ONE WORLD – ONE HEALTH

Proceedings
of the I International Scientific and Practical Conference,
4-5 June 2024, Słupsk, Poland

Słupsk
2024

Pomeranian University in Słupsk, Słupsk, Poland
National Academy of Agrarian Sciences of Ukraine
Institute of Climate-Smart Agriculture of the National Academy of Agrarian Sciences of Ukraine (NAAS), Odesa, Ukraine
National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
Ludwik Rydygier Collegium Medicum in Bydgoszcz,
Nicolaus Copernicus University in Toruń, Poland
Sumy State Pedagogical University named after A.S. Makarenka, Sumy, Ukraine
T.H. Shevchenko National University "Chernihiv Colehium", Chernihiv, Ukraine

ONE WORLD – ONE HEALTH

Proceedings
of the I International Scientific and Practical Conference,
4-5 June 2024, Słupsk, Poland

Słupsk
2024

UDC 61: 63: 619: 004.8

Editors: H. Tkaczenko, N. Kurhaluk, O. Lukash, O. Yakovenko, I. Antonik

One World – One Health. Proceedings of the I International Scientific and Practical Conference, 4-5 June 2024, Słupsk, Poland. Słupsk: Institute of Biology, Pomeranian University in Słupsk, 2024. 452 p.

Recommended for publication by the Academic Council
Institute of Biology of the Pomeranian University in Słupsk
(protocol No. 5, dated May 20, 2024)

The conference "One World – One Health" is registered at the State scientific institution
"Ukrainian Institute of Scientific and Technical Expertise and Information"
(No. 290, dated May 8, 2024)

This proceedings contains the proceedings of the First International Scientific and Practical Conference "One World – One Health", held at the Institute of Biology of the University of Pomerania in Słupsk on 4-5 June 2024. The conference brought together scientists, educators, doctoral candidates, postgraduates and students to address contemporary health challenges in a globalised world. The focus was on the health challenges posed by environmental changes, pandemics and increasing urbanisation. Participants presented research spanning medicine, veterinary science, biology, environmental protection and agriculture, with the aim of identifying innovative solutions to ensure sustainable health systems. Particular emphasis was placed on the concept of 'One Health', which emphasises the interconnectedness of human, animal and environmental health. The collection includes papers that present the latest scientific and practical advances in the field, as well as recommendations for integrating interdisciplinary strategies to address global health challenges.

Mlynarkiewicz). Słupsk, Wydawnictwo Naukowe Akademii Pomorskiej w Słupsku. – P. 117-152. ISBN 978-83-7467-336-5.
10. Treesubsuntorn, C., Lakaew, K., Autarmat, S., & Thiravetyan, P. (2020). Enhancing benzene removal by *Chlorophytum comosum* under simulation microgravity system: Effect of light-dark conditions and indole-3-acetic acid. *Acta Astronautica*, 175, 396-404. https://doi.org/10.1016/j.actaastro.2020.05.061.
11. Wilczek, N.A., Brzyska, A., Bogucka, J., Sielwanowska, W.E., Żybowska, M., Piecewicz-Szczęsna, H., & Smoleń, A. (2023). The Impact of the War in Ukraine on the Epidemiological Situation of Tuberculosis in Europe. *Journal of clinical medicine*, 12(20), 6554. https://doi.org/10.3390/jcm12206554.
12. Zalakeviciute, R., Mejia, D., Alvarez, H., Bermeo, X., Bonilla-Bedoya, S., Rybarczyk, Y., & Lamb, B. (2022). War Impact on Air Quality in Ukraine. *Sustainability*, 14(21), 13832. https://doi.org/10.3390/su142113832.
13. Zanoletti, A., Bilo, F., Borgese, L., Depero, L.E., Fahimi, A., Ponti, J., Valsesia, A., La Spina, R., Montini, T., & Bontempi, E. (2018). SUNSPACE, A Porous Material to Reduce Air Particulate Matter (PM). *Frontiers in chemistry*, 6, 534. https://doi.org/10.3389/fchem.2018.00534.

Mykola Grabovskyi, Mykola Stepanenko, Taras Panchenko, Lesya Kachan, Leonid Kozak

STARCH AND BIOETHANOL OUTPUT FROM CORN GRAIN DEPENDING ON THE FERTILIZATION SYSTEM

Bila Tserkva National Agrarian University, 09117 Bila Tserkva, Kyiv region, Ukraine
E-mail: nikgr1977@gmail.com, stepanenkowww@gmail.com, panchenko.taras@gmail.com, viddilaspirantura@ukr.net, kla59@ukr.net

Keywords: *corn, fertilizer system, starch, bioethanol*

Introduction. The use of bioethanol-based fuels, which have captured a significant share of the global energy market, is becoming more important every year as experts predict an increase in global production. It is clear that the energy balance of maize for bioethanol production depends on the grain yield per unit area: as maize yields increase, the efficiency of producing 1 tonne of bioethanol increases. At the same time, the efficiency of cultivation requires proper justification, an important part of which is the development of a business plan that takes into account the company's real capabilities, development prospects and means of implementation in an unstable market and the global financial crisis [1, 4-8, 10].

Bioethanol is the most widely used liquid biofuel in the world, helping to overcome energy dependency and significantly reducing the negative environmental impact of traditional fuels. The feasibility of industrial ethanol production depends on many factors, including energy and economic factors. The main criterion for feedstock selection is accessibility and availability for processing 365 days a year. As feedstock costs account for 70-80% of the cost of ethanol, feedstock availability determines the economics of production [2, 5].

Many crops with high starch or sugar content can be used as feedstocks for bioethanol production: maize, cassava, potatoes, sugar beet, sweet potatoes, barley and sugar sorghum. The higher the sugar and starch content of the feedstock, the more cost-effective ethanol production is due to the low cost of raw materials [3]. When ethanol is produced from corn, one third more energy is released during combustion than was used to grow, harvest and process the crop [4].

Corn biomass has good energy and environmental performance for bioethanol production, which is a positive characteristic of this feedstock for use as an energy source. To be processed into bioethanol, it is necessary to have grain with the highest possible starch content. The starch content of cereals depends on both the characteristics of the variety and the technology used to grow it. Hybrids used as renewable bioenergy feedstocks should have a high starch content [5, 10].

Materials and methods. The research was carried out in 2022-2023 at the Research and Production Centre of the Bila Tserkva National Agrarian University according to the following scheme: 1. Without ammonium nitrate and microfertilizer (control), 2. Ammonium nitrate (N_{40}) before sowing maize 3. Pre-sowing ammonium nitrate (N_{40}) + microfertilizer Nutrivant Plus Corn (2.5 kg/ha) in the 3-5 leaf stage of maize 4. Ammonium nitrate (N_{40}) before sowing + microfertilizer Vuksal R Max (2 l/ha) in the 3-5 leaf stage of maize 5. Ammonium nitrate (N_{40}) before sowing + microfertilizer Rosalik (3 l/ha) in the 3-5 leaf stage of maize. The total area of the plots was 38.6 m^2 and the maize hybrid SI Zephyr (FAO 430) was grown. The production of bioethanol from maize grain was calculated as ethanol yield – the amount of ethanol obtained from one tonne of carbohydrates in the form of starch, according to guidelines [7].

Results and discussion. The starch content of maize grain determines the bioethanol yield and is highly dependent on the maturity group, hydrothermal conditions of the year, subspecies and specific cultivation techniques [6, 9].

The best conditions for maize growth and development are created by applying nitrogen fertiliser (N_{40}) before sowing in combination with Vuksal R Max microfertiliser, which is reflected in the highest starch yield per unit area in 2022 – 7.35 t/ha and in 2023 – 8.03 t/ha (Table 1). At the same time, the starch yield in the control (no fertiliser application) was 6.22 and 6.66 t/ha.

Table 1. Starch output from maize grain according to fertilization system, t/ha

Fertilization system	2022	2023	Mean
Control	6.22	6.66	6.44
Ammonium nitrate (N_{40})	6.68	7.31	7.00
Ammonium nitrate (N_{40}) + microfertilizer Nutrivant Plus Corn (2.5 kg/ha)	7.18	7.82	7.50
Ammonium nitrate (N_{40}) + microfertilizer Vuksal R Max (2 l/ha)	7.35	8.03	7.69
Ammonium nitrate (N_{40}) + microfertilizer Rosalik (3 l/ha)	7.13	8.06	7.60
LSD, $P < 0.05$	0.23	0.30	0.18

The use of nitrogen fertiliser and microelements increases starch production per unit area by 0.56-1.15 t/ha on average over two years compared to the control.

Fertilisation improves the architecture of the maize plant, allowing better photosynthetic activity and organic matter formation, and can influence starch accumulation in the grain and consequently bioethanol output.

The output of bioethanol from maize grain was highest in 2023 – 4.91 thousand litres/ha, and in 2022 it was 4.48 thousand litres/ha (Table 2).

Table 2. Estimated bioethanol output from maize grain depending on the fertilization system, thousand liters/ha

Fertilization system	2022	2023	Mean
Control	4.03	4.32	4.17
Ammonium nitrate (N_{40})	4.33	4.74	4.53
Ammonium nitrate (N_{40}) + microfertilizer Nutrivant Plus Corn (2.5 kg/ha)	4.65	5.07	4.86
Ammonium nitrate (N_{40}) + microfertilizer Vuksal R Max (2 l/ha)	4.76	5.20	4.98
Ammonium nitrate (N_{40}) + microfertilizer Rosalik (3 l/ha)	4.62	5.23	4.92
LSD, $P < 0.05$	0.15	0.19	0.13

Optimisation of plant nutrition through the use of nitrogen fertilisers and microelements contributed not only to an increase in starch yield per unit area, but also to an increase in bioethanol yield per hectare. The highest bioethanol yield, averaged over two years, was obtained in the variant using nitrogen fertiliser (N_{40}) before sowing in combination with the microfertiliser Vuksal P Max – 4.98 thousand litres/ha, which is 0.81 thousand litres/ha more than in the control variant. The increase in bioethanol yield in the other fertiliser treatments was 0.36-0.75 thousand litres/ha.

Conclusions. Optimising plant nutrition through the use of nitrogen fertilisers and microelements helps to increase starch and bioethanol production per unit area. On a two-year average, the highest values of these indicators were obtained in the variant with the use of nitrogen fertiliser (N_{40}) before sowing in combination with the microfertiliser Vuksal P Max - 7.69 t/ha and 4.98 thousand litres/ha.

References

1. Грабовський, М.Б., Roubík, H., Кучерук, П.П., Павліченко К.В. (2022). Розрахунковий вихід біогазу і метану у гібридів кукурудзи залежно від застосування добрив. Матеріали міжнародної науково-практичної конференції «*Інноваційні технології в агрономії, землеустрої, електроенергетиці, лісовому та садово-парковому господарстві*», Біла Церква, 22–24.
2. Грабовський, М.Б., Вахній, С.П., Лозінський, М.В., Панченко, Т.В., Басюк, П.Л. (2021). Зернова продуктивність гібридів кукурудзи залежно від застосування комплексних мінеральних добрив. *Агробіологія*, 2, 33–42. https://doi.org/10.33245/2310-9270-2021-167-2-33-42.
3. Грабовський, М.Б., Павліченко, К.В., Козак, Л.А., Качан, Л.М. (2022). Енергетична ефективність вирощування гібридів кукурудзи для виробництва біогазу за використання макро- і мікродобрив. *Зернові культури*, 1, 100–107. https://doi.org/10.31867/2523-4544/0212.

4. Дудка Т.В. (2012). Доцільність отримання біоетанолу із зерна кукурудзи. *Сортовивчення та охорона прав на сорти рослин*, 1, 44–47.
5. Калетнік, Г.М. (2010). Біопаливо. Продовольча, енергетична та екологічна безпека України. Монографія. К.: Хай-Тек Прес.
6. Мазур, В.А., Паламарчук, В.Д., Поліщук, І.С., Паламарчук, О.Д. (2017). Новітні агротехнології у рослинництві. Підручник. / В.Д. Паламарчук, І.С. Поліщук, В.А. Мазур, О.Д. Паламарчук. – Вінниця, 2017. – 602 с.
7. Новітні технології біоенергоконверсії (2010). Монографія. / Я.Б. Блюм, Г.Г. Гелетуха, І.П. Григорюк та ін. – К.: "Аграр Медіа Груп", 2010. – 326 с.
8. Павліченко, К. В., Грабовський, М. Б. (2022).Формування біометричних показників та накопичення сирої надземної маси гібридами кукурудзи під впливом макро- і мікродобрив. *Таврійський науковий вісник*, 123, 98–111. https://doi.org/10.32851/2226-0099.2022.123.14.
9. Паламарчук, В.Д., Алексеєв, О.О. (2020). Математичні моделі висококрохмальних гібридів кукурудзи різних груп стиглості. *Сільське господарство та лісівництво*, 1(16), 28–47. https://doi.org/10.37128/2707-5826-2020-1-3.
10. Паламарчук, В.Д., Климчук, О.В. (2010). Альтернативні аспекти використання зерна кукурудзи для отримання біоетанолу. *Збірник наукових праць Вінницького національного аграрного університету. Серія: Сільськогосподарські науки*, 42(4), 123–129.

Igor Dragovoz, Liubov Zelena, Liliya Avdeeva

BACILLUS VELEZENSIS 20F AS A POTENTIAL GROWTH STIMULANT AND PLANT BIOCONTROL AGENT: EXPERIMENTAL DATA IN FAVOUR OF THIS CONCLUSION

Zabolotny Institute of Microbiology and Virology, National Academy of Sciences of Ukraine, 03143 Kyiv, Ukraine
E-mail: igordragovoz@ukr.net; zelenalyubov@gmail.com; avdeeva_liliya@ukr.net
Keywords: *bacilli, phytase, fengycin, phytohormones, biopreparation*

Introduction. Bacteria belonging to the operational group *Bacillus amyloliquefaciens* are gram-positive, endospore-forming, bacilliform microorganisms, members of the family *Bacillaceae*, class *Bacilli* and type *Firmicutes*. To date, this operational group includes 4 species of bacteria: *B. amyloliquefaciens, B. nakamurai, B.siamensis, B.velezensis.* They are widely distributed in different environments including soil, plants and water. Members of this group are also known as plant growth promoting bacteria (PGPB) due to their ability to fix nitrogen, convert insoluble phosphate and produce phytohormones, antimicrobial compounds and siderophores. They are also characterised by the ability to synthesise a wide range of exoenzymes (particularly lytic) and antibiotic substances capable of inhibiting pathogen growth, including non-ribosomal peptides and polyketides [7].

The above characteristics of this group of bacteria indicate their high ecological plasticity and undiscovered potential for use as plant growth stimulators, biocontrol agents, bioremediation tools, probiotics and producers of commercial enzyme preparations and antibiotics.