FARM FORESTRY PROBLEMS OF THE SOIL CONSERVATION SERVICE IN REGION III

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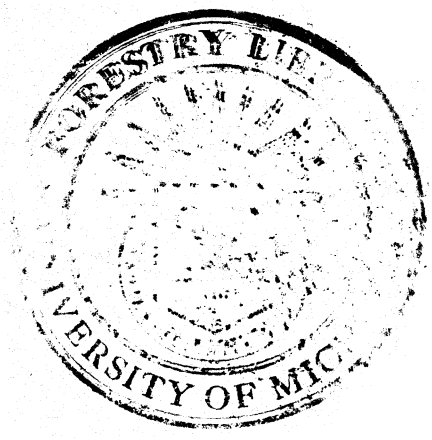
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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Forestry in the University of Michigan

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PURPOSE OF STUDY

The purpose of this study is to enumerate and discuss the problems encountered and the solution procedures involved in connection with the farm forestry work of the Soil Conservation Service in Region III.

CHAPTER I

THE SOIL CONSERVATION SERVICE

CHANGES UNDERGONE BEFORE THE PRESENT STATUS WAS ATTAINED

The original agency which eventually became the Soil Conservation Service was established on September 19, 1933 in the Department of the Interior as the Soil Erosion Service. This agency was provided with $5,000,000 under the authority of the National Industrial Recovery Act. The reason for the establishment of this original agency was to provide a combination of unemployment relief activity with conservation and land control. The Soil Erosion Service carried on the establishment of soil and water conservation demonstration projects throughout the country in areas that were especially in need of work of this type.

The Soil Conservation Act of April 27, 1935 transferred the activities of the Soil Erosion Service to the Department of Agriculture and changed the name of the agency to the Soil Conservation Service. This act definitely allotted to the Department of Agriculture the responsibility for Federal activities relating to soil erosion. The responsibility was then sub-divided in a manner that gave to the

newly created Soil Conservation Service the duties of carrying out the majority of the action phases of the act. This act gave the Secretary of Agriculture the following authority:

1. To conduct surveys, investigations, and research relating to the character and prevention of soil erosion, to disseminate information on the subject, and to conduct demonstrational projects in areas subject to erosion by wind and water;

2. To carry out preventive measures, including, but not limited to, engineering operations, methods of cultivation, the growing of vegetation, and changes in use of land;

3. To cooperate or enter into agreements with, or to furnish financial or other aid to, any agency, governmental or otherwise, or any person, subject to such conditions as he may deem necessary for the purposes of this Act;

4. To acquire lands, or rights or interests therein, by purchase, gift, condemnation, or otherwise, whenever necessary for the purposes of this act.[1]

The broad powers presented to the Department of Agriculture and, in turn, to the Soil Conservation Service by this Act provided the nucleus for the present program of the Soil Conservation Service. Other legislative action that has modified or added to the program includes the Norris-Doxey Cooperative Farm Forestry Act of 1937, the passage of Soil Conservation District laws by the majority of the states, and a few other less important legislative actions, all of which will be discussed later.

[1]Ramsdell, W. F., Backgrounds of Land Policy in the United States Primarily as Evidenced by Legislation. Land Utilization Seminar, School of Forestry and Conservation, University of Michigan, Ann Arbor, Michigan, October, 1939.

PRESENT LINES OF ACTION

The program of the Soil Conservation Service, as it is set up at the present, is composed of several activities that are working toward "a common, ultimate goal of better land use, conservation, and a more abundant life for the people of the country."[2]

These lines of action may be divided into six main groups as follows:

1. Soil Erosion Control. This activity of the Service was mainly instituted by the authority received under the previously mentioned Soil Conservation Act of 1935. The present status of this line of action is essentially the same as when it was started.

2. Submarginal Land Purchase. In this phase of the program the Soil Conservation Service departs from the original policy of dealing with only physical problems and takes up the consideration of social and economic problems which, in many cases, have to be solved before a program of wise land use can be started. This program was authorized under Title III of the Bankhead-Jones Farm Tenant Act and was conceived with the idea in mind of correcting social and economic problems in rural areas by changing existing

[2]Bennett, H. H. Soil Conservation, McGraw-Hill, New York, 1939, p. 314.

patterns of occupancy and agricultural use of land. In general, this program provides for the purchase of sub-marginal land and the consequent management of these lands under uses to which they are best adapted.

3. Flood Control. The authorization for this program was the Flood Control Act of 1935. In this activity the Soil Conservation Service works in cooperation with the Bureau of Agricultural Economics and the Forest Service of the Department of Agriculture, and the Corps of Engineers of the War Department. The general plan of this program includes investigation and surveys of watersheds and actual watershed protection work designed to reduce flood hazards.

4. Water Facilities. This is another cooperative program, authorized by the Pope-Jones Water Facilities Act of 1937, in which the Soil Conservation Service works with the Farm Security Administration, Bureau of Agricultural Economics, and other agencies through the medium of the Water Facilities Board. The purpose of this program is to give assistance to farmers in the planning and construction of devices for the development of water facilities that will help to bring about improvements in land use. This program is in operation only in 17 western states.

5. Norris-Doxey Farm Forestry Program. The authorization for this line of action is the Norris-Doxey Cooperative Farm Forestry Act of 1937. It is the purpose of this act to spread the practice of farm forestry as an aid to the

establishment of wise land-use procedures. This is another program in which the Soil Conservation Service works in cooperation with other agencies. In this case the other cooperating agencies include the Forest Service, Agricultural Extension Service, State Experiment Stations, State Foresters, and the Bureau of Agricultural Economics.

6. Drainage and Irrigation. The purpose of this program, authorized by the Agricultural Appropriation Act of 1932, is to develop improved methods of draining and irrigating agricultural land.

FURTHER DISCUSSION OF THE SOIL EROSION CONTROL AND NORRIS-DOXEY FARM FORESTRY PROGRAMS

The term, "farm forestry work," used in this writing refers not only to the forestry work being done under the Norris-Doxey program but also to the work in forestry carried on by the soil erosion control program. In order to secure a clearer picture of the problems encountered in the farm forestry work it is desirable to have an understanding of the more important features of the administrative organization and the activities of the Service. This is especially true with reference to the work units that are established to perform the field operation of the soil erosion control and Norris-Doxey farm forestry programs.

The administrative structures employed in carrying on these two programs in Region III are demonstration

projects, Norris-Doxey farm forestry projects, and Soil Conservation Service districts.

1. Demonstration projects. The personnel of a demonstration project consists of a project manager and a staff of technicians and office employees. Technicians employed on projects in Region III include engineers, agronomists, soils specialists, foresters, farm management specialists, and biologists. A demonstration project usually consists of an area having natural physiographic boundaries such as a watershed. Projects are arranged in this manner to more adequately carry out the basic purposes of an erosion control demonstration. The factors which cause erosion are usually of such an extensive nature that a suitable demonstration of control practices cannot be shown on a single field or a single farm. From this standpoint, it is evident that an area such as a watershed that includes a variety of soil and slope conditions, a diversity of farming practices being followed and a consequent variation in the intensity of control measures required will best fill the need of an area that can be used to demonstrate erosion control practices. When the farms in an area of this nature have been replanned they offer an example that will serve as a guide for other landowners with similar problems in the improvement of their farms. The value of any such area as a demonstration will be determined by the ability shown by the technical staff of the Service in their replanning

of the farms within the project area and by the extent of the area surrounding the project that has similar problems. It is obvious that in order to secure the maximum benefits from a demonstration project it must meet two requirements. First, it must show the results of very careful planning by a group of technicians that have taken into account all the factors involved on each cooperating farm within the project. The project must also be located in an area where the erosion control practices demonstrated will have an opportunity to spread to adjacent areas with only a minimum of modification in their application.

The decision as to the changes that will be made in the replanning of farms in the project area is made by the technical staff of the Service working with the landowner. The plans are developed with the idea in mind of controlling soil and water losses on the farm and at the same time meet the requirements of the owner for income from the land. The plan of conservation operations consists of plans for the necessary erosion control structures to be built, land-use practices, and cropping arrangements for a five year period. After a satisfactory plan has been completed it is included as a part of a formal cooperative agreement between the government and the farmer. The agreement explains all details of the plans that have been drawn up. It also states the obligations of each party to the agreement in regard to the furnishing of labor, materials, equipment,

and technical assistance. The agreement states that it is the duty of the farmer to carry on all regular farming operations and to furnish additional labor in some cases. The government in all cases makes an effort to avoid the necessity of furnishing more than half the materials required for putting in the new farm plan. Technical assistance is furnished by the Soil Conservation Service in all cases. Labor furnished by the Service, other than technical assistance, is in nearly all cases from either Civilian Conservation Corps camps or from relief rolls. Materials furnished by the Soil Conservation Service in Region III in the past have included such articles as lime, fertilizer, seed, fence, tree planting stock, and materials for erosion control structures. Labor furnished by the Service has been used for purposes of constructing terraces and other erosion control structures, tree planting, woodland improvement, fence building, and other work involved in the installation of the Conservation practices outlined in the cooperative agreement.

When the Soil Conservation Service program was first started it was necessary for the Service to furnish considerable labor and materials in order to secure a more rapid response from the farmers within the project area. Large amounts of labor were also furnished by the Service because it was charged with the responsibility of supplying work for a large portion of the relief roll in the vicinity of

the project area. Within more recent times, however, the trend has been for the proportion of labor and materials furnished by the Service to be less than it was in the early stages of the program.

2. Norris-Doxey farm forestry projects. Although the act which authorized this program was passed in 1937, funds were not appropriated by congress to carry out the provisions of the act until the fiscal year of July 1, 1939 - June 30, 1940. Consequently, only a small amount of progress has been made in the actual establishment of projects. According to all available information at this writing only two projects are now in operation in the Region. Information has also been secured that indicates the formation of at least one other project in the near future.

The eventual goal of this program is to have a farm forestry project for each principal type of farm timberland within a state to demonstrate the value of careful woodland management.[3]

It has previously stated that the Norris-Doxey farm forestry program is one in which the Soil Conservation Service works in cooperation with other agencies. The terms, "farm forestry" and "forest farming," have gained considerable significance since the start of this program. A general definition of farm forestry that is used in connection with this program is the operation of forest lands on

[3]Anonymous. Federal News and Reviews, American Forests, Vol. 46, No. 4, p. 186, 1940.

farms where the major portion of the income is derived from some source other than forest products. Projects set up in areas where this situation applies are known as farm forestry projects and the responsibility for the action part of their program is delegated to the Soil Conservation Service. A broad definition of forest farming is the operation of forest lands on farms where the major portion of the income is derived from forest products. In this instance the projects are known as forest farming projects and have as their directing agency the United States Forest Service. Since this study is being made of the farm forestry problems of the Soil Conservation Service the projects to be considered here will consist of only the farm-forestry projects. Only general statements can be made as to the administrative organization for these projects. This is caused by the fact that the basic plans for the operation of a project are created by a group that includes representatives of the Soil Conservation Service, United States Forest Service, Bureau of Agricultural Economics, State Forest Service, Agricultural Experiment Station, Extension Service, State Conservation Department, and possibly some other agencies in the state. From this it can be seen that, while the same representatives of the Soil Conservation Service and the United States Forest Service might be on the planning committees in different states within the Region, the individuals on the committee repre-

senting the other agencies mentioned would almost certainly be different for each of the states making up the Region. These differences in the plans that will be formed as the program gains momentum in the different states in the Region will probably be of rather minor importance, however, as each plan must be submitted to the Regional office of the Soil Conservation Service for approval.

The work on the project is in charge of a forester. He is assisted by other technicians when all the operations on the farm are being replanned according to Soil Conservation Service recommendations. The policy that is followed on farm forestry projects is different from that followed on demonstration projects from the standpoint of the materials furnished by the Soil Conservation Service. On the farm forestry projects all materials required to carry out the cooperative agreement are furnished by the farmer.

3. Soil Conservation Service districts. A necessary step prior to the establishment of districts in any state is the passing of a State Soil Conservation Districts Law. This law must be patterned after the Standard State Soil Conservation Districts Law that was designed by the United States Department of Agriculture. According to all information available at this writing two states in Region III have adopted the necessary legislation for establishing districts. The two states mentioned are Michigan and Indiana.

The main points of the Standard Act after which the legislation in these two states was patterned is explained very well in an article by Philip M. Glick[4] in Soil Conservation. The following discussion of the Standard District Law is adapted from his article.

The act establishes a State Soil Conservation Service Committee which has power to define the boundaries of each district, to encourage the organization of districts in the State, and to coordinate the several district programs. Each district is an independent unit, and is not subject to the control of the State Committee. The act provides that the State Committee shall have not less than three or more than five members, and that the following shall be its members: the State director of extension, the director of the State Experiment Station, and the State Conservation Commission or Commissioner of Agriculture if there are such officers in the State.

The procedure of organizing districts is as follows: Any 25 land occupiers may petition the State Committee to establish a district. The term, "land occupier" includes any person or corporation who holds title to or is in possession of lands, either as owner, lessee, renter, tenant, or otherwise. The Committee is required to hold a public hearing on the petition, to define the boundaries of the proposed district, and then to submit to all land

[4]Glick, Philip M., State Legislation for Erosion Control, Soil Conservation, Vol. 3, p. 120.

occupiers living within the boundaries defined the question as to whether or not the district should be created. No district may be established unless a majority of the votes cast in the referendum is in favor of such creation.

Each district is to be governed by a group of five supervisors, two of whom are to be appointed by the Committee, and three to be elected by the land occupiers of the district. The supervisors are to receive no compensation other than expenses necessarily incurred. A paid staff may be provided for each district.

When organized each district will have power to perform research experiments in erosion control; to conduct demonstrational projects; to carry out preventative and control measures; to enter into contracts with farmers and give them financial and other assistance; to buy lands for retirement or project purposes; to make loans and gifts of equipment, machinery, seeds, etc., to farmers; to take over and operate State and Federal erosion-control projects; and to recommend land-use plans for soil conservation.

In addition to the above powers the supervisors may formulate an ordinance requiring certain land-use practices to be carried out on farms within the district. In order for these regulations to be put into effect they must be voted on by the land occupiers in the district. Provision is made in this ordinance that any landowner will have an opportunity to petition a board of adjustment to permit

variances from the land-use regulations in exceptional cases.

After a district has been in operation five years, the land occupiers may petition for a discontinuance of the district. The question of discontinuance must be submitted to a referendum after which the organization will be disbanded unless the majority of the votes cast are in favor of continuance.

The funds necessary for the operation of a district are secured from an appropriation out of the State treasury and from grants-in-aid from the Soil Conservation Service or other Federal agencies. The districts are not authorized to levy any taxes or special assessments or to issue bonds.

CHAPTER II

REGION III

Some attention should be given to the general characteristics of the area included in Region III before any mention is made of specific problems that are encountered by the farm forestry work of the Soil Conservation Service within the Region.

LAND-USE CHARACTERISTICS AND EROSION CONDITIONS IN THE REGION

The states included in the Region are Michigan, Indiana, Ohio, Kentucky, and Tennessee. This group of states represents a wide variety in characteristics of land-use. Although the greater part of the area is primarily agriculture in character, the types of farming vary considerably throughout the Region.

The work of the Soil Conservation Service in this Region is chiefly concerned with agricultural areas. Certain portions of the states in the Region that do not come under this classification are not involved in the activities of this agency to any appreciable extent. This is the case in Michigan where a line drawn westward from

Saginaw Bay to Lake Michigan is generally considered to be a rough boundary line between the agricultural portion of the state on the south and the non-agricultural portion on the north. The extremely mountainous portions of eastern Kentucky and Tennessee are also usually considered to be non-agricultural. It possibly should be emphasized that this area does not include the hill farming sections of these two states. The section referred to is the area that is more mountainous and "farther back" than the hill farming country.

A diversified type of farming is carried on in the agricultural area of Michigan that involves an emphasis on dary farming in certain sections, and in other localities a trend toward fruit farming is apparent. In the eastern section of the Michigan agricultural area and in parts of northern Indiana wind erosion is a problem.

Dairy farming, characterized by the necessity of considerable areas of pasture land and nearness to an adequate market, is also practiced in northern and southeastern Indiana as well as in northern and southwestern Ohio. This type of farming is also followed in various degrees of intensity in other places throughout the Region. The usual problems encountered in this type of farming area are centered around the control of erosion on pastured lands and, in areas of rolling topography, erosion on sloping cultivated land.

The corn belt extends across the central portions of Ohio and Indiana. This section is characterized by soils of high fertility. Nevertheless, a considerable amount of sheet and some gully erosion have lowered the productivity of this section. The large amount of livestock farming carried on in the area has been a major factor in keeping the damaging effects of soil erosion at a minimum.

As might be expected, the hill farming sections of Ohio, Indiana, Kentucky, and Tennessee present the most serious erosion problems found in the Region. Unwise land use in an area where factors occur that cause the soil to have a high degree of susceptibility to erosion has been the cause of the erosion conditions found throughout a major portion of this section. The principal crops grown here in the past have been clean-tilled, soil depleting crops such as corn and tobacco with some cotton being grown in the southern extremity of the Region.

In the western portions of Kentucky and Tennessee the erosion problem is somewhat similar to that found in the corn belt. The area is characterized by a fairly level topography with at least moderately productive soils which are mainly utilized for the production of corn, tobacco, cotton, wheat, and forage crops.

Other sections of these two states, notably the blue grass region of Kentucky, are used for grazing. Soil losses due to erosion are not nearly as serious here as

it is in the area of clean-tilled crops and rough topography.

During the course of this discussion of the erosion conditions found throughout the Region the type of farming has been the factor most heavily emphasized. It is recognized, however, that this point alone does not account for all the degrees of erosion found in different parts of the Region. All the factors that contribute to the degree of erosion found in any locality usually will consist of a list that includes type of farming, farming practices followed, soil series and type, topography, climatic conditions, and other items.

Table 1 gives a general picture of the erosion conditions found in the different states of the Region. This information, secured by a soil erosion reconnaisance survey, was based on the plan of grouping areas under each classification that have 25 percent or more of their total area affected as indicated. For example, the table shows that 12.2 percent of the total area of Michigan has at least 25 percent of its area affected by wind erosion.

TABLE 1

EROSION CONDITIONS BY STATES FOR REGION III[5]

	Michigan	Indiana	Ohio	Kentucky	Tennessee
Percent of total area with little or no erosion	81.0	57.4	51.8	5.3	13.7
Percent of total area affected by sheet erosion	12.2	39.9	48.2	73.7	63.8
Percent of total area affected by wind erosion	8.3	2.8	*	*	*
Percent of total area affected by gullying	5.6	30.7	34.5	87.0	80.7
Percent of total area essentially destroyed for tillage	**	6.3	3.9	10.4	7.8

*Data not available.

**Less than .1 of 1%.

[5]Data compiled from Soil Erosion, A Critical Problem in American Agriculture. Part V of the Supplementary Report of the Land Planning Committee to the National Resources Planning Board. Government Printing Office, Washington D.C., 1935.

The 1935 Census of Agriculture[6] (see Table 2) shows that 21.4 percent of the total farm land of the Region is in woodlands. Of this amount, 10.3 percent of the total farm land is in pastured woods and 11.1 percent is in woods not pastured. For the entire United States, 17.6 percent of the total farm land is in woodland with 10.3 percent of the total being pastured woods and 7.3 percent being woodlands not pastured.

A large portion of the woodlands of this Region shows the results of improper management. This has probably been brought about by a lack of appreciation on the part of the woodland owner of the benefits that could be secured by proper management. Observations of existing practices tend to show that a large number of farm woodland owners look upon this section of their farm as being waste land or, at best, only an area where a small amount of pasture can be obtained. This attitude is very likely a carry over from the time of settlement of this section of the country. The forests at this time were an obstacle in the path of the settler. It was necessary that the land be cleared before cultivation of the soil could take place.

As the area became more completely settled the portion of the farm that remained in woodland still did not represent to the owner a very important factor in the economy of the farm. The soils that were cultivated were

[6]United States Census of Agriculture: 1935. Bureau of the Census, U. S. Dept. of Commerce, Government Printing Office, Washington, D. C., 1936.

TABLE 2

DATA CONCERNING FARM WOODLANDS OF REGION III[7]

(AREAS GIVEN IN ACRES)

	All Land in Farms (1935)	Woodland Pastured (1934)	Woodland Not Pastured (1934)	Total Woodland (1934)	Percent of All Land in Farms That is in: (1934)		
					Woodland Pastured	Woodland Not Pastured	Total Woodland
Ohio	22,857,692	2,049,967	1,108,915	3,158,882	9.0	4.9	13.9
Indiana	20,518,745	2,091,878	972,309	3,064,187	10.2	4.7	14.9
Michigan	18,459,922	2,883,217	932,907	3,816,124	15.6	5.1	20.7
Kentucky	20,698,510	1,668,918	3,752,328	5,421,246	8.1	18.1	26.2
Tennessee	19,085,937	1,717,509	4,488,708	6,206,217	9.0	23.5	32.5
Total for Region	101,620,706	10,411,489	11,255,167	21,666,656	10.3	11.1	21.4
Total for U. S.	1,054,515,111	108,095,711	77,379,254	185,474,965	10.3	7.3	17.6

[7] Ibid., 1936.

capable of producing an adequate income for the farm through high yields of crops. This situation did not necessitate a critical appraisal of the part of the total farm income that could be secured from the farm woodland. The majority of the woodlands were still able to supply all the ordinary needs of the farm in the way of fuel and other wood products. If the woodland present on the individual farm would not supply these needs, an abundant supply of wood products were available from other lands within the area at a low price or from other more heavily forested regions also at a low price due to the large supply of timber available and the fairly low transportation charges. This situation tended to convey to the woodland owner in this Region the attitude that the wooded portion of his farm occupied a rather unimportant place in the scheme of his farming operations. In many respects this attitude was reasonable.

Within recent times, however, the situation has changed considerably. Cultivated soils that once produced an abundant income for the farm unit have declined in their income producing ability due to a lowering of fertility as well as a decrease in market prices of crops. The practice of purchasing wood products for use on the farm has also lost a considerable protion of its attractive ness. This has been brought about by the diminishing of of the supply both within and outside the region and by

the increased cost of transporting the product to its point of utilization. In this manner the income of many farms has been lowered by a combination of unwise land-use practices. Soil depleting or destroying crop practices coupled with lower market prices have lowered the gross income of the farm. Increased prices of wood products purchased for use on the farm have raised the costs of the farming operation. The end results have been a lowered net income for the farm with a consequent need arising for a more intelligent appraisal of the ability of the different portions of the farm to produce their share of the farm income.

This situation that applies at present over wide areas of the Region, caused by economic factors and characteristics of past land-use, are such that the potential ability of the farm woodland to contribute an important share of the total farm income has been materially increased. These conditions were exerting their influence at the time the Soil Conservation Service program was started. Fundamentally, the farm forestry work of this program is concerned with changing the income producing ability of the wooded portions of each farm from a potential status to an actual condition.

CHAPTER III

THE PROBLEMS AND THE SOLUTION PROCEDURES EMPLOYED

For purposes of discussion the problems encountered in the farm forestry program of the Soil Conservation Service can be grouped into three classes according to the time at which they are met. The time of occurrence of the three classes of problems is as follows: (1) before the entire Soil Conservation Service program can be started, (2) before the farm forestry work of the program can be put in operation, and (3) after the farm forestry work has been started.

PROBLEMS ENCOUNTERED PRIOR TO THE START OF THE ENTIRE PROGRAM

Before the specific problems of the farm forestry work of the Soil Conservation Service are encountered a general problem of the entire Soil Conservation Service program must be solved. This is true because the organization of this agency's work is such that all phases of the program must be acceptable to the landowner before any specific part of the program can be put in operation on his farm. For example, a landowner must be in accord with recommendations for the performance of practices such as strip

cropping, installation of erosion control structures, proper rotation of crops or any other recommendations that might be set forth in the cooperative agreement before the woodland management section can give him assistance in farm forestry work.

This initial problem is concerned with the motivation of certain groups to have a belief in the value of all Soil Conservation Service recommendations. The individuals who must be convinced of the value of the program can be divided into three groups as follows:

Group A: Landowners

Group B: Tenants and landowners in the case of rented farms.

Group C: Individuals not included in the above two groups who are key citizens in the community. (local bankers, newspaper editors, heads of local organizations, etc.)

The solution procedure involved in this case is the education of the above groups with respect to the benefits than can be derived from the Soil Conservation Service program. It is obvious that individuals included in Group C who have been convinced of the value of the program will be of great assistance in the education of the other two groups.

The dissemination of information regarding the work of the Soil Conservation Service and the need for such work

is carried on by means of the press, radio, exhibits, motion pictures, lectures, and other educational devices. Individuals who could not be classified as being in any of the three groups mentioned are the recipients of a part of this information. This is valuable from the standpoint of securing from the general public an appreciation of the work being done. It is planned, however, for a greater part of this information to be received by people who belong in one of the groups listed.

A great part of the educational work is carried on in connection with demonstration projects and Norris-Doxey farm forestry projects. It is the primary object of these two types of projects to set an example that can be followed by landowners in the surrounding territory. The degree of cooperation received from groups A and B within the project area will determine to a considerable extent the value of the project as an example to be followed by farmers outside the area. In other words, full cooperation must be received from the owners and operators of the farms that are to be used as demonstrations before these farms may be used successfully as exhibits of approved practices.

It is the policy of the Woodland Management Section of the Soil Conservation Service to actually perform only a portion of the tree planting and woods improvement work that is to be done on cooperating farms in demonstration and Norris-Doxey farm forestry projects. The remainder of

this work is to be done by the cooperator. Therefore a measure of the success of the educational methods used can be determined by the spread of these practices on the cooperating farm as well as on farms that are not under a cooperative agreement. Table 3 shows the number of acres of woods improvement work done by the Soil Conservation Service and the number of acres improved by cooperators during the period of July 1, 1938 - June 30, 1939.

TABLE 3

SPREAD OF PRACTICE--WOODS IMPROVEMENT WORK BY COOPERATORS. REGION III, 1938-39[8]

Area or Project	Acres Worked by S.C.S.	Acres Worked by Cooperators
Benton Harbor, Mich.	5	19
Howell, Mich.	0	52
Mt. Vernon, Ohio	115	397
Bedford, Ind.	253	758
Falmouth, Ky.	10	15
Paducah, Ky.	68	220
Springfield, Tenn.	15	111
Humboldt, Tenn.	5	12
Total	471	1,584

Table 4 outlines the tree planting program that was

[8]Unpublished data, Regional Office, Soil Conservation Service, Dayton, Ohio.

carried on in Region III during the fiscal year of 1938-1939.

TABLE 4

SPREAD OF PRACTICE--TREE PLANTING IN REGION III
PLANTING SEASON OF 1938-39[9]

Practice	Number of Farms	Acres
1. Planting by cooperators, both trees and labor supplied by cooperator.	49	160
2. Seed planted by cooperator,--both seed and labor furnished by cooperator.	10	27
3. Planting by non-cooperators--influenced by S.C.S. demonstrations.	301	476
4. Seed planted by non-cooperators--influenced by S.C.S. demonstrations.	3	6
5. Planting by cooperators, trees supplied by cooperators, labor by S. C. S.	130	800
6. Additional planting on cooperators' farm, trees and labor supplied by S.C.S.	37	137
7. Additional planting by cooperators, trees supplied by S.C.S., labor by cooperator.	53	101
8. Seed planted by cooperator, seed supplied by S.C.S., labor by cooperator.	2	8
Total	585	1,715
Total number of trees purchsed by cooperators		1,131,000

[9]Unpublished data, Regional Office, Soil Conservation Service, Dayton, Ohio.

The suitability of the educational practices being used can be determined in the case of Soil Conservation Service districts by the number of people who vote in favor of establishing a district. As previously stated, it is essential that a majority of the land occupiers inside a proposed project vote in favor of the district before it can be formed.

A very important part of the work being done to secure a belief in wise land-use recommendations that make up a large part of the work of the Soil Conservation Service is being carried out by other agencies. The country land-use planning program of the Bureau of Agricultural Economics is an example of this type of cooperative aid to the solution of the educational problem. In this program land-use planning committees are organized in each county under the guidance of representatives of the Bureau of Agricultural Economics. It is the purpose of this committee to take an inventory of their county with the idea in mind of recognizing any needs for an adjustment in present land-use practices. The committee then submits to the Bureau of Agricultural Economics a report consisting of the changes that they believe will be beneficial and a request for governmental supervision and assistance in carrying out these changes. For example, a county committee might decide that their county was in need of changes in land-use practices that would control soil erosion. In their report to the

Bureau of Agricultural Economics they would request the Soil Conservation Service to direct their activities toward the installation of a Soil Conservation district in their county. The Bureau of Agricultural Economics would then convey this information to the Soil Conservation Service. This cooperation of the two agencies is of benefit to the Soil Conservation Service in that they can more accurately make plans for carrying on their educational activities that must take place prior to the formation of a district.

The members of the county land-use planning committee mainly consist of farmers who are familiar with conditions in their county. It can readily be seen that a great part of the educational work has been done when a committee of this type recognizes the need for changes in land-use practices.

The work of the Extension Service of the Agricultural College in each state is also a very important aid in the disseminating of information relating to sound land-use practices. The Extension Service includes the County Agricultural Agents. The County Agent is capable of exerting considerable influence in relation to the adoption of new farming practices by the farmers in his county. This is chiefly due to the fact that he is acquainted with and has the confidence of a large number of the farmers in his territory.

The Agricultural Conservation Program is carrying on

activities that tend to make farmers more conscious of the need for sound land-use practices. The general plan of this agency's work involves the making of payments to farmers for the rearranging of their farming operations. These payments are based on the decrease in soil depleting crops and the consequent increase of soil building crops present on each farm. This agency's policy of making payments for the institution of forestry practices is especially helpful in increasing the interest in farm forestry. The chief forestry practice that enables the farmer to receive a payment is the planting of forest trees and shrubs. The information given in Table 5 was secured from the state office of the Agricultural Conservation Program in each of the states of Region III that are listed. This information was not available for the state of Kentucky.

TABLE 5

EXTENT OF FORESTRY PRACTICES UNDER THE AGRICULTURAL CONSERVATION PROGRAM FOR 1939

State	No. of Farms Participating	Total No. of Acres Retired to Forestry Practice
Indiana	24	283
Michigan	449	3,755
Ohio	141	532
Tennessee	1,550	2,500

PROBLEMS ENCOUNTERED PRIOR TO THE START OF THE FARM FORESTRY WORK

The solution of the first problem discussed secures an acceptance of the practices advocated by the Soil Conservation Service on the part of individuals whose activities will be affected. The actual planning work on individual farms can now be started. A problem immediately arises which directly affects the farm forestry work of the program. This problem is concerned with the decision as to which areas of each farm will be allotted to farm forestry practices.

The farm areas that create this problem are chiefly the portions devoted to some use other than farm forestry at the present time. When the farm is being replanned each section is subjected to an analysis of the particular type of land-use to which it is best suited. In most cases the farm being replanned will have certain areas that are not used at present according to best land-use practices. The fundamental considerations involved in the solution of this problem includes decisions as to which sections of each farm should undergo a change in land-use and which of these sections are to be devoted to farm forestry.

The solution procedure utilized in connection with

this problem is the making of use capability surveys.[10] In Region III a survey of this type attempts to classify land according to the most intensive tillage that can be practiced safely with permanent maintenance of the soil. This classification of land is based entirely on physical characteristics of the soil and its climatic environment.

> At least four groups of factors must be considered: (1) Permanence of the soil if cultivated (susceptibility to erosion; (2) productivity of the soil as conditioned by native fertility, capacity for retention and movement of water, salt content, aeration, or other factors; (3) the presence of any factor that would interfere with cultivation, such as stoniness or a hardpan layer; and (4) the climatic environment, particularly temperature and precipitation.[11]

The classes of land that are recognized on the basis of this classification are as follows:

I. Suitable for cultivation without special erosion control practices.

II. Suitable for cultivation with simple erosion control practices.

III. Suitable for cultivation with complex or intensive erosion control practices.

IV. Not suitable for continuous cultivation.

V. Not suitable for cultivation at any time.

This classification shows that land in Class V should be devoted to woodland, wildlife purposes, or permanent

[10] Norton, E. A., Soil Conservation Survey Handbook, Misc. Publ. No. 352, U. S. D. A., 1939.

[11] Ibid., 1939.

pasture. This classification does not indicate that woodlands in existence on any of the other classes of land should be cleared in order to cultivate the land. The main purpose of this classification is to serve as a guide in changing the land-use practices being followed on land that will not adequately support the intensity of cultivation that is being followed at present.

The replanning of a farm according to this classification is dependent to a high degree upon the judgment of the individuals who are making the survey. For this reason it is essential that the men in charge of the replanning operation have a very good understanding of the characteristics of different types of land-use as well as the practices that each section of the Soil Conservation Service will recommend as a result of the land classification that is decided upon. The replanning operation must take into account the special needs of the individual farm unit that is under consideration. The farm being planned may be a dairy or livestock farm that needs considerable pasture land. In this case most of the land in Class V should be delegated to permanent pasture if no other areas of permanent pasture are present on the farm. If the farming operation involves a considerable amount of fence construction Class V lands might well be devoted to tree planting for the production of fence posts. In other words,

the replanning operation must be done in such a way as to meet the economic needs of the farm unit as well as to control soil erosion.

PROBLEMS ENCOUNTERED AFTER THE START OF THE FARM FORESTRY WORK

At this time it has been decided which areas of the farm will be changed from its present use to that of forestry. At this stage plans will have to be made also for the management of the woodlands that are already present on the farm. The problems encountered at this point will be directly concerned with farm forestry work. The problems to be solved can be stated as follows: (1) attainment of satisfactory planting results, (2) development of woodland management plans, and (3) development of improved timber marketing practices.

1. Attainment of satisfactory planting results. Problems connected with the attainment of a successful planting program are probably the most difficult ones encountered in the farm forestry work. A variety of factors are involved in the creation of this situation. The primary cause of many of the difficulties encountered is the fact that the majority of the planting sites have had their fertility depleted to a serious extent. The best planting stock, careful planning of site preparation, and an efficient planting job are necessary to secure a successful plantation

on a site of this kind. Planting plans must be designed with great care because a variety of soil conditions caused by differences in soil series, soil type, and degree of erosion may be found on a comparatively small planting area.

Bell makes the following statement concerning the tree planting problems of Region III.

> Several controllable factors contribute to the success or failure of an erosion control planting. Most important are: (1) Correlation of species to soil, climate, and other components of site; (2) determination of the practical need for and method of site preparation; (3) quality of planting stock; and (4) tree planting methods, tool, and crew organization.[12]

The selection of the proper species to plant on different sites involves a careful consideration of the characteristics of the individual site as well as the purpose for which the planting is being made. Plantings may be classified in two groups according to their purpose. The first and probably the most common group is erosion control plantings where the primary objective is to secure as quickly as possible a vegetative cover that will control erosion on the site. Production of commercial products in this case is of secondary importance. The other group consists of plantings made in existing woodlands that need an improvement in the quality of their growing stock.

The site characteristics that must be considered in the selection of a planting species are those that have

[12]Bell, G. Y., Analysis of Tree Planting Problems in Region III, Soil Conservation, Vol. 4, p. 89, 1938.

been determined by such factors as the original soil type and parent materials, the degree of erosion present, physical condition of the soil, and amount and annual distribution of rainfall.[13]

A study was made in the fall of 1938 by W. S. Ligon and other Soil Conservation Service technicians of Region III in connection with the influence of soil type and site factors on the success of erosion control plantings.[14] In this study 49 Soil Conservation Service erosion control plantings in Ohio, Indiana, Kentucky, and Tennessee were studied. Most of the plantings were five years old. The plantings consisted of black locust, various pines, and a variety of hardwoods, pure or in mixture. The study included field plantings, gully plantings, and combinations of the two. A total of 25 different soil series and a wide range of erosion conditions were included in the 49 planting areas studied. The data secured from this study are based on existing field conditions and not on research under controlled conditions. The primary purpose of the study was to record facts for practical application rather than to explain them. Tables 6, 7, 8, and 9 show the information secured from this study.

[13] Ibid., 1938.

[14] Ligon, W. S., Influence of Soil Type and Other Site Factors on the Success of Tree Plantings for Erosion Control. Jr. For., Vol. 38, p. 226, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science at Columbus, Ohio, December, 1939).

TABLE 6

RESPONSE* OF BLACK LOCUST, PINE, AND HARDWOOD PLANTINGS WITH REFERENCE TO SOILS - (1938 STUDY)[15]

Soil Series	Number of Plantings Studied	State	Black Locust			Pines			Hardwoods		
			E	M	F	E	M	F	E	M	F
Residual Sandstone, Shale, and Limestone Soils:											
Muskingum	12	O-Ind.	2	4	3	7	2	1	0	0	7
Wellston	4	Ohio	0	2	2	3	1	0	0	0	3
Tilsit	5	O-Ind.	0	1	2	1	1	0	0	0	2
Hanceville	1	Ky.	0	1	0	0	1	0	0	0	1
Zanesville	1	Ky.	1	0	0	-	-	-	-	-	-
Manitou	1	Ky.	0	1	0	-	-	-	0	0	1
Westmoreland	4	Ohio	2	1	0	2	2	0	0	0	3
Brooke	1	Ohio	1	0	0	0	1	0	0	0	1
Belmont	1	Ohio	0	0	1	0	0	1	0	0	1
Upshur	3	Ohio	2	1	0	-	-	-	0	0	2
Meigs	5	Ohio	2	1	0	2	1	0	0	0	3
Cherty Limestone Soils:											
Frederick	1	Ind.	0	0	1	1	0	0	-	-	-
Bedford	2	Ind.	0	1	1	1	1	0	-	-	-
Lawrence	1	Ind.	0	0	1	0	1	0	-	-	-
Dickson	1	Tenn.	0	1	0	0	1	0	0	0	1
Illinoian Till Soils:											
Cincinnati	3	Ind.	0	2	1	0	1	0	-	-	-
Gibson	2	Ind.	0	0	2	0	1	0	-	-	-
Loess and Coastal Plain Soils:											
Princeton	2	Ind.	2	0	0	1	0	0	1	0	0
Alford	1	Ind.	1	0	0	-	-	-	-	-	-
Memphis	3	Ky-Tenn.	2	1	0	0	1	0	0	0	1
Grenada	5	Ky-Tenn.	3	2	0	1	1	1	-	-	-
Brandon	5	Ky.	0	0	5	0	1	0	-	-	-
Lexington-Ruston	2	Tenn.	0	1	1	0	1	1	0	0	1
Ruston	2	Tenn.	0	1	1	1	1	0	-	-	-
Atwood	2	Tenn.	0	0	2	2	0	0	-	-	-

*E, Excellent to good; M, medium to fair; F, poor to failure.

[15]Ibid., 1940.

TABLE 7

RESPONSE* OF BLACK LOCUST AND PINE PLANTINGS WITH REFERENCE TO LOCATION ON SANDSTONE AND SHALE SOILS (1938 STUDY)[16]

Soil Series and Tree Species	Surface Plantings		Gully Plantings															
			Sandstone Predominant								Shale Predominant							
			Ridges		Sides		Bottoms		Concretions Present		Ridges		Sides		Bottoms		Concretions Present	
	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
Muskingum:																		
Black Locust	5	3		2		2		2		2	1	5	4	2	4	2		2
All Pines	28	6	3	3	3	3	2	3			9	1	2	4		4		
Scotch Pine	6		1		1		1				2		1	1	1	1		
White Pine	4	2		1		1		1			1	1		1		1		
Red Pine	11		2		2		1				4		1	1	1	1		
Corsican	1	2		1		1		1			1			1		1		
Austrian		1		1		1		1										
Shortleaf	4										1							
Pitch	1																	
Loblolly	1																	
Wellston:																		
Black Locust	1	2										1		1		1		1
All Pines	10	1									3		3			3		
Red Pine	4										1		1			1		
Scotch Pine	2																	
White Pine	2	1									1		1			1		
Shortleaf	1																	
Corsican	1										1		1			1		
Tilsit:																		
Black Locust		1										3	2	1	3			
All Pines	3	1									1			1		1		1
Scotch Pine	1																	
Red Pine	2		1			1		1		1								
White Pine		1																

*S, satisfactory; F, failure.

[16]Ibid., 1940.

TABLE 8

RESPONSE* OF LOCUST AND LOBLOLLY PINE PLANTINGS WITH REFERENCE TO POSITION ON GRENADA SOILS (1938 STUDY)[17]

(Exposure of underlying sand or cemented gravel as indicated)

Species	Surface Plantings		Gully Plantings					
			Gully ridges		Gully sides		Gully bottoms	
	S	F	S	F	S	F	S	F
Black Locust			4 on loess	1 on loess	3 on loess	2 on cemented gravel	3 on loess	2 on cemented gravel
Loblolly Pine	1		2 on loess	1 on loess	1 on loess 1 on sand	1 on loess	2 on sand	1 on loess

*S, satisfactory; F, failure.

[17] Ibid., 1940.

TABLE 9

FACTORS DEFINITELY CONTRIBUTING TO FAILURES* - (1936 STUDY)[18]

Soil Series	LOCUST							PINES						
	Soil Factors	Grazing	Inter-Planting with Pine	Poor Planting Methods	Mice Damage	Drought	Other Vegetation	Soil Factors	Insects and Diseases	Poor Stock	Poor Planting Time and Methods	Grazing	Drought	Inter-Planting with Locust
Muskingum	7					1		4	1			1	1	1
Bellston	1				1			1						
Tilsit	3							1						
Hanoeville	1									1				
Belmont	1			1							1			
Meige-Upshur		1					1		1					
Cincinnati	2					1								
Gibson	2													
Frederick	1													
Bedford	1													
Lawrence	1													
Dickson	1													
Memphis										1	1			
Grenada	2							1	1			1		1
Brandon	5													
Lex.-Aust.	1								1					
Atwood	2		1											
TOTAL	31	1	1	1	1	2	1	8	4	2	2	2	1	2

*Failure of entire planting or part of planting.

[18]Ibid., 1940.

The following is a summary of the study as reported by Ligon.

> Observational studies of five year old erosion control plantings in Ohio, Indiana, Kentucky, and Tennessee indicate (1) that black locust grows best on calcareous soils, soils of good drainage, aeration, and moisture holding capacity, soils free from compact impervious layers and high content of concretionary or indurated materials; (2) that pine will thrive on soils that are more acid, droughty, and infertile than those to which locust is adapted; (3) that hardwoods other than locust fail in practically all cases.[19]

In line with this discussion of the selection of the proper planting species it should be borne in mind that in the past the species planted has been determined to a considerable extent by the availability of planting stock. At the outset of the erosion control planting program black locust was the species that was available in large quantities. It was also the species that was considered to be suitable for all planting sites. Consequently, a large percentage of the older erosion control plantations in existence today are black locust plantings. The inaccuracy of the belief that black locust was universally suitable for erosion control plantings has become evident through studies such as the one just discussed. In recent times a larger percentage of pines and hardwoods have been used for this type of planting. Table 10 shows the trend in the proportion of black locust, pine, and hardwoods that have been used in the planting program from its inception up to the present.

[19] Ibid., 1940.

TABLE 10

PERCENTAGE OF SPECIES USED IN PLANTING PROGRAM OF REGION III. 1934-1939[20]

Year	Percentage Planted		
	Black Locust	Pine	Hardwoods*
1934 - 1935	83	14	3
1935 - 1936	79	8	13
1936 - 1937	60	13	27
1937 - 1938	42	27	31
1938 - 1939	35	52	13

*Includes direct seeding

The question of site preparation is considered from the standpoint of the necessity of any work of this kind. In the past a considerable amount of labor has been devoted to the construction of temporary gully structures as a means of site preparation. Within more recent times, however, the value of procedures such as contour furrows, cultivation, mulching, and fertilization for site preparation are being considered more carefully.

During the summer of 1938 a study was made of the effect of mulching on planting sites. This study was made under the direction of the forestry technicans at the Soil

[20]Unpublished data, Regional Office, Soil Conservation Service, Dayton, Ohio.

Conservation Service projects located at Paducah, Ky., Beford, Ind., and Zanesville, Ohio.

Their observations were compiled in a preliminary report on the mulching of planting sites[21] from which the following discussion of mulching is adapted.

The first part of this report is concerned with the different types of mulches that were studied. Sawdust mulch was considered to be undesirable due to no appreciable stimulus of tree growth and absence of vegetation in the mulched area. Another disadvantage mentioned is its inability to remain in place during hard rains. Straw and hay mulches were found to be very effective as an aid to the establishment of herbaceous vegetation in the planting area. Brush mulches were found to be suitable. Sod mulches made from scalped sod replaced in an inverted position around the trees gave only a slightly favorable growth result as compared to unmulched trees. The Zanesville project reported very good results from dust mulching which consists of placing two inches of loose soil on top of the firmly tamped soil around the tree roots.

The cost of mulching was found to depend largely on the availability of mulching material. It was found after a comparison of costs based on readily available material that sod mulching was the cheapest.

[21]Unpublished data, Regional Office, Soil Conservation Service, Dayton, Ohio.

The studies made of gully mulching of black locust revealed the fact that survival of this species planted in 1936 on mulched gully heads of Grenada silt loam and Memphis silt loam had at least twice the survival percent of comparable unmulched sites.

The growth of gully plantings of black locust on mulched and unmulched sites as observed in this study is shown in Table 11.

TABLE 11

RESPONSE TO MULCHING OF GULLY PLANTED BLACK LOCUST

Soil Type	Date Planted	Date Measured	Av. Ht. (ft) Mulched	Av. ft. (ft.) Unmulched
Bedford silt loam	March, 1936	July, 1938	9.1	5.6
Memphis silt loam	March, 1936	June, 1938	8.0	5.0
Memphis silt loam	April, 1937	June, 1938	4.0	3.0
Grenada silt loam	March, 1936	June, 1938	8.0	5.0
Grenada silt loam	April, 1937	July, 1938	4.5	3.0
Grenada silt loam	April, 1936	June, 1938	7.0	3.5

Root distribution of black locust on soil of the Grenada series was found to be better on mulched areas than on unmulched areas. Soil temperatures taken within the top one-half inch of soil of the Grenada series commonly ranged as high as 140 degrees Fahrenheit on unmulched areas while the temperature seldom exceeded 90 degrees Fahrenheit on the mulched areas.

The observations made during this study showed that mulching unquestionably aids the establishment of volunteer vegetation on the planted areas.

Table 12 shows the growth of field plantings of black locust and pines on mulched and unmulched sites as observed in this study.

The conclusions reached on the basis of this entire study are stated as follows:

a. Hay and straw mulches of a thickness no more than one-half inch promote volunteer vegetation more effectively than other types of mulching.

b. Gullies can be controlled quicker, more effectively, and more economically with mulching than with temporary structures.

c. All gully heads should be mulched.

d. Gully mulching promotes survival during dry seasons by conserving moisture, and during wet seasons by reducing losses from washing.

e. Gully mulching stimulates the growth of black locust during its first two or three years, the degree of increase varying on different soils.

f. Mulching promotes better distributed root development in black locust on loess soils.

g. Mulching definitely retards evaporation in the soil surface.

h. Mulching eliminates lethal temperatures at the soil surface.

i. Thin straw or hay mulches greatly increase volunteer vegetation. More efficient erosion controlling species volunteer in mulched areas than in unmulched areas.

j. Mulching of field planted 1-0 pines increased survival on Grenada silt loam by three percent, which was not sufficient to justify the cost of mulching.

TABLE 12

RESPONSE TO MULCHING OF FIELD PLANTED BLACK LOCUST AND PINE

Soil Series	Species	Date Planted	Date Measured	Av. Ht. (Ft.) Mulched	Av. Ht. (Ft.) Unmulched
Muskingum	Black Locust	4/36	7/38	9.5	8.9
Fredrick	Black Locust	4/36	7/38	1.5	1.3
Fredrick	Black Locust	4/36	7/38	4.5	2.3
Bedford	Black Locust	3/36	7/38	5.2	3.2
Bedford	Black Locust	3/36	7/38	5.6	3.2
Fredrick	Shortleaf Pine	3/36	7/38	1.6	1.1
Fredrick	Shortleaf Pine	4/36	7/38	1.3	1.2
Grenada	Loblolly Pine	3/38	8/38	1.4	1.1
Grenada	Shortleaf Pine	3/38	8/38	0.8	0.7
Grenada	Pitch Pine	3/38	8/38	0.7	0.7
Grenada	Virginia Pine	3/38	8/38	0.7	0.6
Grenada	Black Locust	3/38	8/38	1.6	1.4

k. Mulching usually slightly increases the growth of field planted pines and black locust.

l. Mulching prevents heaving of field planted 1-0 pitch and shortleaf pines on badly sheet eroded areas.

m. On poor soils mulching increases the vigor of 1-0 pines.

n. Since labor involved in mulching field plantings more than doubles planting cost, only those parts of areas should be mulched where there is incipient gullying.[22]

Considerable work has been done in Region III in regard to the fertilization of planting stock. The majority of this work has been done in connection with black locust. The application of about 16 grams of a 2:12:6 commercial fertilizer to each tree has proved to be practical. On the basis of 1,200 trees per acre the cost of this fertilization treatment would be about one dollar per acre.[23]

Table 13 gives the results of the planting program in Region III based on survival counts. These figures are especially valuable as a partial measure of the success of the solution procedures previously discussed that are used in connection with planting problems.

Quite a bit of work is being done by other agencies in an attempt to solve planting problems similar to the ones encountered in the Soil Conservation Service program. The Central States Forest Experiment Station is devoting

[22] Ibid.

[23] Bell, G. Y., op. cit., p. 90.

TABLE 13

RESULTS OF THE SOIL CONSERVATION SERVICE PROGRAM OF PLANTING TREES AND SHRUBS IN REGION III[24]

1	2	3	4	5	6	7	8	9
State	Planted to Date SCS Records	Examined and Reported Fiscal Year of 1937	Percentage of Planted Area Examined	Satisfactory Survival		Unsatisfactory Survival		
				Acres	Ave. Survival Percent	Acres	Ave. Survival Percent	Percent of Acres Examined (7) ÷ (3)
Indiana	7,539	2,899	38	2,221	83	678	49	23
Kentucky	7,839	3,210	41	2,204	80	1,006	58	31
Michigan	127	119	94	110	81	9	64	8
Ohio	11,819	3,587	30	2,457	84	1,130	46	31
Tennessee	3,744	797	21	768	88	29	61	4

[24]Preston, John F., Results of the Soil Conservation Service Program of Planting Trees and Shrubs, Jr. For., vol. 37, p. 20, 1939.

considerable attention to studies of site requirements of different species and methods of site preparation. These studies have been instituted because the planting sites that the United States Forest Service works with in the central states are often in a similar condition to the problem areas encountered by the Soil Conservation Service.

2. Development of woodland management plans. The problem encountered here is chiefly concerned with the wooded areas that are already in existence on the farm. These woodlands represent a variety of situations in the way of species and amount and condition of growing stock. The requirements that a farm unit makes on the woodland present on the farm also varies according to the type of farming operations being followed. These facts make it imperative that a woodland management plan be formed in such a way that it fits in with the general scheme of farming operations. In some cases the management plan also has to be modified so as to mesh with the plans of other technicians. For example, silvicultural practices may have to be restricted in order to comply with the recommendations of wildlife technicians.

The solution procedure followed in the problem of designing a woodland management plan that best fits the needs of the individual farm unit involves a decision as to the woodland products that are most useful to the farm. Fence posts are an important item in the case of a

livestock farm. In the south part of the Region flue-wood is essential in the flue-curing of tobacco. Other types of farming will give rise to a need for different products. In order to determine the woodland products needed on each farm it is necessary to make an inventory of the amount of these products that are used each year. This inventory considers such uses as construction purposes, fuel, fence posts, and others. It is the main objective of the management plant to provide a perpetual source of supply for the majority of these needs and provide wood products for sale if possible.

The minimum requirements that are stipulated in all management plans include protection of the woodlands from fire and grazing and the restriction of cutting to such an extent that the woodland cover will be adequate to conserve soil and moisture. These requirements are necessary to prevent misuse of the woodlands. The management plan usually goes farther than this in that they strive to make the farm woodlands a more important section of the economic farm unit. In most cases the farm agreement of which the woodland management plan is a part specifies certain definite woods practices for the farmer to carry out. These practices include thinnings, removal of wolf trees, pruning of crop trees, and the planting of open places in the canopy.

The actual management plan that is made for the farm

woodland is composed of two parts. The first part is the technical plan that includes a description of the sites and types present, stand tables, growth data, and selection of rotation and cutting cycles. This part of the plan remains in the possession of the Soil Conservation Service. The second part is a simple and modified copy of the first part that is given to the landowner. This part will contain a description of stand and growth conditions, farm wood requirements and their relationship to stand and growth conditions, simple protection and cutting plans, and a record of products removed in case the Soil Conservation Service has done improvement work on the woodland.[25]

The studies that the United States Forest Service, State Forest Services, and the Agricultural Experiment Stations have made of woodlands are of considerable assistance to the Soil Conservation Service in the designing of suitable management plans.

3. Development of improved timber marketing practices. A greater appreciation by the landowner of the economic value of his woodland is one of the aims of the farm forestry work of the Soil Conservation Service. The designing of a management plan, as previously discussed, that supplies the farm needs and in some cases provides wood products for

[25]Monroe, A. F., The Farm Woods in a Soil Conservation Program in Michigan. Paper presented at the 1939 meeting of the Michigan Academy of Science.

sale is of paramount importance in securing the appreciation on the part of the owner. When a woodland provides products for market it follows that the maximum returns from the marketing transaction brings the maximum appreciation of the value of the woodland. In order to secure the maximum returns from the sale of woodland products, especially saw timber, certain marketing problems must be taken into consideration. The farm forestry work of the Soil Conservation Service is concerned with assisting the farmers they are working with in the solution of these problems. A statement of these problems that face woodland owners has been made as follows:

a. To determine what they have to sell.

b. To find a market for what they have to sell.

c. To evaluate their stumpage in view of various economic factors and determine when to sell.

d. To choose a method of selling that will result in the highest stumpage return.[26]

Very few farmers have an accurate conception of the amount and value of the timber that they have to sell. A study made in Indiana showed that out of 91 sales of ash timber only eight percent of the owners had made a previous estimate of their timber.[27] The forestry technicians of

[26]Brundage, R. C., Timber Marketing Problems in the Central Hardwood Region. Jr. For., Vol. 38, p. 227, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science at Columbus, Ohio, December, 1939.)

[27]Ibid., 1940.

the Soil Conservation Service are interested in giving the woodland owner instructions in the estimating and valuation of his timber stand. This will involve instruction in the methods of securing volume figures by log diameter classes and by log grades.

The next problem that confronts the timber owner is that of available markets. In order to secure highest prices for his product he must have a knowledge of the different markets within economic hauling distances that will buy the kind of timber that he has for sale. In this instance the forestry technician is of assistance in being able to give information on the different markets that are available in the area.

The decision on the part of the timber owner as to the best time to sell his product involves various economic factors. These factors include price levels for various species, possible trends of demand and price, and the necessity for securing a cash income from the timber property at any given time. In this case the forestry technician of the Service can be of assistance by giving advice on the status of the available timber markets.

The fourth problem to be decided upon is the selection of a method of selling. The timber owner usually has a choice of selling his product on the stump or as logs, either at the farm or at the market. The forestry technician can be of service in this instance by offering advice based on the following points:

a. The individual's ability to evaluate what he has to sell.

b. His experience in cutting and preparing timber products for market.

c. Whether or not he can or wishes to assume the financial risks required for producing timber. These may be money for logging costs, trucking charges, and workmen's compensation insurace; also milling costs if converted into sawn products prior to marketing.[28]

The principal cooperative aids to the solution of the above problems are the marketing studies that are carried on by the various Agricultural Experiment Stations in the Region, and the timber marketing information presented to woodland owners by the Extension Service in the various states.

[28] Ibid., 1940.

CHAPTER IV

SUMMARY

The Soil Conservation Service, under its present organization, is an agency dealing with land-use problems with the emphasis in Region III on problems connected with erosion control. The present lines of action are soil erosion control, submarginal land purchase, flood control, water facilities, farm forestry, and drainage and irrigation.

Region III of the Soil Conservation Service includes the states of Michigan, Indiana, Ohio, Kentucky, and Tennessee. This is an area of varied farming activities and land-use practices. The extent of land deterioration throughout the entire area caused by past misuses of land has been governed chiefly by the characteristics of different parts of the region.

The specific problems of the farm forestry work of the Soil Conservation Service in the Region are inextricably tied up with the problems that confront the activities of the entire program. The sequence followed in arriving at the farm forestry problems first involves the solution of a general problem of securing an acceptance of the recommendations of the entire Soil Conservation Service program. The solution procedure followed here is educational

activities that will result in an acceptance of the precepts of the entire program.

The next problem encountered has to be solved before the specific activities of the farm forestry work can be started. This will involve a decision as to the areas of each farm unit that will be allotted to forestry practices. The solution procedure in this instance is land-use planning by means of use capability surveys modified by the characteristics and special needs of each farm.

The problems encountered after the farm forestry work has started are threefold. Attainment of satisfactory planting results on sites that are usually in a condition of depleted fertility is a very important problem. Observations made of existing plantings on sites of all types serve as a guide to the solution of this problem. Another difficulty encountered at this time is the development of a woodland management plan that will best fit the needs of the individual farm unit. The solution procedure used here is a careful consideration of all the factors involved on each farm. This includes the present condition of the woodland and the amount and kind of wood products that are to be utilized on the farm. Consideration is always given to the possibilities of producing products in excess of those used on the farm so that they may be sold and furnish an addition to the farm income.

The problem of the development of improved timber

marketing practices is also encountered. The solution procedure used in this instance includes activities that will give the woodland owners a more adequate knowledge of businesslike methods of timber marketing. This consists of instruction in methods of estimating volume and values of timber, information conerning available markets, advice as to the best time to sell, and suggestions as to the best methods of marketing the product.

All of the problems enccuntered in the farm forestry work of the Soil Conservation Service are of such a nature that considerable assistance in their solution is derived from the work of other agencies. These agencies include the Bureau of Agricultural Economics, United States Forest Service, State Forest Services, Agricultural Experiment Stations, Agricultural Conservation Program, and the Extension Service of the various states in the Region.

BIBLIOGRAPHY

Aaltonen, F.; Herr, C. S.; and Barraclough, K. E. The Cooperative Marketing of Forest Products, Journal of Forestry, vol. 36, p. 203, 1938.

Allen, Bushrod W. A Two Way Channel in Planning, Journal of Forestry, vol. 37, p. 770, 1939.

Anonymous. A Five-Million Dollar Crop, Ohio Forest News, No. 18, p. 8, 1932.

Anonymous. An Experience with Black Locust. Soil Conservation, vol. 2, No. 2, p. 25, 1936.

Anonymous. Assessment of Forest Land. Publication 19, Indiana Department of Conservation, 1936.

Anonymous. Care of the Farm Woods, Ohio Forest News, No. 17, p. 5, April, 1932.

Anonymous. Census Shows Increase in Woods, Ohio Forest News, No. 28, p. 5, July, 1936.

Anonymous. Editorial: Whither Federal-Land Grant College Cooperation in Farm Forestry, Journal of Forestry, vol. 37, p. 757, 1939.

Anonymous. Farm Forestry Bill Enacted, American Forests, vol. 43, no. 6, p. 302, 1937.

Anonymous. Federal News and Reviews, American Forests, vol. 46, no. 4, p. 186, 1940.

Anonymous. Ohio Ranks Third, Ohio Forest News, no. 18, p. 3, July, 1932.

Anonymous. Profits from Black Locust, Ohio Forest News, no. 21, p. 8, March, 1933.

Anonymous. Report of Committee on Farm Forestry in Agricultural Colleges, Journal of Forestry, vol. 36, p. 168, 1938.

Anonymous. Report of Committee on Farm Forestry in the Agricultural Colleges, Journal of Forestry, vol. 37, p. 123, 1939.

Anonymous. Report of Committee on Private Forestry, Journal of Forestry, vol. 37, p. 121, 1939.

Anonymous. 1939 Report of the Chief of the Soil Conservation Service. Government Printing Office, Washington, D.C., 1939.

Anonymous. Report of the Secretary of Agriculture for 1939. Government Printing Office, Washington, D.C., 1939.

Anonymous. Soil Conservation Districts for Erosion Control. Misc. Publ. 293, U. S. D. A., Soil Conservation Service, Government Printing Office, Washington, D. C., 1937.

Anonymous. Soil Erosion, A Critical Problem in American Agriculture. Part V of the Supplementary Report of the Land Planning Committee to the National Resources Planning Board. Government Printing Office, Washington, D. C., 1935, 112 pp.

Anonymous. Soils and Men. 1938 Yearbook of Agriculture, Government Printing Office, Washington, D. C., 1938.

Anonymous. United States Census of Agriculture: 1935. Bureau of the Census, U. S. Department of Commerce. Government Printing Office, Washington, D. C., 1936.

Anonymous. Woods Influence on Water Supply. Ohio Forest News, no. 17, p. 5, April, 1932.

Auten, John T. A Forest Soil Research Program for the Central States, Journal of Forestry, vol. 37, p. 153, 1939.

Auten, John T. A Method of Site Evaluation for Yellow Poplar Based on Depth of the Undisturbed A_1 Soil Horizon. Central States Forest Experiment Station Note, no. 33, 1937.

Auten, John T. Reconstruction of the Hardwood Forest Soil Profile by Vegetative Covers, Journal of Forestry, vol. 38, p. 229, 1940.

Auten, John T. Porosity and Water Absorption of Forest Soils, Central States Forest Experiment Station Note no. 8, 1934.

Auten, John T. Site Requirements of Black Locust, Central States Forest Experiment Station Note no. 4, 1933.

Auten, John T. Site Requirements of Yellow Popular, Central States Forest Experiment Station Note no. 32, 1937.

Auten, John T. Soil Profile Studies in Relation to Site Requirements of Black Locust and Black Walnut, Central States Forest Experiment Station Note no. 31, 1936.

Auten, John T. Successful Forest Planting Requires Better Site Appraisals, Journal of Forestry, vol. 33, p. 861, 1935.

Bahr, Carl. Economic and Commercial Policies Necessary for Successful Private Forestry, Journal of Forestry, Vol. 37, p. 453, 1939.

Baker, O. E. The Forest Problem in a Rich Agricultural County of Ohio, Forestry Quarterly, vol. 6, p. 138, 1908.

Baker, Willis M. Comments on Timber Stand Improvement in the Central States, Central States Forest Experiment Station Note no. 30, 1936.

Baker, Willis M. The Place of Forestry in Soil and Water Conservation in the Tennessee Valley, Journal of Forestry, vol. 37, p. 157, 1939.

Baldwin, Henry I. Marketing Cordwood in New Hampshire, Journal of Forestry, vol. 37, p. 474, 1939.

Barraclough, K. E. County Land Use Planning, Journal of Forestry, vol. 37, p. 460, 1939.

Behre, Edward. The Place of Forestry in the New Agricultural Conservation Program, Journal of Forestry, vol. 34, p. 674, 1936.

Bell, G. Y. Analysis of Tree Planting Problems in Region III, Soil Conservation, vol. 4, p. 89, 1938.

Bennett, H. H. Cooperative Farm Forestry--Another Avenue to Better Land Use, Soil Conservation, vol. 5, no. 6, p. 13[illegible].

Bennett, H. H. Soil Conservation, McGraw-Hill, New York, 1939, 993 pp.

Brundage, R. C. Marketing Crossties and Piling in Southern Indiana. Bulletin No. 395, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1934.

Brundage, R. C. Marketing Timber for Basket Stock in Indiana. Bulletin 408, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1936.

Brundage, R. C. Marketing Timber for Handle Stock in Indiana. Bulletin No. 424, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1937.

Brundage, R. C. Marketing White Ash, Ohio Forest News, no. 35, p. 10, March, 1939.

Brundage, R. C. Timber Marketing Problems in the Central Hardwood Region, Journal of Forestry, Vol. 38, p. 227, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the asupices of the American Association for the Advancement of Science at Columbus, Ohio, December, 1939).

Bruner, M. H. Another Approach to Farm Forestry, Journal of Forestry, vol. 38, p. 307, 1939.

Calland, J. W. Marketing of Woodlot Products. Bulletin 302, Ohio Agricultural Experiment Station, Wooster, Ohio, 1916.

Chandler, Robert F. The Influence of Grazing upon Certain Soil and Climatic Conditions in Farm Woodlands, Journal of Forestry, Vol. 38, p. 228, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science held in Columbus, Ohio, December, 1939.)

Chapman, A. G. A Basis for Selection of Species for Reforestation in the Central Hardwood Region, Central States Forest Experiment Station note no. 29, 1936.

Chapman, A. G. An Ecological Basis for Reforestation of Submarginal Land in the Central Hardwood Region, Ecology, vol. 18, no. 1, 1937.

Chapman, A. G. Regeneration Studies. Central States Forest Experiment Station Investigative Report for 1936 and Program for 1937, 1936.

Chittenden, A. K. and Robbins, P. W. The Farm Woodlot in Michigan. Special Bulletin No. 196, Agricultural Experiment Station, Michigan State College, East Lansing, Michigan, 1930.

Clapp, E. H. Dependable Forests--Especially Farm Forests, Soil Conservation, vol. 4, p. 51.

Cole, R. O. Soil Conservation in Indiana. Extension Bulletin, No. 228, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1938.

Conrey, G. W., Cutler, J. S., and Paschall, A. H. Soil Erosion in Ohio. Bulletin 589, Ohio Agricultural Experiment Station, Wooster, Ohio, 1937.

Coulter, Stanley. The Woodlot Problem. Indiana State Board of Forestry, 14th Annual Report, p. 73, 1914.

Coulter, Stanley. Woodlot Conditions and Possibilities. Indiana State Board of Forestry. 9th and 10th Annual Reports, 1909, p. 37, 1910, p. 126.

Culbertson, Glenn. Some Preliminary Investigations with Regard to the Cultivation of Black Locust in Southeastern Indiana. Indiana State Board of Forestry, 14th Annual Report, p. 67, 1914.

Cutler, J. S. Anchoring Farmlands in the Ohio Valley Region. U.S.D.A., Soil Conservation Service, Government Printing Office, Washington, 1937.

Cutler, J. S. Ohio Valley Launches Extension Program. Soil Conservation, vol. 3, p. 34.

Davis, Arnold M. Erosion on Roads and Adjacent Lands, Leaflet No. 164, U.S.D.A., 1938.

Day, Ralph K. Reduce Woodland Grazing by Increasing Pastures. Central States Forest Experiment Station Note no. 12, 1934.

Day, Ralph K. and DenUyl, Daniel. The Natural Regeneration of Farm Woods Following the Exclusion of Livestock. Bulletin No. 368, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1932.

Den Uyl, Daniel. Tree Windbreaks for Indiana Farms. Extension Bulletin No. 226, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1938.

Den Uyl, Daniel and Day, Ralph K. Woodland Carrying Capacities and Grazing Injury Studies. Bulletin No. 391, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1934.

Detwiler, S. B. The Soil Saving Persimmon. Soil Conservation, vol. 3, p. 230.

Diller, O. D. Progress of the Ohio Farm Forestry Survey, Journal of Forestry, vol. 38, p. 225, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science held in Columbus, Ohio, December, 1939.)

Diller, O. D. Soil Mixture Content during Critical Period in the Regeneration of Previously Grazed Farm Woodlands, Journal of Forestry, vol. 35, p. 399, 1937.

Drier, John. Forests for Farmers, Land Policy Review, vol. 1, no. 1, p. 8.

Edminster, Frank C. Improving Farm Woodland for Wildlife, Soil Conservation, vol. 4, p. 212.

Fivaz, A. E. Farm Woodland: Conserver of Soil and Moisture, Soil Conservation, vol. 2, p. 28.

Fonda, Morris. One Farmer's Profits from Black Locust, Soil Conservation, vol. 2, p. 101.

Frank, Bernard. Foresters and Land Planning, Journal of Forestry, vol. 34, p. 262, 1936.

Frontz, Leroy. Trees for Cash and Conservation, Soil Conservation, vol. 2, p. 212.

Gillet, Charles A. The Cooperative Approach in Forestry, Journal of Forestry, vol. 37, p. 99, 1939.

Glick, Philip M. State Legislation for Erosion Control, Soil Conservation, vol. 3, p. 120.

Goetz, C. H. Need of Farm Woodlots in the Central States, Forest Leaves, vol. 13, no. 2, p. 21, 1911.

Goodell, B. C. Soil Freezing as Affected by Vegetation and Slope Aspect, Journal of Forestry, vol. 37, p. 626, 1939.

Green, W. J. First Report on Forestry Conditions in Ohio, Bulletin 188, Ohio Agricultural Experiment Station, Wooster, Ohio, 1907.

Hall, R. C. Forest Conditions in Kentucky and Tennessee, American Forestry, vol. 19, p. 533, 1913.

Hall, R. C. Suggestions for Locust Borer Control. Central States Forest Experiment Station Note, no. 5, 1933.

Hall, William F. Progress and Problems of Private Forest Practice, Journal of Forestry, vol. 37, p. 110, 1939.

Heiberg, Svend O. Forest Soil in Relation to Silviculture, Journal of Forestry, vol. 37, p. 42, 1939.

Herbert, P. A. Public Agencies in Farm Woodland Forestry, Journal of Forestry, vol. 37, p. 915, 1939.

Herbert, P. A. Some Phases of County Planning in Michigan, Journal of Forestry, vol. 37, p. 743, 1939.

Hicks, William. Economic Aspects of Cooperative Marketing of Forest Products, Journal of Forestry, vol. 37, p. 392, 1939.

Hopkins, Howard. Recent Developments in Cooperative Opportunities between Federal and State Forest Agencies, Journal of Forestry, vol. 36, p.1,110, 1938.

House, Ray W. Leatherwood Creek Project Proves Value of Conservation, Purdue Agriculturist, vol. 33, p. 9, 1939.

Jepson, Hans,G. Prevention and Control of Gullies, Farmers Bulletin No. 1813, U.S.D.A., 1939.

Jotter, E. V. Farm Woodland in the Soil Conservation Program, Forestry News Digest, January, 1937.

Jotter, E. V. Farm Woodland Returns, Soil Conservation, vol. 2, p. 81.

Jotter, E. V. Trees, Soil Conservation, vol. 3, p. 57.

Kell, Walter V. Cover Crops for Soil Conservation. Farmers Bulletin no. 1758, U.S.D.A., 1936.

Kell, Walter V. Strip Cropping for Soil Conservation. Farmers Bulletin no. 1776, U.S.D.A., 1938.

Kellog, L. F. Black Locust Planting for Erosion Control. Central States Forest Experiment Station Note no. 3, 1933.

Kellog, L. F. Failure of Black Locust-Coniferous Mixtures in the Central States. Central States Forest Experiment Station Note no. 15, 1934.

Kellog, L. F. Growth of Black Locust. Central States Experiment Station Note no. 6, 1933.

Kellog, L. F. Site Index Curves for Plantations for Black Locust in the Central States Region. Central States Forest Experiment Station Note no. 36, 1939.

Kriebel, Ralph M. Wildlife Conservation in Indiana through Erosion Control. Indiana Audubon Year Book, vol. 16, p. 16, 1938.

Larsen, J. A. Natural Spreading of Planted Black Locust in Southeastern Ohio, Journal of Forestry, vol. 33, p. 616, 1935.

Lentz, Gus. The Tennessee Valley Authority's Attack on Soil Erosion through Reforestation, Journal of Forestry, vol. 33, p. 570, 1935.

Ligon, W. S. Influence of Soil Type and Other Site Factors on the Success of Tree Plantings for Erosion Control, Journal of Forestry, vol. 38, p. 226, 1940. (Abstract of papers presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science at Columbus, Ohio, December, 1939).

Lord, Russell. To Hold This Soil. Misc. Publ. no. 321, U.S.D.A., 1938.

Lowdermilk, W. C. Civilization and Soil Erosion, Journal of Forestry, vol. 33, p. 554, 1935.

Lowdermilk, W. C. Land Use Patterns in Erosion and Flood Control, Journal of Forestry, vol. 35, p. 1040, 1937.

Martin, Clyde S. What Woods Practices Are Necessary for the Development of Private Forestry, Journal of Forestry, vol. 37, p. 465, 1939.

Mattoon, W. R. Large Increase in Farm Woodland, Journal of Forestry, vol. 34, p. 917, 1936.

Mattoon, Wilbur R. and Barrows, William B. Measuring and Marketing Farm Timber. Farmers Bulletin No. 1210, U.S.D.A., 1930.

McAtee, W. L. Groups of Plants Valuable for Wildlife Utilization and Erosion Control. Circular no. 412, U.S.D.A., 1936.

McComb, A. L., and Kapel, F. J. Growth of Seedling Black Locust and Green Ash in Relation to Subsoil Acidity and Fertility, Journal of Forestry, vol. 38, p. 228, 1940. (Abstract of paper presented before a meeting of the Society of American Foresters held under the auspices of the American Association for the Advancement of Science at Columbus, Ohio, December, 1939).

Meginnis, H. G. Effect of Top Pruning on Survival and Early Growth of Black Locust, Journal of Forestry, vol. 38, p. 30, 1940.

Meginnis, H. G. Soil Collecting Trenches as Substitute for Temporary Check Dam in Reforesting Gullies, Journal of Forestry, vol. 37, p. 764, 1939.

Monroe, A. F. The Farm Woods in a Soil Conservation Program in Michigan. Paper presented at the 1939 meeting of the Michigan Academy of Science.

Murphy, F. T. Cooperative Timber Marketing, Journal of Forestry, vol. 35, p. 448, 1937.

Neubrech, LeRoy W. Marketing Indiana Timber. Bulletin No. 335, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1930.

Norton, E. A. Soil Conservation Survey Handbook. Misc. Publ. no. 352, U. S. D. A., 1939.

Polivka, J. B. and Alderman. O. A. The Problem of Selecting the Desirable Pine Species for Forest Planting in Ohio, Journal of Forestry, vol. 35, p. 832, 1937.

Preston, John F. A Fence Around the Farm Woodland, Soil Conservation, vol. 4, p. 133.

Preston, John F. Forestry in Soil Conservation; the Forester's New Opportunity, Journal of Forestry, vol. 35, p. 205, 1937.

Preston, John F. Results of the Soil Conservation Service Program of Planting Trees and Shrubs, Journal of Forestry, vol. 37, p. 19, 1939.

Preston, John F. The Approach to Farm Forestry, Journal of Forestry, vol. 37, p. 367, 1939.

Preston, John F. The Place of the Forester in Soil Conservation, Soil Conservation, vol. 2, p. 8.

Preston, John F. Woodland, A Part of the Farm Plan, Soil Conservation, vol. 2, p. 117.

Reed, E. F. and Falconer, J. I. The Effect of Land Use and Management on Erosion. Bulletin 585, Ohio Agricultural Experiment Station, Wooster, Ohio, 1937.

Roberts, E. G. Soil Depth and Height Growth of Black Locust, Journal of Forestry, vol. 37, p. 583, 1939.

Rowalt, E. M. Soil Defense in the Piedmont. Farmers Bulletin no. 1767, U.S.D.A., 1938.

Rule, Glenn K. Conserving Corn Belt Soil. Farmers Bulletin no. 1795, U.S.D.A., 1937.

Rupp, A. F. Choosing the Right Tree, Soil Conservation, vol. 2, p. 52.

Rush, Donald R. The Use of Agricultural Credit in a Land Use Program, Land Policy Review, vol. 1, no. 1, p. 12.

Sawyer, L. E. The Farm Forestry Situation in the Central States, Journal of Forestry, vol. 37, p. 173, 1939.

Secrest, Edmund. Opportunities for Research in Forestry, Ohio Forest News, no. 37, p. 3, October, 1939.

Secrest, Edmund. The Role of Artificial Regeneration in the Re-enforcement of Hardwood Woodlots, Journal of Forestry, vol. 18, p. 329, 1913.

Sharpe, C. F. Stewart. What is Soil Erosion, Misc. Publ. no. 286, U.S.D.A., 1938.

Shaw, T. E. and Brundage, R. C. The Need for Woodland Improvement in Indiana. Extension Bulletin No. 221, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, 1937.

Shepard, Ward. Integral Land Reconstruction, Journal of Forestry, vol. 33, p. 561, 1935.

Shivery, G. B. The Farm Woodland in Tennessee. Extension Bulletin no. 144, University of Tennessee, Knoxville, Tennessee, 1926.

Silcox, F. A. The Forests--Storehouses of Economic Wealth, Soil Conservation, vol. 4, p. 22.

Sites, John W. Choose Superior Locust Stands for Seed Collection, Soil Conservation, vol. 5, p. 32.

Spillers, A. R. A Correlation of Erosion with Land Use and Slope in the Norris Dam Watershed, Journal of Forestry, vol. 34, p. 492, 1936.

Steer, Henry B. Stumpage Prices of Privately Owned Timber in the United States. Technical Bulletin 626, U.S.D.A., 1938.

Stevens, Ross O. Wildlife Conservation through Erosion Control in the Piedmont. Farmers Bulletin no. 1788, U.S.D.A., 1937.

Swingler, William S. The Farmer Turns Forester--A Study in Cooperation, Land Policy Review, vol. 1, no. 2, p. 11.

Tillotson, C. R. Growing and Planting Hardwood Seedlings on the Farm. Farmers Bulletin no. 1123, U.S.D.A., 1932.

Tillotson, C. R. The Care and Improvement of the Farm Woods. Farmers Bulletin no. 1177, U.S.D.A., 1920.

Van Dersal, William R. A Border for the Woods, Soil Conservation, vol. 3, p. 99.

Wallace, Henry A. Conservation--The Farmers' Part in National Defense. Journal of Forestry, vol. 38, p. 209, 1940.

Westveld, R. H. Farm Forestry Education in the Agricultural Curriculum, Journal of Forestry, vol. 35, p. 910, 1937.

Westveld, R. H. and Van Camp, J. L. Forest Planting on Michigan Farms. Extension Bulletin no. 147. Michigan Agricultural Experiment Station, East Lansing, Michigan, 1935.

Wilcox, R. F. and Shaw, T. E. Planting Forest Trees in Indiana. Forestry Bulletin No. 10, Indiana Department of Conservation, Division of Forestry, 1937.

Wilcox, R. F. The Price of Forestry Neglect in Indiana. Department Publication no. 61, Indiana Department of Conservation, Indianapolis, 1927.

Wilde, S. A. The Significance of Soil Texture in Forestry, and Its Determination by a Rapid Field Method, Journal of Forestry, vol. 33, p. 503, 1935.

Williams, W. K. Protect Hardwood Stands from Grazing. Leaflet no. 86, U.S.D.A., 1933.

Yerkes, Guy E. Propagation of Trees and Shrubs, Farmers Bulletin no. 1567, U.S.D.A., 1932.