



ISSN 1313 - 8820
Volume 6, Number 4
December 2014

AGRICULTURAL SCIENCE AND TECHNOLOGY

2014

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

Editor-in-Chief

Tsanko Yablanski
Faculty of Agriculture
Trakia University, Stara Zagora
Bulgaria

Co-Editor-in-Chief

Radoslav Slavov
Faculty of Agriculture
Trakia University, Stara Zagora
Bulgaria

Editors and Sections

Genetics and Breeding

Atanas Atanasov (Bulgaria)
Nikolay Tsenov (Bulgaria)
Max Rothschild (USA)
Ihsan Soysal (Turkey)
Horia Grosu (Romania)
Bojin Bojinov (Bulgaria)
Stoicho Metodiev (Bulgaria)

Nutrition and Physiology

Nikolai Todorov (Bulgaria)
Peter Surai (UK)
Zervas Georgios (Greece)
Ivan Varlyakov (Bulgaria)

Production Systems

Dimitar Pavlov (Bulgaria)
Bogdan Szostak (Poland)
Dimitar Panaiotov (Bulgaria)
Banko Banev (Bulgaria)
Georgy Zhelyazkov (Bulgaria)

Agriculture and Environment

Georgi Petkov (Bulgaria)
Ramesh Kanwar (USA)
Martin Banov (Bulgaria)

Product Quality and Safety

Marin Kabakchiev (Bulgaria)
Stefan Denev (Bulgaria)
Vasil Atanasov (Bulgaria)

English Editor

Yanka Ivanova (Bulgaria)

Scope and policy of the journal

Agricultural Science and Technology /AST/ – an International Scientific Journal of Agricultural and Technology Sciences is published in English in one volume of 4 issues per year, as a printed journal and in electronic form. The policy of the journal is to publish original papers, reviews and short communications covering the aspects of agriculture related with life sciences and modern technologies. It will offer opportunities to address the global needs relating to food and environment, health, exploit the technology to provide innovative products and sustainable development. Papers will be considered in aspects of both fundamental and applied science in the areas of Genetics and Breeding, Nutrition and Physiology, Production Systems, Agriculture and Environment and Product Quality and Safety. Other categories closely related to the above topics could be considered by the editors. The detailed information of the journal is available at the website. Proceedings of scientific meetings and conference reports will be considered for special issues.

Submission of Manuscripts

All manuscripts written in English should be submitted as MS-Word file attachments via e-mail to editoffice@agriscitech.eu. Manuscripts must be prepared strictly in accordance with the detailed instructions for authors at the website www.agriscitech.eu and the instructions on the last page of the journal. For each manuscript the signatures of all authors are needed confirming their consent to publish it and to nominate on author for correspondence.

They have to be presented by a submission letter signed by all authors. The form of the submission letter is available upon request from the Technical Assistance or could be downloaded from the website of the journal. Manuscripts submitted to this journal are considered if they have submitted only to it, they have not been published already, nor are they under consideration for publication in press elsewhere. All manuscripts are subject to editorial review and the editors reserve the right to improve style and return the paper

for rewriting to the authors, if necessary. The editorial board reserves rights to reject manuscripts based on priorities and space availability in the journal.

The journal is committed to respect high standards of ethics in the editing and reviewing process and malpractice statement. Commitments of authors related to authorship are also very important for a high standard of ethics and publishing. We follow closely the Committee on Publication Ethics (COPE), <http://publicationethics.org/resources/guidelines>

The articles appearing in this journal are indexed and abstracted in: EBSCO Publishing, Inc. and AGRIS (FAO).

The journal is accepted to be indexed with the support of a project № BG051PO001-3.3.05-0001 "Science and business" financed by Operational Programme "Human Resources Development" of EU. The title has been suggested to be included in SCOPUS (Elsevier) and Electronic Journals Submission Form (Thomson Reuters).

Address of Editorial office:

Agricultural Science and Technology
Faculty of Agriculture, Trakia University
Student's campus, 6000 Stara Zagora
Bulgaria

Telephone.: +359 42 699330
+359 42 699446

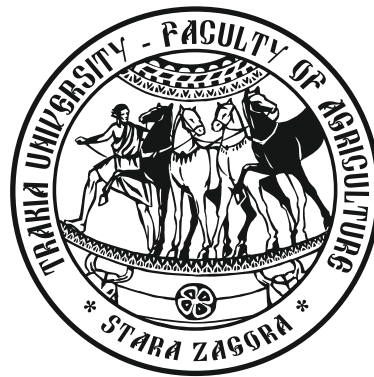
www.agriscitech.eu

Technical Assistance:

Nely Tsvetanova
Telephone.: +359 42 699446
E-mail: editoffice@agriscitech.eu

ISSN 1313 - 8820

Volume 6, Number 4
December 2014



*AGRICULTURAL
SCIENCE AND TECHNOLOGY*

2014

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

Relationship between soil salinity and *Bassia hirsuta*, *Salicornia europaea* agg. and *Petrosimonia brachyata* distribution on the territory of Pomorie lake and Atanasovsko lake

M. Todorova^{1*}, N. Grozeva², L. Pleskuza¹, Z. Yaneva³, M. Gerdjikova¹

¹Department of Plant Production, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

²Department of Biology and Aquaculture, Faculty of Agriculture, Trakia University, 6000 Stara Zagora, Bulgaria

³Department of Pharmacology, Animal Physiology and Physiological Chemistry, Faculty of Veterinary Medicine, Trakia University, 6000 Stara Zagora, Bulgaria

Abstract. In the Black Sea biogeographical region on the territory of Bulgaria there are only two Salinas – Atanasovsko lake and Pomorie lake. Since 1980 the north part of Atanasovsko lake has been declared nature reserve. Since 1999 the northern part of the lake has been re-categorized as Managed Nature Reserve according to the new Protected Areas Act. Since 2001 Pomorie lake has been declared Protected Site. The aim of the study was to assess the relationship between soil salinity and halophyte plants distribution – *Salicornia europaea* agg., *Bassia hirsuta* (L.) Asch. and *Petrosimonia brachiata* (Pall.) Bunge on the territory of both protected areas. The period of investigation was between September and October, 2013. A total of 22 soil samples were taken from a depth of 0–20 cm. In each sample taking point vascular plants of *Salicornia europaea* agg., *Bassia hirsuta* and *Petrosimonia brachiata* existing there, were also collected. The collected soil samples were analyzed for electrical conductivity (EC), pH, Cl⁻, CO₃²⁻ and HCO₃⁻ content. The soil from the studied territory of Atanasovsko lake Managed Nature Reserve was characterized with alkaline to strong alkaline reaction and high level of salinity. The alluvial deposit from Pomorie lake Protected Site was characterized with neutral to alkaline reaction and light to high salinity. *Salicornia europaea* forms populations on alkaline soil, with salinity from 2 to 44 mS/cm, but dominates on high salinity soil, above 14 mS/cm. *Bassia hirsuta* forms populations on soil with neutral to moderate alkaline reaction and from light to high salinity, with EC up to 14 mS/cm. *Petrosimonia brachyata* forms populations on alkaline soil, from light to moderate salinity, with values of EC from 2 to 6 mS/cm.

Keywords: electrical conductivity, soil salinity, salinas, *Salicornia europaea* agg., *Bassia hirsuta*, *Petrosimonia brachiata*

Introduction

Salt and alkaline lakes could be found on every continent. Within salt lakes, alkaline wetlands form a hydro chemically distinct group. They include numerous large lakes, but the majority are shallow, often seasonal still wetlands. Bare, dry lakebeds are characterized by scattered, annual halophytic plants (Boros, 2003). A halophyte is a plant that completes its life cycle in a salty environment and shows optimal growth in the presence of very high concentration of salt. Some of these halophytes have specialized morphological adaptations to cope with high salinity, such as glandular hairs or succulence (Zörb et al., 2013). On the other hand, the large majority of plant species, which include all major crop plants are damaged by salinity (Penkov et al., 1985; Zaprianova et al., 2007; Zörb et al., 2013)

In the Black Sea biogeographical region on the territory of Bulgaria there are only two Salinas – Atanasovsko Lake and Pomorie Lake. The objects of our study were soil salinity and distribution of halophytes *Salicornia europaea* agg., *Bassia hirsuta* (L.) Asch. and *Petrosimonia brachiata* (Pall.) Bunge on the territory of both lakes. The northern part of the Atanasovsko lake has been declared Nature Reserve (State gazette, № 70/1980). Since 1999 the northern part of the lake has been re-categorized as Managed Nature Reserve according to the new Protected Areas Act (1998). Atanasovsko ezero is hyper saline near the coastline, divided in two parts by the road Bourgas – Varna. Both parts of the lake have been salt-pans since 1906. The lake level is about 1 m lower than the sea level. Pomorie lake is a natural hyper-saline lagoon, being part of the

most significant complex of wetlands along the Bulgarian Black sea coast – Burgas Wetlands. It is separated from the Black Sea by a sand bar. Since 2001 Pomorie lake has been declared Protected Site.

The climate in the study area is continental-Mediterranean. The absolute maximum of temperature exceeds 40°C, while the absolute minimum is – 20.3°C. (Tsenkova-Bratoeva et al., 2010). The average precipitation value is between 520 and 580 mm. The highest values are reached in June and November, and the lowest – in August and September. The annual average air temperature is 12 – 13°C, and the temperature in January varies between 20.5 – 21.5°C.

There are many publications found in the literature about the vascular plants in Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve (Grozeva, 2004, 2005; Grozeva et al., 2004; Stojanov, 2010), but a few of them reported controversial results about the relationship between soil salinity and halophyte plant distribution. For instance, Ivanova et al. (2006) reported soil salinity in the sand bar near Pomorie lake from 659 to 850 mg/g which values are too low for halophyte plants from *Bassia*, *Petrosimonia*, *Salicornia*, whereas Sümer et al. (2010) reported that species from genus *Salicornia* grow well at 70 g/l dissolved solids.

The present study attempts to answer two main questions: 1. Is there any difference of level of salinity between the territories of Atanasovsko and Pomorie lakes which are inhabited by communities of annual halophytes from *Bassia hirsuta*, *Petrosimonia brachiata*, *Salicornia europaea* agg., 2. Does soil salinity level influence the distribution of those halophytes.

* e-mail: todorova72@yahoo.com

Material and methods

Sample collection

The period of investigation was between September and October, 2013. The location maps of the studied areas and sampling points of Pomorie lake and Atanasovsko lake are shown on Figure 1. A total of 22 soil samples were taken from a depth of 0 – 20 cm. In each sample taking point the plants from *Bassia hirsuta*, *Petrosimonia brachiata*, *Salicornia europaea* agg. existing there were also collected. Soil samples were air-dried and then passed through a sieve with a 2 mm mesh. Soil samples were analyzed for electrical conductivity (EC) and pH. Soil pH was determined on air-dry samples using 1:2.5 soil water ratio. EC (mS/cm) was measured using 1:5 soil water ratio and used as an indicator of salinity (Popandova, 2001). The level of salinization was evaluated according to values of EC, mS/cm (Table 1). Determination of Cl^- , CO_3^{2-} and HCO_3^- content was performed according to classical chemical methods. Content of SO_4^{2-} was determined by UV/VIS spectrophotometer DR 5000 Hach Lange (Germany).

To assess the status of the population of *Bassia hirsuta*, *Petrosimonia brachiata*, *Salicornia europaea* agg. methodology for monitoring vascular plants in Bulgaria has been used. The voucher specimens are deposited in the herbarium of the Institute for Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (SOM). Chemometrics was used to establish relations between the soil properties and distribution of the vascular plants in the studied areas. Principal component analysis (PCA) was applied to the experimental data to assess the relationship between values of EC and pH in soil samples and distribution of the samples in multidimensional space. Chemometrics was carried out by Unscrambler X 10.2 (CAMO Software AS, Norway).

Results and discussion

Soil salinity in both protected areas

The descriptive statistics of values of the EC for the soil samples from the territory of Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve are presented on Figure 2. According to the soil saltiness scale the samples were classified as different level of salinization from light to high saline. A difference of the level of soil salinity between both studied areas was found. For instance, soil samples from the territory of Atanasovsko lake are characterized with more salinization than samples from the territory of Pomorie lake. The minimum values of EC 1.78 mS/cm of samples from Pomorie lake were lower than the minimum values of EC in samples from Atanasovsko lake with EC 2.59 mS/cm. The same trend was found with average and maximum values. The mean values of electrical conductivity of the soil samples from the area of Atanasovsko lake were two times greater than those for the samples from Pomorie lake. The maximum value of EC (42.6 mS/cm) of the samples from Atanasovsko lake area was much higher than that of Pomorie lake samples, EC=12.61 mS/cm.

The studied territory of Atanasovsko lake is occupied by Lake Solonchaks, which are characterized by water dissolved salts content with high level of salinity (Trendafilov, 2001). Therefore, the soil samples from Atanasovsko lake were characterized by alkaline reaction with values of pH (H_2O) between 8 and 9.2 in comparison to the samples from Pomorie lake with values of pH (H_2O) between 7.1 and 8.9, which characterized the neutral to alkaline reaction of the samples (Figure 3).

A correlation between EC and values of pH in the samples from the present study with $R = 0.60$ was found. Alkaline reaction and high values of EC in saline soils were mainly due to the presence of water-

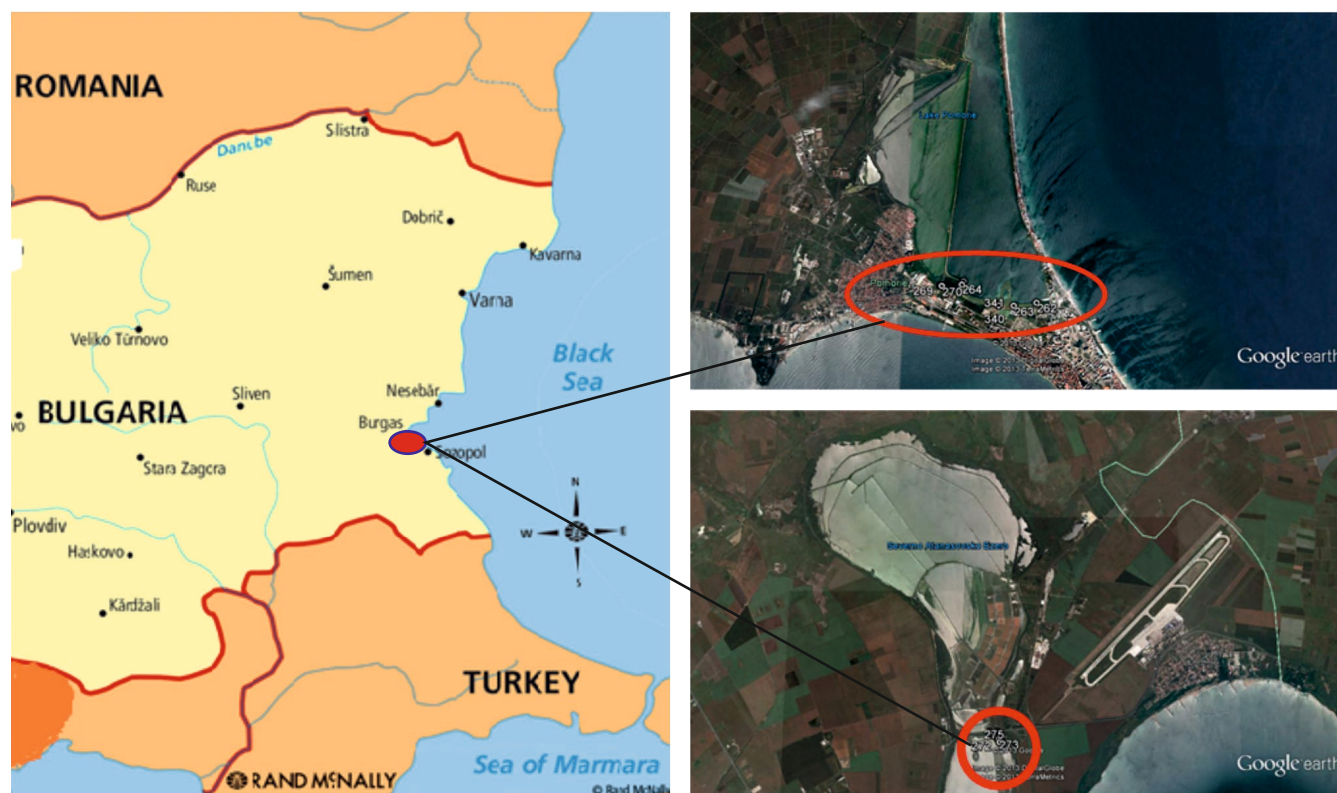
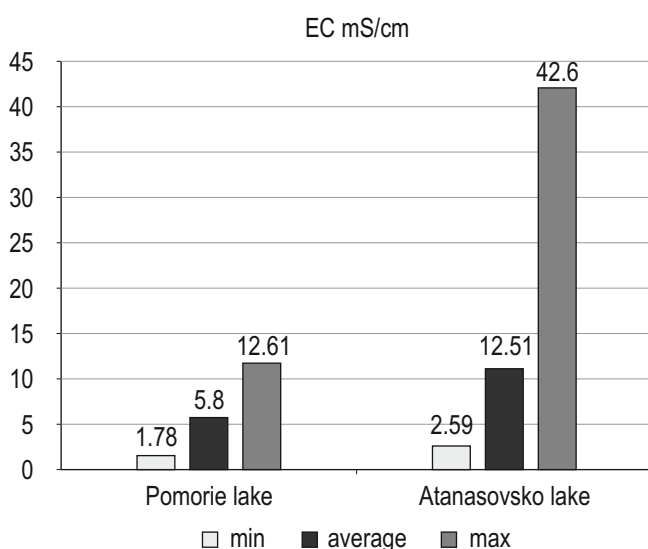


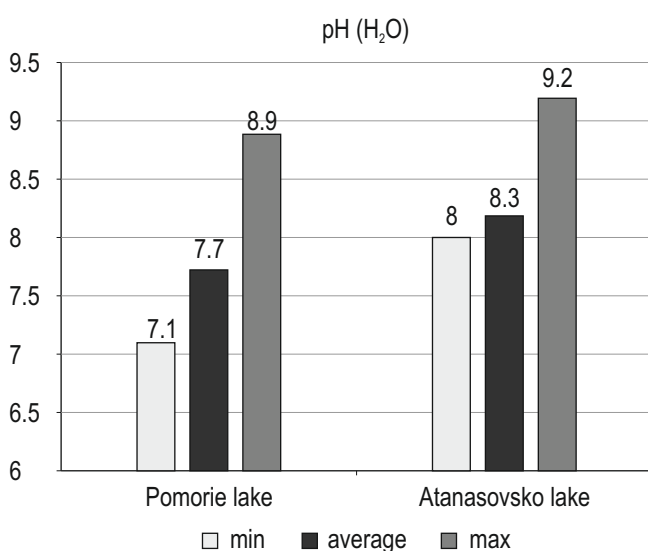
Figure 1. Location map of studied area and sampling points from the territory of Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve.

Table 1. Classification of saline soils according to EC values

Classification of saline soils	EC, mS/cm
Non saline	< 1
Light saline	1 - 4
Moderate saline	4 - 8
High saline	8 -16

**Figure 2.** EC values, mS.cm⁻¹ in the soil samples from Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve

soluble chlorides with values between 0,43 and 21 meq/100 g for all soil samples (Table 2). Carbonates were not established in the soil. The content of water-soluble sulphates and hydrogen carbonates was low – between 0. 02 and 0. 93 meq/100 g and from 0. 15 to 1. 35 meq/100 g, respectively. It is not surprising that sea water

**Figure 3.** The values of pH (H₂O) in the soil samples from Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve**Table 2.** Water dissolved salts in the studied samples

	Minimum	Average	Maximum
HCO ₃ ⁻ , meq/100 g	0.15	0.31	1.35
SO ₄ ²⁻ , meq/100 g	0.02	0.26	0.93
Cl ⁻ , meq/100 g	0.43	5.57	21.0

typically contains 40 grams per liter (g/l) of dissolved salts, mostly sodium chloride. Kolev et al. (2013) reported that the surface ion concentrations of salts evaporated from Black sea water were with higher values of Cl⁻ = 47.40 at,% as compared to HCO₃⁻ = 2.09 and CO₃²⁻ = 0.26 at,%. The main reason of salinity in the studied areas was capillary rise from high ground water due to sea water influence. Evaporation of water by capillarity resulted in salt accumulation on the soil surface (Sümer et al. , 2010).

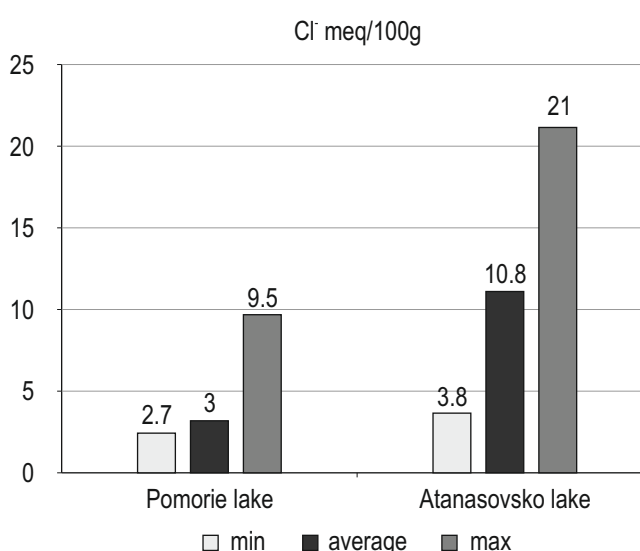
With regard to chloride content in the samples, the chloride concentrations in the samples from the Atanasovsko lake area were higher than Pomorie lake, the ranges were between 3.8 and 21 meq/100 g and between 2. 7 to 9. 5 meq/100 g, respectively (Figure 4).

Based on the data for chloride content and EC values, correlation between chloride content and EC values in the soil solution (R = 0.79) was found (Figure 5). By increasing the chloride content, the EC values of soil solution also increased.

Relationship between soil salinity and halophyte plants distribution

On the territory of Pomorie lake the population of *Bassia hirsuta* is characterized by the greatest number and area, whereas in the researched areas of the Atanasovsko lake *Salicornia europaea* agg. is dominating. Populations of *Petrosimonia brachiata* are limited in number and area.

On the basis of the values of EC and pH for soil samples Principal component analyses were performed to investigate the soil samples distribution in multidimensional space (Figure 6). In the score plots, the grouping of objects can be recognized. Factor 1 explained 93% of the data variance, and formed clearly one group of soil

**Figure 4.** The values of Cl⁻, meq/100 g in the soil samples from Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve

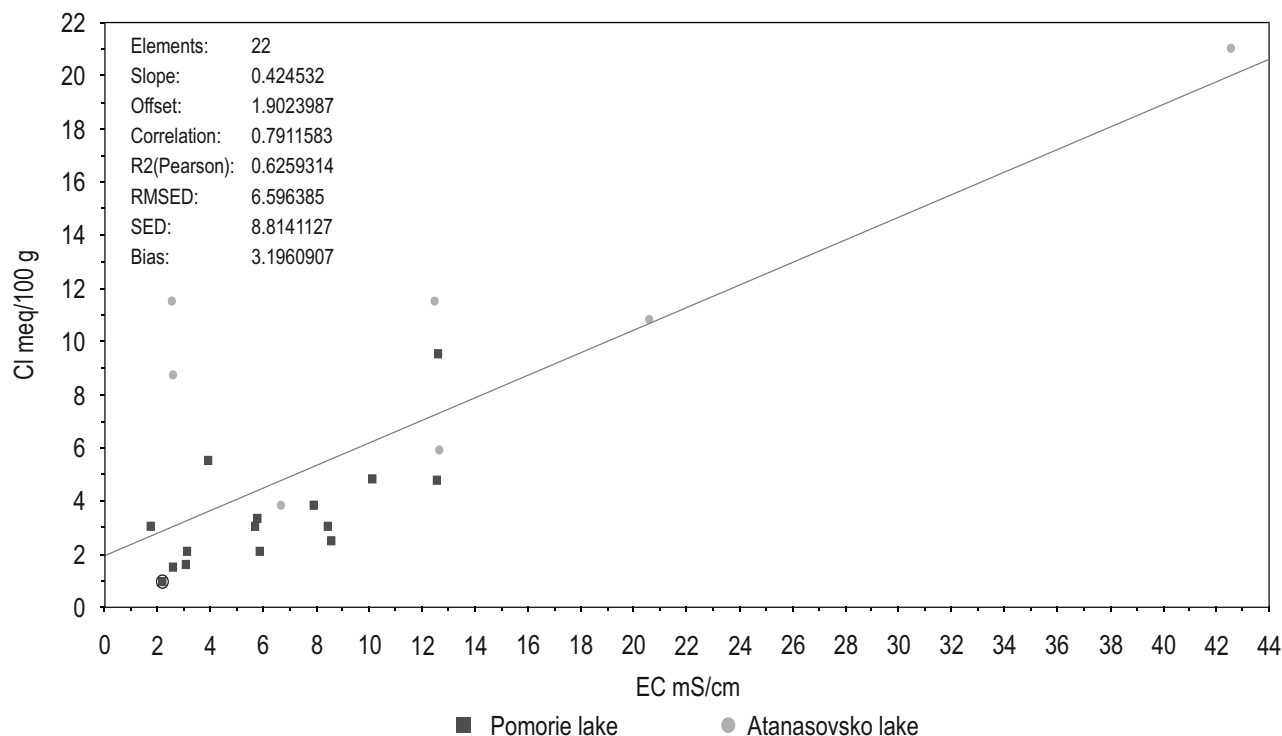


Figure 5. Relationship between Cl⁻, meq/100 g content and EC values in the soil samples.

samples. PC1 completely described variable – soil electrical conductivity, therefore EC is the more dominant soil parameter for group formation than pH. Soil samples belonging to that group are characterized by light to high salinity, with EC values between 2 – 14 mS/cm and with neutral to moderate alkaline reaction with pH values

between 7.1 – 8.9. Under these soil conditions the dominant species was *Bassia hirsuta*. There is the second scattered group of samples in the PCA space with five soil samples with alkaline soil and high soil salinity from 6 to 44 mS/cm. Under these soil conditions the dominant species was *Salicornia europaea* agg. Figures 7 and 8

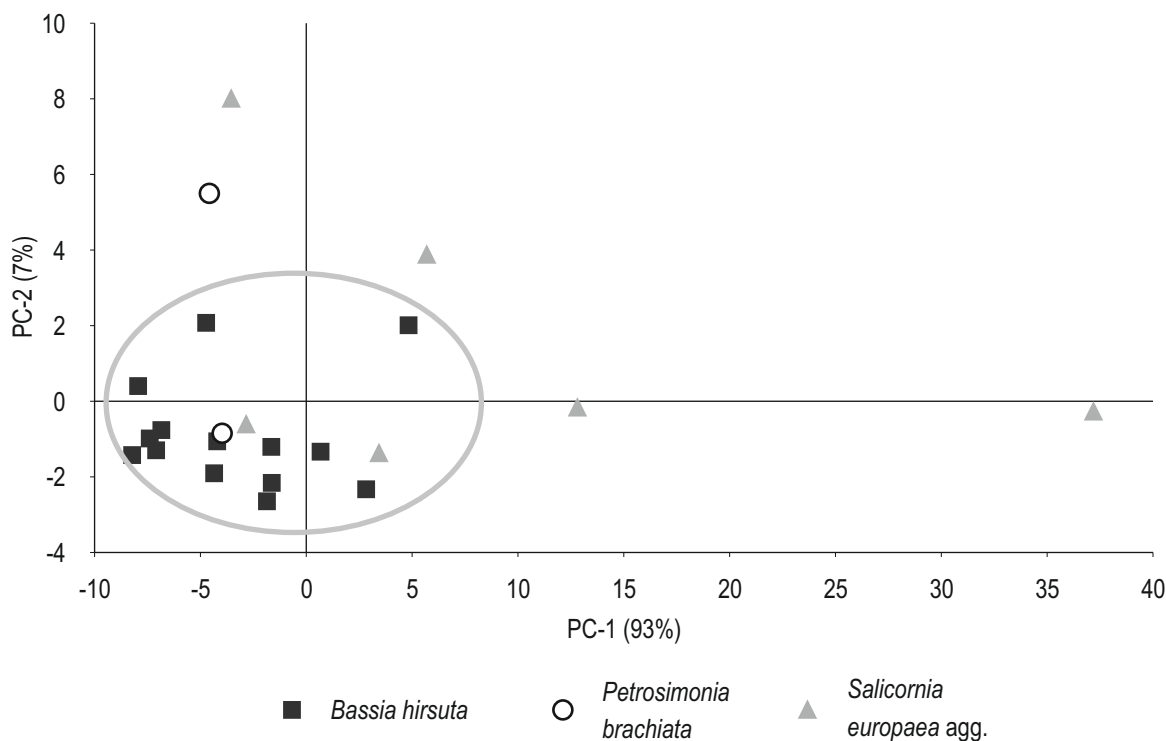


Figure 6. Score plot of the soil samples on the first two principal components according to values of pH and EC

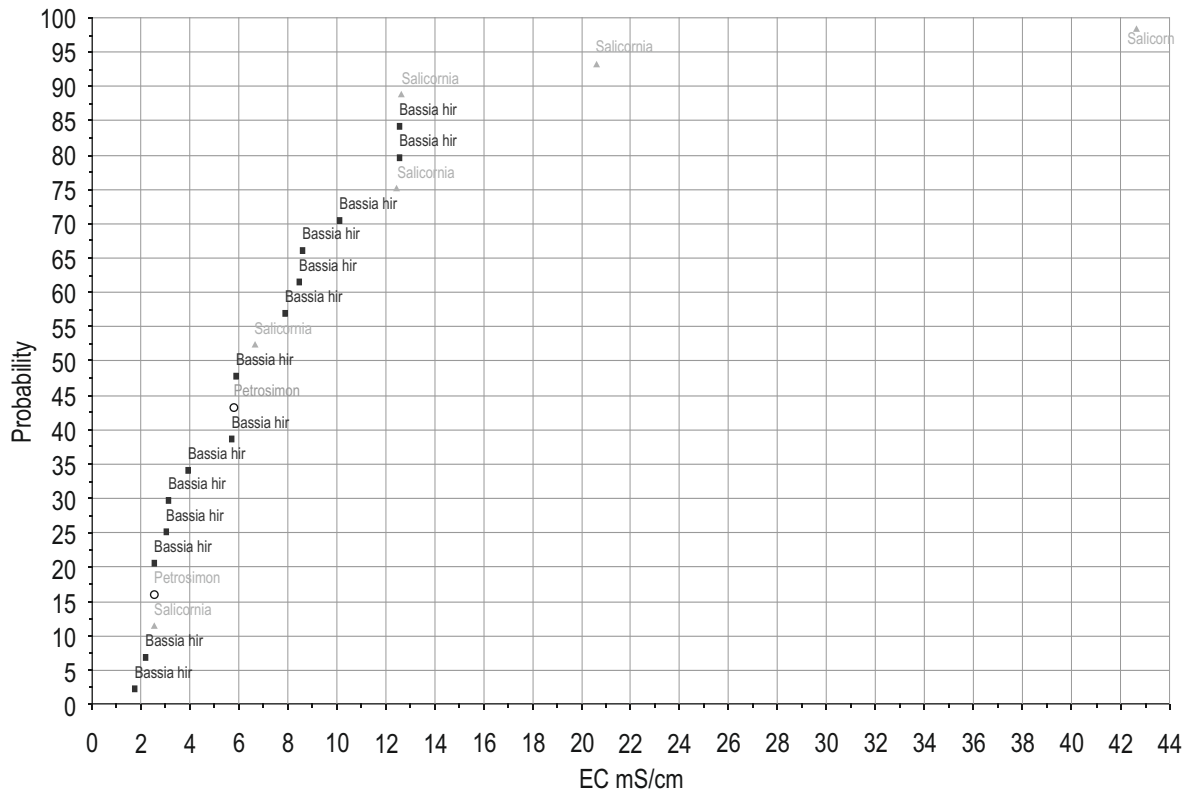


Figure 7. Distribution of *Bassia hirsuta*, *Petrosimonia brachiata* and *Salicornia europaea* agg. according to EC values in the soil samples

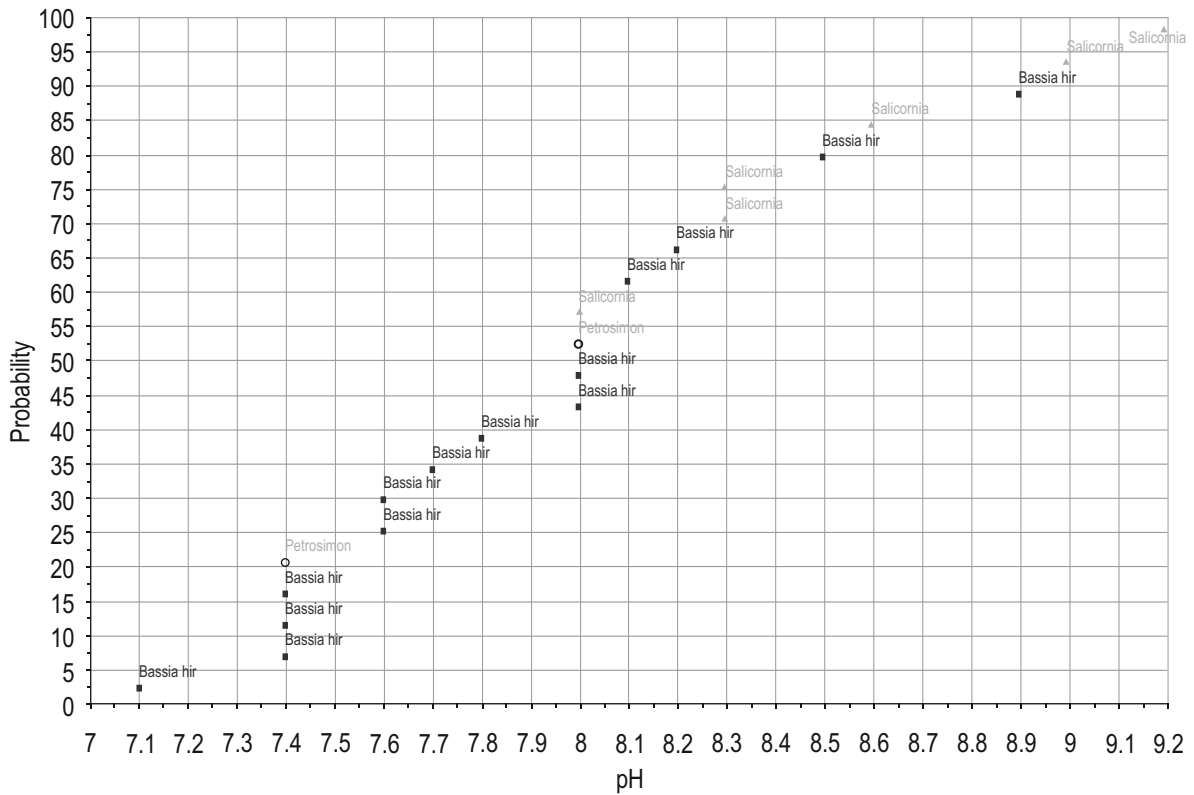


Figure 8. Distribution of *Bassia hirsuta*, *Petrosimonia brachiata* and *Salicornia europaea* agg. according to pH values in the soil samples.

graphically illustrate the distribution of *Salicornia europaea* agg., *Petrosimonia brachiata* and *Bassia hirsuta* according to EC and pH (H₂O) values in soil samples. The species from genus *Salicornia* form a population in the soil salinity from 2 to 44 mS/cm and is predominant in salinity above 14 mS/cm. According to the present study, *Petrosimonia brachiata* grew in the slight saline soils on both of the studied territories with EC values from 2 to 6 mS/cm. Therefore, halophytes such as *Salicornia europaea* agg. and *Bassia hirsuta* form populations in different soil salinity level. Sümer et al. (2010) also reported that species from genus *Salicornia* as *Salicornia fragilis* survive in higher soil salinity than *Petrosimonia brachiata*. The authors pointed higher values of EC = 67.62 and 49.13 dS/m as compared to the data in our study. Zörb et al. (2013) also reported that *Salicornia fragilis* grew at EC values of 64 dS/m in the upper soil layer and about one-half salinity at depth of 5 – 10 cm (33dS/m) and *Petrosimonia brachiata* grew at 48 – 49 dS/m at depth up to 5 cm, but salinity values strongly decreased at 5 to 10 cm and 10 to 15 cm to values of approximately 16 – 28 dS/m. Therefore, one of the reasons for lower soil salinity established in our study is because of the depth of soil samples taken from 0 to 20 cm. *Salicornia europaea* grew in alkaline soil with pH above 8.1, whereas *Bassia hirsuta* could be grown on soil with neutral to moderate alkaline reaction.

Conclusions

The soil from the studied territory of the Managed Nature Reserve near Atanasovsko lake is characterized by high level of salinity and alkaline to strong alkaline reaction. The studied alluvial deposit from the territory of Pomorie lake Protected Site is characterized by light to high salinity and neutral to alkaline reaction. *Salicornia europaea* agg. forms populations in Pomorie lake Protected Site and Atanasovsko lake Managed Nature Reserve on alkaline soil, with salinity from 2 to 44 mS/cm, but dominates on high salinity soil, above 14 mS/cm.

Bassia hirsuta (L.) Asch. forms populations in both protected areas on soil with neutral to moderate alkaline reaction and from light to high salinity, with EC up to 14 mS/cm. *Petrosimonia brachiata* forms populations in both lakes – Pomoriisko and Atanasovsko on alkaline soil, from light to moderate salinity, with values of EC from 2 to 6 mS/cm.

Acknowledgements

This work was supported financially by Project № 2E/13 Trakia University, Faculty of Agriculture.

References

- Boros E**, 2003. Alkaline lakes. National Ecological network, Hungary, 1-17.
- Grozeva, N**, 2004. Family Chenopodiaceae plants with conservation value. Journal of Balkan Ecology, 7, 125-134.
- Grozeva N**, 2005. The flora of the Atanasovsko Lake Natural Reserve. – In: Gruev, M., Nikolova, M. & Donev, A. (eds.) Proceedings of the Balkan Scientific Conference of Biology in Plovdiv (Bulgaria), 19-21 May, 2005, 381-396.
- Grozeva N, Miteva Tsh, Ivanov P and Videv V**, 2004. The flora of Atanasovsko Lake presented through web-based information systems. Journal of Balkan Ecology, 7, 362-373.
- Ivanova A, Nechev J and Stefanov K**, 2006. Effect of soil salinity on the lipid composition of halophyte plants from the sand bar of Pomorie. General Applied Plant Physiology, Special Issue, 125-130.
- Kolev H, Tyuliev G, Christob C and Kostov K**, 2013. Experimental study of the surface chemical composition of sea salt crystallized during evaporation of seawater under natural conditions. Bulgarian Chemical Communications, 4, 584-591.
- Penkov M, Dzudzinski B and Kavardjiev J**, 1985. Amelioration of soil with low soil fertility. Zemizdat, 117-188.
- Popandova S**, 2001. On determination of the salinization degree of soils from water extract with different soil-water ratios. Soil Science, Agrochemistry and Ecology, 1, 14-13.
- Stoyanov D**, 2010. The flora of the Pomoriysko lake Protected Site – In: Collection of Scientific Reports of Exerts, BSPB.
- Sümer A, Sungur A, Karabacak E and Özcan H**, 2010. Relationship between Soil salinity and Halophytes Species in Kavak dela (Northwest Turkey). In: proceeding of the International Soil Science Congress on management of natural Resources to Sustain Soil Health and Quality. R. Kizilkaya, C, Gulser, O. Dengis (eds), May 26-28, 2010. Ondokuz mayis University, Samsun, Turkey, 538-542.
- Trendafilov K**, 2001. Soil remediation methods and technologies. Plovdiv.
- Tsenkova-Bratoeva A, Koleva E and Ivancheva Y**, 2010. Climatic conditions in the area of Pomorie lake and its surrounding lands. Book of reports for Integrated management plan of Protected area „Pomorie lake“ BG 0000152 and Protected area „Pomorie“ BG 0000620.
- Zaprianova N, Morjankova D, Popandova S, Georgieva T and Djilianov D**, 2007. Biological amelioration on Gleyic Solonetz with different genotip populars. Soil Science, Agrochemistry and Ecology, 2, 17-23.
- Zörb Ch, Sümer A, Sungur A, Flowers T and Özcan H**, 2013. Ranking of 11 coastal halophytes from salt marshes in northwest Turkey according to their salt tolerance. Turkish Journal of Botany, 37, 1125-1133.

Review

- Effect of cubicle technological parameters on welfare and comfort of dairy cows** 377
D. Dimov

Genetics and Breeding

- Identification of promising genotypes for hybridization in spring barley** 383
B. Dyulgerova, D. Dimova, N. Dyulgerov

- Comparative evaluation of triticale cultivars grown in the region of Dobrudzha** 387
A. Ivanova, N. Tsenov

- Stress tolerance to drought of inbred maize lines** 392
P. Vulchinkova

- Sericin content in raw silk from *Bombyx mori* L. cocoons with different fluorescent characteristics** 395
M. Panayotov

- Genetic variability in two-rowed spring barley** 400
B. Dyulgerova, N. Dyulgerov, M. Dimitrova-Doneva

- Testing of new Bulgarian sunflower hybrids under the conditions of Northeast Bulgaria** 403
II. Phenological specificity
G. Georgiev, P. Peevska, E. Penchev

- Maize hybrids testing in system "Plus"** 409
S. Vulchinkov, V. Valkova, D. Ilchovska, P. Vulchinkova

- Effect of gamma-irradiation on the fatty acid composition and susceptibility to powdery mildew (*Erysiphe cruciferarum*) of oilseed rape plants** 413
M. Petkova, M. Dimova, D. Dimova, S. Bistrichanov

Nutrition and Physiology

- Investigations on haematological parameters and bone marrow morphology in broiler chickens with experimental aflatoxicosis** 417
I. Valchev, D. Kanakov, Ts. Hristov, L. Lazarov, N. Grozeva, Y. Nikolov

- Light microscopy of the adipose tissue distribution along the coronary branches in the myocard of the New Zealand White rabbit** 423
D. Vladova, D. Yovchev, R. Dimitrov, M. Stefanov, P. Hristov

- Clinical and haematological studies on subclinical lactational ketosis in dairy goats** 427
R. Binev, V. Marutsova, V. Radev

- Effect of linseed and sunflower oils in the diet on the growth parameters in rainbow trout (*Oncorhynchus mykiss* W.) cultivated in a recirculating system** 431
G. Zheliazkov

CONTENTS**Production Systems**

Intensity of spike increase in *Triticum aestivum* L. cultivars depending on some agronomy factors 437
M. Nankova, A. Ivanova, N. Tsenov

Effect of the complex suspension foliar fertilizers Lactofol and Amalgerol premium on grain yield from soybean (*Glycine max* (L.) Merr.) under the conditions of Dobrudzha region 445
G. Milev, R. Todorova

Seasonal dynamics of virus pathogens important for *Foeniculum vulgare* 451
B. Dikova, H. Lambev

Fertility and hatchability of Japanese quail eggs under semi arid conditions in Nigeria 455
A. Raji, S. Mbap, G. Mohammed, I. Kwari

Agriculture and Environment

Algae cenoses with dominate *Homoeothrix varians* Geitler and *Homoeothrix crustaceae* Woronichin in the Veleka River, Bulgaria 460
K. Velichkova, I. Kiryakov

Relationship between soil salinity and *Bassia hirsuta*, *Salicornia europaea* agg. and *Petrosimonia brachyata* distribution on the territory of Pomorie lake and Atanasovsko lake 465
M. Todorova, N. Grozeva, L. Pleskuza, Z. Yaneva, M. Gerdgikova

Environmental friendly methods of inducing resistance against *Cucumber mosaic virus* in pepper 471
N. Petrov

Product Quality and Safety

Meat quality traits in Japanese quails with regard to storage conditions and duration 475
P. Vasileva, H. Lukanov, A. Genchev

Analytical features of an optimized method for HPLC analysis of some polyphenolic acids and flavonoids in tomato fruits 480
D. Georgieva, I. Tringovska, A. Atanasova, V. Kmetov

Effect of vitamin E in the diet of pigs on the lipid and protein oxidative stability of meat during storage 486
T. Popova, P. Marinova, M. Ignatova

Variability of individual coagulation ability and qualitative composition of milk from Kalofer Longhaired goats 491
G. Kalaydzhiev, A. Vuchkov, T. Angelova, D. Yordanova, V. Karabashev, J. Krastanov, D. Dimov, N. Oblakov, S. Laleva, Y. Popova

Short Communication

Influence of the distillation rate on the quality and quantity of essential oil from *Rosa alba* L. 494
A. Dobрева

Instruction for authors

Preparation of papers

Papers shall be submitted at the editorial office typed on standard typing pages (A4, 30 lines per page, 62 characters per line). The editors recommend up to 15 pages for full research paper (including abstract, references, tables, figures and other appendices)

The manuscript should be structured as follows: Title, Names of authors and affiliation address, Abstract, List of keywords, Introduction, Material and methods, Results, Discussion, Conclusion, Acknowledgements (if any), References, Tables, Figures.

The title needs to be as concise and informative about the nature of research. It should be written with small letter /bold, 14/ without any abbreviations.

Names and affiliation of authors

The names of the authors should be presented from the initials of first names followed by the family names. The complete address and name of the institution should be stated next. The affiliation of authors are designated by different signs. For the author who is going to be corresponding by the editorial board and readers, an E-mail address and telephone number should be presented as footnote on the first page. Corresponding author is indicated with *.

Abstract should be not more than 350 words. It should be clearly stated what new findings have been made in the course of research. Abbreviations and references to authors are inadmissible in the summary. It should be understandable without having read the paper and should be in one paragraph.

Keywords: Up to maximum of 5 keywords should be selected not repeating the title but giving the essence of study.

The introduction must answer the following questions: What is known and what is new on the studied issue? What necessitated the research problem, described in the paper? What is your hypothesis and goal?

Material and methods: The objects of research, organization of experiments, chemical analyses, statistical and other methods and conditions applied for the experiments should be described in detail. A criterion of sufficient information is to be possible for others to repeat the experiment in order to verify results.

Results are presented in understandable

tables and figures, accompanied by the statistical parameters needed for the evaluation. Data from tables and figures should not be repeated in the text.

Tables should be as simple and as few as possible. Each table should have its own explanatory title and to be typed on a separate page. They should be outside the main body of the text and an indication should be given where it should be inserted.

Figures should be sharp with good contrast and rendition. Graphic materials should be preferred. Photographs to be appropriate for printing. Illustrations are supplied in colour as an exception after special agreement with the editorial board and possible payment of extra costs. The figures are to be each in a single file and their location should be given within the text.

Discussion: The objective of this section is to indicate the scientific significance of the study. By comparing the results and conclusions of other scientists the contribution of the study for expanding or modifying existing knowledge is pointed out clearly and convincingly to the reader.

Conclusion: The most important consequences for the science and practice resulting from the conducted research should be summarized in a few sentences. The conclusions shouldn't be numbered and no new paragraphs be used. Contributions are the core of conclusions.

References:

In the text, references should be cited as follows: single author: Sandberg (2002); two authors: Andersson and Georges (2004); more than two authors: Andersson et al. (2003). When several references are cited simultaneously, they should be ranked by chronological order e.g.: (Sandberg, 2002; Andersson et al., 2003; Andersson and Georges, 2004).

References are arranged alphabetically by the name of the first author. If an author is cited more than once, first his individual publications are given ranked by year, then come publications with one co-author, two co-authors, etc. The names of authors, article and journal titles in the Cyrillic or alphabet different from Latin, should be transliterated into Latin and article titles should be translated into English. The original language of articles and books translated into English is indicated in parenthesis after the bibliographic reference (Bulgarian = Bg, Russian = Ru, Serbian = Sr, if in the Cyrillic, Mongolian =

Mo, Greek = Gr, Georgian = Geor., Japanese = Ja, Chinese = Ch, Arabic = Ar, etc.)

The following order in the reference list is recommended:

Journal articles: Author(s) surname and initials, year. Title. Full title of the journal, volume, pages. Example:

Simm G, Lewis RM, Grundy B and Dingwall WS, 2002. Responses to selection for lean growth in sheep. *Animal Science*, 74, 39-50

Books: Author(s) surname and initials, year. Title. Edition, name of publisher, place of publication. Example:

Oldenbroek JK, 1999. Genebanks and the conservation of farm animal genetic resources, Second edition. DLO Institute for Animal Science and Health, Netherlands.

Book chapter or conference proceedings:

Author(s) surname and initials, year. Title. In: Title of the book or of the proceedings followed by the editor(s), volume, pages. Name of publisher, place of publication. Example:

Mauff G, Pulverer G, Operkuch W, Hummel K and Hidden C, 1995. C3-variants and diverse phenotypes of unconverted and converted C3. In: Provides of the Biological Fluids (ed. H. Peters), vol. 22, 143-165, Pergamon Press. Oxford, UK.

Todorov N and Mitev J, 1995. Effect of level of feeding during dry period, and body condition score on reproductive performance in dairy cows. IXth International Conference on Production Diseases in Farm Animals, September 11-14, Berlin, Germany.

Thesis:

Hristova D, 2013. Investigation on genetic diversity in local sheep breeds using DNA markers. Thesis for PhD, Trakia University, Stara Zagora, Bulgaria, (Bg).

The Editorial Board of the Journal is not responsible for incorrect quotes of reference sources and the relevant violations of copyrights.

Animal welfare

Studies performed on experimental animals should be carried out according to internationally recognized guidelines for animal welfare. That should be clearly described in the respective section "Material and methods".

AGRICULTURAL SCIENCE AND TECHNOLOGY

Volume 6, Number 4
December 2014



Journal web site:
www.agriscitech.eu


Publisher:
www.alfamarket.biz