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Soybean seed protein, oil, and fatty acids are altered by S and S + N fertilizers under irrigated or non-irrigated environments

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ABSTRACT

Information on the effect of sulfur (S) or sulfur+nitrogen (S + N) on soybean seed composition is scarce. Thus, the objective of this study was to investigate the effects of S, and S + N fertilizers on soybean [(Glycine max (L.) Merr.)] seed composition in the Early Soybean Production System (ESPS) under irrigated (I) and nonirrigated (NI) environments. Two separate field experiments were conducted from 2005 to 2007. One experiment was irrigated, and the second experiment was nonirrigated. Under I condition, S at a rate of 44.8 kg/ha alone or with N at 112 kg/ha resulted in a consistent increase in seed protein and oleic acid concentrations, and a decrease in oil and linolenic acid concentrations compared with the control (C). For example, in 2006 and compared with the C, application of S + N increased the percentage up to 11.4% and 48.5% for protein and oleic acid, respectively. However, oil concentration decreased by 3%. Protein and oleic acid increase were accompanied by a higher percentage of leaf and seed N and S. Under NI conditions, seed protein and oleic acid concentrations were significantly higher in C than in any S or S + N treatments, but the oil and linolenic acid concentrations were significantly lower. The results indicate that specific rate of S alone or S + N combined can alter seed composition under irrigated or nonirrigated conditions. This knowledge may help plant breeders to develop and release cultivars to suit specific target locations to grow new value-added soybeans or select for specific seed composition traits under specific environmental stress factors such as drought.

KEYWORDS

Fatty Acids; Nutrition; Oil; Protein; Seed Composition; Soybean

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