AGRICULTURAL
GUIDE
Published by the University of Missouri-Columbia Extension Division

Analyzing cropping systems

D.D. Buchholz, L.E. Anderson,
Z.R. Helsel, H.C. Minor, C.J. Johannsen,
J.H. Scott, and H.N. Wheaton
Department of Agronomy, College of Agriculture

In tight financial times, businesses often try to reduce spending and improve their profits. Many farmers are currently operating their businesses under such conditions. Wise management decisions can improve profits in farming while reducing cash flow needs.

Some of what you put into your farm business can be perceived as cost free. That is, this input does not change as yield per acre changes. Examples include timeliness in all operations, equipment adjustments, crop rotations, land rent, and taxes. Making the best use of them should increase yields and profitability in your cropping system.

Avoid high costs until your financial position improves. Too often, we take big risks during hard times in hopes of **BIG** payoffs. But when you are counting your chips, that's not the time to double your bet. Don't overlook any necessary costs that could directly affect crop yield. These necessities might include seed, pest control, fertilizer, lime, fuel, equipment, maintenance and adjustment, and positive management. Omitting anything that has increased yields will undoubtedly reduce profits.

Keep a positive attitude. It has been stated, "For success, attitude can be as important as ability".

This guide contains information about cost-cutting and cost-effective measures that may be useful in your crop production. The major theme is management. Proper management will improve profitability.

Management strategies in your cropping system

Planting and seed

Seed quality is a key to good yields. For most crops, use certified seed or seed of a quality comparable to certified seed. Home-grown seed can save money, but you should know the germination, so you can get a proper seeding rate. Never use seed from hybrid crops for next year's planting (corn or grain sorghum).

Use new varieties. Soybean varieties have been improving at about ⅓ bushel per year. Using a 10-year-old variety means you may end up with about 3 less bushels per acre. Corn varieties are improving at about 1 bushel per year. Use current variety test information to help make your decision.

Always treat seed corn. Wheat seed treatment is generally beneficial. Soybeans may not need seed treatment in non-stress conditions. Seed treatment can improve some low germination seed.

Narrow rows for nearly all crops usually increase yields. (See Table 1 and Figure 1.) Consider narrowing existing equipment to the limit and, as needs arise, purchase equipment for narrow rows. Soybeans planted in narrow rows (10 inches or less) have increased yields an average of 4 bushels per acre over 30-inch rows. Narrow rows show the greatest advan-

Table 1. Average soybean response to drilled seeding at several Missouri locations.

		Yield (bushels/acre)		
Year	Location	30-inch rows	10-inch rows	Response
1981	Novelty	41.8	42.8	1.0
	Marshall	43.3	44.6	1.3
	Columbia	45.8	51.0	5.2
	Portageville	31.2	34.4	3.2
1982	Marshall	47.5	52.9	5.4
	Columbia	47.7	51.7	4.0
	Portageville	39.7	43.0	3.3

tage in late-planted crops such as double crop soybeans or grain sorghum.

You can get narrow rows by doubling back with wide-row equipment.

Planting date is extremely important in achieving yield potential. Nobody can plant every acre on that *best* planting date. But strive to have at least half of your crop planted by that date. The only excuse for late planting should be the weather.

Plan ahead to get your planter in field condition before that first planting day. Check and adjust your planter often. Drive as slowly as possible to ensure good seed placement and proper seeding rate while still getting the planting done on time.

Tillage costs money in fuel, labor, and wear and tear on equipment. Reducing the number of tillage operations and tillage depth will reduce these costs. Work the soil only until you achieve that seedbed which will give satisfactory emergence. Added tillage may also increase soil erosion potential. Evaluate tillage by categorizing *necessary* and *traditional* tillage.

Herbicides and weed control

Know the weeds you need to control. Too often, farmers select herbicides for broad spectrum control when less expensive alternatives may control the weeds present in your crops. Comparing prices of herbicides in relation to their recommended application rates may result in considerable cost savings. Several herbicides are manufactured by more than one company. Shop for the least expensive brand of the same herbicide.

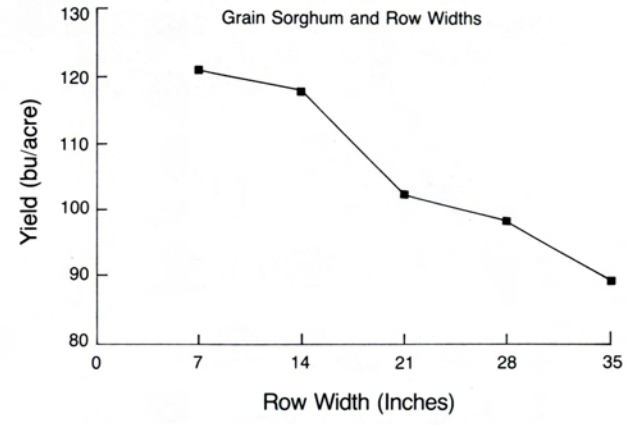
Band application of some herbicides over the row can reduce costs by as much as two-thirds. Some herbicides do not require incorporation and can be effectively used in a band over the row for pre-emergence or postemergence application. You can cut costs by cutting down on the amount of herbicides used per acre and by reducing tillage.

Use a rotary hoe to control small weeds early and a cultivator to control major weeds as the crop grows. This can result in effective weed control and can cut costs. For weeds in the rows, post-directed or rope wick application may give the added control you need at a reduced cost. Take care in selecting fields for this purpose. Be certain that under almost any condition, timely cultivation and herbicide application can be accomplished.

Table 2. Nitrogen added to the soil by a legume crop (optimum).

Legume crop	Nitrogen added (lbs. N/acre)
Alfalfa	
80-100% Stand	120-140
50-80%	40-60
Less than 50%	0-20
Sweet Clover (Green Manure)	100-120
Red Clover (Pure Stand)	40-60
Soybeans	15-60

Figure 1. Effect of row width on average grain sorghum yields (Columbia, three-year average).



Fertilizers and soil fertility

Get a soil test before applying fertilizer. Fields high in phosphorus or potassium can go without those nutrients for a year or more without reducing yields. If you have some fields with high fertility and some with low, fertilize only those with low fertility. This practice will give a better return than fertilizing all fields at a reduced rate. When cash flow is good, fertilize to high levels. This will allow you to reduce fertilizer rates when cash flow is poor.

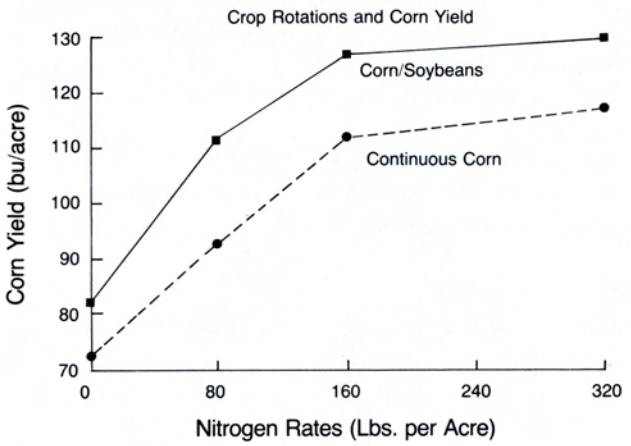
Sound fertility management is just as important during tight times as it is when cash flow is adequate. Avoid the temptation to buy unproven products, stick with the proven and recommended practices. Often *new, miracle* products result in no increased yields.

Stick to the major nutrients during these economic times. As yet, many micronutrients are not recommended by University agronomists. The probability of response to micronutrients is much less than with N, P or K. It is easy to increase a fertilizer bill $10 or more per acre with micronutrients. Use only those nutrients with a proven response on your soil.

Consider band application of fertilizer rather than broadcasting. Band application has long been proven to be more efficient at lower fertilizer application rates. Banding can be accomplished at planting by placing fertilizer near the seed or by using new innovations, such as knifed placement or dribble applications.

Ensuring effective use of applied fertilizer is always important. The key is incorporation of the

Figure 2. Comparison of corn/soybean rotation and continuous corn on average corn yields (Illinois 10-year average).



fertilizer into the rooting zone. Potassium and phosphorus applied at planting without incorporation often result in little or no response. Incorporate these nutrients at fall or spring tillage.

Remember to reduce nitrogen rates appropriately when legumes or manure are used in crop rotations. (See Table 2.) Soybeans can add 30 to 50 pounds of N to a subsequent wheat or corn crop. Manure commonly contains appreciable amounts of N, P, and K. To effectively reduce the fertilizer needed, determine the nutrient content of manure by lab analysis. Fresh animal manure often contains 10 to 15 pounds of N, 5 to 10 pounds of P_2O_5, and 10 to 15 pounds of K_2O per ton.

Crop growth

Monitor fields periodically for insect, disease, nutrient, or other associated problems while the crop is actively growing. Don't use fungicides or insecticides until the economic threshold of crop damage has been reached. Consult an agronomist on field problems to help you make those costly decisions. One less spraying could save several dollars. According to research, twenty percent leaf loss in soybeans does not normally reduce yield potential.

Monitoring crop growth this year can help you plan to correct next year's problems. Fertility problems are often difficult to overcome during the current cropping season but, through plant analysis, you can make plans for next year.

Avoid unnecessary trips to fields. During active growth, weekly, thorough inspection is necessary. But as growth tapers off, growth problems are less likely.

Crop rotations

Crop rotations have consistently shown yield increase (roughly 10 percent) over continuous mono-cropping. (See Figure 2.) Plan crop rotations as best fit your land and potential crop prices.

Consider planting as many soybeans as possible for short run cash flow improvement. Production costs for soybeans are generally lower than most other row crops.

Plant suitable acres to double crop soybeans or grain sorghum. With a minimum cost, you can get some return from continued use of crop acres through double cropping.

Avoid double cropping on unsuitable land or during dry conditions. Don't plant and wait for a rain. Wait for rain and then plant if it's not too late. Remember, if it's dry, don't try!

Harvest

Have harvest equipment adjusted and fields ready in advance. When harvesting wheat, run a minimum of straw through the combine. This will prolong the life of the machine and usually result in cleaner grain. Check behind the combine for harvest losses. (See Table 3.) Adjust the machine if necessary. Lost grain is lost yield.

Note problems in fields at harvest such as lodging, shattering and reduced yields. Start making plans for improving and correcting those problems for next year's crop.

Harvest at a maximum moisture content. If possible, don't wait for grain to become too dry. There is no bonus for grain that is too dry.

Summary

Improving profitability does not come easily. It requires management of your present operation and planning for new technology that will be cost effective in your future operation. If farming is not profitable today, staying with present practices and technology ensure an unprofitable future. Improving crop yields

Table 3. Harvest loss on soybeans due to combine cutter bar height (an average of three varieties, Columbia, Mo.).

Cutter bar height (inches)	Yield loss (%)
2	0.3
4	2.6
6	9.5

Troubleshooting your cropping system

Planting and Seed

__ Do you get the expected plant population?
__ Do you always use certified or quality seed?
__ Do you shop for seed prices?
__ Are you using the best varieties?
__ Do you use narrow rows, where applicable?
__ Do you finish planting your crops when the best farmers in your area are finished?
__ How much tillage are you doing for seedbed preparation?

Herbicides

__ Do you know the major weed species you are planning to control on your various fields?
__ Do you have fields with continual weed problems?
__ Are you trying to control perennial weeds or annual weeds?
__ Have you priced comparable herbicides?
__ Can you band herbicides over the row?
__ Does your herbicide control the weeds effectively?

Fertilizers

__ Do you have soil test and fertilizer history on all your fields?
__ Are you certain you are getting a response from every pound of fertilizer put on?
__ Is your fertilizer bill high in relation to your yield returns?
__ Do you have deficiencies showing up in your crops?
__ Are you using nutrients and rates recommended by University research?
__ Are you always looking for that miracle nutrient or product that will greatly improve yields or quality?
__ Are micronutrients a large part of your fertilizer bill?
__ Do you band apply any fertilizer?
__ Is your fertilizer program based on fertilizer bought or on soil requirements?

Insects and disease

__ Do you always treat your seed with an insecticide or fungicide?
__ Do you walk your fields once or twice a week looking for insects and disease symptoms?
__ Do you control insects and disease by following your neighbor as an example?

Crop Rotations

__ Do you notice any specific weed, insect, and disease problems in your continuous cropping systems?
__ Are you using your best land for the most responsive crops?
__ Do you doublecrop?
__ Do you plan your herbicide applications with rotations in mind?

Harvest

__ Do you have any lodging or shattering problems?
__ Do you wait until the crop is at the right moisture level or do you have a dryer?
__ Do you harvest yourself or custom hire?
__ Do you frequently check your combine efficiency (harvest losses)?

per acre is one method of improving the potential for a profitable farming operation. That goal, along with making the best use of "no cost" farm resources, will improve your position in crop production.

■ Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914 in cooperation with the United States Department of Agriculture. Leonard C. Douglas, Director, Cooperative Extension Service, University of Missouri and Lincoln University, Columbia, Missouri 65211. ■ An equal opportunity institution.