Name: Chung Ki Kim Date of Degree: May 29, 1960

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: PLANNING THE TEACHING ACTIVITIES ON SOIL MANAGEMENT FOR AGRICULTURAL HIGH SCHOOL STUDENTS IN KYUNG-NAM, KOREA

Pages in Study: 46 Candidate for the Master of Science Degree

Major Field: Agricultural Education

Scope and Method of Study: The purposes of this study were: (1) to determine the nature and extent of certain selected methods now used in teaching soil management, (2) to identify the major difficulties experienced by teachers in teaching soil management to high school students, and (3) to make recommendations that may provide more effective methods of teaching soils in vocational agricultural high schools. These recommendations should apply to the situation that exists in Kyung-Nam, Korea.

A questionnaire on soil management problems was prepared by the writer. Ten teachers of vocational agriculture in Kyung-Nam, Korea, supplied the information required under the supervision of the writer.

Findings and Conclusions: The main problems related to soil management taught in the vocational agriculture schools were making compost, improving acidic soils, crops adapted to community soil, providing organic matter, cover crops, soil survey of the community and water erosion in the community. The major problem that appeared to be neglected was assignments concerning soil management on the student's home farms. The common difficulties encountered by teachers in teaching soil management were: (1) lack of time to visit students' home farms during school term, (2) the number of students prevented effective supervision on the campus farm, (3) lack of facilities that were related to soil management, and (4) insufficient references.

The study revealed that improving acidic soil and applying fertilizers were the two general programs emphasized in teaching soil management.

The author's conclusions were that teaching problems on soil management should: (1) be planned to meet the needs of farmers in the community, (2) emphasize the solving of problems of the students including a study of soil management needs on the home farms, and (3) provide opportunities for the students to exhibit soil management accomplishments at fairs and shows.

ADVISER'S APPROVAL _____

PLANNING THE TEACHING ACTIVITIES ON SOIL MANAGEMENT FOR AGRICULTURAL HIGH SCHOOL STUDENTS IN KYUNG-NAM, KOREA

By

CHUNG KI KIM

Bachelor of Science

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1953

Submitted to the faculty of the Graduate School of
the Oklahoma State University
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
May, 1960

PLANNING THE TEACHING ACTIVITIES ON SOIL MANAGEMENT FOR AGRICULTURAL HIGH SCHOOL STUDENTS IN KYUNG-NAM, KOREA

Approved:

Adviser

Robert R. Price
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ACKNOWLEDGMENTS

The writer wishes to express his sincere appreciation for the guidance and counsel of those who have assisted and encouraged him in the completion of this report. He is especially indebted to his major adviser, Professor Robert R. Price, Head of the Department of Agricultural Education, and to Associate Professor Don M. Orr, Assistant Professor Claxton R. Cook and Professor Robert MacVicar, Dean of the Graduate School. Gratitude is also expressed to the principals and the teachers in his home country who assisted with the study. To all individuals in the United States and in Korea who have encouraged him, he is deeply grateful.

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CHAPTER I

INTRODUCTION

Almost three-quarters of the Korean population live by tilling the soil or by distributing and marketing the fruits of farm labor. For more than four thousand years the patient, hardy farmers in Korea have been caring for their paddy land and in turn his serene soil has been caring for him.

Modern Korea, with its roots in 4,000 years of wise experience, looks to the future through the eyes of its youth. Children in schools and clubs are learning the methods of how the outside world produces food. Elders are beginning to see that progress should not be postponed until tomorrow, but action should be taken today.

> Far-reaching changes and advancements have been made in agriculture during recent years. In the past, some people have been of the opinion that anybody could farm. Today farming is a business which involves many scientific practices, and it has become highly organized, specialized and mechanized. The soil is rapidly becoming depleted in many areas; the country is becoming densely populated; many pests have been introduced; production, management and competition is becoming keener each year. Consequently, the farmer must cope with many complex problems. He must be able to form judgements, evaluate carefully, and arrive at proper conclusions in solving his problems.[1]

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[1]Phipps and Cook, Handbook on Teaching Vocational Agriculture, Illinois, 1956, p. 34.

These trends are giving a mighty impetus to agricultural education. Consequently the most sensational chapter in Korean recent agricultural history is the increase of agricultural high schools which will raise the educational standards achieved by young farmers.

Educators in general are recognizing the importance of offering vocational agriculture in Korea. One hundred and forty-three agricultural high schools are organized as compared with only ten agricultural high schools ten years ago.

> Vocational education becomes that part of the experiences of an individual whereby he learns successfully to carry on any gainful occupation.
>
> Vocational education in agriculture is to train present and prospective farmers for proficiency in farming. Systematic instruction in agriculture of less than college grade connected in public schools for those persons fourteen years of age, or who are preparing to enter upon the work of the farm. Vocational agriculture was introduced to fill a gap in the public school educational system, and it has developed and become recognized as one of the permanent phases of the program of public education.[2]

Statement of the Problem

One of the major problems covered with teaching soil management in Korea is "How should we plan the teaching programs related to soil management?" If it is felt that teaching program can be challenging to the boys to become interested in studying their community soil and in solving their

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[2]Phipps and Cook, "Handbook on Teaching Vocational Agriculture", Illinois, 1956, page 19.

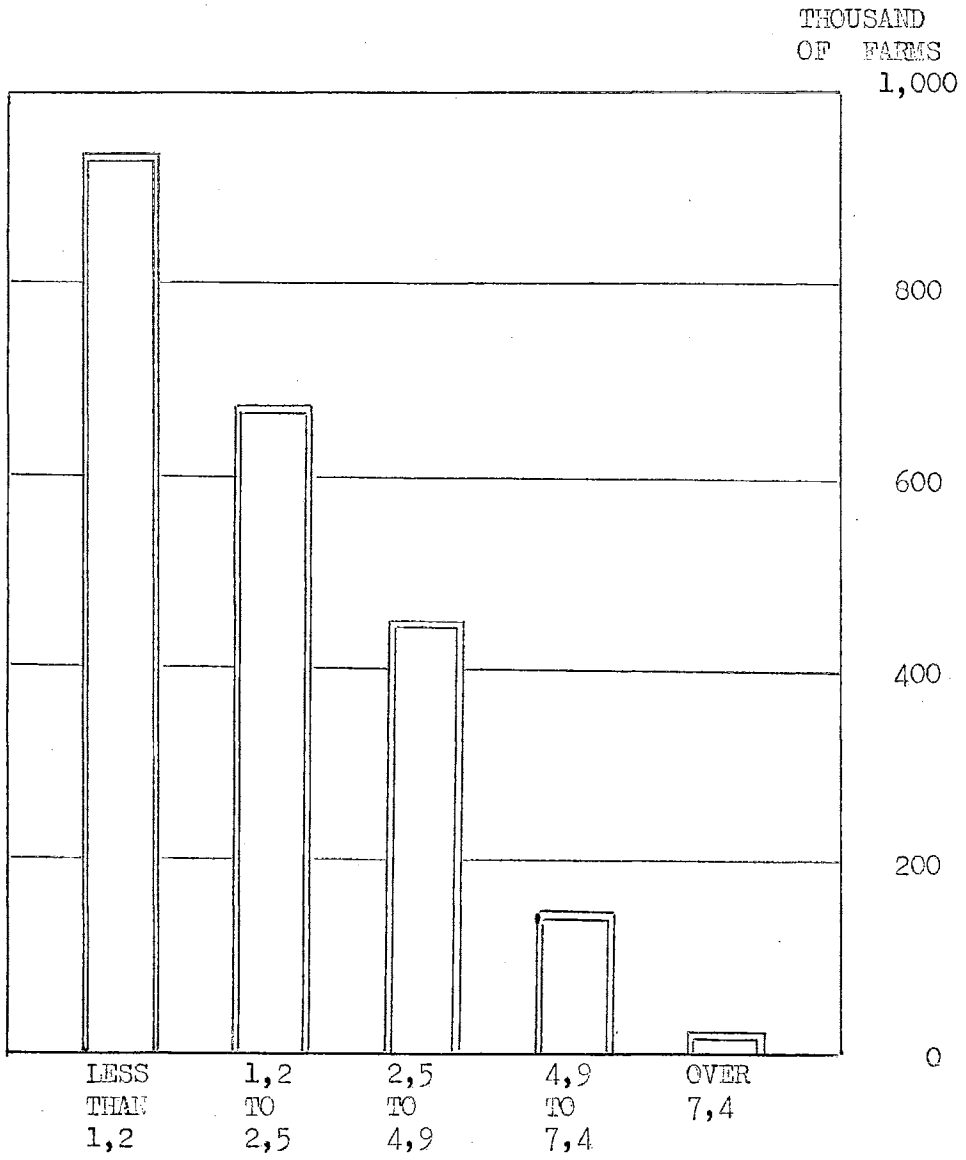
own problems, further achievement in teaching soil management to agricultural high school students would be expected.

Korean soils by virtue of their origin are inherently poor in plant foods. Having been continuously cropped for thousands of years, large quantities of bulky organic manures and chemical fertilizers have to be supplied to maintain intensive production. Bulky organic manures are of great value for improving the soil and are of great importance in maintaining a high level of crop production in soils which do not get any rest. The origin of organic manures in Korean soils are put into two classes, bulky organic manures and commercial organic manures, the former corresponds to farm manures, and commercial manures consist of oil seed and bean cakes, fish meal, etc., and the quantity of these available in South Korea is now extremely limited.

We need to recognize the fact that loss of nutrients for plants has lowered the productivity of the soil to such an extent that many acres of cultivated land are yielding at a much lower rate, even though more and more tons of organic matter and fertilizer are being applied, unless the farmers use additional methods of soil management that will help them utilize the soil and maintain the fertility lowered yields. Farmers should realize that fertilizers are not cure-all remedy for their problems.

We are faced with the probable facts that most farmers do not use improved methods such as growing the soil improving crops, applying organic matters, and protecting water

SIZE OF FARMS IN KOREA



erosions, so the potential fertility of Korean soils is declining.

There is therefore ample evidence of the necessity for teaching soil management to Korean high school students who will soon be responsible for taking care of their trampled soils.

Purpose of the Study

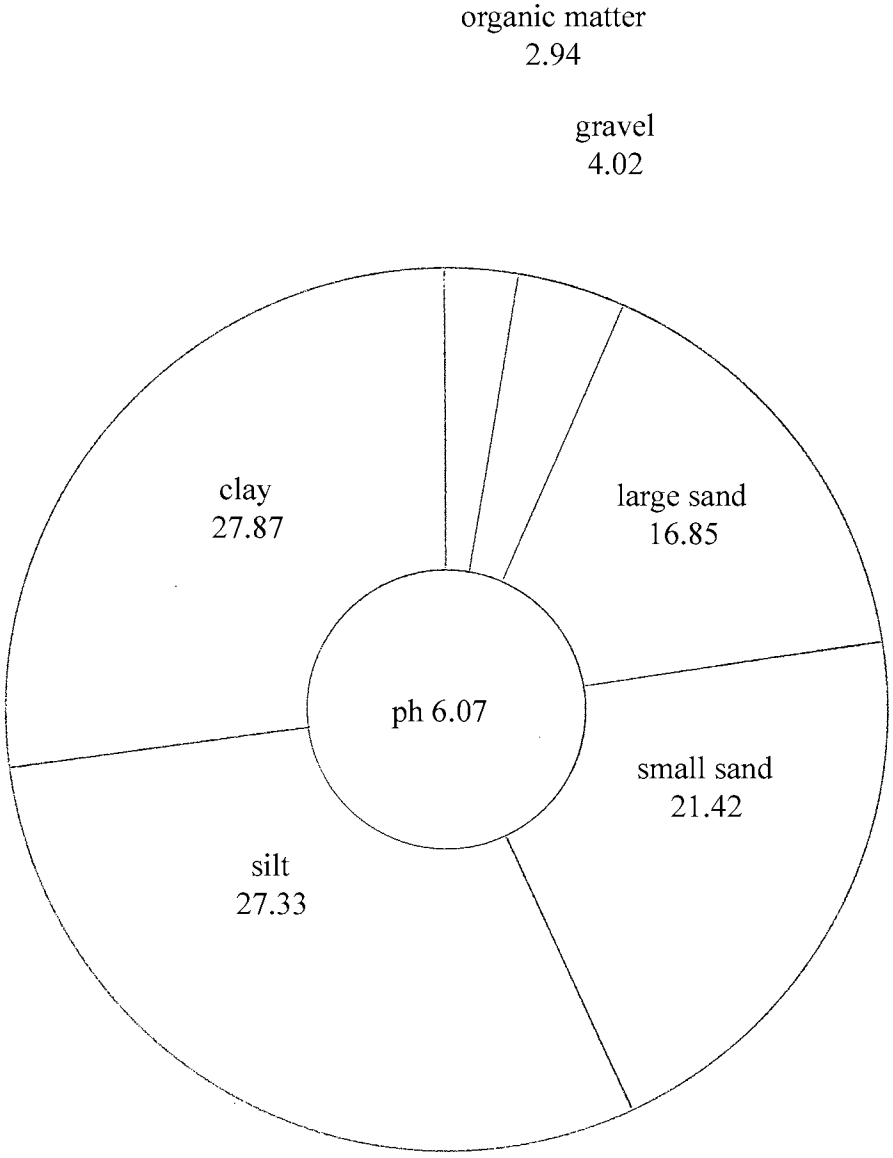
The primary purposes of this study are as follows:

1. To determine the nature and extent of certain selected methods now used in teaching soil management.
2. To identify the major difficulties experienced by teachers in soil management to high school students.
3. To suggest more effective methods of teaching soil management problems which should be emphasized in vocational agricultural high schools, and those suggestions are made in such a manner that they will apply to the circumstances in Kyung-Nam, Korea.

Other purposes are to:

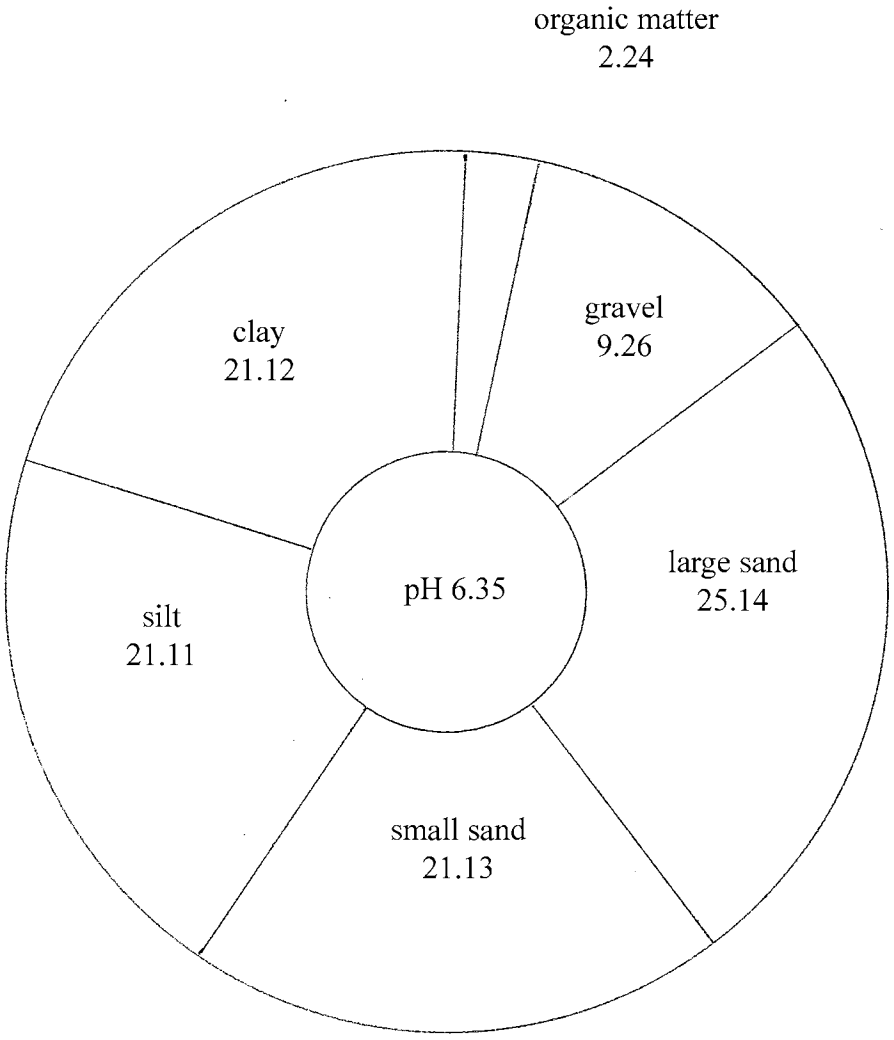
1. Make certain comparisons between teaching procedures followed in teaching soils and those in other agriculture units or subjects.
2. Determine the frequency of use of certain methods and techniques in teaching soils.
3. Determine the frequency of opportunity that students have of exhibiting and showing.

AVERAGE TEXTURE OF PADDY SOILS
IN KOREA



note; Figures present percent of air-dried
soil samples

AVERAGE TEXTURE OF DRY-FIELD SOILS
IN KOREA



note; Figures present percent of air-dried
soil samples

4. Determine how teachers supervise students on the school farm.

Limitation of the Study

This study is limited to the soil problems that teachers of agricultural high schools encountered in Kyung-Nam, Korea. This study is also designed to study the problems related to the teaching programs of soil management in the community. The basic programs for teaching soil management in Korean high schools are generally not confined to the community problems. We should consider giving special consideration to the community problems when teaching soil management in agricultural high schools of Korea.

Methods of Procedure

A study was made of soil technology courses, college textbooks, Korean high school textbooks on soil. With information received from these sources, a questionnaire was presented to Agricultural Education 500, Seminar class, taught by Professor Don M. Orr, for criticism and suggestions. The questionnaire was revised and approved by Dr. Robert R. Price, major adviser. It was then submitted to soil teachers of vocational agricultural high schools in Kyung-Nam, Korea.

The items included in the questionnaire were selected from the author's personal teaching experiences and from the soil knowledge which the author experienced recently

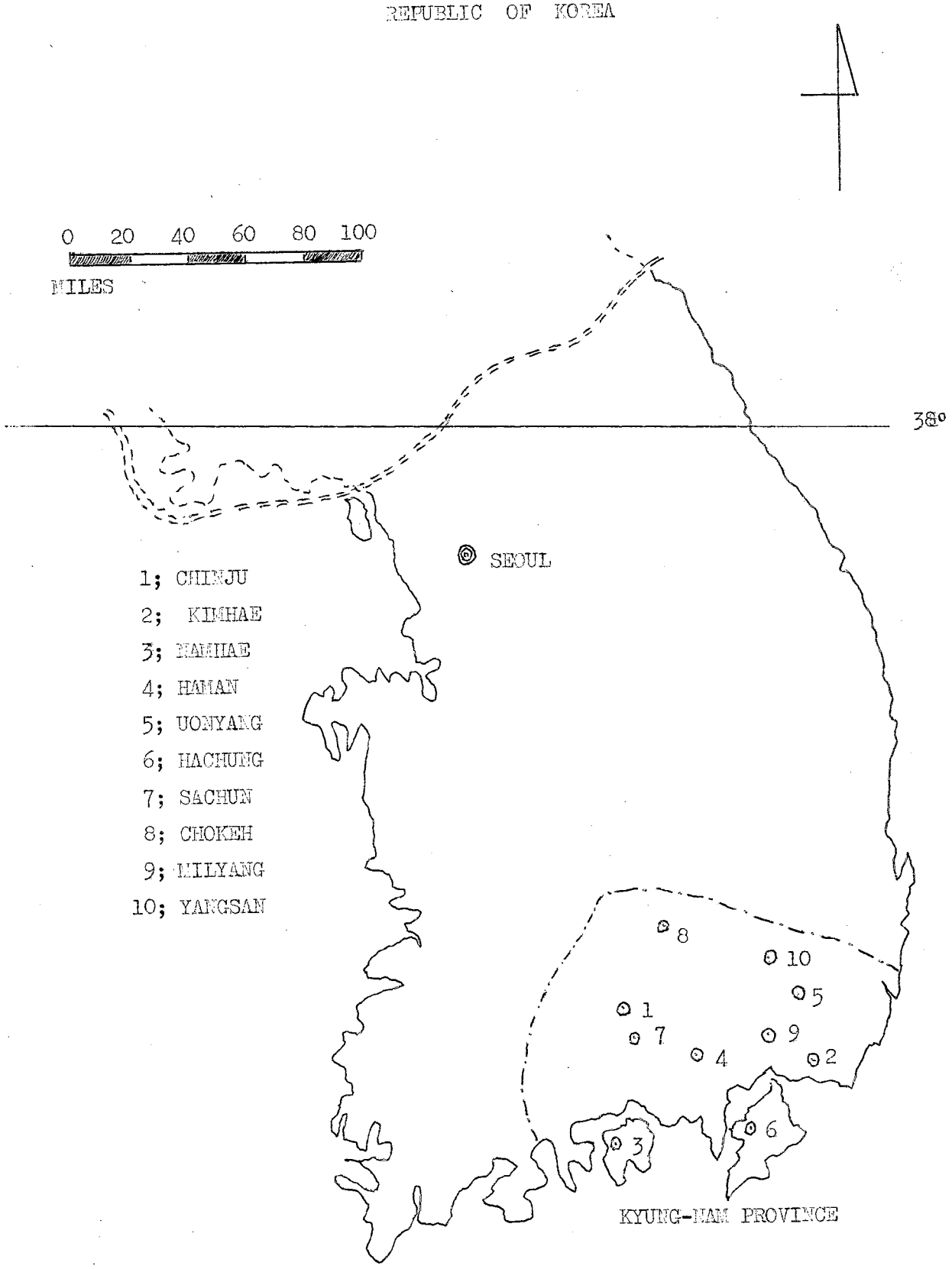
at the Oklahoma State University. Soil references that were available were reviewed and either selected or rejected as to their suitability and adaptability in the appropriate area.

The following ten schools were selected to be used in the study; CHINJU Agricultural High School, KIMHAE Agricultural High School, NAMHAE Agricultural High School, HAMAN Agricultural High School, HACHUNG Agricultural High School, CHOKEH Agricultural High School, YANGSAN Agricultural High School, MILYANG Agricultural High School, UONYANG Agricultural High School, and SACHUN Agricultural High School.

The map on the next page shows the location of the schools that were studied.

LOCATION OF SCHOOLS STUDIED

REPUBLIC OF KOREA



CHAPTER II

INFORMATION RELATED TO AGRICULTURAL HIGH SCHOOLS IN KOREA

1.	Number of Schools:	143
	Number of Students:	58,726
	Number of Vocational Agriculture Teachers:	1,672
2.	Age of Students:	16 - 19 years
	Year Taught:	Three
3.	School Days per Year:	230 - 260
	School Days per Week:	6
	Class Hours per Week:	34 - 39
	(Saturday:	4)
4.	Vacation	
	Summer in August:	25 - 30 days
	Winter in January:	25 - 30 days
	Busy Season for Rice Planting (Spring)	3 - 5 days
	Busy Season for Rice Harvesting (Fall)	3 - 5 days
5.	Number of Students per Class:	50 - 65

6. Major Courses Pursued by the Students are:

   1. Agriculture

2. Forestry
3. Animal Husbandry
4. Agricultural Engineering
5. Horticulture

7. The campus farm includes paddy, greenhouses, orchards, vegetable fields, livestock yards, and forest plots.

TABLE I

THREE YEAR CURRICULA FOR AGRICULTURAL HIGH SCHOOLS IN KOREA

Academic Courses:

1. Required Subject: 31 percent of total hours.

Korean language	Korean history
Moral values	Mathematics
Civic values	Science
Politics	Physical education
Economics	Music
Arts	

2. Elective Subject: 31 percent of total hours.

Foreign history	Military training
Geography	English
Analytical geometry	German
Geometry	Biology
Physics	Geology
Chemistry	

3. Special Curricula Activities: 7 percent of total hours.

Athletics, clubs	Farm practices

Vocational Courses: 31 percent of total hours.

1. Agriculture Major:

Soil and Fertilizer:	Crop production

Paddy crop:	Field crop
Vegetable:	Fruit culture
Processing agricultural products:	
Insect control:	Breeding of crops
Farm tools and machines:	Agricultural survey
Sericulture:	Farm economics
Farm management:	General agriculture
General livestock:	General forestry
Flower growing:	Special crops
Farm practice:	

2. Forestry Major:

General agriculture:	Soil and fertilizer
Farm management:	Farm economics
Forestry management:	Forestry chemistry
Forestry conservation:	Forestry survey
Sandy soil management and erosion:	
Growing garden tree:	Gardening

3. Animal Husbandry Major:

General agriculture:	Farm management
Physiology of livestock:	Livestock feeding
Breeding of livestock:	Processing animal products
General veterinary problems:	Swine raising
Cow raising:	Dairy cattle
Poultry production:	Sheep raising
Horse raising:	

4. Agricultural-Engineering Major:

General agriculture	Farm management
Geology	Tillage and Cultivation
Water management	Cartography
Steel and concrete construction	
Use of steel materials in agriculture	
Soil survey	

5. Horticulture Major:

General agriculture	Farm management
Insect control	Processing agricultural products
General livestock	Breeding of crops
Fruit culture	Commercial flower production
Flower growing	Gardening
Vegetable crops	Vegetable forcing
Soil and fertilizer	

TABLE II

THE PRESENT STATUS OF AGRICULTURAL HIGH SCHOOLS IN KYUNG-NAM, KOREA

Name of Agricultural High School	Number in Class	Number of Students	Size of Campus Farm	Number of Voc.-Ag. Teachers
1. Chinju	28	1,473	29,800 Pyung*	23
2. Kimkae	13	612	18,053	7
3. Pusan	24	613	22,896	9
4. Chinkyo	6	308	18,673	4
5. Ulsan	17	797	17,926	6
6. Kosung	10	376	12,276	3
7. Kuchang	15	658	21,307	4
8. Milyang	18	682	13,102	7
9. Sanchung	7	206	17,054	1
10. Chilwoon	5	167	17,500	2
11. Unyang	5	219	5,130	2
12. Yehsan	6	270	6,930	5
13. Haman	8	383	8,134	3
14. Chanyung	6	246	3,600	3
15. Namhae	9	449	10,901	4
16. Yansan	6	239	15,400	3
17. Jinyung	4	196	8,380	1
18. Changsin	9	456	2,430	2
19. Hapchun	7	252	15,000	1
20. Samjin	3	113	2,100	1
21. Sachun	9	402	500	3
22. Chokeh	3	82	528	1
23. Hangyang	9	430	1,500	3
24. Uhlyung	6	247		2
25. Hachung	3	143	800	1

* 1 Pyung = 4 yard square

Main Teaching Programs on Soil Management in the Textbook

1. Soil formation
2. Soil profile
3. Physical and chemical components and properties
4. Textures of soil
5. Micro-organisms in soil

6. Soil fertility
7. Soil utility
8. Primary fertilizer
9. Types of fertilizer
10. Human manure
11. Composts
12. Livestock manure
13. Soil-improving crops
14. Miscellaneous fertilizer
15. Complete fertilizer
16. Use of calcium for acidic soil
17. Methods of fertilization
18. Soil survey
19. Fertilization experiments[1]

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[1]Baik, H. Cho, Soil and Fertilizer (Textbook for Agricultural High School Students, Korea, 1954)

CHAPTER III

REVIEW OF LITERATURE

The author reviewed a study made by Hollingsworth[1] in an attempt to determine the problem areas in teaching soils that vocational agriculture teachers have recognized, areas considered important, and the major difficulties that teachers encounter in teaching soil management.

The purposes of this study were to determine:

1. The problem areas in teaching soils that vocational agriculture teachers have recognized and considered important,
2. The major difficulties teachers encounter in teaching soils to high school students,
3. Where soil information is obtained, and how it is used by vocational agriculture teachers,
4. The educational background relative to soils of the vocational agriculture teachers interviewed,
5. Some suggestions concerning information which should be included in a high school soils book for Oklahoma.

Hollingsworth reported that the major problem areas in teaching soils were: (1) land use classification, (2)

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[1]Hollingsworth, Jack L., Teaching Soils to High School Students of Vocational Agriculture, (unpublished M.S. thesis, Agricultural Education Department, Oklahoma State University, Stillwater, Oklahoma, 1955.)

recommended land use practices, (3) information concerning soil types. Two thirds of the teachers secured land use classification information, one-half secured recommended land use practices, and slightly over forty-three percent secured information concerning soil types.

Hollingsworth found that the difficulties most commonly reported were: (1) lack of laboratory facilities, (2) lack of college preparation on the part of the teacher, (3) not enough time in four years, and (4) student not having general science background. Eighty percent of the teachers reported lack of laboratory facilities, and sixty-three percent reported lack of college preparation on the part of the teacher. Forty-three and three-tenths percent reported not having enough time in four years to thoroughly cover the subject, and forty percent listed students not having general science as difficulties in teaching soils to high school students.

Hollingsworth's findings indicated that only thirty-nine percent of Oklahoma counties have soil survey reports. The teachers do not have suitable soil textbooks. The sources of information used were: land judging schools, soil conservation service technicians, bulletins, books, magazines, and the extension service personnel. Teachers make wide use of pictures, films, and filmstrips in teaching soils. One-third of the teachers have farm plots for demonstrating soil management practices. The plots were used to demonstrate fertilizer tests and crop variety tests.

The teachers prefer Oklahoma bulletins and took a beginning course in soils. Courses taken most frequently pertained to physical properties of the soil and water management.

Hollingsworth came to the conclusion, that a soil course that teaches land classification, recommended land practices, and soil types should be required for students in Agricultural Education. He further concluded that more reference material needs to be made available to vocational agriculture teachers, and the reference material should be of a nature that would fit local conditions.

A study was made by Hong[2] in an attempt to determine: (1) the effectiveness of the program of soil management which is now being taught in selected vocational agriculture schools, (2) the facilities that are needed for a complete soil management course of study, and (3) what methods of teaching now used which are effective and to suggest additional methods or changes which are needed.

The findings and interpretations made by Hong indicate that vocational agricultural teachers in Korea need to revise their teaching programs to meet the needs of their community in teaching soil management. The sources of reference materials used by the teachers in the school studied are American and Japanese. These are not as applicable to the communities as Korean references. Teachers need more

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[2]Hong, Nak S., Increasing the Effectiveness of the Teaching of Soil Management in Agricultural High Schools of Kyongzi-Do, Korea. (unpulblished M.S. Report, Agricultural Education Department, Oklahoma State University, Stillwater, Oklahoma, 1958)

facilities on soil. The soil management program carried out by the students in their farming programs are in relation to that carried out on the home farm rather than in relation to the teaching program which is carried out by the teacher in soil management.

Tisdale[3] reported that,

> Because of the reduced availability of nitrogen and the contribution to soil humus, the effects of manure tend to be distributed over a longer period of time than commercial fertilizers. The residual effect observed from a long-time experiment conducted in England is shown on the following page. It is interesting to note that 40 years after manure application had ceased the yield on the plots which received manure for 20 years was still double that of the untreated plots.
>
> Manure has been just as effective as chemical fertilizers for wheat grown continuously since 1843. This experiment is located on a fine sandy loam soil. On a fine-texture soil manure was superior to chemical fertilizer, especially for root crops.

Chemical Reactions Explaining the Loss of Nitrogen and the Retention of Ammonia in Manure Abstracted From Thompson[4]

1. Loss of nitrogen

$Co(NH_2)_2 + 2H_2O \longrightarrow (NH_4)_2CO_3$

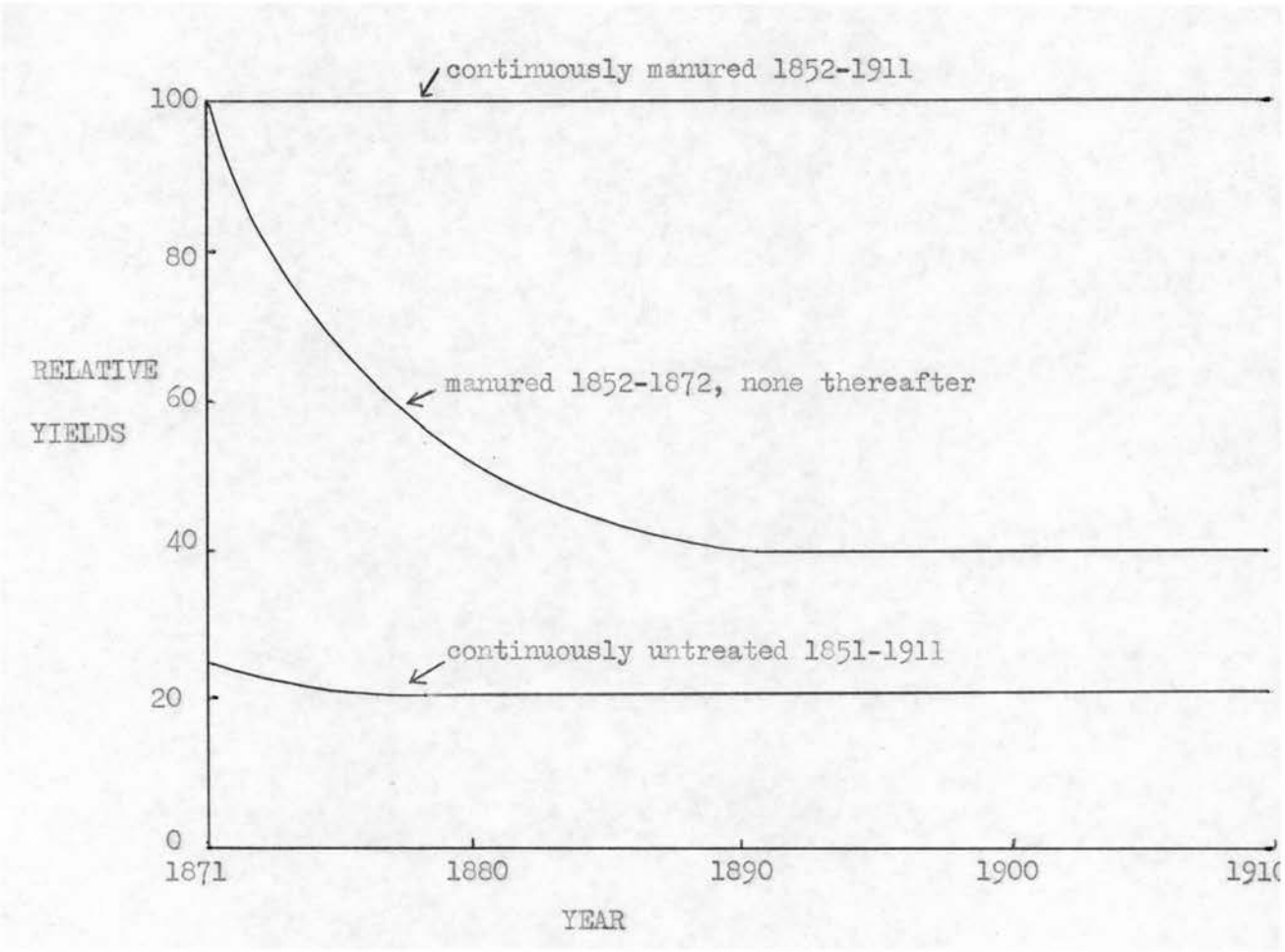
(Urea, the chief nitrogen compound in manure, undergoes hydrolysis to ammonium carbonate withing five days.)

---

[3]Tisdale, Samuel L., "Soil Fertility and Fertilizers," (published 1958, New York), page 249.

[4]Thompson, Louis M., "Soils and Soil Fertility," McGraw-Hill Book Co., Inc., New York, Page 328.

THE RESIDUAL EFFECTS ON BARLEY OF MANURE APPLIED AT AN ANNUAL RATE OF 14 TONS PER ACRE, BY TISDALE [1]



1; Samuel L, Tisdale, "Soil Fertility and Fertilizers", New York, .Page 249

$(NH_4)_2CO_3 \longrightarrow 2NH_3 + CO_2 + H_2O$

(The ammonium carbonate is unstable and tends to form gaseous ammonia and carbon dioxide.)

2. Preservation of ammonia

$CaSO_4 + (NH_4)_2CO_3 \longrightarrow CaCO_3 + (NH_4)_2SO_4$

(Gypsum is used to reduce ammonia losses from manure.)

$2CaSO_4 + CaH_4(PO_4)_2 + 2(NH_4)_2CO_3 \longrightarrow Ca_3(PO_4)_2 + 2(NH_4)_2SO_4 + 2H_2O + 2CO_2$

(50 pounds of ordinary-superphosphate (20%) is used to reduce ammonia losses from one ton of manure. The main purpose of using superphosphate with manure is that manure is deficient in phosphorus compared to nitrogen and potassium.)

A study was made by Price[5] in an attempt to determine a complete outline of the subject matter in soil management that would be desirable in a well-rounded four-year course of vocational agriculture for high school students, young farmers, and adult farmer classes.

The purposes of this study were to prepare an outline for teaching the area of soil management to vocational agricultural students, young farmers, and adult farmer classes in Oklahoma.

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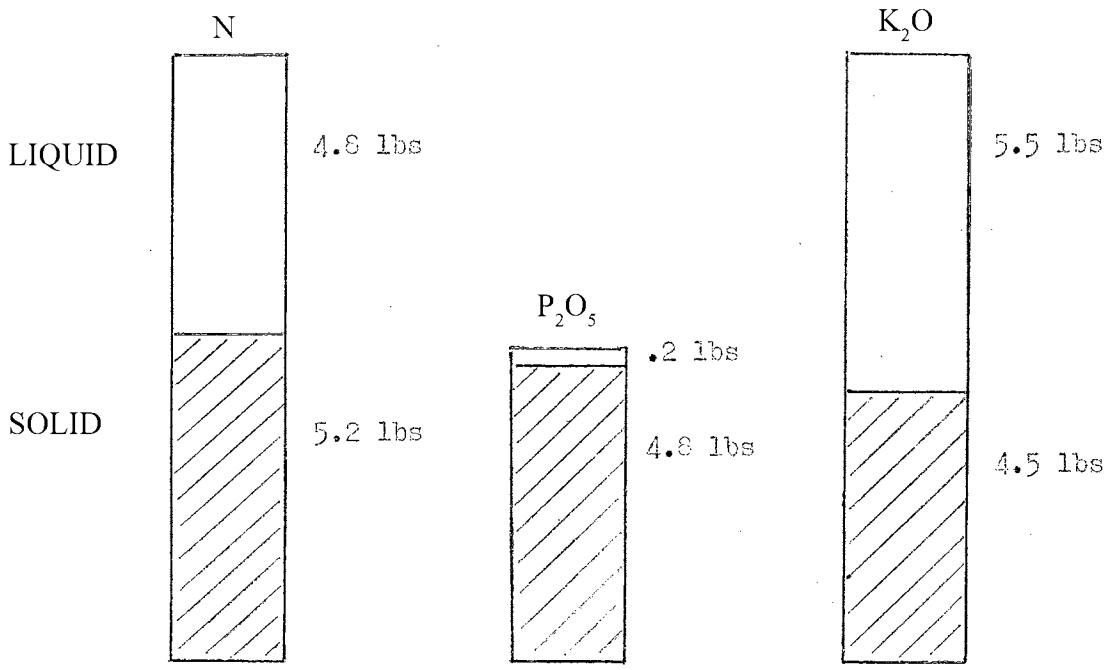
[5]Price, Conn, An Outline for Teaching Soil Management to Vocational Agriculture Students in Northwest Oklahoma. (unpublished M.S. Report, Agricultural Education Department, Oklahoma State University, Stillwater, Oklahoma, 1958)

The findings of this study showed a definite change in the emphasis of certain subjects as taught to vocational agricultural students in Oklahoma. There is a trend toward subjects that are of a more practical or economic value. The writer noted some new phases in the teaching of soil management during the past twenty years. These included the following; land classification, commercial fertilizers, soil testing, pastures, and F.F.A. contests. In the same manner some soil management subject matter shows a trend of decrease in importance in the vocational agriculture teaching outline. These include; micro-organisms in the soil, flood control, animal manures, gully control, postlots and woodlands. These differences and trends may well be due to the ever changing techniques of modern farming. The subject matter rated the highest is considered the most practical value by the student who is, or plans to be, operating a farm.

A new survey of this kind will be needed often as the farming techniques and methods are in a process of continual change.

THE DISTRIBUTION OF PLANT NUTRIENTS BETWEEN
LIQUIT AND SOLID PORTIONS OF A TON
OF MANURE, BY THOMPSON[6]



6; Louis K, Thompson, "Soils and Soil Fertility". McGray-Hill Book Company Inc.. New York, 1957. Page 318

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Information needed for this study was obtained by the use of questionnaire to ten agricultural high schools in Kyung-Nam, Korea. This number represented exactly forty percent of the total number of agricultural high schools in Kyung-Nam. Schools were selected in such a manner that big and small agricultural high schools were equally represented.

TABLE III

TEACHING PROBLEMS RELATED TO SOILS IN THE COMMUNITY OF TEN AGRICULTURAL HIGH SCHOOLS IN KOREA

Problems	Number of Schools			
	Yes	Percent	No	Percent
How to collect soil samples	4	40	6	60
How to make community soil surveys	2	20	8	80
What crops are adapted to the soil in the community	9	90	1	10

TABLE IV

TEACHING PROBLEMS RELATED TO SOILS AS TAUGHT BY TEN AGRICULTURAL HIGH SCHOOLS IN KYUNG-NAM, KOREA

Problems	Number of Schools Reporting			
	Yes	Percent	No	Percent
Size of soil particles	6	60	4	40
Soil textures	7	70	3	30
Nutrients in fertilizer	7	70	3	30

The analysis of data in Table III indicates that more than half of the schools did not collect soil samples with their students. Only two out of ten schools have soil survey programs of their community that is involved in their teaching plan. The writer is of the opinion that teachers in two schools have only the discussion method of teaching soil survey to their classes. It is very interesting to note that one teacher did not have the program of crops adapted to the soils of the community.

Soil surveys that are published usually contain valuable information for vocational agriculture teachers. A section of these reports usually tells what a particular soil is like, how it is used, and some of the uses in which it is suited. These reports give the expected yields for other soils mapped so that different soils may be compared. The soils are also rated as to their productivity under common practices. The best uses and management practices are given for each soil.

The soil surveys tell where the principle types of soils are located in the community. They tell what the soils are like, and how they are related to one another. The soil maps show how the different kinds of soils tend to be arranged in different localities. Information on how the soils of the community were formed, and how they are related to the major soil groups of the world can be obtained from these soil surveys.

The soil survey reports contain information on subjects

other than soils which may be very useful to vocational agriculture teachers. Information on such items as the following are presented: climate, the types and sizes of farms, the principal farm products and how they are marketed, the kinds and conditions of farm tenure, kinds of farm buildings, equipment and machinery, availability of schools, churches, hospitals, highways, railroads, telephone and electric services and water supplies; also included in the reports are the industries, cities, villages, and population characteristics.

It is interesting to note that the teachers reported their programs on soil management included these items. It is more interesting to note that three of the ten school teachers reported their plan did not involve the items are located in small rural towns, whereas the seventy percent of schools reported "yes" are mostly located in big cities and they are big schools more than the number three reported "no", and the larger schools usually included these items in their teaching schedule.

TABLE V

PROBLEMS RELATED TO ACIDIC SOILS THAT ARE INCLUDED IN THE TEACHING PLAN ON SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers	
	Yes	Percent
Why soils are acid in the community	6	60
Selecting commercial fertilizers	10	100
Effect of calcium to acidic soil	10	100

Information obtained from the table clearly indicates that every teacher has concern for the method of improvement of the acidic soil in his community. Forty percent of teachers are not convinced the value of teaching the reason why soils are acid.

TABLE VI

WATER EROSION PROGRAMS INCLUDED IN THE TEACHING PLAN ON SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers Reported			
	Yes	Percent	No	Percent
How water erodes the soil	7	70	3	30
Plant covers break down the force of raindrops	1	10	9	90

A comparison of data in this table reveals that seventy percent of the teachers have the program of how water erodes the soil, on the contrary, only one teacher had a program of how plant covers break down the force of raindrops. The analysis of data in the table clearly points out that six teachers out of seven taught their students water erosion without explaining the fact that plant covers break down the force of raindrops, in other words, nine of the ten teachers reported that their teaching plan didn't involve the item "plant covers break down the force of raindrops".

The data in Table VII reveals that two of the seven teachers did not have "water erosion problems in the community" in their teaching plan. Nevertheless, their teaching plan involved water erosion problems. It calls one's

attention to analyze the fact that the same number of teachers did not creat community water erosion problem notwithstanding they had absent students due to water flood.

TABLE VII

WATER EROSION PROBLEMS IN THE COMMUNITY INCLUDED IN TEACHING PLAN ON SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers	
	Yes	Percent
How water erodes the soil	7	70
Water erosion problem in the community	5	50
Absent students due to water flood	7	70

TABLE VIII

SOIL IMPROVING PROGRAMS INCLUDED IN THE TEACHING PLAN OF SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers	
	Yes	Percent
Significance of manure and compost	10	100
Soil improving crops	9	90
Manure yields produced by livestock	10	100

The data in this table indicates that a majority of the teachers are greatly concerned with soil improving programs in their teaching plans. The writer is of the opinion that soil improving programs is the most efficient way to make up for the lost nutrient pantry of plants in the soil, and that farmyard manure must be looked upon as a complete manure, and is called a "general" manure, as it supplies all the essential constituents of plant food.

TABLE IX

TEACHING PROBLEMS RELATED TO COMPOST AND MANURE IN TEN AGRICULTURAL HIGH SCHOOLS

Problems	Number of Schools			
	Yes	Percent	No	Percent
Making compost	10	100	0	0
Calculated manure produced*	8	80	2	20

*See the formula used below

It is interesting to note that all schools had the programs of producing compost in their teaching plans. The writer can see the value of producing compost for teaching soil program from the standpoint of soil physical conditions as well as nutrient value for plants. The analysis of the data in this table also indicates that only two of the ten teachers reported "no" in item of calculation of the yields of manure by the livestock. Yields of manure are calculated as below:

F : amounts of feeds in dry condition

f : amounts of litter in dry as bedding

$\frac{F}{2}$: half of the total feeds becomes dung

$\frac{F}{2} + f$: amounts of the dry matter of manure

$(\frac{F}{2} + f) \times 4$: Total amounts of manure produced by animals

The analysis of data in Table X points out that eight of the ten schools have demonstration areas for commercial fertilizers on the school farm. More than half of the schools have cultural practice areas and variety practice areas on the

campus farm. It is interesting to note that six of the ten schools do not have demonstrating areas for the use of compost.

TABLE X

DEMONSTRATING AREAS ON THE CAMPUS FARM FOR TEACHING SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers			
	Yes	Percent	No	Percent
Use of commercial fertilizer	8	80	2	20
Cultural practice	7	70	3	30
Variety practice	6	60	4	40
Use of compost	4	40	6	60

TABLE XI

SOME METHODS USED IN TEACHING SOIL MANAGEMENT REPORTED FROM TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers			
	Yes	Percent	No	Percent
Inviting resource persons	3	30	7	70
Substituting another teacher for you	5	50	5	50
Taking field trips	4	40	6	60

TABLE XII

AGRICULTURAL INSTITUTES LOCATED NEAR SCHOOLS REPORTED FROM TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers			
	Yes	Percent	No	Percent
Agricultural institute	6	60	4	40
Agricultural college	2	20	8	80
Others	5	50	5	50

A comparison of data in tables XI and XII reveals that only three of the teachers invited resource persons, and

only four of the ten teachers reported having field trips as a teaching method. It is interesting to note that six of the schools have agricultural institutions near their schools.

TABLE XIII

AMOUNT OF TEXTBOOK CONTENTS COVERED IN THE TEACHING SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of teachers	
	Yes	Percent
All the materials	6	60
Two-thirds of the materials	4	40
One-half of the materials	0	0

This table clearly indicates that more than one-half of the ten teachers covered all the material in the textbooks, and four of the ten teachers covered two-thirds of the material. The writer is of the opinion that this is possibly the reason why they did not allot enough time for the other activities concerning soil programs.

TABLE XIV

OPPORTUNITIES OF THE STUDENTS TO EXHIBIT AND SHOW AGRICULTURAL PRODUCTS AS REPORTED BY TEN AGRICULTURAL HIGH SCHOOLS

Items	Teacher's Number			
	Yes	Percent	No	Percent
Limited to your school	3	30	7	70
Included other school	1	10	9	90
Country-wide	7	70	3	30

The data in this table shows that only one-third of the teachers have contests within their school. Two-thirds of

the schools participated in the country-wide show. It calls one's attention to note that only one school had a contest with other schools.

TABLE XV

TEACHER'S ATTITUDE IN REGARD TO SOIL CONTESTS AS A TEACHING METHOD IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Teachers Reporting Yes	Percent
Did your students enter soil management speech contests?	2	20
Do you require an explanation of soil problems related to agriculture exhibits?	6	60

An explanation of Table XV reveals that eighty percent of the teachers did not encourage their students to enter soil management speech contests. Sixty percent of the teachers required an explanation from students in regard to soil when they had a contest.

TABLE XVI

NATURE OF ASSIGNMENTS RELATED TO SOIL MANAGEMENT ON THE STUDENTS' HOME FARMS IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Schools Reported Yes	Percent
Assignment from text	9	90
Directly related to student home farms	3	30
Solved at next class meeting	9	90

A comparison of the data in this table indicates that ninety percent of the teachers gave their students written

assignments mostly found in text books. Thirty percent of them gave their students the assignments in such a manner as to relate directly to students' home farms. It is interesting to note that teachers who gave the assignments found in the textbook were the same ones who solved their problems thoroughly at next class.

TABLE XVII

FREQUENCY OF VISITING STUDENTS' HOME FARMS REPORTED FROM TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers Visiting			
	Yes	Percent	No	Percent
During the vacation periods	8	80	2	20
During the busy season on the farm	6	60	4	40
During the semester	1	10	9	90
Only during the busy season on farm	2	20	8	80

A study of the data in Table XVII reveals that two of the teachers did not visit the students' home farms during the vacation periods. It is interesting to note that the number of teachers who visited the students' home farms during the busy season is the same as the number of teachers who did not visit the home farm during the vacation periods. The low rating given to the "visiting during the semester" is possible because teachers did not allot time for farm visiting.

TABLE XVIII

NUMBER OF STUDENTS SUPERVISED BY ONE TEACHER ON THE CAMPUS FARM AND POSSIBLE NUMBER TO SUPERVISE EFFECTIVELY

Name of School	No. of Students Supervised By One Teacher	No. of Students Possible for One Teacher To Supervise Effectively
Chinju Agricultural High School	40	20
Kimhae Agricultural High School	40	20
Milyang Agricultural High School	30	30
Namhae Agricultural High School	50	10
Haman Agricultural High School	50	20
Uonyang Agricultural High School	30	20
Hachung Agricultural High School	40	20
Sachun Agricultural High School	20	20
Chokeh Agricultural High School	20	10
Yansan Agricultural High School	20	20

TABLE XIX

NUMBER OF STUDENTS SUPERVISED BY ONE TEACHER ON THE CAMPUS FARM AND EFFECTIVE NUMBER OF STUDENTS ONE TEACHER COULD EFFECTIVELY SUPERVISE
(Abstract of Table XVII)

Number of Students Being Supervised	Number of Teachers Reported	
	Supervised Now	Effective Number
65	0	0
64 - 55	0	0
54 - 45	2	0
44 - 35	3	0
34 - 25	2	1
24 - 15	3	7
14 - 5	0	2
4 -	0	0

The data in Table XVIII reveals that two of the teachers supervise fifty students each. The writer is of the opinion that, in this case the teacher supervised more students than he could effectively. This table indicates that the largest number of students one teacher can effectively supervise is twenty.

TABLE XX

NATURE OF STUDENT QUESTIONS ENCOUNTERED THAT WERE RELATED TO SOILS WHILE WORKING ON THE CAMPUS FARM IN TEN AGRICULTURAL HIGH SCHOOLS

Questions	Number of Teachers Reported	
	Yes	Percent
Questions listed in teaching plan	2	20
Questions regarding with other courses	9	90
Questions about their home farms	8	80

TABLE XXI

FREQUENCY OF STUDENT'S QUESTIONS ASKED REGARDING THEIR HOME FARMS WHILE WORKING ON THE CAMPUS FARM IN TEN AGRICULTURAL HIGH SCHOOLS

Frequency	Number of Teachers	
	Number	Percent
Very often	0	0
Often	8	80
Seldon	2	20
Never	0	0

An analysis of the data in Table XXI indicates that ninety percent of the teachers were asked questions in regard

to other courses and eighty percent of the teachers were asked questions about the student's home farms while working on the campus farm. The low rating given to "questions listed in the teaching plan" is possible because most students are not sufficiently motivated to become interested in their classroom studies as compared to their problems arising on their home farms. The data in this table shows that a majority of the teachers have been asked questions about students' home farms, while these students were working on the campus farm.

TABLE XXII

FREQUENCY OF TEACHER'S EXPLANATION TO STUDENTS RELATED TO SOIL MANAGEMENT PROBLEMS DURING THE CAMPUS FARM PRACTICE

Frequency	Number of Teachers	
	Number	Percent
Always	3	30
Often	7	70
Seldom	0	0
Never	0	0

Table XXII indicates that when teachers noticed something important on soil management during practice on the farm, they explained the problem to their students. Analysis of the data in the table reveals that teachers do have opportunities to explain soil management problems to their students while working on the campus farm. This occurs more often on the campus farm than in the classroom. The writer is of the opinion that a majority of the teachers noticed new facts

while working on the campus farm that were not included in their teaching plans.

TABLE XXIII

SOIL TEACHER'S REGARD AND INTEREST FOR THE COMMUNITY REPORTED FROM TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers Reported			
	Yes	Percent	No	Percent
Do you have adult farmer meetings in the community?	7	70	3	30
Do you attend the farmers meeting?	7	70	3	30

TABLE XXIV

PERCENT OF STUDENTS VISITED IN ONE YEAR BY THEIR TEACHER WHILE LIVING ON THEIR HOME FARMS AS REPORTED IN TEN AGRICULTURAL HIGH SCHOOLS

Percent of students visited	50	40	30	20	10
Number of teachers reported	0	1	1	8	0

A comparison of data in Table XXIII reveals that the number of teachers who have farmer meeting in their community is equal to the number who attended the meeting. It appears that where there is farmer meetings in the community, they attend the meetings.

The high percent of students visited by their teacher on the student home farm is twenty percent of the total students in this study. The writer is of the opinion that,

the teachers should visit the rest of the students who were not visited. These students need the teacher's help and guidance on their home farms as well as the other students who were visited and advised by their teacher.

TABLE XXV

FACILITIES AND EQUIPMENTS FOR TEACHING SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Yes	Percent	A certain school reported as below
Soil testing kit	3	30	No
Auger	2	20	No
Farm level	4	40	No
Charts on soil	7	70	No
P.H. tester	3	30	No
Soil data	8	80	No
Local soil map	4	40	No
Soil sample	8	80	No
Farm laboratory	5	50	No
Farm inside campus	10	100	Yes
Motion picture projector	2	20	No
Slide projector	2	20	No
Film slide projector	1	10	No
Opaque projector	1	10	No
Magazines on farming	0	0	No
Foreign news about farming	5	50	No

This would seem to show the importance of the soil samples and charts on soils in teaching soil management as well as farm level, soil data, foreign news on farming, and farm laboratory. It is of interest to notify that every agricultural high school in Korea has their campus farm.

It calls one's attention to note the fact that a certain school has only campus farm. It would seem that this school was established as an agricultural high school in February 1960.

TABLE XXVI

MAJOR DIFFICULTIES TEACHERS EXPERIENCED IN TEACHING SOIL MANAGEMENT IN TEN AGRICULTURAL HIGH SCHOOLS

Items	Number of Teachers			
	Yes	Percent	No	Percent
Lack of facilities	10	100	0	0
Lack of reference books	10	100	0	0
Lack of teacher's knowledge	8	80	2	20
Lack of student interests	6	60	4	40
Shortage of teaching periods	5	50	5	50

A study of the data in Table XXVI reveals that major difficulties experienced by teachers in teaching soil management were lack of facilities and lack of reference books. A majority of the teachers expressed a lack of knowledge on their part. Sixty percent of the teachers reported one of their major difficulties is due to the lack of student interest. The writer is of the opinion that this difficulty may be offset in the method of teaching. One-half of the teachers reported they had experienced a shortage of teaching periods as a major difficulty in teaching soil management.

CHAPTER V

SUMMARY AND INTERPRETATION

Information secured in this study indicates that teaching problems related to soil management should be concerned to the soils in the community where the school is located and should be revised to meet the needs of the community.

Eighty percent of the teachers indicated that their teaching problems on soil management are not related to the soil surveys in the community.

Only one of the ten teachers reported that his teaching plan included the item, "plant covers break down the force of raindrops". The teaching programs of seven teachers included the water erosion problems.

Every teacher showed that soil improving programs included the following problems; significance of manure, soil improving crops, and making compost. These would help their students make up the plant nutrient pantry lost by water erosion.

A majority of the teachers indicated that teaching programs on soil management are greatly concerned with providing soil organic matters and improving soil physical properties.

More than one-half of the teachers indicated that some methods were used in teaching soil management other than the

class work by the soil teachers. There are; inviting resource person, substituting another teacher for soil teacher and making field trips.

Slightly over fifty percent of the teachers indicated that they required an explanation regarding soils when students exhibited the agricultural products for contest.

Only three out of ten teachers revealed that the assignments on soil management are directly related to the student's home farms.

A majority of the teachers reported that they did not have sufficient time to visit student home farms during the semester.

All the teachers suggested that they could be more efficient if they supervise less than thirty students on the campus farm as compared with forty or fifty students that they now supervise.

Eighty percent of the teachers indicated that the nature of student's questions asked while working on the campus farm are related to their home farms.

Every teacher indicated that they were convinced the value of practice for the students on the campus farm.

Thirty percent of the teachers indicated that they did not have adult farmer meetings in their community. Eighty percent of their students were not visited on their home farms.

The teacher reported that they need more soil testing kits, soil augers, and p.H. testers. Other facilities needed

include; local soil map, farm laboratory, slides, and magazines of the area in which they are doing their teaching.

The difficultires most commonly indicated by the teachers were: lack of facilities, lack of reference books, lack of teacher's knowledge, lack of student interests, and shortage of teaching periods. One hundred percent of teachers indicated the lack of facilities and lack of reference books.

CHAPTER VI

RECOMMENDATIONS

The following recommendations are presented by the author with the hope that they may be included in the plan for better teaching of soil management to students of agricultural high school in Korea.

The recommended units on soil management are:

1. Collecting community soil samples
2. Making community soil survey
3. Plant covers break down the force of raindrops
4. Water erosion problems in the community
5. Significance of organic matter
6. Making compost
7. Taking field trips
8. Having opportunities to exhibit and show the products
9. Soil improving crops
10. Giving assignments concerned with student's home farms
11. Plans for visiting student's home farms during the semester
12. Supervising effective number of students
13. Making teaching aids with students
14. Using teaching aids

This report includes teaching program which is suggested by the author as a basis for teaching phases of soil management.

A complete presentation of teaching aids which are available are included and arranged for use in teaching soil problems.

The more opportunity to exhibit and show agricultural products and to make field trips will add interests in solving various soil problems.

The author's conclusion in this report is that teaching problems on soil management must be planned to meet the needs of the community, and should be concerned with the problems of student's home farms.

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APPENDIX

QUESTIONNAIRE

A. Soil course

1. How many students are taking soil course? 1500-1000, 999-500, 499-300, 299-100, 50-0.
_____, _____, _____.

2. How many vocational agricultural teachers are there in your school? 40-30, 29-20, 19-15, 14-10, 9-5.
_____, _____, _____, _____, _____.

3. How many teachers teach soil courses in your school: 5_____, 4_____, 3_____, 2_____, 1_____.

4. How many students are there in your soil class? 80-70, 69-65, 64-60, 59-55, 54-50.
_____, _____, _____, _____.

5. What percent out of total number of vocational agricultural teacher in your school do you think can teach the soil course besides soil teachers? -50, 49-30, 29-20, 19-10, 10-1, 0.
_____, _____, _____, _____.

6. Did another teacher substitute for you when you didn't attend the soil class? Yes_____ No_____

7. Do you often have students who cannot attend school due to water flood in rainy season? Very often_____ Often_____, Seldom_____, Never_____.

B. Class discussion

1. How many of your students own soil textbooks? %: 100-90, 89-80, 79-70, 69-60, 59-50.
_____, _____, _____, _____.

2. Do you teach all of the material in the textbook:
a. All the material Yes_____ No_____
b. Two-thirds of the contents Yes_____ No_____
c. Half of the material Yes_____ No_____

3. How many references on soils do you have in your school library? 100-20, 19-10, 9-5, 4-1, 0.
_____, _____, _____, _____.

4. What are the dates of publications? -1945, 1945-1950, 1950-1955, 1955-
_____, _____, _____, _____.

5. Do you have the following laboratories in your school?
   a. Chemistry laboratory Yes_____ No_____
   b. Physics laboratory Yes_____ No_____
   c. Biology laboratory Yes_____ No_____
   d. Farm laboratory Yes_____ No_____
   e. Soil laboratory Yes_____ No_____

6. How often do your boys ask about the soil problems of their parents farms? Frequently_____, Often_____, Seldom_____, Never_____.

7. Have you ever worked with your boys on collecting soil samples in your community? Yes_____ No_____

8. How do you explain, for instance, the soil textures to the class?
   a. By drawing on the board, _____
   b. By illustrated explanation, _____
   c. By charts, _____
   d. By soil sample, _____

9. Do you have the charts of soil textures in your school? Yes_____, No_____

10. Did the contents of your teaching plan on soils involve the following factors?
    a. Various sizes of soil particles Yes_____ No_____
    b. Percentage of various soil particles in the soil texture Yes_____ No_____
    c. Applying commercial fertilizer Yes_____ No_____
    d. Significance of manure and composts to the soil Yes_____ No_____
    e. Nutrient requirements for plant growth Yes_____ No_____
    f. Data of the percentage of major nutrients for plant growth in the various fertilizer Yes_____ No_____
    g. Plant covers break down the force of raindrops Yes_____ No_____
    h. Why soils are acid in your community Yes_____ No_____
    i. Soil survey in your community Yes_____ No_____
    j. Analysis of the percentage of complete fertilizer Yes_____ No_____
    k. Calculation of the yields of manure produced by livestock Yes_____ No_____
    l. Yields of manure produced by various livestock Yes_____ No_____
    m. Water erosion problems in the community Yes_____ No_____
    n. Selecting commercial fertilizer Yes_____ No_____
    o. Crops adapted to the soils of the community Yes_____ No_____

C. Teaching Aids

1. How many soil charts are there in your classroom?
_____

2. Do you have the following audio-visual aids in your school, and often use them in the soil class?

	Yes	No	Often	Seldom	Never
a. Motion projector	___	___	___	___	___
b. Film strip projector	___	___	___	___	___
c. Slide projector	___	___	___	___	___
d. Opaque projector	___	___	___	___	___
e. Charts	___	___	___	___	___
f. Soil sample	___	___	___	___	___

3. Do you invite resource persons to your soil class? If so, how many times last year? Yes_____ No_____, Last year _____.

4. Whom do you invite to your soil class as a resource person?
   a. Local soil specialist _____
   b. Agricultural college professor _____
   c. Teachers in the same school _____

5. Did you take any field trip for your soil class? Yes_____ No_____

6. Do you often present the following information besides the text to the soil class?
   a. Soil magazine Yes_____ No_____
   b. Water erosion by picture Yes_____ No_____
   c. Foreign news on soil Yes_____ No_____

7. Do you have an area of the school farm used for demostrating the following:
   a. Use of commercial fertilizer Yes_____ No_____
   b. Cultural practice Yes_____ No_____
   c. Variety demonstration Yes_____ No_____
   d. Use of compost Yes_____ No_____

D. Opportunities to exhibit and show.

1. Do you often given written assignments on soils to your students? Yes_____ No_____.

2. What is the nature of assignments?
   a. Are the answers mostly found in the textbook?
   b. Are the problems directly related to parents farms?
   c. Are the problems thoroughly solved at the next class?
      a. All times____, Many times____, Occasionally____, Never_____.
      b. All times____, Many times____, Occasionally____, Never_____.
      c. All times____, Many times____, Occasionally____, Never_____.

3. Do you ever give a rather big assignment to your boys?
   a. Student select incubator eggs Yes____ No____
   b. Planting seeds and take care for young plants Yes____ No____
   c. Bud conpling of fruit trees and care for them Yes____ No____
   d. Any assignments on soils Yes____ No____

4. Did you have a contest for student to exhibit agricultural products?
   a. Limited to your school Yes_____ No_____
   b. Included other schools Yes_____ No_____
   c. Country-wide Yes_____ No_____

5. Do you think that a judging contest for students on soils would help create interest and promote learning? Yes_____ No_____

6. When students exhibit crops do you require an explanation regard soil? Yes_____ No_____

7. Did your boys have any speech contest about the soils under your advice? Yes_____ No_____

8. Have you ever had such a contest that students compete with other students for the yields of agricultural products in the campus farm? Yes_____ No_____

E. Practice on Farm

1. How many boys do you supervise when the students are working on the campus farm? 200-100, 99-70. 69-50, 49-30, 29-10. _____, _____, _____, _____.

2. What percent of soil classes in the school are alloted to take practice on school farm? %: 50-40, 39-30, 29-20, 19-10, 10-0. _____, _____, _____, _____.

3. Does your school share some of the products on the campus farm to your students? Some_____, Seldom_____. Never_____.

4. What numbers of boys can you supervise effectively while working on the school farm? 50_____, 40_____, 30_____, 20_____, 10_____.

5. Do you often explain to the boys the conditions which you notice on the campus farm during the farm practice? Always_____, Often_____, Seldom_____, Never_____.

6. Do your students ask many questions which are not listed in the contents of your teaching plan on soils? Very often_____, Often_____, Seldom_____, Never_____.

7. Does your school have enough farm tools for the boys to have good practice on the farm? Yes____ No____

8. What do you do on rainy days which is scheduled to practice on farm?
   a. Class discussion on soil _____
   b. Recreation _____
   c. Laboratory work on soil _____
   d. Others _____

9. How often do you visit on student parents farms?
   a. Only vacation periods _____
   b. Busy seasons on farm, too _____
   c. During the semester _____
   d. Never visit _____

10. What percentage of your students have you visited?
    %: 50-40, 39-30, 29-20, 19-10, 10-0.
    _____, _____, _____, _____.

11. Have you ever been asked any questions on farming by the parents? If so, were the questions about:
    a. Insect damages _____
    b. Commercial fertilizer _____
    c. Shortage of labor _____
    d. Students dislike working _____
    e. Water erosion _____
    f. Others _____

12. Did you answer all the questions asked by parents?
    Yes_____, No_____.

13. How do you travel to student parents farms?
    a. By walking _____
    b. By bicycle _____
    c. By bus _____
    d. By train _____

14. Who pays the transporation cost to visit the parents farms? School _____, Yourself_____.

15. Do you have any farmers meeting (not in school) in your community? Yes_____, No_____.

16. Have you ever attended farmers meetings in your community? Yes_____, No_____.

F. Major difficulties

1. Do you have any agricultural institute near your school?
   a. Agricultural college Yes____ No____
   b. Local agricultural institute Yes____ No____
   c. Local agricultural experiment station Yes____ No____

2. Do you have the following facilities and equipment in your school?

a. Soil testing kit	Yes_____	No_____
b. Auger	Yes_____	No_____
c. Farm level	Yes_____	No_____
d. Charts on soil	Yes_____	No_____
e. P.H. tester	Yes_____	No_____
f. Soil data	Yes_____	No_____
g. Local soil map	Yes_____	No_____
h. Soil sample	Yes_____	No_____

3. Do your schools have a farm shop for building and repairing farm tools? Yes_____, No_____.

4. What major difficulties have you experienced in teaching soils to the class?

a. Lack of laboratory facilities _____
b. Lack of illustrative materials in teaching soils _____
c. Lack of books and other references _____
d. Teacher limitations
   1. Lack of knowledge on subject _____
   2. Dislike of subject _____
   3. Others _____
e. Student limitations
   1. Lack of interests on soils _____
   2. Lack of knowledge of general science _____
   3. Problems too difficult _____

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