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Photochemical Processes Photosynthesis Pathway On House Plants Leaves "Black Prince"

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Annatation: The effect of the reaction of the coordination compounds o-aminobenzoic acid, hydroxylamine and cobalt-II nitrate on houseplants "black prince" was studied. The expected results in our experiment consists of the following steps.

Key words: coordination compounds, o-aminobenzoic acid, hydroxylamine, cobalt-II nitrate, black prince, expected results, Calvin cycle, radioactive labeling of sugar.

The first mention that in sugarcane the first product of photosynthesis may be dicarboxylic tetracarbonic acid appeared in 1954 in the form of a short note without reference and was published in the annual report of the experimental station of the Hawaiian Sugar Planters Association. In more detail, this work appeared in the form of a short communication by H. P. Korczak, K. E. Hartt and G.O.Burra. A full article by this group of researchers was published only in 1965. This large delay is due to the discrepancy between the results obtained and the data obtained in the laboratory of Melvin Calvin, with whom the Hawaiian group had close contact at that time.

Similar results were obtained at about the same time by Soviet scientists. In the works of L. A. Nezgovorova, it was found that with short exposures of corn leaves to light, ^{14}C from $^{14}CO_2$ is found in aspartic acid. Around the same time, in 1960, the Russian scientist Yu.S.Karpilov published data demonstrating that malic and aspartic acids are the first to form in corn when radioactively labeled.

In 1963, Yu. S. Karpilov, together with his colleague I. A. Tarchevsky, published the second article, which examined the effect of the leaf killing procedure on the radioactive labeling of photosynthesis products. Karpilov published his next article on this topic only in 1969. It goes without saying that neither Soviet nor Hawaiian scientists knew about each other's achievements until 1969.

Working at that time in the laboratory of the Australian company CSR Limited in Brisbane, scientists Marshal Davidson Hatch and Charles Roger Slack knew about the results of the Hawaiian group since 1960. Therefore, in 1965, when a full-fledged article was published, they decided to double-check these data. Echoing the results of the Hawaiian group on radioactive labeling of sugar cane photosynthesis products, they identified oxaloacetate as the first carbon acceptor using a specific killing technique. Based on their data, they compiled a simple working model and in 1966 published an article in which they first described this biochemical pathway as a new type of photosynthesis, fundamentally different from the Calvin cycle.

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Figure-1

The carboxykinase type has been found in several fast growing tropical cereals that are used as fodder crops. This path of photosynthesis is used by some representatives of the genus millet (Guinea grass), Chloris Guiana and eggplant. Chloroplasts of both mesophyll cells and sheath cells have grana and an active photosystem II. Aspartate, alanine, malate and phosphoenolpyruvate are used as transport products.
As in C_4-type NADH metabolism, oxaloacetate is converted to aspartate in mesophyll cells. Aspartate diffuses into the lining cells, where oxaloacetate is regenerated with the participation of an aminotransferase localized in the cytosol. In the cytosol, under the action of the enzyme PEP-carboxykinase, oxaloacetate is converted to PEP with the consumption of ATP. The CO_2 released in the reaction diffuses into the chloroplasts, and PEP diffuses back into the mesophyll cells. In plants of this type, ATP consumption for pumping CO_2 into sheath cells is associated mainly with the consumption of ATP by PEP carboxykinase. Mitochondria provide this reaction with the necessary amount of ATP, oxidizing malate with the participation of NAD-malate-enzyme. The source of malate, as in the case of the NADP-malate dehydrogenase type, are mesophyll cells. Thus, in the metabolism of C_4- carboxykinase type, only a small part of CO_2 is released in mitochondria.

Experimental Part

The effect of the reaction of the coordination compounds o-aminobenzoic acid, hydroxylamine and cobalt-II nitrate on houseplants "black prince" was studied.
The expected results in our experiment consists of the following steps.
Coordinating coordination compounds of o-aminobenzoic acid, hydroxylamine and cobalt-II nitrate we prepared an alcoholic solution of 2.5% and 5% solutions were prepared in distilled water.
The prepared solutions were sprayed 2 times a week from a sprayer on two sides of the leaves. Plant growth was measured for 1 month.

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Conclusion

As a result of the effect of prepared 2.5% and 5% solutions on leaf mesophylls, it was found that, compared with a 2.5% solution, a 5% solution is more active at a temperature of 20 °C at a humidity of 28%.

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