15 Strategy for increasing gamma-amino butyric acid in plants

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In plants, gamma-amino butyric acid(GABA), a major inhibitory neurotransmitter in nervous system in animals, is synthesized by glutamate decarboxylase(GAD), the activity of which is tightly modulated by Ca^{2+}/calmodulin. To study the molecular mechanism of GABA production *in vivo*, transgenic tobacco plants expressing a recombinant-DNA derived calmodulin (VU-1) and/or a full-length petunia GAD have been generated and analyed. We find that tobacco plants expressing VU-1 calmodulin have approximately 2-fold higher GABA levels than normal control tobacco plants. Transgenic tobacco plants expressing the GAD have 2.5-fold higher levels of GABA. In addition, transgenic tobacco plants expressing both the calmodulin and GAD have further increased GABA levels compared with the transgenic tobacco plants expressing either the calmodulin or GAD. These data suggest that GABA synthesis in the transgenic plants is elevated possibly as a result of enhanced GAD activation due to increased levels of the foreign calmodulin, as well as elevated levels of GAD enzyme.

Keywords: Calmodulin, GAD, GABA, Transgenic Plants