

5. Mika, A., Buler, Z., Treder, W., (2016) Mechanical pruning of apple trees as an alternative to manual pruning. *Acta Scientiarum Polonorum – Hortorum Cultus*. 15 (1), 113–121

6. Чаплюцький. А.М. Мельник О.В. (2019). Формування продуктивності насаджень яблуні залежно від способу і строку обрізування. *Збірник наукових праць УНУС*. Вип 95. Ч. 1 С. 199-206. URL: doi.org/10.3195/2415-8240-2019-95-1-199-206

7. Karkee M., Adhikari B., Amatya S., (2014) Qin Zhang. Identification of pruning branches in tall spindle apple trees for automated pruning. *Computers and Electronics in Agriculture*, Volume 103, 2014, Pages 127-135, ISSN 0168-1699. URL: doi.org/10.1016/j.compag.2014.02.013

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DEVELOPMENT OF A TECHNOLOGY FOR OBTAINING A PREPARATION FOR PLANT GROWTH USING HYDRATED FULLERENES

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The analysis of literary sources showed that the priority direction of the agricultural production development aimed to growing ecologically clean food products is the use of growth regulators of a new generation obtained by the method of bio- and nanotechnology and used in concentrations that give significant increases in the yield of cereals and other agricultural crops. That provides a significant reduction of the pesticide load by activating the plant's own protective forces [1, 2].

A significant number of scientific publications and patents testify to the great interest and practical significance of biologically active preparations based on plant growth regulators, their production and use both as independent preparations and together with traditional organic-mineral fertilizers (in the form of bio-additives for plant growth). They determine the nature and development of plants, the formation of new organs, resistance to high and low temperatures, the transition to rest, etc. [3].

In recent years, there has been great interest in the study of the bioprotective function of humic substances, which means, on the one hand, the physiological stimulation of biota under stress conditions, and on the other hand, the immobilization and inactivation of a number of xenobiotics. When constantly being introduced into agrocenoses, growth regulators become components of the environment, which act not only as a passive component in varietal populations of cultivated plants, but also due to their active influence on the functions of the nucleus, they can become factors that make changes in the genome of plants.

To enhance the bactericidal properties of the new growth-stimulating preparation based on humic acids, we have conducted a study of hydrated fullerenes – $C_{60}HyFn$, which are complexes of highly stable water structures created and supported by the presence of special structures of pure carbon.

The biological activity of hydrated fullerenes has been proven on many models, so their influence on seed germination has been studied and positive dynamics has been obtained [4].

As it is known, growth regulators, both of natural and synthetic origin, are used to treat plants in order to change the processes of their vital activity or structure, in order to improve their quality, increase yield, or facilitate harvesting.

Currently, many new natural and chemical compounds with growth-regulating activity which are subjected to increased requirements have been obtained. They should not contain toxic metabolites and mutagenic properties, harmful effects on soil microflora and reservoir inhabitants, and should not create an environmental burden on the environment.

A study of the effect of the preparation containing, in addition to humic substances, hydrated fullerene, a new nano-raw material, and microbiological carotene, showed a significant increase in the productivity of the main field crops. This study was carried out on the experimental fields of V. Dokuchaev Kharkiv National Agrarian University in 2018-2019.

The stimulating effect of the developed preparation is based on accelerating the processes of respiration and metabolism in the plant, the growth and development of the root system and aerial parts, activating the synthesis of carbohydrates and proteins, increasing the resistance of plants to adverse environmental factors, including excess mineral salts in the soil, nitrates and nitrites. At the same time, the components of the preparation facilitate the supply and movement of nutrients in the plant. Pre-sowing treatment of grain seeds with a new preparation using the method of semi-dry dressing increases the yield by an average of 15-20%.

It has been determined that the direct stimulating effect of the new preparation was associated with the influence of humic acids and carotene on the permeability of cell membranes, increased activity of respiratory enzymes, synthesis of proteins and carbohydrates, activation of metabolic processes and increased penetration of nutrients (including minerals) through the pores of plants, which resulted in their better digestibility, while hydrated fullerenes provided the bactericidal properties of the preparation. The presence of hydrated fullerenes in solutions made it possible to

develop a preparation that did not undergo separation during storage due to the binding properties of fullerenes and provided bactericidal effect.

Referances

1. Технологія екологічно безпечного використання нанопрепаратів у адаптивному рослинництві / Н. Ю. Таран та ін. *Фізика живого*. 2011. Т. 19, № 2. С.54–58.

2. Ankita M., Debasish P. (2017). Novel Plant Growth Regulators and their Potential Uses in Agriculture. *International Journal of Bioresource and Stress Management*. 2017. Vol. 8, No. 6. P. 820–826.

3. Використання домішок для підвищення врожайності насіння харчового призначення / Л. В. Кричковська та ін. *Наукові доповіді НУБІП України*. 2021. № 5(93).

4. Використання біологічно активних речовин у препаратах для сільського господарства / Л. В. Кричковська та ін. *Наукові доповіді НУБІП України*. 2024. № 1(107).

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ВЕГЕТАЦІЙНИЙ ІНДЕКС *NDVI* – ІННОВАЦІЙНЕ РІШЕННЯ В МОНІТОРИНГУ СТАНУ АГРОБІОЦЕНОЗІВ

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Швидке зростання можливостей геоінформаційних технологій в області обробки та аналізу просторових даних призвело до істотного зростання ролі геоінформаційних систем в різних областях людської діяльності, зокрема для визначення стану посівів сільськогосподарських культур. Для встановлення функціональних зв'язків між вегетаційними характеристиками рослин, що перебувають у стресових умовах, і спектральними параметрами цих рослин доцільно вживати так звані спектральні вегетаційні індекси.

NDVI (Normalized Difference Vegetation Index) або Нормалізований індекс різниці рослинності – це простий показник кількості фотосинтетичної активної біомаси, який використовувався впродовж останніх 40 років, як основний метод оцінки здоров'я рослин. Розраховано понад 150 варіантів вегетаційних індексів, в основі яких відомі особливості експериментальних кривих спектральної відбивної здатності рослинності і ґрунтів. На червону зону спектру (0,62–0,75 мкм) припадає максимум поглинання сонячної радіації хлорофілом, а на ближню інфрачервону зону (0,75–1,30 мкм) максимальне