

SL201

Historical Aspects and Recent Advances of Gibberellin Researches

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Up to now, a few numbers of plant hormones (auxin, gibberellins, cytokinines, etc.) are known, and their discoveries and the subsequent developments of researches have revealed individual characteristic aspects. To compare their specific features and to speculate about their differences might suggest the future researches of plant hormones including unknown ones. Here, I would like to take up gibberellins (GAs) and present a brief history of GA researches which have been intensively performed in Japan. Also, some points in the recent advances of GA researches will be discussed.

The discovery of GAs was made in the field of plant pathology. An unusual stem elongation of rice infected with *Gibberella fujikuroi*, a pathogenic fungus, was found to be caused by some bioactive substance produced by the fungus. This important result was reported in 1926 by Kurosawa, a microbiologist working in an agricultural experiment station in Taiwan. In 1938, the substance was isolated by Yabuta and Sumiki in The University of Tokyo, and the substance was named gibberellin. After the War II, chemical studies on GAs were intensively performed in Japan, The United State and England using plural GAs isolated from the fungus, and their structure were determined at beginning of 1960's.

The dramatic growth-promoting activity of GAs attracted many scientists, and the studies on their application in the agricultural fields were extensively pursued. On the other hand, plant physiologists considered the significance of GAs in higher plants. In 1951 Mitchell et al. reported the occurrence of GA-like substance in immature bean seed, and in 1956 Radley demonstrated the occurrence of GA-like substances in vegetative tissue of pea. The definite result showing the occurrences of GAs in higher plants were obtained in 1958-59. MacMillan et al. isolated GAs, for the first time, from immature seed of *Phaseolus coccineus*, indicating that GA is a kind of plants hormone. West and Phinney, and Kawarada and Sumiki also isolated GAs from higher plants. With these results as a starting point, chemical studies on plant GAs were accelerated by organic chemists of natural products. They isolated many kinds of GAs from various higher plants. Thus, over 90 GAs, including GAs newly isolated from *G. fujikuroi*, have been now known. Up to now, many important results were obtained by British and Japanese chemists in the field of isolation and structure determination, biosynthesis, chemical synthesis, analytical methodology. From 1980's, however, the main foci in GA researches have been moving to biochemistry and molecular biology. The major subjects at the present time could be summarized as follows.

- 1) Studies on relationships between translocation/localization of GAs and physiology.
- 2) Studies on relationship between photo-signal and biosynthesis/action of GAs.
- 3) Isolation and characterization of enzymes of GA biosynthesis.
- 4) Studies on molecular mechanism in the action of GAs.
Isolation and characterization of GA-receptors
Gene expression by application of GAs
- 5) Development of ultra-sensitive and convenient analytical methods.

In these studies, application of immunology is absolutely important. In relation with these subjects, some results obtained by our group will be presented.