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Soybean seed protein, oil, fatty acids, and mineral composition as influenced by soybean-corn rotation

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Author(s)

Nacer Bellaloui, H. Arnold Bruns, Anne. M. Gillen, Hamed K. Abbas, Robert M. Zablotowicz, Alemu Mengistu, Robert L. Paris

ABSTRACT

Effects of crop rotation on soybean (Glycine max (L) Merr.) seed composition have not been well investigated. Therefore, the objective of this study was to investigate the effects of soybean-corn (Zea mays L.) rotations on seed protein, oil, and fatty acids composition on soybean. Soybeans were grown at Stoneville, MS, from 2005 to 2008 in five different scheduled cropping sequences. In 2007, following three years of rotation with corn, seed oleic acid percentage was significantly higher in any crop rotation than continuous soybean. The increase of oleic fatty acid ranged from 61 to 68% in 2007, and from 27 to 51% in 2008, depending on the rotation. The increase of oleic acid was accompanied by significant increases in seed concentrations of phosphorus (P), iron (Fe), and boron (B). In 2007, the increase of P ranged from 60 to 75%, Fe from 70 to 72%, and B from 34 to 69%. In 2008, the increase of P ranged from 82 to 106%, Fe from 32 to 84%, and B from 62 to 77%. Continuous soybean had higher linoleic:oleic ratio and linoleic: palmitic + stearic + oleic ratio, indicating that relative quantity of linoleic acid decreased in rotated crops. The total production of protein, oil, stearic and oleic fatty acids was the lowest in continuous soybean. The total production of palmitic acid was inconsistent across years. The results show that soybean- corn rotation affects seed composition by consistently increasing seed oleic fatty acid, P, Fe, and B concentrations. Higher oleic acid, unsaturated fatty acid, is desirable for oil stability and long-shelf storage. The mechanisms of how these nutrients are involved are not yet understood.

KEYWORDS

Fatty Acids; Mineral Nutrients; Oil; Protein; Seed Composition; Soybean-Corn Rotation

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