

The influencing of corona discharges on the overall contamination of winter barley and wheat seeds

V. L. Bychkov¹, P. A. Goryachkin¹, D. N. Vaulin¹, A. P. Shvarov¹, A. M. Izotov²,
B. A. Tarasenko² and D. P. Dudarev²

¹ Lomonosov Moscow State University, Faculty of Physics, Department of Physical Electronics
Bd. 2, 1 Leninskiye Gory, Moscow, 119991, Russia
E-mail: bychvl@gmail.com

² Institute "Agrotechnological Academy" of the Crimean Federal University
named after V. I. Vernadsky
Agrarnoe, Simferopol, 295492, Republic of Crimea

Received 7.11.2023; revised 30.11.2023; accepted 7.12.2023

Studies have been conducted on effects of positive and negative corona discharge on the infection of winter wheat and winter barley seeds with fungal diseases. Treatment of seeds of these crops with cold plasma of the corona discharge helps to reduce their contamination with fungal spores that cause plant diseases. As the duration of exposure increases, the effectiveness of the use of cold plasma increases. With an exposure of 60 minutes, the negative corona reduced the number of fungal spores per barley grain by 45 %. The positive crown did not have a significant effect on the contamination of winter barley seeds. The negative and positive corona had almost the same effect on the contamination of winter wheat seeds with spores of pathogenic fungi. During an exposure of 60 minutes, the total contamination of winter wheat seeds during cold plasma treatment decreased by 69 %.

Keywords: corona discharge, seeds, infestation, germination, disinfection, fungal diseases, winter wheat and winter barley.

REFERENCES

1. Balayan V. M., Pharmacy for plants, Moscow, Prosveshenie, 1985 [in Russian].
2. 1st International Workshop on Plasma Agriculture [Electronic resource]: www.iwopa.org
3. 2nd International Workshop on Plasma Agriculture [Electronic resource]: www.iwopa2.org
4. Los A., Ziuzina D. and Bourke P., J. Food Sci. **83**, 1–10 (2018). doi: 10.1111/1750-3841.14181
5. Gordeev Yu. A., Stimulation of biological processes in plant seeds by low-temperature plasma radiation, Smolensk, Smolensk State Agricultural Academy Publ., 2008 [in Russian].
6. Bychkov V. L., Chernikov V. A., Deshko K. I., Izotov A. M., Tarasenko B. A. and Dudarev D. P., IEEE Trans. Plasma Sci. **49** (3), 1034–1040 (2021).
7. Bychkov V. L., Goriachkin P. A., Chernikov V. A. et al. Impact of corona discharge on germination and infestation of winter wheat seeds. Atmosphere, Ionosphere, Safety. Proc. Intern Conf. Kaliningrad, 2023. Eds. Borchevkin O. P., Golubkov M. G., Karpov I. V. Kaliningrad, 2023, pp. 307–310.
8. Bychkov V. L., Goriachkin P. A., Chernikov V. A., Shvarov A. P., Vaulin D. N., Sorokovykh D. E., Izotov A. M. et al., Applied Physics, № 2, 5–21 (2023) [in Russian].