Mechanism and Selection of Maize Resistance to Corn Earworm

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Abstract

Corn earworm (*Helicoverpa zea* (Boddie), CEW) belongs to order Lepidoptera, family Noctuidae, is a major pest of maize which causes serious economic losses. About 2.5% production loss of maize and 50% loss of sweet corn are caused by CEW annually in USA. The CEW resistance of maize is conferred by C-glycosyl flavones which are produced in maize silks and inhibit larvae growth or kill the larvae while ingesting maize silks. There are 3 flavone compounds, maysin, apimaysin and methoxymaysin, isolated from silks of resistant corn varieties. The most important compound is maysin. The maysin concentration in maize silks displayed a significant negative correlation with weight of CEW larvae through silk feeding. C-glyscosyl flavones are synthesized via the branch of phenylpropanoid/flavonoid pathway and its expression is controlled by several quantitative trait loci (QTL). The *p1* allele which locates on chromosome 1, is the most functional among these QTLs. It enhances maysin accumulation in silks. Environmental effects, position of chromosome and interactions of different alleles affect the *p1* expression that induces various resistant levels among varieties. The inhibition of maysin to CEW growth can be used as a selection index for resistant strain screening. Forthermore, the application of QTL molecular marker can reduce the labor loading and field space and enhance the efficiency of resistance selection. In addition to lab methods, field evaluation of resistance is also an important basis for selection.

Key words: corn earworm, flavone, quantitative trait locus(QTL), selection

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