INCREASING THE EFFECTIVENESS OF THE TEACHING OF SOIL MANAGEMENT IN AGRICULTURAL HIGH SCHOOLS OF KYONGGI-DO, KOREA

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

The conservation of soil and other natural resources is one of the major difficulties of the individual farmers and is of concern to the people of any nation. Farming practices on the individual farm constitute important factors in the maintenance of the soil and soil fertility. There is a definite relation between soil conservation on the farm as a whole and the management of the farm enterprises. Many soil conservation practices are carried out in connection with the different farm enterprises and others in connection with the management of the farm business.

> "Perhaps in no phase of farming is there more need for understanding and ability than in connection with the conservation and management of soils. Some farmers do not appreciate the fact that they have been depleting farm land by their farming practices, and many lack knowledge of farming practices that will restore the soil".[1]

Soil depletion is both physical and chemical. The former may or may not be clearly visible to the individual, while the latter is usually not easily detected by him. Depletion results in declines in yields, frequently increases crop failures, and causes deficiencies in nutrients in plants that may be used for feed and food. Considera-

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[1] Educational Objectives in Vocational Agriculture, Vocational Division Monogram No. 21, U. S. Department of Education (Washington, 1940), p. 7.

tion must be given to the conservation of water, wildlife, and forests, as well as soils.

> "Education must rank as the first remedy. The United States is a democracy; it does not accomplish ends by hand-down decrees from above, but by the initiative and with the consent of the citizens who must know what they want and how to achieve it. Education includes good schools in poor areas as a means of imbuing young people with the ambition to seek better opportunities elsewhere; vocational education to train them for occupations other than farming; and agricultural education that will show those who remain the needs of the soil and adjustments in agricultural practices required to conserve it. Going further, education is also the means for bringing about a widespread change in the attitudes of people toward the soil -- a process in which the schools, the press, the pulpit, the radio, the motion picture, and the discussion group all have a part to play. Where the land has been abused for generations, it will not be easy to develop the necessary knowledge, convictions, and attitudes, nor will it be done quickly.
>
> "Good soil management, in the sense of maintaining fertility and productivity, depends on a number of relatively simple practices. Broadly, four things are of first importance: (1) Suitable tillage; (2) maintaining the supply of organic matter, principally by the use of proper rotations and cover crops, including legumes; correcting soil acidity in the humid regions; (3) providing an adequate supply of phosphorus; and (4) using mechanical measures to control erosion where rotation and cover cropping are not sufficient. This applies to general farming in most regions. In some areas and for special crops, there are special problems associated with water supply, drainage, nitrogen, potash, and certain minerals."[2]

The potential fertility of Korean soils has rapidly declined as a result of the combined efforts of crop production, leaching, and erosion. The cultivated soils have lost about two-fifths of their original supply of organic matter and nitrogen. Soil acidity and nitrogen deficiency have also become serious problems on much of the cultivated land in this country. There is therefore ample evidence of the necessity

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[2] Soils and Men, U.S.D.A. Yearbook (Washington, 1938), p. 11, 19.

for the teaching of soils management in Korean high schools. This study is made and devised especially for Kyonggi-Do, central Korea. The basis for teaching soil in high schools of Korea has been largely confined to the area of crop study and this has made it somewhat difficult to ascertain the total time being used for the teaching of soils. We should give special consideration to the area of soil conservation for teaching soil management in high schools. While the teaching of soil conservation is very essential, it is but a part of the program which the students should study to make their knowledge of soils complete.

It has been estimated that twenty per cent of the top soil has been lost from the cultivated areas in Korea. Although this is only an estimate, we do know that the loss of this top portion has lowered the fertility of the soil to such an extent that many acres of cultivated land are yielding at a much lower rate. Each year more and more tons of fertilizer are being applied to the soils in Korea. Farmers must realize that fertilizer is not a cure-all for their problems unless they use additional methods of soil management which will assist them in utilizing the soil and maintianing the fertility.

The soil being the basis for any civilization, we must do something to maintain and improve our soil and utilize it in such a manner that something will be left for the future. This demands that our teaching of high school boys as well as the adult farmers must be effective so that the farms of the future will remain productive instead of consisting only of infertile and worn-out farms which will not support families and the nation.

MAJOR PROBLEMS IN SOIL MANAGEMENT EXPERIENCED BY KOREAN FARMERS

1. Maintaining productivity of soils for grain crops.

2. Securing the most economical fertilizers and manures.

3. Maintaining terraces and soil conserving structures on steep slopes.

4. Providing the best tillage practices for conserving soils.

5. Keeping soils in good tilth through use of green manures and crop residue.

6. Converting steep mountain lands into productive pastures and conserving the soil.

7. Developing a desire on the part of all family members for keeping farm soils and a productive level.

8. Selecting crops which will produce a good living for the family and keep the soil fertile.

Since many of the farm families have boys of high school age, it is evident that through teaching the students proper soil management a better and more profitable farming program will result.

Some of the students, however, have failed to become interested in studying agriculture and many parents feel that their sons would be better off by completing academic programs. The major problem of soil management is closely related to the attitude of students and parents toward vocational agriculture. If the teaching can be challenging and the attitude more favorable, both the educational program and the farming will be improved.

PURPOSES OF THE STUDY

The purposes of this study are as follows:

1. To determine the effectiveness of the program of soil management which is now being taught in selected vocational agriculture schools in central Korea.

2. To suggest the various phases and areas of soil management which should be emphasized in vocational agriculture classes in Central Korea.

3. To determine and suggest the facilities that are needed for a complete soil management course of study.

4. To arrive at a suggested number of periods for teaching soil management in the high schools in central Korea.

5. To identify reference material now used which is satisfactorily and suggest new reference material which may be needed.

6. To determine what methods of teaching now used which are effective and to suggest additional methods or changes which are needed.

To reach these objectives or purposes, a review of literature was made, a study was made of research conducted in this area in the United States, and personal interviews were made with eight teachers of vocational agriculture in Oklahoma. A survey form was prepared and submitted to vocational agriculture teachers and senior students in five high schools of Kyonggi-Do, central Korea. Data were compiled and analyzed and recommendations for improving the teaching program formulated. A suggested outline for teaching and soil management in Korean high schools was formulated.

CHAPTER II

THE AGRICULTURE OF KOREA

The agricultural situation in any nation is closely correlated with education and especially with agricultural education. We can not develop vocational agricultural educational programs of benefit without considering all phases of the agricultural situation.

I will endeavor to present the agricultural situation of Korea with data in the following tables: (1) Number of farming households and cultivated area; (2) Number of farming households by size of farms; (3) Agricultural production and cultivated area, I; (4) Agricultural production and cultivated area, II; (5) Commercial fertilizer applied to farms in Korea; (6) Number of domestic animals on Korean farms; and (7) Forest areas.

As is shown in Table I, the farm families of Korea are quite large with an average of six persons in each farm home. The size of cultivated land is nine tambo or about two and one-third acres per farm. Approximately two-thirds of this acreage is in rice paddies while the remaining cultivated land is in dry field crop production. With this small amount of cultivated land for each farm, it is necessary that the productivity be kept at a high rate. Soil conservation and improvement are essential to the existance of the population and survival of the nation.

TABLE I

NUMBER OF FARMING HOUSEHOLDS AND CULTIVATED AREA IN KOREA
(1955 CENSUS)[1]

Area	Number of Farming Households	Farming Population		Cultivated Area (Unit: Chongbo)*			Cultivated Area Per Farming Household (Unit: Tanbo)*		
		Total	Per House	Rice Paddy	Dry Fields	Total	Rice Paddy	Dry Fields	Total
Korea	2,218,185	13,299,812	6.00	1,197,276.9	814,177.3	2,011,459.2	5.40	3.67	9.07
Kyonggi-Do (Central Korea)	232,877	1,371,965	5.89	175,113.0	107,372.4	282,485.4	7.52	4.61	12.13

* 1 chongbo = 10 tanbo = 2.45 acres.

TABLE II

NUMBER OF FARMING HOUSEHOLDS BY SIZE OF FARMS
(1955 CENSUS)[2]

Area	Number: Less Than 5 Tanbos	Number: 5 Tanbos to 10 Tanbos	Number: 10 Tanbos to 20 Tanbos	Number: 20 Tanbos to 30 Tanbos	Number: 30 Tanbos or Over	Total
Korea	954,816	689,745	445,632	122,441	5,551	2,218,185
Kyonggi-Do (Central Korea)	64,237	70,924	68,763	27,307	1,646	232,877

[1] [illegible] of Bank of Korea (Seoul, 1957), p. 147.

Table II shows that there is considerable variation in the size of individual farms. In Kyonggi-Do, about the same number of farms are found in each of the catagories, less than five tanbo, five to ten tanbo, and ten to twenty tanbo. Those people who farm less than seven tanbo have only a bare minimum existance. The size of farms in Korea cannot be expected to increase, therefore, it is very important to raise the yields of crops on all farms especially those of small size.

As is shown in Tables III and IV, the main crop is rice and side crops are barley, wheat, soy beans, and potatoes. The cultivated area is also in order of rice paddies, barley fields, soy bean fields, wheat fields, and potato fields. We must endeavor to produce more yields economically in a certain size of farm, and perhaps find other suitable crops for the people in addition to rice and barley.

Table V shows that Korean farmers use much more commercial ammonium sulphate and nitrate than other commercial fertilizers. There is indication that legumes and small grains will respond to phosphorus fertilizer application. Demonstrations should be carried out on school farms.

We can find in Tables VI, VII and VIII that alot of beef cattle and milk cows can be raised in mountain areas of Korea. Those people who have not alot of fields to raise crops should utilize mountain areas to raise cattle, sheep and goats for their food. The importance of meat and milk in the human diet is known by everyone. The health and well-being of people depend upon the consumption of large quanti- of meat and milk. There are many thousand chongbos of forest and

TABLE III

AGRICULTURAL CROP PRODUCTION IN KOREA
(1956)[3]

Location	Rough Rice	Summer Grains (Cleaned)				Other Cereals (Cleaned)						
		Barley	Naked Barley	Wheat	Rye	Italian Millet	Barn Yard Millet	Glutinous Millet	Sorghum	Corn	Oats	Buckwheat
*Korea	12,781	2,520	2,142	964	180	394	0.76	8.24	36.2	83.8	0.43	78.2
*Kyonggi-Do (Central Korea)	2,025	315	2	128	16	39	0.01	0.16	12.9	4.4	0	5.2
**Korea	1,106	503	293	124.4	36.2	151	0.53	3.11	12.1	24.1	0.52	27.1
**Kyonggi-Do (Central Korea)	162	59	0	15.3	3.1	13	0.01	0.07	4.2	0.9	0	1.6

[3] Economic Almanac, pp. 148-149.

TABLE III (CONTINUED)

Location	Pulses						Others
	Soy Beans	Red Beans	Green Beans	Kidney Beans	Peas	Peanuts	
*Korea	1,135	84.4	20.5	2.48	3.02	4.44	17.1
*Kyonggi-Do (Central Korea)	160	14.4	6.5	0.89	0.87	0.51	3.4
**Korea	272	25.6	6.6	0.86	0.78	1.52	4.68
**Kyonggi-Do (Central Korea)	38	4.6	2.5	0.45	0.25	0.23	1.00

* Production in 1,000 Sok (1 Sok = 4.96 Bushels)
** Cultivated area in 1,000 Chongbo (1 Chongbo = 2.45 Acres)

TABLE IV

AGRICULTURAL PRODUCTION IN KOREA
(1956)[4]

Location	Potatoes	Sweet Potatoes	Fiber and Oilseed Crops						
			Cotton	Hemp	Ramie	Black Rush	Perilla	Sesame	Castor
Korea	445*	867*	81,615**	1,509***	124.5***	398***	14.7*	13.7*	11.75*
Kyonggi-Do (Central Korea)	46*	62*	3,244**	27***	0	30***	3.4*	3.5*	2.89*
****Korea	48.9	46.3	116	7.90	1.09	1.58	4.87	4.8	2.87
****Kyonggi-Do (Central Korea)	4.2	3.7	8	0.18	0	0.12	1.34	1.31	0.14

*Production in 1,000 Sok (1 Sok = 4.96 Bushels = 180.39 Liters)
**Production in 1,000 Kun (1 Kun = 0.6 Kilograms)
***Production in 1,000 Kwan (1 Kwan = 3.75 Kilograms)
****Cultivated Area in 1,000 Chongbo (1 Chongbo = 2.45 Acres

[4] Economic Almanac, p. 149.

TABLE V

COMMERCIAL FERTILIZER APPLIED TO FARMS OF SOUTH KOREA (1955)[5]

Units,* Ammonium Sulphate	Units,* Ammonium Nitrate	Units,* Calcium Nitrate	Units,* Super Phosphate	Units,* Urea	Units,* Triple Super Phosphate	Units,* Fused Phosphate	Units,* Others
286,102	113,594	69,827	21,992	69,695	35,500	31,089	17,342

* 1 Unit = 1 Kilogram

TABLE VI

OWNERSHIP OF FOREST LANDS IN KOREA* (1956)[6]

Area	Total	Owned By			
		National	Public	Temple	Private
Korea	6,397	1,265	549	112	4,471
Kyonggi-Do	615	103	49	3	459

* 1 Unit = 1,000 Chongbo (1 Chongbo = 2.45 Acres)

[5] Economic Almanac, p. 152.

[6] Ibid., p. 150.

TABLE VII

NUMBER OF DOMESTIC ANIMALS IN KOREA
(1956)[7]

Area	Draft Cattle	Milk Cows	Horses	Asses	Mules	Pigs	Sheep	Goats	Rabbits	Chickens	Ducks	Turkeys
Korea	961,793	395	16,778	317	106	1,161,417	957	51,409	291,256	9,031,338	364,364	618
Kyong-gi-Do	99,963	142	279	18	1	87,933	30	268	23,377	1,078,570	26,593	62

TABLE VIII

FOREST AREAS AND CONDITION*
(1956)[8]

Area	Total	Good Stand	Sparse Stand	No Stand	Burned Field	Suitable for Cultivation	Suitable for Pasture	Others
Korea	6,397	3,149	1,645	1,296	30	54	55	168
Kyonggi-Do	615							

*1 Unit = 1,000 Chongbo (1 Chongbo = 2.45 Acres)

mountain land which, if planted to adapted grasses and legumes would support cattle, sheep and goats for milk and meat. This is a challenge to agricultural educators.

CHAPTER III

SECONDARY EDUCATION IN KOREA

Schools providing for education of Korean youth in the modern sense began in the late Lee Dynasty around the end of the nineteenth century. Despite the fact that the Korean people had their own language, education was developed through use of Chinese characters. In the latter part of the Lee Dynasty, Korea began to open her eyes wide to the international situation of the time and modern schools and curricula were developed. It was a great pity that Korea was invaded by the Japanese just when a great revolution was about to take place in Korean education.

Korea was set aside from world progress due to Japanese imperialism until the liberation on August 15, 1945.

Independence of the Republic of Korea three years after the liberation saw a new beginning for all kinds of cultural activities, even though independence was accomplished only by the southern part of Korea due to the failure of unification for the South and North.

> "In the area of education, there has been a firm determination to erase the regressive aspects in Korean society as soon as possible. This determination brought memorable development under the most adverse conditions."[1]

At present six years of elementary education is compulsory and the years of schooling in middle school, high school, and college are three,

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[1] The Phi Delta Kappan (Bloomington, Indiana), p. 112.

three and four years respectively.

One of the urgent problems in Korean society is to rehabilitate vocational education. The government recognized the need very early, and set up various vocational high schools in agriculture, industry, commerce, fisheries and home economics.

The government has tried to keep the ratio of academic high schools to vocational high schools at three to seven, but in practice the situation has not come up to this policy of vocational emphasis due to various reasons. Qualified teachers in the vocational fields are lacking. School facilities are scarce. Curricula for vocational schools are still incomplete and inadequate. Hundreds of needed textbooks have not yet been written and published. The result is a kind of vacuum stage in vocational education. This is true in the case of vocational colleges also. Moreover, the loss in vocational education due to the Korean War is unthinkably severe; the war devastated about ninety-six per cent of the facilities of vocational education. UNKRA and ICA put $3,451,720 into a restoration program from 1953 to 1957. This, however, amounts to no more than a twenty-two per cent restoration of devastation created by hostilities. Though the Korean government is intensely desirous of enriching vocational education, there is little financial backing for the program from the government due to limitations of the national budget. The consequences are that some parents are complaining of the uselessness of vocational education without adequate teachers and equipment. It is especially alarming to observe that a trend is being established in that some educators in present vocational schools are trying to convert such programs into

academic high schools where less facilities are needed. The situation is becoming worse, except where schools are being rehabilitated as UNKRA and ICA projects.

As reported in a recent issue of the professional education journal, Phi Delta Kappan[2], foreign aid agencies, particularly UNKRA and ICA, are providing material and technical assistance to raise the level of Korean schools. UNKRA carried the major responsibility in the education field up to the end of 1955, contributing slightly over ten million dollars during the previous three-year period for classroom construction, teacher training, vocational education, library and science equipment, basic school supplies, textbook producing facilities, and a fundamental education training center.

With the transfer of the functional field to the Office of the Economic Coordinator under ICA, that agency assumed responsibility for on-going services. In cooperation with the Ministry of Education, the consequent U.S. aid program has been designed to provide continuing necessary help to Korean schools in several critical areas. More than seven and one-half million dollars have been allocated in the fiscal years 1956 and 1957 in support of basic projects, namely, vocational education, teacher education, classroom construction and higher education.

A staff of nine specialists is provided to work in established UNKRA centers and extend material and technical assistance to fifty-five selected agricultural, mechanical, commercial, and fishery high schools where practical training will be emphasized. The program in-

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[2]Phi Delta Kappan, p. 113.

cludes the development of the first comprehensive community high school in Korea and the inauguration of a vocational teacher training project. Support funds for equipment and buildings are allocated and approximately twenty Korean teachers will be sent to the U.S. for additional training each year.

General data regarding agricultural high schools of Korea is briefly presented as follows:

1. Agricultural High Schools in South Korea:

Number of Schools	Number of Students	Number of Teachers
142	58,726	1,672

2. Age of students: 16 to 19 years.

3. Year taught: Three.

4. Curriculum (Source - Ministry of Education):

School Days per Year	230 to 260
School Days per Week	6
Class Hours per Week	34 to 39

Many agricultural high schools have their own school farms, cows to power plows, swine, chickens, orchards, greenhouses, and forest plots.

TABLE IX

THE THREE YEAR CURRICULA FOR HIGH SCHOOLS IN KOREA AS DIRECTED BY THE MINISTRY OF EDUCATION

	Subject	Hours
Required of all students in all types of schools:	Civic values	245
	Moral values	105
	Korean history	105
	Mathematics	140
	Science	140
	Physical education	105
	Music / Art	140
	Korean language	385
	Vocational elective	315
Academic type program - elective subjects:	Korean language	315
	Foreign history	105
	Geography	105
	Analytical geometry	105 to 210
	Geometry	70 to 140
	Physics	140
	Chemistry	140
	Biology	140
	Geology	140
	Military training	420
	Philosophy and education	210
	Physical education / Music / Art	0 to 210
	English / German* / French* / Chinese*	0 to 525
Special activities: Athletics, clubs, etc.		210

*These courses, while listed on the plan, are actually taught in only a very few schools.

TABLE X

VOCATIONAL COURSES IN AGRICULTURE
(1890 Total Hours of Study Required)

Elective Areas of Specialized Study	
Soils and Fertilizer Use	Breeding of Livestock
Crop Production	Processing Animal Products
General Animal Husbandry	General Veterinary Problems
Laboratory and Field Practice	Mensuration and Farm Engineering
Horticulture	Geology
Processing Plant Products	Farm Machinery Operation
Entomology	Tillage and Cultivation
Breeding of Crops	Water Management
Farm Shop and Mechanics	Cartography
General Forestry	Steel and Concrete Construction
Sericulture	Use of Steel Materials in Agriculture
Farm Management	Silk Production
Forestation	Clinic and Disease Prevention
General Agriculture	Dissection of Animals
Forest Management	Immunity of Bacterium
Forestry Mechanics	Pathology of Animals
Sandy Soil Management and Erosion	Vegetable Production
Forest Conservancy	Fruit-culture
Forest Chemistry	Flowering Plants for Homes
Animal Husbandry	Home Improvement and Landscaping
Physiology of Livestock	Commercial Flower Production
Livestock Feeding	

CHAPTER FOUR

A REVIEW OF A SELECTED STUDIES

A study was made by Hollingsworth[1] in an attempt to determine difficulties which teachers encounter in teaching soil management. The purposes of this study were to determine: (1) the problem areas which teachers recognize in teaching soils to high school boys; (2) the difficulties teachers encounter in teaching soils to high school boys; (3) where teachers secure information on soils; (4) how soils information is used by teachers; and (5) the nature and number of soils courses teachers had in college.

The findings and interpretations made by the investigator showed the major problem areas in teaching soils were: (1) land use classification; (2) recommended land use practices; and (3) information concerning soil types. The major difficulties were: (1) lack laboratory facilities in the high schools; (2) lack of college preparation on the part of teachers; (3) not enough time in four years of high school to teach soils; and (4) high school student's lack of knowledge of science.

Only thirty-nine per cent of Oklahoma counties have soil survey reports. The teachers do not have a suitable soils textbook. The sources of information used were: land judging schools, soil conservation ser-

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[1]Summaries of Studies in Agricultural Education, U. S. Department of Health, Education and Welfare Vocational Division Bulletin, Agricultural Series No. 69 (Washington, 1956), p. 48.

vice 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 use the teachers took a beginning course in soils. Courses taken most frequently pertained to physical properties of the soil and soil and water management.

A study was made by Ott[2] in an attempt to secure skills required for a beginning teacher of vocational agriculture to teach soil and water conservation.

The purpose of this study were to arrive at a list of skills needed by the beginning teacher of vocational agriculture to teach efficiently and thoroughly a course on soil and water conservation, and to demonstrate the practices involved.

The findings and interpretations made by the investigator showed the study resulted in the development of a list of the skills required. This list is to be used by teacher-training institutions as a guide in curriculum development.

Following is a typical list of the skills required to teach a particular job, "Establishing Terraces and Field Diversions": (1) Make map of farm; (a) Locate conservation jobs, (b) make borings to check soil suitability; (2) provide terrace outlets (jobs listed under "Establishing Sod Waterways"); (3) use transit or hand level to stake out

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[2]Summaries of Studies in Agricultural Education, U. S. Department of Health, Education and Welfare Vocational Division Bulletin, Agricultural Series No. 64 (Washington, 1954), pp. 52-53.

preliminary terrace line; (4) realine terrace lines to fit crops and equipment; (5) stake out terrace shape and grade; (6) move earth to construct terrace; (a) disc plow, (b) moldboard plow, (c) slip scraper, (d) blade grader; and (7) seed recommended varieties at proper rate and depth; (a) drill seeder, (b) cyclone seeder, (c) horn seeder, (d) seeder cultipacker, (e) hand broadcasting.

A study was made by Fitts[3] in an attempt to develop demonstrations in teaching soil conservation. The purposes of this study were to develop demonstrations in improved soil conservation practices that will be useful to teachers and pupils of vocational agriculture in the interest of stimulating greater enthusiasm for better soils and better living.

The findings and interpretations made by the investigator in this study showed that demonstrations are valuable in the teaching of soil conservation. The demonstration method creates enthusiasm and interest and may be followed up by actual practice on FFA projects on the farm.

This study presents a cross-section of demonstrations to be used in teaching soil conservation. Thirty-nine demonstrations are used. The demonstrations described are classified according to time needed and place of performance. They are classified as follows: (1) seven classroom demonstrations requiring more than one day for completion; (2) thirteen classroom demonstrations that can be performed at one time; (3) eight field trip demonstrations requiring more than one day

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[3] Summaries of Studies in Agricultural Education, Agricultural Series No. 64, pp. 19-20

for completion; and (4) eleven field trip demonstrations that can be performed at one time.

A study was made by Grubel[4] in an attempt to tie the relationship of soils and physical characteristics to the teaching of vocational agriculture. The purpose of this study also included preparation of a selected bibliography on climate to meet the needs of the teachers of vocational agriculture of New York state.

The findings and interpretations made by the investigator in this study are: teachers of agriculture are not fully cognizant of the importance and application of the physical resources in their teaching. Teachers of agriculture are most familiar with the influence of soil upon selected crop enterprises and less familiar with the influence of the climatological (physical) factors, particularly temperature. The importance of the physical resources should be studied in subject-matter fields. A selected bibliography is presented for the use of teachers of vocational agriculture in New York state.

A study was made by Gray[5] in an attempt to select and organize content and activities, and to suggest teaching procedures in soil and water management.

The purposes of this study were to select and organize content and activities, and to suggest teaching procedures for the area of soil and water management to be used in the Arizona course of study in vocational agriculture.

The findings and interpretations made by the investigator in this

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[4]Summaries of Studies in Agricultural Education, U. S. Department of Health, Education and Welfare Vocational Division Bulletin, Agricultural Series No. 59 (Washington, 1950), p. 15.

[5]Ibid.

study follow: (1) objectives for the area of soil and water management were formulated and grouped into six major abilities used as teaching units. The units include: (a) evaluating the fertility of soils; (b) analyzing the relationships between soils and their vegetative cover; (c) using irrigation water efficiently; (d) making land more productive through proper use of fertilizers; (e) utilizing proven soil management practices; and (f) conserving natural soil resources.

(2) The content appropriate to each objective was selected by a consideration of the types of abilities necessary to attain that objective. The abilities include: (a) knowledge and understanding; (b) manual skills; (c) managerial decision; and (d) appreciations and ideals. (3) A group of teaching-learning activities were developed for each unit which include: (a) demonstrations; (b) field classes; (c) study of specimen material, (d) use of visual aids; (e) use of guest speakers; (f) experiments; (g) student participation in collecting materials; and (h) interpreting data for specific uses. (4) Teaching aids were formulated for each unit of instruction including; (a) visual aids; (b) specimen materials; (c) field materials; (d) student references; and (e) teacher references. (5) A test was constructed to be used after the completion of all six units. It is composed of 110 simple response items, including true-false, simple recall, matching, multiple choice, and modified multiple choice.

A study was made by Dillon[6] in an attempt to develop units and jobs in teaching soil conservation. The purposes of this study were to deve-

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[6] Summaries of Studies in Agricultural Education, Agricultural Series No. 59, p. 10.

lop units and jobs which should be included in a course of study in conservation of soil and water resources for instruction in vocational agriculture in New Mexico. The findings and interpretations made by the investigator in the study of the compiled data reveals: (1) soil and water conservation programs are important in vocational agriculture instruction; (2) surveys and landuse maps are also important; (3) overgrazing is the most important item in range management; (4) several practices were recommended in soil and water conservation; (5) soil and water conservation practices should be included in instructional programs. A total of four practices are reported in detailed form: (1) general soil and water conservation; (2) range management; (3) dry farming management; (4) irrigation farming management. Concluded that these practices could be used for instruction of all-day students in vocational agricultural departments in New Mexico.

A study was made by Strickler[7] in an attempt to develop a course of study in soil management instruction in agriculture classes.

The purposes of this study were to develop a course of study in soil management for vocational agriculture classes.

The findings and interpretations made by the investigator showed the units developed for inclusion in soil management were: origin of soils; physical properties of soils; soil organisms; organic matter in soils; soil water; soil tillage; crop rotation; the plant food elements; soil acidity and its control by liming, green manures, farm manures, and special soil erosion control practices.

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[7] Summaries of Studies in Agricultural Education, U. S. Department of Health, Education and Welfare Vocational Division Bulletin, Agricultural Series No. 57 (Washington, 1948), p. 97.

A study was made by McCall[8] in an attempt to develop a program for teaching soils in the high schools of Florida. The purpose of this study was to develop a program for teaching soils in vocational agriculture classes in Florida.

The findings and interpretations of the results made by the investigator indicated that in Florida nine teachers out of ten do not teach soils as a separate subject, but correlate it with crop production. The writer recommended the teaching of a separate course of study including the following items: selection of the soil; essentials of soil management; composition of the soil; different kinds of soils; chemical essentials; supplying the crop needs; control of soil water; tillage; crop rotation; farm manures; green manures; cover crops and crop residues; the use of lime; fertilizers; managing soils for various uses.

A study was made by Glick[9] in an attempt to find the feasibility of developing a local teaching program from the data secured by a study of the soils and the farm businesses of a local community. The purposes of this study were to determine whether or not it would be practical for an agriculture teacher to collect soil data and farm business information to use as the basis for a teaching program in high school.

The findings and interpretations of this study made by the investigator showed the following: Sheet erosion was found on almost

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[8] Summaries of Studies in Agricultural Education, Agricultural Series No. 57, pp. 68.

[9] Ibid., pp. 38.

all fields of ten or more percent slope. Gulleying was prevalent, but was being controlled. N, p, and K tests were low; pH average test was 6.2; and lime test was good.

The farm business records showed that labor incomes were low; crop index based on United States States average yields was 99.6.

The author made specific recommendations for improving the cropping systems, fertilizer utilization; and, in some cases, complete reorganization on the farm business.

The time required for this type of study is too great for a teacher to spend. He should get help from his all-day class members, the farmers, Soil Conservation Service, and his agricultural college. The type of information obtained is considered to be ideal as a basis for organizing evening class instruction and can be used to some extent in all-day classes.

CHAPTER FIVE

A SURVEY OF SOIL MANAGEMENT INSTRUCTION IN FIVE AGRICULTURAL HIGH SCHOOLS IN CENTRAL KOREA

METHODS OF PROCEDURE

A questionnaire was prepared and submitted to teachers of vocational agriculture in five schools in Kyonggi-Do, central Korea. The schools chosen were ones in which the teacher had been for at least three years and the school had been functioning at least fifteen years.

The senior students in each school filled out a test form which was designed to measure their knowledge on soil management. These tests were graded with an effort to correlate the average number of periods taught with the average grade made on the tests. The questionnaire and tests were designed on March 7, 1958, at Stillwater, Oklahoma, and were sent to five schools in central Korea.

The items included in the questionnaire and tests were selected from material which had been included on soil conservation, teaching and activities, and from the author's personal farming and teaching experiences in Korea. The phases of soil management were used to determine to what extent they were all taught in relation to soil management.

References that were available were reviewed and either selected or rejected as to their suitability and adaptability in the appropriate area.

A basis for a teaching program in soil management was determined from the phases of soil management taught.

A survey was made of soil management practices which each student had completed on the farm on which he lived.

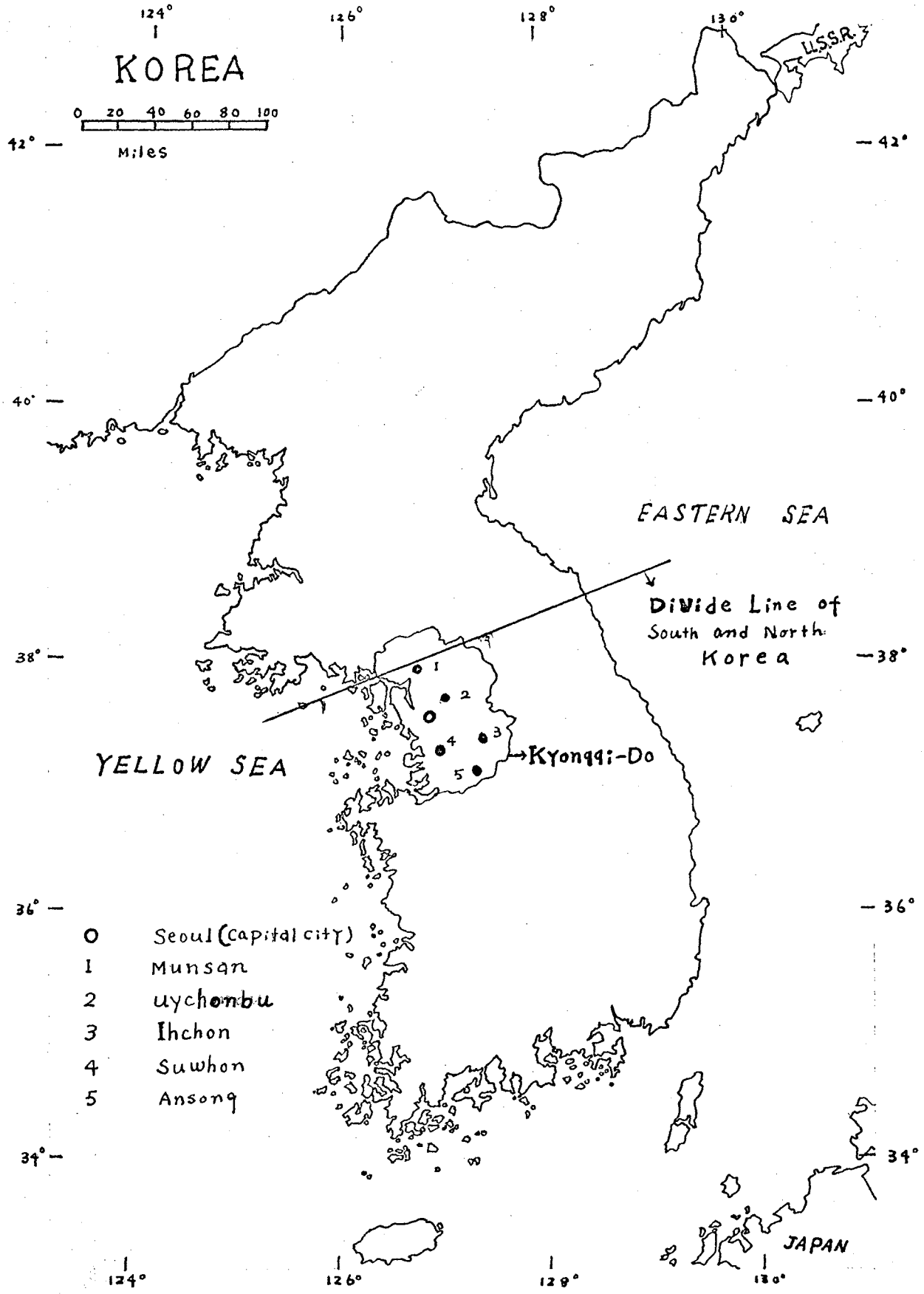
Copies of the questionnaire and tests are presented on subsequent pages in this chapter.

The following five schools were selected to be used in the study: Munsan Agricultural High School; Uychongbu Agricultural High School; Inchon Agricultural High School; Suwhon Agricultural High School; Ansong Agricultural High School.

The hour at which the upper division classes were taught in various schools was obtained from the files in the Kyonggi Province Supervisor Office.

The work was planned for arrival at the school before the time for the upper division class permission was obtained to present the tests to the students. The teacher was requested to fill out the questionnaire at the same time. The tests and questionnaire were returned from five schools to Stillwater by April 15, 1958.

The map on the preceeding page shows the location of the schools studied.


KOREA
0 20 40 60 80 100
Miles
124°
126°
128°
130°
U.S.S.R.
42°
40°
38°
36°
34°
EASTERN SEA
Divide Line of
South and North
Korea
YELLOW SEA
Kyonggi-Do
JAPAN
0 Seoul (capital city)
1 Munsan
2 uychonbu
3 Ihchon
4 Suwhon
5 Ansong

A SOILS MANAGEMENT QUESTIONNAIRE FOR VOCATIONAL AGRICULTURE STUDENTS

True and False

1. Korean clover (miscroiespedeza) is a good grass for barren land. _____

2. We can raise crops even on very steep slopes if we make level terraces spaced closely together. _____

3. Thin plowing during planting crops in the land of central Korea is not necessary to conserve water. _____

4. Level terraces are often to be preferred on sandy or open soils. _____

5. We mix alot of organic material or sandy soil in tight soils in order to improve tight soils. _____

6. To best control erosion, all farming operations should be done parallel to the terraces. _____

7. Rice fields in Korea are small ones of level terraces. _____

8. Planting cover crops is not beneficial for slopes with strong soil erosion. _____

9. Spillways are required to improve tight soil with high underground water. _____

10. The amount of slope or fall of the land is the greatest single factor determining the spacing of terraces. _____

11. If we practice deep plowing and turn under alot of vegetation and crop residue in drying land, water requirements will be higher. _____

12. Cultivated soils in central Korea are getting more acid. _____

13. Contour farming increases crop yields by conserving soils and moisture. _____

14. Land that has been cultivated for a long time will be less acid than a similar area used for pasture. _____

15. Legumes such as sweet clover and alfalfa fail to grow and develop properly in soils which are sour or acid. _____

16. When starting to terrace a field, the lower terrace should be the first constructed. _____

17. Terraces should never be drained into a pasture or woodland. _____

18. Alkali spots are generally quite acid and should be treated with high rates of lime stone. _____

19. Soils which have sandy subsoils are classified as a slowly permeable soil. _____

20. Perennial grasses are those of a rather temporary nature which requires reseeding each season. _____

21. The depth of soils means the total of both surface soil and subsoil. _____

22. Any soil suitable for cultivation, having a slope greater than 12" per 100', will be benefitted by terraces. _____

23. Soils which contain a high percentage of clay are more susceptable to damage by wind erosion. _____

24. It is a desirable practice to burn pastures every year or two in order to kill weeds or insects. _____

25. We need the drainage of an under drain in the area which cultivated fields are not wide. _____

26. When the vetch is grown mainly for the purpose of seed production, there is little advantage to be gained by inoculation. _____

Completion Questions

Directions: Fill in the blank spaces with word which correctly completes the following statements:

1. Complete fertilizers with the formula 25-12.5-7.5 contain:

   a. 25 kwan of _____.

   b. 12.5 kwan of _____.

   c. 7.5 kwan of _____.

2. Three ways in which soils lose fertility are:

   a. _____.

   b. _____.

c. _____.

3. Soils are sometimes classified as follows:

(name of the soil)

a. _____ includes less than 12.5 per cent of clay.

b. _____ includes 12.5 to 25 per cent of clay.

c. _____ includes 25 to 37.5 per cent of clay.

d. _____ includes 37.5 to 50 per cent of clay.

e. _____ includes more than 50 per cent of clay.

4. The following treatments and applications are required for using green manure.

a. _____

b. _____

c. _____

Multiple Choice

Directions: Draw a circle around the numbers of the statements which are true in each question.

5.

(i) The ways of supplying nitrogen to plants growing on poor soils are:

a. Applying three to four tons of lime per acre.

b. Growing a cover crop of vetch.

c. Applying 200 to 300 pounds of superphosphate.

d. Applying a side dressing of 50 to 150 pounds of ammonium nitrate.

e. Applying 50 to 100 pounds of sodium chlorate per acre.

(ii) The amount of limestone which should be applied to soils will be determined by the following:

a. Amount of organic matter in the soil.

b. Texture of the soil (whether sand or clay).

c. Depth of the topsoil.

d. Soil test to determine acidity.

e. Amount of loose rock or gravel present.

(iii) In the processes completed by soil micro-organisms the following are beneficial for farming.

a. Denitrification.

b. Ammonification.

c. Nitrification.

d. Nitrogen fixation.

e. Sick soil (propagation of a disease germ).

(iv) Legumes are a class of plants which:

a. Are known as cereal or grass crop.

b. Have growths called nodules on the roots.

c. Can be used to increase the nitrogen supply in the soil.

d. Are suited for growing on acid soils.

e. Help to increase the supply of phosphorus in the soil.

(v) Hairy-vetch is a legume which:

a. Is a good green manure eduring for cold.

b. Is propagated among the rice fields in the beginning of October.

c. Needs alot of nitrogen.

d. Is needed two kun per acre as seed, and produced about a thousand kwan.

e. We should raise more in central Korea.

(vi) The valuable native plants for pasture usage in central Korea are the following:

a. Kuz.

b. Lupine.

c. Soy bean.

d. Korean clover

e. Artemisia asiatica nakai.

Student Experiences in Soil Management

Directions: What soil management practices have you employed on the home farm? If the answer is yes, add the number of tanbo.

6.	Yes	No	Tanbo
a. Constructed terraces.			
b. Maintained terraces.			
c. Practiced contour farming.			
d. Practiced crop rotation.			
e. Planted legumes.			
f. Plowed under green manure crops.			
g. Used lime on fields.			
h. Used fertilizers.			
i. Planted submarginal land back to pasture.			
j. Planted legumes in the pasture.			
k. Tested soils.			
l. Collected soil samples for testing.			
m. Helped to build a farm pond.			
n. Controlled weeds by mowing.			

TABLE XI

ANALYSIS ON THE TESTS ADMINISTERED TO THE STUDENTS IN THE VARIOUS COURSES

TABLE XI-A

PER CENT OF STUDENTS IN FIVE KOREAN HIGH SCHOOLS MARKING TEST QUESTIONS CORRECTLY

True or False Question Number	Per cent of students marking correct answers
1	71
2	96
3	98
4	74
5	95
6	83
7	89
8	94
9	96
10	96
11	98
12	71
13	93
14	67
15	64
16	80
17	9
18	71
19	83
20	97
21	83
22	57
23	98
24	77
25	94
26	88

TABLE XI-B

RESPONSES OF TWENTY STUDENTS IN EACH OF FIVE KOREAN HIGH SCHOOLS IN TERMS OF INCORRECT ANSWERS

True or False Question No.	Number Students Answering Incorrectly					Total All Schools
	School 1	School 2	School 3	School 4	School 5	
1	12	2	5	7	3	29
2	3	1	0	0	0	4
3	1	1	0	0	0	2
4	7	7	6	4	2	26
5	1	0	0	0	4	5
6	4	2	1	5	5	17
7	3	1	1	4	2	11
8	2	0	1	2	1	6
9	1	0	0	1	2	4
10	1	1	0	1	1	4
11	2	0	0	0	0	2
12	7	8	5	4	5	29
13	3	0	1	2	1	7
14	11	5	4	0	13	33
15	7	4	8	6	11	36
16	9	4	0	2	5	20
17	18	18	17	20	18	91
18	7	6	4	6	6	29
19	4	7	0	3	3	17
20	1	0	1	1	0	3
21	2	9	3	2	1	17
22	8	8	9	8	10	43
23	1	0	0	1	0	2
24	9	5	1	3	5	23
25	3	0	1	0	2	6
26	6	0	0	4	2	12
Total	133	89	68	86	102	478
Per cent of mistakes	25.57	17.19	13.08	16.54	19.61	18.38

TABLE XI-C

PER CENT OF TEST QUESTIONS MARKED CORRECT BY 100 STUDENTS IN FIVE KOREAN HIGH SCHOOLS

Completion Question No.	Per Cent of Students Marking Answers Correctly
1	78.6
2	65.7
3	33.2
4	45.8

TABLE XI-D

DISTRIBUTION OF TEST SCORES OF TWENTY STUDENTS IN EACH OF FIVE KOREAN HIGH SCHOOLS

Completion Question 1 Score	Number of Students In: School 1	School 2	School 3	School 4	School 5	Total All Schools
100	17	11	13	12	16	69
40	1	5	7	7	4	24
0	2	4	0	1	0	7
Average point	87	65	79	74	89	78.6
Completion Question 2 Score						
100	2	2	0	2	4	10
80	5	2	0	4	0	11
70	8	11	14	5	11	49
60	0	0	2	0	0	2
50	2	1	0	4	1	8
40	2	3	6	3	4	18
20	1	0	0	0	0	1
0	0	1	0	0	0	1
Average point	68	65	61	65.5	69	65.7

TABLE XI-D, CONTINUED

Completion Question 3 Score	Number of Students In: School 1	School 2	School 3	School 4	School 5	Total All Schools
100	1	0	1	1	1	4
80	3	1	0	2	2	8
60	3	7	5	3	0	18
40	6	2	2	1	6	17
20	5	3	3	6	9	26
0	2	7	9	7	2	27
Average point	43	32	27	30	34	33.2
Completion Question 4 Score						
70	7	3	2	7	6	25
60	0	3	0	3	1	7
50	1	4	7	2	3	17
40	6	3	3	6	8	26
30	4	2	5	1	2	14
20	1	1	3	0	0	5
0	1	4	0	1	0	6
Average point	46	39.5	41	52	50.5	45.8

TABLE XI-E

PER CENT OF TEST QUESTIONS MARKED CORRECT BY 100 STUDENTS IN FIVE KOREAN HIGH SCHOOLS

Multiple Choice Question Number	Per Cent of Students Marking Answers Correctly
1	75.0
2	82.5
3	67.6
4	92.3
5	89.6
6	92.6

TABLE XI-F

DISTRIBUTION OF TEST SCORES OF TWENTY STUDENTS IN EACH OF FIVE KOREAN HIGH SCHOOLS

Multiple Choice Questions		Number of Correct Points					
		School 1	School 2	School 3	School 4	School 5	Total
Question 1	100	17	10	6	12	7	52
Score	50	3	9	14	8	12	46
	0	0	1	0	0	1	2
	Avg. pt.	92.5	72.5	65	80	65	75
Question 2	100	12	15	11	13	16	67
Score	50	8	5	8	6	4	31
	0	0	0	1	1	0	2
	Avg. pt.	80	87.5	75	80	90	82.5
Question 3	100	6	3	1	6	14	30
Score	70	0	2	0	1	3	6
	60	11	13	12	12	0	48
	40	1	0	2	1	0	4
	30	2	2	5	0	1	10
	0	0	0	0	0	2	2
	Avg. pt.	68	64	52.5	71.5	82	67.6
Question 4	100	19	17	9	19	19	84
Score	80	0	1	0	0	1	2
	50	1	2	11	1	0	15
	Avg. pt.	97.5	94	72.5	97.5	99	92.3
Question 5	100	15	12	9	16	13	65
Score	75.5	0	1	0	0	1	2
	70	5	7	11	4	6	33
	Avg. pt.	92.5	88.25	83.5	94	89.75	89.6
Question 6	100	19	19	19	14	6	77
Score	70	1	1	0	3	13	18
	60	0	0	1	3	1	5
	Avg. pt.	98.5	98.5	98	89.5	78.5	92.6

The range of the various students within the various schools tended to indicate a wide variation between the students, but in some schools the difference between the low score and the high score on the tests was relatively small. This would tend to indicate that some of the teachers were not teaching effectively to a number of students; whereas, the opposite is true of some teachers and they are receiving maximum effort from the students.

The questions on the examination which received the highest percentage of the students giving correct answers were as a whole true and false questions, and multiple choice questions; whereas, the questions which were missed by the greater majority of the students were the questions filling the blanks.

The following questions were the three which received the greatest percentage of correct answers among all the students used in the study.

	Per cent correct by students.
2. We can raise crops even on very steep slopes if we make level terraces spaced closely together.	98
11. If we practice deep plowing and turn under alot of vegetation and crop residue, the water requirement will be higher.	98
23. Soils which contain a high percentage of clay are more susceptable to damage by wind erosion.	98.

The following questions were the three which received the smallest percentage of correct answers among students responding to the study.

True and False Questions	Per cent correct by students.
17. Terraces should never be drained in to a pasture or woodland	9

Fill in the Blanks

3. Soils are classified as following: (name of the soil)		
a. _____ includes less than 12.5% of clay.		33.2
b. _____ includes 12.5 - 25 % of clay.		
c. _____ includes 25-37.5% of clay.		
d. _____ includes 37.5 - 50% of clay.		
e. _____ includes more than 50% of clay.		
4. The following treatments and applications are required for using green manure.		
a. _____		45.8
b. _____		
c. _____		

These questions which were missed more often by students are discussed in all classrooms and are of importance to the area. It tends to indicate that they are not discussed as to certain importance to their phase of soil management, but in relation to other points brought up in class or they are generalized upon by teachers and not summarized as they should be. It is considered that the question concerning "17" was not taught in the schools studied. The questions concerning "3" and "4" are so important in soil management that more careful teaching for the subjects is required.

Considering the results from the test as a whole, the conclusion might be drawn that some of the phases are not as important in some communities as others and that some teachers recognize this fact while others pay little attention to the manner in which these individual communities may vary.

Vocational Agriculture Department Questionnaire on Teaching Soil Management

Purposes: To survey phases of soil management that should be emphasized in agricultural high schools.

To be able to suggest the number of periods of soil management to teach in agricultural high schools.

To determine the facilities needed for a complete soil management course of study.

To recommend references that are used satisfactorily and new references that may be used.

Name of the school _____

Name of the vocational agriculture instructor _____

1. How many years have you taught in the present school? _____

2. What is the total number of years taught? _____

3. How many periods do you teach the following phases of soil management based on your three year program?

   1. How are soils formed. _____
   2. How soils deteriorate. _____
   3. Use of cover crops. _____
   4. Classifying land. _____
   5. Plant food elements and the use of fertilizers. _____
   6. Soil acidity and the use of lime. _____
   7. Maintaining and supplying organic matter. _____
   8. Constructing and maintaining soil conserving structures. _____
   9. Use of green manure. _____
   10. Use of farm manure. _____
   11. Methods of tillage. _____
   12. Irrigation and moisture conservation. _____
   13. Crop rotation _____

14. Use of the farm level. _____

15. Wildlife conservation. _____

4. What facilities do you have for teaching soil management?

1. Soil testing kit. _____

2. Auger. _____

3. Farm level. _____

4. Other. _____

5. What references do you have for teaching soil management? List below.

6. Do you find soil management hard to teach? _____

7. How is it made easier to teach? _____

8. How many more periods of soil management do you think should be taught in your school based on your three year program? _____

9. Have you held young farmer or adult classes in soil management? ___

10. What results have you had on the home farms of the members of young farmer or adult classes? _____

11. Do you use Korean Agricultural Department personnel to help you teach soil conservation and management to the all day boys and adult classes? _____

12. What place do you consider soil management in relation to the other phases of agriculture which you teach?

1. Most important _____
2. One of the most important _____
3. Of lesser importance _____

13. Would you classify soils in which you live and diagram with colors?

Name of District in Which You Live

Name of Soils	Per Cent of the Soil

14. Would you classify fertilizers which are used to raise following crops in your school area?

Name of crops	Vegetable Manure	Nitrogen	Phosphate	Potassium
Rice				
Barley & wheat				
Legumes				
Potatoes				

15. What consideration do you think should be emphasized in this report or study?

ANALYSIS OF THE QUESTIONNAIRE

A. Relationship of the number of years teachers had taught in relation to the total number of periods of soil management which he now teaches in the three year program.

In analyzing the number of periods of soil management taught by the various schools studied, a comparison was made between the number of periods of soil management taught by the teachers in the various schools and the number of years of teaching experience which each teacher had.

Years Taught	Number of Periods
3	68
3	72
8	81
9	91
15	116

As shown by the foregoing table, there seems to be an indication that the teachers who teach the greater number of periods of soil management have also taught the greater number of years. There is ample evidence indicated that on the average the teachers who are teaching their third year are teaching less than the average number of periods of soil management being taught by all the teachers. This would seem to imply that the beginning teacher either does not realize the importance of soil management phases in relation to the other phases of agriculture in the teaching program

B. An analysis of the study of various phases of soil management being taught by the various schools studies.

In analyzing the phases of soil management being taught, there were some phases of items considered. It is recognized that perhaps some overlapping would occur. Some teachers indicated that certain phases listed were being taught in conjunction with crops. This would lower the number of periods which some schools are using for teaching soil management and make an additional number of periods taught in the area of crops. Some teachers indicated that all phases could be used in teaching soil management and all were important enough to receive consideration in the area of central Korea. The study showed that the phase of soil management in which the least work is being done is Wildlife Conservation; whereas, the phase receiving the greatest emphasis is Farming Methods and Soil Conserving Practices.

The chart on the following page shows a tabulation of the periods which the teachers indicate they now teach in the various areas or phases of soil management.

TABLE XII

VARIATION IN NUMBER OF PERIODS TAUGHT PER SCHOOL OF THE PHASES RELATIVE TO SOIL MANAGEMENT

Phases of Soil Management	Periods Taught				
	School 1	School 2	School 3	School 4	School 5
How soils are formed	3	5	4	4	5
How soils deteriorate	4	4	4	6	5
Use of cover crops	3	4	3	4	2
Classifying land	3	3	5	2	3
Plant food elements and the use of fertilizers	15	9	10	8	12
Soil acidity and the use of lime	2	4	8	4	6
Maintaining and supplying organic matter	3	6	3	6	6
Constructing and maintaining soil conserving structures	13	10	3	18	12
Use of green manure	4	4	5	2	3
Use of farm manure	4	4	4	2	18
Methods of tillage	5	3	3	2	4
Irrigation and moisture conservation	4	3	5	2	3
Crop rotation	4	5	3	2	2
Use of the farm level	12	7	8	27	32
Wildlife conservation	2	1	0	2	2
Total number of periods	81	72	68	91	115

C. An analysis of the facilities and equipment which teachers in the area had for teaching soil management.

In response to the question "What facilities do you have for teaching soil management?," data regarding schools' facilities are shown in Table XIII:

TABLE XIII

FACILITIES AND EQUIPMENT FOR TEACHING SOIL MANAGEMENT IN THE FIVE HIGH SCHOOL STUDY

Facilities and equipment	Number per School				
	School 1	School 2	School 3	School 4	School 5
Soil testing kit	5	1	1	4	1
Auger	1	5	4	3	3
Farm level	3	4	5	10	15
Charts	2	0	0	1	1
Soil data	1	0	0	1	1

This would seem to show the importance of the farm level in teaching soil management as well as the soil testing kit and the soil auger. Other facilities which the teachers listed as important were charts and samples of soils. I would like to suggest the use of slides and film strips in the teaching of phases of soil management. Fertilizer samples will also be helpful.

D. An analysis of the references which teachers have and which they consider important in teaching soil management.

In response to the question "What reference do you have for teaching soil management in your school?," all teachers indicated that they have used old Japanese texts as their references. Some teachers reply that Soil Science by Weir, Soils and Fertilizers by Bear, and and Elements of Soil Conservation by Bennet are recently used extensively by the teachers of vocational agricultural schools in Korea. It is our responsibility to translate good U. S. references in teaching soil management into Korean. The teachers indicated that they can't find good Korean references and that Japanese references are so old that they are not so useful for teachers. They are unable to use American references because they don't know English well.

I think good references can more readily be applied to the community in solving problems which are prevalent.

We have a couple of textbooks in teaching soil management in agricultural high schools, but they indicated that all of the teachers except one have not used any textbooks for teaching soil management in the class with the reason that the textbooks made in Korea are very poor and not helpful to the students. I hope we will soon have good reference books for soil management in Korea.

E. An analysis of the difficulties which teachers feel they encounter in teaching soil management.

In response to the question, "Do you find soil management hard to Teach?," the following tabulation is given of the replies from the

teachers of the schools studied:

TABLE XIV

OPINIONS OF TEACHERS REGARDING THE DIFFICULTY OF TEACHING SOIL MANAGEMENT

Opinion Expressed	Teachers Reporting	
	Number	Per Cent
1. Hard to teach.	3	60.0
2. Not too hard to teach.	2	40.0
3. Not hard to teach	0	0.0
Total	5	100.0

This would tend to indicate that the majority of the teachers have a hard time in teaching soil management. The teachers finding soil management hard to teach have some difficulties which when analyzed can be overcome with some added effort on the part of the teachers.

In response to the question "How could it be made easier to teach?," the following replies were received:

1. All desired a better text and good references in Korean for teaching soil management.
2. Two desired to be able to do more field work and field study in proportion to time spent in classroom instruction.
3. Two desired more equipment for teaching soils.
4. One stated that it could be easier to teach if it could be more closely linked with crops and livestock in a complete farming program.

The variations in expression of needs seem to indicate that many teachers realize their problems and that half of the needs are such

that they can, through added effort and planning on the part of the teachers, be corrected. The desire to have a better text and good references in Korean was expressed by all of the teachers. This perhaps indicates that their biggest problem is the lack of a better text and good references in Korean in teaching soil management. There is evidence that the teachers want to have more time to do field work and study than before.

F. An analysis of the number of periods which teachers consider should be taught in the schools studied.

In response to the question "How many more periods of soil management do you think should be taught in your school based on your complete three year teaching program?," teachers gave replied indicating the following tabulation:

TABLE XV

OPINIONS OF TEACHERS REGARDING THE NUMBER OF ADDITIONAL PERIODS WHICH SHOULD BE DEVOTED TO TEACHING SOIL MANAGEMENT

Number of Additional Periods Suggested	Teachers Reporting	
	Number	Per Cent
No more periods	1	20.0
10-20 additional periods	1	20.0
30-40 additional periods	3	60.0
50-60 additional periods	0	0.0

There is an indication that one teacher is satisfied with the number of periods which he is teaching at present, while three teachers feel the need for teaching 30-40 more periods of soil management. There was a teacher who expressed the need for revision in his teaching programs, which would require an increase of 10-20 periods in soil management.

This would seem to indicate a need of an increase of periods in teaching soil management in their total teaching program.

G. An analysis of the young farmer and adult classes in soil management conducted by teachers in the schools.

Response to the question concerning adult education:

TABLE XVI

NATURE OF ADULT EDUCATION IN SOIL MANAGEMENT AS PROVIDED BY THE FIVE HIGH SCHOOLS

Nature of Classes Held	Teachers Reporting	
	Number	Per Cent
No adult classes held	1	20.0
Extension classes held	3	60.0
Evening classes held	1	20.0

The fact that three of the teachers in the schools studied are holding extension classes and one of them is holding evening classes in soil management and conservation for adult farmers seems to indicate that most teachers consider the area of soil management of relatively high importance; one of the definite needs which the farmer has and

one which he needs to do something about. This would also indicate that teachers have found farmers interested in receiving help on these problems.

In response to the question "What results have you had on the home farms of the members of young farmer and adult classes?," A large majority of teachers reported favorable responses from the members of the classes held. This tends to indicate that the farmers feel the need for instruction in soil management and will put out an increased effort to adopt any management practices which will increase the efficiency of their farming programs if the teacher will provide information the farmer desires which are profitable and in the range of his ability to complete.

H. An analysis of the use of Korean Agricultural Department personnel in teaching soil management.

In response to the question concerning the use of Korean Agricultural Department personnel in teaching s oil conservation and management, the teachers gave replies as following:

"No, we don't use the personnel."

This would tend to show that the teachers don't realize the value of such assistance which may be obtained from the personnel in specialized fields. The assistance which the personnel will give to teachers will depend upon their relations with them and the extent of the Agricultural Department work being done in the area.

I. An analysis of the relation of soil management to other phases of agriculture.

Response to the question of the relation of soil management to other phases of agriculture:

TABLE XVII

OPINION OF TEACHERS AS TO THE IMPORTANCE OF SOIL MANAGEMENT

Opinion Ranking	Teachers Reporting	
	Number	Per Cent
Most important	2	40.0
One of the most important	3	60.0
Of lesser importance	0	0.0

This study tends to indicate that all the teachers feel the importance of soil management in agriculture. The teachers seem to feel that other phases of agriculture are based around the soil and recognition and consideration must be given the soil management teaching programs and evening classes for improved and permanent agriculture in Kyonggi-Do, Korea.

J. An analysis of soil texture and soil reaction in the school areas studied.

On the following page will be found Table XVIII which shows the response of teachers to the request for soil types and the soil reaction.

TABLE XVIII

RESPONSE OF TEACHERS AS TO THE SOIL TYPES AND SOIL REACTION

Soil Type and Reaction	Per Cent In School Area 1	Per Cent In School Area 2	Per Cent In School Area 3	Per Cent In School Area 4	Per Cent In School Area 5
Loam	35	50	15	20	40
Sandy Loam	20	20	60	55	20
Sandy Soil	15	7.5	5	7	10
Silt Loam	15	2.5	5	5	0
Clay Loam	10	20	9	5	10
Clay Soil	5	0	6	8	10
Slightly Acid	20	40	0	15	60
Moderately Acid	50	20	70	60	10
Neatur	20	30	20	20	20
Alkali	10	10	10	5	10

The results of Table XVIII would seem to indicate that more than seventy percent of soils are getting acid. Maintaining and improving soil texture, and soil conservation from acidification are very important subjects in Korea.

K. An analysis of fertilizers which are used in the school areas studies.

Teacher responses to the question concerning fertilizers which are used in the school areas are shown in the following table:

TABLE XIX

RESPONSE OF TEACHERS AS TO THE USE OF MANURES AND COMMERCIAL FERTILIZERS IN THE AREA

School Area	Crops	Fertilizers*			
		Manures & Compost	Nitrogen	Phosphorous	Potassium (kalium)
No. 1	Rice	300	3	1.5	1.5
	Barley & Wheat	200	3	2	1
	Legumes	200	0	2	2
	Potatoes	300	2	2	2
No. 2	Rice	300	3	2	1
	Barley & Wheat	400	4	2	1
	Legumes	200	0	2	3
	Potatoes	300	1	2	1
	Vegetables	300	5	2	1
No. 3	Rice	300	3	2	1
	Barley & Wheat	450	4	2	1
	Legumes	200	0	2	3
	Potatoes	250	1	2	2
	Vegetables	300	5	2	1
No. 4.	No reporting.	-	-	-	-
No. 5.	Rice	200	4	2	1
	Barley & Wheat	200	3	2	1
	Legumes	80	0	2	2

*Unit: Kwan per tanbo. (Kwan = 3.75 kilograms; Tanbo = 0.245 acre.

The results of Table XIX indicate that they use alot of vegetable manure heaps and commercial fertilizers to produce crops. All the teachers indicated that the price of commercial fertilizers is higher than crops produced with commercial fertilizers. We are now building two big fertilizer plants in Korea to solve this problem.

CHAPTER SIX

PRESENTATION AND ANALYSIS OF DATA

The presentation and analysis of data will be discussed under the following main headings:

1. A comparison of scores made on the tests by the students from different schools.
2. The relation of scores made on the tests to the soils management and soil conservation programs carried out by the students.
3. The relation of the number of periods of soil management taught in the school to the score on the tests.
4. The type of reference material used in teaching soil management.
5. The facilities used by the schools studied in teaching soil management.

A COMPARISON OF SCORES MADE ON THE TESTS BY THE STUDENTS FROM THE DIFFERENT SCHOOLS

The tests were taken to five schools and given to the students without any previous preparation on the part of the students. The tests, after being given, were graded on the basis of the number missed instead of the number being correct.

The majority of the questions on the tests were chosen from many references and the investigator's own farming and teaching experiences.

The tests covered questions over most of the phases of soil management as well as soil conservation. There was no perfect score on the test from the one hundred students taking the examination.

As a whole, the questions which were missed by the students of a

school were similar in nature. This might tend to indicate that certain subject matter had not been covered fully in class. The tabulation which follows will show the variation of the average scores and the score grade to each question in each school studied.

The names of the schools are not used, but throughout the study they will be referred to by a number. The same number will be used in all analyses made in the study.

TABLE XX

DISTRIBUTION OF THE AVERAGE TEST SCORES OF STUDENTS IN THE FIVE HIGH SCHOOLS IN TERMS OF NUMBER OF QUESTIONS MISSED

Type of Questions	Per Cent of Questions Missed by Students					
	School 1	School 2	School 3	School 4	School 5	Average
True and False	25.57	17.19	13.08	16.54	19.61	18.38
Completion	39.00	49.625	48.00	44.625	39.375	44.175
Multiple Choice	11.834	15.875	25.584	14.584	15.959	16.734
Average Number Wrong	25.484	27.563	28.554	25.24	24.981	26.429

THE RELATION OF SCORES MADE ON THE TESTS TO THE SOIL MANAGEMENT AND SOIL CONSERVATION PROGRAMS CARRIED OUT BY THE STUDENTS

The soil management practices which the boys carried out with their farming programs correlated with the soil management programs carried out on the home farm. Soil management practices carried out by the students taking the tests evaluated from their farming programs and from the practices which they have helped to carry out on the home farm.

This would seem to indicate that the boys are given more opportunity to carry out the practices if they live in a community in which the majority of the farmers are practicing proper soil management. And this would also tend to indicate that the parents of the boys which attended the classes carried out soil conservation and management programs on their farms.

TABLE XXI

SOIL MANAGEMENT PRACTICES CARRIED OUT BY THE STUDENTS TAKING THE TESTS EVALUATED FROM THEIR FARMING PROGRAMS AND FROM PRACTICES WHICH THEY HAVE HELPED TO CARRY OUT ON THE HOME FARM

Practices	Your Farming Program	On The Farm
1. Constructed terraces.	(No Reporting)	18
2. Maintained terraces.		34
3. Practiced contour farming.		48
4. Practiced crop rotation.		42
5. Planted legumes.		57
6. Plowed under green manure crops.		84
7. Used fertilizers.		78
8. Planted submarginal land back to pasture.		0
9. Used lime on fields.		6
10. Planted legumes in the pasture.		0
11. Tested soils.		12
12. Collected soil samples for testing		0
13. Helped to build a farm pond		42
14. Controlled weeds by mowing		40

THE RELATION OF THE NUMBER OF PERIODS OF SOIL MANAGEMENT TAUGHT IN THE SCHOOL TO THE SCORE MADE BY THE STUDENTS ON THE TESTS

The number of periods taught by the various schools ranged from a high of 115 down to 68 periods. The tests ranged from an average of 28.554 percent down to 24.981 percent missed by the students in the various schools. In general the teachers which teach the greater number of periods of soil management tended to have a lower number of questions missed by the students from that school. The teachers which taught a lesser number of periods on soil management tended to have students which missed the greater number of questions on the tests.

In a very few cases, the students from the schools which taught the fewer number of periods of soil management as compared to other schools made relatively better scores on the tests. This would seem to indicate that the quality of teaching is possibly as important a factor in teaching soil management as the total number of periods taught.

Some of the teachers indicated that they felt that they had not received enough practical training through soil courses in college. This would tend to make the teaching more difficult for them. Other studies have repeatedly indicated that teachers tend to teach more about the area which they are better acquainted and in which they are more interested.

All of the teachers indicated that they needed good references which were applicable to the area and of an elementary type for high school students. They felt that such reference material could be applied to the students' farming programs and the home farms contributing to the interest of the students.

Some of the teachers indicated their inability to do as much work in the field as they would desire. This seems to be another factor which tends to cut down on the periods of soil management taught that the teachers would allocate in their course of study.

TABLE XXII

THE AVERAGE SCORE MADE BY STUDENTS IN THE SCHOOLS STUDIED AS COMPARED TO THE NUMBER OF PERIODS ALLOCATED TO THE TEACHING OF SOIL MANAGEMENT IN THE TEACHERS' ANNUAL TEACHING PLAN

School Number	Average Number Missed	Number of Periods
1	25.484	81
2.	27.563	72
3	28.554	68
4	25.240	91
5	24.981	115

Data in Table XXII would indicate that there is little relationship between the scores which students made on the examination and number of periods of soil management taught.

It should be pointed out, however, that the school with the least number of periods taught did have a slightly lower student score. Sixty-eight periods, the least number of periods taught, may be effective if quality of teaching is good.

THE TYPE OF REFERENCE MATERIAL USED

The reference material which most of the schools use in teaching soil management follow:

土壤學汎論 森田修三著
肥料施用法 平野俊著
植物生育と土壤 by Russell
Soil Science by Weir
Elements of Soil Conservation by Benner
Soils and Fertilizers by Bear

This would seem to indicate that the teachers use Japanese references and American references, but they don't use Korean ones. The teachers should find material which can be applied to the community in common and the problems which are common in the community and are prevalent.

Some textbooks published in Korea in teaching soil management are used by the students and are useful for them.

Some teachers indicated that they didn't use the textbooks with the reason that the textbooks are neither good, useful nor helpful to the students and the teachers.

THE FACILITIES WHICH ÆRE NEEDED FOR TEACHING SOIL MANAGEMENT

All of the schools have soil testing kits. All schools have soil augers and farm levels. Three schools have charts and soil data on the area. Other facilities which have been suggested by most of the schools are slides, film strips and fertilizer samples.

CHAPTER SEVEN

FINDINGS AND INTERPRETATIONS

The findings of this indicate that vocational agricultural teachers in Korea need to revise their teaching programs to meet the needs of their community in teaching soil management.

To teach soil conservation alone is not enough of the basic phases of soil to give the students an adequate program in soil management.

The quality of teaching is as important in teaching soil management as the number of periods which are used in the teaching.

The soil management programs 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.

The sources of reference materials used by the teachers in the schools studied are Japan and America, but these are not as applicable to the communities as Korean references.

The teachers indicated that they need more soil testing kits, soil augers, and farm levels. Other facilities include charts, slides, film strips, fertilizer samples, and soil data on the area in which they are doing their teaching.

The teachers who are holding extension classes or evening classes in soil management and soil conservation have received the best results in carrying on a soil management program and practices among the farmers and the students.

The findings seem to indicate that some phases of soil management are being included in the area of crops.

The teachers indicated that the area of soil management is one of the important phases in teaching agriculture.

The teachers indicate that they have problems in teaching soil management, but some of them can be worked out with some effort on the part of the teachers.

The findings indicate that the teachers who have been teaching for a shorter period of time teach lesser periods of soil management than teachers who have been teaching for a longer period of time.

I would like to have soil conservation contests which are a basis of motivation in teaching soil management as a problem in soil management classes in Korea, too.

CHAPTER EIGHT

RECOMMENDATIONS

The following phases are recommended for inclusion in the plan for teaching soil management in high schools and evening classes in line with the finding of the survey:

1. How soils are formed.
2. How soils deteriorate.
3. Using cover crops and green manure.
4. Classifying land.
5. Determining the plant food elements and using fertilizers.
6. Determining soil acidity and the use of lime.
7. Maintaining and supplying organic matter.
8. Constructing and maintaining soil conserving structures.
9. Using farm manure.
10. Determining methods of tillage.
11. Determining methods of irrigation and moisture conservation.
12. Determining crop rotations.
13. Using the farm level.
14. Soil conserving practices and farming methods.
15. Wildlife conservation.

The average total number of periods devoted to all phases of soil management in the five schools studied is eighty-five; therefore, it is recommended that at least one hundred periods of soil management should be included in the three year training program.

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

It is realized that the plans may not be complete, but are designed as a guide for teaching such problems in communities with similar soil types, topography, and type of farming areas.

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

It is recognized that the schools should have facilities for teaching soil management which include a minimum of five soil testing kits, five augers, and five farm levels. Other items which could add to the effectiveness of the instruction would include soil maps of the area, and it would be desirable to have such charts and fertilizer samples as the teacher can construct or obtain otherwise.

The teachers felt that the more field work which can be accomplished by the students, the more interests they will have and the more proficient they will become in solving various soil problems.

I would like to recommend the soil conservation contests which increase the motivation and provide for an increased interest as a basis for teaching to the teachers in Korea.

A list of references which teachers are using are included as recommendations for books which may be used in teaching soil management. I will recommend the following references for teaching soil management to the teachers in Korea:

Recommended List of References

Weir, W. W., Productive Soils, J. B. Lippincott Company.

Weir, W. W., Soil Science, J. B. Lippincott Company.

Bennett, H. H., Elements of Soil Conservation.

Bennett, H. H., Soil Conservation.

Gustafson, A. F., Using and Managing Soils, McGraw-Hill Book Company.

Miller, M. F., The Soil and Its Management, Ginn and Company.

Donahue. Our Soils and Their Management. Interstate.

Rather, H. C., Field Crops, McGraw Hill Book Company.

U. S. D. A. Yearbook, Soils and Men, U. S. Government Printing Office.

A SUGGESTED TEACHING PROGRAM

Enterprise	Problem	Number Periods
Soil properties	Getting acquainted with the soil	3
Soil management	Determining how soils deteriorate	5
	Determining methods of tillage	3
Maintaining soil fertility	Managing alkali soils	2
	Improving slick spots	2
	Using lime and phosphate	2
	Test soils for acidity and phosphorus	6
	Determining the plant food elements and use of fertilizers	6
Soil improvement	The utilization of cover crops and green manure	5
	Planning systems of rotation	5
	Maintaining and supplying organic matter	4
	Establishing strip cropping systems	2
	Using farm manure	4
	Contour farming and furrows	4
Waste land conservation	Conservation practices of the waste land	6
	Reseeding abandoned land	3
Soil conservation	Terracing	12
	Determining terrace outlets and establishing water ways	5
	Using the farm level	6
	Providing wildlife conservation	2
	Establishing of woodlands	2
	Determining land classification	6
	Land judging	6
Moisture conservation	Conserving soil moisture	3
	Determining and providing irrigation methods	2
	Providing the farm pond	6
	Draining flood	3

A SELECTED BIBLIOGRAPHY

Bank of Korea, Research Department. Economic Almanac. Seoul, Korea: Bank of Korea Publishing House, 1957.

Bunch, Merle L. "A Study of Soils Management as Taught in Twenty-Three High Schools in Central Oklahoma with a Suggested Teaching Program." Unpublished Master's Report. Stillwater: Oklahoma Agricultural and Mechanical College, 1951.

Hammonds, Carsie. Teaching Agriculture. New York: McGraw-Hill, 1950.

Ingram, J. Fred. What Makes Education Vocational? Washington: American Vocational Association Pamphlet, 1956.

Kauh, Kwang Man. "A Critical Analysis of Korean Education." Phi Delta Kappan, Volume XXXIX, Number 3 (December, 1957), 112-114.

Lancelot, William Henry. Permanent Learning. New York: Wiley and Co., 1944.

Phipps, Lloyd J. and J. C. Cook. Hand Book on Teaching Vocational Agriculture. Danville, Illinois: The Interstate Printing Company, 1956.

Research Committee, Agricultural Section, American Vocational Association. Summaries of Studies in Agricultural Education. Supplement No. 2. U. S. Department of Interior, Office of Education, Vocational Education Bulletin No. 180. Washington: U. S. Government Printing Office, 1948, pp. 38, 39, 68, 97.

_____. Summaries of Studies in Agricultural Education. Supplement No. 3. Federal Security Agency, Office of Education, Vocational Division Bulletin No. 242. Washington: U. S. Government Printing Office, 1950, pp. 10, 15.

_____. Summaries of Studies in Agricultural Education. Supplement No. 7, U. S. Department of Health, Education and Welfare. Office of Education, Vocational Division Bulletin No. 253. Washington: U. S. Government Printing Office, 1954, pp. 19, 20, 52, 53

_____. Summaries of Studies in Agricultural Education. Supplement No. 9, U. S. Department of Health, Education and Welfare. Office of Education, Vocational Division Bulletin No. 258. Washington: U. S. Government Printing Office, 1956, p. 48.

United States Department of Agriculture. Soils and Men, the Department of Agriculture Year Book, 1938. Washington: U. S. Government Printing Office, 1957.

_____. Soil, the 1957 Year Book of Agriculture. Washington: U. S. Government Printing Office, 1957.

U. S. Office of Education. Educational Objectives in Vocational Agriculture, Revised 1940. Vocational Education Vocational Division Monogram No. 21. Washington: U. S. Government Printing Office, 1940.

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