

# WHAT BLUEGRASS FARMERS THINK ARE THE CONDITIONS FOR USING SOIL-CONSERVATION AND SOIL-BUILDING PRACTICES

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## SUMMARY

Highlights of this study of why or when farm operators think certain soil-building and conservation practices should be used are the following:

1. Most farmers recognized the function of soil testing in determining fertilizer needs, but many felt it necessary to test only when a person had had a crop failure. This was particularly true of those with small cropland acreages.
2. Farmers emphasized the need to obtain larger yields as the dominant reason for using fertilizer on corn, but few mentioned a soil test as a condition for fertilizing. Those with small corn acreages were less likely to view fertilizer as necessary.
3. Relatively few had fertilized permanent pastures, although both users and nonusers gave improvement of pastures as the reason one might fertilize them. Those with larger farming operations and more contacts with agricultural agencies had more often tried pasture fertilization.
4. The majority mentioned a soil test as a criterion for spreading lime. Others gave folk or "natural" indicators. The larger the cropland acreage, the greater was the tendency to suggest a soil test.
5. Few farmers had ever used terraces, although most recognized them as a means of preventing erosion. Only those with more than 25 acres of cropland, some sloping fields, and a serious concern with the problem of erosion were likely to have used them.
6. The conditions under which farmers felt contouring should be used were similar to those for terraces.

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State agricultural extension services, the U. S. Conservation Service, and other agricultural agencies usually recommend a farming practice on the basis of a specific scientific justification. However, the reasons or conditions for using the practice as perceived by farmers may not be based on the scientific justification, even among farmers who are regular users and perhaps staunch proponents of the practice. Nonusers may sometimes have quite "far-fetched" or entirely erroneous ideas as to why or when a practice should be used; this may be a part of the reason why they have not tried it. An example of a difference between the scientific conditions for using a practice and a common lay conception of the conditions may be seen in the reasons given for soil testing. A soil test is merely an objective way of assessing soil deficiencies in relation to crop requirements, but it is thought of by many farmers as a "cure," to be used only in case of a crop failure.

The purpose of this report is to examine what farmers think are the conditions for using certain soil conservation and soil-building practices, including soil tests, fertilizer, lime, terraces, and contouring. Differences in opinion and perception are analyzed in relation to whether the farmers are actually using the practice, and to such factors as the education of the farmer, size of farm and the farmer's contacts with agricultural agencies.

The data were obtained in a 1960 survey of 140 farm operators in 12 neighborhoods of an Outer Bluegrass county. The soils in these neighborhoods are of two general types — Outer Bluegrass (Lowell, Shelbyville, and Bedford) and Hills of the Bluegrass (Eden and Nicholson). The farmers interviewed are a 50 percent sample of the farm operators residing in the 12 neighborhoods.<sup>1</sup>

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<sup>1</sup>For additional details on the neighborhoods and the farmers interviewed see C. M. Coughenour and N. B. Patel, Trends in Use of Recommended Farm Practices and of Farm Information Sources in 12 Kentucky Neighborhoods. Lexington: Kentucky Agricultural Experiment Station, Progress Report 111, January 1962.

In each interview the farmer was asked whether he had used certain practices. The survey questions are summarized below:

1. Soil testing — Have you ever had any soil tested?  
Have you had any soil tested in the past 3 years?
2. Fertilizer on corn — Did you use commercial fertilizer on corn which you planted in 1959 or 1960?
3. Fertilizer on permanent pastures — Did you spread commercial fertilizer on land being used for permanent pasture in 1959 or 1960?
4. Lime — Did you spread lime on any land on your farm in 1959 or 1960?
5. Contouring — Have you ever farmed on the contour, that is, have you farmed fields that were laid out with a level and plowed and cultivated that way?
6. Terraces — Have you ever built or used terraces on your farm?

Farmers who had not used a practice were asked whether they would ever use it, and, if they responded affirmatively they were asked under what conditions they would use it. If the farmer had used the practice, he was asked to indicate the conditions under which he felt the practice should be used. The intent of the question in each case was to obtain information as to what farmers regarded as the deciding factor for when or whether to use a particular practice.

#### SOIL TESTING

Three-fourths of the farmers interviewed reported that, on at least one occasion, they had had soil tested; three-fifths had tested soil in the three years prior to the interview (Table 1). Of those who had had soil tested, 41 percent regarded soil testing as necessary to determine fertilizer needs and to save money, while 16 percent regarded it as important in determining how to build soil. The remaining farmers believed soil testing was a device to get ASC payments (10 percent), or to save the farmer from repeated crop failure (32 percent). As one might expect, those who regarded soil testing as a means of curing crop failure only infrequently find it necessary to have soil tested. Of the 33 persons giving this reason for testing soil, 26 had not had any soil tested in the 3-year period prior to the interview.

In general, the usefulness of a soil test in determining fertilizer needs is recognized as often by nonusers as users. The survey suggests that the non-soil-test user uses fertilizer only in relatively small

Table 1. - WHEN WOULD A FARMER TEST SOIL?  
(Percentage Distribution of Users and Nonusers by  
Type of Reason Given)

Had Had Soil Tested (106 farmers, 76 percent)		Never Had Any Soil Tested (34 farmers, 24 percent)	
Reasons or Conditions for Use	%	Reasons or Conditions for Use	%
1. To determine what fertilizer is needed for crops and grasses, and to save money	41	1. To determine what commercial fertilizer is needed	71
2. After crop failure, to determine what ground needs; or if one can't determine what ground needs by looking at it (had not had soil tested in past 3 years)	25	2. If there is insufficient natural or green manure, or can't tell what fertilizer is needed	5
3. If there is loss of production and lack of knowledge of ground needs	7	3. If production is low and need to know what fertilizer to use	6
4. To determine crop needs and share in ASC payments	10	4. If required in order to get government payments	9
5. Test soil routinely to build soil, if necessary or when breaking new ground	16	5. If other farmers do it	9
6. Other	1		
TOTAL	100	TOTAL	100

amounts or not at all, and that the motivation to soil test is linked to the farmer's convictions regarding the value of fertilizer. That many are unconvinced of the value of commercial fertilizer under normal conditions is indicated by the responses of those who had tested but said they had done so only to prevent further crop failure.

The size of farm operations seems to be related to the use of com-

mercial fertilizer, since soil testing is most common among farmers with 25 acres or more of cropland. Of the operators of the large farms, 84 percent had tested soil compared with 69 percent of those operating the small farms. Moreover, small farmers (those with less than 25 acres of cropland), if they have tested soil, are more likely than the larger operators to say that they tested to prevent crop failure (47 percent compared with 15 percent).

Soil testing is not useful in itself, but is a means to the efficient use of fertilizer and lime; however, not all farmers understand this and, therefore, it is not particularly surprising to find a strong association between soil testing and the educational level of the farmer (85 percent of the farmers with 8 or more years of schooling had had soil tested, compared with only 63 percent of those with less than 8 years). Apparently, the better-educated farmers more readily see the connection between soil testing, use of fertilizer, higher yields, and larger incomes because they have more contacts with agricultural agencies.

#### FERTILIZER WITH CORN

The great majority of the farmers interviewed had grown corn in one or both of the preceding years. Of those growing corn, 70 percent had used some commercial fertilizer. As to the conditions for using fertilizer with corn, the dominant response was "to get larger yields," reported by 82 percent of the corn growers (Table 2). Only 12 percent volunteered the information that the need for fertilizer could be indicated by a soil test, despite the fact that most had earlier mentioned soil testing as primarily useful in determining fertilizer requirements. This percentage may partially reflect the method of questioning, but it also suggests that farmers tend to move directly from felt needs for a crop to fertilizer purchases, omitting the intervening step of having soil tested.

None of the farmers who had not used fertilizer with their corn unconditionally endorsed its use. More than half seemed to feel that fertilizer, although helpful, would not "pay" because of their small acreages, the price of corn, etc. Traditional beliefs about the fertility of virgin sod and of bottom land were evident in the responses of 19 percent, while 11 percent said they rely on past experience. For the latter, apparently, fertilizer might be used as a cure for declining yields, but the possibility of increasing yields over those presently obtained does not excite them. Indeed, the less favorable attitudes toward the use of fertilizer with corn by the non-fertilizer users seems to be the primary factor which distinguishes them from those who do use it.

Of course, there are situational factors, such as the number of acres planted to corn, which sustain and support favorable attitudes toward the use of fertilizer. Although only 62 percent of the farmers with less than 15 acres of corn in 1960 had used fertilizer, it was

Table 2. - WHEN WOULD A FARMER USE FERTILIZER ON CORN?  
(Percentage Distribution of Users and Nonusers by Type of Reason Given)

Had Used Fertilizer on Corn in Past Two Years (83 farmers, 70 percent)		Had Not Used Fertilizer on Corn in Past Two Years (36 farmers, 30 percent)	
Reasons or Conditions for Use	%	Reasons or Conditions for Use	%
1. To get larger yield	82	1. If growing enough corn, or if price of corn im- proves	42
2. As recommended by a soil test	12	2. If farming upland in- stead of (rich) bottom land, or if using old land instead of new sod	19
3. Other	6	3. If able to afford cost	11
		4. If past experience in- dicates a need for fertilizer	11
		5. Other kind of response	17
TOTAL	100	TOTAL	100

used by 100 percent of those with 15 acres or more of corn. Nearly all of the farmers growing 15 or more acres of corn held highly favorable attitudes toward fertilizer use, while among the smaller growers only those who had actually used fertilizer favored it (62 percent).

In view of the fact that about three-fifths of the farmers with less than 15 acres of corn held favorable attitudes toward the use of fertilizer and were using it, it seems strange that the remaining farmers do not have favorable attitudes. To some extent the favorable and unfavorable attitudes of the small acreage corn growers are related to the size of their scale of over-all farm operations measured in terms of labor-input. For example, 47 percent of the small corn growers who had favorable attitudes and had used fertilizer had large-scale farming operations<sup>2</sup> compared with only 22 percent of those who had not used fertilizer and had unfavorable attitudes. Perhaps some farmers with large over-all operations gain experience with and develop favorable attitudes toward

<sup>2</sup> In this case, large-scale operators are those with more than 2,150 productive man work units. Forty-eight percent of the 119 corn growers had large-scale operations.

"A productive man work unit is ...an ordinary day's work for one man." G. W. Forster, Farm Organization and Management, (New York: Prentice-Hall, 3rd Ed., 1953), p. 402.



fertilizer use with other crops which they transfer to their management of corn growing, even when the acreage is small. Or, it may be that with larger operations the cost of fertilizer for corn is not quite as prohibitive. The possible influence of contact with professional agriculturalists also is indicated since 76 percent of the small corn growers using fertilizer had contacts with one or more agricultural agencies compared with 56 percent of those who were not using fertilizer.

#### FERTILIZER ON PERMANENT PASTURE

All of the farmers interviewed had some pasture land which they regarded as permanent, but only a fifth of them had spread commercial fertilizer on any of it in the two years prior to 1960 (Table 3).

Table 3. - WHEN WOULD A FARMER PUT FERTILIZER ON PERMANENT PASTURE? (Percentage Distribution of Users and Nonusers by Type of Reason Given)

Had Used Fertilizer on Permanent Pasture (30 farmers, 21 percent)		Had Not Used Fertilizer on Permanent Pasture in Past Two Years (110 farmers, 79 percent)	
Reasons or Conditions for Use	%	Reasons or Conditions for Use	%
1. To improve quantity and quality of pasture, or to reclaim deteriorated pasture	87	1. If needed to improve land and pasture	51
2. To obtain government (ASC) payments	7	2. If able to afford its cost	25
3. Other response	6	3. If have much livestock and need much pasture	11
		4. Would never use fertilizer on pasture	4
		5. Other response	9
TOTAL	100	TOTAL	100

The need to improve the quality of pasture was given as the primary condition for using commercial fertilizer by the majority of those who had used it (87 percent), as well as by those who had not used it (51 percent). But the fact that none of either group suggested that a soil test might be used to indicate the need for fertilizer reflects the lack of concern, in general, with systematic improvement of pastures. An additional 25 percent of the nonusers say that they would use commercial fertilizer on their pastures if they could afford it, implying perhaps that they recognize a need for it. While these persons see considerations of cost in relation to expected returns as mitigating

against using commercial fertilizer on permanent pasture, the remainder either are satisfied with the way their pastures are producing or feel that the use of fertilizer is not justified because of the small scale of their farming operations.

If a majority of the farmers feel that the need to improve pasture is the primary prerequisite for use of commercial fertilizer, why have so few of those expressing this view (32 percent) actually used fertilizer in the two years prior to the survey? Both the scale of farm operations and the extent of contacts with agricultural agencies seem to be closely related to actual use. Of all the farmers giving this improvement reason as a basis for fertilizer use, 69 percent of the fertilizer users compared with 23 percent of the nonusers had had contacts with two or more agricultural agencies (Extension Service, Soil Conservation Service, or the Agricultural Experiment Station). Similarly, 69 percent of the fertilizer users compared with 32 percent of the nonusers had large-scale farm operations. Thus, it would seem that the combination of objective needs and consultation with professional agricultural specialists have been instrumental in the farmer's decision to use fertilizer on permanent pasture, once its advantages have been recognized.

#### USE OF LIME

Forty-two percent of the farm operators had spread lime on their farms in the two years prior to the 1960 interview (Table 4).

Table 4. - WHEN WOULD A FARMER USE LIME?  
(Percentage Distribution of Users and Nonusers by Type of Reason Given)

Had Spread Lime on Farm in Past Two Years (59 farmers, 42 percent)		Had Not Spread Lime on Farm in Past Two Years (81 farmers, 58 percent)	
Reasons or Conditions For Use	%	Reasons or Conditions For Use	%
1. If recommended by soil test	53	1. If recommended by soil test	11
2. If there is soapstone in land	9	2. If the stand of grass is poor or there is broom sage in it	42
3. If improvement in land for crops and grasses is needed	20	3. If conditions of land (cold land, soapstone) indicate need	41
4. To get ASC payments	12	4. If ASC pays half the cost, or if other farmers are using lime	6
5. Spread lime periodically	6		
TOTAL	100	TOTAL	100

Of the 81 farmers who had not limed, 21 (26 percent) had reported five years earlier that they had used lime on their farms. Thus, at least 3 out of 5 farmers in these neighborhoods had spread lime on their farms during the years 1953 to 1960.

More than half (53 percent) of the farmers spreading lime in 1958-59 had done so after having their soil tested. Compared with the percentage of those who gave soil testing as a basis for the decision to use fertilizer, this relatively high percentage is quite notable. The response probably relates to the ASC policy of requiring a soil test in obtaining ASC support.

Most of the remaining farmers who have used lime recently, as well as most of those who have not done so, gave various "natural" conditions as indicators of when lime is needed. Deterioration in the stand of grass or a feeling that it should be better, or presence of soapstone were the principal reasons given by those who had used lime recently. A poor stand of grass (especially if there is broom sage in it), the presence of soapstone, etc., were the conditions most mentioned by the farmers who had not recently limed.

A soil test is not only the most common reason given for a decision to lime, but, in combination with the possibility of getting ASC support, it is the most effective one. While 65 percent of those mentioning a soil test had spread lime in the two years prior to the 1960 survey, only 20 percent of those who depended on "natural" factors had done so. Moreover, it is apparent that farmers who rely on "natural" factors use lime infrequently. Of the 21 farmers who reported using lime in the 1955 survey but not in the more recent one, 18 had decided to use it because of the appearance of soapstone, broom sage, "cold land", etc. By contrast, more than half of the farmers who reported using lime in both surveys had relied on a soil test.

The scale of farm operations as indicated by the amount of cropland farmed is important not only to whether lime is used, but also to the conditions under which it would be used. Sixty percent of the farmers with 25 or more acres of cropland had spread lime on their farms compared with 27 percent of those with smaller acreages. Moreover, among the farmers who had spread lime those with larger cropland acreages were most likely to depend on the results of soil tests (58 percent compared with 43 percent).

Although the amount of schooling of the farmer seems to be less important than the scale of his farming operations, the conditions mentioned for spreading lime depend on the farmer's knowledge, thus his education may indirectly affect decisions to lime. While 44 percent of the farmers who had completed less than 8 grades of school mention the presence of soapstone as a reason to lime, this reason is given by only 15 percent of the farmers with 8 years or more of schooling and mentioned by none who had limed in recent years.

TERRACES

Terracing has been recommended for many years as a means of soil conservation where the slope of the land is from 2 to 12 percent. Since the kind of cover crop affects soil erosion, greater importance is attached to terracing when the land is in crop rotations than when it is in grasses. However, despite its importance and the length of time that terracing has been recommended, relatively few farmers use the practice. Many feel that planting, cultivating, and harvesting operations with terraces are more time consuming and the use of machinery more difficult. Also, there are initial construction costs.

According to their reports, a fifth of the farmers in these neighborhoods had no land that might require terraces (cropland with more than a 2 percent slope). Of the remainder, about a quarter were using or had used terraces on their farms (Table 5).

Table 5. - WHEN WOULD A FARMER TRY TERRACING? (Percentage Distribution of Users and Nonusers by Type of Reason Given)

Had Used Terraces (30 farmers, 27 percent)		Had Never Used Terraces (81 farmers, 73 percent)	
Reasons or Conditions for Use	%	Reasons or Conditions for Use	%
1. To control erosion or avoid washing of land	77	1. If have a problem of erosion or drainage and no other satisfactory means of control	36
2. To avoid washing of pasture land	13	2. If land isn't too rolling, and terraces not too costly and time-consuming in farming	36
3. If ASC recommended it	10	3. No particular basis given	26
		4. Never would use terraces	2
TOTAL	100	TOTAL	100

Terracing was found to be closely associated with the amount of cropland farmed. While only 5 percent of the farmers with less than 25 acres of cropland had used terraces, over half of those with larger acreages of cropland had used them. At the same time, among farmers with 25 acres or more of cropland, those who had terraced were farmers who were much concerned with the problem of soil erosion. This is evident since 89 percent of the large-acreage

group who had used terraces express opinions emphasizing the problem of soil erosion, while only 35 percent of the nonusers with the same acreages of cropland express similar opinions. It is further noteworthy that many farmers with less than 25 acres of cropland express concern about the problem of soil erosion, but very few have ever used terraces. Of the 23 farmers with less than 25 acres of cropland who, according to their replies, recognized that terracing prevents soil erosion only 3 had ever used terraces. Thus, in the absence of a large cropland acreage, concern about soil erosion does not lead to terracing, nor does a large cropland acreage in the absence of a concern for the problem of soil erosion lead to the building of terraces. Thus, for terracing, both appropriate attitudes of the farmer and a "substantial" farm size (by the standards in this county) are essential conditions.

Of additional interest is the explanation why some of the farmers (9 in this sample) who had 25 or more acres of cropland and who recognized the importance of terraces in controlling erosion had not tried them. There are, of course, a variety of possible reasons for the failure to use terraces, including cost, perceived inconvenience, or use of contouring or other alternative methods of erosion control. It seems significant that of these nine farmers who had not tried terracing four had had contacts with two or more professional agricultural specialists in the county and all four are contouring. One is tempted to think that lack of contact with agricultural specialists is the main reason that the remaining five farmers are not using a similar alternative, but the data do not justify a definite conclusion.

Why more of the farmers with large acreages of cropland presumably subject to erosion were not concerned about the problem of erosion is another question to be examined. A partial answer may be found in the degree of farmer education since the farmers with 25 or more acres of cropland and with 8 or more years of schooling are more concerned with the problem of soil erosion than those with the same acreage but less schooling. If more of the larger operators had more schooling, there is reason to believe that more of them would be able to see the importance of erosion control. This again emphasizes the stake which the programs of agricultural agencies have in the general education of people who become farmers.

#### CONTOURING

Contouring offers at least a partial control of erosion on sloping land that is farmed. Twenty-nine percent of the farmers who said they had sloping cropland had tried contouring (Table 6). Nearly all who had tried contouring said that they used it as a means of preventing washing or erosion of soil. However, only 39 percent of the nonusers gave this as a reason for contouring.

Considering all the farmers who mentioned soil erosion as

Table 6. - WHEN WOULD A FARMER TRY CONTOURING?  
(Percentage Distribution of Users and Nonusers by Type of Reason Given)

Had Used Contouring (32 farmers, 29 percent)		Had Never Used Contouring (79 farmers, 71 percent)	
Reasons or Conditions For Its Use	%	Reasons or Conditions For Its Use	%
1. To control erosion and prevent washing	84	1. If field is washing away, must be cropped, and if it's laid out on contour	39
2. To control erosion and conserve moisture	13	2. If field on rolling land is large enough	12
3. Other kind of response	3	3. If convenient, or if others do, etc.	24
		4. Would never farm on contour	25
TOTAL	100	TOTAL	100

the condition for contouring, 50 percent had tried contouring and 50 percent had not. It is thus evident that, by itself, recognition of contouring as a means of erosion control does not insure the use of contouring. An important additional factor is the amount of cropland farmed. Of the 62 farmers who mentioned erosion control in this context, 66 percent of those farming 25 or more acres of cropland had tried contouring, compared with 25 percent of those farming smaller acreages. Contouring, like terracing, is practiced when a sizable commitment to cropping is joined with an acceptance of this means of coping with the problem of erosion.

There were 13 farmers, however, who were farming 25 or more acres of cropland and mentally associated contouring with erosion control, but had not tried it. Why? Although this question can not be answered with complete satisfaction, the contacts that farmers have or have not had with representatives of agricultural agencies seem to have been a major factor in the use or nonuse of contouring. While only 3 of these 13 farmers had had contacts with two or more agricultural agencies<sup>3</sup>, 23 of the 25 farmers who were using contouring had had such contacts. It thus seems that contacts with agricultural agencies helped farmers to recognize the value of contouring, and to try it if they were farming relatively large acreages.

<sup>3</sup> Agricultural Extension Service, Soil Conservation Service, and Agricultural Experiment Station.

In addition to the nonusers of contouring who are at least vaguely favorable to contouring and mention conditions of one kind or another for its use, a substantial minority said that they would never farm on the contour under any circumstances. The 25 percent (Table 6) making this statement is larger than the percent of those rejecting any other practice in this report. It is not clear from these data whether these farmers are unalterably opposed to "them crooked rows" or merely think that establishing contour lines for farming purposes is not worth the trouble. Regardless, this negative opinion is indicative of a considerable gap in the appreciation and understanding of contouring in soil conservation.