Annual Carbon Fluxes from No-Till Corn and Soybeans (Illinois)

(Correction from previous issue of *Better Crops with Plant Food*)

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The article titled "Annual Carbon Fluxes from No-Till Corn and Soybeans" which appeared in the previous edition of *Better Crops with Plant Food* (1999, Issue No. 3), contains some numbers which are not correct.

An error was made in calculating the carbon dioxide (CO_2) sequestered in the grain of corn and soybean. This error resulted in an underestimation of the CO_2 removed in the grain. **Table 1** in the original article is reproduced below with corrected values in the last column.

The new values for tons of CO_2 removed by grain exceed the total measured CO_2 exchange for the entire period. The period includes approximately three fallow seasons, but only two growing seasons. A more accurate estimate of the CO_2 balance for the corn and soybean rotation is obtained if the period from October 20, 1996 to October 19, 1998 is used. This period includes one soybean fallow season, one corn growing and fallow season, and one soybean growing season. When this two-year period is used, the net CO_2 exchange between the no-till ecosystem and the atmosphere is a gain of 0.19 tons CO_2 per acre to the ecosytem.

The CO_2 flux measurements account for mineralization of soil organic matter and decomposition of the surface residue as well as the net CO_2 fixed through photosynthesis. The net loss of CO_2 from the ecosystem during the soybean growing season is due to the relatively slower photosynthetic rate of soybeans and the rapid decomposition of the corn residue from the previous year. The flux measurements do not allow for the separation of the CO_2 released by soil and plant respiration and the residue decomposition. However, the flux measurements do provide an accurate measure of the net CO_2 exchange between the no-till ecosystem and the atmosphere.Thus, the flux measurements support the hypothesis that a no-till corn-soybean rotation maintains a balance of carbon (C) in the soil. In fact, the measurements indicate that the crops are adding as much or more new C to the soil as is being respired from the soil. The corn crop, because of its large vegetative biomass, is the main contributor of CO_2 to the ecosystem. BC

Note: *The original article appeared in Better Crops with Plant Food, Vol. 83 (3), pages 13-15. The complete article with corrections is available in pdf format at the web site: ppi-far.org*

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TABLE 1. Seasonal net CO_2 exchange from a no-till field with corn in 1997 and soybeans in 1998.

Crop	Period	Net CO_2 exchange, tons	Evapotranspiration, in.	Precipitation, in.	Grain CO_2, tons
Soybean	Oct 20 1996 - Apr 18 1997	-1.56	5.05	6.42	–
Corn	Apr 19 1997 - Oct 19 1997	9.20	14.45	9.01	-5.60
Corn	Oct 20 1997 - Jun 1 1998	-1.58	8.33	10.67	–
Soybean	Jun 2 1998 - Oct 19 1998	2.22	14.46	7.59	-2.49
Soybean	Oct 20 1998 - Mar 31 1999	-1.15	3.95	5.06	–
Total	**Oct 20 1996 - Mar 31 1999**	**7.13**	**46.24**	**38.75**	**-8.09**

A negative CO_2 value indicates a C loss by the ecosystem.