REDUCED TILLAGE FOR BEANS

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Soil erosion over the past 88 years in southern Idaho has had a subtle, but an extremely important impact upon crop production potential. Recent research has shown that the crop yield potential, averaged over all crops grown, has been decreased 25% during this period. This represents a permanent loss because loss of productive topsoil actually changes the production potential by factors that modern technology cannot replace.

Most of the erosion and sediment loss has resulted from too much tillage and mismanagement of irrigation. Perceptions exist about how much and what kind of tillage operations are needed for best crop productions. Some of these perceptions are not correct, and we need to change them through the application of recently developed cropping systems technology. For example, one recent study showed that 36-39 tillage operations were used over five years of a particular traditional cropping system rotation, but only nine tillage operations were used over the same five years to produce the same yields and quality of the same crops when conservation tillage practices were applied.

Erosion and sediment loss were reduced 80 to 100% and net farm income increased $50 to $100 per acre each year when the new conservation tillage system was used compared to the traditional one. The primary change from the traditional to the improved system was the order in which the crops were grown and the emphasis on doing the fewest tillage operations needed to produce those crops.

SOME CHANGES TO CONSIDER

If we are going to conserve our soil with its present productive capacity for future generations, we must change our perceptions and operating procedures. If we continue using traditional systems, the productivity potential of the soil will continue to decrease until it will become unprofitable to farm. Following are some changes that should be made to protect our soils resources. These changes will increase net income to the operators over the long term, and probably even in the short term. Farmers should try these changes on a small scale at first so that they can work those changes into their general operations as they feel comfortable with them.

Data don't lie! We have plenty of data that clearly demonstrate that new conservation tillage systems are far more superior to those traditionally in use. The transition to these new systems should be made as rapidly as possible, but with individual caution.

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CHANGE CROPPING SEQUENCE

When considering changes in cropping sequences always think about getting to the next crop with the smallest number of tillage operations. For example, in a rotation including alfalfa, corn or cereal can be seeded without tillage after spraying to kill the alfalfa. Similarly, cereal can be seeded in corn stubble and corn can be seeded into cereal stubble without tillage. Therefore, the only operations needed for the first two years following alfalfa are seeding, cleaning corrugates, spraying, and harvesting. The best sequence is alfalfa-corn-cereal because this sequence makes the most efficient use of nitrogen fixed symbiotically while the alfalfa was growing. This sequence has been demonstrated many times. Erosion is generally eliminated with this sequence. No nitrogen fertilizer is needed for the corn and usually only a small amount is needed for the cereal the second year after alfalfa.

Beans should not be grown following alfalfa. Until an active, surface applied herbicide is available for beans, it is necessary to incorporate herbicides for weed control. Several tillage operations are needed following alfalfa to be able to make an effective herbicide incorporation. Furthermore, beans will not utilize the nitrogen that becomes available following alfalfa as effectively as corn or cereal, and nitrate leaching is likely to occur while beans are being grown.

The best time to grow beans in a sequence is following cereal or corn. These crops provide some residue to help control erosion, but permit herbicide incorporation more readily than following alfalfa. Usually disking corn or cereal stubble a couple of times will accommodate herbicide incorporation. Of course, beans can be grown following beans or even sugarbeets, but after these crops there is insufficient residue to provide much protection against soil erosion.

PLOWING NOT NEEDED

Many traditional cropping systems include moldboard plowing as one of the tillage practices. Research has shown that not only is moldboard plowing not necessary, it is detrimental because it leads to more erosion. Every farmer should try to eliminate the practice. It should be used only in rare instances where a diseased crop has to be buried, or for similar circumstances.

Chisel plowing has gained in popularity in the past few years. It is a better soil conserving practice than is moldboard plowing, but often it is not needed. The perception exists that the soil needs to be loosened to prepare a seedbed, but research results indicate that soil loosening more than about three inches deep is generally not necessary. If chisel plowing is to be done, it should be done only three or four inches deep.

Ripping or deep chiseling rarely is beneficial. The exception is where soil compaction has occurred that has not been or will not be alleviated by freezing and thawing. Another exception is where cross slope ripping can prevent or reduce runoff from snow melt.

TIME DISKING RIGHT

When beans are to be grown following cereal or corn, the stubble should be disked once in the fall so that the field is left in a rough condition for winter. That disking can be done almost any time after the cereal or corn is harvested. The rough field condition will trap snow and will prevent wind erosion. The following spring, however, the timing of disking is very important. Fields should not be disked when the straw is tough. The best time to disk those fields that have been disked once the previous fall is on a warm spring afternoon when the straw is brittle. Such a practice cuts the straw to the best length to prevent erosion, and the disking usually is done without clogging that can occur with wet, tough straw.

Disking should be delayed in the spring until the straw and soil surface become rather dry. If the farmer does not preplant irrigate, there is plenty of time to prepare a seedbed in late April or May. Late disking is usually a good weed control practice.

PREPLANT IRRIGATION NOT NEEDED

Numerous comparisons show that there is no advantage to the crop by preplant irrigation. That practice causes severe soil erosion on many fields. It contributes to nitrate leaching, and it wastes water. Much time and effort is expended doing all the preparatory tillage operations to prepare fields for preplant irrigation, and these operations cause water loss from the soil. Research results indicate that much of this time and effort is wasted, because bean production is just the same when the seed is placed into dry soil and a short duration irrigation applied. Only enough water is needed to wet to the seed row.

Preplant irrigations apply a minimum of eight inches and often 12 to 16 inches of water. Post plant irrigations for wetting only to the seed in the row usually requires three or four inches of water. The short duration irrigation requires more frequent water set changes than is the case for preplant irrigating, but a field can be irrigated in a shorter time.

CONCLUSIONS

I have discussed a number of practices that need to be changed to reduce erosion, conserve water, reduce nitrate leaching, and reduce the need for nitrogen fertilizer. Several experiments have been conducted that demonstrate that all these changes are beneficial. All of them lead to lower production costs to produce the same yields and quality of the same crops now grown in traditional systems. This all translates into greater net income to the farmer with less operational effort going into producing the crops. These changes require thought and planning, particularly during the adjustment changes to the new conservation tillage cropping systems. That is how good progress is made.