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EFFECT OF ANTIOXIDANTS AND NANO-FERTILIZERS ON YIELD AND QUALITY OF FIELD CROPS

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Abstract: *Nowadays we are facing problems in agricultural production, whether in terms of productivity or quality. Therefore, we need to focus on what we can do to give plants some ability to growth and increase their productivity in quantity and quality. In this concern, Antioxidants have synergistic effects on growth and productivity of many species of plant. Antioxidants are the natural and safety compounds which inhibit oxidation that can produce free radicals. Foliar application with antioxidants helps agricultural crops to resist environmental stresses and restore their capacity, thus obtaining the highest possible yield. As well as, Nano-fertilizers are one of the applications of nanotechnology which are of great importance in agriculture to improve crop growth, quality and quality parameters while increasing the efficiency of food use, reducing fertilizer waste and the cost of agriculture. Nano-materials provide more space for different metabolic reactions in the plant, which increases the rate of photosynthesis and produces more dry matter and yield productivity. Therefore, we can use these materials as a foliar spray on plants to achieve the greatest economic return.*

Keywords: *Nano-fertilizer, Antioxidants, Nano-technology.*

Introduction:

Nano-fertilizers are used recently as an alternative to conventional fertilizers for slow release and efficient use by plants. Nano-fertilizers could enhance nutrient use efficiency and decrease the costs of environmental protection **[1].**

Nano-fertilizers “Nano fertilizers are synthesized or modified form of traditional fertilizers, fertilizers bulk materials or extracted from different vegetative or reproductive parts of the plant by different chemical, physical, mechanical or biological methods with the help of nanotechnology used to improve soil fertility, productivity and quality of agricultural produces. Nanoparticles can made from fully bulk materials **[2].**

The nano-fertilizers have higher surface area it is mainly due to very less size of particles which provide more site to facilitate different metabolic process in the plant system result production of more photosynthesis.

Due to higher surface area and very less size they have high reactivity with other compound. They have high solubility in different solvent such as water. Particles size of nano-fertilizers is less than 100 nm which facilitates more penetration of nano particles in to the plant from applied surface such as soil or leaves.

Nano fertilizer has large surface area and particle size less than the pore size of root and leaves of the plant which can increase penetration into the plant from applied surface and improve uptake and nutrient use efficiency of the nano-fertilizer. Reduction of particle size results in increased specific surface area and number of particles per unit area of a fertilizer that provide more opportunity to contact of nano-fertilizers which leads to more penetration and uptake of the nutrient.

Recently, attention has been to focus heavily on the potential use of natural materials and to improve the safety of plant growth and flowering and fruit preparation. In this concern, the antioxidants have synergistic impacts on growth, yield and quality of yield of many species of plant. These compounds have a useful impact on trapping the free radicals or active oxygen (singlet oxygen, hydrogen peroxide, hydroxyl radicals, superoxide anion and ozone) that are produced during processes photosynthesis and respiration.

Ascorbic acid, carotenoids, flavonoids, and tocopherols, due to its antioxidant properties and health-promoting effects, are attractive targets for programs of bio-immunization. Increasing specific antioxidant products, whether with molecular or conventional methods, is a vital and interesting topic of plant breeding and biotechnology **[3].**

Foliar application with antioxidants like ascorbic acid, which is a small molecule antioxidant soluble in water works as a substrate core in the periodic track to remove toxins and neutralize the superoxide radicals and singlet oxygen. Ascorbic acid, (vitamin C) is one of the main products of D-glucose metabolism, which is synthesized in higher plants. It has proven to play multiple roles in plant growth and development, i.e., cell division, and the expansion of the cell wall.

It has been revealed beneficial effects of ascorbic acid on the growth and productivity in many field crops i.e., soybeans and sugar beets. Citric acid is an organic compound that belongs to the group of carboxylic acids. It is one of an arrangement of compounds that included within the physiological oxidation of proteins, fats and carbohydrates to CO2 and water. Ascorbic and citric acids work together like a concert that indicates a complete set of an antioxidant defense system, rather than protection with a single antioxidant under stressful conditions **[4].**

Abd-Allah *et al.,* **[5]** pointed that the height of plant, yield and its components as well as content of protein in faba bean and also common bean have increased with the citric acid application.

El Hawary and Nashed **[6]** reported that grain weight/ear, length of ear, 100 grain weight, grain yield, straw yield, and maize crop harvest index increased significantly with the foliar application by 100 ppm of ascorbic acid (AA), citric acid (CA) and salicylic acid (SA) compared with untreated plants (control).

Conclusion:

The prime aim of this review was to highlight the role of antioxidants as well as nano-fertilizers as an important factor in increasing the productivity of agricultural crops and improving their quality.

Application of different nano-fertilizers have greater role in enhancing crop production this will reduce the cost of fertilizer for crop production and also minimize the pollution hazard. Also use some natural materials like antioxidants that help plants recovery under these stresses and to ensure world food security. Antioxidants play a role in agricultural crops gaining some ability to adapt to climate changes and help them recover quickly and give the highest possible yield under the influence of these pressures.

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ИЗУЧЕНИЕ ОНТОГЕНЕЗА ПОПУЛЯЦИЙ ЛЮЦЕРНЫ ХМЕЛЕВИДНОЙ В УСЛОВИЯХ ИСКУССТВЕННОГО КЛИМАТА

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