ISSN 1313 - 8820
Volume 8, Number 3
September 2016

AGRICULTURAL SCIENCE AND TECHNOLOGY

2016

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, 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 from 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: 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).

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 8, Number 3
September 2016

AGRICULTURAL SCIENCE AND TECHNOLOGY

2016

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

AGRICULTURAL SCIENCE AND TECHNOLOGY, VOL. 8, No 3, pp 242 - 244, 2016
DOI: 10.15547/ast.2016.03.046

Effect of some soil herbicides on vegetative habits of almond trees of 'Nonpareil' cultivar grown in a second-year nursery field

Z. Rankova[1]*, M. Tityanov[2]

[1]Fruit Growing Institute, 4004 Plovdiv, 12 Ostromila, Bulgaria
[2]University of Forestry, 10 Kliment Ohridski, 1756 Sofia, Bulgaria

(Manuscript received 31 May 2016; accepted for publication 26 July 2016)

Abstract. *The study was carried out in the period 2010 – 2012 in a nursery field established on the territory of the Fruit-Growing Institute, Plovdiv. The effect of the combined soil-applied herbicide metolachlor + oxyfluorfen (Metofen) and the contact soil herbicide with foliar activity flumioxazine (Pledge 50 WP) on the vegetative habits of 'Nonpareil' almond cultivar grafted on almond seedling rootstock was evaluated. In the period 15-25 March, before beginning of vegetation, soil herbicides were applied in the row strip in the second-year nursery field. The following variants were included in the study: 1. Control (untreated, hand-weeded); 2. Metofen – 120 ml/da; 3. Metofen – 240 ml/da; 4. Pledge 50 WP – 8.0 g/da; 5. Pledge 50 WP – 20.0 g/da. The effect of the herbicides on weed infestation and on the vegetative habits of the cultivar/rootstock combination 'Nonpareil'/almond seedling rootstock was followed up. The results showed that the herbicides applied at the tested rates had a good control on weed infestation and the herbicide activity continued for 3.5-4 months. That makes it possible to eliminate the competitive impact of weeds on the development of the grafted trees for 4-5 months after beginning of vegetation. Visual symptoms of phytotoxicity (chlorosis or necrosis in the leaves and shoots) or an obvious suppression of the development of the grafted trees in the treated variants were not established. A depressing effect on growth of the grafted trees was reported after treatment with Metofen. The contact herbicide with soil and foliar activity Pledge 50 WP– 8.0 g/da can be applied for weed control in a second-year nursery field of almond trees grafted on bitter almond seedling rootstock.*

Keywords: almond, herbicides, weeds, phytotoxicity

Introduction

Control of weed vegetation is a serious agrotechnical problem in fruit tree nurseries. Weeds have a strong suppressing effect on rootstock and scion development in production of planting material. The direct negative impact of weed infestation (weed-cultivated crop competition for moisture, light and nutrients from soil and fertilizers) is particularly strong. Under the influence of weeds, growth and development of the young trees is delayed, wood does not mature and the obtained planting material is of low quality. The indirect impact of weed infestation, such as the occurrence of pests and diseases, including viral ones, is strongly expressed in that case, taking into account modern issues in the production of certified, virus-free fruit planting material.

There are data in literature about the different effect of a number of soil and foliar herbicides on growth of fruit species used as rootstocks – from a total lack of phytotoxicity and the production of good quality planting material to very strong phytotoxicity after applying some active substances contained in the herbicides, leading to dying of the trees (Rankova, 2004; Hanson and Schneider, 2008; Rankova, 2011; Rankova and Tityanov, 2013; Rankova and Zhivondov, 2013; Abit and Hanson, 2013; Rankova and Tityanov, 2014).

In a study about the effect of the herbicides Pledge 50 WP and Metofen on the vegetative habits of almond seedling rootstocks in the nursery during the first year, it was established that the depressing effect of the active substances was obviously expressed in relation to stem height and comparatively less expressed in relation to thickness at the place of grafting (Rankova and Tityanov, 2014). After treatment with high rates of Metofen – 240 ml/da and Pledge 50 WP 8.0 and 20.0 g/da, symptoms of phytotoxicity were reported, including necrosis and leaf withering. The symptoms of phytotoxicity caused by the herbicides are overcome about 35 – 45 days after seedling emergence. Application of Metofen – 120 ml/da and Pledge WP – 8.0 g/da immediately after sowing, before plant emergence, can be recommended in the production of almond seedling rootstocks. Treatment with higher rates of those active substances is risky for causing phytotoxicity, which is expressed in growth suppression.

The aim of the present research was to study the effect of the soil-applied herbicides Metofen (metolachlor + oxyfluorfen) and Pledge 50 WP (flumioxazine) on growth habits of the cultivar/rootstock combination 'Nonpareil' cv. grafted on almond seedling rootstock in a second-year nursery field.

Material and methods

In the period 2010 – 2012 a study on the effect of the soil-applied herbicides Metofen and flumioxazine on vegetative habits of the cultivar/rootstock combination 'Nonpareil' cv. grafted on almond seedling rootstock in a second-year nursery field was carried out at the Fruit-Growing Institute – Plovdiv. Treatment with herbicides was applied in the second half of March, before the period of vegetation. The following variants were included in the study: 1. Control (untreated, hand-weeded); 2. Metofen – 120 ml/da; 3. Metofen – 240 ml/da; 4. Pledge 50 WP – 8.0 g/da; 5. Pledge 50 WP – 20.0 g/da. The efficacy of the applied herbicides was evaluated using the quantity-weighing method, by reporting weed infestation in the separate variants during vegetation in dynamics, every 30th day after

* e-mail: rankova_zarya@abv.bg

treatment, until the end of the herbicide post-effect. During vegetation the grafted plants were grown following the standard technology.

In October, when the trees were dug out, quality grading was performed according to the following characteristics: stem height (cm), stem thickness at 15 cm above the place of grafting (mm) and mean annual length increment (cm).

Results and discussion

Weed association in the fruit tree nursery in the experimental fields of the Fruit-Growing Institute – Plovdiv is of the "arable type", i.e. the annual early and late spring weed species being prevailing. The development of the following grassy weed species was established: ivy leaf speedwell (*Veronica hederifolia* L.), blackgrass (*Alopecurus myosuroides* L.), common groundsel (*Senecio vulgaris* L.), field brome (*Bromus arvensis* L.), wild barley (*Hordeum murinum* L.), white goosefoot (*Chenopodium album* L.), redroot pigweed (*Amaranthus retroflexus* L.), prostrate knotweed (*Polygonum aviculare* L.), purslane (*Portulaca oleracea* L.), horseweed (*Erigeron canadensis* L.), (Rankova and Tityanov, 2013; Rankova and Zhivondov, 2013 Rankova and Tityanov, 2014).

During the first three months after applying the herbicides, the weeds available in the different variants were reported by species and in number. On the 60th and 90th days single plants of the species *Alopecurus myosuroides* L. and *Bromus arvensis* L. were found in the variants treated with the herbicides (Figure 1). All the studied herbicides at the rates applied showed a good control of weed infestation and the post-effect lasted for about 3.5 – 4 months. The herbicide effect continued for about 120 days after treatment, i.e. until the beginning of August.

In the period when the efficient herbicide post-effect subsided, the major representatives in the weed association were the late spring species purslane (*Portulaca oleracea* L.) and horseweed (*Erigeron canadensis* L.).

The results obtained about the effect of the active substances applied at the studied rates, on the weed infestation level and the duration of the efficient herbicide post-effect showed that it is possible to realize efficient weed control in the fruit tree nursery. The herbicides with a comparatively broad-spectrum of activity (controlling grassy and broad-leaved weed species) included in the study, contributed to the control of almost all the weed species in the weed association, which may develop in the fruit tree nursery.

The realization of a long-term herbicide effect, lasting for about 4 months after the herbicide application, provides favourable conditions for the development of the grafted plants, at a time when weed-cultural plant competition has the greatest suppressing effect.

External symptoms of phytotoxicity or obvious growth suppression were not established after herbicide treatment in spring in the second-year nursery field. Based on the results obtained, it could be concluded that after treatment with herbicides, the seedling rootstocks show greater susceptibility compared to grafted plants in the second-year nursery fields (Rankova and Tityanov, 2014).

Data of the biometric analysis of the trees of 'Nonpareil' cultivar grafted on almond seedling rootstock, are presented in Figure 2.

Lower values of the three studied biometric characteristics were reported in the two variants treated with Metofen (Var. 2 and 3). That gave the grounds to conclude that treatments with that herbicide induce growth suppression in grafted trees. When the higher rate of Pledge 50 WP was applied, a tendency to a certain suppressing effect was observed, however differences to the control were statistically insignificant. The lower rate of Pledge 50 WP (Var. 4) did

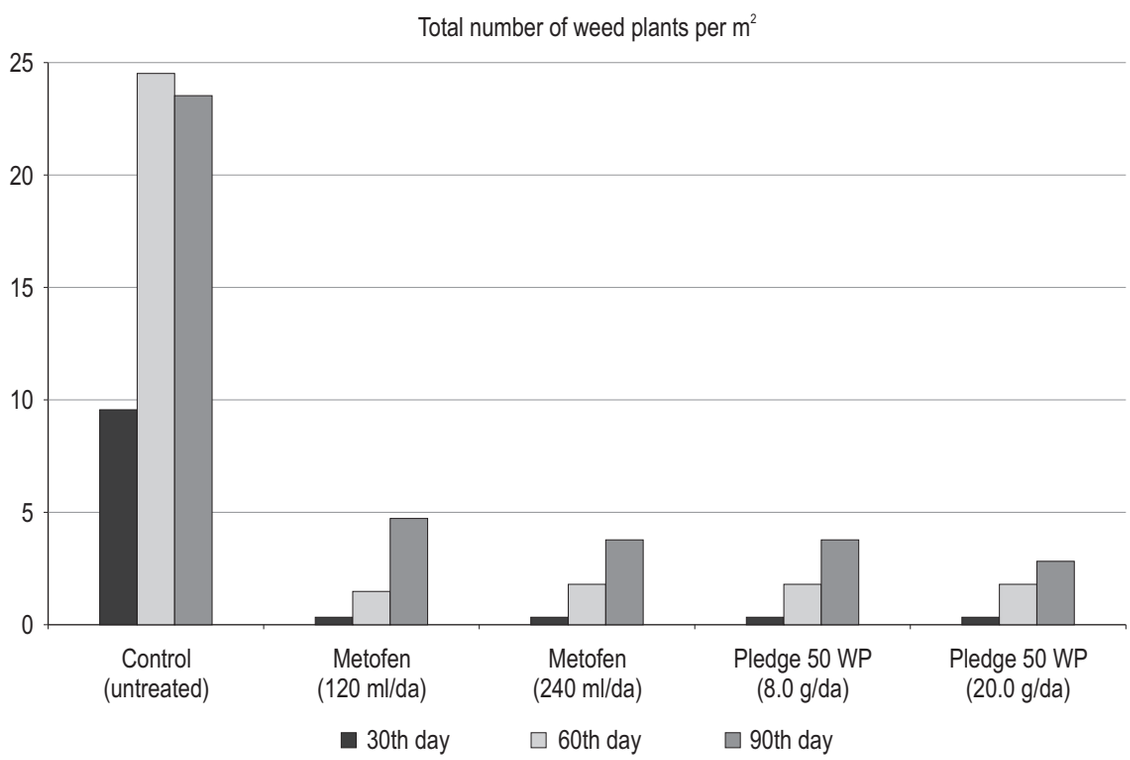

Figure 1. Effect of the soil-applied herbicides on the level of weed infestation (mean number of plants/m^2)

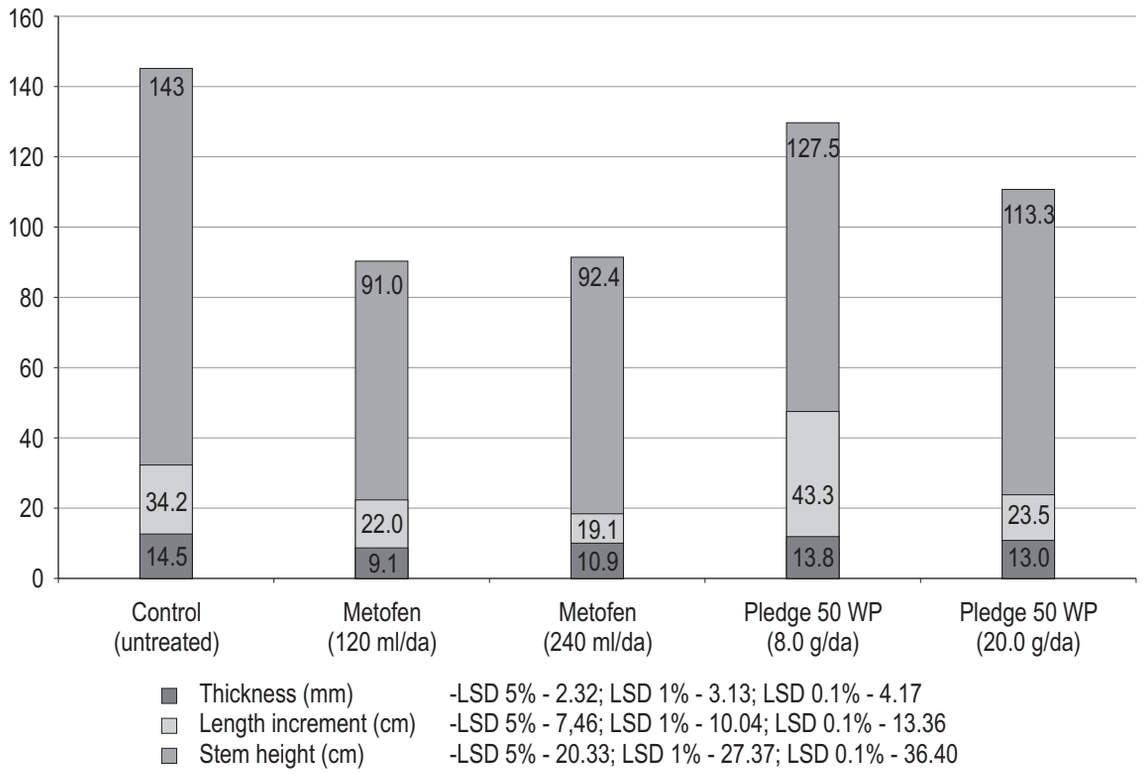

Figure 2. Effect of soil herbicides on growth on 'Nonpareil' cv. grafted on almond seedling rootstock

not induce phytotoxicity expressed in growth habits suppression.

Conclusions

Better and longer-term control of weeds in the second-year nursery field was achieved after treatment with the higher rates of the herbicides. Satisfactory herbicide activity was reported when applying the lower tested rates (Variants 2 and 4). After herbicide treatment applied in spring in the second-year nursery field, external symptoms of phytotoxicity or obvious depression in the development of the grafted plants were not observed. A suppressing effect was established after treatment with Metofen. In production of grafted almond trees on bitter almond seedling rootstock, the contact herbicide of soil and foliar effect Pledge 50 WP – 8.0 g/da can be applied in the second year nursery field for control of weed vegetation.

References

Abit J and Hanson BD, 2013. Evaluation of preemergence and POST-directed herbicides on rootstock safety in field-grown almond nursery stock. HortTechnology, 23, 462-467.

Hanson BD and Schneider SA, 2008. Evaluation of Weed Control and Crop Safety with Herbicides in Open Field Tree Nurseries. Weed Technology, 22, 493-498.

Rankova Z, 2004. Study on the effect of some soil-applied herbicides on the vegetative habits of seedling rootstocks of yellow plum and peach. Thesis for PhD, Fruit-growing Institute, Plovdiv, Bulgaria, (Bg).

Rankova Z, 2011. Possibilities of Applying Soil Herbicides in Fruit Nurseries – Phytotoxicity and Selectivity. In: Herbicides, Theory and Applications, ed. Sonia Soloneski and Marcelo L. Larramendy, ISBN: 978-953-307-975-2, InTech.

Rankova Z and Zhivondov A, 2013. Effect of some soil herbicides on the vegetative habits of the plum-apricot cultivar 'Standesto' in a nursery. Proceedings of the 4th Conference on Innovations in Fruit Growing, Belgrade, 249-254.

Rankova Z and Tityanov M, 2013. Effect of some soil herbicides on the vegetative habits of apricot seedlings, Proceedings of the 4th Conference on Innovations in Fruit Growing, Belgrade, 255-260.

Rankova Z and Tityanov M, 2014. Effect of some soil-applied herbicides on the vegetative habits of almond seedling rootstocks (*Prunus dulcis* L.). Plant Sciences, 2-3, 45-48.

CONTENTS 1 / 2

CONTENTS 2 / 2

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 8, Number 3
September 2016

Journal web site:
www.agriscitech.eu

Publisher:
www.alfamarket.biz