MAP cultivation, breeding and biotechnology

Autores
García Victoria, N[1]; Weber, S[2]

Instituições
[1]Wageningen UR Greenhouse Horticulture; [2]Wageningen University, chair group Horticulture and Product Physiology

Email
nieves.garcia@wur.nl

Abstract

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Consumers increasingly demand products from natural origin. This drives the growing industrial demand for steviolglycosides extracted from the leaves of the plant *Stevia rebaudiana* as a non-caloric sugar substitute. *S. rebaudiana* is a short day plant, and biomass production as well as the content of steviolglycosides stagnate when the plant becomes generative. Within the programme "The Greenhouse Pharmacy" we investigated to which extent the production of stevioglycosides could increase through greenhouse cultivation. The effects of CO_2-enrichment, EC-level in fertigation and red light night interruption on total biomass production and steviolglycosides content were studied with two *S. rebaudiana* genotypes. Results indicate that enrichment of the greenhouse air with CO_2 at 700 ppm increased photosynthesis rate by 50% and biomass production by 25%. Short-day induced flower budding was prevented by red light night interruption with low light levels, providing a cheap method to keep the plants vegetative, avoiding yield and compounds stagnation. A higher EC level did not lead to more biomass production or higher steviolglycoside content. The two genotypes differed in their relative contents of steviolglycosides. Based on these first results we estimate that a 2.5 fold increase in yield is now possible in a greenhouse cultivation system, with additional benefits of pesticide free and sustainable production. A further increase in steviolglycoside content could be obtained by selection of the right genotype in combination with specific greenhouse cultivation measures.