Gibberellin Growth in Plants

MICRO 3333

**Abstract:**

 Gibberellin (GAs) are natural multifaceted biomolecules originally identified as secondary metabolites from the fungus *Gibberella fujikuroi*. To have an understanding of the metabolites/GAs supplementary investigations are needed to gain more knowledge (Salazar, 2018). Not only have GAs been discovered in plants but also different fungal and bacterial species. In this review there will be a summarization of Doctor Salazar and colleagues’ paper that went through different journals and investigations to do research on the current evidence about the known pathways for GA synthesis in plants. Starting from genes that were represented as part of the GA production group to the enzymes responsible for the catalytic alterations and the bio-synthetical routes involved. Also, to show the presentation of the relationship between the observations noted and the biotechnological applications of GAs in plants, which is able to show how impactful GAs can be with the commercial industries.

**Introduction:**

To the ear gibberellin growth in plants sounds like gibberish. The research on plants is not widely known to the young generations. People pass by plants every day, some never think twice about what kind of plants are around them. Others enjoy the beauty the plants behold. Then there are the scientists, they see past the beauty. They see the molecular side to the plants. Gibberellin (GAs) is a type of plant hormone that plays the role of stimulating the cell in ways such as elongation, germination, and flowering (Gibberellin, 2012). There are two main types of GAs associated with this assignment; one group consists of molecules with 20 carbon atoms (C20-GAs) and the other group consists of 19 carbon atoms (C19-GAs) and one lactone (Salazar, 2018). The C19-GAs are capable of bioactivity but not all the atoms are. The most outstanding activity reported has been from GA1, GA3, GA4, and GA7 (Bomke 2009). Gibberellin in plants has the ability to promote exceptional morphology in plants but there is always more that needs to be done. In the paper from Salazar there is a passage about different works done by other scientists and the results they received from working with GA observations. Sawada observed that there was a disease in rice plants that made them grow out of control making them weak then ultimately leading the crop to death (Salazar, 2018). GAs have recently been studied more at the molecular level to gain more knowledge about the full function of the GAs. Whether the GAs have a pure genetic makeup or if mutations can make the hormone more reliable.

**Methods:**

There has been a lot of studying the biosynthetic pathway in plants with GAs. Salazar goes through the route starting from geranyl-geranyl diphosphate, then in the green tissue of most plants, the isoprenoid unit IPP is produced by two different routes: the mevalonic acid pathway in the cytoplasm and the methyl erythritol phosphate pathway in plastids and the full route can be divided into three stages rendering to their subcellular-self and the enzymes involved. The first stage is catalyzed by soluble enzymes located in the proplastids. Then leading to the manufacture of ent-kaurene. When the second stage comes into play the entkaurene is oxidized to GA12-aldehyde. The third and final stage of the pathway is catalyzed by 2-oxoglutarate-dependent di-oxygenases in the cytosol of the cell (Sun, 2008)(Salazar, 2018).

 The research on the biosynthetic pathways are very specific and the use of many different pathways. The discovery with the plant’s pathways were exposed by the difference between the GA bio-synthetical pathways in F. *fujikuroi* and plants is the stage where the 3β-and the 13-hydroxylations arise. In fungi, GA12-aldehyde is 3β-hydroxylated to GA14-aldehyde and 13- hydroxylation which only takes place in the final step to form GA3 from GA7, however in plants the final step is the 3β-hydroxylation of GA9 and GA20 to GA4 and GA1 (Salazar, 2018). Being able to identify numerous genes that are involved in the biochemical routes that are accountable for gibberellin biosynthesis is able to give further insight to the diverse pathways and the regulation of each pathway. With this knowledge though, there are observations that show how some enzymes are skilled for encoding multiple genes.

**Discussion:**

 Being able to investigate the metabolic pathways GAs are capable of shows how far science has come over the years. Plants seem to be overlooked by most people for some peculiar reasons, but the need to know more about plants is a necessity to all life on earth. With further investigations from scientists on GAs an exploration on a more molecular and cellular level to observe responses to different signals involved with each GA pathway. Also, the use of biotechnological investigations of GAs have been able to show an effective impact in the production of diverse plants, but new technique and technological ways are needed to generate species of plants that have beneficial characteristics to improve plant production, which is needed to keep up with the growing population. Without a sustainable agriculture for the current population and the upcoming population there will be nothing left. Without plants the world here will cease to exist.

**Work Citied**

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