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Spermidine in soybean: Genetic variation of a potential health component

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Soybean is one of the richest food sources of spermidine. Recent findings have identified spermidine as major health protecting component with strong anti-aging effects. Spermidine-mediated health effects might be due to its strong autophagy inducing property as well as due to anti-oxidant and anti-inflammatory characteristics. Thus, spermidine concentration of soybean could partly explain the long-term health benefits associated with soy-food consumption. As spermidine content might become increasingly relevant for food-grade soybeans in future, a set of early maturity genotypes was grown in replicated field experiments near Vienna, Austria for three seasons, and spermidine and other polyamine concentrations were determined from seed samples using ultra-high performance liquid chromatography (UHPLC). The results confirm earlier reports on soybean polyamine levels: Spermidine concentration was in the range of 167-291 mg/kg dry seed, whereas putrescine and cadaverine were between 3 and 29, and spermine between 31 and 179 mg/kg, respectively. Statistically significant genetic as well as environmental variation was found for all polyamines analysed. Concentrations of putrescine, spermidine and spermine were highly correlated to each other, which is due to their common biosynthesis pathways. In contrast, seed protein content was negatively correlated to cadaverine, but not correlated to any other polyamine. Estimates of heritability for spermidine concentration were medium to high and comparable to other seed quality traits suggesting that spermidine could be selected for in food-grade soybean breeding. Thus, plant breeding could contribute to the development of food-grade soybeans with an additional health benefit.