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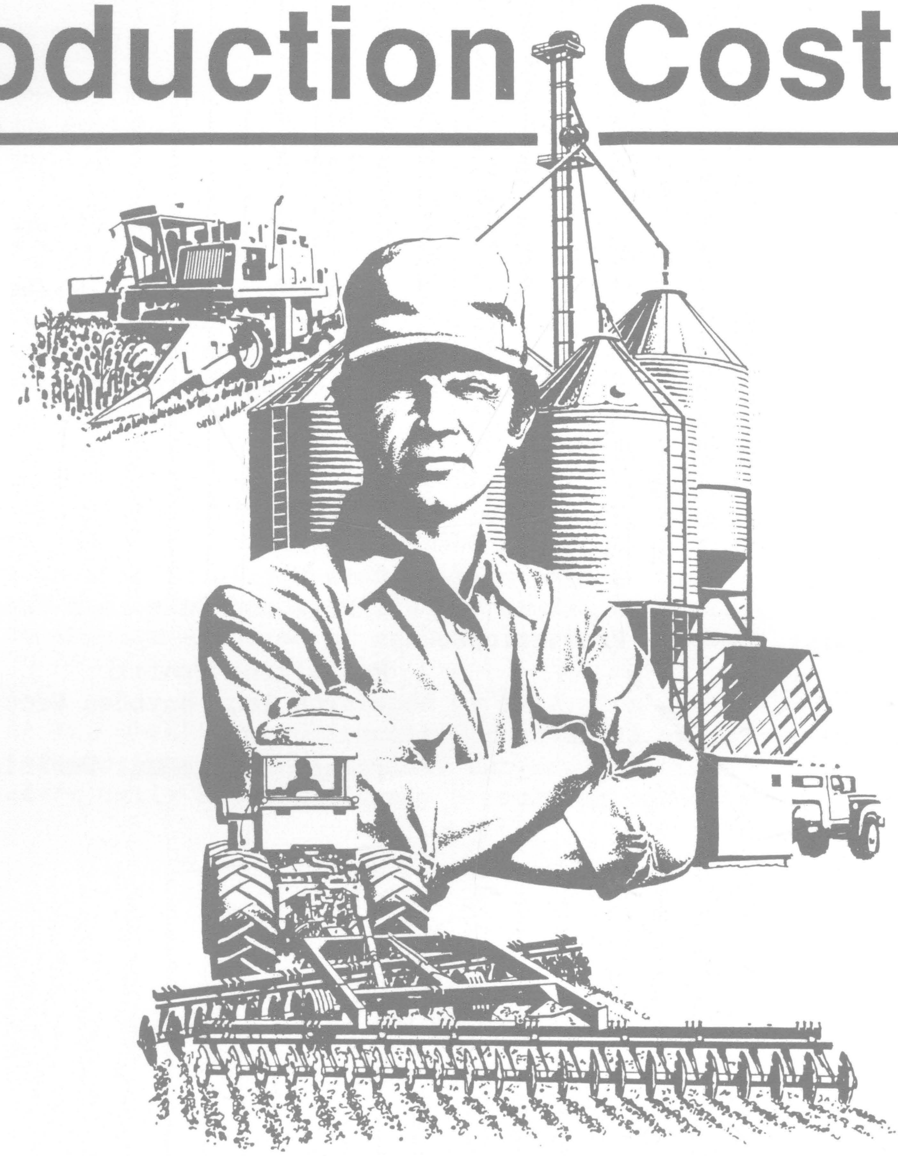
Reducing Crop Production Costs



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Reducing Crop Production Costs

Introduction

During a period of economic stress, it is necessary to critically evaluate all agronomic input to crop production. A careful review of these crop production decisions is necessary in order to assess the benefit and risks of each production practice. For some crop producers, this will result in reduced production costs with little or no risk in yield reduction; for others it will mean production costs would be be maintained or moderately increased while increasing yields and the probability of making a profit.

Now is the time for crop producers to increase their crop management input, improve their management skills and to substitute these for capital input. Low cost crop production considerations coupled with superior management skills may assist crop producers to survive a period of economic stress.

This publication, developed by Extension Agronomists at The Ohio State University, contains agronomic information relating to cost mangement of inputs to efficiently and effectively produce agronomic crops.

Crop Fertilization

Jay W. Johnson
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A sound fertility program is just as important, possibly more so, during financilly distressed times than when cash flow is adequate. So, obtain a soil analysis and develop a soil fertility program that is based on this analysis. Fertilizer needs vary from field to field and within some fields. Fertilize each field based on need.

Those farmers who do not have the means to apply the fertilizer required for optimum crop yields should be very cautious in reducing fertilizer rates. Nitrogen recommendations contain only the minimum amount required to get to the desired yield goal.

To determine nitrogen requirements, consider yield goals, previous crop and nitrogen remaining from previous crop, soil drainage, and application practices. Set realistic yield goals based on previous history and the relative productivity of your field. In fields where the previous crop was a legume or another crop other than corn, reduce nitrogen rate to take advantage of nitrogen left from the previous crop. Manure commonly contains appreciable amounts of nitrogen, phosphorus and potassium. Incorporation of manure greatly reduces nitrogen loss. Adjust fertilizer requirements based on amounts of nutrients available from previous crop and/or manure application.

On soils with less than adequate drainage, consider the sidedress application of most of the nitrogen. This will reduce the potential for nitrogen loss due to denitrification. To insure vigorous early growth, be sure to add some starter nitrogen. When sidedressing or knifing in anhydrous ammonia close to planting, add some starter nitrogen.

Minimize surface volatilization losses of urea in reduced tillage by either surface banding or injecting to reduce contact of urea with surface litter.

The P and K recommendations commonly have built in some additions needed for maintaining the soil fertility of the field. The closer the fertility level is to the desired or adequacy level, the higher the percentage of the fertilizer recommendation for maintenance. The desired soil test for corn and soybeans is presented in Table 1. Therefore, reducing rates at these levels has little influence on yields.

Table 1: Soil Test Required for Optimum Yield in Ohio

	Soil Test Level			
Crop	P_1	Exchangeable K		
		C.E.C. (MEQ/100 g)		
		10	20	30
		lb/A		
Corn	40	265	315	370
Soybeans	31	325	375	425

Determine what yield your field could produce if you had no limiting factors; the usual could be 140-200 bu/A for corn and 50 to 70 bu/A for soybeans. After setting your yield goal, determine the percent of optimum yield and use Tables 2 through 5 to determine the minimum fertilizer required to reach this yield level. These rates are for broadcast incorporated P and K programs.

The final yield percentage achieved depends on the percent of both phosphorus and potassium. The final yield grown is the product of the fertilizer programs for both P and K.

Example #1:

Optimum yield goal (corn) = 160 bu/A
Farmer yield goal (corn) = 120 bu/A

Percent yield goal = 140/160 bu/A = 87.5%

Soil test P_1 = 15 lbs/A
K^1 = 300 lbs/A
CEC = 20 MEQ/100 g.

Because K is near 98%, we would choose to add only P. The rate required would be:

87.5% Final Yield = X% for P_2O_5 x 98% for K_2O
X = 89.3%

Therefore, for a phosphorus soil test of 15 lb/A, we would need to add 30 to 40 lb/A to achieve 140 bu/A corn.

Example #2:

Optimum yield goal (corn) = 160 bu/A
Farmer yield goal (corn) = 140 bu/A

Percent yield goal = 140/160 bu/A = 87.5%

Soil test P_1 = 15 lb/A
K = $_1$50 lb/A
CEC = 20 MEQ/100 g.

Both P and K are very low. Therefore, some of each nutrient needs to be added.

The percentage yield increase for each 10 lb. of P_2O_5 yields improve two to five percent. For K this yield increase is two to four percent.

If the P_2O_5 cost is greater than the K_2O cost, then K_2O should be added first. If the cost of P_2O_5 is less than the cost of K_2O, then P should be considered first. In this example we will assume that the cost of P_2O_5 is greater than the cost of K_2O.

Adding 80 lb. K_2O/A would improve yields from 77% to 95%

Now we can determine the amount of P_2O_5 required:

87.5% optimum yield = X% P_2O_5 x 95% K_2O

X% P_2O_5 = 92.1%

Therefore: 40 to 50 lb P_2O_5 would be required.

Table 2 Phosphorus Requirements for Corn

Soil Test P[1] lb/A	Relative Yield (Percent of Optimum) — P_2O_5 Added (lb/A) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
10	63	70	76	80	84	87	89	91	93	95	96	97	98	99	100
15	77	82	85	88	90	92	94	95	96	97	98	99	100		
20	86	89	91	93	94	95	96	97	98	99	100				
25	92	93	94	95	96	97	98	99	100						
30	95	96	97	98	99	100									
35	98	98	99	100											
40	100														

Table 3 Potassium Requirements for Corn

Soil Test K lb/A — Soil CEC (MEQ/100g) 10	20	30	Relative Yield (Percent of Optimum) — K_2O Added (lb/A) 0	10	20	30	40	50	60	70	80	90	100	110	120
100	150	200	77	81	84	87	89	91	93	94	95	96	97	98	100
125	175	225	84	87	89	91	93	94	95	96	97	98	100		
150	200	250	89	91	93	94	95	96	97	98	100				
175	225	275	92	94	95	96	97	98	100						
200	250	300	95	96	97	98	100								
225	275	325	97	98	100										
250	300	350	98	100											
275	325	375	100												

Table 4 Phosphorus Requirements for Soybeans

Soil Test P[1] lb/A	Relative Yield (Percent of Optimum) — P_2O_5 Added (lb/A) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
10	71	76	79	82	85	87	89	91	92	93	94	95	96	97	100
15	85	87	89	91	92	93	94	95	96	97	98	100			
20	92	93	94	95	96	97	98	100							
25	96	97	98	100											
30	98	100													
35	100														

Table 5 Potassium Requirements for Soybeans

Soil Test K lb/A Soil CEC (MEQ/100g)			Relative Yield (Percent of Optimum) K_2O Added (lb/A)									
10	20	30	0	10	20	30	40	50	60	70	80	90
100	150	200	58	71	80	86	90	93	95	97	99	100
125	175	225	67	77	84	89	92	95	97	98	100	
150	200	250	73	81	87	91	94	96	98	100		
175	225	275	78	85	90	93	95	97	100			
200	250	300	83	88	92	96	98	100				
225	275	325	87	90	94	98	100					
250	300	350	90	92	96	100						
275	325	375	93	98	100							
300	350	400	96	100								
325	375	425	100									

A note of caution: There is no soil maintenance built in; therefore, these recommendations will likely cause your soil test to decrease if you add less than crop removal. Also, there is little insurance built in for abnormal conditions such as weather stress.

Fertilize fields with low fertility first and then fields with high fertility. Fields high in phosphorus and potassium do not require additional nutrients for a year or more without affecting yields. This practice will give a greater return for each fertilizer dollar than reducing the fertilizer rate on all fields uniformly.

Apply only those nutrients that are determined to be limiting yield. As yet, many micronutrients are not recommended for most soils by The Ohio State University agronomists. Something applied when not needed is an additional cost of production and reduces profit.

Banding phosphorus and potassium with the planter has proven to be more efficient at low soil test levels than broadcast applications. To insure efficient uptake of phosphorus and potassium, place them beneath the soil surface. Roots, nutrients and moisture must be in the same area for nutrient uptake.

Managing Livestock Waste As A Fertilizer

Donald J. Eckert
Extension Agronomist, Conservation Tillage

Livestock manures present problems and opportunities to those farmers faced with their disposal. On one hand, manures represent waste products of an animal production operation that must be stored, handled and disposed of in an environmentally sound manner. On the other hand, for farmers also operating a crop production enterprise, manures represent relatively inexpensive sources of plant nutrients. Proper manure management can offer many farmers the opportunity to reuse fertilizer purchased in the past by recycling it through the animal and back to the field.

The Soil Conservation Service recently adopted specifications stating that manures be applied to fields at rates that provide phosphorus (P) to row crops and small grains or potassium (K) to forages at rates equivalent to nutrient removal. Extension agronomists at OSU have endorsed these recommendations on soils where applications of P or K at crop removal rates are sufficient to achieve optimum yields. On less fertile soils somewhat higher application rates or supplemental amendment using commercial fertilizers may be needed.

In the past, manure disposal often has been guided by the nitrogen supplying power of the manure, a philosophy that has led to very high loadings per unit area in many cases. These high loading rates have resulted in elevation of soil test P and K levels into the extremely high ranges and in some cases have induced yield-depressing nutrient imbalances. A better understanding of manure characteristics and some simple arithmetic will show that applications of manure at lower rates based on crop P and K requirements may be more economical than higher rates of application for many farmers.

Livestock manures contain appreciable quantities of P, K and nitrogen (N), plus smaller quantities of other nutrients. Table 1 lists the approximate N-P-K contents of various manures. These values are only averages and farmers are urged to have their own manure lots analyzed by a reputable laboratory prior to planning a management program.

Most well-designed handling systems will hold P and K losses from the manure to a minimum; however, N losses are virtually impossible to control because much of the N is in highly volatile forms, which evaporate upon drying. Up to 50 percent of N in manure can be lost in this manner. In addition, only one-third of the remaining N (75 percent for poultry manure) will be plant-available in the year of application. Thus, the 10 pounds N per ton of raw dairy manure shown in Table 1 may yield only 1.7 pounds plant available N in the field. The P and K in manure also may not be totally available the first year, but this is of lesser concern when soil test levels are adequate to begin with.

For the sake of an illustration, assume that a farmer wishes to produce 50 acres of corn on a field with existing fertility adequate to allow for a crop-removal fertilizer program. He has need to dispose of 1200 tons of dairy manure with nutrient contents equivalent to those shown in Table 1. After correcting for handling losses and N availability, the actual quantities of nutrients available would be about 2,000 pounds N, 4,800 pounds P_2O_5 and 9,600 pounds K_2O.

In one disposal alternative, the farmer might choose to apply all manure to 10 of the 50 acres, providing 200 pounds nitrogen per acre to that 10 acres but overfertilizing them with 480 pounds P_2O_5 per acre and 960 pounds K_2O per acre. Spreading the manure over the entire 50 acres yields loadings of 40 pounds nitrogen per acre, 96 pounds P_2O_5 per acre and 192 pounds K_2O_5 per acre.

Table 1. Approximate nutrient contents of various manures before storage and handling losses

	Solid			Liquid		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	(lb/ton raw manure)			(lb/1000 gal liq. manure)		
Dairy	10	4	8	41	17	32
Beef	11	8	10	45	34	39
Swine	14	10	11	55	41	39
Sheep	22	8	19	97	32	83
Horse	12	4	9	48	18	36
Layer	27	24	14	109	95	57
Broiler[1]	34	17	13	-	-	-

[1]Birds on litter
Source: Ohio Livestock Waste Management Guide (OCES Bulletin 604)

These P and K applications are adequate to compensate for crop removal from a better than average corn silage harvest but are not excessive.

Additional fertilizer is required in each case. In the first case, N, P and K must be applied to 40 acres. In the second, N must be applied to all 50 acres. The fertilizer programs for these alternatives are shown in Table 2. Note that in the year of application, the second alternative reduces fertilizer costs significantly (approximately $30 per acre). True savings can be determined by subtracting any extra application costs from the savings on fertilizer.

While the two alternatives presented here are representative of extremes, they do demonstrate that manure application designed to satisfy P and K requirements can be more economical than heavier applications. This line of thinking can be applied to grain as well as silage production and to crops other than corn. It can also be applied at soil fertility levels less than sufficient in P and K, though in performing calculations, one should assume 50 percent availability for P and K, due to lack of uniformity in manure nutrient distribution and somewhat lower efficiency of manure P and K than fertilizer P and K. This correction is not necessary when soil test levels are at sufficiency or above (crop removal situations) because the manure is replacing already adequate fertility in the soil.

Table 2. Fertilizer programs for two manure management systems

	Acres Fertilized	Fertilizer Rate	Total Fertilizer	Cost[1]
	-Acres-	-lb/A-	-lb-	-$-
		10 Acres Manured		
N	40	200	8,000	1,200
P_2O_5	40	95	3,800	760
K_2O	40	190	7,600	760
				2,720
		50 Acres Manured		
N	50	160	8,000	1,200
P_2O_5	0	0	0	0
K_2O	0	0	0	0
				1,200

[1]N = $.15/lb; P_2O_5 = $.20/lb; K_2O = $.10/lb

Selecting Cost Efficient Tillage Practices

Donald J. Eckert
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The selection of the most cost-efficient tillage system in a given year involves evaluation of a number of factors. These include equipment available for tillage and planting, soils present on farm, previous crops and any anticipated effects of tillage on yields. For the purposes of this discussion, it will be assumed that the farmer is interested in the short-term goal of generating a reasonable, positive cash flow, rather than adopting the tillage system that will produce the biggest profit in the long run.

The first decision that must be made is whether to till or not. This decision should be made based on the type of planter the farmer expects to be using. If an individual owns or has ready access to a no-till planter, no-till becomes a reasonable alternative in many situations. If not, some seedbed preparation is usually needed to ensure establishment of adequate stands.

Those farmers choosing no-till as their alternative should strive to execute a well-planned, complete no-till program. If P and K were not applied in the fall, these nutrients should be broadcast as early in the spring as possible to ensure leaching into the root zone, or applied as row fertilizer at planting. Nitrogen should be applied as anhydrous ammonia or dribbled, injected or sidedressed as 28 percent UAN (sidedressing is preferable on poorly drained soils). Urea should be used only if it can be injected or applied before a heavy rain. Phytophthora root rot-tolerant soybean varieties should be used. Finally, planting should be accomplished as early as is reasonably possible but should be delayed if soil conditions do not permit establishment of good, consistent seed-soil contact. Following the above guidelines carefully will add little if anything to production costs and will help ensure a successful no-till production program.

Most reasonably well-drained fields (naturally or tiled) can be successfully no-tilled in an emergency situation. The most successful programs will be those in which a crop rotation is practiced; however, on naturally well-drained fields, continuous corn can normally be practiced using no-till with little or no reduction in yield potential.

Farmers not possessing no-till planters or those needing incorporated herbicides for specific weed pressures (i.e., johnson-grass in corn) will need to perform some spring tillage. The intensity of such tillage should be based on field conditions. Several factors should be considered.

Nearly any field to be planted to a crop different than last year's should be tilled only enough to ensure adequate planter performance. A light disking or field cultivation of soybean residue covered fields is sufficient for corn production, as would be a light disking of cornstalks for soybean production. On low organic matter soils such an option is also appropriate for continuous corn.

On poorly-drained, higher organic matter soils (Kokomo or Pewamo, for example) farmers contemplating continuous corn or soybeans are faced with a dilemma. Yields will generally be proportional to the degree of tillage, i.e., more tillage gives higher yields. These differences are economic in most years. These are the only soil-cropping combinations in which spring plowing should be considered as an option. Plowing, however, should be accomplished very early, preferable before April 1 and plowing should only be done when soils will not slab. A poor or hurried job of plowing may leave the soil in poor physical condition, which will result in reduced stands, root development and yields.

If plowing cannot be accomplished in a timely manner, light tillage is a preferable alternative. Yields will probably be somewhat lower than in a well-prepared, plowed seedbed but higher than in one improperly prepared by plowing. If weather delays field preparation past the optimum planting period, no-till should be seriously considered. Yield losses resulting from delayed planting may be much greater than those resulting from reduced tillage.

Tillage operations cost money in terms of fuel consumption, labor charges, equipment deterioration and yield loss due to delayed planting. They do not always increase yield. Such costs reduce positive cash flow and profits. Farmers in distressed financial states or those simply desiring to maximize short-term returns should consider that in most Ohio cropping situations, eliminating tillage operations or reducing tillage intensity will not adversely affect profitibility but will improve it.

Considerations For Improving The Cost-Efficiency Of Weed Control

Kent Harrison
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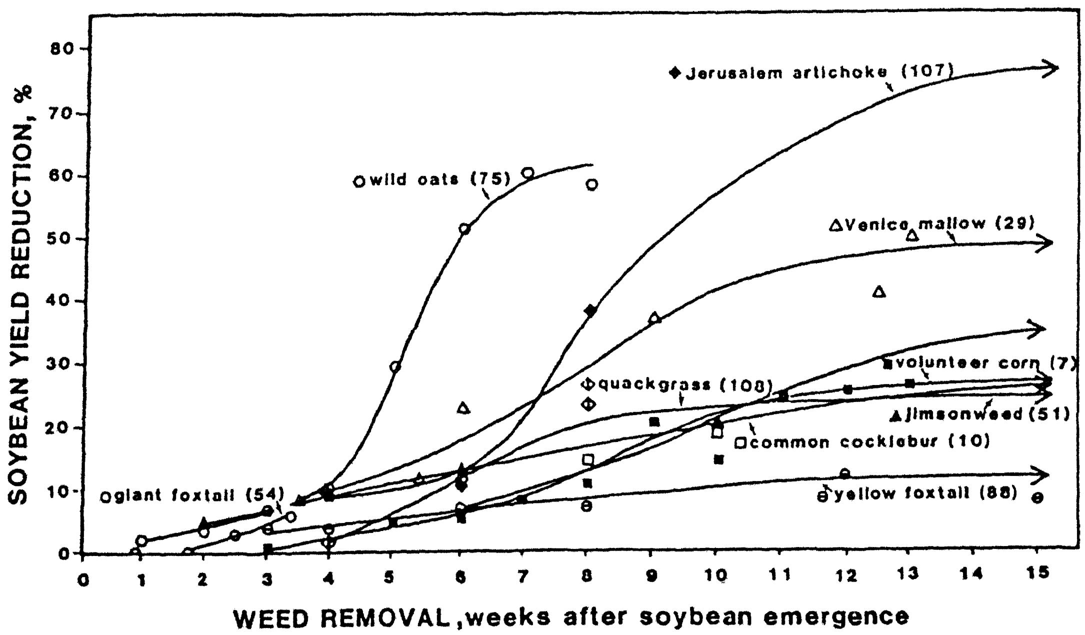
Weed control is a necessary part of all crop production systems because weeds reduce yield by competing with crops for water, nutrients and sunlight. The most successful weed control programs usually involve a combination of cultural practices and the use of carefully selected herbicides. More importantly, the most successful producers use methods that maximize profits, not just weed control.

There are two very important concepts that should be considered when planning a weed control program for corn and soybean production. These are as follows: (1) good weed control within the first four weeks after crop emergence is critical in order to avoid a yield loss from weeds; and (2) different weeds vary greatly in their ability to compete with crops and reduce yield. Years of research on weed competition with soybeans has shown that good weed control within the first month after soybeans emerge will avoid a yield reduction by weeds (Figure 1). Information available at the present time indicates that a similar period of weed control is also critical for corn.

Fields that are kept free of weeds for the first four weeks allow the crop to become well-established so that late-emerging weeds are not competitive and therefore have little effect on yield. In fields where the primary problems are annual grasses and annual broadleaf weeds, a soil-applied treatment may be the most cost-effective and reliable method of controlling weeds within the first month. Application of postemergence herbicides may be required for specific problem weeds or when soil-applied herbicides fail (due to extremely dry weather, etc.), but they require timely application for good weed control. This is an important factor to remember because postemergence applications may have to be delayed beyond the first critical month after crop emergence should weather conditions be unfavorable.

Figure 1. Effect of time of weed removal on soybean yield.



Data from Stoller, Harrison, Wax, Regnier, Nafziger, 1986.

There are economic thresholds for weeds just as there are for insects. The economic threshold for weeds may be defined as the weed population or the time after weeds and crop emerge at which control measures should be implemented to avoid economic injury. Economic injury occurs at the weed population or point in time when the economic yield loss caused by weeds has exceeded the cost of available control measures.

In reality, the economic thresholds for weeds are difficult to determine unless the decision is made to apply no control measures until weeds emerge after the crop is planted. Postemergence herbicide treatments may be applied for weed control when the economic threshold is reached but may be expensive, dependent on weather conditions for maximum effectiveness, and require timely application with regard to the size and age of weeds. Preventative treatments (preplant or preemergence soil-applied treatments) may be more effective and economical in fields where weed infestations are known to be high. Unfortunately, we do not always have a clear-cut answer to the question, "Is it worth the time and money to spray?" However, there are some considerations one should remember when trying to design the most cost-effective weed control program.

Certainly some of the most effective and cost efficient methods of weed management over the long term involve the use of cultural practices including crop rotation, adequate seedbed preparation, adequate fertility, proper seeding rate and date and use of optimum row width. Crop rotation involves herbicide rotation, which helps prevent certain weed species from becoming dominant and building up seed reserves in the soil. Narrow rows (for soybeans) will shade the centers faster and help suppress weeds that emerge later in the season. The other factors mentioned help the crop to become quickly established and compete better with weeds.

Herbicides are usually the single most expensive component of any year-to-year weed control program. Fortunately, there are many commercial herbicides available that vary greatly in price and provide broad-spectrum weed control. As a result, several options are available to today's grower when planning a weed control program. The key to maximizing weed control at reduced costs is to target specific weed problems with specific herbicides.

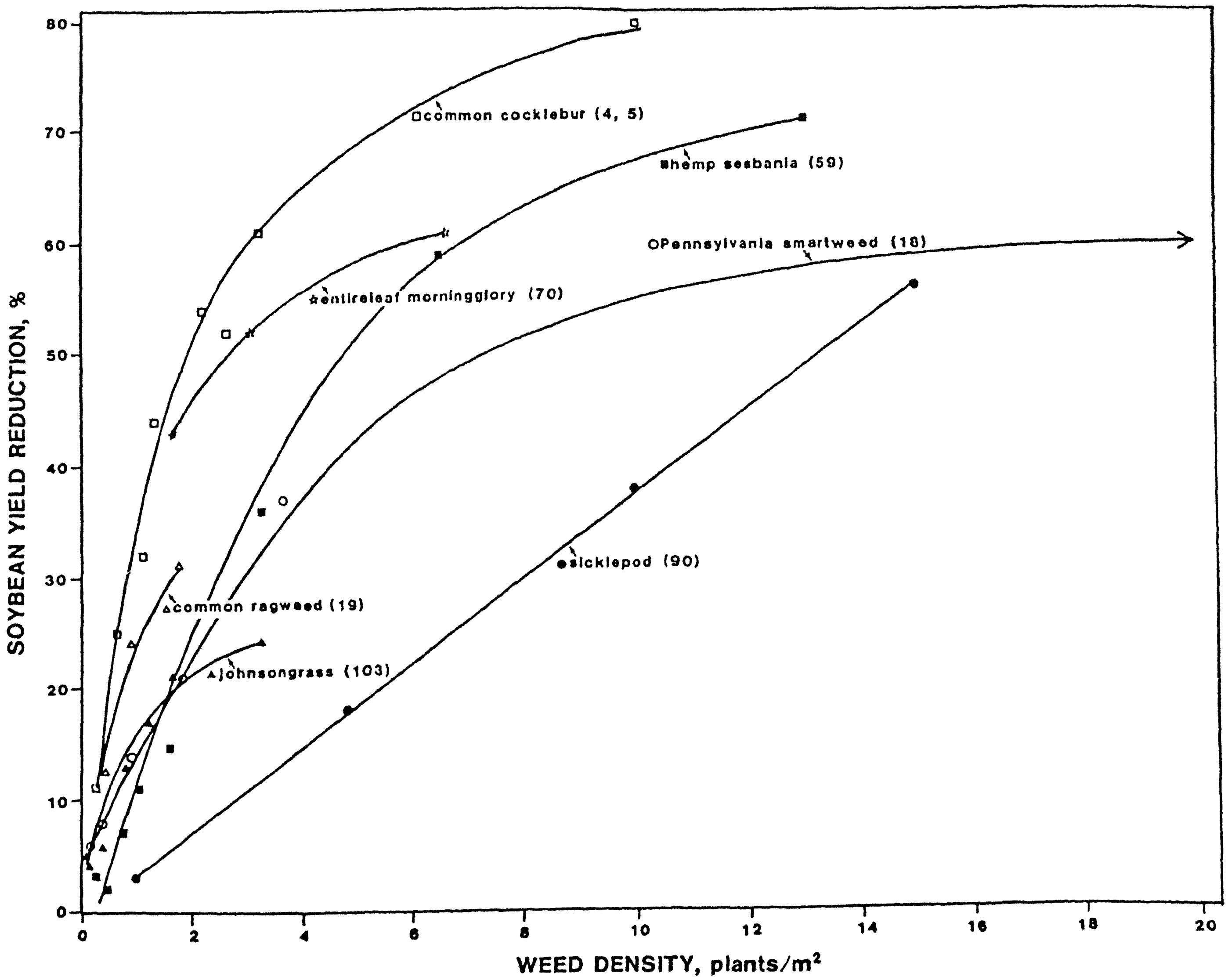
Decisions on the herbicide to use should be based upon the specific type and number of weeds present. The rates of application should be those recommended on the herbicide label. Applying more herbicide than is recommended by the label often does not increase the level of weed control and may cause crop injury. In short, over-application is simply a waste of money that may actually do more harm than good. Obviously, applying too little herbicide may result in poor weed control and cause the need for additional treatment.

As mentioned in other sections of this bulletin, using no tillage or very little tillage is one of the easiest ways to reduce production costs. In many no-till systems, recent evidence suggests there is no need for increased herbicide rates when compared to conventional tillage. One of the factors that increases herbicide costs in no-till crop production is the need for a burndown herbicide to control established weeds before or at planting. One method to avoid the need for a burndown herbicide is to make soil-applied treatments early in the spring before most weeds emerge. Early preplant (EPP) applications are most effective when applied about one month before planting. The danger of EPP herbicide application is that the herbicide will not last long enough to provide adequate weed control for the entire growing season. For this reason, results have often been more consistent by making a split application; that is, applying half the recommended herbicide rate EPP and the rest at planting time.

If there are no weeds present at planting, there is certainly no need for a burndown herbicide. In addition, if only small (less than 2-3 inches in height) annual weeds are present, the addition of a crop oil concentrate to soil-applied herbicides like atrazine (for corn) or metribuzin (for soybeans) produces good burndown activity and eliminates the need for an additional contact herbicide. Application of herbicides in liquid fertilizer may also enhance burndown activity. Specific burndown herbicides (paraquat, Roundup, etc.) should be used if many weeds are present, if weeds are too large to control with other herbicides, or when perennial weeds present a problem. If annual broadleaf weeds are the major problem before planting, the use of 2,4-D as a burndown herbicide, where labeled, is a cheap and effective alternative to more expensive products.

Different types of weeds vary greatly in their ability to interfere with the crop and reduce yield (Figure 2). For example, a moderate infestation of common cocklebur or jerusalem artichoke in soybeans will reduce yield much more than a similar infestation of venice mallow or giant foxtail. When planning a herbicide program, money is often better spent on herbicides that target highly competitive weeds like cocklebur or johnsongrass as opposed to applying a "standard" herbicide treatment for general weed control. It is also important to remember that weed control is always necessary for profitable crop production, but complete control for weeds is not required to maximize profits.

Figure 2. Effect of weed population density on soybean yield.



Data from Stoller, Harrison, Wax, Regnier, Nafziger, 1986.

Corn Hybrid Selection, Planting Rate And Date, And Crop Rotation

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Select high-yielding, full season hybrids with good performance traits (standability, fast dry down, etc.) for maximum yield. Large differences in yield potential exist among corn hybrids, even within similar maturities. Seed prices vary among hybrids, so determine seed cost on a per acre basis. Then compare the expected income difference with the seed cost difference for any two hybrids. Hybrid maturity management to produce the most bushels of grain on a given acreage of corn requires planting the full-season hybrids first and following with hybrids of earlier maturity. If corn planting is completed by mid-May, the early maturing hybrids planted last will reach harvest moisture levels earlier in the fall than do the full-season hybrids which were planted first.

Planting rate or population can be reduced to lower seed cost, but this approach typically costs more than it saves. Consider the following example. Seed cost is $25 per acre if 26,400 kernels are dropped per acre. A bag with 80,000 kernels costs $75. For each 10 percent reduction in seeding rate, $2.50 per acre can be saved. The value of the yields lost due to lowering the seeding rate by increments of 10 percent for a 125 bushel per acre yield goal are shown in Table 1. Notably, decreasing cash cost by decreasing seeding rate decreased profits with all reductions in plant population. Therefore, **seeding rate should not be decreased.** Seeding rate should only vary within the limitations imposed by such factors as soil water holding capacity and soil production potential.

Early planted corn produces the highest grain yield, matures earlier in the fall, and is lower in moisture content when it matures than late planted corn. Planting early does not cost more than planting late. Corn planting should be completed by May 10 to avoid yield reductions. More than half of the corn in Ohio is typically planted after the optimum planting date causing lower yields.

Rotation of corn with other crops has

Table 1. Effect of Reducing Plant Population on Grain Yield and Income (assumes yield of 125 bu/A for a 100% stand and $2.50/bu selling price

Population	--Yield reduction--		Value of lost yield	Lost return over seed cost
% of stand	percent	bu/A	$/A	$/A
90	3	3.8	$ 9.50	$ 7.00
80	9	11.2	$28.00	$23.00
70	15	18.8	$47.00	$39.50

many benefits. Cash costs are reduced because rootworm insecticide is not needed for first year corn and the nitrogen requirement is decreased when corn is planted after a legume. In addition, corn yields in Ohio are increased 5 to 10 percent when rotated due to factors other than nitrogen and pest control. This effect is even more pronounced on the very poorly drained soils in Ohio (Table 2).

In summary, there are management practices that can be changed to increase corn yields without increasing the cash cost of production. These practices include careful hybrid selection, early planting, and crop rotation. Decreasing seeding rate will decrease yield, increase unit cost, and lower profit.

Table 2. Effect of Crop Rotation on Corn Yield

Soil type	Percent Yield Increase for Corn after Soybeans
Canfield (well drained)	8
Kokomo (poorly drained)	15
Hoytville (very poorly drained)	25

Maximizing Profit From Your Soybean Crop

James Beuerlein
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There are two basic processes for increasing the profit realized from your soybean crop. One is to produce more yield at the same cost of production and the other is to produce the same yields at a lower cost of production. The greatest effect is realized when both can be accomplished - i.e., more yield at a lower cost of production. Specifically, variable cost must be reduced or cultural practices may be changed, which either reduce costs or increase yield or both. Following are some possible adjustments that can be made in your soybean production plan.

Reducing Variable Costs

Set a realistic yield goal for each field or for each soil type in a field. Perform soil test on each soil type or at least separate low and high organic matter soils. Dark soils usually have higher soil test values than light colored soils and may not require additional nutrients while the light colored soils may need adjustment. Table 1 shows some suggested fertilizer rates for varying soil levels of phosphate and potash.

Select the herbicides that will control the most important weeds in each field. Don't plan on using the same combination and rates in each field unless they have exactly the same problems. It may be prudent to change rates as soil types change. Chemical weed control improves as the row spacing is reduced, so use the crop to help control weeds.

Table 1: Suggested Fertilization Rates When Economically Stressed

	Soil Test Levels					
Soil Type	Soil P = <30,	30-45,	>45	Soil K = <250,	250-350,	>350
0-2% Organic Matter	30	0	0	100	50	0
2-6% Organic Matter	15	0	0	150	75	0

Conventional tillage usually costs $20 to $30 per acre, of which $5 to $10 are variable costs that can be eliminated or saved when using no tillage. The soil types likely to respond positively to tillage are the fine textured-poorly drained clay soils. As tillage is reduced, soil dries slower and the date of planting may be delayed but can be compensated for by the use of narrow rows. Do not perform tillage unless soil conditions at the 3 to 8 inch depth are satisfactory for tillage.

Improved Cultural Practices

Where plant stands have been erratic or inadequate in the past, buy seed with a fungicide applied and plant at the proper rate and depth. If **Phytophthora** is present, select tolerant varieties and treat with Apron fungicide, or buy varieties with good resistance (Century 84, Wlliams 82, Beeson 80, etc.). When planting later in the season or into soils that are warm where emergence is expected to occur in less than seven days, a fungicide may not be needed.

Select the best varieties for your production system. Use only small or medium size seed in grain drills as large seed may be damaged. Select lodging resistant varieties if lodging has been a problem or reduce the seeding rate by 15 to 20% to prevent lodging which, reduces yield, slows harvest and increases harvest losses. If **Phytophthora** is present on your farm, select varieties that have sufficient tolerance or resistance so that yields won't be affected. If Phytophthora is present and you plan to plant early, then have Apron fungicide applied to your seed.

Always rotate crops. All crops will produce 5 to 10 percent higher yield when following a crop other than themselves. The cost of production is usually lower for rotations.

Plant as soon as soil conditions become suitable. Earlier planting enables the use of more of the growing season and usually higher yields. However, earlier planting requires a better weed control program and good stands are harder to achieve.

Row spacings for soybeans should never be greater than 15 inches. If planting in June, rows should be no wider than 7 inches. Use a combination of planting date and row spacing that will provide a completed canopy by late June. If you have only a 30 inch row corn planter for planting soybeans, then split the middles, to achieve narrow rows. When planting 5 acres per hour and soybeans are worth $5.00 per bushel, the return per hour while splitting the middles would be $125.

The maximum yield can be harvested from a field only if the proper combination of cultural practices and materials for the conditions of that field are used. For any field we can use:

a tillage system or the IDEAL tillage system;

the MOST EFFICIENT fertility program or a less efficient one;

a good variety or the BEST variety;

a weed control program or a VERY EFFICIENT weed control program;

a good cultural sytem or the BEST cultural system.

The difference in "a good" and "the best" input may change yield by only half a bushel. But when eight different inputs add a half bushel each, in total they add an extra $20 per acre, which may be a two to four-fold increase in profit. In essence, it is doing each thing well, no matter how insignificant it may seem, that will likely be the difference in profit and loss in 1987.

Forage Management Decisions

Donald K. Myers
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Timeliness

Be timely. Be prepared to do things on time when they should and could be done. Among the many factors important in profitable forage production, timeliness of seeding, harvest and pest control are of utmost importance.

Seedings

Prepare a level, firm weed-free seedbed. Seed during April - early May or August. Seed shallow, no more than 1/4 inch in soil. By proper seeding techniques, seeding failures are reduced and recommended seeding rates are more than adequate to establish productive stands, thus reducing establishment costs. Inoculate legume seed with the specific inoculum. Inoculation continues to be a means of insuring the presence of adequate numbers of the desired Rhizobium bacteria necessary for nitrogen fixation.

Fertilizing Forages

Obtain a soil test. Make decisions based upon a soil analysis. Fields high in phosphorus and potassium may not need or need very little fertilizer. If some fields have high fertility and some are low, apply fertilizer to the low ones. This procedure will result in a higher return than fertilizing all fields at a reduced rate.

Remember, the major nutrients for forage production are lime, phosphorus and potassium. Soil pH must be corrected to at least 6.5 for alfalfa, pH 6.2 for red clover and pH 6.0 for birdsfoot trefoil. Soil phosphorus level should be a minimum of 40-60 (Bray P_1) and exchangeable potassium 220-260 plus five times the cation exchange capacity (CEC). These pH and soil fertility levels may be higher than the minimum levels necessary to produce some of the row crops. Therefore, it may not be necessary to raise all fields to these levels, just those fields in which forages are to be grown.

Annual forage removal is 14 pounds of P_2O_5 and 60 pounds of K_2O per ton of dry matter harvested from the field. Where soil P and K levels are in the high range, these annual rates may be reduced for a short time.

Use manure. As mentioned elsewhere in this leaflet, manure has a fertilizing value. Especially important to forages is the potassium which manure contains. When using manure to raise soil P and K levels prior to seeding, apply the manure as far ahead of the seeding as possible and plow or till into the seedbed. Manure should not be surface applied just prior to no-tillage seedings.

Manure may be used to provide the annual forage maintenance requirements. The manure should be applied in the fall, following the last regular harvest.

Apply minor and micronutrients where plant analysis confirms a deficiency may exist.

Harvesting

Among the production decisions which the forage producer must make, none is more important to both quantity and quality of production than timing of the harvest.

Nutritional values of forage vary directly with the maturity of the forage. From the time the heads begin to emerge in grasses, digestibility decreases approximately one-half percentage unit per day. In the case of legumes, digestibility is reduced by one-third to one-half percentage unit each day following the development of flower buds.

One of the reasons silage is so popular is the attempt to overcome some of the weather and associated harvesting hazards. Most reports indicate approximately ten percent more feed value is harvested and stored when the forage is ensiled, due to reducing the harvest losses by harvesting at a higher percent moisture than for hay.

Pest Control

Scout the fields. Identify the insect and weed problems and apply control measures when necessary, but only when necessary. Application of pesticides when not needed is costly.

Unproven Products

Avoid the temptation to buy unproven products. Stick with the proven, recommended practices. Often new miracle products do not result in increased yields, only increased costs.