

by Dr. Raun Lohry

Surface Banding Superior To Broadcasting on Reduced-Till

Field studies demonstrate yield benefits in corn, wheat and bromegrass.

Summary: Surface banding in reduced-till has shown up to 21 bu/A increases in corn yields over broadcasting in University of Maryland trials, 5 bu/A increases in wheat yields, and as high as 1,100 lbs/A increases in bromegrass in Kansas comparisons. Corn is drier when harvested, nutrient uptake is greater P/K fixation is reduced, and wind drift is less.

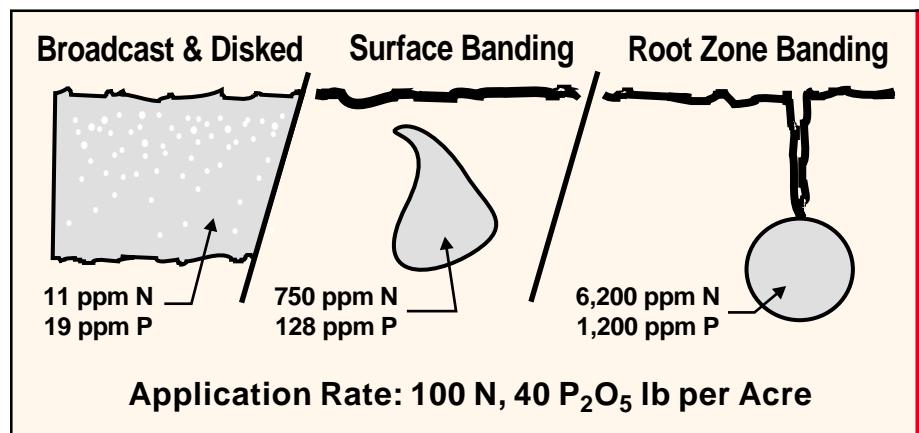


Figure 1. Soil nutrient concentrations comparing broadcasting, surface banding, and subsurface banding.

Growers who band are finding that crop yields improve significantly compared to broadcasting, where nutrients may be lost due to residue tie-up and volatilization. Surface banding, sometimes called "dribbling" or "stripping," allows for the speed and convenience of custom application, yet offers the agronomic benefits of banded fertilizer. It is environmentally preferred.

Surface banding involves application of liquid fertilizer in bands or strips of varying widths on the soil's surface or on the surface of crop residues. Zones of high nutrient concentration are produced, which improve nutrient-use efficiency. Relative to concentration of nutrients in the soil, this technique is intermediate between broadcast and subsurface banding (Figure 1).

Hundreds of university and private trials also have shown greater yield potential in reduced-till with surface banding when compared to

broadcasting. These tests have been systematically conducted on corn, wheat, and pasture, some of which we will review in this discussion.

Conversion is required to switch to a reduced-till banding program. Spray

booms on applicators must be modified to apply fertilizer in streams rather than in a spray pattern. On corn ground, strips are spaced 30 inches apart. On pasture and wheat strips, spacing is set at 18 inches.

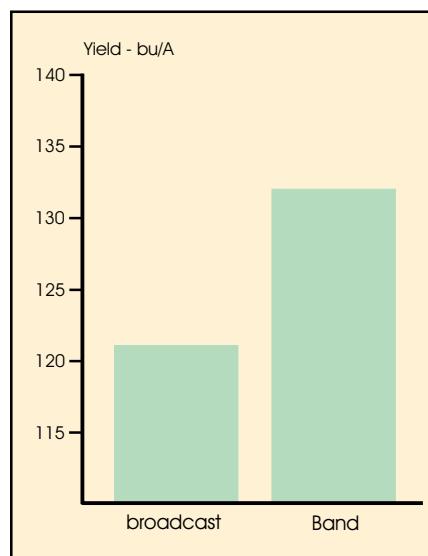


Figure 2. Corn yield response to surface banding NPK versus broadcasting in reduced-till, Purdue University.



Figure 3. Corn yield response to surface banding N versus broadcasting in reduced-till, University of Maryland.

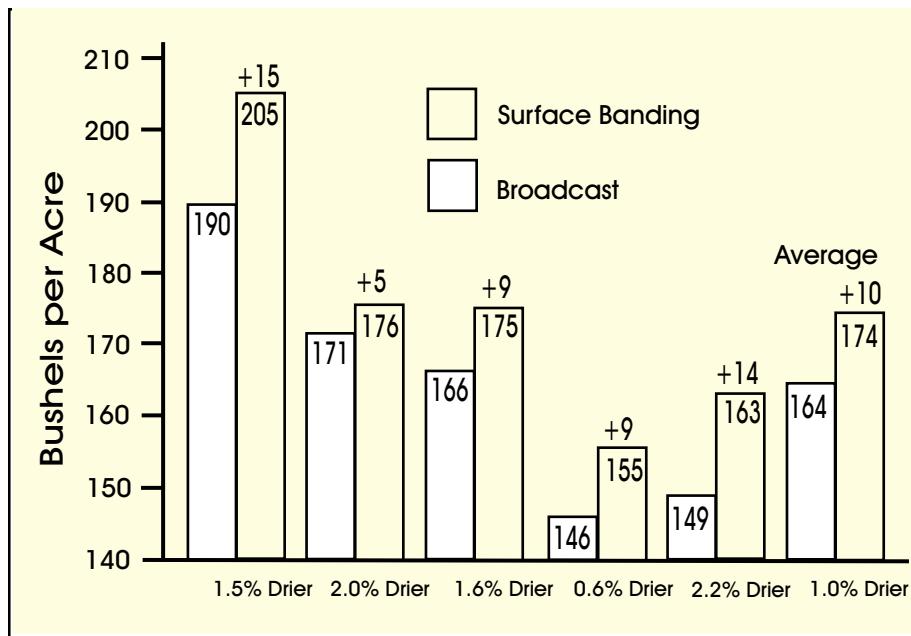


Figure 4. Corn yield response to surface banding NPK versus broadcasting in reduced-till, Iowa.

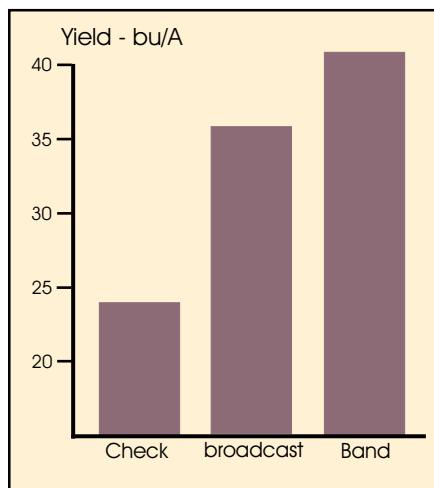


Figure 5. Wheat yield response to surface banding versus broadcasting in reduced-till, Iowa

Among the benefits growers can expect by surface banding in reduced-till instead of broadcasting are:

- greater nutrient uptake
- reduced fixation of phosphorus and potash
- less wind drift.

Better penetration of the soil's surface may also result. High concentrations of N in the band will tend to overwhelm immobilization mechanisms of crop

bu/A compared to 121 bu/A by broadcasting, or a gain of 11 bu/A (Figure 2).

Maryland. At the University of Maryland, 125 pounds of nitrogen was surface banded on no-till corn and produced 120 bu/A compared to 99 bu/A by broadcasting, or a net gain of 21 bu/A (Figure 3)!

Iowa. In Iowa, the results of five band-applied NPK (plus sulfur and zinc) trials in the Fall resulted in yield increases over broadcasting as high as 15 bu/A (Figure 4). The average of the five applications was an improvement of 10 bu/A. Just as significant was a one percent decrease in moisture at harvest time. Drier corn and associated reduced drying costs in the Fall suggest surface banding has better fertilizer efficiency.

Surface banding compared favorably in reduced-till wheat trials, producing an extra 5 bu/A over broadcasting as shown in Figure 5.

Kansas. Surface banding proved better than broadcasting in Kansas bromegrass trials. Banding 60 lbs/A of nitrogen raised forage yields to 5,000

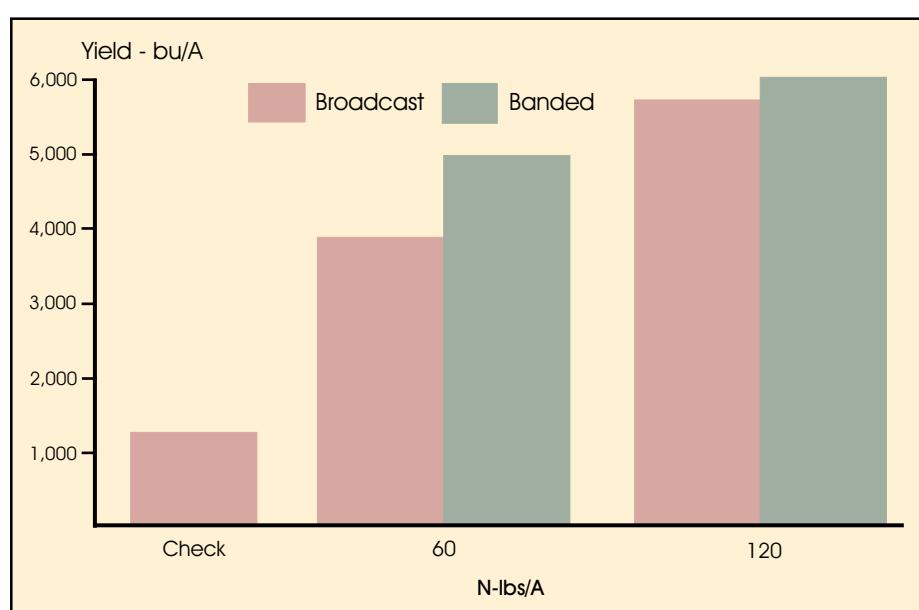


Figure 6. Bromegrass yield response to surface banding N versus broadcasting in reduced-till, Kansas.

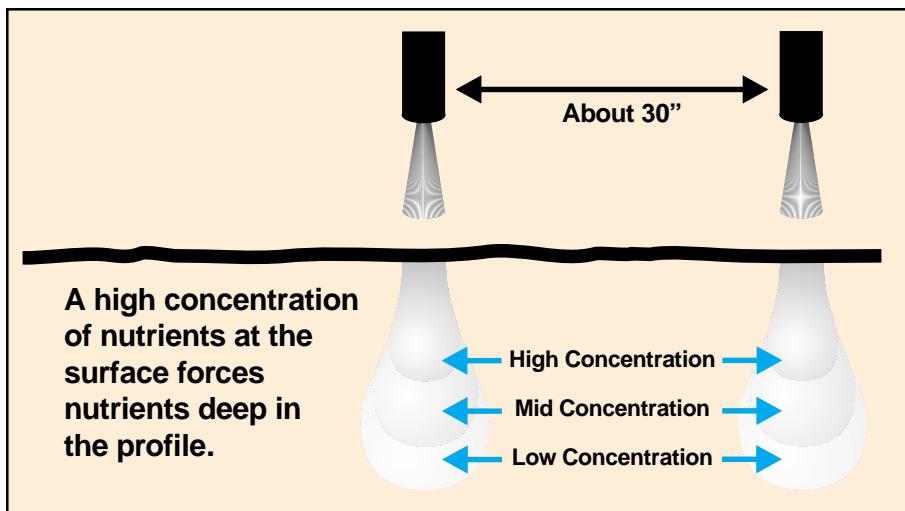


Figure 7. Movement of nutrients into soil when surface banding.

lbs/A compared to 3,900 lbs/A via broadcasting (Figure 6). N at 120 lbs/A pushed yields to 6,000 lbs/A, compared to 5,700 when broadcasting.

Surface banding excelled in another trial, this time before planting on no-till corn stubble. Nitrogen broadcast at the rate of 150 lbs/A produced 149 bu/A, whereas the same amount banded produced 12 bu/A more or 161 bu/A. Yields improved when fertilizer was banded because nitrogen moved deeper into the soil profile. Potential loss of

nitrogen from denitrification and immobilization also was reduced.

Why better

An explanation of why nutrient uptake is improved when fertilizer is surface banded in reduced-till instead of broadcast is shown in Figure 7. Note how the nutrients move deeper into the soil profile. When liquid fertilizer is surface banded, it is about 50 times more concentrated than when it is broadcasted. Even after the band is incorporated with a reduced-till

implement, nutrients remain concentrated. The high concentration of nutrients tends to force nutrients deeper into the soil profile. Fixing capacity of the soil becomes overloaded, allowing even phosphorus and potassium, which are considered immobile, to move deeper. Deeper nutrients will promote a deeper root system. A high concentration of nutrients offers four important benefits:

- increased root uptake
- reductions in fixation of phosphorus and potassium
- reductions in nitrogen loss
- enhancement of phosphorus uptake by roots via more nitrogen.

Conclusion

Documentation is sufficient. Speed and convenience of custom application, nutrient efficiency, and improved yields are three mighty benefits for those who switch from broadcasting to surface banding in reduced-till.

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