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Taurine Production in Brassica: a New Marketable Trait

Frank Turano
Michelle Price, John Thoguru, Sulochana Cheepineeti, Jeffrey Shipp, Kathleen Turano

Plant Sensory Systems, Baltimore, USA

Taurine (Tau) is an amino sulfonic acid that is needed for aquafeed, pet food, infant formula, and energy drinks. Plants do not make Tau; it is found in meat, fish, dairy products and human milk. Plant-based products that require Tau need to supplement the amino sulfonic acid. Currently, nearly all supplemental Tau is chemically synthesized in China using carcinogenic and hazardous substances, and the final product has been shown to contain arsenic. Plant Sensory Systems has developed a biotechnology, the Enhanced-Nutrition (EN) technology, which when transferred to Brassica allows Tau to be produced in mature seeds. Tau can be synthesized from cysteine (Cys) through the activities of two enzymes: Cys dioxygenase (CDO) and sulfinoalanine decarboxylase (SAD). PSS used a molecular approach to move the CDO and SAD genes (EN1 technology) into Arabidopsis seeds. EN1 was evaluated using high-performance liquid chromatography (HPLC). In the EN1 Arabidopsis seeds, Tau levels ranged from 0.7-12% of the total extracted free amino acids. In seeds without the EN technology, Tau was undetectable. To boost the Tau level in the seeds, a new form of the EN technology (EN+) was developed and tested in Arabidopsis seeds. Levels of Tau in seeds of the EN+ lines ranged from 40-69% of the total extracted free amino acids. Preliminary data also show that lines with the EN technology have a significant increase in seed oil. The EN+ technology has since been transferred into canola. We plan to discuss the implications of the EN technology on amino acid pools, oil and glucosinolates in Brassica seed and the potential market opportunity. Tau production from Brassica seeds would be a safe, sustainable, and cost-effective approach to produce Tau. Tau could be used either as a fortified plant protein based ingredient for aquafeed or pet food, or it could be purified and used as an ingredient in aquafeed, pet food, nutraceuticals, or health/energy drinks.