

Effect of different non-chemical treatment methods on organic seed

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Summary: The importance of ecological farming in Hungary is increasing. The utilisation of organic seed is regulated by national law. In our experiment the effect of two plant conditioning substantial: Biokál and Biomit Plussz were tested on the germination of seed. Our test plant species was garden pea (*Pisum sativum* L.), the most important vegetable in Hungary. The experiment was carried out in the germination laboratories of the National Institute for Agricultural Quality Control after international rules. The germination, the length of root and shoot were measured. 4 hours soaking of pea seeds in 30% solution of Biokál gave the best result. Our results could help to make the field emergence of organic seed faster and safer.

Key words: seed-treatment, germination, plant-conditioning, pea, organic

Introduction

The role of organic farming is more and more important not only in the agricultural practice but also in political level in the European Union. Organic farming is increasing in Hungary as well. In the last twelve years the size of organically cultivated area in our country has reached the 110 000 ha.

Nowadays this kind of agricultural cultivation is also regulated. According to the 82/2002. (IX. 4.) FVM-KvVM Regulation the use of organic seed is obligatory in organic plant production from 01.01.2004. This regulation makes it important to find alternative methods for seed treatment instead of chemical treatment which is not allowed in organic farming (Plakolm, 2000, Ruegger, 1998). The situation is difficult because of the low amount of non-chemical seed treatment methods and additionally most of them are not effective enough. Certainly there are some proposed methods like heat-treatments: hot air drying (Kristensen, 2000) and soaking in hot water (Schachermayr et al., 2000, Hermansen et al., 1999, Erdey et al., 1997). Selection of seeds to size, morphological shape or damage could make a higher and more homogeneous quality of organic seeds with better germination ability and with higher vigour (Guberac et al., 1998). There are many researches to find any material, which could replace chemical seed treatments and that are permitted in ecological farming. (Hartman, 1995, Ozcan, 2000).

The goal of our research is to find methods, which keep the good quality of organic seeds and assure a safety field emergence.

The experiment was carried out in the germination laboratories of the National Institute for Agricultural Quality Control (OMMI) in the years 2001–2002.

Material and method

Non-treated pea seed (*Pisum sativum* L.) were used in our experiment. The variety was Rajnai törpe, the percentage of germination ability was 91%, which fulfils the requirements of EU and Hungarian Standard for Seed.

The effect of two materials: Biokál and Biomit Plussz were tested on seed germination. These materials are permitted in ecological farming as plant conditioning substantial. Biokál contains herbs, water extract of biohumus and volatile oils, Biomit Plussz contains complex organic material, macro- micro and trace elements and plant extracts.

Different concentrations of solutions were tested (water solutions: 30% of Biokál, 30% of Biomit Plussz, and 10% of Biomit Plussz).

Different methods of soaking were applied:

- untreated seeds were germinated in paper, which was soaked for 3 minutes in the solutions, and then dripped down.
- the seeds were soaked for 2–4–6 hours in the solutions, and germinated in untreated paper.
- control means germination test with untreated seeds in untreated paper.

Methods of germination were carried out between paper (BP Roll) in 20 °C under 8 hours lighting in the germination

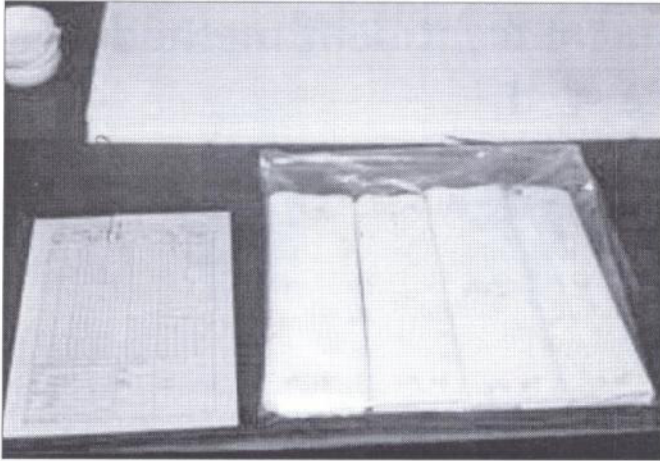


Figure 1 Seeds between paper roll for germination testing

Table 1 Treatments and labelling

Treatments	Biokál 30%	Biomit 10%
Control	K	K
Paper soaked for 3 min.	BP	NP
Seed soaked for 2 h	B2	N2
Seed soaked for 4 h	B4	N4
Seed soaked for 6 h	B6	N6

chamber according to the ISTA (International Seed Testing Association) International Rules 1999.

9 treatments were carried out with four repetitions each with 100 seeds.

The normal and healthy germs were counted, and measured the length of shoot and root on the fifth (vigour day) and eighth day (end account).

Data were analysed with one-way analysis of variance, with Tukey test at 5% significance level.

Results

Biokál

The germination was better in all four treatments than in the control.

In the case of growing of the root system measured at the vigour day, control and soaked paper formed homogenous group and significantly differed from 2 hours and 6 hours soaking of seeds, which also formed a homogenous group.

4 hours soaking differed significantly from all the other treatments. 12.8 cm long roots were measured on the average.

Growing of the shoot showed similar results, with lower but still significant differences.

At the end account we found that the length of shoots and roots were more equalised. The 4 hours soaking showed the best results; and excepting the 2 hours soaking significant difference was found from all other treatments.

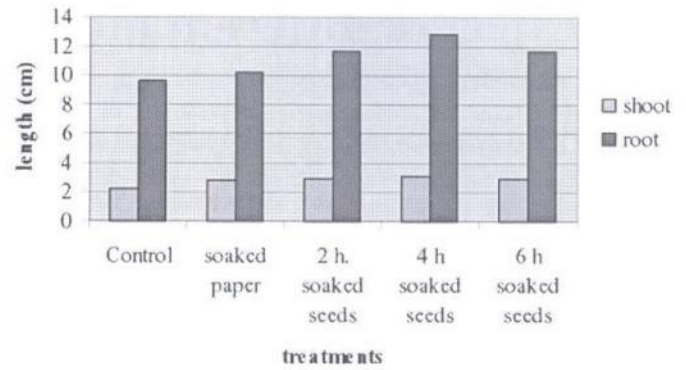


Figure 2 The length of shoot and root on the vigour day in treatment with 30% solution of Biokál

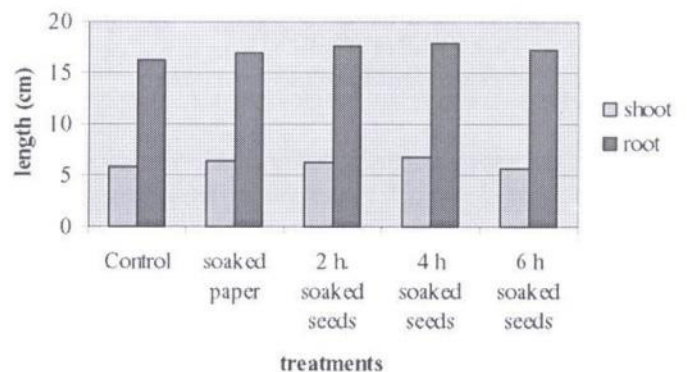


Figure 3 The length of shoot and root at the end account in treatment with 30% solution of Biokál

Biomit Plusz

In the case of the 30% solution of Biomit Plusz such a strong toxic effect was observable on seeds, that the data couldn't be evaluated. Therefore the solution was reduced to 10% concentration and the experiment continued.

The germination was weaker in all treatments than in the control, especially in the soaked paper (germination was 25%).

As we examine growing of root the control and treated seeds gave significantly better results than the soaked paper. There were significant differences between the homogenous group of 4 hours and 6 hours soaking and the other homogenous group of the control and 2 hours soaking. We measured the longest roots in the 2 hours soaking on the average.

In the case of the growing of shoot results were similar. The longest shoot was measured in the treatment with 2 hours soaking of seeds, and soaked paper gave the shortest shoots. There was no significant difference between the control, and the 4 and 6 hours soaking.

At the end account the seeds in the soaked paper died so the data couldn't be analysed. The other treatments showed also weak results. The growing of shoots and roots has decreased.

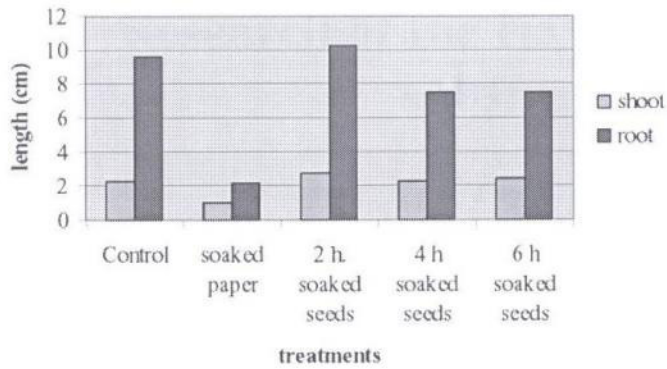


Figure 4 The length of shoot and root at the vigour day in treatment with 10% solution of Biomit Plusz.

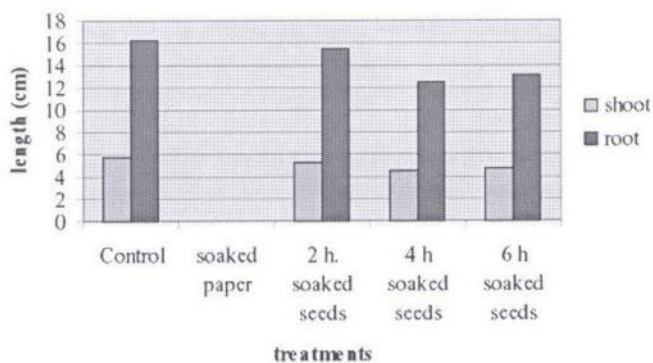


Figure 5 The length of shoot and root at the end account in treatment with 10% solution of Biomit Plusz.

Conclusion

Our results show positive effects of using 30% solution of Biokál for seed treatment. It gave better results with all soaking methods than the control in germination and also in the length of roots and shoots.

4 hours soaking of seed in 30% solution of Biokál was the most successful treatment because difference at 5% significance level can be found between this and the control in all tested parameters.

The root and shoot systems grow faster in 30% Biokál than in the case of control. The well developed shoot and root system can mean a great benefit at the field emergence and organic farming should take advantage of this profit.

The experiment will be continued in year 2003 under field conditions.

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