

## Long-term Cropping System Impacts on Soybean Grain Quality

Won Kyo Jung<sup>1</sup>, Newell R. Kitchen<sup>1</sup>

Soil Management Div. National Institute of Agricultural Science and Technology, RDA, 249  
Seodun dong Suwon city Kyunggi province KOREA, 441-707

<sup>1</sup> Cropping System and Water Quality Research Unit, USDA-ARS, 240 Ag. Engineering Bldg.  
Univ. of Missouri, Columbia, Missouri USA, 65201

### Objective

To evaluate the influence of long-term cropping system on soybean grain quality properties.

### Materials and Methods

- Research site : Centralia, Missouri, USA
- Soil : Mexico silt loam (Aeric Vertic Epiaqualfs)
- Soil samples were obtained at the top 7.5-cm soil depth and analyzed for physical and chemical properties
- Soybean grains samples were obtained in 2002
- Cropping system treatments (since 1991)

Cropping system	Tillage	Crop	Annual fertilizer	Yield goal
CS1	Mulch till	Soybean-corn rotation	Corn: N 190 kg ha <sup>-1</sup> Lime, P, and K by soil test	Corn: 10,079 kg ha <sup>-1</sup> Soybean: 2,508 kg ha <sup>-1</sup>
CS2	No till	Soybean-corn-wheat rotation	Corn: N 151 kg ha <sup>-1</sup> Lime, P, and K by soil test	Corn: 8,063 kg ha <sup>-1</sup> Soybean: 2,508 kg ha <sup>-1</sup>
CS3	No till	Soybean-corn-wheat-rotation with cover crop	Corn: N 151 kg ha <sup>-1</sup> Lime, P, and K by soil test	Corn: 8,735 kg ha <sup>-1</sup> Soybean: 2,508 kg ha <sup>-1</sup> Wheat: 4,031 kg ha <sup>-1</sup>

- Landscape positions
  - Footslope (FS) : less than 1% slope at the bottom position of plot stripe
  - Backslope (BS) : slope is between 1% and 2%
  - Summit (SS) : greater than 1% slope with top position of plot stripe

\*Corresponding author: (Phone) 031-290-0276 (E-mail) wonkyo@rda.go.kr

## Results and Discussions

- The impact of cropping system on soybean grain quality varied little after 12 years of practices even when comparing tilled to no-tilled system.
- Significant difference of linoleic acid content was found when cropping system 3 was compared to cropping system 1.
- Soybean linoleic acid content was significantly correlated to Bray1-P, while oleic acid showed significant correlation with soil pH in top 7.5-cm soil depth.
- Twelve years of cropping system practice impacts little on soybean quality properties. We found that no-till practices did not significantly influenced for variation of soybean grain quality properties when compared to conventional tillage practices.

Table 1. Probability level of F-test for soybean quality properties by cropping systems and landscape positions.

Source of variation	df	Protein	Oil	Saturated fatty acid		Unsaturated fatty acid		
				Palmitic acid	Stearic acid	Oleic acid	Linoleic acid	Linoleic acid
Block	2	0.09	0.13	0.92	0.86	0.80	0.66	0.91
Cropping system (CS)	2	0.92	0.96	0.09	0.91	0.16	0.30	0.02
Landscape position (LP)	2	0.46	0.11	0.79	0.07	0.15	0.16	0.03
CS*LP	4	0.04	0.03	0.40	0.91	0.56	0.56	0.91
CS contrast								
CS1 vs. CS2	1	0.79	0.97	0.05	0.76	0.70	0.62	0.07
CS1 vs. CS3	1	0.78	0.80	0.27	0.79	0.08	0.16	0.01
LP contrast								
FS vs. BS	1	0.50	0.66	0.55	0.09	0.26	0.28	0.10
FS vs. SS	1	0.24	0.06	0.61	0.35	0.29	0.31	0.11

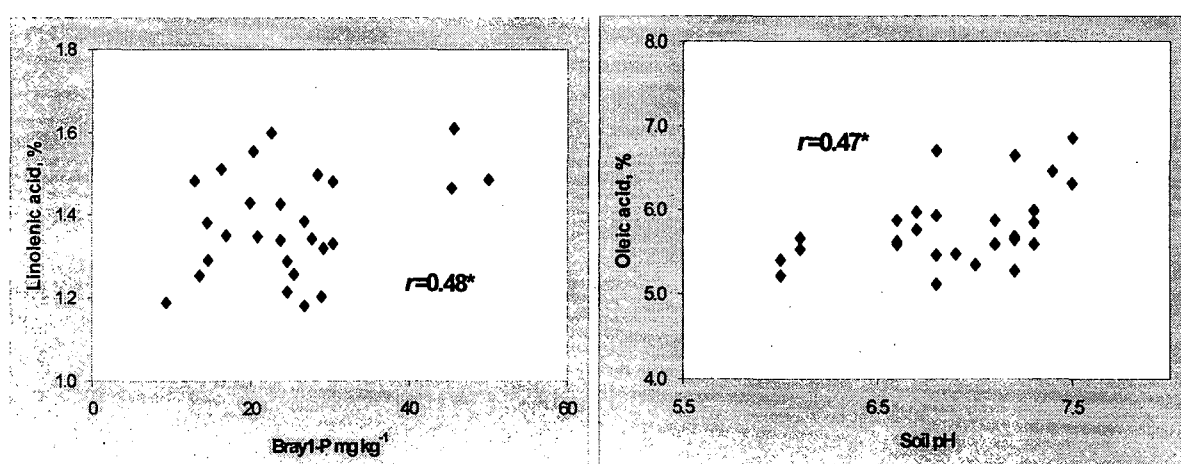


Figure 1. Relationship of soil properties and soybean quality properties mass