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Биологически активные вещества растений – изучение и использование

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Изложены материалы Международной научной конференции, посвященной обсуждению актуальных проблем по изучению и использованию биологически активных веществ растений, в том числе биотехнологических аспектов в растениеводстве с участием ученых из Беларуси, России, Украины, Молдовы, Казахстана, Кыргызстана, Венгрии.

На молекулярном, клеточном и организменном уровнях рассмотрены имеющие важное научное и практическое значение вопросы, в числе которых состав, структура, биосинтез и использование веществ вторичного метаболизма растений, антиоксидантная и антирадикальная активность и лечебно-профилактические препараты из растений, сырьевые источники БАВ, биотехнологии в растениеводстве.

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USE OF SELENIUM NANOPARTICLES IN MEDICINAL PLANTS BIOTECHNOLOGY

Kuzovkova A.A.[1], Mazur T.V.[1], Azizbekian S.G.[2], Reshetnikov V.N.[1]
[1] SSI «Central Botanical Gardens», NAS of Belarus, Minsk,
e-mail: fioraia@nm.ru
[2] SSI «Institute of Physical Organic Chemistry», NAS of Belarus, Minsk,
e-mail: mechanochem@ifoch.bas-net.by

Selenium (Se) is a biologically active microelement, that essential for bacteria, animals, people and well influencing on plants. Deficiency of Se in a human organism leads to development of endocrine, cardiovascular and oncological diseases. In many geographical regions (and in Belarus) combined deficit of the iodine and Se is registered. Deficiency of Se aggravates manifestations of iodic insufficiency, causing morphological and functional changes in a thyroid gland [1]. The food correction for achievement of Se physiological consumption norms per day is necessary. One of ways is daily therapeutic reception of biologically active supplements (BAS) to food. BAS with Se can be used as nutraceuticals (for piece out Se shortage in an organism) and parapharmaceuticals (with pharmacological activity for adjuvant therapy of diseases). A number of medicinal plants are capable to accumulate Se and can be a basis for dietary supplement.

Here, we have investigated the influence of nulvalent Se nanoparticles (nanoSe) on physiological and biochemical parameters of medicinal herb *Agastache rugosa* (Fisch. & C.A. Mey) Kuntze cell cultures (leaf and stem calluses of the 14th passage). We have analyzed cell ability to accumulate Se from culture medium, protein content and peroxidase activity. Biological effects of the nanoSe we have estimated in comparison with sodium selenite – highly toxic chemical compound (the 1st class of danger), nevertheless, being used as a part of fertilizers, additives at forages and in veterinary products. Formerly in experiments with laboratory mouse's it was shown that Se nanoparticles with 20–60 nm sizes completely kept a range of ionic Se biological activity. In particular, they stimulated synthesis of Se-containing enzymes, activated system of antioxidant protection by increase of catalase and peroxidase activities, promoted reduction of lipid peroxidation products formation and at that were several times less toxic than sodium selenite [2].

We have found that the *A. rugosa* callus tissues possessed the expressed ability to Se accumulation. Sodium selenite was more bioavailable than the Se nanoparticles for the *A. rugosa* cells, however it was toxic in investigating concentration (10 and 50 mg/l) and caused callus death. Selenium in the *A. rugosa* callus tissues stimulated biosynthesis of protein (the nanoSe – on ~ 23–43%, sodium selenite – ~ 10–83%) and modified peroxidase activity (the nanoSe increased on ~ 19–22% in the leaf callus and decreased on ~ 22–25% in the stem callus, sodium selenite lowered on ~ 69–82% in the both calluses). Thus, results of preliminary experiments indicate that only Se nanoparticles pretend to a role of the dietary supplement component as nontoxical neither for animals, nor for plants.

The list of the used references

1. Макаревич И.А. Исследование йод-дефицитных состояний у подростков загрязненных районов Брестской области // BFRIR-PINSK.ORG: официальный сайт Брестского филиала РНИУП «Институт радиологии». – 2005. – URL: http://www.bfrir-pinsk.org/docs/article/2005/004bf05.pdf. – дата обращения 27.02.2012.

2. Храмцов А.Г., Серов А.В., Тимченко В.П., Мирошниченко М.В. Новый биологически активный препарат на основе наночастиц селена // Вестник Северо-Кавказского государственного технического университета. – 2010. – № 4. – С. 122–125.