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Keith Whigham  
soy@iastate.edu

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# Relationship between corn and soybean yields

## **Abstract**

The relationship between corn and soybean yields on the same land varies from year to year, depending on the weather. Corn/soybean yield ratios express the relative yield of corn to soybean (i.e., 134 bu/acre of corn is 3.05 times greater than 43.5 bu/acre of soybean). Table 1 presents the average Iowa corn and soybean yields, and the corn/soybean yield ratios from 1990 to 2001. These ratios indicate that weather favored corn versus soybean growth and development during some years. The higher the ratio above 3.0:1, the greater the advantage for corn during that year; and the lower the ratio below 3.0:1, the greater the advantage for soybean. These ratios refer to agronomic advantage only and may not have a direct relationship to market value of the crop.

## **Keywords**

Agronomy

## **Disciplines**

Agricultural Science | Agriculture | Agronomy and Crop Sciences

# INTEGRATED CROP MANAGEMENT

## Relationship between corn and soybean yields

The relationship between corn and soybean yields on the same land varies from year to year, depending on the weather. Corn/soybean yield ratios express the relative yield of corn to soybean (i.e., 134 bu/acre of corn is 3.05 times greater than 43.5 bu/acre of soybean). Table 1 presents the average Iowa corn and soybean yields, and the corn/soybean yield ratios from 1990 to 2001. These ratios indicate that weather favored corn versus soybean growth and development during some years. The higher the ratio above 3.0:1, the greater the advantage for corn during that year; and the lower the ratio below 3.0:1, the greater the advantage for soybean. These ratios refer to agronomic advantage only and may not have a direct relationship to market value of the crop.

**Table 1. Iowa corn/soybean yield ratios for average grain yields (1990-2001).**

<b>Year</b>	<b>Ave. Corn Yield (bu/acre)</b>	<b>Ave. Soybean Yield (bu/acre)</b>	<b>Ratio</b>
1990	126	41.5	3.0:1
1991	117	40.5	2.9:1
1992	147	44.0	3.3:1
1993	80	31.0	2.6:1
1994	152	50.5	3.0:1
1995	123	44.0	2.8:1
1996	138	44.0	3.1:1
1997	138	46.0	3.0:1
1998	145	48.0	3.0:1
1999	149	44.5	3.3:1
2000	145	43.5	3.3:1
2001*	147	44.0	3.3:1
Average	134	43.5	3.05:1

Table 2 shows the Iowa corn/soybean yield ratios for each crop reporting district from 1990 to 2001. The north central district produced the highest ratio averaged over the past 12 years, 3.2:1. The lowest ratio average by district was 2.9:1 for both the east central and southeastern districts. When averaged across districts 1992, 1999, 2000, and 2001 produced the highest ratios of 3.3:1, and the lowest ratio was 2.6:1 during 1993. Five of the nine districts produced their highest ratios in 2000, and six of the districts produced their lowest ratios in 1993. Based on the corn/soybean yield ratios, corn yields were relatively better than soybean yields for most districts in 1992, 1999, 2000, and 2001, when the average ratios were 3.3:1 or higher each year. In 1991, 1993, and 1995 the ratios were 2.9:1 or lower, which indicates a relative yield advantage for soybean over corn during those years. The lowest ratio shown is 2.2:1 during 1993 in the southeastern district when soybean had a yield advantage.

Producers in some areas of Iowa are concerned that soybean is not yielding as well as they expect relative to corn yields. Each crop has different optimum environmental conditions for moisture and heat stress. One of the most critical developmental stages for corn is during flowering and pollination. Moisture stress due to drought or extreme high temperatures during this period may reduce the fertilization of individual kernels because of silk or pollen grain desiccation. Therefore, low moisture and high temperature during the last half of July have a major impact on corn yield in Iowa most years. Soybean requires the most moisture during the pod- and seed-filling periods. In Iowa, the shortage of moisture, or extremely high temperatures, during August greatly reduce soybean yield. August rainfall usually correlates very strongly with soybean yield. Corn/soybean yield ratios are a reflection of the environmental conditions and their effect on each crop during a given year.

**Table 2. Iowa corn/soybean yield ratios by district (1990-2001).**

	Iowa Crop Reporting District									
Year	NW	NC	NE	WC	C	EC	SW	SC	SE	Average
	Corn/Soybean Yield Ratios									
1990	3.0:1	3.2:1	3.0:1	3.0:1	2.9:1	2.8:1	3.1:1	3.1:1	3.0:1	3.0:1
1991	2.9:1	3.2:1	3.0:1	3.0:1	2.9:1	2.3:1	3.2:1	2.9:1	2.3:1	2.9:1
1992	3.3:1	3.5:1	3.3:1	3.4:1	3.4:1	3.2:1	3.5:1	3.3:1	3.2:1	3.3:1
1993	3.0:1	2.8:1	2.5:1	2.5:1	2.6:1	2.4:1	2.3:1	2.3:1	2.2:1	2.6:1
1994	3.1:1	3.3:1	2.9:1	2.9:1	3.0:1	2.9:1	3.0:1	3.0:1	3.0:1	3.0:1
1995	2.8:1	2.8:1	2.5:1	2.7:1	2.8:1	2.7:1	3.0:1	3.0:1	2.8:1	2.8:1
1996	3.1:1	3.4:1	3.1:1	3.1:1	3.0:1	3.0:1	3.2:1	3.3:1	3.0:1	3.1:1
1997	3.0:1	3.3:1	2.9:1	2.9:1	3.0:1	2.8:1	3.0:1	2.9:1	2.9:1	3.0:1
1998	3.1:1	3.1:1	3.2:1	3.1:1	3.0:1	2.8:1	3.2:1	2.9:1	2.6:1	3.0:1

1999	3.4:1	3.5:1	3.2:1	3.5:1	3.3:1	3.1:1	3.1:1	3.3:1	3.2:1	3.3;1
2000	3.3:1	3.3:1	3.0:1	3.6:1	3.5:1	3.3:1	3.4:1	3.4:1	3.6;1	3.3:1
2001*	3.2:1	3.4:1	3.3:1	3.3:1	3.5:1	3.2:1	3.2:1	3.3:1	3.5:1	3.3:1
Average	3.1:1	3.2:1	3.0:1	3.1:1	3.1:1	2.9:1	3.1:1	3.1:1	2.9:1	3.1:1

\*November 2001 estimate. Source: Iowa Agricultural Statistics.

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