Phosphorus Fertilization and Biosynthesis of Functional Food Ingredients. (S04-paliyath121527-Oral)

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Abstract:

The disease-preventive and health-restorative effects of fruit- and vegetable-consumption have been related to the action of several nutraceutical components, positively affecting the physiological functions in humans. Two classes of the major nutraceutical components studied in fruits include flavonoids and isoprenoids. Flavonoids such as quercetin and catechin are strong antioxidants and powerful inhibitors of calcium second messenger function. Isoprenoids such as lycopene and carotene are also strong antioxidants. In general, these components are believed to be the principal agents in fruits, vegetables and their processed products, that impart anticancer properties and cardiovascular protection in humans. Phenolic components from fruit wines acted as strong superoxide and hydroxyl radical scavengers. As well, phenolic components from red grape wine inhibited the proliferation of breast cancer cell lines. Therefore, enriching the fruits and vegetables with nutraceutical components could have beneficial effects to the consumers. Both the flavonoid biosynthetic pathway and the isoprenoid pathway are heavily dependent on phosphorus containing metabolites such as ATP, NADPH and sugar phosphates derived through the pentose phosphate pathway. Thus, phosphate fertilization may have a direct effect on the levels of these metabolites, and potentially in the levels of the end products such as flavonoids and lycopene. To examine this possibility, we have subjected tomato plants and apple trees to supplemented soil and foliar phosphorus (superphosphate, hydrophos, seniphos) fertilization. Evidences gathered so far suggest that increased phosphorus fertilization can enhance the anthocyanin levels in apples, and lycopene levels in tomatoes. Further studies are in progress.

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