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Organic vs Conventional Fertilizers Effect on DNA of Plants (Coriander)

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Abstract: ***The aim of this study was to evaluate the effect of organic and conventional fertilizers on plants/herbs. The effect on the plants is measure by extracting the relative DNA content present in organically and conventionally grown plants.Optical Density values were then calculated for each of the sample. Overall, coriander plants fertilized with organic fertilizer accumulated greater concentration of DNA than plants grown with conventional fertilizer.***
Keywords: Organic, conventional, optical density, colorimeter, fertilizer

I. INTRODUCTION

During the last decade, consumers have started to look for safe and well controlled foods produced in environmentally friendly, authentic and local systems. Consumer studies suggest multiple reasons for buying organic fruits and vegetables, for example, they taste better, are healthier and safer. Increased market demand for organic products has stimulated research interest in evaluating the effect of organic farming on the quantity and quality of nutrients in fruits, vegetables, grains, etc.

Coriandrum sativum commonly called as coriander, belonging to the Apiaceae family, is known for its aromatic, culinary and medicinal properties is used as a natural medicine,in cooking, garnishing and also in the cosmetic industry. C.sativum presents bioactive compounds that are accounted for a wide range of pharmacological activities such as anti-inflammatory, anxiolytic, antimicrobial, diuretic, cognition improvement, antidiabetic, antiseptic, antioxidant, anticancer and neuro protective activities.

The formation of free radicals by oxygen is associated to the development of cancers and heart disease. On the other hand, good antioxidant substances may act as antimutagenic and antigenotoxic agents and be able to reduce the action of chemical or physical agents that induce damage to genetic material. The phytochemicals of natural products can present therapeutic applications, since they can act as antioxidants and prevent genomic damage. Therefore, it is indispensable for the therapeutic validation of medicinal plants to characterize their chemical composition and possible biological activities in vitro and in vivo.

II. MATERIALS AND METHODS

1) *Materials Required:* Distilled water, ethanol, liquid soap and Sodium hydroxide.
2) *Plant Material*: Conventionally and organically grown herbs were purchased from the herbal drugstore and grown respectively.

III. METHODOLOGY OF EXPERIMENT

A. To a beaker containing 15 ml of water, add organically grown coriander paste and stir it well.
B. To this beaker, add about 4-5 drops of detergent/ liquid soaps. Shake gently and keep still. Detergent contains sodium lauryl sulfate, which helps in disintegrating the membranes of the cells, pulling apart the lipids and proteins that make up the membranes surrounding the cell and nucleus. Once the membranes are broken apart, the DNA is released from the cell.
C. To this add 10-15 ml of ethanol. Gently pour ethanol along the side of the test tube without much shaking. Two layers of liquid are formed. Now the strands of the exposed DNA are visible to the naked eye.
D. Once the DNA is visible (as strands), it is carefully transferred into a cuvette to which sodium hydroxide and water has been added. In DNA isolation or extraction, NaOH (sodium hydroxide) is used as alkaline lysis buffer. It helps in the stabilization of DNA and prevents it from further denaturation. The cuvette is then kept in the calorimeter and then the OD value (optical Density) is noted. The colorimeter was adjusted to an absorption value of wavelength 447.
E. The same process is used to extract the conventionally grown coriander and the OD values are taken.

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IV. RESULTS AND DISCUSSION

It can be observed that there is a decrease in the colorimetric values (OD values) of the samples in which organic coriander was added which is 0.20 as compared to the OD values of the conventionally grown coriander which is 0.04. The results obtained showed that there was an influence by source fertilizer used.

Optical density or OD is a method used to estimate how much DNA is present in solution by measuring the absorbance at 447 nm.

V. CONCLUSION

Plants grown under organic fertilizers responded positively than conventionally grown plants. Also plants with organic fertilizers showed better growth parameter, revealing a higher concentration of tissue nutrients and higher fresh and dry weight.

Our results suggest that plants grown with organic fertilizers showed greater DNA concentration as compared to the conventionally grown plants. This study shows that organic or conventional fertilizers can alter fresh or dry weight and nutrients absorption of the plants.

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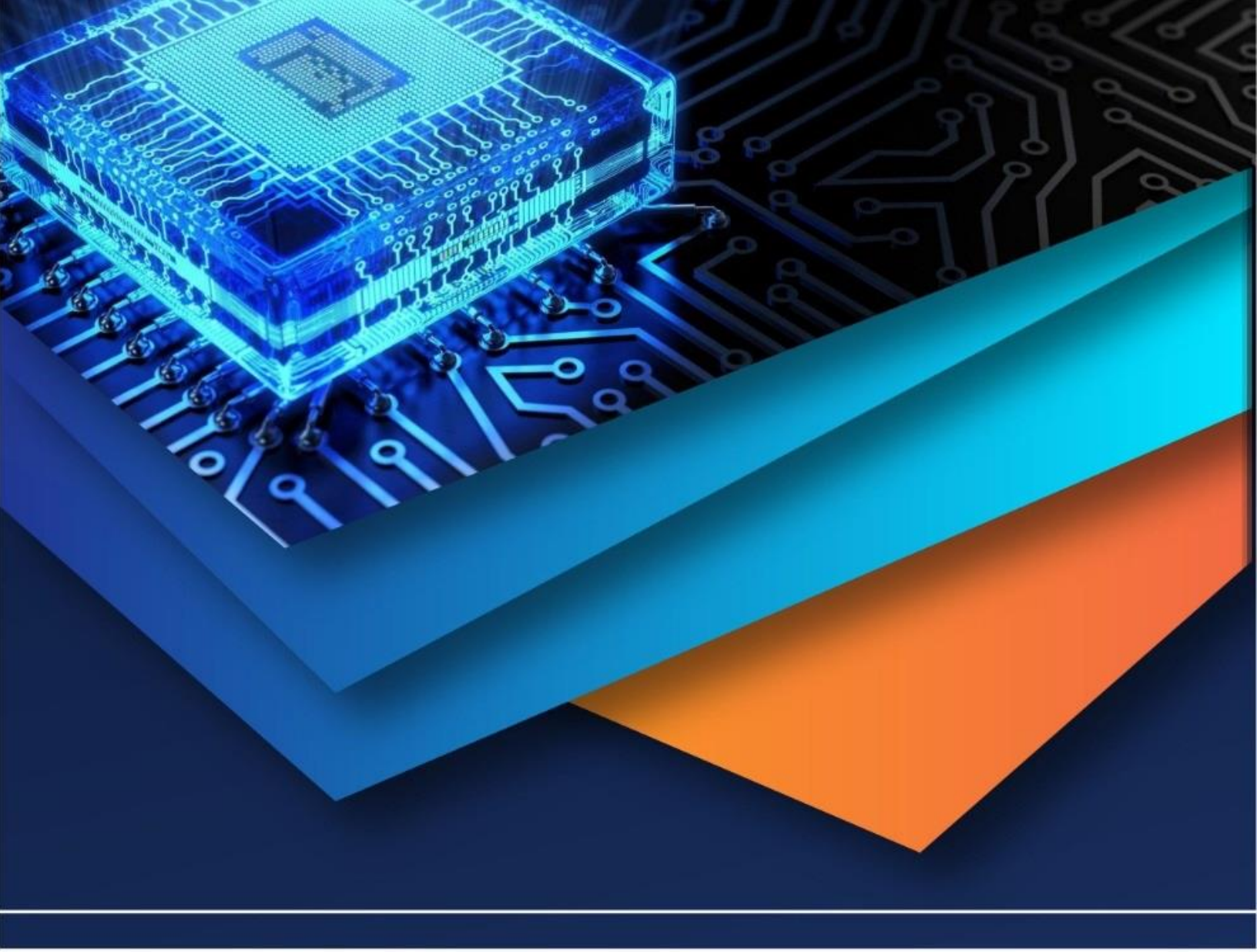

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