Role of *Red Aleurone1* in the Biosynthesis of Defense Related Flavonoids in Maize

Abstract

Maize is an economically important crop with most of the cultivated varieties susceptible to corn ear worm and anthracnose fungus. One type of resistance to these pests and pathogens has been attributed to the presence of C-glycosyl flavones and 3-deoxyanthocyanins synthesized through flavonoid pathway. The 3'-hydroxylated products of these compounds are more toxic than nonhydroxylated products. Flavonoid 3'-hydroxylase (F3'H) is the key enzyme required for the 3'-hydroxylation reaction. We have shown that F3'H activity is encoded by *red aleurone1/purple aleurone1* (*pr1*) gene. Mutation in *pr1* gene leads to the accumulation of red as oppose to purple anthocyanin pigments in the kernel aleurone. Biosynthesis of anthocyanins, 3-deoxyanthocynanidins, and C-glycosyl flavones is regulated by different transcription factors. Here, we hypothesize that *pr1* plays important role in the biosynthesis of 3' hydroxylated products of different flavonoid compounds some of which are toxic to insects and pathogens. Our preliminary results indicated that plants carrying functional *Pr1* gene accumulated higher levels of 3' hydroxylated products as compared to mutant plants. Characterization of *Pr1* expression over different developmental stages of aleurone, the role of *pr1* in anthocyanins, 3-deoxyanthocynanidins, and C-glycosyl flavones biosynthesis and its transcriptional regulation will be tested through this proposal.