Soybeans Respond to Better Management Thinking

By William K. Griffith

Generally, soybean producers are aware of the many inputs and management decisions which must be made when growing the crop. Production information is obtained from dealer contacts, producer meetings, farm magazines, neighbors, the Extension Service and other sources. Most often lacking is the farmer's ability to package this information into a high-yielding soybean production system for specific farm or field conditions. This article describes a different approach which might help. Let's call it "better management thinking" (BMT).

IT IS NOT UNUSUAL for neighboring soybean growers with identical soils and fixed costs to have a big difference in yields and profits. The explanation almost always means that one farmer used better management thinking (BMT).

Like all high-yield cropping systems, there must be an integration and balance of all controllable inputs. But it is usually the improper management of several of these inputs which explains why one farmer profits more than another; a single input is seldom responsible. The BMT technique outlined here can improve grower yields and profits. Yields and profits do go hand-in-hand. That's because higher yields reduce production costs per bushel by spreading fixed cost, such as those for land and machinery, over more bushels per acre.

Step by Step

The path to BMT starts with a positive and realistic yield goal. A good rule of thumb is to set a yield goal 10 to 15 percent higher than the previous high for the field. Set aside 5 or 10 acres to try BMT techniques. Then adopt those practices that prove best for your specific conditions to the entire soybean acreage. Once a yield goal has been achieved, then set a new, higher goal.

The second step to BMT begins after harvest and before planting. This step involves listing all the controllable factors you can think of for soybeans. Following are a few examples of key controllable factors which are essential for top yielding, full-season soybeans. There are many others . . . some may be quite specific for the conditions on your farm. Along-side these factors, jot down the visual problems and yield or profit consequences which will result if each factor is not managed at optimum levels. Think about each factor and list the recommendations you plan to follow which are best suited for your location, soils and yield goals. Your local agribusiness dealer or farm advisor can help you list the factors and select the optimum recommendations for your farm. Keep reviewing these strategies and be flexible in changing recommendations as yield goals increase, as new varieties are released, and as new management technology is discovered.

Better Management Thinking for Soybeans

Planting date factor. Timely planting is the biggest economic bargain for full-season soybeans. It costs no more to plant on the optimum date than at any other time. For each day past the optimum planting date, expect soybean yields to decrease an average of one-third to one-half bushel per acre. Ohio data show a 6 bu/A loss in 15 days from delayed planting (**Table 1**). That's $36 per acre off the bottom line for $6 soybeans. **BMT strategy:** Have the planter ready, seed purchased, fertilizer in place and be ready to plant on that

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Table 1. Late planting reduces soybean yields.

Planting date	Soybean yield	Yield loss after May 10
	------------ bu/A -------------	
May 10	49	—
May 25	43	6
June 10	34	15

Ohio

optimum date. Only an uncontrollable factor such as unfavorable weather or soil conditions should change the plan.

The variety factor. The variety chosen sets the genetic yield potential on a particular farm. Variety trials across the country show differences at any one location of 15 to 20 bu/A between the top and bottom varieties. **BMT strategy:** Don't use a variety just because it is being used or sold by a neighbor. Monitor variety trial results and remember that the most useful tests are those that are conducted under top management. Make a point to grow a few rows of several varieties to see which varieties are best for a particular location and farming system.

The row width factor. Narrower row widths almost always increase yields over wider rows and seldom hurt if weather doesn't cooperate. This is true across all soybean producing areas. Beans benefit from better sunlight interception, greater moisture efficiency and reduced pressure from weeds that escape control measures. Expect full-season soybean yields to increase 3 to 4 bu/A for every 10-inch reduction in row widths down to a 7-inch drill width. **BMT strategy:** Give serious consideration to reducing soybean row widths down to 15, 10 or even 7-inches. Match this row width reduction with careful variety selection and plant populations. Remember that non-branching varieties respond more to narrow rows. Remember too that determinate semi-dwarfs do better in narrow rows with high populations.

The rotation factor. Expect soybeans to yield 3 to 5 bu/A more if produced in rotation versus continuous beans. Rotations are also good for the soil, help with pest control problems, and increase the yield potential for the other crops in the rotation. **BMT strategy:** Design a crop rotation system that reduces the number of times soybeans are grown after soybeans.

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ROTATING corn with soybeans offers advantages for both crops.

NARROW ROWS for soybeans offer greater yield potential.

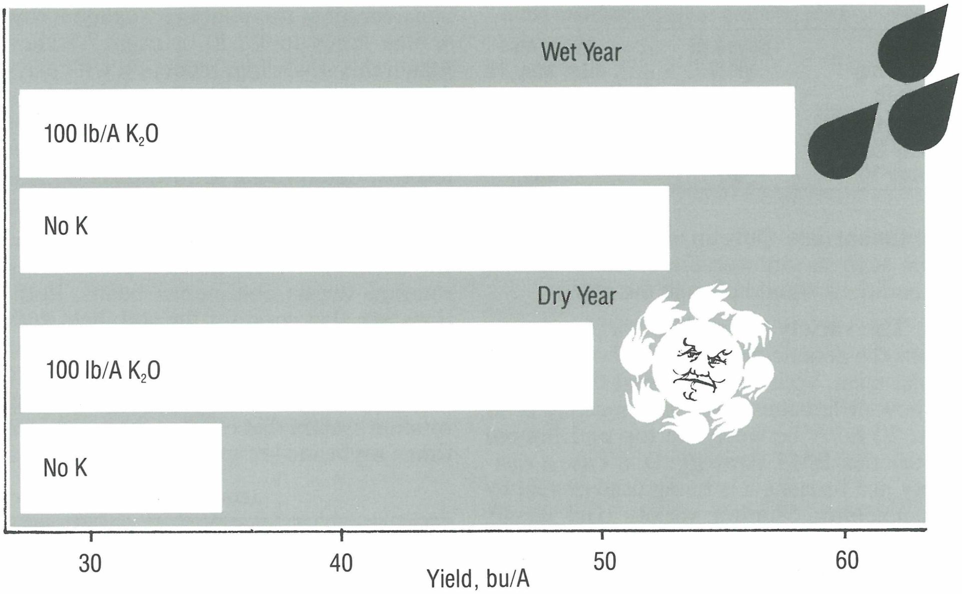


Figure 1. Soybean response to K may be greatest in a dry year.

The potassium factor. If soybeans don't have adequate potassium (K), the crop will have poorly developed roots, uneven maturity, weak stalks, more shriveled and diseased seed, fewer nitrogen (N) fixing nodules and much greater susceptibility to drought. In fact, K responses are frequently better under moisture stress conditions (**Figure 1**). **BMT strategy:** Soil test ahead of planting and maintain a high soil test K level. This build-up application can be made ahead of the previous crop, but make sure that the soil K test or K availability is high for the soybean crop. Soybeans remove about 1.4 lb K_2O per bushel of yield. Apply a maintenance amount of K based on expected yield goal.

The phosphorus factor. Low phosphorus (P) levels cause the soybean crop to lack the energy needed for rapid vegetative growth and uniform grain fill. Phosphorus-deficient beans will not ripen uniformly and will be more susceptible to drought and disease stress. **BMT strategy:** Plant high-yield soybeans into a soil that is testing high in P. Apply a maintenance amount of P based on the fact that each bushel of soybeans removes about

POTASSIUM deficiency symptoms.

0.8 lb of P_2O_5. Make sure that soil pH is at the recommended level because efficient P use and optimum N fixation are dependent on proper soil pH. Phosphorus can be applied to a preceding crop. But be sure that enough P, and K, are applied for both crops (**Table 2**).

The weed factor. Weeds rob soybeans of yield and profit. They are fierce competitors for nutrients and moisture. When fertility or moisture levels are marginal, losses to weeds are even greater. **Table 3** shows some losses which occurred at one location from various types of weeds. **BMT strategy:** Routinely scout fields for

Table 2. Adequate P and K interact to boost soybean yields.

P_2O_5 lb/A[1]	K_2O lb/A[1]	1992 Yield, bu/A	5-year avg., bu/A
0	0	65	66
0	60	68	67
30	0	69	67
30	60	81	69
60	0	76	68
60	60	80	69

[1]P_2O_5 and K_2O for corn prior to soybeans. Kansas

PHOSPHORUS response in soybeans.

potential weed problems. Scouting for a soybean crop begins during the growth of the preceding crop. Identify problem weeds and problem areas and begin planning for control in the future. Good management practices for all the other inputs go a long way in reducing the pressure from weed competition.

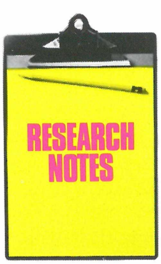
Summary

This highlights full-season soybean "better management thinking" for several controllable inputs. Expand the list to include tillage practices, planting depth, population, harvest management, soil acidity control, secondary nutrient needs, micronutrients, insect and disease pests and all the other inputs over which you have some control. Then integrate these into a new soybean production package. That's the kind of thinking that raises yield levels and profit potentials. If BMT works for you, then try it for other crops in the rotation. ■

Table 3. Control weeds for better soybean yields.

Problem weed or grass	Plants per foot of row	Yield reduction %	Yield reduction bu/A	Income loss $/A
Giant foxtail	6	10	4	28.00
Fall Panicum	1	20	8	56.00
Pigweed	0.25	30	12	84.00
Morningglory	1	52	20.8	145.60
Cocklebur	1	10	4	28.00
	2	28	11.2	78.40
	3.50	43	17.2	120.40

Assume 40 bu/A yield and $7.00/bu soybean price — Illinois



Oregon

The Influence of Tillage and Cropping Intensity on Cereal Response to Nitrogen, Sulphur and Phosphorus

IN THIS 6-year study, cereal responses to nitrogen (N), sulphur (S) and phosphorus (P) were determined under conventional-till (CT) and no-till (NT) for cereal/fallow and cereal/cereal. Semi-dwarf white winter wheat was alternated annually with either fallow or spring cereal (barley or wheat). Fertilizer treatments were none, N, NS and NP.

The cereals showed a strong response to fertilization, averaging 16.5, 13.8 and 7.0 bu/A, for N, S and P, respectively. Both N and S were more deficient in NT and when soils were cropped annually than was P.

Adequate fertility was a prime prerequisite for efficient yields for CT, NT and crop rotation, but was most critical with NT and the cereal/cereal rotation. ■

Source: P. E. Rasmussen and C. L. Douglas, Jr. 1992. Fertilizer Research 31:15-19.