



Poljoprivredni fakultet
Sveučilište Josipa Jurja
Strossmayera u Osijeku

Faculty of Agriculture
University of Josip Juraj
Strossmayer in Osijek

45. HRVATSKI I
5. MEĐUNARODNI
SIMPOZIJ
AGRONOMA

45th CROATIAN AND
5th INTERNATIONAL
SYMPOSIUM ON
AGRICULTURE

15. – 19. veljače 2010. | Opatija | Hrvatska
15th – 19th February 2010 | Opatija | Croatia

ZBORNIK RADOVA

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sjemenarstvo

Genetics, Plant Breeding and Seed
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Povrćarstvo

Vegetable Growing

Opatija, Grand Hotel Adriatic

Izdavač
Published by

**Poljoprivredni fakultet
Sveučilišta Josipa Jurja Strossmayera u Osijeku**

**Faculty of Agriculture,
University of Josip Juraj Strossmayer in Osijek**

Za izdavača | Publisher

prof.dr.sc. Vlado Guberac

Glavni urednici | Editors in Chief

**prof.dr.sc. Sonja Marić
prof.dr.sc. Zdenko Lončarić**

Tehnički urednici | Technical Editors

**prof.dr.sc. Tihomir Florijančić
Ras Lužaić, dipl.ing.**

Oblikovanje | Design by

Ras Lužaić, dipl.ing.

Fotografija | Photo by

Samir Kurtagić

Tisak | Printed by

Grafika Osijek

Naklada | Edition

500

CIP zapis dostupan u računalnom katalogu Gradske i
sveučilišne knjižnice Osijek pod brojem **120922066**

ISBN 978-953-6331-79-6

PRELIMINARY COMMUNICATION

Preparatoirs for potatoes in organic farming

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Abstract

The aim of this experiment was to try alternative methods of regulation of Colorado beetle (*Leptinotarsa decemlineata*) and late blight (*Phytophthora infestans*) (the biggest harmful organisms of potatoes) and production of the good-class of the biopotatoes.

Preparation Neem-Azal showed trend of the lower larvae occurrence. Combination of the cupric fungicide with preparation PRP-EBV and vermicompost decreased tops-attack by late blight. The statistically lowest production was under the scaffold net. There were not found significant differences in production by using vitality- strengthening preparation.

Key words: biopotatoes, Neem-Azal, vermicompost, Lignohumate, PRP-EBV

Introduction

The production of potatoe in the quality of bio takes only a very small proportion of the total potato production in the Czech Republic (Dvorak, Bicanová, 2007). Therefore it is necessary to work out some of the technologies of potatoes cultivation for conditions of organic farming and to offer high quality and good looking tubers. To increase the vitality of plants and their defenses against negative factors mentioned there can be used in organic farming system numbers of authorized products or the exception. Experimentally tested for foliar application product Lignohumate B, which stimulates growth and acceleration of photosynthesis. The principle is a mixture of humic acids and fulvoacids. Application for potatoes is about 0,5-1 l / ha. Another is PRP-EBV with the specific ratio of minerals that support enzymatic reactions. Increasing the intensity of photosynthesis the PRP-EBV activates developing of root system and thereby forses the resistance against stress (PRP, 2008).

Sulzberger (1998) recommended for promotion and growth of potatoes leaf application of the product of Californian earthworms, called "worm tea» (vermitea). According to Stumpf (2006) vermitea contains humic acids, growth hormones, enzymes, microorganisms and amino acids. Another preparate with the increasing of resistance of plants against fungal and bacterial diseases may be Myco-Sin VIN. Causing the production of phenolic compounds and strengthens the surface of leaves – this prevents spores intergrowing cuticle. This leads aslo to the change on pH on leaves and thus reducing the germination of spores (Weinbau Infoblitz, 2007).

In recent years the pressure of the *Leptinotarsa decemlineata* in the organic production of potatoes is increasing. We can decrease the activity of *Leptinotarsa decemlineata* using natural insecticide based on azadirachtin, known under the name Neem-Azal. The function is as a strong antifidant repellent, which interferes with homeostasis of insect hormones as well as other BIO-products, without the risk on humans and animals (Pavela, 2008).

Material and methods

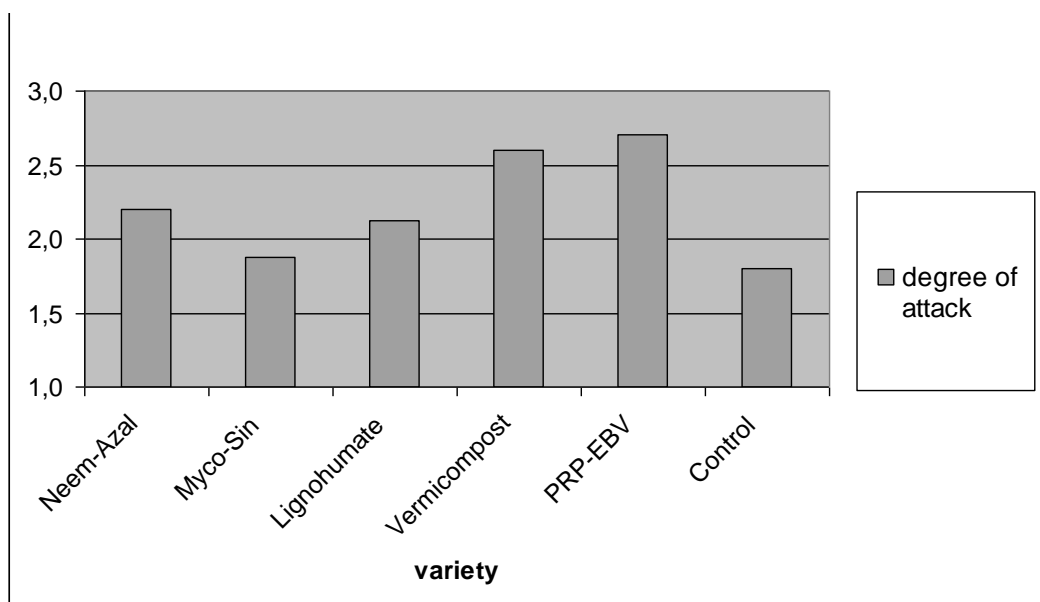
The small parcel test was realized in 2009 on the area of CULS certificated for organic farming in Prague-Uhřetěves. There was used biologically prepared seedlings - pregerminated (starting point in March). Previous crop was clover-grass, which was plowed under in the autumn. After the spring initial actions followed by preparation of the soil formed for the outplanting and placing of the black nonwoven fabric on these already formed soil. Then followed hand outplanting (17th of April 2009) typesetters for bulbs to pre-openings in the soil. Use mulch fabric was chosen because of lower weed pressure. The spacing was 300 x 800 mm and there were used in two varieties: very early variety Monika, boiling type B and semi-early variety Red Anna, b. type B / A. The area of one experimental parcel was 7.2 m², every 30 tubers. For a mechanical barrier of the invasion of weed and *Leptinotarsa decemlineata* the parcels was after signalisation of raid alarm covered by the protective net. In the Table 1 you can see used products, their benefits recalculated per hectare and the date of the application. Under the applications 30th of June occurred within 3 hours after application to rain, the reaplicated was realized 7th of July. We have assessed during the vegetation (1 x per week) the number of insects, nests, and the larvae of . the leaves *Leptinotarsa decemlineata*. There was monitored and evaluated blight on potato haulm – assessed by the level 9 - No infection to the level 1 - fully contested vegetation.

Table 1 Used preparates, their potion and the date of application.

variety/date	May 26	June 18	June 30	July 7
Neem Azal	2.5 l/ha	untented	2.5 l/ha	2.5 l/ha
Myco-Sin	untented	1 % solution	1 % solution	1.2 % solution
Lignohumate	0.55 l/ha	0.55 l/ha + 2.5 kg/ha Cuprocafaro	0.85 l/ha + 1.95kg/ha Cuprocafaro	0.85 l/ha + 1.95 kg/ha Cuprocafaro
Vermicompost	8.4 l/ha	8.4 l/ha + 2.5 kg/ha Cuprocafaro	8.4 l/ha + 1.95 kg/ha Cuprocafaro	8.4 l/ha + 1.95 kg/ha Cuprocafaro
PRP-EBV	2.5 l/ha	2.5 l/ha + 2.5 kg/ha Cuprocafaro	2.5 l/ha + 1.95 kg/ha Cuprocafaro	2.5 l/ha + 1.95 kg/ha Cuprocafaro
control	untented	untented	untented	untented

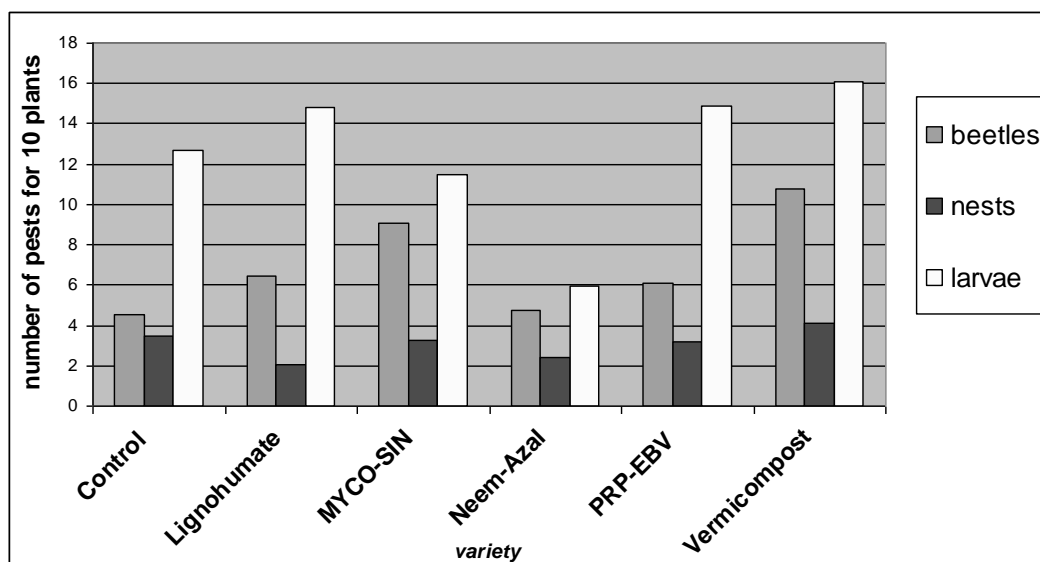
Results and discussion

Blight pressure was strong this year and peaked in mid-July. The crop was affected by blight 12th of July and within a few days was completely destroyed. The lowest level of infection of potato stems blight was statistically confirmed in the application of PRP-EBV (level 2.7) and vermicompost (grade 2.6).). These options were simultaneously treated with cupric Cuprocaffaro. Váňa (1994) published that the use vermitea is reducing fungal disease attack. In test we have achieved this theory, but by the current applications of copper. Monika variety is less tolerant (with an average degree of infection of haulm 1.69 to 3.2 degree at Red Anne), due mainly to its earliness. The controll testing (Monika and Red Anna) showed the largest affect of haulm, statistically confirmed.



Graph 1 The level of affecting of potatoe vine by blight – devided in variations and species

This year *Leptinotarsa decemlineata* didnt caused significant damages. There were no statistically significant differences in the variants, but the application of Neem-Azal trend showed the lowest number of larvae, against which the product is primarily intended. In contrast, experimental variants treated by vermicompost were the most attractive for beetles and there we have discovered many nests and larvae (Graph 2). Influence of variety on pest attack has been statistically confirmed and the difference was inconclusive. Crop was covered by protective net to prevent against beetles in oviposition, but on the final output the measure reflected negatively.

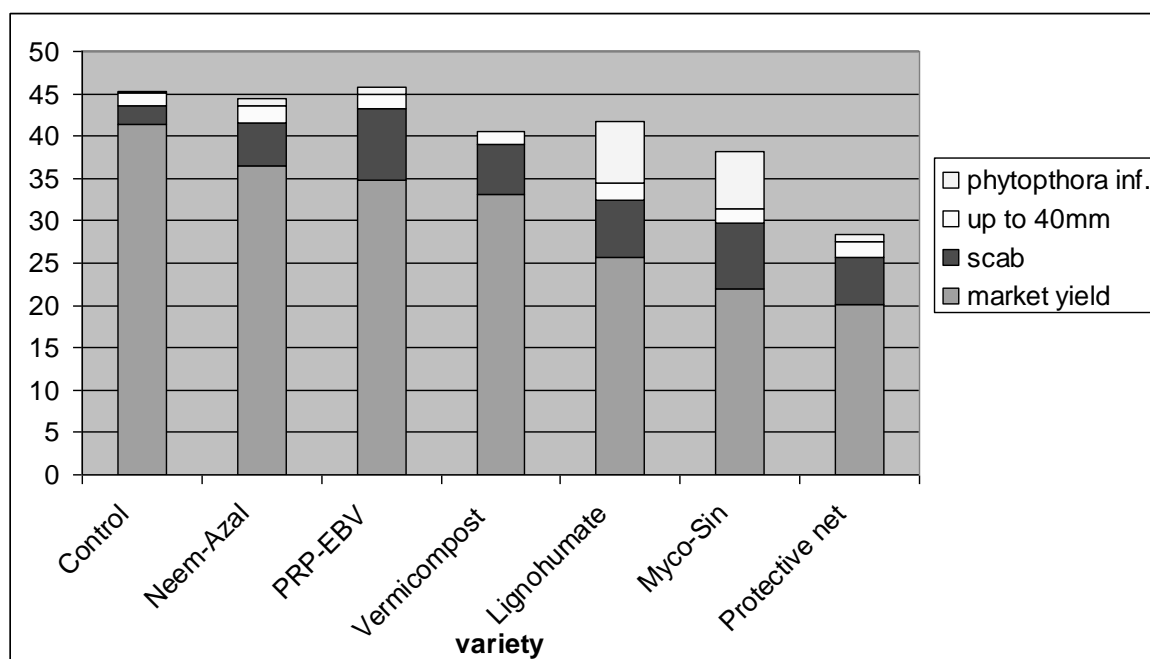


Graph 2 Number of pests for 10 plants

In assessing of the yield has been defined the amount of infected potato tubers, potato scab (in combination with wireworm) and tubers less than 40 mm. In assessing of the overall yield was found statistically significantly lowest yield under the scaffold net although the

vegetation resisted the pressure of potato blight at longest from all variants and attacking of tubers was inconsiderable (Graph 3).

For the troublefree sale of organic potatoes is particularly important the look of potato tubers. Therefore there is included also the market yield in the results (excluding tubers with scab more than 33% of the surface of roots, damaged parts, putrescent and green tubers). Statistically significant is the market highest yield. It was achieved on the untreated control (average of rep. 40.51 t / ha) and lowest market yield under scaffold net (22.94 t / ha). Overall yield was statistically the lowest under the scaffold net (31.08 t / ha). Monika was a variety of higher total yield (average of 41.47 tons / ha) compared to Red Anna (37.01 t / ha), which was statistically confirmed. In assessing of market yield, differences decreased, which was due to higher losses (scab, wireworms, rot) of the Monika variety. Scab of potatoes, is reduced during the application of humic substances (Lignohumate) (Agrarni obzor, 2007), which is demonstrated in the experiment. As stated Tugarinov et al. (2009), humic substances increase the yield by 10%, which is also demonstrated in this experiment. Growing of organic potatoes under black non-woven fabric may negatively influence the quality of harvested tubers. The edge of uncovered textile fabrics (other varieties: Impala and Bellarosa) was less visually affected by scab and wireworm. There is the need to determine the impact on the quality of non-woven fabric production. Fabrics would be the appropriate solution because of the pressure of weeds for gardeners. It can be used for several years consecutively.



Graph 3 The overview of yield depending of the method of treatment

Conclusions

This year represented the biggest problem in the potato producer - potato blight. The combination of Cuprocaffaro with vermicompost and PRP-EBV reduced this blight infection of potato wine, but to keep vegetation green for a longer time failed. Without any infection and any attack by *Leptinotarsa decemlineata* was the crop covered by this protective net, but statistically it showed the lowest overall yield and market yield of ware tubers. This year would not be the measure financially advantageous (from its high cost of the protective net). Statistically significant highest market yield was achieved in the

untreated control. This year, there was a small pressure of *Leptinotarsa decemlineata*, which is reflected in small differences between the variants. The preparative Neem Azal showed a trend of reduction *Leptinotarsa decemlineata* larvae. Inasmuch that this is a one-year test, we will need another test years to determine the optimal method of treatment of agricultural technique and way of treatment of organic potatoes.

Acknowledgement

The study was supported by grant from CULS CIGA reg. č. 20092006 and by Ministry of Education, Youth and Sport of the Czech Republic, Research proposal No. 6046070901, NAZV No. QH82149.

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