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Responses to the Induction of Anthocyanin Biosynthesis in Nonchlorophyllous Leaf Segments of Corn (*Zea mays* L.)

Jin-Seog Kim*, Byung-Hoi Lee, Tae-Joon Kim, Kwang-Hoon Oh, Kwang Yun Cho

Biological Function Research Team, Korea Research Institute of Chemical Technology, P O Box 107, Yuseong, Daejeon 305-600, Korea

Objectives

The physiology and basic genetics of the anthocyanin biosynthesis is well characterized. However, understanding of regulatory network is deficient. Park et al. reported that anthocyanin formation was accelerated by sucrose supplementation in nonchlorophyllous (white) leaf segments of corn. This result suggests that a more intense investigation of the role of the chloroplast related to anthocyanin biosynthesis network might be possible using white tissue. As the first step to know the possibility, in the present study, we investigated anthocyanin formation characteristics of nonchlorophyllous leaf segments to various environmental and chemical signals.

Materials and Methods

1. Plant material s and anthocyanin induction

White seedlings of corn (*Zea mays* L.) were induced by fluridone treatment The white seedlings or their leaf segments were floated on test solutions in 1.0 mM MES buffer and incubated in the growth chamber for anthocyanin induction. The effects of 16 carbohydrates, light, temperature, dehydration , and several compounds including plant hormones on anthocyanin induction were investigated.

2. Extraction and assay of anthocyanin

Extracted in 10 ml of methanol containing 1% concentrated HCl. Anthocyanin contents = A528 – 0.25 x A657

Results and Discussion

Most stimulatory carbohydrates to anthocyanin formation were fructose, glucose and sucrose. Carbohydrate concentration, light exposure time and incubation temperature showed a quantitative response in anthocyanin formation. Low temperature treatment to the white tissue was also stimulatory to anthocyanin biosynthesis, but water stress didn't affect. ABA, jasmonic acid and ethephone enhanced anthocyanin formation in the limited range of concentration. Their anthocyanin induction degrees were different according to sucrose concentration and relatively lower in white tissue than in green tissue. GAs and BA was significantly inhibitory by nM level. IAA and salicylic acid had no effect in this system using white tissue. Diuron was inhibitory to sucrose-induced anthocyanin accumulation in green tissue, but not in white tissue. These results show that nonchlorophyllous leaf segments of corn maintain a normal anthocyanin formation system with several unique characteristics and seem to be good systems for signal network research on anthocyanin biosynthesis, especially as it relates to chloroplast function.

**Corresponding author* : Jin-Seog Kim, Tel : 042-860-7026, E-mail : jskim@krict.re.kr