Article Review

[Name of the Writer]

[Name of the Institution]

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For a healthy plant growth there must be essential elements and trace minerals, in addition to these minerals there are some extra additives which are added by the farmers to increase the efficiency and production of the plants. There are many additives which are used by the farmers that include enzymes, amino acids, and other plant hormones. Enzymes are the most important additives, and when a farmer use them, then they speed up the rate at which nutrient absorption takes place. These enzymes are made up of DNA, RNA and amino acids, and the unique feature about them is they act like a catalyst that speeds up the chemical reaction without changing themselves. When the activation energy is reduced then the energy can be used for other reactions in the plant body. Enzymes can be applied directly or indirectly to plants. Applying isolated enzymes is an example of direct applying while in case of indirect applying beneficial microbes are added which further increases the amount of the enzyme ("Enzymes, Amino Acids, and Plant Hormones," n.d.).

Amino acids are the second most important additives in plants which are required for the synthesis of enzymes, proteins, chlorophyll, and other enzymes. It must be noted that these amino acids are part of the plants from the very beginning when the plants soon after their development they start to make their structural proteins by using these amino acids and also by regulating the water. Mostly when the plants are in the perfect conditions, then they make their amino acids but not all the plants are in the perfect conditions so to enhance the growth of such plants it is important to add these amino acids as additives. Between the two types of amino acids, the D-form cannot be taken by the plants; therefore, the horticulturists must use the L-form which can not only absorbed in the original form but also in they can make complexes with other peptides and enhance the growth of the plants.

Plant hormones which are also known as phytohormones are the specific type of chemicals that regulate the growth of the plant body. Plant hormones are helpful in the development of roots and shoots and also for the production of fruits and flowers. Based on the molecular nature of the hormones they are classified into five main groups which are auxins, cytokinins, gibberellins, abscisic acid, and ethylene. Auxins are associated with the physical structure of the plant. These hormones are helpful in upward growth and root development. Horticulturists use these auxins to enhance the root growth of their plants. Gibberellins are most commonly associated with germination, dormancy, and also in flower development. Cytokinins are associated with cell division. These hormones play a vital role in embryo development. The ratio of cytokinins to auxin directly affects the way the plant grow and develop. Cytokinins are most important in horticulture due to their ability of cell division. Abscisic acid are also called stress hormone which is synthesized by the plants when there is environmental stress. During low moisture conditions, farmers spray a solution containing the abscisic acid on the plants which prevents the wilting of leaves because during low humidity plants close their stomata to prevent the loss of water. Ethylene is produced in the plant during ripening processes. It is sprayed on the plants to speed up the ripening process ("Enzymes, Amino Acids, and Plant Hormones," n.d.).

All these amino acids, enzymes and phytohormones are used for different purposes. Some of these hormones are helpful in the root and shoot development while others help in the ripening process, and some of them are used to stimulate cell division. Most of these horticulturists adopt a multifaceted approach by adding these additives. Although the exact mechanism of how these hormones and enzymes help in different mechanisms is not fully known the advantages of applying these components are massive therefore most of the farmers prefer to use these components to enhance their productivity. In this article, the advantages of using these components are explained but how they improve the plant growth and how the plants respond to these additives are not fully known.

**References**

Enzymes, Amino Acids, and Plant Hormones. (n.d.). Retrieved March 16, 2019, from https://www.gardenandgreenhouse.net/articles/plant-nutrition-articles/enzymes-amino-acids-plant-hormones/