

Buffer Economics

Wes Burger - MSU, Philip Barbour -USDA-NRCS, Steve Martin - MCES

Problem

Agricultural producers understand that they often experience yield reductions at field margins. These reductions are due to a combination of factors including: production practices (field edge traffic causing compaction), more variable inputs (herbicide, fertilizer, etc), greater weed and insect pressure, and competition with adjacent vegetation for sunlight, water, and nutrients. However, it is more difficult to visualize potential profit reductions associated with yield or economics of alternative production options (e.g. enrollment in subsidized conservation programs).

Potential Solution

To characterize opportunity costs of conservation buffer establishment, researchers at Mississippi State University estimated average yields for 104 corn and 56 soybean fields relative to 3 different types of field margins and compared these estimates to yields from the field interiors. The 3 types of field margins evaluated were rowcrop, herbaceous (pasture, idle fields, etc.), and woody (forests, hedgerows, etc.) plant communities adjacent to the crop. The researchers used GPS referenced yield monitors to estimate dry yield in the first 4 combine header swaths (each swath 24') next to the edge and the field interior. Corn yield was more influenced by proximity to edge and edge type than soybean yield. Corn yield was substantially reduced (13 – 38%) immediately adjacent to all types of plant communities (swaths 1 and 2, Figure 1)), relative to yield from the field interior. As expected, greatest yield reductions occurred next to wooded field margins. Soybean yield was only moderately reduced (6 – 14%) immediately adjacent to all types of plant communities, relative to yield from the field interior (Figure 2.). Both corn and soybean yields were only slightly reduced by the third (48 – 73') and fourth (74 – 96') combine swaths adjacent to all types of plant communities, relative to yields from the field interiors.

To make the economics of field margin production clearer, researchers constructed partial budgets to develop break-even analyses on profitability with and without CP33-type buffers.

The results of the break-even analyses illustrated that a number of factors influenced whether or not CRP CP33 – Upland Habitat Buffers were more profitable than cropping the same acreage. The most important factors included: the type of plant community adjacent to the crop (expected yield reduction, the county Soil Rental Rates, expected crop yield, and expected commodity prices. On average, if soil rental rates are \$59.00/ac, production costs are \$320/ac, corn price is \$4.00/bu, and expected yield < 150 bu/ac, it would be economically beneficial to enroll up to 30' in CP33 – Habitat Buffers for Upland Birds. If expected yields were below 125 bu/ac, it may be economically beneficial to enroll 60' in this buffer practice. Because soybeans exhibited less yield reduction at the edge, there was less difference in swaths 1 – 4. In soybeans, assuming \$150/ac production costs and \$8.00/bushel commodity price, CP33 buffers 30 – 100' wide could be more profitable than cropping if expected yields were less than 32 bu/ac.

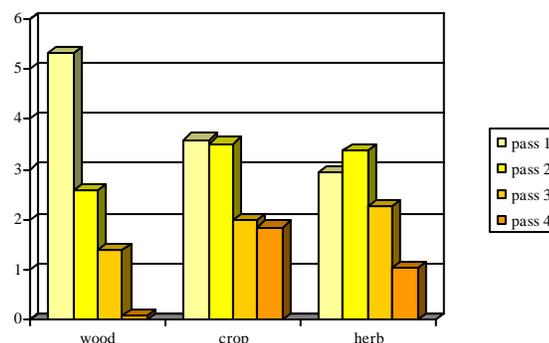


Figure 1. Mean corn yield reduction (bu/ac less than field interior mean) field edges next to wood, crop, or herb adjacent plant community types.

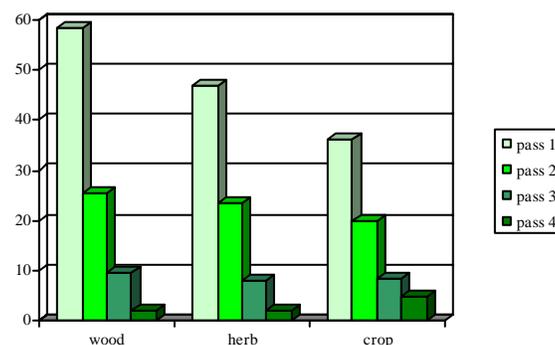


Figure 2. Mean soybean yield reduction (bu/ac less than field interior mean) for edges next to wood, crop, or herb adjacent plant community types.

Citation:
Barbour, P. J., Martin, S. W., and Burger, W. 2007. Estimating economic impact of conservation field borders on farm revenue. Online. Crop Management doi:10.1094/CM-2007-0614-01-RS.