

CAN WE INCREASE BOTH CORN ACRES AND YIELDS?

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The 2002 Farm Bill, price support from increasing industrial usage of corn (primarily ethanol production), and high corn yield and high corn:soybean yield ratio in 2003 have combined to increase corn acreage in Illinois and Iowa. Because corn and soybean occupy such a large percentage of cultivated land in these two states, corn acreage can increase substantially only at the expense of soybean acres, and only by increasing the acreage of corn that follows corn instead of soybean in the crop sequence. Following are some summary points regarding the management of corn following corn:

- While corn following corn sometimes yields as much as corn following soybean, this should not be our expectation. Averaged over a number of trials in Illinois, corn yields are about 10 percent higher for corn following soybean than for corn following corn. Some people use 5 percent as the expected yield reduction, but on infrequent occasions, yields can be as much as 25 to 40 percent lower in continuous corn, for reasons that are not clear.
- Despite what many producers believe, the second year of corn – the first year that corn follows corn – in field that have been rotated between corn and soybean for many years does not usually produce lower yields than continuous corn that follows in subsequent years. That is, continuous corn does not “fix” the problem of lower yields compared to what it would yield if corn followed soybean.
- Two likely strategies that producers will use to transition to more corn will be to assign more productive fields to continuous corn as they continue to rotate corn and soybean on remaining fields; or to produce corn on two or more consecutive years between soybean crops. This decision will be influenced to some extent by the uniformity among fields farmed by individual producers.
- We have limited data, but it appears that yield of a soybean crop that follows two years of corn instead of one year will sometimes be increased.
- Corn following corn routinely needs about 40 lb more N per acre than corn following soybean to optimize yield.
- The Western corn rootworm, which has traditionally been a potentially serious pest of corn following corn but not of corn following soybean, has now adapted to the corn-soybean rotation over about one-third of Illinois, and so requires management in corn following soybean. This has lowered the “adoption cost” for moving to continuous corn, since both rotations now require similar attention to managing the WCR.
- Leaf diseases, especially gray leaf spot, tend to be worse in corn following corn, especially if corn residue remains on the surface to provide a source of inoculant. Stalk diseases are not routinely worse in corn following corn, unless the crop experiences stress sooner during the growing season.

- Results from recent hybrid tests in corn following corn show mixed results, with yields of hybrids following soybean correlating well with those following corn at one location (Fig. 1a), but showing poor correlation in another location (Fig. 1b). This makes hybrid choice for corn following corn rather difficult, but until we learn more, choosing hybrids from tests in which corn follows soybean might be better than trying to guess at which hybrids will do best when following corn, based on attributes such as disease resistance or root ratings.
- Choosing hybrids based on higher extractable or fermentable starch may hold promise as breeding for these traits develops, but grain yield is a more important criterion at present.
- Fields where corn follows corn are usually tilled more than where corn follows soybean, both to bury some of the residue and also to help relieve what is often believed to be more compaction. Continuous no-till is difficult to maintain in continuous corn, due to accumulation of large amounts of residue on the surface.
- If it proves to be economically feasible to use corn residue for ethanol production, the need for more tillage, and possibly for more nitrogen, will be reduced to some extent, but questions about the effect of annual removal of several tons of residue on soil properties and soil erosion will need to be evaluated.

We believe that we can successfully manage corn following corn as corn acreage increases in response to increased demand for ethanol and other uses, but there will be some costs. It's likely that corn yields per acre will decline to some extent on acres where continuous corn replaces corn following soybean, and it is possible that continuous corn yields will be more variable over years than are yields of rotated corn. Continuous corn is also more energy-intensive: it uses more N fertilizer, usually is done with more tillage, and has much higher drying and transport costs than soybean. On the positive side, production of more corn will take advantage of the outstanding weather and soils compared to most other parts of the world, and more residue means more carbon returned to the soil and less erosion, providing that residue and tillage are managed properly. Finally, rotations with more years of corn between soybean crops will probably raise soybean yields.

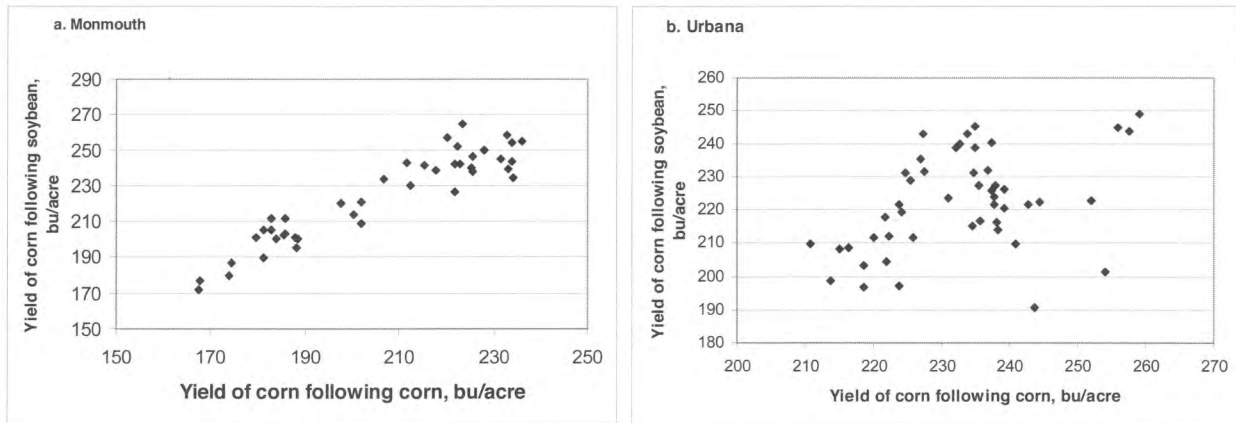


Figure 1. Correlation between yields of corn hybrids grown following corn compared to yields of the same hybrids grown following soybean. Data are from the 2004 hybrid trials at Monmouth, Illinois (a), where there were 42 hybrids, and at Urbana, Illinois (b), where there were 48 hybrids. The average yield of corn following soybean was 223 bu/acre at both locations, and corn following corn averaged 206 bu/acre at Monmouth and 233 bu/acre at Urbana. See the website <http://vt.cropsoci.uiuc.edu> for trial details.