Strip Intercropping: Life on the Edge

In the early 1990s a dozen PFI cooperators tried their hand at strip intercropping, the practice of planting narrow strips of different crops side by side. Some impressive corn yields were recorded, but various problems made it difficult to consistently take advantage of the added sunlight and diversity afforded by strips. PFI cooperators Jeff Olson and Gayle Olson, Mt. Pleasant, and Paul and Karen Mugge, Sutherland, are working with university and USDA scientists to identify those barriers. Research in 1997 focused on three groups of insects that seem to take advantage of the diversity and plentiful borders between crops: corn rootworms, grasshoppers, and the common stalkborer. Table 14 presents corn yields and stands by row in strip intercropping on the Olson and Mugge farms.

Figure 9. Bt effect on strip corn yields and stands by row

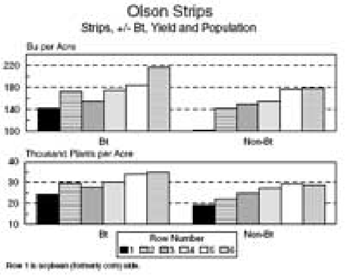

Figure 9. Bt effect on strip corn yields and stands by row.

When the outer rows of corn in strips does not yield better than strip interiors, insects, weeds, or pathogens may be responsible. On the Olson farm stalkborer has been identified as a problem. The grass waterways around these strips provide ample wintering sites for the eggs of these insects. There is also some indication that the young larvae are using the strips as a superhighway into the field. PFI and ISU staff examined several ways to disrupt the insect. One of these was the use of Bt-enhanced corn. Jeff Olson planted a Bt corn in some strips, and in others he planted the non-Bt sister hybrid.

Bt corn is not advertized as effective against common stalkborer, but Bt tends to be active against lepidopterous (moth and butterfly) larvae in general. As Table 14 and Figure 9 show, Bt had a significant effect on corn stands, yields, and the frequency of stalkborer damage. In fact, corn yields were closely tied to plant population. As stand varied across the strips, so did yield. Stand in Bt strips was far from uniform, but it was consistently higher than in non-Bt strips. Does this mean strip intercropping requires Bt corn? No, but the Bt corn is providing insight into the agroecosystem. It might be that the most effective use of this biotechnology is in the border rows of strips. That conservative level of use should slow the development of resistant insects.

Where Jeff Olson's corn yields suffered on the west borders of strips, Paul Mugge's corn yielded 15-20 bushel more on either border than in the strip centers (Table 14). Grasshoppers have bothered the soybeans in Mugge's strips, but corn yields have been little affected by the hoppers. You might not guess to look at the corn yields, but there is evidence that corn rootworm larvae are at work on the strip edges neighboring previous-year corn strips. USDA-ARS entomologist Mike Ellsbury has tracked the underground migration of rootworm larvae from last year's corn row #6 to this year's row #1, a distance of one row-width. His research on the Mugge farm has been reported in The Practical Farmer, Winter 1996/1997. Ellsbury, the ISU agronomists and entomologists, and PFI farmers are gradually developing a fuller understanding of crop-pest interactions in strip intercropping

TABLE 14. Strip Intercropping, Row Yields and Stands

NORTH-SOUTH STRIPS	OLSON						EAST-WEST STRIPS	MUGGE	
	NK 6800 Bt			NK 6800				PI 3563	
ROW	YIELD	STAND	STALK BORER	YIELD	STAND	STALK BORER	ROW	YIELD	STAND
	BU/ACRE	PLANTS/ ACRE	% PLANTS	BU/ACRE	PLANTS/ ACRE	% PLANTS		BU/ACRE	PLANTS/ ACRE
(W)	(SOY)						(S)	(SOY)	
1	142.1	24,358	7.9%	103.1	19,308	22.6%	1	180.0	31,339
2	173.4	29,705		141.9	21,982		2	157.2	32,081
3	154.5	27,626	3.6%	148.9	24,952	15.5%	3	152.3	32,824
4	175.4	30,002		154.9	27,329		4	147.6	32,081
5	183.8	34,161		177.0	29,110		5	164.6	33,715
6	216.1	35,052	2.9%	179.2	28,814	17.5%	6	181.4	31,487
(E)	(OATS)						(N)	(OATS)	
STRIP AVG.:	174.2	30,151	4.8%	150.8	25,249	18.6%	STRIP AVG.:	163.9	32,255
BLOCK:	143.5	29,953		128.7	26,735		BLOCK:	146.2	29,656