculty of Veterinary Medicine, Trakia University - Stara Zagora, Bulgaria.

Abstract

Recent research includes studies on the welfare of farm animals to recognizing and assessing positive indicators of welfare. Some of them are specific behavioral activities that can be grouped together under the name "comfortable behavior". To more accurately study these behavioral activities, we chose to use specialized Observer XT software. This article describes how The Observer XT was used to integrate and synchronize video, observational, tracking, and physiological data. The Observer was originally developed as a manual event recorder for the collection, management, analysis, and presentation of observational data on the behavior and welfare of sheep and cattle.

Keywords: Observer XT, animal behavior, welfare

Acknowledgment

This work was supported by the Bulgarian Ministry of Education and Science under the project GREENANIMO (contract No Д01-287/07.10.2020), part of the National Programme “European Scientific Networks”.

Diversity of Bacteria that Cause Clinical Mastitis in Holstein-Frisian High Dairy Cows in Pelagonia Region - North Macedonia.

S. Stojanovski, G .Cilev, B. Trajanoska
Department of Microbiology, Faculty of Veterinary Medicine, University "St. Kliment Ohridski", 7000 Bitola, North Macedonia

Abstract

Examination is done for a period of two years. The subject of the examination are bacteria that most often cause clinical mastitis in Holstein-Frisian High Dairy Cows. In the study were included 36 cows suffering from clinical mastitis confirmed by a veterinarian. Two sterile swabs were taken from each spike of a cow or a total of 92.Milk samples were taken in sterile tubes and placed on petri dishes with a nutrient medium where sheep blood was added. The dishes were cultured at 370C for 24-48 hours. The bacteria were initially identified by characteristics of the blood agar columns, Gram-staining and biochemical characteristics .Furthermore the columns were placed on selective nutrient media as follows: Mannitol salt agar, MacConkey agar, Edward's media за Streptococci. The obtained results for 2019 are: E.coli 41%, Staphylococcus spp 33%, Streptococcus spp 10%, Pasteurella spp 7%, Proteus spp 5% and Klebsiella spp 4% and for 2020 are: E.coli 37%. Staphylococcus spp 29%, Streptococcus spp 13%, Proteus spp 10%, Pasteurella spp 6% and Klebsiella spp 5%.

Keywords: E.coli, Staphylococcus spp, Streptococcus spp, Pasteurella spp, Klebsiella spp

Effect of feeding different levels of wheat dried distillers grains with solubles (wDDGS) on nutrient digestibility in growing pigs

Gancho Ganchev, Atanas Ilchev, Krum Nedelkov
Faculty of Agriculture, Trakia University

Abstract

The aim of this research was to evaluate the total tract digestibility coefficients of the main nutrients in growing pigs fed diets with different inclusion levels of wheat dried distillers grains with solubles (wDDGS) produced in Bulgaria. Four castrated male pigs from the Danube White breed averaging (± SD) 31 ± 0.4 kg, housed in individual metabolic cages, were used to compare digestibility parameters after feeding 4 different diets. Dietary treatments were composed of a basal diet (100 wheat) consisting mainly of wheat, (96.7% wheat and 3.3% vitamins and minerals), a diet containing 40% wDDGS, 60% wDDGS diet, and wDDGS based diet (100 wDDGS), consisting mainly of wheat DDGS (97.85% wDDGS and 2.15% vitamins and minerals). The apparent total tract digestibility coefficients of nutrients, including dry matter (DM), crude protein (CP), ether extracts (EE), crude fibers (CF), and nitrogen-free extracts (NFE) were determined. In this digestibility trial, the gradual increase of the wDDGS in the rations of growing pigs resulted in significant decreases in total tract digestibility coefficients of CP, EE, CF, and NFE.

Keywords: wheat, wheat DDGS, digestibility, growing pigs

Effects of feeding frequency on the silkworm Bombyx mori L. development

Radostina Peneva Guncheva
Faculty of Agriculture, Trakia University

Abstract

The aim of this paper was to study the influence of the feeding frequency on the silkworm Bombyx mori L. development, based on the traits survival (%) and larval development duration (h). The study was conducted during 2020 at the Training experimental Station of the Sericulture section of the Faculty of Agriculture at Trakian University. Two hybrid forms of the silkworm Bombyx mori L. ""1013 x 20"" and ""20 x 1013"" were used, divided into two experimental groups according to number of feedings whit mulberry leaf per day – two (1st experimental group) and four (2nd experimental group).

The hybrids from the two experimental groups demonstrated normal survival (70.55 – 86.32%) on the straight hybrid form and high (85.92 – 89.01%) and very high survival (93.89 – 96.65%) on the reciprocal throughout the larval stage as a significant effect of feeding frequency on survival is observed only in the last instars of the straight hybrid form. In the individuals from the 1st experimental group there is a more essential delay in development by about 3 days compared to the generally established norms in the practice but it could be compensated by increasing the amount of food offered. The frequency of feeding has a highly significant effect on the duration of the first and the last instars in both analyzed hybrids. However, the results obtained in the present study give reason to believe that the frequency of feedings in silkworm rearing could be reduced in order to achieve maximum economic efficiency in terms of labor costs.

Keywords: Bombyx mori L.; silkworms; mulberry leaf; feeding frequency; survival; development duration

Productivity of newly created F1 tetrahybrids of the silkworm Bombyx mori L. reared with artificial diet with reduced mulberry powder content

Radostina Peneva Guncheva, Panomir Ivanov Tsenov, Yolanda Vasileva
Faculty of Agriculture, Trakia University

Abstract

The aim of this paper was to study the productivity of newly created F1 tetrahybrids of the silkworm Bombyx mori L. reared throughout the entire larval stage with artificial diet with reduced content of dried mulberry leaf. The study was conducted at the Training Experimental Station of the Sericulture section of the Faculty of Agriculture at Trakian University. Object of the study were the tetrahybrids ""Vraca63 x Line22 / Nig2 x Merefa6"" (1st experimental group) and ""Nig2 x Merefa6 / Vratsa63 x Line22"" (2nd experimental group). The tetrahybrid ""I1 x VB1 / N2 x HB2"" was used for the control. Silkworms were reared with artificial diet (15%) produced at Scientific Center on Sericulture – Vratsa and prepared by methods, developed by the manufacturer.

Both experimental groups demonstrate relatively high mean values, with insignificant differences between them, in terms of traits determining the quality of their productivity. Even the unwinding of the silk sheath – 85% and 87%, silkiness – 44% and 43%, laboratory yield of raw silk – 37.8% and 37.7% and continuous unwinding length of the silk thread – 754 m and 802 m, respectively for the 1st and 2nd experimental groups, has with higher mean values than the control.

That gives a reason to believe that the analyzed hybrids have relatively high potential of rearing with artificial diet with reduced mulberry powder content (15%). Therefore, they could be offered for testing by IASAS and approved as the first hybrids in Bulgaria, suseptability for rearing whit artificial diet.

Keywords: Silkworms; Bombyx mori L.; hybrids; artificial diet; productivity; cocoons; silk; technological traits.

Food consumption and winter mortality in bee colonies wintering in hives with lattice and solid bottom

Ivanka Zhelyazkova and Svilen Lazarov
Faculty of Agriculture, Trakia University

Abstract

Some parameters which characterize the wintering of the bee colonies (amount of dead bees and quantity of food consumption in the winter) was investigated. The bee colonies are housed in 10-frame Dadan-Blatt hives with a lattice and solid bottom. Two reviews of the bee colonies were carried out (during wintering in November 2020 and at the beginning of the active season in March 2021). Amount of bees in the beehive (strength) and amount the capped honey in the honeycombs were reported. In bee colonies wintering in hives with a lattice bottom, the consumption of food per 1 kg of bees is 1.639 kg (50%) higher than hives with a solid bottom. Winter mortality of bees in hives with a lattice bottom is higher compared to this indicator in hives with a solidbottom, respectively 16.19±10.72 and 12.59±3.57, which can be considered an excellent wintering below 15% and for good wintering in the range of 15.0-19.99%.

Keywords: Bee colonies, Food consumption, wintering

Monitoring of temperature and humidity in hives made of different material through an electronic recording system during the autumn and winter period of the development of bee colonies

Ivanka Zhelyazkova and Svilen Lazarov
Faculty of Agriculture, Trakia University

Abstract

The changes of temperature and humidity in hives made of different material (wood, polystyrene, ceramics) during the autumn-winter period (2020 - 2021) from the development of bee colonies are tracked. Bee colonies settled in 10-frame hives Dadan-Blatt system with lattice and solid bottoms are used. To control the temperature and humidity in the beehives, an electronic recording system is used with sensors installed in each hive and one sensor for monitoring the outside temperature and humidity.

During the studied autumn-winter period the temperature in the hives (on average for the period and by months) is higher and the humidity lower compared to the values of the outside temperature and humidity, regardless of the material of the hive and the type of bottom (lattice or solid).

The highest average temperature in the autumn period (September, October, November) is found in the ceramic hive with a solid bottom (29.15 ± 6.51°C), and the minimum value is reported in the polystyrene hive with a solid bottom (19.01 ± 8.47°C). During the same period, the maximum value of the humidity indicator for the hives with a lattice bottom is observed in the ceramic hive (50.74 ± 8.92%) and minimum in the polystyrene hive (45.91 ± 9.62%). For beehives with a solid bottom, the highest average humidity is found in the polystyrene hive (55.14 ± 6.96%), and the lowest in the wooden hive (44.69 ± 5.00%).

During the winter period (December, January, February) the highest average temperature is found in wooden hives, and the lowest in polystyrene hives, regardless of the type of bottom. The largest difference from the outside temperature (average 5.11° C) is observed in the wooden hives - respectively 5.04°C with a lattice bottom and 6.78°C with a solid bottom. The lowest average value of the humidity indicator is reported in the wooden hives, regardless of the type of the bottom, and the highest in the polystyrene hive with a lattice bottom and the ceramic hive with a solid bottom. The difference between the average values of the humidity indicator in the hives compared to the external humidity (79.24%) in the hives with lattice bottoms is less than 10%. In the hives with solid bottoms the differences vary in the range of 6-24% and the highest being in the wooden hives.

Keywords: Monitoring, Hives, Electronic recording system

Hematological and biochemical reference values of mature domestic donkeys in Bulgaria

Rumen Binev, Krum Nedelkov, Anton Rusenov, Krasimir Stoyanchev, Lazarin Lazarov, Tsanko Hristov, Todor Slavov
Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract

The aim of the present study was to establish hematological and major biochemical reference values for adult domestic donkeys in Bulgaria. Blood samples were collected from 385 healthy donkeys (90 males and 295 females) aged from 1.5 to 20 years and over. The mean values of red blood cell count (RBC), hemoglobin concentration, hematocrit, and the number of white blood cells (WBCs) were estimated to be 6.55 T/L (SD = 0.11), 144 g/l (SD = 1.53), 0.35 % (SD =0.06) and 10.9 G/L (SD = 0.25), respectively. The mean WBC differential count for eosinophils, metamyelocytes, segmented and banded neutrophils, lymphocytes and monocytes was 15.8%, 0.42%, 4.70% , 33.7%, 45% and 0.32%, respectively. The biochemistry profile included the average levles of total protein, albumin, urea, blood glucose concentration, cholesterol, total and conjugated bilirubin which were measured as 69.95 g/l (SD = 3.22), 35.76 g/l (SD = 0.51), 4.05 mmol/l (SD = 0.11), (4.68 mmol/l; SD = 0.06), (92.11 mg/dl; SD = 0.77), (3.29 µmol/l; SD = 0.07) and (0.48µmol/l; SD = 0.02), respectively. The hematological and biochemical average ranges for adult donkeys established in the current study can be effectively used as a reference value in routine clinical practice.

Keywords: donkey, reference values, hematological profile, mature

Reference ranges of certain paraclinical parameters in domestic donkeys in Bulgaria

Rumen Binev, Krum Nedelkov, Anton Rusenov, Krasimir Stoyanchev, Lazarin Lazarov, Tsanko Hristov, Todor Slavov
Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract

The present study aimed to determine the reference ranges of certain paraclinical parameters for adult domestic donkeys in Bulgaria. Three hundred and eighty-five healthy adult donkeys (n = 90 males; n = 295 females) aged from 1.5 to 20 years and over were sampled. Blood samples were obtained by venipuncture of the jugular vein. The paraclinical panel included some biochemical parameters, coagulation factors, phagocytic number, phagocytosis percentage, lysozyme and complement activity, and urine pH. The average levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatine kinase (CK), lactate dehydrogenase (LDH), glutamate dehydrogenase (GDH) and alkaline phosphatase (ALP) were 168 ± 41.5 IU/L (Mean + SD), 16.7 ± 5.30 IU/L, 171 ± 46.3 IU/L, 432 ± 61.3 IU/L, 44.8 ± 16.5 IU/L and 137 ± 25.4 IU/L, respectively. The mean values of coagulation factors were measured as 1.95 ± 0.06 g/l, 9.80 ± 0.16 s and 31.31±0.32 s for the fibrinogen, thrombin time (TCT), and partial thromboplastin time (PTT), respectively. The average values of phagocytic count, phagocytosis percentage, lysozyme and complement activity/CH50 were estimated as 1.67 ± 0.13, 57.6 ± 2.93%, 1.26 ± 0.05 mkg/ml and 68.7 ± 0.90 mkg/ml, respectively. The observed paraclinical ranges in the present study are advised to be used as reference values for mature domestic donkeys in Bulgaria.

Keywords: donkey, reference ranges, paraclinical parameters, domestic

Effect of phytonutrients on the performance and serum cholesterol profile of entire male pigs

Sonya Ivanova, Tanya Nikolova
Земеделски институт – Шумен

Abstract

The experiment aimed to assess the potential of addition of phytonutrients from dry distilled rose petals Roza Damascena Mill (DDRP) in the feed to affect the performance and serum cholesterol profile in entire male pigs. A total of 30 male pigs from Danube white breed with an average body weight of 67 kg were allocated to one of the three groups – control, castrated male pigs (C), entire male pigs (EM) and entire males with addition of 5g of DDRP in 1 kg of feed (EM+R). All pigs were reared and fed in group pens enriched with outside yards. At the age of 186 days and average live weight of 109 kg, the pigs were slaughtered and blood samples were taken. Total cholesterol, high density lipoproteins (HDL), low density lipoproteins (LDL), triglycerides, urea and testosterone concentrations were analyzed in certified laboratory. Addition of DDPR to the feed of EM did not influenced growth performance and the content of triglycerides in the blood. The group of entire males consuming DDPR in feed, had significantly lower values of total cholesterol ($P<0,001$), LDL ($P<0,001$) and HDL ($P<0,05$), in comparison to the C and EM groups. Urea concentrations in blood were decreased in both EM group ($P<0,001$). The testosterone level in EM+R group was also decreased by 45,17% (n.s.). In conclusion, the addition of phytonutrients to the diet and enriched raised conditions did favorably affected the welfare of entire male pigs.

Keywords: entire male pigs, phytonutrients, performance, serum cholesterol, HDL, LDL, triglycerides, urea, testosterone

Acknowledgements: This research was funded by BULGARIAN NATIONAL SCIENCE FUND, grant number KP-06-COST 16 "Exploring the possibilities for welfare, overcoming the boar taint in the meat of entire male pigs and the attitudes of consumers", supporting COST action CA15215 IPEMA “Innovative Approaches for Pork Production with Entire Males”.

Influence of milk fat-to-protein ratio on reproductive performance of Holstein dairy cows

Teodora Angelova, Krum Nedelkov, Jivko Krastanov, Daniela Yordanova, Svetlana Georgieva
Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract

The objective of the present analytical study was to evaluate the milk fat-to-protein ratio (FPR) and its effect on reproductive performance of highly producing Holstein dairy cows. The study included 2,849 cows from first to sixth parity and the total number of 25,462 milk production records. The higher risk of incidence of subacute ruminal acidosis (SARA) estimated by FPR was observed at cows during the first 100 days of lactation. Changes in FPR were associated with extended days open (DO) period as the longest interval was found at FPR values of 1.4. The reproductive performance determined by the calving intervals (CI) was slightly affected by the FPR which was within a narrow range of 1.18 to 1.20 for both shorter and longer CI. However, the early-lactation cows experiencing ketosis, predicted by milk FPR, had much longer DO compared to health and SARA cows. It was also observed a relatively longer CI of 462 days in early-lactation cows experiencing ketosis. The current analysis indicated that the milk FPR by which the SARA and ketosis could be easily identified is one of the major factors influencing the reproductive performance of Holstein dairy cows.

Keywords: dairy cows, fat-to-protein ratio, reproductive performance

CRISPR-Cas9 Technique, Its Use in Livestock and Ethical Evaluation

Hasan ÇOĞAN, Murat YILMAZ
Aydın Adnan Menderes University, Aydın- TURKEY

Abstract

Clustered Regularly Interspaced Short Palindromic Repeats CRISPR-Cas9 (CRISPR associated) system, which is currently a genome engineering tool; It is an RNA and protein based technique discovered in bacteria, archaea, prokaryotes that aims to protect the cell against bacteriophage infections, invasive plasmids and foreign nucleic acids. It covers broad fields of study such as medicine, animal husbandry and even environmental studies, with its ability to insert, extract and even edit DNA sequences easily and precisely. The CRISPR / Cas9 system has studies aimed at inducing the knockout and knockout alleles of the bovine PRNP gene responsible for mad cow disease in both bovine fetal fibroblasts and IVF embryos, generating a polled genotype in cattle. There are many studies aiming to deactivate the unwanted gene in rabbits, goats and sheep. Genetic studies have been carried out in different species using the CRISPR-Cas9 technique for different purposes in livestock breeding. The CRISPR-Cas9 technique has provided opportunities in modern medicine as a healing tool against preventable diseases and has enabled the prevention of cancer, blood diseases, HIV treatment, cystic fibrosis, blindness, muscular dystrophy and other diseases. In the livestock industry, embryonic stem cells have expanded the range of work to produce transgenic animals, resistant and highly productive hybrids. Although it is exciting to see at a very high level how Cas9 actually works to cut and edit DNA strands, it is difficult to give definitive answers about its bad results in the future. In order for gene editing technique to be used as a clinical tool, it must be carefully studied with basic research methods in terms of safety, accuracy and applicability.

Keywords: Genetics, CRISPR, Cas, Gene silencing, Livestock farming

Study of the sheep breeder's interest in the use of modern information and communication technologies in sheep breeding

Valentina Petrova, Doytcho Dimov
Agricultural university

Abstract

The process of digitalization in the activities of sheep breeder's communities is gradually gaining momentum. The aim of the present study is to examine the sheep breeder's interest in the use of modern information and communication tools in sheep breeding and in particular their role in increasing the public interest in popular local sheep breeds. For this purpose, data, information, facebook pages, websites and communication tools of three breeding organizations dealing with the breeding of four local sheep breeds were used – White Maritza sheep, Patch-faced Maritza sheep, Black-headed Pleven and native Stara Zagora. Based on a survey of 147 sheep breeders, it was found that 99.32% of them own mobile phones, 66.67% use smartphones and 51.02% own personal computers, which is a prerequisite for the intensive use of modern information and communication technologies (ICT). Among the sheep breeder's communities of the four breeds, half of the sheep breeders (51.02%) use a personal computer and 55.10% have an e-mail. The farmer's interest in the social networks regarding published photos and videos of the breeds White Maritza and Patch-faced Maritza was tested. The public interest in the published photos is greatest during the first 24 hours (1968.33 and 1780.98 views, respectively), gradually subsiding by the 504th hour until 0. The user attitude expressed by writing comments under the individual posts is highest in the first 24 hours and after the 96th hour the comments are extremely rare. The public interest in the published videos over the years is definitely great, which defines this type of dissemination of information and advertising materials as an effective method (over 1000 views), and the user attitude is almost the same as in the photos. Conducting an on-line auction is a new opportunity to sell sheep and rams for breeding, and in the new COVID environment it can be an important priority for breeding organizations.

Keywords: information and communication technologies, sheep, breeds

Секция 2. "Растениевъдни науки"
Section 2. Crop science

Доклади
Oral presentations

Possibilities for integrated control of the cotton bollworm (Helicoverpa armigera Hb.) in the growing tomatoes in green houses.

Roksana Mineva, Vinelina Yankova, Nikolay Valchev
Faculty of Agriculture, Trakia University

Abstract

Cotton bollworm (Helicoverpa armigera Hb.) has become one of the main pests in growing greenhouses tomato. In recent years, there has been a significant increase in the number of this pest due to changing climatic conditions and the hidden lifestyle of the caterpillars, which usually remain unaffected by the insecticides. Chemical treatments are not always effective enough. Resistance to the insecticides used is often observed in the populations. New alternative solutions to control this pest are constantly being searched. The integrated control creates an opportunity for optimal combination of chemical and biological approaches. In 2020, experiments on tomatoes variety Pink Rock F1 grown in greenhouses to determine the biological activity of some plant protection products were conducted in the "Maritsa" Vegetable Crops Research Institute - Plovdiv. The by-products Rapax (a. i. Bacillus thuringiensis subsp. kurstaki strain EG 2348) at a dose of 100 ml/da and Helicovex (a. i. Helicoverpa armigera nucleopolyhedrovirus Hear NVP, DSMZ-BV0003) at a dose of 20 ml/da have good efficacy >70% towards the cotton bollworm in the interval 7-14 days after treatment. The tested insecticides Coragen 20 SK 20 ml/da (a.i. chlorantraniliprol), Exalt 25 SK 240 ml/da (a.i. spinetoram), Voliam Targo 063 SK 80 ml / da (a.v. abamectin + chlorantraniliprol) and Ampligo 150 3K 40 ml/ da (a.i. lambda cyhalothrin + chlorantraniliprole) showed very good biological activity (E > 80%) 7 days after treatment.

Keywords: tomato, Helicoverpa armigera, bioproducts, insecticides, Integrated pest management

Study of the effectiveness of chemical and biological agents for the control of tomato leaf miner (Tuta absoluta Meyrick).

Roksana Mineva, Vinelina Yankova, Nikolay Valchev
Faculty of Agriculture, Trakia University

Abstract

The effect of four varieties of tomatoes has been studied in greenhouses of conventional and integrated control method against tomato leaf miner. The following products are included in the conventional method: Confidor Energy OD 0.08% (a.v. imidacloprid + deltamethrin); Ampligo 150 ZK 40 ml / da (a.v. lambada cyhalothrin + chlorantraniliprol); Coragen 20 SC 20 ml / da (a.v. rinaxipir); Exalt 25 SC 240 ml / da (a.v.spinetoram); Voliam Targo 063 SC 80 ml / da (a.v. abamectin + chlorantraniliprol); Voliam Targo 063 SC 80 ml / da. In the integrated method are used the products for plant protection - Confidor Energy OD 0.08%; Sineis 480 SC 25 ml / da (a. V. Spinosad); Sineis 480 SC 25 ml / da; Voliam Targo 063 SC 80 ml / da; Nim Azal T / C 0.3% (a.v. azadirachtin); Nim Azal T / C 0.3%. Six consecutive treatments were performed at intervals of 10 days.

In the experiment are tracked the biological activity and efficacy of the preparations against the tomato leaf miner, the degree of attack of the different varieties by the enemy and the productivity of the tomatoes. It was found that in the conventional and integrated treatment method, the highest efficacy was shown by the preparation Voliam Targo 063 SK, applied at a dose of 80 ml / da on the seventh day after spraying. The percentage of damaged plants is the lowest in the variety Clarosa (8.00%), with the application of the conventional plant protection method. The results are similar in the integrated method - 10%, while in the control the degree of attack reaches 50%. The percentage of damaged fruits in both treatment methods was 12.00%, significantly lower than in the control (56.00%). The highest is the productivity of tomatoes with the application of the conventional plant protection method for the Manusa variety.

Keywords: Tuta absoluta, chemical and biological agents for control, efficiency, productivity, tomatoes.

Gonocerus acuteangulatus (Hemiptera: Coreidae) нов неприятел при биологично производство на малини в Западна България.

Елена ЦОЛОВА, Лиляна КОЛЕВА
Лесотехнически университет, София

Abstract

Дъреницата е Gonocerus acuteangulatus е ратителнояден вид от сем. Coreidae. Видът е разпространен от Европа, с изключение на север до Централна Азия. Насекомите обитават широколистни храсти и дървета, особено храсти от сем. Rosaceae.

Дървениците бяха намерена във висока плътност в насаждения от малини в района Костинброд , Дупница и Костенец. Възрастните индивиди бяха идентифицирани като Gonocerus acuteangulatus (Goeze, 1778) въз основа на морфологичните белези и таксономичен ключ за този вид. Повредите и вредата от дървеницата са установени при ремонтантния малинов сорт Люлин по време на вегетационния сезон от април до септември на 2017- 2019 г. Това изследване представлява първо съобщение за G. acuteangulatus като нов неприятел във висока плътност по малиновите насаждения в Западна България.

Keywords: Rubus idaeus, G. acuteangulatus, статус на неприятеля

Study of the disease "Sudden wilting of lavender", caused by `Candidatus. Phytoplasma solani` in Bulgaria.

Zhelyu Avramov
University of Forestry

Abstract

The beneficial properties of medicinal and essential oil crops and medicinal and aromatic plants have been studied for thousands of years. Their cultivation corresponds to their growing demand, which leads to an annual increase in areas and an increase in the amount of herbal collection. In Bulgaria, the cultivation of some crops such as oil-bearing rose, lavender, and mint, has old traditions and world recognition and fame. Lavender as an intensive crop is often accompanied by the appearance of diseases and pests that can cause serious damage and in some cases even compromise the harvest. It is inadmissible in the production and its derivatives, the presence of even traces of the use of plant protection products. On the basis for the improvement of the applied methods of plant protection is an achievement of a good knowledge of the diseases in lavender plantations. An important point is the accurate, fast and reliable identification of pathogens in laboratory conditions of new and unknown phytoplasma diseases for Bulgaria.Examination of the lavender fields revealed symptoms of lavender disease with marked yellowing, reduction, straightening or sagging of the leaves, reduction and abortion of the inflorescences. A laboratory analysis total number on 91 lavender plant samples, 32 cicadas and 16 weed samples were performed. Phytoplasma infection in five samples from the Chirpan and Dobrich regions belonging to the Stolbur phytoplasma group, showing identical profiles was identified by PCR and RFLP analysis. For confirmation qPCR and sequencing was performed. The results are evidence that the established infection is of Sudden wilting of lavender caused by the phytoplasma ‘Candidatus Phytoplasma solani’ identified for the first time in Bulgaria.

Keywords: Lavender, ‘Candidatus Phytoplasma solani’, Bulgaria.

Проучване на най-ранните симптоми на шарка по сливата в Софийското поле и Врачански регион.

Желю Аврамов
Лесотехнически университет

Abstract

Още от древността плодовете на сливата са заемали важно място на трапезата на българина. Сливите се консумирали целогодишно. През юли, август и септември като пресни плодове, а през зимните месеци като сушени сливи и в преработено състояние. Заради традициите сливата и за в бъдеще ще бъде една от основните овощни култури в страната. За получаване на високи и стабилни добиви от съществуващите сливови насаждения, важно условие е правилното организиране и провеждане на растително защитни мероприятия и не на последно място е правилното и точното диагностициране на PPV – Шарката по костилковите. При нашите климатични условия Шарката по сливата проявява симптоми най-напред по първите пролетни листа. Типични са бледозелените широки пръстеновидни петна, разпръснати по цялата листна петура. Малко и оскъдни са описаните симптоми по цветовете при различните костилкови видове и затова проведохме настоящето проучване за подробно описание, диференциране и сравняване на визуални симптоми при цъфтежа със резултатите от ELISA тестове на листата на обследваните костилкови видове. От обследваните видове гостоприемници на PPV бяха избрани и описани 12 дървета със симптоми по цветовете в два района на България – Софийското поле и Врачански регион. В общо 9 броя проби беше потвърдена инфекция от PPV. Установените отклонения бяха констатирани единствено при овощните култури, които цъфтят с бели цветове. Въз основа на резултатите и направените изводи, настоящето проучване ще допринесе за своевременното откриване на причинителя на Шарката по най-ранните симптоми в разсадниците и градините и ще даде правилна и бърза насока за преодоляване на щетите чрез правилно провеждане на растително защитните дейности.

Keywords: PPV, най-ранни симптоми, диагностика, България

Role of citizen science for plant health in Bulgaria.

Rumen Tomov, Elena Tsvetkova, Hristina Stefanova, Galin Milchev
Лесотехнически университет/University of forestry

Abstract

Plant health is crucial for crop production, forestry, natural ecosystems, and urban areas. The risk of introducing alien plant pests (APP) in Bulgaria is constantly increasing due to the trade of plants and plant material and climate change. Phytosanitary measures successfully prevent the introduction of quarantine and regulated non-quarantine pests in Bulgaria but there is a risk of introduction of non-regulated plant feeding insects already established elsewhere in Europe. Good awareness about the pathways and negative impact of APP are crucial for early detection and prevention of their introduction and spread. Citizen science (CS) could play an important role in the awareness-raising and engagement of different stakeholders in the prevention of APP. The COST Action CA 17122 has addressed multidisciplinary research questions in relation to developing and implementing citizen science. To facilitate the implementation of this COST Action in Bulgaria, the project "State and perspectives of citizen science for invasive alien species in Bulgaria" supported by the National Science Fund of Bulgaria has been launched in 2019.

The article presents an analysis of the SC initiatives for APP in Bulgaria. Based on a questionnaire survey, it was found that the main reasons for the failure to participate in SC initiatives are the lack of accessible information on the problems posed by the APP and the lack of tools and initiatives for the SC dedicated to APP in Bulgaria. Necessary activities, aiming at changing public attitude towards the problem of introduction of APP and involvement of the general public in SC activities for prevention of the introduction of APP in Bulgaria are presented and discussed.

Keywords: alien species, insecta, pests, awareness

Current status of alien arthropods established in agrocenoses of Bulgaria.

Rumen Tomov
Лесотехнически университет

Abstract

Bulgaria is threatened by the introduction of alien species because of its geographic position, diverse climate and rapidly increasing trade of plants and plant material. Eighteen alien not regulated plant-feeding insect species have been detected in Bulgaria during the period 2011-2020. Some of them with potential to become economically important pests. About a hundred arthropod speci

Key words: es with alien origin are considered as crop pests and still, about ten of them are economically important pests despite the fact that they have been introduced before more than 40 years in Bulgaria. In addition, several beneficial species were introduced or entered Bulgaria by natural spread from neighboring countries. Despite the many projects developed related to alien species, there are still arthropod species that have an unclear population status in Bulgaria. Based on review of published studies and field survey conducted in the framework of the project: "Assessment of the impact of the alien insects and the risk of their introduction in agrocenosis in Bulgaria" during the period 2019-2020, a validated list of alien arthropod species established in agrocenoses of Bulgaria was developed. History of introduction, occurrence, pathways, biases, and gaps in our knowledge of alien arthropods related to agrocenoses of Bulgaria are presented and discussed.

Keywords: Non-indigenous, pests, bioagents, insect, mites

Секция 2. "Растениевъдни науки"

Section 2. Crop science

Постери
Posters

Selectivity and stability of herbicides, herbicide tank mixtures and herbicide combinations on Clearfield oilseed canola (Brassica napus L.)

Grozi Delchev
Тракийски университет, Аграрен факултет, Стара Загора

Abstract

During the period 2018 - 2020 a field experiment was carried out with the winter Clearfield oilseed canola hybrid Phoenix CL (Brassica napus L). Factor A included the years of investigation. Factor B included untreated control, 2 combined herbicides: Cleranda SC and Cleravo SC; 6 herbicide tank mixtures: Electron 500 SC + Maza 4 SL, Springbok + Maza 4 SL, Tanaris + Maza 4 SL, Butisan max + Maza 4 SL, Cliofar 600 SL + Maza 4 SL and Galera super + Maza 4 SL; 6 herbicide combinations: Caliph 480 EC + Maza 4 SL, Caliph mega + Maza 4 SL, Bismark CS + Maza 4 SL, Nero EC + Maza 4 SL, Brasan 540 EC + Maza 4 SL and Colsor trio EC + Maza 4 SL. Herbicides Cleranda, Cleravo and Maza were used in addition with adjuvant Dash HC. Foliar-applied herbicides were treated during 2-4 leaf canola stage. Soil-applied combined herbicides were treated during after sowing before emergence period of the canola. The highest seed yields are obtained by use of combined herbicide Cleranda, followed by herbicide tank mixture Electron + Maza and combined herbicide Cleravo. High canola yields are also obtained by herbicide tank mixtures Butizan max + Maza, Springbok + Maza, Tanaris + Maza, as well as by herbicide combinations Caliph mega + Maza, Brasan + Maza, Bismarck + Maza. Technologically the most valuable are combined herbicide Cleranda, followed by herbicide tank mixture Electron + Maza and combined herbicide Cleravo. In terms of technology for growing winter Clearfield oilseed canola, herbicide tank mixtures Springbok + Maza, Butisan max + Maza and Tanaris + Maza, as well as herbicide combinations Caliph mega + Maza, Bismar + Maza and, Nero + Maza get high rating. Herbicide tank mixtures Cliofar + Maza and Galera super + Maza and herbicide combinations Caliph + Maza and Colsor trio + Maza get low rating.

Keywords: oilseed canola, herbicides, herbicide tank mixtures, herbicide combinations, selectivity, stability

Sowing characteristics of the durum wheat seeds (Triticum durum Desf.) by use of some antigraminaceous and combined herbicides

Grozi Delchev
Тракийски университет, Аграрен факултет, Стара Загора

Abstract

The research was conducted during 2018 - 2020 on pellic vertisol soil type. Under investigation was Bulgarian durum wheat cultivar Predel (Triticum durum Desf.). It was investigated 18 variants: hand weeded control, 4 antigraminaceous herbicides – Imaspro 7.5 EB (fenoxaprop-ethyl) – 1 l/ha, Sword 240 EC (clodinafop-propargyl) – 250 ml/ha, Traxos 50 EC (pinoxaden + clodinafop-propargyl) – 1.20 l/ha, Axial 050 EC (pinoxaden) – 900 ml/ha and 13 combined herbicides - Axial one (pinoxaden + florasulam) – 1 l/ha, Zerrate (clodinafop-propargyl + piroxulam) – 250 g/ha, Palace 75 WG (piroxulam) – 250 g/ha, Corello duo (florasulam + piroxulam) – 250 g/ha, Hussar max OD (mesosulfuron + iodosulfuron) – 1 l/ha, Pacifica expert (amidosulfuron + iodosulfuron-methyl-sodium + mesosulfuron-methyl) – 500 g/ha, Atlantis flex 20.25 WG (mesosulfuron-methyl + propoxycarbazone sodium) – 330 g/ha, Tolurex 500 SC (chlorotoluron) – 4 l/ha, Constell (diflufenican + chlorotoluron) – 4.5 l/ha, Battle delta (flufenacet + diflufenican) – 600 ml/ha, Eagle 75 WG (chlorosulfuron) – 20 g/ha, Prol aqua (pendimethalin) – 3 l/ha, Krum (prosulfocarb) – 5 l/ha. All of antigraminaceous herbicides and foliar-applied combined herbicides were treated during tillering stage of the durum wheat. Soil-applied combined herbicides were treated during after sowing before emergence period of the durum wheat. Combined herbicides Tolurex and Constell decrease proved germination energy and laboratory seed germination of the durum wheat seeds. Length of coleoptile is decreased by influence of herbicides Tolurex and Constell. Lengths of primary roots are decreased by influence of herbicides Tolurex, Constell, Krum and Battle delta. Investigated 4 antigraminaceous and 13 combined herbicides do not proved influence on waste grain quantity. Combined herbicides Tolurex and Constell during their soil application during after sowing before emergence period lead to obtaining of the lowest durum wheat grain yields. Soil-applied combined herbicide Eagle leads to obtaining of the highest grain yields.

Keywords: durum wheat, antigraminaceous and combined herbicides, grain yield, sowing characteristics

Сравнително изпитване на стари сортове обикновена зимна пшеница при променящите се климатични условия

Comparative testing of old winter common wheat varieties of under changing climatic conditions.

Евгений Димитров, Златина Ур, Рангел Драгов, Радослав Чипилски
Evgeniy Dimitrov, Zlatina Uhr, Rangel Dragov, Radoslav Chipilski.
IPGR, Sadovo / FCI Chirpan

Abstract

Експериментът е проведен в опитното поле на ИРГР – гр. Садово през периода 2018-2020 г. Сортовите опити са извеждани по блокова схема в три повторения, с размер на опитната парцела от 10 m^2 по възприета в ИРГР технология на отглеждане след бобов предшественик. Шестнадесетте старите сортове обикновена зимна пшеница, създадени в ИРГР, са изпитвани по добив в продължение на две години и са сравнявани със стандарт Садово 1. Проследени са добива, височината и физичните свойства на зърното: маса на 1000 зърна (g) и хектолитрова маса (kg/hl). Получените данни са обработени със статистически методи – дисперсионен, вариационен и анализ на главните компоненти. Резултатите показват, че при всички проследени показатели е доказано влиянието на генотипа, средата и взаимодействието им. Всички сортове са с значимо по-високи добиви от стандарта. Най-висок добив от зърно е отчетен при сортовете Йоана, КМ 135, Диамант и Гинес. Не е отчетена доказано по-висока маса на 1000 зърна, а хектолитровата маса само при два сорта е значимо по –висока в сравнение със стандарта. Варирането при проследените показатели е ниско, като при добива стойността е гранична (CV=10.2%). Резултатите от дисперсионния анализ показват, че при всички проследени показатели е доказано влиянието на генотипа, средата и взаимодействието им. Данните от анализа на главните компоненти сочат, че два от компонентите са значими и обясняват 67.7% от общото вариране.
Целта на изследването е изпитване ефекта на климатичните изменения върху добива, височината и физичните свойства на зърното на стари сортове обикновена зимна пшеница, като основна продоволствена култура, и оценка устойчивостта им на климатичните промени.

The experiment was conducted in the experimental field of IRGR - Sadovo in the period 2018-2020. The varietal experiments were performed in a block sheme in three replications, with a size of the experimental plot of 10 m2, according to the technology of cultivation after bean predecessor adopted in IRGR. The sixteen old varieties of common winter wheat, created in IRGR, were tested in yield for two years. As standard was used the variety Sadovo 1. The yield, plant height and physical properties of the grain were obtained: 1000 g kernel weight and test weight (kg/hl). The obtained data are processed by statistical methods - dispersion, variation and analysis of the main components. The results show that the influence of the genotype, environment and their interaction has been proven in all monitored traits. All varieties have significantly higher yields than the standard. The highest grain yield was reported for the varieties Joanna, KM 135, Diamand and Guinness. There is no significant higher 1000 kernel weight and the test weight of only two varieties is significantly higher than the standard. The variation in the monitored traits is low, as the yield value is limited (CV=10.2%). The results of the analysis of the main components show that two of the components are significant and explain 67.7% of the total variation.
The aim of the study is to test the effect of climate change on the grain yield, plant height and physical properties of old varieties of common winter wheat, as the main food crop, and to assess their resilience to climate change.

Keywords: стари сортове; обикновена зимна пшеница; устойчивост; климатични промени; добив;
old varieties; common winter wheat; resistance; climatic changes; yield;

Проучване на добива и елементите на продуктивността за стари сортове обикновена зимна пшеница при променящите метеорологични условия
Study of the yield and productivity elements of old common winter wheat varieties in changing climatic conditions.

Евгений Димитров, Златина Ур, Рангел Драгов, Радослав Чипилски
Evgeniy Dimitrov, Zlatina Uhr, Rangel Dragov, Radoslav Chipilski
IPGR, Sadovo

Abstract

Експериментът е проведен в опитното поле на ИРГР – гр. Садово през периода 2018-2020 г. Сортовите опити са извеждани по блокова схема в три повторения, с размер на опитната парцела от 10 m^2, по възприета в ИРГР технология на отглеждане след бобов предшественик. На шестнадесетте старите сортове обикновена зимна пшеница, създадени в ИРГР е проведен биометричен анализ. Снети са показателите: добив, продуктивна братимост, дължина главен клас, брой класчета в главен клас, брой зърна в главен клас, тегло зърно в главен клас, брой зърна в останали класове, тегло зърна останали класове, брой зърна 1 растение и тегло зърна от 1 растение. Изчислено е съотношението на тегло зърно главен клас към теглото на зърна 1 растение, %. Данните са обработени чрез статистическите методи – дисперсионен, вариационен и анализ на главните компоненти. Най-ниско е варирането при показателите: обща братимост, продуктивна братимост, дължина главен клас, брой класчета в главен клас; средно при добив, брой зърна в главен клас, тегло зърно в главен клас, брой зърна в останали класове, брой зърна 1 растение и тегло зърна от 1 растение и най-силно варира теглото на зърна в останалите класове. Резултатите показват, че при всички проследени показатели е доказано влиянието на генотипа и взаимодействието на генотип х среда. Влиянието на средата е недоказано само при 3 показателя - БКГК, ТЗОК и Б31Р. Данните от анализа на главните компоненти сочат, че 4 от компонентите са значими и обясняват 84.3% от общото вариране.
Целта на изследването е изпитване ефекта на климатичните изменения върху добива и структурните елементи на добива на стари сортове обикновена зимна пшеница, като основна продоволствена култура.

The experiment was conducted in the experimental field of IRGR - Sadovo in the period 2018-2020. The varietal experiments were performed in a block sheme in three replications, with a size of the experimental plot of 10 m2, according to the technology of cultivation after bean predecessor adopted in IRGR. Biometric analysis was performed on the sixteen old varieties of common winter wheat created in IRGR. The main productivity elements were taken.The ratio of grain weight in the main spike to the weight of grains per plant,%, was calculated. The data are processed by statistical methods – variance, variation and analysis of the main components. The variation in the indicators is from weak to strong- depending on the size of VC%. The results show that the influence of the genotype and the interaction of the genotype x environment was proved in all the monitored traits. In terms of traits, the influence of the environment is unproven only in 3 indicators – grains weight in 1 plant , grains weight in the other spikes and spikelets number in the main spike. The data from the analysis of the main components show that 4 of the components are significant and explain 84.3% of the total variation.
The aim of the study is to test the effect of climate change on yield and the structural elements of the yield of old varieties of common winter wheat, as the main food crop.

Keywords: обикновена зимна пшеница; стари сортове; климатични промени; структурни елементи, статистически анализи;
common winter wheat; old varieties; climate change; structural elements; statistical analyzes;

Продуктивност на Trihoderma viride върху среди, съдържащи различни хранителни източници.

The productivity of Trihoderma viride on media containing different food sources.

Олга Георгиева, Наталия Караджова
Olga Georgieva and Natalia Karadzhova
Институт по зеленчукови култури "Марица"/Maritsa Vegetable Crops Research Institute

Abstract

Проучено е влиянието на хранителните среди, количеството посевен материал и началната киселинност върху натрупване на биомасата от антагонистичната гъба Trihoderma viride при дълбочинно култивиране. В резултат от изследванията са оптимизирани биотехнологичните параметри за дълбочинно производство на биопрепарата. Разработена е хранителна среда, върху която гъбата осъществява пълният цикъл на онтогенеза и образува хламидоспори и фиалоконидии. Получената биомаса с титър повече от 1˙108 хламидоспори в 1 мл може да се използва както за производство на течен препарат, така и за производство на препарати върху твърди субстрати. / The influence of nutrient medium, amount of inoculum and initial acidity on the biomass accumulation of the antagonistic fungus Trihoderma viride during deep cultivation was studied. As a result of the research, the biotechnological parameters for deep production of a biological product were optimized. A balanced semi-synthetic nutrient medium was developed in which the fungus performs a complete ontogenesis cycle, forming chlamydospores and phialoconidia. The resulting biomass with a titer of more than 1˙108 chlamydospores in 1 ml can be used both to produce liquid preparations and to produce preparations on solid substrates.

Keywords: Trihoderma viride, дълбочинно производство, оптимизиране, хранителни среди, натрупване на биомаса, хламидоспори, фиалоконидии./Trihoderma viride, submerged fermentation, optimization, medium composition, accumulation of biomass, chlamydospores, phialoconidia.

Study of the productivity of irrigation water for cotton.

Antoniya Stoyanova
Trakia University, Faculty of Agriculture

Abstract

The aim of this study was to investigate the effect of irrigation on three varieties of cotton grown under natural moisture and optimal irrigation. To study the nature of the relationship between cotton productivity and irrigation rate, irrigation water productivity and additional yield during rainy years. The study covers a set of data for the period 2018 to 20120, characterized by uneven distribution of precipitation during the growing season, in the conditions of optimal irrigation regime and natural water supply. The data are the result of field conditions in the region of Stara Zagora, Bulgaria. As a result of this study, corn production facilities have been established for optimal irrigation and natural water supply. Calculate the productivity of irrigation water, which varies from 1.72 to 5.72 kg.ha-1.mm, over the years with different rainfall provision. There is a strong positive relationship between additional yield and irrigation rate productivity. The correlation coefficient was determined (r = 0.88). The rate of development of rainwater productivity is dynamic, but with smaller deviations from the rate of additional yield.

Keywords: cotto, irrigation, fertilization, productivity, ANOVA

Effect of irrigation and fertilization on yield and biomass in three varieties of cotton.

Antoniya Stoyanova, Velika Kuneva
Trakia University, Faculty of Agriculture

Abstract

The purpose of the study is to evaluate, by means of correlation analysis, the correlation between the main biometric indicators for three cotton varieties. The study was conducted in the field of experience of the Department of Crop Production, Faculty of Agriculture at the University of Trakia, Stara Zagora during the period 2018-2019. The field experience is derived by the method of fractional plots. The influence of both factors (fertilization and irrigation) on the development and productivity of the three varieties of cotton was studied. The relationships between the mass of one boll, the number of bolls per plant, the biomass by phase, the total yield per plant and the total yield of cotton per hectare were studied. Correlation dependencies were found, with a high degree of Helius correlation between the structural elements: mass of one boll and bud-formation (r = 0.989), mass of one boll and number of bolls per plant (r = 0.988) under irrigation conditions. Darmi is distinguished by a high degree of correlation between flowering and the number of bolls in a plant (r = 0.996). Colored naturally of Isabell is characterized by a high degree of correlation between positive depending of bud-formation and ripening (r = 0.967) and between the number of bolls in a plant and a total yield (r = 0.958). For irrigation are established correlations between bud-formation and flowering (r = 0.983) and between ripening and number of bolls in one plant (r = 0.979) in Helius. With a high degree of correlation feature dependencies between bud-formation and ripening (r = 0.963), and bud-formation number of bolls in a plant (r = 0.994) in Darmi. Strong positive correlation is drawn between bud-formation and flowering (r = 0.964) and between flowering and ripening (r = 0.956).

Keywords: Cotton, irrigation, fertilization, yield, correlations

The agro-biodiversity of alternative grain legumes under conditions of climate change.

Sofia Petrova, Tsvetelina Stoilova
Institute of Plant Genetic Resources

Abstract

Grain legume crops are an important component of agricultural biodiversity and food security, because of the reach protein food and fodder, and source of income. The climate change and future forecasts are a prerequisite for the plant species and varietal structure of grain legumes in Bulgaria. The aim of the current study was to evaluate the agro-morphological diversity of four alternative legume crops (Cicer arietinum, Lathyrus sp., Lupinus sp. and Vigna unguiculata L.) and to select the best accessions with high yield potential to be used under changing climatic conditions. The assessment of agro-morphological traits was performed according to the International Descriptors' of each crop. The yield components, such as plant height, number of pods and grains per plant, mass of grains per plant, grain size, mass of 100 grains etc. have a significant role on the plant productivity. The variability of agro-morphological traits among accessions of targeted crops provided possibilities to meet the challenges from climate change. Based on the results obtained from this study the best accessions were selected as appropriated for stress conditions, for example: from Cicer arietinum - four accessions; from Lathyrus sp. – four accessions; from Lupinus sp.– two accessions and from Vigna unguiculata L. – eight accessions. Quantitative and qualitative traits have been used to study the morphological diversity and important agronomic traits of four alternative grain legume crops. According to these results it can be concluded, that the best accessions will be used for the next experimental trials and will be recommended to the researchers and farmers, who are interested.

Keywords: alternative grain legumes, agro-biodiversity, agro-morphological assessment

The agromorphological and genetic diversity of grass pea (Lathyrus sp. L.) and cowpea (Vigna unguiculata L.) of subsets of IPGR's germplasm collection.

Tsvetelina Stoilova, Sofia Petrova
Institute of Plant Genetic resources

Abstract

Although grass pea and cowpea are an environmentally successful grain legumes with major traits of interest for food security and animal feeding, the genetic potential of these crops have long been neglected. The success of any crop improvement programme essentially depends on the nature and magnitude of genetic diversity. This study included subsets of the grasspea and cowpea IPGR's collections. The two crops were characterized using International Descriptors' of each crop. The accessions of the different species displayed considerable phenotypic variation during different growth stages. Among the common characters for the two crops are those related to plant height, plant growth habit, days to flowering, number of pods and number of grains per plant. The dendrograms were built based on grouping produced by cluster analysis. The results of the cluster analysis will help to select accessions with maximum genetic distance to assemble the broad-based panel of genetic resources of these legume crops for future research and use.

Keywords: agro-morphological, genetic diversity, grass pea, cowpea, germplasm collection

Установяване на генетичното разнообразие в диалелна кръстоска от твърда пшеница
Establishment of genetic diversity in a diallel cross of durum wheat

Рангел Драгов
Rangel Dragov
Институт по полски култури - Чирпан / Field crops institute – Chirpan

Abstract

Целта на това изследване е да се установи генетичната отдалеченост в диалелна кръстоска с пет съвременни сорта твърда пшеница и техните десет кръстоски. Провеждане на PC анализ и корелационен анализ за определяне на взаимовръзките между изследваните девет количествени признака. Опитите са изведени в три последователно години в експерименталното поле на ИПК-Чирпан. Експериментите са залагани в рандомизиран блоков метод в три повторения. С най-висок коефициент на вариране се характеризира признакът продуктивна братимост. Признаците брой зърна в клас и тегло на зърната в клас са във висока положителна корелация. Тази взаимовръзка е от голямо значение за определяне на правилната стратегия за водене на отбор и развиване на селекционната програма по продуктивност. Проведеният клъстерен анализ разкрива две групи генотипове генетично различаващи се една от друга. Едната група достоверно се разделя на две подгрупи. Наблюдават се три клъстера с достоверно различие между тях. Диалелното кръстосване дава възможност да се оцени действието на гените и в същото време допринася за създаване на генетично разнообразие при пълното комбиниране на генетичния материал от дадена група сортове, както и да се определи тяхната селекционна значимост, като донори на ценни признаци. Клъстерният анализ предоставя точна оценка за съществуващото генетично разнообразие. Генетичната близост и отдалеченост на генотиповете в диалелната кръстоска може да се използват при създаването на стратегия за водене на ефективен селекционен процес при твърдата пшеница.

The aim of this study was to establish the genetic diversity in a diallel cross with five modern durum wheat varieties and their ten hybrid combinations. Conducting PC analysis and correlation analysis to determine the relationships between the studied nine quantitative traits. Experiments was grown in three consecutive years (2014-2016) in Field Crops Institute-Chirpan. The trials were performed in a randomized block design in three replications. Productivity tillering is characterized with the highest coefficient of variation. The traits grains number per spike and grains weight per spike had a high positive correlation. This relationship is of great importance in determining the right strategy for leading a selection and developing a breeding program by productivity. At the first level the cluster analysis reveal two clusters genetically different from each other. The bigger cluster is divided into two subclusters. Three cluster was observed with a significant difference between them. Diallel crossing contributes to the creation of genetic diversity in the complete combination of genetic material from a group of varieties, as well as to determine their breeding value as donors of valuable traits. Cluster analysis provides an accurate assessment of existing genetic diversity. The genetic proximity and distance of the genotypes in the diallel cross can be used to create a strategy for conducting an effective breeding process in durum wheat.

Keywords: твърда пшеница, селекция, генетично разнообразие, диалелна кръстоска, клъстерен анализ
durum wheat, breeding, genetic diversity, diallel cross, cluster analysis

Селекционна оценка на нови перспективни линии памук
Breeding assessment of new promising cotton lines

Валентина Димитрова, Рангел Драгов
Valentina Dimitrova, Rangel Dragov
Институт по полски култури - Чирпан / Field crops institute – Chirpan

Abstract

Селекцията на памука в България е насочена основно към подобряване на ранозрелостта, продуктивността и качеството на влакното на съвременните сортове памук. Създаването на ново генетично разнообразие е една от основните предпоставки за успеха на селекционните програми. Целта на това изследване е селекционна оценка на линии памук, получени чрез вътревидова и отдалечена хибридизация съчетан с беккрос технология, с оглед на най-ефективното им използване в селекцията. 23 линиите са включени в конкурсни сортови опити, изведени през периода 2014-2017 г. Осреднените резултати показват, че много перспективни са линиите № 550, № 639, № 641, получени чрез отдалечена хибридизация. Тези три линии се отличават с най–добро съчетание на продуктивност, дължина и рандеман на влакното, като и по трите показателя превъзхождат стандартния сорт Чирпан - 539. Утвърден/признат е нов сорт памук - Аида (№ 457), който по добив на суров памук и добив на влакно, и технологични качества на влакното превъзхожда стандартните сортове – Чирпан - 539 за ранозрелост и продуктивност и Авангард - 264 – за качество на влакното. Линия 535 за трета година е в държавно сортоизпитване. Излъчени са още два нови кандидат-сорта памук - № 550 и № 553. В държавното сортоизпитване трите кандидат-сорта потвърждават качествата си. Получените линии, отличили се по един признак или комплекс от качества обогатяват генофонда на българския памук.

The cotton breeding in Bulgaria is mainly aimed at improving the earliness, productivity and fiber quality of modern varieties. The creation of new genetic diversity is one of the basic prerequisites for the success of breeding programs. The aim of the study was to evaluate cotton lines obtained by intraspecific and remote hybridization combined with backcross technology, with a view to their most effective usage in selection. Twenty-three lines were included in competitive variety trials conducted during the 2014-2017 period. The averaged results showed that the lines 550, 639, 641, obtained by remote hybridization, appeared to be very promising. These three lines were distinguished by the best combination of productivity, fiber length and fiber lint percentage, and by these three indicators they exceeded the standard variety Chirpan - 539. A new cotton variety Aida (No. 457) was approved, which in seed cotton yield and fiber yield, and technological fiber properties surpassed the standard varieties Chirpan - 539 for earliness and productivity and Avangard-264 for fiber quality. The candidate variety 535 continued the state variety testing. Two new candidate cotton varieties No 550 and No 553 were released. In the state variety testing the three candidate varieties confirmed their qualities. The obtained lines, distinguished by one trait or by complex of qualities, enriched the gene pool of Bulgarian cotton.

Keywords: памук, кандидат-сортове, добив, качества на влакното
cotton, breeding, candidate varieties, yield, fiber properties

Мониторинг на вредителите при чуждестранни сортове ечемик в района на гр. Вълчи дол - Варненска област

Димитър Василев, Ралица Иванова, Антония Стоянова
Шуменски университет Епископ К.Преславски

Abstract

Barley is one of the oldest crops grown in the world. There are many and varied biological types that are adapted to different soil and climatic conditions. Attempts are being made in Bulgaria to spread foreign species as well. However, they are suitable for areas where precipitation is significantly higher and the winter is milder than in Bulgaria. The purpose of this study is to identify the main pests of barley crops in the region of Valchidol, Varna region. The study found the following conclusions: the areas in the region of Valchidol are heavily weeded with mustard (Sinapis arvensis L.), Amaranthus retroflexus and Convolvulus arvensis. The Tulus variety has good productivity but is more strongly attacked with tapeworm, reticulate spot and powdery mildew. The German variety Nemo shows good resistance to brown spotted rust and Weak - resistance to tapeworm, reticulate spots and brown rust. The studied foreign varieties of barley show a relatively good winter hardiness and a relatively lower tendency to lodging.

Keywords: barley, varieties, weeds, pathogens, yield

Биологично отглеждане на овес (Avena sativa L.) в условията на Североизточна България.

Димитър Василев, Антония Стоянова
Шуменски университет Епископ К. Преславски, България

Abstract

Проучването е изведено в периода 2018 - 2020 г. в землището на с. Миланово, Шуменска област. В периода 23-30 март в зависимост от климатичните условия на годината е засят пролетния овес сорт Скорпион при сеитбена норма 300 - 400 кълняеми семена/da. Почвата е сиво-кафява горска (Luvisols Lessive - FAO UNESCO). Овесът е отгледан при спазване на нормите за биологично отглеждане на полски култури. През вегетацията посевът е поливан два пъти при поливна норма 4-6 m3/da. Целта на настоящото проучване е да се докаже, че овес сорт скорпион е подходящ за биологично производство и от него се получава качествен продукт за директна консумация. В засятата площ са установени следните групи плевели: зимно-пролетни (Chamomilla recutita Rauchert, Consolida regalis S.P. Gray, Centaurea cyanus L., и Papaver rhoeas L.) ранни пролетни (Sinapis arvensis L., Bifora radians M.B., Polygonum convolvulus L., Galium tricorne With, Avena fatua L.), ефемери (Veronica hederifolia L., Stellaria media L., Holosteum umbelatum Jagged chickweed) и кореновоиздънкови (Cirsium arvense Scop., Convolvulus arvensis L., Cardaria draba L.). Средно за периода е получено съдържание на протеин - 10.56 %, нишесте - 43.62 %, пепел - 4.24 % и фибри - 13.47 %. Овесът е прибран на зелена маса, в млечна зрялост като окосяването е извършено в края на месец юни двуфазно с косачка за прибиране на билки. Реколтираната площ е 1.23 ha, а получената зелена маса е средно 10 t. Изсушаването на зелената маса е направено на слънце, в резултат на което са получени 2470 kg сух стрък овес. От това количество са приготвени снопчета с дължина 20 - 25 cm, и опаковани в найлон подравнени в задния край. Теглото на едно снопче варира от 100 до 300 g. От получените снопчета след обезпрашаване може да се получи продукт за директна консумация с дължина на влакното 0.4 - 3 mm.

Keywords: овес, сорт, плевели, зелена маса, снопчета

Секция 3. "Екология, околна среда и качество на храните"

Section 3. Ecology, Environment, Food quality

Доклади
Oral presentations

Infestation with protostrongylides of Chamois in Rila National Park: Preliminary data

Yanko Yankov[1], Dian Georgiev[1], Petar Iliev[2], Anton Tonev[2], Simeon Arangelov[3], Kostadin Valchev[4]
[1]Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria
[2]Faculty of Veterinary Medicine, Trakia University-Stara Zagora, Bulgaria

Abstract

A total of 112 faecal samples were collected between May and September 2020 from the territory of Rila National Park and were processed by flotation technique using saturated sodium chloride (sp. gr. 1.20), routine sedimentation method, Baermann's method and larval cultivation, 57 (51%) of them turned out to be positive for representatives of the family Protostrongylidae. The larvae found belong to four genera. The predominant infestations are species of the genus Muellerius which is present in 67.24% of the samples and the genus Cystocaulus present in 66.67% of the samples. The genus Protostrongylus is present in 10.53% of the samples, and Neostrongylus - 7.02%. Research on Infestation with protostrongylides of Balkan Chamois in Rila National Park is carried out for the first time in Bulgaria**.**

Keywords:genus Muellerius; genus Cystocaulus; genus Protostrongylus; Neostrongylus

A Comparative Study of Phenolic Content in Florina Apple Fruits from Conventional and Organic Orchards

Nadezhda Petkova, Tatyana Bileva, Ekaterina Valcheva, Galya Dobrevska, Neli Grozeva and Vladislav Popov
University of Food Technologies, Bulgaria
[1]Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract

The aim of the current research was to evaluate the influence of conventional and organic growing conditions on the individual phenolic acids and flavonoids profiles. The 60% ethanol extracts of four different samples of Florina apples collected from organically and conventional orchard and sward orchard were analyzed by HPLC-DAD method. Eight phenolic acids were detected – gallic, prorocatehuic, chlorogenic, vanillic, caffeic, syringic acid, p-coumaric and ferulic acid and flavonoids ((+)-catechin, (-)-epicatechin, rutin, hesperitin and quercetin). Chlorogenic acid and (+)-catechin were found to be the predominant components in the Florina apple fruits collected from organically sward orchards 164.02 μg/g and 42,94 μg/g dry samples. (-)-Epicatechin, vanillic, caffeic and rutin were found in the highest content in conventionally grown fruits. Gallic acid was detected only in apples from the sward orchards – 0.23-0.28 μg/g dry samples. Ferulic and p-coumaric acids were detected only in the conventional sward orchard. (-)-Epicatechin (159.41and 89.37 μg/g dry weight) was the major component from in the ethanol extracts of apple fruits, while hesperitin, quercetin and kaempherol were under limit of detection.

Keywords: Florina apple, phenolic acids, flavonoids, conventional and organic orchards

Proximate composition of commercial shellfish from the Black Sea (Bulgaria)

Albena Merdzhanova, Veselina Panayotova, Katya Peycheva, Rositsa Stancheva, Diana A. Dobreva, Lubomir Makedonski
Медицински университет – Варна

Abstract

The Mediterranean mussel (Mytilus galloprovincialis), striped venus clam (Chamelea gallina) and wedge clam (Donax trunculus) are the most important commercial bivalve species in the Black Sea. The aim of the present study was to determine chemical composition: crude proteins, total lipids, carbohydrates, energy value and macroelements in market ready shellfish from the Bulgarian Black Sea coast. Crude protein, carbohydrates and total lipids were determined using standard procedures. Macroelements (K, Ca, Mg, Na) were determined by ICP-OES. Analysed samples were characterized by high protein (11.8±0.1 to 17.3±0.2 g/100g) and low lipid content (2.54±0.06 to 5.15±0.27 g/100g). C. gallina showed the highest protein, M. galloprovincialis – highest carbohydrate, while D. trunculus – highest lipid content. The three species were presented similar energy values: 104.3 kcal/100g (D. trunculus), 100.4 kcal/100g (C. gallina) and 110.7 kcal/100g (M. galloprovincialis). Concentrations of the analysed macro elements varied between 1675 and 2560 mg/kg ww for K; 786 and 1167 mg/kg ww for Ca; 341.5 and 573 mg/kg ww for Mg; 1850 and 2968 mg/kg ww for Na. This study presents new data on the chemical composition of commercial Black Sea shellfish. Despite species-specific variations in chemical composition, the results show that D. trunculus, C. gallina and M. galloprovincialis may be healthier choice of low energy dense food due to high protein and macroelements levels and low lipid, carbohydrate and calories contents.

Keywords: Mytilus galloprovincialis, Chamelea gallina, Donax trunculus, proteins, lipids, macroelements

Acknowledgements: This study was financially supported by the National Science Fund of Bulgaria, Project № КП-06-ОПР03/11 from 18/12/2018

Nutritional indices for assessing risk-benefits from Black Sea shellfish consumption

Albena Merdzhanova, Katya Peycheva, Veselina Panayotova, Rositsa Stancheva, Diana A. Dobreva, Lubomir Makedonski

Abstract

"The Mediterranean mussel (Mytilus galloprovincialis), striped venus clam (Chamelea gallina) and wedge clam (Donax trunculus) are the most important commercial bivalve species in the Black Sea. The aim of the present study was to assess possible risk-benefits from shellfish consumption through computation of nutritional indices for lipid quality and trace elements content.

Lipid quality indices: n-6/n-3, PUFA/SFA, index of atherogenicity (IA), the index of thrombogenicity (IT), the hypocholesterolemic/hypercholesterolemic ratio (h/H) were calculated based on fatty acid composition. The human health risk was evaluated on the base of estimated daily intake (EDI), target hazard quotient (THQ) and hazard index (HI).

Analysed samples are characterized by favourable lipid quality indices. PUFA/SFA are within the range 1.8 (M. galloprovincialis) and 3.4 (C. gallina). The ratio n-6/n-3 varies between 0.35 and 1.4. We found low levels for AI and TI (<1) and high h/H (>2) for all studied species

The results for EDI, THQ and HI indicated that studied species are safe for human consumption and do not pose health risks for the trace elements.

This study presents new data on the nutritional quality and possible health risks associated with consumption of commercial Black Sea shellfish. Lipid fractions of the three species present nutritionally beneficial ratios and indices. In addition low parameters for health risk assessment indicate that M. galloprovincialis, C. gallina and D. trunculus might have beneficial effects for the consumer's health.

Keywords: Mytilus galloprovincialis, Chamelea gallina, Donax trunculus, lipid quality indices, health risk assessment

Acknowledgements: This study was financially supported by the National Science Fund of Bulgaria, Project № КП-06-ОПР03/11 from 18/12/2018

Регионален суровинен потенциал за производство на полски култури в България

Десислава Тотева, Петър Маринов, Росица Микова, Румен Попов
Институт по аграрна икономика

Abstract

The raw material potential is an important factor for development of the bio economy. The present study examines the raw material potential for wheat and sunflower production in the six planning regions of Bulgaria.

The aim of the present study is to reveal the comparative advantages for biomass production and to map the most suitable regions for development of bio economic production in the six planning regions of Bulgaria.

The method of the Regional Shift Share Analysis (RSSA) will be applied in order to reveal in which direction and to what extend the raw material potential for development of regional bio economy in the six planning regions of Bulgaria is changing.

Keywords: Biomass, Bio Economy, Wheat, Sunflower, Bulgaria.

Biodiversity of the macrozoobenthos in the area Albena-Shkorpilovtsi (the Black Sea)

Соня Узунова, Елица Петрова-Павлова
Институт по рибни ресурси – Варна

Abstract

In July 2020, studies of the bottom habitats off the Bulgarian coast were conducted in the region of Albena - Shkorpilovtsi in order to investigate biodiversity of benthic communities and distribution of commercially important species. Grab samples were collected from 15 stations located at a depth of between 3 and 24 m. The cluster analysis based on the results of the laboratory processing of macrozoobenthos, showed a clear demarcation of two large groups distributed below and above the 10-meter isobath. Within these groups, differentiation of smaller clusters according to substrata is observed. The univariate statistical indices support results of cluster analyses, reaching higher values for the stations with sandy substrata and greater biodiversity, while at the relatively deeper stations these indices have lower values due to the natural depletion of their bio-diversity. Species from genus Donax are concentrated mainly in the upper sublittoral.

Keywords: Key words: bottom habitats, macrozoobenhos, the Bulgarian Black Sea coastal area

Investigation of the effect of organic liquid plant biostimulant from WWTP sludges on spring vegetables

Dyana Dermendzhieva, Georgi Beev, Lubov Plescutsa, Gergana Kostadinova, Georgi Petkov

Abstract

The aim of the present study is to determine the effect of an organic liquid plant biostimulant obtained by an innovative approach from waste products (sludges) released from wastewater treatment in WWTPs. The study was conducted for the period March-July, 2020 with early spring greenhouse crops. Prior to application, a complete physico-chemical and microbiological analysis of the sludge product was performed in accordance with the current Bulgarian and European legislation. Soil samples were taken before and after the end of the field experiments on 5 indicators - pH, mobile forms of nitrogen (NH4+, NO3-), phosphorus (P2O5), potassium (K2O) and humus. Leaf diagnostics of spring crops (greenhouse cucumbers, tomatoes, lettuce and green beans) was performed according to 3 physicochemical parameters: total N, total P and total K, in accordance with BDS and ISO standards. The plants were treated once on every two weeks with a test product solution in concentration of 50 ml/l mixed with the fungicide "Nurle" for plant diseases control. The analysis of the obtained results revealed that the tested product stimulates the development and quality of spring crops (greenhouse cucumbers, tomatoes, lettuce and green beans), increases the effectiveness of the fungicides used, improves the agrochemical parameters of the soil and restores its nutritional functions.

Keywords: treatment plant, sludge, physicochemical and microbiological parameters, agrochemical evaluation, plant biostimulant

Morphological and karyological study of Suaeda maritima (L.) Dum. in Bulgaria

Neli Grozeva, Stefka Atanassova

Abstract

The karyological and morphological variability of Suaeda maritima from 7 populations of the species was studied. Intrapopulation and interpopulation variability have been traced. The results of karyological research indicated that studied populations of Suaeda maritima had a diploid chromosome number of 2n = 18 and two types of chromosomes - metacentric and submetacentric. The average length of chromosomes varied from 1.80 to 1.94 µm. Dominant in the general morphological population variability was the interpopulation. The vegetative traits are more variable, and the most conservative of the generative ones are those that characterize the seeds. No significant variability was found in the studied quantitative characteristics, stomata and pollen morphology. Two types of stomata anomocytic and paracytic have been registered. The pollen is a spherical pantoporate type, without perforations of the tectum.

Keywords: Suaeda maritima, morphology, karyology, Bulgaria

A brief review of studies of species of Rosa L.

Mariya Zhelyazkova
Faculty of Agriculture, Trakia University

Abstract

Rosa L. are an important genus in the family of Rosaceae with more than 18 000 cultivars. The most widely used species are R. *damascena*, R. *gallica*, R. *centifolia* and R. *alba*. They are grown for the commercial production (rose oil, rose water, absolute and concrete) and aromatic industries. Genetic diversity in the genus Rose is influenced by large number of natural crosses and spontaneous mutations. More than one ploidy level are reported for most of sections of the genus. The more significant research in the genus covers genetic diversity through different types of DNA markers (RAPD, AFLP, SSR, ISSR and SCoT), studies of chemical composition and pharmacological studies showing the various health effects.

Keywords:

Постери
Posters

CONCENTRATION OF HEAVY METALS IN EASTERN EUROPEAN HEDGEHOGS (ERINACEUS ROUMANICUS BARRETT-HAMILTON, 1900) IN BULGARIA

Dian Georgiev[1], Atanas Mikov[2] & Dilian Georgiev[2]
[1]Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora,
[2] Plovdiv University, Faculty of Biology

Abstract

Twenty tissue samples of *Erinaceus roumanicus* (Barrett-Hamilton, 1900) from different habitats in Southern Bulgaria were studied. Nine of the samples are from foothills and mountainous areas, and eleven from areas with strong anthropogenic impact.

The samples were collected from animals victims of road traffic. Each tissue sample was fixed in 70% C_2H_5OH. Analyzes of heavy metal content were performed on an AAnalist 800 atomic absorption spectrometer (Perkin Elmer). The concentration of eight elements was reported: Zn, Cu, Fe, Mg, Mn, Ni, Pb and Cd.

The highest concentrations in the tissue samples of *E. roumanicus* showed six of the studied elements from the region of Stara Zagora: Zn = 53.06 mg/kg, Cu = 14.05 mg/kg, Fe = 77.07 mg/kg, Ni = 0.4027 mg/kg, Pb = 0.2891 mg/kg и Cd = 0.0664 mg/kg.

Keywords: *Erinaceus roumanicus*, Heavy Metals, Southern Bulgaria, road traffic

Antimicrobial activity of methanolic extracts from Acorus calamus, Chlorella vulgaris, Lemna minuta and Scenedesmus dimorphus

Toncho Dinev[1]*, Milena Tzanova[1], Katya Velichkova[2], Georgi Beev[1]
[1]Department of Biochemistry, Microbiology and Physics, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria
[2]Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria
*e-mail: dinev_sz@mail.bg

Abstract

Plant extracts are important alternative to antibiotics, which are ever more restricted because of the developing microbial resistance and some adverse effects following frequent application. The aim of the present study was to determine the antimicrobial potential of methanolic extracts of Acorus calamus, Chlorella vulgaris, Lemna minuta and Scenedesmus dimorphus at a concentration of 64 mg/mL. Antifungal activity of the extracts against strains of Aspergillus flavus, Aspergillus parasiticus, Aspergillus ochraceus, Aspergillus niger, Aspergillus carbonarius, Fusarium graminearum, Fusarium oxysporum, Penicillium chrysogenum and Alternaria alternata was evaluated by agar well diffusion method. A. calamus methanolic extracts had antifungal activity against 8 of the 9 mycotoxigenic fungal strains examined, measured in diameter of inhibition zones (mm, mean±SD), as follows: F. oxysporum (10.3±0.6), A. flavus (10±0), A. niger (9.3±0.3), F. graminearum (9.2±0.3), A. ochraceus (8.7±0.3), Alt. alternata (8.2±0.3), A. carbonarius (7.8±0.3) and P. chrysogenum (7.7±0.3). Methanolic extracts of C. vulgaris had antifungal activity against A. niger, P. chrysogenum and Alt. alternata, with diameter of inhibition zones of 9.2±0.3, 8.3±0.3 and 7±0 mm, respectively. Methanolic extracts of S. dimorphus were inhibitory only against A. niger (8.2±0.6) and P. chrysogenum (8±0 mm). Methanolic extracts of L. minuta showed minimal activity against A. ochraceus, P. chrysogenum and Alt. alternata with diameter of inhibition zones of 7±0, 7±0 and 7.7±0.3, respectively. In conclusion, A. calamus extracts demonstrated the highest antimicrobial potential among all plant extracts studied.

Keywords: Antimicrobial potential, methanolic plant extracts

Antioxidant activity of methanolic extracts from Acorus calamus, Chlorella vulgaris, Lemna minuta and Scenedesmus dimorphus

Milena Tzanova[1]*, Toncho Dinev[1], Katya Velichkova[2], Georgi Beev[1]
[1]Department of Biochemistry, Microbiology and Physics, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria
[2]Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria
*e-mail: mtzanova@abv.bg

Abstract

Plants are important source of bioactive compounds with medicinal significance. The aim of the present study was to determine antioxidant activity of methanolic extracts of Acorus calamus, Chlorella vulgaris, Lemna minuta and Scenedesmus dimorphus. This activity was measured by determination of three parameters – total phenolic content, total flavonoid content and radical scavenging potential through UV-Vis analysis. Among the plant species studied, the extract from S. dimorphus showed the highest antioxidant potential determined by DPPH method (106±10 mmol TE/ kg dm). This correlated to its high total phenolic and flavonoid content – 31.78±1.70 g GAE/ kg dm, and 6.68±0.32 g CE/kg dm, respectively. From A. calamus and L. minuta methanolic extracts were obtained similar values of the aforementioned parameters, followed by C. vulgaris extracts that showed the lowest antioxidant activity. Based on the Pearson correlation coefficients, the impacts of total phenolic content and total flavonoid content on the radical scavenging capacity are similar. The Pearson correlation between total phenolic content and total flavonoid content of the methanolic extracts was characterized by a high and positive correlation coefficient, which means that flavonoids were a large part of the total phenolic compounds extracted from the plant materials studied.

Keywords: Antioxidant potential, methanolic plant extracts

A pilot study on histochemical alterations in caged mussels from contaminated reservoirs in Bulgaria

Vesela Yancheva, Iliana Velcheva, Stela Stoyanova, Elenka Georgieva
Plovdiv University, Faculty of Biology

Abstract

As bivalves are widely applied as bioindicators for water pollution, they are known to provide a time integrated indication of environmental contamination, as well as representative data on the ecosystem state under anthropogenic impact. Hence, caged mussels (Sinanodonta woodiana Lea, 1834) were used to investigate the water quality in three large standing water bodies by applying biological tools, known as biomarkers. For this purpose, changes in the PAS-reaction in gills of the tested bioindicators were assessed to determine the toxicity of contaminated waters in Kardzhali, Studen Kladenets and Zhrebchevo reservoirs in Bulgaria. This work was supported by Project SP-21-BF-001, financed by the Department of Scientific Research, University of Plovdiv, Bulgaria.

Keywords:caged mussels, water contamination, biomarkers, histochemistry

Treated municipal wastewater for irrigation: Benefits and risks - A review

Gergana Kostadinova, Georgi Petkov, Diyana Dermendzhieva
Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract

In many countries all over the world, especially in Asia, Africa and the Americas, treated wastewater from settlements is used to irrigate crops, rangelands, forests, parks, golf courses and on restored terrains disturbed by open pit mining. This practice is especially popular in areas with water shortages and droughts. For the Balkans, the use of wastewater for is more widespread in Turkey, while in other countries in the region, incl. Bulgaria is not yet widely used. The reasons for this are different - lack of sufficient studies on the effect of the use of wastewater for irrigation, legal restrictions, lack of traditions, prejudices of farmers (subjective factor) to use wastewater in agriculture, and others. It should be borne in mind that treated wastewater is rich in nutrients which improve soil fertility, but also contains a large number of microorganisms, including pathogens and invasive forms of parasites that are harmful to soil health and for the quality of agricultural production. All this requires a very careful assessment of the possibilities for utilisation of the treated wastewater, as well as the risks associated with their use for irrigation of agricultural crops. These arguments provoked the writing of this review, which, based on the experience of other countries, as well as the results of our own research to outline the picture for effective utilization of this resource in Bulgaria.

Keywords: nutrients, irrigation, pathogens, risks, utilization, wastewater

The relationship between the content of heavy metals Cd and Cu in some components of the environment and the manifestation of COPD.

E. Valkova[1], V. Atanasov[1], T. Vlaykova[2], T. Tacheva[2], Y. Zhelyazkova[2] , D. Dimov[2], K. Yakimov[3]

[1]Agriculture Faculty, Trakia University, Department of Biochemistry, Microbiology and Physics, Stara Zagora (Bulgaria); [2] Medical Faculty, Trakia University, Department of Chemistry and Biochemistry, Stara Zagora (Bulgaria); [3]Agriculture Faculty, Trakia University, student

Abstract

"The aim of the study was to establish the relationship between the content of Cd and Cu in the air and drinking water and the blood serum of patients with and without COPD.
The amount of FDP10 has the highest values in 2017. (average annual value 25.2 µg/m3).
The results regarding the amounts of cadmium in the air of the Stara Zagora region clearly show the absence of pollution.
Determination of the amounts of the studied heavy metals in drinking water and the blood serum of the patients was carried out by the method of atomic absorption.
The values of Cu, registered during the year-long study into the water of Stara Zagora and Radnevo are much lower than those adopted in Bulgarian legislation norms of 2 mg/l.
The highest value of Cd is characterized by the drinking water in Stara Zagora Town of from January 2020. (0.0047 mg/l), the value of which almost reaches the norm of 0.005 mg/l, defined in the normative documents. The cadmium concentrations measured during the same period in the drinking water of the Radnevo City are significantly below the accepted norms.
Taking into account the results of the analysis of the blood serum samples tested for the content of the element copper, the concentrations recorded in the control samples are characterized by the highest values. The lowest levels were observed in patients with HOOB - smoking.
Quantities of Cd, registered in samples from control group patients were 0,020 µg/l lower than those found in patients with COPD, who belong to the smoker and to 0,110 µg/l lower than the values established in the current smoking. In healthy in terms of COPD organisms levels of this element are lower when compared with those measured in patients with COPD.

Keywords: cadmium, copper, blood serum, COPD, environment

The relationship between the content of heavy metals Pb and Zn in some components of the environment and the manifestation of COPD

E. Valkova[1], V. Atanasov[1], T. Vlaykova[2], T. Tacheva[2], Y. Zhelyazkova[2] , D. Dimov[2], K. Yakimov[3]

[1]Agriculture Faculty, Trakia University, Department of Biochemistry, Microbiology and Physics, Stara Zagora (Bulgaria); [2] Medical Faculty, Trakia University, Department of Chemistry and Biochemistry, Stara Zagora (Bulgaria); [3]Agriculture Faculty, Trakia University, student

Abstract

The aim of the study was to establish the relationship between the content of Pb and Zn in the air, drinking water and blood serum of patients with and without COPD.

The determination of the amounts of the studied heavy metals in drinking water and the blood serum of the patients was carried out by the method of atomic absorption.

The amount of PM10 has the highest values in 2017 (average annual value 25.2 µg/m3).

The concentrations of Pb in the air do not exceed the requirements of Ordinance 12 of 15.07.2010.

The levels of lead found in the drinking water of the of Stara Zagora Towon in the period June 2019 - July 2020 often approach the limit value determined by Ordinance №9 of 16.03.2001. (0.01 mg/l).

The established concentrations of zinc in the drinking water of the cities of Radnevo and Stara Zagora during the reported period are lower than the MAC of 4 mg/l defined in the normative documents.

Quantities of zinc, measured in the serum of the control group patients were highest (2010,44 µg/l), which is completely normal in the absence of disease such as COPD. The serum of smokers with COPD is characterized by the lowest values (1432.9 µg/l).

Pb concentrations measured in samples from COPD patients who are current non-smokers were 0.01 µg/l higher than the arithmetic mean, 0.016 µg/l higher than in the control group, and 0.014 µg/l higher than the established concentration in smokers. The conducted study shows that the quantities of lead, measured in patients who did not develop COPD are lowest.

Keywords: lead, zinc, blood serum, COPD, environment

Effect of management practices on soil fauna in organic orchard in Plovdiv region

Tatyana Bileva *, Ekaterina Valcheva, Rada Popova, Galya Dobrevska, Manol Dallev , Vladislav Popov
Agricultural University of Plovdiv

Abstract

Different management of apple orchards agrosystems affects soil biodiversity. Organic farming is beneficial for conserving soil fauna and stimulating the biological activity of the soil and this leads to an increase in soil fertility. A field study was conducted to examine the influence of agricultural practices on soil fauna. The study was realized on organically managed apple orchard at Agroecological centre of Agricultural University of Plovdiv for two year period (2019-2020). We obtained comprehensive information by monitoring of various agrometeorological factors and agro-technological practices (tillage, mowing, irrigation, pest management and soil analysis). Macro- and microfauna were observed. Ecological parameters were higher in sward orchard and buffer zone.

Keywords: apple, organic orchard, soil fauna

Overview of nest box types used by Lesser Kestrel (Falco naumanni) after being recovered as a breeder in Bulgaria

T. Bileva, S. Yaneva*, G. Gradev, S. Marin
Agricultural University of Plovdiv

Abstract

Lesser Kestrel often nest in urban areas surrounded by agricultural areas or open pastures. This makes the species largely dependent on human activity, not only in terms of feeding places, but also due to availability of nesting places. The loss of natural nesting sites was one of the main reasons the species to became extinct in the late 20th century. After it was recovered as a breeding species in Bulgaria, one of the main goals of the Green Balkans's team is to make the colony stable. For implementation of these goal, it is necessary to provide a suitable nesting places for the species. Field studies show that the provision of artificial nest boxes for Lesser Kestrel resulted in increasing of numbers and strengthening existing colonies. There are different types of artificial nest boxes like: classic wall, cavity wall, under-roof and etc. Under the implemented of project LIFE 11 NAT/BG/360 more than 90 artificial nests were installed. All of them are specially design for the Lesser Kestrel in accordance to DEMA's methodology. Conducting daily observations of the birds, the colony's nesting territory was determined - concentrated around the Lesser Kestrel Release and Adaptation Module. In the past years large proportion of the Lesser Kestrel population in Bulgaria nested in artificial nest boxes thus proving that species easily occupies artificial nests designed for it.

Keywords: Falcon, raptors, endangered species, Sakar SPA, NATURA 2000

Pyrethrins in capitula of Tanacetum cinerariifolium plants derived from in vitro selected clones

Vladimir Ilinkin, Milena Nikolova, Boryanka Traykova, Strahil Berkov, Marina Stanilova
Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences

Abstract

Tanacetum cinerariifolium (Trev.) Schultz-Bip, Asteraceae, is endemic for the east Adriatic coast, widely used since ancient times as a repellent. Its insecticide properties are due to several bioactive compounds commonly named pyrethrins. In vitro cultures were initiated from seeds originated from one population of Croatia. About twenty clones were propagated, the four ones with fastest multiplication were selected, and 320 plants were ex vitro adapted in a phytotron. Sixteen plants (4 per clone), were planted in October 2019 in the ex situ collection of IBER-BAS. Most of them bloomed in spring 2020, and secondary flowering was observed in October, although the usual flowering was reported in the second year. Some variations were noticed in the number of the stem ramifications and the flower heads. Samples of flower heads were collected from 15 plants in June and n-hexane extracts were analyzed by GC/MS. All 6 active substances: esters of the chrysanthemum acid (Pyrethrin-I, Cinerin-I, Jasmolin-I), and esters of the pyrethric acid (Pyrethrin-II, Cinerin-II, Jasmolin-II) were detected in the samples. The method of in vitro clonal micropropagation of high-productive individuals has been proved to be very appropriate for Tanacetum cinerariifolium as the seeds of this species are characterized by low germination; moreover, seed-derived plants express considerable variation in the biosynthesis of pyrethrins.

Keywords: Pyrethrum, Bio-insecticides, Ex situ adaptation, Primary and secondary flowering

Acknowledgements: This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme ""Healthy Foods for a Strong Bio-Economy and Quality of Life"" approved by DCM # 577 / 17.08.2018"". Authors are grateful to Dr. Martina Grdiša for the initial seeds.

Glycyrrhizin content in wild-growing and cultivated Glycyrrhiza glabra plants originating from Bulgarian populations

Asya Kozhuharova, Rumen Denev, Strahil Berkov, Marina Stanilova

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences

Abstract

Glycyrrhiza glabra L. (Fabaceae) is a medicinal plant which roots and stolons contain the biologically active substance glycyrrhizin and are used for treatment of many diseases, among them asthma, renal calculus, ulcer, and psoriasis. In Bulgaria, licorice is distributed along the Danube River, but its populations drastically decreased due to overexploitation, and only few localities remained near the villages of Dolni Vit, Koilovtsi, and Beltsov. The species is included in the Red Data Book of the Republic of Bulgaria as "endangered" and protected by the Biodiversity Act. Our studies are oriented towards establishment of a pilot plantation of licorice. We have already selected Beltsov as the richest in glycyrrhizin population (29.6 mg/g dry weight). In 2017, root segments were used to obtain plants from the three localities in the ex situ collection of IBER. Stolon segments were collected in October 2020 with the aim to test the glycyrrhizin content of plants with different origins, cultivated 3 years under control conditions and equal soil composition, as only three or more year roots are of commercial importance. Samples from all the cultivated plants shown similar values of glycyrrhizin (determined in methanol extracts by HPLC), while the glycyrrhizin content in the roots of the cultivated plants originating from Dolni Vit was significantly higher than that in the roots collected from this population ($P < 0.01$), increasing from 21.2 to 28.8 mg/g dry weight. These results confirm the assertion that G. glabra was naturalized in Bulgaria and all populations belong to one and the same genotype, which is of practical importance for further establishment of licorice plantations.

Keywords: Licorice, Medicinal plants, Endangered plants

Effects of drought stress induced by PEG 6000 on the germination and seedlings of Chelidonium majus L.

Iva Doycheva

Abstract

Drought can cause loss of agricultural land and is one of the obstacles for crop production and yield. It is an abiotic stress which affects plant growth and metabolism. Chelidonium majus L. is a medicinal plant which is cultivated as a crop in some countries in Central Europe. It contains wide variety of alkaloids and is an ingredient of some plant remedies. The aim of the study was to assess the effects of PEG-induced drought on germination and seedling growth and the possible impact of substrate type on them. The substrates used were filter paper (FP) and water agar (WA) supplemented with 1%, 5%, and 10% PEG 6000 solutions to induce drought stress.

Seed germination was not inhibited by drought stress. For all PEG percentages applied on FP the germination was over 85%. On WA the germination percentage was low (52.5%-30%); only at 5% PEG 6000 it was 82.5%. When PEG was applied at lower concentrations, the seedling root length was stimulated. With the increase in PEG concentration on all treatments, either on WA or FP, the root length decreased. The increase in PEG concentration gradually decreased the hypocotyl length on both studied substrates. The higher root length under drought stress on FP is probably an adaptive response whose aim is for deeper water to be reached. The retarded morphological development caused by drought stress is perhaps the reason for a more pronounced decrease in shoot length.

Keywords: filter paper, water agar, root and hypocotyl length

Acknowledgements: This research was supported by the Bulgarian National Science Fund, Bulgarian Ministry of Education and Science (Project КП-06-М26/4 from 01.12.2018).

Chemical composition, "in vitro" gas production and relative feed value of waste flowers of Rosa damascena Mill.

Mariya Gerdzhikova, Mima Todorova, Neli Grozeva, Ana Dobreva, Nadezhda Petkova
Trakia University

Abstract

The oil-bearing rose is one of the main essential oil crops grown in Bulgaria. During the processing of rose flowers are obtained rose oil, rose concrete, rose absolute, and rose water. Waste rose flowers after the distillation of the essential oil still have a limited usage. The aim of present study is to determine the chemical composition, "in vitro" gas production, digestibility and relative feed value of waste flowers of Rosa damascena Mill. and their suitability for use as forage. The rose flowers were collected from 6 fields located in the Kazanlak valley, Southern Bulgaria: 3 of them are with organic rose production and 3 are conventional. After their destilation the chemical composition of rose wastes is determined: crude protein, crude fat, crude fibre, ash and nitrogen free extracts (NFE). Comparative analysis of the chemical composition, structural fibre components: neutral detergent fibre (NDF) and acid detergent fibre (ADF), "in vitro" gas production and relative feed value (RFV) of rose wastes is conducted in the conditions of the two production systems.

Keywords: Rosa damascena Mill., rose wastes, chemical composition, detergent fibre; "in vitro" gas production; relative feed value

MARINE ALGAE – BENEFITS AND POTENTIAL HEALTH HAZARDS

Daniela Klisarova, Dimitar Gerdzhikov
Институт по Рибни Ресурси - Варна/ССА/

Abstract

Algae are a valuable marine resource which has been used for thousands of years. Traditionally they have been used in medicine and pharmacology for their anti-microbial, anti-inflammatory qualities and as anti-oxidants. They are also used as food supplements in veterinary medicine, as bio fertilizer in agriculture and also as bio fuel. Marine algae also contain BAS (bio-active substances) /polyunsaturated fatty acids – omega -3 and omega -6 / as well as phospholipids, vitamins, etc. Just as herbs, which are most effective when gathered from the region in which we live, marine algae from the Black Sea should be used as a resource in the future. However, there are also some hazards in the use of marine algae. The microalgae from a genus Pseudonitzschia, Dinophysis, Prorocentrum, Alexandrium, Prymnesium, Mycrocystis in the Black Sea are constantly present in the „blooms „ concentration at the BBS coast. They are described as "potentially toxic" species and their monitoring is important for the ecosystem. Therefore, before we start cultivating and using marine algae we should carefully investigate and eliminate the health hazard factors such as the presence of toxins, especially cyanotoxins, any nuclear pollution in the region, heavy metal pollution and biogenes from the anthropogenic pressure on the waters. The biotoxins found in the mussels and other marine species can cause gastrointestinal problems, skin rash and allergies. This paper describes the benefits and health hazards in the cultivation of marine algae. The results are based on continuous research and monitoring of the Black Sea ecosystem.

Keywords: marine algae, Black Sea, toxic species, health, anti-oxidants

TRANSPARENCY OF THE WATERS ALONG THE BULGARIAN BLACK SEA COAST

Dimitar Gerdzhikov, Daniela Klisarova,
Институт по Рибни Ресурси - Варна/ССА/

Abstract

The transparency (m) of the water, measured by a Secchi disk, is an optical characteristic that determines the depth of the euphotic (trophogenic) zone, where most of the primary production in seawater is formed. Transparency is a factor in the set of indicators (phytoplankton community, chlorophyll, etc.) that are directly affected by the degree of eutrophication - Descriptor 5 of the Marine Strategy Framework Directive. Transparency values ranging between 0.35 m and 13 m depth were measured during the study period. The ecological assessment of the waters in the studied water areas varied from "very poor" to "excellent" status. The aim of the article was to analyze and mark out the main trends in the seasonal and annual transparency's dynamics in the Bulgarian part of the Black Sea over the past ten years.

Keywords: Western Black Sea, eutrophication, water transparency, seasonal and annual dynamics, ecological assessment

Секция 4. “ Аграрна техника и технологии ”

Section 4. Agricultural Techniques and Technologies

Доклади
Oral presentations

Pulsation characteristics of new and used milking liners with round cross section

Galina Dineva, Kancho Peychev, Dimitar Georgiev
Trakia Univesity

Abstract

Milking machines equipped with new and used milking liners with a round cross section of the company GEA Farm Technology were studied. The used milking membranes were operated for 3 months on a farm for rearing 80 cows with double milking. The experiment involves recording the standard pulsation phases a, b, c and d (in absolute units) in the frequency range from 1Hz to 2.5 Hz, in a vacuum mode of 40 kPa and 50 kPa and at a pulsation ratio of 50/50%.

It was found that the transients (phase a and phase c) are faster and the actual phases (phase b and phase d) are longer in milking units equipped with used milking liners. The conclusions are related to the service life of the milking liners.

Keywords: milking liner, pulsation phases, depreciation

Modeling of technological operations in "Parallel" milking parlor

Dimitar Georgiev, Galina Dineva
Trakia Univesity

Abstract

Real-time video surveillance of the machine milking process was performed in three parlor type "Parallel" with capacities from 2x6 to 2x10. Based on the archived data the duration of the technological operations which form the stage for preparation of the animals for machine milking is timed. The organization of the milking process is different at the three observed farms. The time from washing the udder to placing the milking unit varies from 23 to 143 sec. (according to literature data recommended from 30 to 90 sec.) which is contrary to "good practices" as well as the average duration of the latent phase in descent of oxytocin.Based on the analysis of the data from the video surveillance four models have been developed for organization and optimization of the working process in the machine milking. It has been established that the organization of the work of the milkers in parlor type "Parallel" significantly influences the time for preparation of the animals before the "actual milking".

Keywords: milking parlors, machine milking, technological operations

Comparative study of the pulsation phases of a milking unit in laboratory and practical conditions

Galina Dineva
Trakia University

Abstract

A comparative study of the pulsation phases in a classic milking units was performed. The registration of the same is done in laboratory and practical conditions (during milking). The pulsation settings at which the test was performed were pulsation rate 60min-1 and 90min-1, ratio 50/50% and vacuum mode 50 kPa. The experiments were performed in the laboratory of "Machine milking" (Thracian University, Faculty of Agriculture, Department of Agricultural Engineering) on a milking installation with a pipe line and on a farm for 60 lactating cows at the same milking installation.It was found that the transients (phase a and c) are significantly reduced during milking. Respectively, the actual phases (phases b and d) are significantly increased during the milking process. The conclusions are related to the settings and timely diagnostics of the milking machine.

Keywords: pulsation phases, milking unit

Analysis of the input-output operations during the milking process for a hall type "Parallel" with a capacity of 2 x 24

Dimitar Georgiev
Trakia University

Abstract

The aim of the present study is to analyze the input - output traffic and the actual capacity of a "Parallel" milking parlor with a capacity of 2x 24.

Surveys were conducted during the period April-May 2020 in the cow farm located in the municipality of Chirpan. Its capacity is about 600 cows (with a tendency to increase the herd) of which 453 are milked. Milking is done in a milking parlor type "Parallel" with a capacity of 2x24 and "quick exit" with double milking per day.

The experimental studies were performed using the surveillance information system installed on the farm, which includes 18 video surveillance cameras, a recording device, a hard disk, a UPS, a power supply unit and a router. The production process was monitored in and around the milking parlor. The duration of the input-output traffic and its influence on the total hourly productivity of the milking installation is timed. It was found that the times of entry (loading) of cows in one platform from the milking parlor vary from 146 s to 206 s (average 174 s) with no significant difference for left and right platform. The waiting room in front of the milking parlor has a mechanical puller which is not used and has been replaced by an operator directing the cows to the milking parlors. According to a number of authors, the movement of people and the making of noise around milking areas generate additional stress in animals. This in turn adversely affects the overall process of milking cows.

The milking parlor has a "quick exit" and after it there is a buffer zone (second waiting room). The time for the cows to leave the milking parlors varies from 22 s to 42 s (average 31 s) and the departure from the buffer zones (second waiting rooms) on average 114 s. The experiments revealed that there were no factors delaying the progress of the cows from the milking parlors. In the course of the research it was established what part of the input-output operations (depending entirely on the animals) of the total time for the whole milking process including entering the cows, washing, drying, placing the machines, actual milking, sealing and leaving the cows from the platforms . A comparison of the results shows that with the largest share of time for complete milking - nearly 51% (50.7%) is for the actual extraction of milk and the smallest for the cows to leave the platforms - 2% and release of the second waiting - 7%. Respectively, the filling of a platform with cows takes on average 11%, their washing and drying - 17% and the installation of the devices - 12%. The statement is proved that in compliance with the normative requirements and the correspondence with the good world practices in the design of milking parlors (of the considered type) with their adjoining waiting rooms, 71% of the total milking time depends on the animals (20% of it for input-output operations) and 29% of milkers.

Keywords: milking parlors, planning parameters, technological conditions

Постери
Posters

Investigation of connections between some technological and architectural-construction parameters of four-row buildings for free rearing of cows

Vanya Dimova, Petya Veleva
Trakia University

Abstract

The aim of the study is to determine connections between the relative construction costs for shaping the technological profile of the floor and the widths of four-row buildings for free rearing of cows in individual boxes. The analyzed solutions are 23 with widths of the buildings from 12.80 to 31.00 m. When developing the technical-technological schemes for the variants, minimum and maximum sizes of the technological elements have been adopted, in compliance with the current normative requirements. The costs for the execution of the floor profile (including the stationary equipment) have been determined, as the costs for the construction of the zero cycle, the bearing and enclosing structures of the building are excluded. For each of the studied variants, an assessment of the material consumption was made according to the construction indicators: consumption of concrete and steel, related to 1 m2 of built-up area and to one cattle-breeding site. Correlation-regression analysis performed for linear, exponential, power, logarithmic and reciprocal functions was used to establish reliable connections between the studied construction costs and the widths of the buildings. It is found that it is impossible to find an analytical expression that reliably describes the relationship between the costs of the studied indicators and the widths of buildings for the entire range 12.80 - 31.00 m. The results show that for different ranges of it the relation can be expressed by the linear function: $y = ax + b$

Keywords: free rearing of cows, four-row buildings, widths, relative construction costs, technological profile of the floor, correlation-regression analysis, connections

Operational characteristics of a machine-tractor unit for direct sowing of barley using the JD LINK telematics system

Galin Tihanov & Galya Hristova, Trakia University – Stara Zagora

Abstract

A study has been conducted for some operational indicators of a machine-tractor unit for direct sowing of barley. The data for this study ha been collected and retrieved by using the JD Link telematics system. From the obtained results it has been established: The engine speed of the sowing unit while running is 1586.11 min-1, as for the relative share of its use in running is 56.68 % and 14.54 % when idle; The actual working speed has been established when the drill is performing the technological operation "sowing" 10.06 km/h; The fuel consumption has been established to be 25.10 l/h and the actual hourly productivity has been calculated and found to be 3.05 ha/h in the Kidney field and 3.81 ha/h in the Western block Ka field.

Keywords: direct sowing, telematics system, operation speed at sowing, fuel consumption

APPLICATION OF UNMANNED AIRCRAFT DRONES IN CONTEMPORARY AGROTECHNOLOGIES

Teodora Petrova
Trakia University – Stara Zagora

Abstract

One of the trends in the development of environmentally friendly and highly efficient agricultural technologies (animal husbandry, plant growing, environmental monitoring) is the increasing use of unmanned aircraft drones (UAD). Traditionally, in agriculture, UADs are used to monitor crops, land reclamation support, land owing fund inventory, controlling the parameters of agro-technological processes, spraying with chemicals, security of facilities, etc. The range of these applications can be significantly expanded by equipping them with special devices for direct execution of technological operations. When using UAD in modern agrotechnologies, it is necessary to improve the functions such as search, recognition and manipulative-robotic actions of UAD. Development of the project of a multifunctional module highly maneuverable UAV will ensure search and converting agricultural technological functions in the face of accurate agricultural production on spatially distributed territories. In animal husbandry for individual animal care and effective herd management, it is proposed to create a "video shepherd", which is based on a multifunctional device for recording events, with operations for self-training, self-programming and self-regulation. In crop production, when implementing the technology of differentiated agriculture, which takes into account the condition of each plant, the creation of "video technology fields" is proposed, through the development of a multifunctional mechatronic-executive device of UAD with elements for self-direction and self-organization. When observing nature, especially in forestry, fishing and hunting farms, a "video inspector of territories" would be useful, which is based on the development of a multifunctional reconnaissance device for UAD with algorithms for self-learning, self-programming and self-organization.

Keywords: unmanned aerial vehicles, precision farming, exact search, detection, identification, navigation, physics-chemical effects, video robotics, managing agro-technological systems.

Design parameters of furrow forming and compacting roller of the combined seeder STS -80

Galya Hristova, Manol Dallev and Galin Tihanov
Trakia University – Stara Zagora

Abstract

A turf seed drill (CTC – 80 (read as STS) has been designed, in which the seeds from the sowing machines are sent to the soil through seed pipes. The size of the seeds is relatively small, therefore it is a necessary requirement for them to be sown at a dept between 0,5 cm and 1,5cm. The drill allows the following operations to be performed simultaneously: soil furrowing, seed sowing and soil compaction with a compaction roller. The structure of the individual bodies that make up the aggregate is essential for the smooth running of the work process. Two rollers have been developed, which allow the providing of the necessary agro-technical requirements for sowing grass seeds. The role of the roller mounted in the front part of the drill, is to make furrows in the soil at a dept of 1.5 cm, where the grass seeds fall. The roller, located in the rear of the unit, dulls the surface of the soil after the seeds enter it. This creates additional dynamic force, which increases the degree of soil compaction and the intensity of destruction of soil aggregates at a certain mass of the roller.

Keywords: seed drill, compaction roller, furrow roller

Monitoring the technology of wheat production under different climatic conditions and the influence of some technological operations on its yield

Galya Hristova and Petya Veleva
Trakia University – Stara Zagora

Abstract

In agriculture the correct choice of appropriate agrotechnical decisions is an essential aspect when it comes to the implementation for the best practices in the production of cereal. Modern technological and innovative opportunities make it more relevant to find the optimal agro-technical implementations that will lead to the best results needed in agricultural practices. Tillage is an essential process in creating the best conditions for plants growth and development. By meeting these conditions the high productivity and the maximum yields of the crops are shown.

The study is based on many years of field experience on chernozem soils in the territory of the Agricultural Cooperative "Suglasie" in the village of Zetiovo. Throughout the years the previously mentioned operation has had to be applied between two to three times, this course of action has been Influenced by the climatic changes and weather conditions within the years that were taken in account for this study.

A General Linear Model, expressing the relation between the yield of „Exotic" wheat and the depth of Disking during the observed years was compiled. Statistically significant differences between the examined parameters by Post Hoc (Tukey) test at $p < 0.05$ were established.

Keywords: disking, tillage, wheat production technology, statistical analysis

Секция 5. “ Студенти и докторанти ”

Section 5. Students and PhD students

Доклади
Oral presentations

Annual and seasonal variation of NDVI and their relationship with soil temperature for the South-Eastern part of Bulgaria

Radomira Velichkova, Mima Todorova, Stefka Atanassova, Nikolai Takuchev, Neli Grozeva
Trakia University – Stara Zagora

Abstract

In recent years, remote sensing has been established as a preferred method for collect an information on spatially separated objects on and above the earth's surface. There are indisputable qualities of the information by sensors on the board of satellites or planes - objectivity, wide scope and also accessibility of the means for its processing. They could provide information for parameters as leaf area, soil moisture and others, which could be used in different calibration models for indirect determination of photosynthesis activity. The aim of the current study was to monitor plant vegetation in South Eastern Bulgaria during the period 2000-2020 year via annual and seasonal NDVI analysis and relationship of this vegetative index with soil temperature. Monthly average NDVI and soil temperature (10-40) cm data were extracted from the GIOVANNI interface. The used data were based on measurement with a Terra MODIS radiometer. Unscrambler software (CAMO, Norway) were used for data analysis. The values of the NDVI index for the territory of Southeastern Bulgaria varied between 0.07 and 0.79. The lowest value of 0.07 was registered in winter, January, 2017 and the highest value of 0.79 in May, 2016. A high positive correlation between NDVI index and soil temperature was found for the April and March, with values of R = 0.72 and 0.79, also for February and January with values of R = 0.56 and 0.54. A high negative correlation was found for July and August, with R values between -0.86 and -0.65.

This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme “Healthy Foods for a Strong Bio-Economy and Quality of Life” approved by DCM # 577 / 17.08.2018”.

Keywords: NDVI, MODIS, soil temperature

Implications of captive breeding for the reintroduction of the Saker Falcon (*Falco cherrug*) in Bulgaria

R. Petrov, Y. Andonova, Y. Gancheva, Ivaylo Klisurov
Green Balkans - Stara Zagora NGO, Stara planina 9, 6000 Stara Zagora, Bulgaria
Trakia University, Student's campus, 6000 Stara Zagora, Bulgaria
Avans University of Applied Sciences, Onderwijsboulevard 215, 5223 DE 's-Hertogenbosch, Netherlands
University of Wolverhampton, Wulfruna St, WV1 1LY Wolverhampton, United Kingdom

Abstract

The Saker Falcon (Falco cherrug) is a globally endangered species recovered in 2018 in Bulgaria. The only known active pair currently breeding in the wild in the country is made up of captive-bred and released as part of the reintroduction programme birds. As part of the project, sourced Saker Falcons of known European origin are bred ex-situ, the juveniles are parent-reared and released in the wild by the means of the hacking method. The objective of this study is to outline the reintroduction activities and reasons for choosing the captive breeding method, and present in detail the specifics of the breeding programme - aviary and perch types and their maintenance; surveillance methods; Saker Falcon genetics; egg pulling, double-clutching and artificial incubation methods; and veterinary manipulations such as placing microchips and identification rings, and taking measurement data. Presented are results for a ten year period of implementation (2011-2021). Discussed are the results and implications of the ex-situ breeding method for the reintroduction of the Saker Falcon in Bulgaria from the beginning of its implementation to date.

Keywords: raptors, ex-situ, conservation, restoration, endangered species

EUROPEAN BADGER (MELES MELES LINNAEUS, 1758) PREFERENCES TO THE TERRAIN EXPOSURE FOR DIGGING DENS IN SOUTHEASTERN BULGARIA

Stanislava P. Peeva, Dilian G. Georgiev, Krasimir B. Kirilov
Faculty of Agriculture, Trakia University, 6000 Stara Zagora,
Plovdiv University, Faculty of Biology

Abstract

A total of 47 active badger burrows in the Southeastern Bulgaria were described in order to find whether there are preferences to terrain exposure for its digging activity. The most of the dens were found on terrain with south exposure - 23.4%, followed by these on the east and west side -19.15% each. The dens faced to these three directions, together with these to intercardinal directions connected with south, represented 80.85% of the active badger dens found. The established exposure of the burrows suggests more favorable microclimate in front of them in the local ecosystem conditions, making it preferable by the badgers.

Keywords: south, cardinal directions, burrow

Проучвания върху ефекта от ограничаване на пилото през есенно-зимния период върху нивата на VtG в хемолимфа на пчели работнички

Studies on the effect of brood interruption during the autumn-winter period on the levels of VtG in the hemolymph of worker honey bees

Христо Иванов, Н. Русенова, И. Цачев
ССА-София, ИЖН-Костинброд, Тракийски университет, ВМФ

Abstract

The present study is part of a large-scale project tracking the physiological changes, lifespan and productivity of worker honey bees at different times of the year, with various periods of queen cageing. This trial follows the change in the amount of VtG in the hemolymph of worker bees in autumn and spring in colonies with caged (restricted) queens and in colonies with free laying. The experiments were conducted in Central Southern Bulgaria, in the area of Stara Zagora with a local bee breed (Apis Mellifica L.). The insulation of the queen was achieved by Hmara's isolator, which has not yet been the subject of scientific experiments, and the concentrations of VtG have been analyzed by ELISA method. The levels of vitellogenin (VtG) in the hemolymph of bees have not been determined in our country up to date. Results obtained from the autumn samples showed high deviation of the values in both the experimental and the control group. Similar values for both groups were observed at (2 * 2) colonies created by one main hive. The results of the spring tests showed a sharp decrease in VtG levels in the experimental group, which are statistically significantly higher than the reported amounts in the control group. The conducted experiment clearly demonstrates the effectiveness of the Hmara's insulator as a factor and the ability of worker bees to maintain their vitality for a long period due to minimizing brood rearing.

Keywords: vitellogenin, hemolymph, brood interruption, Hmara

Cultivation of non-pungent and pungent peppers (Capsicum spp.) in close vicinity, without probability the sweet peppers to acquire a hot taste

Todorka Srebcheva, Milena Kostova
Катедра „Физиология на растенията, Биохимия и Генетика", Аграрен Университет – Пловдив, България/ Department "Plant Physiology, Biochemistry and Genetics", Agricultural University – Plovdiv, Bulgaria

Abstract

Some of the greatest misconceptions of mankind are related to the history of the pepper. The first is related to the place of origin of this plant. On October 12, 1492, Christopher Columbus first reached the shores of what he considered Asia, but in fact discovered a new continent - America. He believed the western route from Spain to India will be shorter than the land trade route through the Arabian Peninsula. Believing that he had reached India, he called the natives of the New World "Indians." The discovery by his expedition of the plant, from whose fruits the then known spice - pepper, is produced, is also a delusion. It was highly valued and the name "pepper" was used in Europe at that time for all known spices with a pungent and spicy taste. This spice imported from India, with a spicy taste, is actually made from the fruits of Piper nigrum, now known as "black pepper". The newly discovered vegetable from the New World also spreads under the name pepper, but it belongs to a completely different taxonomic family - Solanaceae and represents the different species of the genus Capsicum, known to this day as pepper. Another misconception related to the cultivation of pepper is that after pollination of mothers non-pungent plants with pollen from pungent plants, in the same generation the fruits of mother plants become pungent. Knowledge of the genetics of the synthesis of capsaicinoids (the alkaloids that gives the fruit its spicy taste) helps to debunk this delusion as well.

Keywords: Pungent Pepper, Non-pungent Pepper, Capsicum, Capsaicinoids

Mineral Contents in Brown Seaweed Colpomenia sinuosa for Human Consumption

Melis Yılmaz1, İlknur Ak, Gülen Türker
Çanakkale Onsekiz Mart University, Department of Marine Science and Inland Waters, School of Graduate Studies, Terzioğlu Campus, Çanakkale, TURKEY
Çanakkale Onsekiz Mart University, Department of Aquaculture, Faculty of Marine Sciences and Technology, Terzioğlu Campus, Çanakkale, TURKEY
Çanakkale Onsekiz Mart University, Department of Food Technology, Facuty of Applied Science, Terzioğlu Campus, Çanakkale, TURKEY"

AbstractSeaweeds are rich in mineral contents needed for human nutrition and their popularity increase as an ingredient in cuisines all over the world. But, many factors such as environmental conditions, life cycles, geographic location affect their levels of these contents. In this study, the mineral content (Na, K, Mg, Fe, Cu, Zn, Mn, P, Ni, Pb, Cu, Cd, Cr, Al) of brown seaweed Colpomenia sinuosa which collected from three different locations of Turkey (Aegean Sea (S1), Dardanelles (S2) and Marmara sea (S3) were determined. Our results showed that the differences in mineral levels between seas reached up to 3-fold. The highest level of Na, Ca, Mg, Fe, Ni and Mn were found in S1. C. sinuosa in S3 showed the maximum concentration of P and Zn. The K levels ranged from 478.70 ppm in S2 to 5845.38 ppm in S1. Also C. sinuosa is rich for Ca. The levels of Ca changed from 1235.00 ppm (S2) to 3188.63 ppm (S1). Toxic minerals such as Pb, Co, Cd, Cr, and Al were also studied. Our results showed that C. sinuosa might be used as a source of essential minerals for human consumption.

Keywords: Colpomenia sinuosa, functional foods, human consumption, mineral contents, seaweed.

Постери
Posters

CHANGES IN PHOTOSYNTHETIC ACTIVITY AND PRODUCTIVITY OF DURUM WHEAT (TRITICUM DURUM DESF.) UNDER THE INFLUENCE OF CERTAIN PREPARATIONS AND VARIOUS TERMS OF SOWING

Petar Nikolov, Grozi Delchev
Тракийски университет, Аграрен факултет, Стара Загора

Abstract

In 2019-2020 in the experimental field of the Field Crops Institute, Chirpan was conducted a field experiment with durum wheat cultivar Predel (Triticum durum Desf.). 3 sowing dates were tested: Early sowing (05 - 10 October), Normal sowing (20 - 25 October - standard) and Late sowing (05 - 10 November). In early sowing, 2 retardants were studied: Cearon 480 SL - 1 l / ha and Medax top - 1 l / ha and 2 insecticides: Proteus 110 OD - 625 ml / ha and Mageos - 100 g / ha, as well as the mixtures between them. During late sowing, 2 stimulants were studied: Naturamin plus - 1.5 l / ha and Raiza mix - 750 ml / ha and 2 foliar liquid fertilizers: Mix for cereal SC - 1.5 l / ha and Trimax SC - 1.5 l / ha, as well as the mixtures between them. These preparations and fertilizers are imported after stage 3 - 4 leaves of durum wheat, in the so-called "Closure of crops". In the case of early sowing variants, this stage occurs in autumn, and in the case of late sowing variants, the stage occurs in spring. In early sowing of durum wheat, the leaf area, photosynthetic potential, biological and economic yield are greatest in the combinations of retardants Cearon and Medax top with the insecticides Proteus and Mageos. In late sowing of durum wheat, the leaf area, photosynthetic potential, biological and economic yield are highest in the combinations of the stimulants Naturamin plus and Raiza mix with the leaf fertilizers Mix for cereals and Trimax. In these variants, the leaf area dies faster during milk development stage. The net photosynthesis productivity in the combinations is lower than in the independent use of the respective preparations and fertilizers. The harvest index in the late and normal sowing variants is higher than in the early durum wheat sowing variants.

Keywords: durum wheat, leaf area, photosynthetic potential, net photosynthesis productivity, biological and economic yields, harvest index

BIOMETRIC DATA OF PEACHES' AND NECTARINES' FRUIT AND STONES

Argir Zhivondov, Sashka Savchovska, Svetla Pandova, Dorina Petkova, Pavlina Doykina, Ivan Manolov

Abstract

The article presents a three-year traceability (2018, 2019, 2020) of biometric results of the fruits of eight peaches and nectarines varieties. The study covers the fifth, sixth and seventh vegetation period from the period of full fruiting. Varieties included in this investigation are "Filina" (peach, clingstone), "Gergana" (nectarine, clingstone), "July Lady" (peach, semi-clingstone), "Ufo 4" (flat peach, semi-clingstone), "Laskava" (peach, freestone), "Morsiani 90" (nectarine, freestone), "Flat Queen" (flat peach, freestone), "Evmolpiya" (peach, freestone). The experimental collection plantation was created in the spring of 2014 on the territory of the Fruit-growing Research Institute, Plovdiv, BG (lat. 42.10384828045957 and long. 24.72164848814686).The data analysis shows that the varieties "Laskava" and "Evmolpiya" produce fruits with the highest weight - 319.60 g and 303.60 g, respectively. Average weight is registered in the "Morsiani 90" variety (226.07 g) and the "July Lady" variety (193.87 g). "UFO 4" is characterized with the smallest fruits – an average of 143.83 g and the highest flesh yield. Considering the fact that the "Filina" variety is very early ripening, its fruits can be treated as large for the season - 170.21 g. The stones of the "July Lady", "Morsiani 90" and "Evmolpiya" varieties have the largest average mass.

Keywords: *Prunus persica* (L.) Batsch., peaches, nectarines, fruit biometrics

The endemic plants - a valuable resource with vast potential in Bulgaria (a brief overview)

Dorina T. Petkova, Dasha Sp. Mihaylova
University of Food Technologies

Abstract

The plant kingdom with its natural products, both terrestrial and marine, has been widely studied. Plant-based products have long been used for the prevention and treatment of various diseases. Many natural compounds are reported to have a number of interesting and significant biological activities, such as antioxidant, anti-inflammatory, antitumor, antibacterial, antiviral, antifungal, antiparasitic, analgesic, antidiabetic, antiatherogenic, antiproliferative, and cardioprotective and neuroprotective activities. In order to find a natural product, researchers often explore the possibilities given by nature. Special attention is paid to bioactive compounds synthesized by endemic plants as a specific resource of limited habitat. This review focuses on a brief overview of endemic plants in Bulgaria, most common in the mountainous regions of the country, with the aim to encourage the knowledge of these resource with vast potential.

Keywords: endemic plant, Bulgarian flora, potential, biological activity

Evaluation of fructan and sugar content in three representatives from Carlina genus

Emine Saralieva*, Ivan Ivanov, Nadezhda Petkova
УХТ Пловдив

Abstract

The genus Carlina (Asteraceae) consists of approximately thirty plant species known as carline thistles growing in Europe and Asia, commonly used for medicinal and nutritional purposes. However, the information about fructan content is still limited. The aim of the current study was to evaluate the individual fructan and sugar content in the roots and aerial part of three representatives from Carlina genus, as follows: Carlina acanthifolia All., Carlina vulgaris L. and Carlina corymbosa L. collected during autumn from Golo Bardo and Vlahina mountain in Bulgaria. The ultrasonic extraction was performed to obtain water extracts. The total fructan content was evaluated by the spectrophotometric resorcinol method, while the individual sugar and inulin content was determined by HPLC-RID method. The highest content of the total fructans was found in roots of Carlina acanthifolia All. – 13,29 % dry weight. In all plants parts were detected sugars glucose, fructose and sucrose. The level of inulin was the highest in the roots of Carlina acanthifolia All. -2.70% dw, while in the roots of Carlina vulgaris L. and Carlina corymbosa L. its level was below 1%. However, in the roots of last two samples prebiotic nystose was 0,5 % dw, while in Carlina acanthifolia All. it is completely absent. In aerial part dominated sugars in the higher content than roots, especially in case of Carlina vulgaris L. This is the first detailed study about fructan and inulin content in Carlina vulgaris L. and Carlina corymbosa L. The obtained results evaluated Carlina acanthifolia All. as good source of fructans, among other both represntatives from Carlina genus.

Keywords: genus Carlina, fructans, inulin, sugars

Carbon dioxide levels in the working environment of a cow milking parlor

M. Stoynov, D. Dimov, T. Penev, I. Marinov, J. Mitev and Ch. Miteva
Faculty of Agriculture, Trakia University

Abstract

The study was conducted on a cattle farm with 500 dairy cows in Bulgaria. The animals were reared under the conditions of free-stall housing system and milked in double-8 "Herringbone" type milking parlor. Carbon dioxide levels were reported three times during each milking (at the beginning, in the middle and at the end of the milking), with the measurements repeated during the morning, midday and evening milking, every month for a year. Carbon dioxide levels in the working environment were measured using a Lutron MCH-383SDB combined instrument. The highest average values of carbon dioxide in the air inside the milking parlor were registered during the winter season (789.3 ppm) and in parts during the autumn and spring seasons, which are transitional seasons, with the maximum reported value being 1451.0 ppm. The lowest values of carbon dioxide in the milking parlor were reported during the summer season - 432.3 ppm. The trend was similar to the reported levels of carbon dioxide outside the premises, but the values in the milking parlor were 2 to 3 times higher. The reported values of carbon dioxide in the working environment of milking parlor gradually increased from the beginning to the end of the relevant milking.

Keywords: Carbon dioxide; dairy cows; milking parlor; working environment

Temperature-humidity working conditions in a milking parlor for cows

M. Stoynov, D. Dimov, T. Penev, I. Marinov, Ch. Miteva and J. Mitev
Faculty of Agriculture, Trakia University

Abstract

The study was conducted in the milking parlor of a dairy cattle farm with a capacity of 500 Holstein-Friesian cows. The milking parlor was double-8 "Herringbone" type. There were no windows in the premises, and the roof structure was constructed of glass. The temperature, air humidity and Temperature-humidity index (THI) were reported three times during each milking (at the beginning, in the middle and at the end of the milking), with the measurements repeated during the morning, midday and evening milking. The highest average air temperatures in the working area of the milking parlor were reached during the summer season for midday milking 27.1 0C, and the lowest for the autumn season for evening milking 10.3 0C. The highest average value of the relative humidity - 89.2% in the milking parlor was reached in the winter season for midday milking, and the lowest in the spring season - 55.7%. Significant differences in the values of these indicators outside and inside the milking parlor were not reported. The values of the air temperature inside the milking parlor were significantly higher than the permissible norms for working environment in the spring-summer season (by 5 - 6 ° C) and lower in the autumn-winter season (by 4 to 6 ° C). The lowest values of THI in the milking parlor were reached in the autumn during evening milking - 51.4. The highest values for this indicator were reached during the summer season for midday milking - 75.6. The values of THI much of the year are also above the recommended standards of comfort at workplace. The values reported showed that for 4 - 5 months of the year the milkers were exposed to unfavorable temperature-humidity working conditions.

Keywords: доячи, доилна зала, температура, влажност, ТВИ

Разработване на метод за определяне готовността за зимуване на пчели работнички базиран на нивата на VtG в хемолимфата / Development of a method for determining the wintering of worker bees based on the levels of VtG in the hemolymph

Христо Иванов
ССА-София, ИЖН-Костинброд

Abstract

There are many postulates in beekeeping science and practice regarding preparation of the colonies for the most challenging period of the year. Up to date, there is no clear model or criterion for assessing the winter hardiness of bee colonies that can be applied in advance. The already known approaches compare the indicators such as food consumption, dead bodies, comb of brood, appearance of the queen and others from autumn and spring or in spring only. The levels of vitallogenin (VtG) in the hemolymph of worker bees are directly related to the crude protein in the hemolymph, total protein and fat in the bee's body and directly determine the lifespan of worker bees. The experiments were conducted from the autumn of 2019 till the spring of 2020 with bee colonies with caged and free-laying queens during the period, in an apiary located in Stara Zagora region with a local bee breed (Apis Melifera L.). A VtG concentration threshold of 24 µg/L was observed showing the levels under which the bee wintering abilities reduce. The values of VtG in the autumn above the threshold will ensure good wintering and rapid increasing the number of bee population during the spring period. Due to the established fluctuations in the external meteorological conditions, periods with lack of blooming flora, heredity, etc. it is advisable to repeat this experiment in several consecutive years in order to derive additional data. Currently, the test can only be performed in the laboratory, but with the advancement of technologies the trial can be applied in the field aiming greater benefit to beekeepers.

Keywords: method, wintering, vitallogenin, honey bee

Lesser Kestrel (*Falco naumanni*) diet overview in Bulgaria.

V. Ivanova, G. Gradev, S. Yaneva, S. Marin, T. Bileva

Abstract

The current overview describes elements of the Lesser Kestrel diet in Bulgaria. Falco naumanni is a small, colonial falcon, hunting both on land and air in open cultivated and non-cultivated areas. the study was based on literature review and personal observations (field studies) after the restoration of the species' nesting in our country. We analyse more than 30 publications, the earliest of which dates from 1950. In general, we found specific data on the Lesser kestrel diet in Bulgaria only in 6 - 7 of the sources. In some of them the information is quite general and brief unlike other countries like Spain, Italy, Israel, etc. significant materials on the subject are available. The summarized information confirm that the diet of the Lesser Kestrel in Bulgaria includes the main taxons Orthoptera, Lacertidae and Rodentia (Muridae and Arvicolinae). In our country on the base of field studies as part of the diet of Lesser Kestrel, we also report some species from Chilopoda and small snakes. A diet study is very important, according to management strategies ecology and breeding success of Falco naumanni.

Keywords: Falcon, taxons, feeding behaviour

Studies on the Bulgarian representatives of the family Chenopodiaceae s.str. (Amaranthaceae sensu APG): a review

Vanya Boneva

Abstract

Worldwide, the family Chenopodiaceae numbers about 1,600 species, belonging to more than 100 genera, which are more likely to spread in temperate and subtropical regions. Most of its Bulgarian representatives are included in the group of highly mobile ruderal plants and weeds which spread from the southern continental center, but have become widespread both in the thermal zone of Bulgaria and in its western parts. The aim of the present study is to review the research on bulgarian members of the Chenopodiaceae family. The data available in the literature on the species composition, chorology, morphological features and karyological variability of the species from their Bulgarian populations have been studied. The systematized data are presented in chronological order, which allows to trace the current level of study on the family in Bulgaria and opportunities for new research.

Keywords: Chenopodiaceae, Amaranthaceae, chorology, morphology, karyology, Bulgaria

ARIETAL SUSCEPTIBILITY OF CHICKPEAS (CICER ARIETINUM L.) TO HERBICIDES

Georgi Raikov
Agrarian University

Abstract

The aim of the present field experiment is to study the susceptibility of chickpeas, Chaatai variety, to herbicides in order to establish the biological efficacy of herbicides against economically important weeds and their influence on the physiological development and growth of the crop. The complex action of some herbicides with foliar fertilizers has been studied. The field experiment was carried out in the period 2018-2020 on experimental fields in the village of Cherkovna, region Razgrad, Bulgaria. The experiment includes 12 variants: 1. Merlin flex 480 SC (240 g/l isoxaflutol)-21ml/da; 2. Challenge (600 g/l aclonifen-120 ml/da; 3. Lentagran VP (450 g/kg pyridate)-60+100 g/da; 4. Merlin flex 480 SK+Lactofol Iron+Helason Molybdenum - 21 ml/da+600 ml/da+30 ml/da 5. Merlin flex 480 SK+Yara Vita Brasitrel-21 ml/da+200 ml/da 6. Merlin flex 480 SK+Aminozole+Mix for rapeseed and sunflower SK-21 ml/da+100 ml/da+200 ml/da 7. Challenge+Lactofol Iron+ Chelason Molybdenum-120 ml/da+600 ml/da+30 ml/da 8. Challenge+Yara Vita Brasitrel-120 ml/da+200 ml/da; 9. Challenge+Aminozole+Mix for rapeseed and sunflower SK-120 ml/da+100 ml/da+200 ml/da; 10. Lentagran VP Lactofol Iron+Helason Molybdenum-60+100 g/da 600 ml/da+30 ml/da; 11. Lentagran VP+Yara Vita Brasitrel-60+100 g/da+200 ml/da; 12. Lentagran VP+Aminozole+Mix for rapeseed and sunflower SK-60+100 g/da+100 ml/da+200 ml/da - all applied vegetatively in phase 2-4th leaf of weeds and culture. Selectivity was reported on a 9-point scale of the EWRS.The species composition and density of weeds were determined by a method for accounting and mapping of weeds in main field crops by quantitative method. When treated with a tank mixture of the herbicide Merlin Flex (21 ml/da) with the studied foliar fertilizers, a reduced herbicidal effect against sunflower (as self-seeding) and a very good herbicidal effect against weeds were found. The best anti-stress effect on the crop was registered with a variant of the tank mixture of the herbicide Merlin Flex (21 ml / da) + Aminozole + Mix for rapeseed and sunflower.

Keywords: chickpeas, herbicide, selectivity, phytotoxicity, productivity