

Kentucky's Soils Potential for Alfalfa Production

K.L. Wells, Department of Agronomy, University of Kentucky

A description of Kentucky's land base indicates that of nearly 15 million acres suitable for cropland usage, approximately three-fourths has an erosion hazard potential of some degree, relating largely to steepness of slope (1). For this reason, there is a large potential acreage of alfalfa and other perennial forage crops relating to their sod forming growth habit which provides them an inherent value in erosion control. Generalized cropland use potentials were estimated to be:

<u>USE POTENTIAL</u>	<u>ACRES</u>
Cultivation Base	5.9 million
Hay and Meadow Base	5.5 million
<u>Permanent Pasture Base</u>	<u>3.5 million</u>
Total Cropland Potential	14.9 million

Alfalfa is considered to have the greatest genetic potential for yield and quality of all the perennial forage crops climatically adapted to Kentucky. As such, it is potentially the highest value forage species for use on the hay and meadow base potential. Although deep, well-drained, fertile soils provide the greatest potential for best alfalfa growth, the crop can also be produced with varying degrees of success on soils with less desirable characteristics.

Since high producing stands of alfalfa rarely persist for longer than 4 to 6 years, the crop fits well into rotations with grain crops on sloping land. An estimated 1.9 million acres of the hay and meadow base acreage would be suitable for good alfalfa growth. Most of this potential acreage is concentrated in the western two-thirds of the state (Figure 1). More specifically some counties in the Bluegrass, Pennyrile, and Purchase areas are particularly well-suited because of a high proportion of deep, well and moderately-well drained soils (Figure 2).

Returns Per Acre From Alfalfa Compared to Alternative Crops as Influenced by Land Class

Since crop returns are related to yield, costs of production, and market value, variability in these three factors as influenced by an almost infinite number of uncontrollable factors, makes it very difficult to calculate reliable data for generalized use. Additionally, not all soils within the same land class are equally productive. However, there is a general trend for potential soil productivity to decrease as land class progressively increases from Class I to Class VI. Such decreases in natural productivity are associated with limitations due to amount of topsoil present, depth of root zone, degree of slope, and internal drainage characteristics.

The deep, well-drained soils occurring on level to gently sloping landscapes (0 to 6% slope) are capable of producing sustained yields of 120

to 160 bu/A of corn (the crop most likely to be competitive with alfalfa for land use) and 5 to 7 T/A of alfalfa hay under good management, recommended cultural practices, and average Kentucky climatic conditions. With an average price for alfalfa of \$90/T, corn must sell for \$2.75/bu at 160 bu/A and \$3.67/bu at 120 bu/A to equal that from alfalfa at 5 T/A. If alfalfa yield is 7 T/A, corn must sell for \$5.77/bu at 120 bu/A and \$3.88/bu at 160 bu/A to equal the returns above variable costs from alfalfa. These relationships are based on an estimated annual variable cost of \$170/A for corn and \$180/A for alfalfa. At lower yields of corn, alfalfa would usually be even more competitive with corn. And, even though the same general price relationship exists for sloping land, erosion risk on such land becomes greater for continuous corn production, particularly with conventional seedbed preparation. As a result, corn should be grown in rotation on such fields, whereas alfalfa can be grown continuously for longer periods of time. In such cases, the potential for greater long-term returns per unit land area used may be better for alfalfa than for corn. Alfalfa probably has its greatest economic competitive value in growing it on moderately sloping soils (12-20%). There is a large acreage of soils suitable for alfalfa growth on such slopes in Kentucky which is presently being used for grass or clover-grass production, both of which have lower yield potential, and lower economic value. In these cases alfalfa production would have significantly higher potential for increased returns per acre. Economic competitiveness of cash alfalfa with corn is shown over a range of yields and prices in Figure 3.

The Long-Term Impact of Alfalfa Production on Soil Erosion and Land Productivity

Expansion of alfalfa production in Kentucky will affect soil erosion and land productivity to varying degrees, depending on site-specific characteristics of soils and current land use patterns.

Erosion: A large expansion of corn and soybean production occurred in Kentucky during the 1970's. This expansion was more concentrated in the western half of the state, generally west of Interstate Highway 65, and resulted in sizeable acreages of land too sloping to be continually row-cropped with conventional tillage methods being used. Serious erosion resulted, particularly in the Purchase Area the Pennyroyal Area and the upland areas adjacent to the Ohio, Rough, and Green River bottomlands. Much of this land is suitable for good growth of alfalfa and if grown in rotation with the row crops, would greatly reduce erosion in those areas.

Land Productivity: Long-term production of alfalfa, particularly when grown in rotation and if properly fertilized will improve soil productivity. This results from better soil structure, increased soil nitrogen content, less topsoil erosion and, when grown in rotation, fewer soil insect and disease problems. Alfalfa can also be used to improve economic land productivity if produced on land suitable for its growth which currently is being used for lower value crops such as clover, grasses, or clover-grass mixtures.

Current Situation

In 1981, only 200,000 acres of alfalfa were reported harvested in Kentucky (2). However, a more recent survey of county agricultural agents by Dr. Garry Lacefield, UK Extension Forage Specialist, indicated there were about 250,000 acres grown in 1984. This doesn't represent much more than 10 percent of the state's potential alfalfa acreage. Distribution of this acreage (Figure 4) shows it to be most highly concentrated in the Pennyroyal and Outer Bluegrass Areas of Kentucky.

In order to determine the extent to which counties with sizeable acreages realized their alfalfa base potential during 1984, acreage harvested was expressed as a percentage of the potential base acreage (Figure 5). On the assumption that greatest expansion will likely occur where there are sizeable numbers of farmers already growing alfalfa (these people provide the "critical mass" necessary for large scale expansion), this provides a basis for making value judgements on how realistic it may be for a large expansion of alfalfa acreage in those counties.

References

- (1) Agricultural Potential for Kentucky. Revised 1977 Edition. University of Kentucky College of Agriculture.
- (2) Kentucky Agricultural Statistics, 1981-82 Edition. Kentucky Crop and Livestock Reporting Service. P.O. Box 1120, Louisville, KY 40201.

Figure 3. Returns over variable costs at different yields and prices for corn and alfalfa.

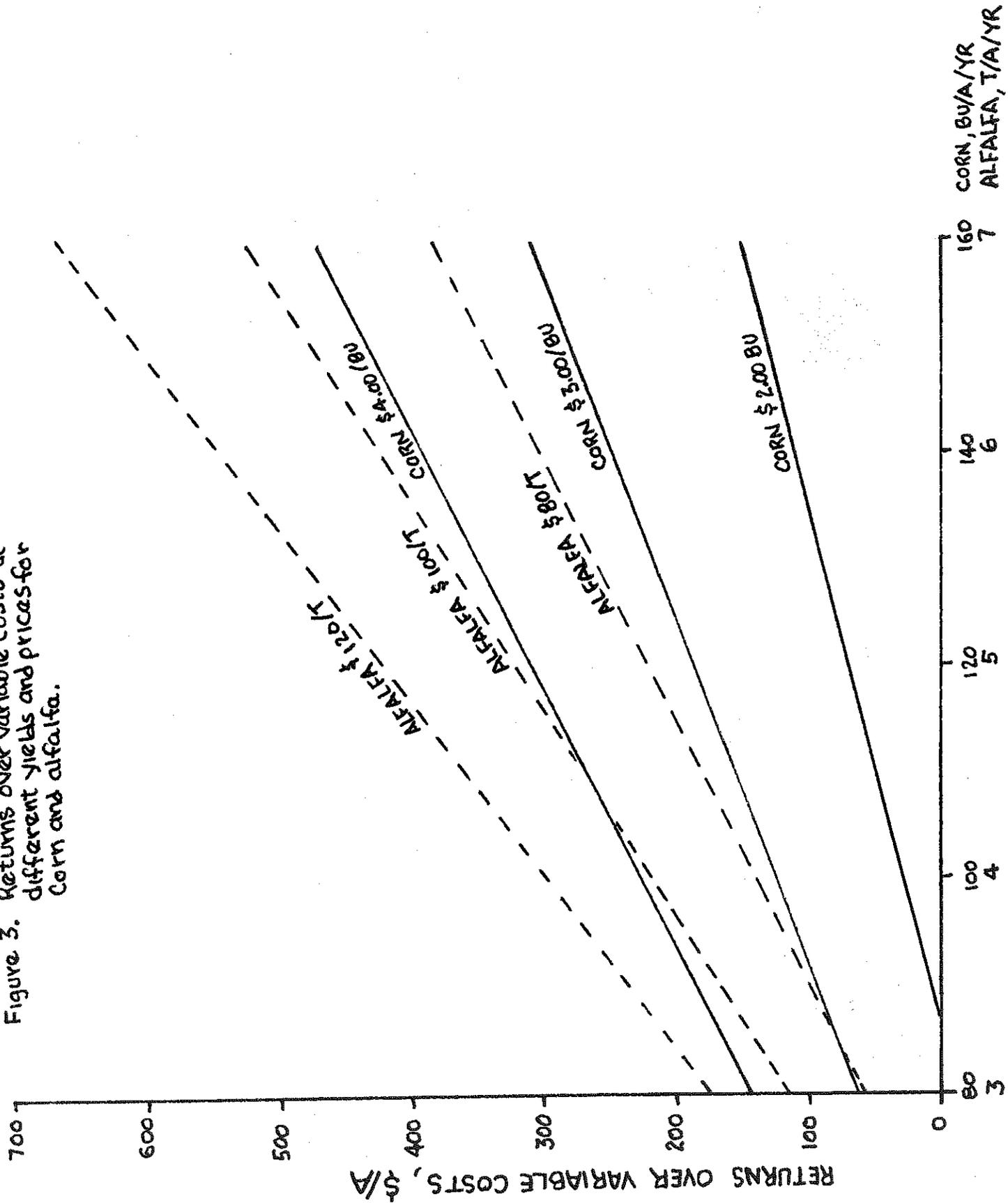


Figure 4.

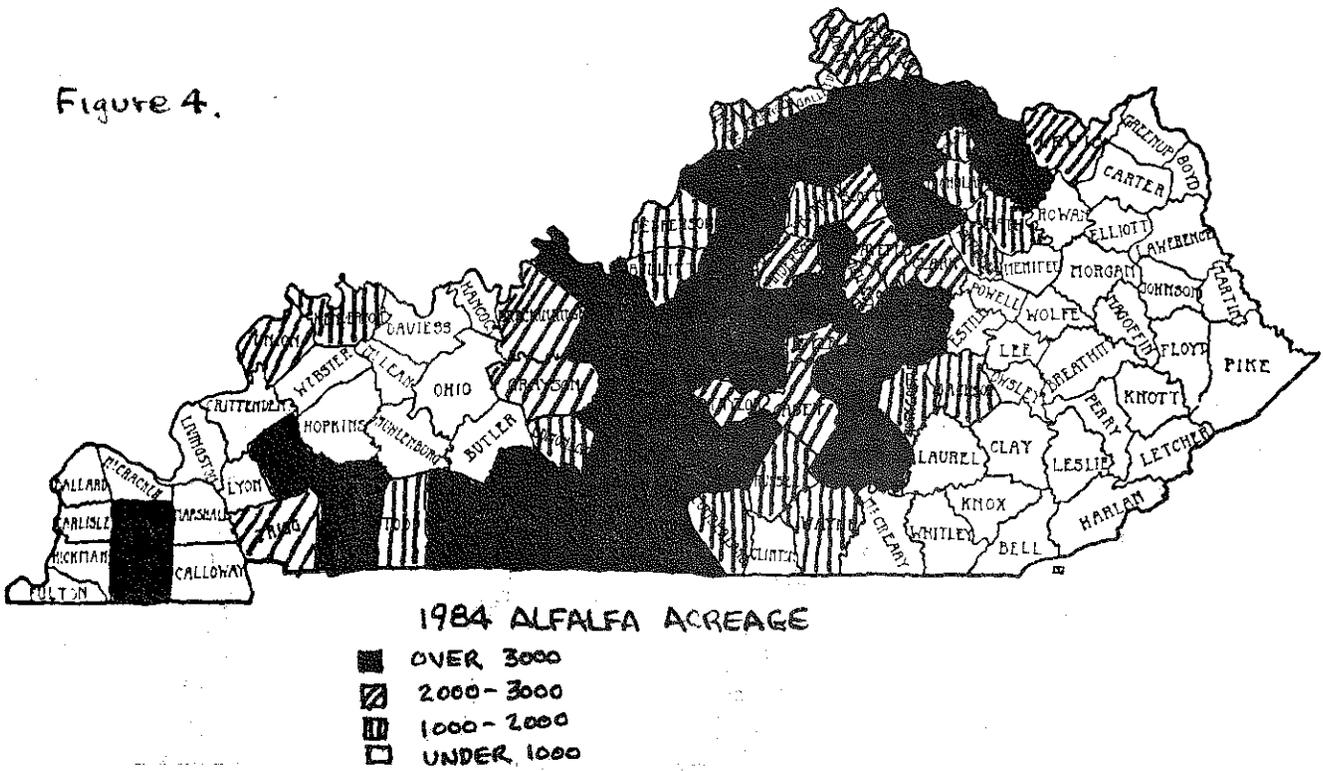


Figure 5. Percent of Alfalfa Potential Being Produced by Counties Growing 3000 or More Acres in 1984.

