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

There are no submission / handling / publication charges. 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 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: DOI, 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).

The journal is freely available without charge to the user or his/her institution. Users can read, download, copy, distribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author. This issue is printed with the financial support by Contract No DNP 05-21/20.12.2016, financed from Fund ‘Scientific Research’ grant Bulgarian scientific Periodicals.

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
Screening of cucurbitaceous rootstocks against root-knot nematodes (*Meloidogyne* spp.) and soilborne pathogens (*Fusarium* spp. and *Pythium* spp.)

V. Yankova*, D. Markova, N. Velkov, S. Masheva

Maritsa Vegetable Crops Research Institute, 32 Brezovsko shosse, 4003 Plovdiv, Bulgaria

(Manuscript received 22 August 2016; accepted for publication 30 January 2017)

**Abstract.** One of the main problems in cucumber greenhouse production is control of soil-borne pathogens and root-knot nematodes. Grafting cucumber plants represent an alternative method to control that is safety and does not pollute the environment. Immune forms to these pests are not established, but in some studies are found sources belong to Cucurbitaceae family that possesses resistant or tolerant response. The aim of this study was to screening cucurbitaceous rootstock genotypes to root-knot nematodes (*Meloidogyne* spp.), *Fusarium* spp. and *Pythium* spp. During the period 2014-2015 in the Maritsa Vegetable Crops Research Institute, Plovdiv thirteen breeding materials belonging to Cucurbitaceae family were tested: Gergana, Kiara F, TG, TD (*Cucumis sativus*); CM 720, SB-2, SB-3, Turban (C. maxima); Muskatna 51-17, Carotina (C. moschata); Turban × Muskatna 51-17, CM 720 × Carotina (C. maxima × C. moschata F.); Local (Lagenaria siceraria). Two parallel trials were performed in greenhouse conditions. Local isolates of pests were used for the screening tests. Plants were grown in pots and inoculated with mixed infection of *Fusarium* spp. and *Pythium* spp. In trial with root-knot nematodes the plants were inoculated with 6000 second stage juveniles (J2). The response was recorded 60 days after inoculation. Results indicated that Carotina was resistant when the pots were inoculated with *Meloidogyne* spp. Resistant response to soil-borne pathogens possesses cucumber lines TG and TD and Lagenaria. Tested cucurbitaceous material can be used directly for grafting cucumber plants, and also be able to used as a basis for starting breeding program for rootstocks with tolerance to *Meloidogyne* spp., *Fusarium* spp. and *Pythium* spp.

**Keywords:** Cucurbitaceae, resistance, soil-borne pathogens, grafting

**Introduction**

Cucumber (*Cucumis sativus* L.) is an important and commercially popular cucurbitaceous vegetable crop which holds a much desired position in the vegetable market. When vegetable crops production taken under greenhouses, the incidence soil-borne diseases and nematodes cause most of the damage due to mono cropping and intensive cropping. Cucumber crop suffers from several infections by serious fungal diseases and nematodes resulting in severe loss of yield and quality. *Rhizoctonia solani, Fusarium* spp., *Pythium* spp. and root-knot nematodes (*Meloidogyne* spp.) are the most serious soil-borne diseases in cucumber rhizosphere (Sharma et al., 1995; Al-Debei et al., 2012).

*Meloidogyne* spp. is considered to be the most important parasites of cucumber which cause yellow foliage, unthrifty growth, reduced fruit size, poor yield, heavy root galling, root decay and reduced root system (Punithaveni et al., 2015). Their presence can alter uptake of water and nutrients, interfere with translocation of photosynthates and increase incidence and severity of *Fusarium oxysporum* f. sp. *radicis-cucumerinum* diseases (Ismail et al., 2012). Damping-off, as the most seedling root and crown rot disease, is a limiting factor in cucumber greenhouse cultivation. Some species of *Pythium* and *Phytophthora* are the most important soil-borne pathogens that cause damping-off and root rot (Rostami et al., 2015). *Fusarium* and *Pythium* species also act as a complex causing cucumber wilt (Bithell et al., 2012).

The current management of nematodes has been done by using plant resistance, crop rotation, culture practices or nematicides. Nematicides control is expensive and hazard to ground water, environment and animal and human health. No commercial cultivars or hybrids of cucumber are recorded as resistant to root-knot nematodes. Because of these reasons are looking for alternative safety application and methods such as antagonistic plant and grafting onto selected resistance rootstocks. Grafting of vegetables on resistant rootstocks is a mean of controlling root-knot nematodes and other soil-borne diseases in areas with intensive land use (Abd El-Wanis et al., 2013; Amin and Mona, 2014).

Cucumber can be successfully grafted onto *Cucumis* spp., *Cucurbita* spp., *Cucurbita* interspecific hybrids, bottle gourd, wax gourd, fig leaf gourd (*C. ficifolia* Bouché), and luffa (*King et al., 2010*). Rootstocks of *Cucurbita maxima* × *Cucurbita moschata* have become the most used hybrids for several watermelon, melon and cucumber cultivars, because of their properties related to the resistance or high tolerance to *F. oxysporum* f. sp. *melonis, F. oxysporum* f. sp. * niveum, Phomopsis* sp., *M. cannonballus, Verticillium dahliae* and nematodes (*El-Eslamboly and Deabes, 2014*). In Asia, Europe and the Middle East, bottle gourd (*Lagenaria siceraria*) and hybrid squash (*C. maxima* × *C. moschata*) were widely used as rootstocks in watermelon production due to their resistance to fusarium wilt (*Cohen et al., 2007*, *Davis et al., 2008*).

The aim of this study was to screening cucurbitaceous rootstock genotypes to root-knot nematodes (*Meloidogyne* spp.), *Fusarium* spp. and *Pythium* spp. in order to be used as rootstocks or as initial material for breeding.

**Material and methods**

The study was carried out in the Maritsa Vegetable Crops Research Institute, Plovdiv, Bulgaria during the period 2014 - 2015.
The investigation was conducted in glasshouse conditions.

**Plant material**

It was used breeding material from collection of Maritsa Vegetable Crops Institute from following cucurbit species: *Cucumis sativus* - Kiara F, (control) commercial cultivar long parthenocarpic type (Dutch type), gynoeceous type of flowering; *Gergana*, TG; TD – salad type, self-pollinated type of flowering;

- *Cucurbita maxima* × CM-720, SB-2, SB-3, Turban;
- *Cucurbita moschata* – Muskatna 51-17, Carotina;
- *Cucurbita maxima* × *Cucurbita moschata* F₁ – Turban × Muskatna 51-17, CM 720 × Carotina;
- *Lagenaria siceraria* – Local.

**Root-knot nematodes (Meloidogyne spp.) test**

Seeds were sown in 400 mL pots with mix (peat:perlite – 1:1). Ten plants per genotype were transplanted into 5 L pots three weeks after emergence. Each pot was inoculated with 600 second-stage juveniles (J2). Plants were uprooted carefully 60 days after inoculation and washed with tap water to remove the adhering soil particles.

The root knot nematode galling severity was rated according to the percentage of galled tissue on a 0 to 4 scale in which 0 - no infestation, 1–weak infestation (up to 10% of root system is infested); 2–average infestation (10–25% of root system is infested); 3–high infestation (26–50% of root system is infested); 4–very high infestation (above 50% of the root system is infested and part of roots are dead) (by Stoyanov, 1980).

**Fusarium and Pythium tests**

The isolate was stored at 4°C on potato-dextrose agar. Inoculums of *Fusarium* spp. and *Pythium* spp. were prepared on barley medium. The autoclaved medium was inoculated from 5-day old culture and then incubated at 25 ± 1°C for two weeks (Singleton et al., 1992). The inoculum was introduced in experimental pots (4% breeding materials CM 720, Kiara F and TD were susceptible (S) to root-knot nematodes, as the lowest rate of root galling was recorded on five-grade scale (0-4), where 0 – no attack; 1 – hit single root; 2 – affected 25% of the roots; 3 – affected 26-50% of roots, 4 – affected over 50% of the roots.

The results from the experiments were processed mathematically. The index of infestation (i, %) was estimated by Mc Kinney formula. Comparison of means was made according to Duncan’s Multiple Range Test at P<0.05 levels (Duncan, 1955).

### Results and discussion

Management of nematode populations using resistant cultivars is considered an important strategy. In this study, reactions cucurbitaceous rootstocks against *Meloidogyne* spp. were assessed on the basis of gall produced on the roots. Significant variations were noticed among cucurbitaceous species in their response to the root-knot nematodes.

Most of the root system of the cucurbit rootstocks grown in soil infected by *Meloidogyne* spp. was uniformly galled ranged from 0.80 to 2.95. Few galls on the root were observed on Carotina (*C. moschata*) with rate of root galling 0.80. The highest rate of root galling was established in Kiara F₁ (*C. sativus*) (2.95), which serve as control. The cucurbit rootstocks varied in their rates of resistance and susceptibility (Table 1). It was found that Carotina (*Cucurbita moschata*) was resistant (R) to *Meloidogyne* spp. Two cucumber breeding materials Kiara F₁ and TD were susceptible (S) to root-knot nematode infestation. Other rootstocks were moderately resistant (MR) to infection by the root-knot nematodes, as the lowest rate of root galling (1.00) was recorded in Turban (*C. maxima*). The breeding materials CM 720 (*C. maxima*) and CM 720 × Carotina F₁, (*C. maxima × C. moschata*) also shows lower rate of root galling of this group, 1.20 and 1.20 respectively. These results are in agreement with results of Punithaveni et al. (2015) who found that

### Table 1. Rate of root galling and degree of infestation of cucurbit genotypes from *Meloidogyne* spp.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Rate of root galling</th>
<th>Degree of infestation*</th>
<th>SD±</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiara F₁ (Control)</td>
<td>2.95 a</td>
<td>S</td>
<td>0.80</td>
<td>1.75</td>
<td>3.50</td>
</tr>
<tr>
<td>Gergana</td>
<td>1.50 bcd</td>
<td>MR</td>
<td>0.50</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>TG</td>
<td>1.30 bcd</td>
<td>MR</td>
<td>0.45</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>TD</td>
<td>2.10 b</td>
<td>S</td>
<td>0.89</td>
<td>1.00</td>
<td>3.00</td>
</tr>
<tr>
<td>CM 720</td>
<td>1.20 bcd</td>
<td>MR</td>
<td>0.76</td>
<td>0.50</td>
<td>2.00</td>
</tr>
<tr>
<td>SB-2</td>
<td>1.30 bcd</td>
<td>MR</td>
<td>0.45</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>SB-3</td>
<td>1.80 bc</td>
<td>MR</td>
<td>0.76</td>
<td>1.00</td>
<td>2.50</td>
</tr>
<tr>
<td>Turban</td>
<td>1.00 cd</td>
<td>MR</td>
<td>0.50</td>
<td>0.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Muskatna 51-17</td>
<td>1.45 bcd</td>
<td>MR</td>
<td>0.51</td>
<td>1.00</td>
<td>2.25</td>
</tr>
<tr>
<td>Carotina</td>
<td>0.80 d</td>
<td>R</td>
<td>0.27</td>
<td>0.50</td>
<td>1.00</td>
</tr>
<tr>
<td>Turban × Muskatna 51-17 F₁</td>
<td>1.40 bcd</td>
<td>MR</td>
<td>0.42</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>CM 720 × Carotina F₁</td>
<td>1.20 bcd</td>
<td>MR</td>
<td>0.76</td>
<td>0.50</td>
<td>2.00</td>
</tr>
<tr>
<td><em>Lagenaria siceraria</em></td>
<td>1.80 bc</td>
<td>MR</td>
<td>0.91</td>
<td>1.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>

a, b, c... – Duncan’s multiple range test (p < 0.05); *0-0.9 = Resistant (R); 1 - 1.9 = Moderately resistant (MR); 2 – 2.9 = Susceptible (S); (3-4) = Highly susceptible (HS)
Cucurbita ficifolia, Cucurbita moschata, Cucurbita maxima and Luffa cylindrica were moderately resistant against root-knot nematode. The highest index of nematode infestation from tested rootstock was recorded in Kiara F, (C. sativus), followed by TD (C. sativus) and Muskatna 51-17 (C. moschata) (Figure 1).

Tested species were found to be promising materials to be used as rootstocks for grafting studies in cucumber. Thus, there is a potential for use of these cucurbitaceous species as rootstock in cucumber cultivated areas infested with the root-knot nematode. Cohen et al. (2007) found differences in nematode susceptibility of Cucurbita breeding lines. This indicates that it might be possible to breed Cucurbita rootstocks that will be resistant or at least less susceptible to root-knot nematodes.

Rate of Fusarium spp. and Pythium spp. infestation varied from 0.40 to 2.80. The lowest infestation rate was observed in Lagenaria siceraria and TG (C. sativus), 0.40 and 0.50, respectively. The highest rate of infestation was recorded in SB-3 (C. maxima) 2.80. From the tested breeding materials Lagenaria siceraria, TG (C. sativus) and TD (C. sativus) were resistant (R) to Fusarium spp. and Pythium spp. The genotypes Kiara F, (C. sativus) Gergana (C. sativus) and Muskatna 51-17 (C. moschata) were moderately resistant (MR) to infection by fungus. The other tested breeding

![Figure 1. Index of root-knot nematode infestation (i, %)](image)

Table 2. Rate of infestation and degree of infestation of cucurbit genotypes from Fusarium spp. and Pythium spp.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Rate of root galling</th>
<th>Degree of infestation*</th>
<th>SD±</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiara F (Control)</td>
<td>1.30 cd</td>
<td>MR</td>
<td>0.45</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Gergana</td>
<td>1.40 cd</td>
<td>MR</td>
<td>0.55</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>TG</td>
<td>0.50 e</td>
<td>R</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>TD</td>
<td>0.80 de</td>
<td>R</td>
<td>0.45</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>CM 720</td>
<td>2.40 a</td>
<td>S</td>
<td>0.42</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>SB-2</td>
<td>2.40 a</td>
<td>S</td>
<td>0.42</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>SB-3</td>
<td>2.80 a</td>
<td>S</td>
<td>0.84</td>
<td>2.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Turban</td>
<td>2.70 a</td>
<td>S</td>
<td>0.45</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Muskatna 51-17</td>
<td>1.70 bc</td>
<td>MR</td>
<td>0.45</td>
<td>1.50</td>
<td>2.50</td>
</tr>
<tr>
<td>Carolina</td>
<td>2.20 ab</td>
<td>S</td>
<td>0.27</td>
<td>2.00</td>
<td>2.50</td>
</tr>
<tr>
<td>Turban × Muskatna 51-17</td>
<td>2.70 a</td>
<td>S</td>
<td>0.45</td>
<td>2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>CM 720 × Carolina F₁</td>
<td>2.10 ab</td>
<td>S</td>
<td>0.22</td>
<td>2.00</td>
<td>2.50</td>
</tr>
<tr>
<td>Lagenaria siceraria</td>
<td>0.40 e</td>
<td>R</td>
<td>0.55</td>
<td>0.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

a, b, c... – Duncan’s multiple range test (p < 0.05); *0-0.9 = Resistant (R); 1 - 1.9 = Moderately resistant (MR); 2 - 2.9 = Susceptible (S); (3-4) = Highly susceptible (HS)
materials responded as susceptible (S) to both soilborne pathogens (Table 2).

The index of infestation was lowest in Lagenaria siceraria, TG and TD (C. sativus) (Figure 2).

Our results are contradictory compared to findings of other authors. Abd El-Wanis et al. (2013) established that Lagenaria siceraria and Cucurbita maxima rootstocks are the most resistant to M. incognita and Fusarium wild. L. siceraria and Cucumis metuliferus was mentioned to be resistant to Fusarium oxysporum (Oda, 2002). Rostami et al. (2015) established significant differences between the studied cucumber cultivars from 15.7% to 100% disease severity to Pythium aphanidermatum. Grafting cucumber cultivars on Cucurbita maxima could be used as disease control strategies in greenhouses.

We established particular resistance in two cucumber lines TG and TD. Both lines could be used as source for breeding or as rootstock for grafting.

**Conclusion**

Screening of root-knot resistant germplasm and developing resistant rootstocks can provide an environmentally friendly method for managing soil-borne pathogens in cucurbitaceous species. From screened breeding material Carotina (Cucurbita moschata) was resistant to Meloidogyne spp. and Lagenaria siceraria, TG (Cucumis sativus) and TD (Cucumis sativus) were resistant to Fusarium spp. and Pythium spp. Tested cucurbit material could be used as rootstock for grafting cucumber as well as for initial material for breeding.

**References**


Rostami F, Alaei H, Karimi HR and Abad AB, 2015. Controlling the root and stem rot of cucumber, caused by Pythium aphanidermatum, using resistance cultivars and grafting onto the cucurbit rootstocks.


## Review

**Antimicrobial activity of *Lactobacillus acidophilus* against pathogenic and food spoilage microorganisms: A review**  
T. Dinev, G. Beev, S. Denev, D. Dermendzhieva, M. Tzanova, E. Valkova

## Genetics and Breeding

**Heterosis and degrees of dominance of grain yield and grain yield elements in maize hybrids in different groups of ripeness**  
M. Ilchovska

**Use of recurrent selection of early flowering in late maize synthetic population. Results of second cycle of breeding.**  
N. Petrovska, V. Valkova

**Productivity and adaptability of new genotypes field pea (*Pisum sativum* L.) cultivated under environmental condition of Southern Romania**  
R. Sturzu, A. M. Ene, Cr. Meluca, J. M. Cojocaru

**Nitrogen uptake and expense in durum wheat depending on genotype and nitrogen fertilization**  
G. Panayotova, M. Almaliev, S. Kostadinova

## Nutrition and Physiology

**Haematological investigations upon acute intoxication with carbofuran in dogs**  
R. Binev, I. Valchev, R. Russenov, Y. Nikolov

## Production Systems

**Phytosanitary status and yield of kamut (*Triticum turgidum polonicum* L.) grown in organic and biodynamic farming**  
V. Maneva, D. Atanasova, T. Nedelcheva

**Hot-water treatment of gladiolus cormels for control of corm-borne fungal diseases**  
S. Bistrichanov, T. Vatchev, Z. Avramov

**Productivity of common wheat (*Triticum aestivum* L.) grown after various predecessors and nitrogen fertilization rates**  
M. Gerdzhikova

## Agriculture and Environment

**Agro-ecological assessment of manure from different farm animals by content of biogenic elements**  
D. Dermendzhieva, G. Kostadinova, G. Petkov, D. Dimov, T. Dinev, T. Penev, Ch. Miteva, J. Mitev
Screening of cucurbitaceous rootstocks against root-knot nematodes (*Meloidogyne* spp.) and soilborne pathogens (*Fusarium* spp. and *Pythium* spp.)
V. Yankova, D. Markova, N. Velkov, S. Masheva

Animal hygiene assessment of microclimate in semi open free-stall barns for dairy cows
D. Dimov, Ch. Miteva, I. Marinov, Zh. Gergovska, T. Penev, A. Enchev

**Product Quality and Safety**

Accumulation of astaxanthin and canthaxanthin in muscle tissues of Rainbow trout (*Oncorhynchus mykiss* W.) fed with xanthophyll supplemented feed
M. Tzanova

Chemical composition and technological characteristics of wines from red grape varieties, selected in Bulgaria
V. Haygarov, T. Yoncheva, Z. Nakov, M. Ivanov, D. Dimitrov
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 is 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 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:


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


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".

Animal welfare