Prof. dr hab. Bronisław Grzegorzewski Trzemiętowo 5. 12. 2024.

Review of the work in the doctoral procedure

MSc Eng. Xianzong Xia

entitled

The effect of low frequency magnetic field (LFMF) on quality of radish (Raphanus sativus L.) seeds

commissioned by the

Scientific Council of the Discipline

Agriculture and Horticulture

of the University of Life Sciences in Poznań

Pursuant to the Act of 14 March 2003 on academic degrees and academic title and degrees and title in the field of art and in accordance with the Regulation of the Minister of Science and Higher Education of 19 January 2018 on the detailed procedure and conditions for carrying out activities in the doctoral procedure, in the habilitation procedure and in the procedure for awarding the title of professor MSc Eng. Xianzong Xia has submitted his doctoral thesis entitled: "The effect of low frequency magnetic field (LFMF) on quality of radish (Raphanus sativus L.) seeds". Xianzong Xia is applying for a Ph.D. degree. The thesis supervisor is prof. dr hab. Roman Hołubowicz.

Around 12,000 years ago, the Neolithic Revolution took place, as a result of which man began to cultivate the land. This fact became the beginning of our civilization. People who did not have to gather food could become thinkers, artists, craftsmen or engineers. From the very beginning of the Neolithic turn, two basic problems appeared: how to store food and how to store seed material. It turns out that we are still struggling with these basic problems and using

increasingly modern techniques, we are looking for new methods of storing food and, above all, improving the quality of seed material.

The first mentions of the positive effect of the magnetic field on plants were observed already in the 19th century. However, over the last twenty years, we have observed an intensification and acceleration of research on the effect of the magnetic field on the quality of seed material. The phrases "magnetic field and quality of seeds" generate a very large number of publications. Therefore, the subject matter covered falls within the area of science of currently very wide interest. The dissertation submitted to me for review deals with the issue of the influence of a low frequency magnetic field on seed quality.

The dissertation opens with an extensive part resulting from literature research. Here we find methods of using a magnetic field in these studies, a broad review of plant parameters enhanced by a magnetic field, mechanisms of response to the magnetic field, difficulties that arise when using a magnetic field, and a photon emission test. This part was developed based on a very extensive review of the literature relating to the issues undertaken. Here we find the latest results of scientific research. This part of the dissertation deserves recognition and introduces the reader well to the researched area.

After the part constituting literature research, research hypotheses and objectives of the dissertation were defined. The main objective is to demonstrate that a low frequency magnetic field improves the quality of seeds using radish seeds as an example. I assess the choice of the undertaken research topic in the field of agricultural sciences and its originality very well.

The results of the research conducted by the Author are preceded by a description of the research material, the experimental technique used, and the statistical method of analyzing the results. The experiments were conducted on original seeds and on seeds subjected to accelerated aging. The author presents the measurement results for the Carmen and Szkarłatna z Białym Końcem radishes. At the beginning, we find the results of measurements related to germination depending on the time of application of the magnetic field. In the further part, we find the results determining the effect of the low-frequency magnetic field on the parameters describing germination depending on the magnitude of the magnetic induction and the time of the field operation. Finally, the influence of the low-frequency magnetic field on the emission of photons is presented. The dissertation ends with a discussion of the obtained results. The discussion, like the introduction, testifies to the scientific maturity of the Author. In the discussion, which

shows the place of the conducted research in the area of the latest literature results, we find confirmation of the validity and originality of the chosen topic. The discussion is certainly a distinctive part of the work. In the conclusions, the Author accurately assessed the obtained results.

The general conclusion obtained on the basis of the conducted research is the statement of the positive effect of the low-frequency magnetic field on the quality of radish seeds. In my opinion, the obtained results are important from a scientific point of view and, above all, they have a very important practical value. The method of presenting the results is appropriate and the statistical analysis is adequate to the results obtained. The dissertation is carefully done. I find no critical comments in relation to the professionalism in the conducted research.

The work is written in a clear and transparent manner. I did not find any significant shortcomings in the use of scientific terminology.

In my opinion, in terms of methodology, the work does not raise any objections. The literature on the basis of which the Author undertakes the research issue is contemporary, sufficiently extensive, and properly used. The hypotheses and objectives are formulated clearly and transparently. In general, the layout of the work is correct.

As a reviewer, I am providing a few shortcomings that I have noticed in the text:

General comments:

1. The author defines the abbreviation LFMF in the title, but the abstract lacks a definition of MF. Furthermore, I believe that the excessive use of abbreviations makes reading the work difficult.
2. When specifying the conditions for conducting the experiment, the author usually provides the value of the magnetic induction and the time of application of this field, omitting the frequency for this field.
3. It seems to me that the value of the magnetic induction used in the experiment should be compared with the value of the magnetic induction of the Earth's field.

Detailed comment:

22_9 In the dissertation is "sensitive to the visible range (300-650 nm)". The range (300-650 nm) is not the visible range.

The above shortcomings do not have a significant impact on the value of the dissertation.

Xianzong Xia is a co-author of three papers containing results obtained during the research that is part of the dissertation. This achievement confirms the professionalism of the Author and seems to be a good prognosis for his further scientific development.

In summary, I would like to state that the dissertation "The effect of low frequency magnetic field (LFMF) on quality of radish (Raphanus sativus L.) seeds" and the scientific achievements of MSc Eng. Xianzong Xia are very good. The presented dissertation is an original work, addressing important, contemporary topics. I assess the research methods used and the results obtained very well.

I therefore state that the dissertation "The effect of low frequency magnetic field (LFMF) on quality of radish (Raphanus sativus L.) seeds" and the scientific achievements of MSc Eng. Xianzong Xia meet the criteria of the Act on Academic Degrees and Academic Title and on Degrees and Title in the Field of Art and I request that MSc Eng. Xianzong Xia be admitted to further stages of the doctoral procedure.

prof. dr. hab. Bronisław Grzegorzewski