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## Total polyphenol content of peaches is influenced by crop management regime and nitrogen fertilisation

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### 1 Sweet Corn Carotenoid Concentrations Influenced By Herbicide Applications

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Carotenoids serve antioxidant functions in plant photosynthetic processes, as well as in the prevention of disease reduction in mammalian systems. Lutein and zeaxanthin are important carotenoids in suppressing aging eye diseases, such as cataracts and macular degeneration. Age-related macular degeneration now affects more than 1.75 million individuals in the United States, with projections reaching nearly 3 million by year 2020. Sweet corn (*Zea mays* var. rugosa) is one of only a few vegetable sources high in zeaxanthin. Mesotrione herbicide is currently labeled for selective pre- and post-emergence weed control in sweet corn production. Mesotrione competitively inhibits phytylene desaturase, a critical enzyme in the biosynthesis of carotenoids, which results in bleaching of leaf tissues in susceptible species and eventual plant death. Sweet corn is tolerant to mesotrione applications; however, differences in tolerance exist among genotypes. Therefore, mesotrione has become a popular herbicide used in sweet corn production. What remains unclear is the impact of mesotrione on carotenoid concentrations in mature sweet corn kernels when post-emergence applications are made to sweet corn plants. Our research objective was to measure mature kernel carotenoid concentrations in response to post-emergence applications of mesotrione to genotypes of different susceptibilities ('Merit' (sensitive), 'Templation' (tolerant), 'Incredible' (moderately sensitive)). Emergence treatments included mesotrione applied alone, or in mixtures with the photosynthesis inhibitor atrazine applied at two stages of growth. Corn plants were 5-10 and 15-20 cm in height for early-post and late-post applications, respectively. Kernels were freeze-dried and ground in liquid nitrogen prior to carotenoid extraction and HPLC quantification. Mesotrione applied alone, or in mixtures with atrazine acted to increase concentrations of lutein and zeaxanthin, and zeaxanthin carotenoids in several sweet corn genotypes. Lutein and zeaxanthin levels significantly increased 15.6% after mesotrione + atrazine post applications, as compared to the control treatment. Mesotrione applications resulted in greater pools of kernel carotenoids once the sweet corn genotypes overcame initial herbicide stress to leaf tissues, which acted to increase nutritional levels. This is the first report of herbicides directly up regulating a key biochemical pathway linked to the nutritional quality of a vegetable crop.

### 99SC2 Total polyphenol content of peaches is influenced by crop management regime and nitrogen fertilisation

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Organic fruits are increasingly requested by consumers. Their nutritional value is usually higher, as compared with conventional fruits. Our study aimed at determining the influence of two management regimes - organic farming (OF) and integrated fruit production (IFP) - and two levels of nitrogen (N) fertilisation - 120 kg N/ha/yr and 150 N/ha/yr - on total polyphenol content of peach fruits and leaves. The experimental design thus included four modalities: Fruits vitamin C content and leaves N content were also measured. The 4 modalities were compared on a plot of yellow peach (cv Inra n°6607) with 4 replicates. Total polyphenol contents were measured following Folin-Ciocalteu method. In 2008, organic fruits exhibited a higher total polyphenol content as compared with IFP modalities (347.1 vs 271.2 mg/100g MS, P=0.012). Within each management regime, fruit polyphenol content is higher with lower fertilisation levels (p=0.012). As a whole, total polyphenol content decreases from OF with lower N fertilisation to IFP with higher N fertilisation, whereas the two other modalities exhibit similar values. Concerning leaves composition, total polyphenol content is significantly lower with IFP-150 kg N/ha-1 than in both organic modalities. Leaves N content is significantly higher in IFP, as compared with OF. Organic management combined with a restricted N fertilisation display higher polyphenol contents in fruits and leaves. After three years of monitoring, we conclude that binding both factors can contribute to a peach production with higher nutritional value. Our results plead for a development of OF towards low-input systems, which can counteract with OF «eco-functional» intensification challenges.

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## ABSTRACTS



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