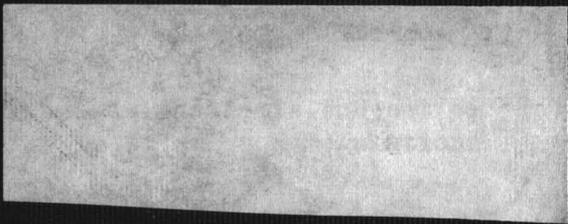


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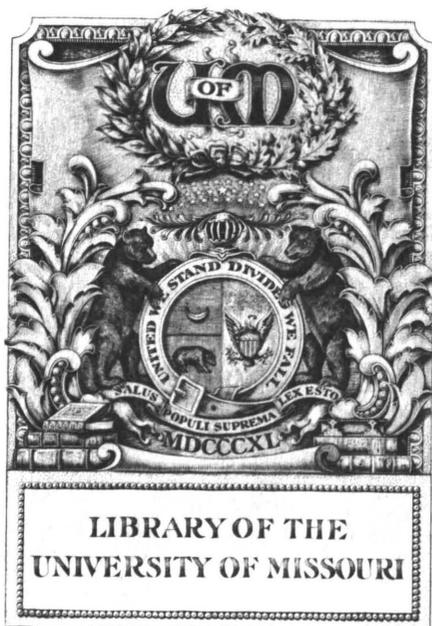


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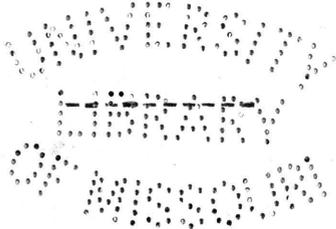




ELEMENTARY AGRICULTURE  
FOR  
CITY HIGH SCHOOLS.

by

*written*  
Martin L. Hayes, A. B.



SUBMITTED IN PARTIAL FULFILLMENT OF THE  
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## PREFACE.

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The experience of teaching Agriculture in the high school for a number of years has impressed upon the writer the need of a more careful selection of material than is indicated by most of the text books in Elementary Agriculture. From this broad and indefinite problem numerous problems arose. Wherein does agricultural subject-matter meet the needs of pupils? How do the needs of different pupils vary? How should the choice of subject-matter vary for different pupils?

The writer's problem assumed its present form in consequence of the inspiration gained from a course in "The Public School Curriculum" by Prof. J.L. Meriam. The guiding principles and the subject-matter have come from various sources. Valuable suggestions were received from members of the faculty in the College of Agriculture among whom may be mentioned especially Professors J.C. Whitten, M.F. Miller, E.J. Durand, and Leonard Haseman. However, to Professor Meriam is due the credit for guidance in the solution of the problem.

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## INTRODUCTION.

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Great progress has been made during the last decade in selecting agricultural material suited to the capabilities and needs of students of the public school. However, merely a beginning in the work has been made. The scope of agriculture is so broad that its subject-matter may be used with profit in every department of the educational system. It is the purpose of this study to select from the fund of agricultural information, subject-matter that is worth while for the students of the city high school.

The school system of the United States is a structure built from the top downward. Certain ideals of scholarship were accepted by colleges and universities of early times, and to prepare students for these institutions various academies and preparatory schools sprang up. The curricula of these preparatory schools were determined by the curricula of the colleges. The higher institutions were not connected with the free public schools since there were no public secondary schools and since the academies offered both elementary and secondary instruction. In time, this gap was bridged by the establishment of the free high school. Gradually the high school displaced the academy and assumed the work of preparing students for the colleges and universities. This made it possible for students to pass step by step from the kindergarten to the graduate school. Not only was the



curricula of the high school determined by the entrance requirements of the higher institutions, but the subject-matter of the elementary school was, in turn, chosen to meet the requirements of the high school. Thus there resulted an educational system thoroughly standardized in every grade and department.

It appears that the needs of only those students who are to continue into college have been considered or that what is best to prepare for college is best to prepare for life. It is known that a very small percent of the pupils of the public school remain to graduate from the high school and a much smaller percent enters a higher institution. It is being seriously questioned whether the training that prepares best for college prepares best for life if the student does not continue through to the college.

The high school has not kept pace with the higher institutions in serving the people. The higher institutions foresaw the need of a varied population and have endeavored to meet those needs. The great modern universities no longer prepare students directly for two or three vocations only but for varied occupations. The high school, on the other hand, continues to give, for the most part, only those subjects that are considered most important as a preparation for college work, and it is slow to provide subject-matter that deals more closely with the student's life and surroundings.



Too much of the life of the student is spent studying things that pertain to the future, and not enough in studying problems of the present; there is too much dealing with dead facts and not enough with live issues; there is too much of the abstract and not enough of the concrete. Often history is too much concerned with chronology and not enough with the industrial and social problems; mathematics is too much hypothetical and not enough real to the student; the sciences are too much pure science and not enough applied.

The mental discipline obtained from the formal high school course is excellent and the student is efficiently prepared for careful and accurate work in the college or university. However, the restless adolescent is full of life and vigor and demands contact with life and life activities. All around him he sees people doing things that have visible present worth. His restless being revolts at the monotony of school work and he longs to enter into the activities of life. This failure of the curriculum to satisfy the cravings of the normal youth is, no doubt, largely responsible for the elimination of the \*95 percent of the pupils before they reach the high school and the 80 percent of the remainder during the high school course. Various remedies have been suggested and all include work with more definite bearing on the life of the pupil. Many

\* A. Caswell Ellis, N.E.A., 1903, PP. 792-793.



educators consider the introduction of strictly vocational training the great need of the system.

It is not the purpose of this study to discuss the means of preventing withdrawals from school, but to suggest for high school students a line of work closely connected with the activities of life and yet not vocational in its purpose.

There was a time when the periodicals were full of discussions as to whether Agriculture should be taught in the high school. Practically no one at this time doubts that Agriculture deserves a place in the high school curriculum. However, Agriculture has entered the curriculum in response to a popular demand for vocational training. Text books have been written to furnish prospective farmers with the fundamental principles underlying the business of farming and with a brief manual in farm practice. The subject-matter is presented from the standpoint of one living on the farm and with the evident purpose of directing the activities of rural people so that better results will follow those activities. The manner in which the subject is taught would lead one to infer that the course is suitable for those only who live in the country or the smaller town, or are preparing for life in the country. The writer has a strong conviction that there are many experiences connected with rural life that may well be studied by any student of the



high school regardless of future study or occupation.

The time was when the agricultural conditions of the country were seriously studied by relatively few people. The problem of feeding the millions had not presented itself. Virgin soils were to be had for the asking and an abundance of food could be produced with little regard to the methods of farming. Little or no thought was given to the requirements of the future. The natural resources were wasted and the fertility of the soil was destroyed. The relation of Agriculture to the cost of living is regarded as of such importance today that people of city and country alike are studying the problems involved. The very active part the commercial clubs of the cities are taking in the county-farm-adviser movement is one of the many evidences of the interest that city people are taking in agricultural conditions. There is every reason to believe this interest will increase and the young people of the present will need to have a clearer understanding of agricultural problems than did their parents. Already one should know much of agricultural information if he would consider himself well informed. Every one in the "corn belt" should know something rather definite about corn. The fluctuations in the price of wheat and flour and the consequent influence upon the cost of living make desirable an understanding of the general principles of wheat growing and the conditions that limit the yield. Likewise, the advancing price of meat due to a shortage in supply makes it necessary for the well



informed to know something of the problems of beef and pork production, of the decrease in pasture lands, the increased price of land, and the ravages of hog cholera. So a plea for young people of town and country well-informed in the things that are so vitally connected with every day life as well as having information of the conditions of the past justifies agricultural training for students of city as well as of country.

Not only does such training give information that is very desirable under the existing social conditions, but much of the subject-matter dealt with in Agriculture is highly educational in a broad sense. It broadens the student's outlook and shows him law and order where before he saw chance and chaos; he sees nature teeming with life where before he saw only dead material; he sees the great realm of plant and animal life in a new light and henceforth he himself is not the same. The love and care of plants is a great means of civilization, especially so when he understands something of the intricacies of plant life and can foresee the plant's response to what is done to it. The boy or girl that trains a tree from the seed, and studiously and intelligently prunes, shapes, and fertilizes it, noting and endeavoring to foresee the response the tree makes to each process, has been engrossed in the task and has been made to have keener insight, broader sympathies, and higher ideals. Likewise, the



student who has seen how the thought of man through the processes of breeding and selection shapes and molds plants and animals into the myriads of types and forms to suit man's fancy, has gained an insight into life that is very desirable for the educated man or woman. Thus in countless ways the student is led to get a new vision of life and to appreciate the beauty, harmony, and possibility in the commonplace things of life.

A valuable result from a study of Agriculture is the comprehensive view it gives of the field of Science. Frequently the student of the high school approaches a science course with little or no idea of the nature of the work to be found. If the course is required, the student takes it because he wishes to graduate; if the course is elective, he elects it because others before him have studied the same subject. Likewise, where the high school student enters college or university he frequently knows nothing of the subject-matter of more than one science. Here, again, he chooses rather blindly from the courses offered. The science of Agriculture is based upon, and partakes of, so many sciences that the student learns to know what he may expect to find in each science. For instance, in his study of soil, the student touches upon in a rather important way the sciences of Geology, Physiography, Physics, Chemistry, and Bacteriology. In various other relations one or more



of these or other sciences are met. From a passing remark of the teacher, here and there, that more of this particular subject may be learned in Physics, or in Chemistry, or in Bacteriology, etc., the pupil gains a rather extensive classification of scientific knowledge. This very meager acquaintance with the subject-matter of the different sciences may serve to help the student find his natural interest or to find the field of Science that is most fascinating to him. It certainly will go far toward showing the interrelation of the different sciences and their practical application in every-day life. In fact, Agriculture might profitably be made the center or core of a course in elementary Science involving principles of various divisions of Science. Certain activities connected with rural life and considered of value in themselves might be selected for study. In acquiring a more thorough understanding of the activities under consideration the student could be led to master the science involved.

The study of Agriculture approaches Science from the proper viewpoint. There is the proper motive. The application is first and the science is incidental, whereas in the pure science frequently the law or principle is first and the application is incidental, if at all. Such an approach to scientific knowledge places Science in its proper relation, - a means to an end and not an end in itself.



While most educators strenuously advocate Agriculture for all students who are in anyway closely connected with rural environment, relatively few have recognized the desirability of such training for students of the city high school. The avidity with which city people read of the beauties of nature and the joy with which they anticipate a visit to the country give evidence of their interest in rural environment. Those who have the more intimate acquaintance with the real conditions of rural environment and activities appreciate all the more the opportunities to observe the herds of live stock, the fields of growing grain, and the various operations of farming. The inhabitant of the city is surrounded by artificiality on every hand. There is little to suggest the works of nature except an artificial attempt to copy nature. The rattle and clatter of the city and the glare of the electric lights become sickening in their monotony. One yearns to see the sunshine and enjoy a breath of country air, to wander over field and woodland, to smell the perfume of new-mown hay, and drink from the cold spring. The hords of people using the week-end excursions to the country towns, the numerous automobiles that speed over country roads, and the increasing demand for suburban homes, are expressions of the longing to break this monotony of the city. However, to many the common-place things of rural life and the ordinary operations of Agriculture are



not familiar. Much of the joy of the outing is missed because of the lack of understanding these farming operations and the scientific principles involved. With a fund of agricultural information upon which to draw and with minds quickened to an appreciation of the activities of rural life the boys and girls of the city will have higher ideals of recreation and will appreciate more than ever the visits to the country.

A very important consideration is the value of such training for an avocation. Nothing need be said in favor of agricultural training for one who wishes to use it for a vocation. No one will deny that the farmer of the future should be carefully trained in all that pertains to his calling. However, in our eagerness to have people trained for the definite work that is to be their vocation in life, we are apt to forget to prepare for an avocation - for the employment of the leisure moments. As the working hours of the day are diminished from time to time this provision for leisure becomes more and more important. Much of the information gained from this course can be put into practice on a limited scale in the city. For the man or woman employed in office or shop no more delightful avocation for the mornings and evenings of summer can be found than applying some of the principles suggested in such a course. Doubtless room will be limited, but much pleasure and training can be had from only a few square feet of ground. Where interest has



been aroused the study will be continued and the small plot of ground may serve as a laboratory in which to experiment and to investigate the particular phase of the work that is being pursued. Thus one phase after another may serve to lead one into the open air for exercise and pastime.

However, it is not the purpose to prepare merely for an avocation when the student has left school, however important that may be. There is the normal desire for activity in the youth that should be satisfied in school and at home. The student's leisure frequently proves a serious problem for parent and for teacher. The activities suggested, if properly presented, should appeal strongly to high school students, and should meet an urgent need in school and in home.

Numerous advantages might be enumerated as results to pupils in general and to the city pupils in particular from a course of instruction in Agriculture. Any one of these results might be selected as the purpose of the course offered and thus be used as a standard for selecting the content of the course. If the subject-matter is carefully judged by the purpose expressed, the same content will probably not be selected for any two of these results used as the purpose of the course. If the purpose is to give a general view of Science to enable pupils to elect scientific courses intelligently, the material selected will evidently be quite different from that selected for a course



intended to give information that can be applied on a city lot and in city environment in general. The text books in Elementary Agriculture, as in many other subjects, fail to give any specific purpose that has determined the selection of material. Frequently teachers offering courses in Agriculture have never thought about the real purpose of the course that is given. Perhaps the two purposes between which teachers and authors vacillate most are the cultural and the vocational. The cultural purpose itself is very indefinite and when it is combined with the vocational, practically no limitation can be put on the content of the course.

The purpose of the course the writer is to suggest is to give to the boys and girls of the city high school a \*proper appreciation of rural environment and activity. While appreciation of rural activities and their importance to the whole population, of the community life in its best form, of the advantages in the natural surroundings, and of the improved country home, is the result most to be desired from such a course, other very important results will be secured incidentally. Such a study will be highly liberalizing and will broaden the interests of the pupils. It will give him information considered important for well informed people in an agricultural nation to know and yet information that either is not included in the ordinary

\* Proper in the sense that it is suitable to young people living in the city and studying rural conditions because such conditions are interesting and pleasurable.



high school curriculum or is scattered through several courses one or more of which the pupil may not take. The study of scientific principles necessary for an understanding of rural activities will give a broad view of Science and aid pupils in intelligent choice of scientific courses. The proper motive for study will be present for the science will be incidental to the application. The course will tend to satisfy the normal desire of youth for activity and for contact with present problems and conditions, and the keen interest aroused will result in the use of most of the information on the city lot, and in a more wholesome and more profitable employment of the leisure hours.

In accordance with the purpose given above, this course is not intended to prepare for any other course that may follow, but it is considered worth while in itself. Since it is desirable that any pupil in the high school have the opportunity to elect the course, it is necessary that no preliminary course be required. Hence, such science is included as is necessary for an understanding of the subjects studied.

The problem, then, stated briefly, is to select from the experiences of rural life the content of a course of instruction providing a year's work that will give to pupils of the city high school a full appreciation of rural environment and activities, - work that will be liberalizing and avocational rather than vocational, that will be worth



while of itself and not preparatory to a more advanced course, and that will require no previous scientific training for an understanding of the course.

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PRESENT TEXT BOOKS IN  
ELEMENTARY AGRICULTURE.

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The writer has suggested that the text books in Elementary Agriculture have, for the most part, been prepared with the rural pupil in mind, and with indefinite purpose to guide in the selection of material. It is the purpose of this chapter to examine some of the texts in Agriculture in use in the public schools and comment upon their purpose as expressed in the preface, their content, their adaptability to the pupils for whom they are intended, and their adaptability as a text book for the course the writer is suggesting for students of the city high school.

The texts on the subject that are really adapted to high school use are relatively few. Commercial considerations have impelled authors to write their books for the rural schools and hence a large majority of the books are too elementary for a high school text. A few authors have tried to compromise between a high school and grade text and thus increase the sale for their books.

Ten text books have been selected from the texts in use in public schools. Both elementary and secondary texts are included in the list. It is thought that these texts are fairly representative of the texts offered to school book commissions for adoption. Of the counties of Missouri, sixty-five percent are using Burkett, Stevens and Hill, and thirty percent are using Goff and Mayne.\*

\*Sixty-Second Missouri Report of Public Schools 1911, pp 302-304



Perhaps Warren's text more than any other is used in the high schools of Missouri that are exempt from county adoption.

The percents given in the following table are based upon the number of pages given to the discussion of the different subjects. Manifestly, for those subjects requiring considerable laboratory and field work the percents are too low to indicate the time the class is expected to devote to the subjects, while for those requiring no laboratory or field work the percents are too high. The list of text books according to number is as follows:-

1. Wilkinson: Practical Agriculture.
2. Ferguson & Lewis: Elementary Principles of Agriculture.
3. Burkett, Stevens & Hill: Agriculture for Beginners.
4. Soule & Turpin: Agriculture.
5. Warren: Elements of Agriculture.
6. Upham: An Introduction to Agriculture.
7. Voorhees: First Principles of Agriculture.
8. Jackson & Daugherty: Agriculture through Laboratory & School Garden.
9. Goff & Mayne: First Principles of Agriculture.
10. Bessey- Bruner- Swezey: New Elementary Agriculture.



Contents of Texts.	Percentage of Pages.										Average.
	1	2	3	4	5	6	7	8	9	10	
Soil & Tillage	10	11	8	20	8	12	18	19	5	6	12
Fertilizers	3	14	-	4	11	6	32	10	4	-	8
Birds	-	3	2	2	-	4	-	-	-	9	2
Field Crops	10	-	19	15	16	7	8	5	1	6	9
Farm Machinery	-	2	1	2	-	-	-	-	-	-	7
Nature & Physiol.of Plants	4	21	17	15	4	13	-	-	20	19	11
Propagation & Pruning	3	7	4	1	6	11	-	15	4	-	5
Improvement of Plants	2	3	-	1	7	-	-	6	2	-	2
Plant Diseases	2	2	7	2	2	1	-	3	-	-	2
Weeds	1	-	3	2	1	3	-	-	11	-	2
Insects	2	8	9	5	4	3	-	12	2	25	7
Vegetable Gardening	3	-	6	2	1	2	-	-	-	-	1
Fruit Production	8	-	3	3	2	4	-	-	5	-	2
Landscape Gardening	4	2	5	1	-	2	-	10	3	-	3
Forestry	2	2	-	2	2	-	-	-	-	-	1
Road Building	3	4	-	1	-	2	-	-	-	-	1
Farm Improvement & Conveniences	5	-	2	-	2	-	-	-	-	-	1
Weather	-	-	-	-	-	-	-	-	-	13	1
Animal Husbandry	14	21	14	15	22	28	35	15	25	20	21
1. Animal Nutrition	3	3	1	4	5	5	17	5	3	2	5
2. Horses	1	3	3	1	5	4	1	-	2	5	2
3. Cattle	2	7	5	2	7	9	9	10	6	8	6
4. Hogs	1	2	1	1	1	2	1	-	2	3	1
5. Sheep	1	2	1	1	1	1	1	-	2	2	1
6. Poultry	1	4	1	2	2	3	-	-	3	-	1
7. Bees	1	-	1	1	-	1	-	-	3	-	1
8. Miscellaneous	4	-	1	3	1	3	6	-	4	-	2
Miscellaneous	14	-	-	7	12	2	7	5	20	2	7



Wilkinson does not indicate in his preface the purpose of the course he has suggested in "Practical Agriculture". He has not told us for what kind of students his course is adapted. However, he says that the "Committee on Industrial Education for the Country Communities" appointed by the National Educational Association in 1903 struck the keynote when it said, "there should be specific, definite, technical training fitting them (young people) for the activities of farm life!" He also suggests that pupils of the city schools should have instruction in Agriculture that they may have "a proper conception of the country and the opportunities they might enjoy there." He says, too, that the young people of the city should be made to realize that health, wealth and happiness are to be found in the country.

Perhaps we would be justified in inferring that his purpose, then, is to give country pupils "specific, definite, technical training fitting them for the activities of farm life," and to give city pupils a proper conception of the country and its opportunities of health, wealth and happiness. His object in having the young people of the city to appreciate the country seems to be to induce them to choose the country as their home. Perhaps the first part of the purpose has been accomplished by the time the student has finished the work outlined in the book. It is very doubtful whether the city pupil will gain any very definite



conception of the health, wealth, and happiness of the country from a perusal of the book. The thirteen pages on "Country Life Conveniences," comprising about three and one-half percent of the book are probably not sufficient to make any deep impressions upon city pupils.

It will be noted that the purpose here expressed resembles closely the purpose the writer has expressed in the previous chapter: namely, to give to pupils of the city a proper appreciation of rural environment and activities. However, the writer disclaims any desire to influence the student's choice of residence. It seems that no special effort has been made to give appreciation to either city or rural pupils.

The general organization of the book is open to severe criticism. A glance at the table of contents shows 353 pages divided into 45 chapters. Some of the chapters are as follows: Country Life and Farming, 3 pages; The History of Agriculture, 3 pages; The Soil, 5 pages; The Plant, 4 pages; Animal Fibers, 4 pages; Rotation of Crops, 4 pages; etc.

Perhaps the most severe criticism that may be offered is that the book is a very brief outline of an encyclopedia of Agriculture. The author says in his preface, "No attempt has been made to exhaust the various topics treated." While this is certainly true, it is also quite evident that an attempt has been made to suggest about all the topics available in each division. This



has led to errors in the relative importance of subject-matter. The orchard crops include apple, pear, peach, nectarine, plum, apricot, cherry, quince, olive, orange, lemon, lime, grapefruit, fig, dates, guava tree, mango, banana, pine-apple, persimmon and papaw. The question might well be raised: Would it not be better to study more in detail the production of a few of these fruits suited to the soil and climate of the locality? In the discussion, more space is given to the olive than to the pear, plum, cherry or quince. The lime is given more space than the lemon. Black pepper, vanilla and hops are each given almost as much space as grapes. The coffee berry is given two or three times as much space as either blackberries, raspberries, or strawberries. Garden vegetables, including lettuce, spinach, onion, celery, cabbage, asparagus, rhubarb, tomato, eggplant, cucumber, watermelon, muskmelon, pumpkin, squash, peas, beans, okra, and pepper are dismissed in six pages.

The manner in which the subject-matter is presented detracts from the desired effect. The descriptions seem to lack the charm that comes from a writer thoroughly permeated with the importance of his subject. The text seems like condensed encyclopedic information. The experiments are poorly planned and appear to be considered of secondary importance.



There is much information in the book that could be used in almost any course in Agriculture, but it is doubtful whether any conditions can be found in the public schools where it will be entirely satisfactory as a text. It will not be satisfactory to give boys and girls of the city high school a proper appreciation of rural environment and activities.

The authors, Ferguson and Lewis, give as the object of their text book the satisfying, "the natural interests of all children about the why of common farm conditions". This, they claim, is the first step in developing an intelligent theory which will guide practice. The object is very indefinite and almost any information concerning farm activities and conditions might be considered as tending to satisfy the interest in the whys. The authors' criticism on texts in Elementary Agriculture is that some are mere hand books dealing with the practical work of Agriculture, while others are only a series of short chapters on botany, chemistry, physics, zoology, meteorology, etc., without reference to application. The inference is that the text book offered avoids both of these extremes.

It is probably assumed that this book is to be used by rural children who are already acquainted with most all the conditions that surround farm life. Hence, the authors endeavor to give scientific information that will explain more or less fully the conditions. This leads



them to emphasize the principles of elementary botany since the answers of most of the whys about plant life will depend upon a knowledge of the form, physiology, structure, etc., of plants. To this phase of the work about 28 percent of the space has been given. The percent of space may be rather high for the purely botany work, but we must concede that an accurate knowledge of the general principles of plant life is necessary for an understanding of farm conditions. However, a question might arise whether it would be necessary to use 26 percent of the space in satisfying the natural interests in the whys of animal husbandry. Then, too, the whys of crop production, fruit production, vegetable gardening, and improvement of the home grounds have been disregarded.

Thus, we can see that the material of the text was selected largely without regard to the object expressed in the preface. The work on plants and soils seems very well selected, and would answer the purpose fairly well for the course that is to be recommended for city pupils. The work, as a whole, is well written and gives valuable information on the topics treated. It is, perhaps, too elementary for high school classes but might easily be supplemented. It would not fulfill the requirements of a text that is to give to city pupils an appreciation of rural environment and activities.

The authors, Burkett, Stevens and Hill, offer in their preface no definite purpose that has guided them in the selection of material. They intimate, however, that the purpose



of the teaching of Agriculture is to train youth for the occupation of farming. It may be inferred from the preface that the book is intended for grammar grade pupils that live on the farm or are expected to live on the farm. It is stated that this training will make the pupil's life-work profitable and delightful. The life-work is to be made profitable by a study of the "great laws upon which Agriculture is based." It is to be made delightful by "learning to know and love nature." The material selected should furnish information that can be used with profit or information that will give appreciation and pleasure.

Judged by these standards the subject-matter presented is justifiable. A glance at the table of comparison of percents (page 18) shows that the authors have discussed most all the subjects ordinarily included in such a book. We may notice, too, that none of the divisions stand out very prominently. Field crops, botany, and animal husbandry occupy the relatively high percent of space.

The book is very simple in treatment and perhaps there would be a tendency for students of sixth, seventh, and eighth grade to resent the frequent reference to the intellectual weakness of the student. While much of the book is written as though it were intended for a fourth or fifth grade pupil, the amount of material is as much as, or more than, an eighth grade pupil can do in one year. This attempt at simplicity, however, is not a bad fault.

While the purpose, as given by the authors, is quite broad it seems that the vocational has been emphasized most in the writing of the book. The text proves fairly



satisfactory for rural pupils for whom it is intended. As noted above, 65 percent of the counties of Missouri have adopted it as the required text. Because of its elementary nature and its lack of emphasis on the things that are of most worth in giving city pupils an appreciation of rural life it would not be suitable as a text for the course desired.

Soule and Turpin have stated the aim of their book as follows: "So to state the scientific facts and principles which underlie the processes of Agriculture that they will be intelligible and interesting to young people." With such an aim the authors have method rather than subject-matter as their chief problem. Such an aim is easy to accomplish, for most of the fundamental principles may be stated as facts in very simple language and it is relatively easy to arouse interest in young people in agricultural subject-matter. The book is written in a very simple style, and it may be assumed that the authors have accomplished their aim.

Soil and its general management and improvement are regarded as of chief importance by the authors, since about one-fourth the space and, doubtless, more than one-fourth the time are given to this phase of the work. Field crops, botany and animal husbandry occupy about an equal amount of space (15 percent.) Those things that influence the life of the farmer, - the conditions of the home and home grounds, the conveniences and improvements, the community life, - are almost wholly disregarded. The experiments



that are suggested are not carefully selected for school work. Experiments that require a number of years on the farm are mentioned along side of experiments for the school room. Perhaps the text treats of too many subjects to do justice to very many of them. It is evident that this text is not suited to give city pupils a proper appreciation of rural conditions and activities.

Warren's text, "Elements of Agriculture", has the distinction of being one of very few books that really deserve to be considered high school texts in Agriculture. Bailey says in the preface that the purpose of the book is "to make the teaching of Agriculture in the existing high schools comparable in extent and thoroughness with the teaching of physics, mathematics, history, and literature." Such a purpose fails entirely in indicating the content to be selected. The book seems to be an expression of resentment against the easy courses sometimes given in the formal high school as options for those pupils who object to Latin or Greek.

The author himself does not say what principle has guided him in selecting the material in the book. He discusses the purpose in teaching Agriculture, and perhaps we may infer that the purpose of his text is the same. This, he says, is not to make farmers or farmers' wives primarily, but the teaching of Agriculture is the "best means of training a student's mind." It is evident that much of the material presented might have been omitted and <sup>more emphasis</sup> much put on other material, and still the primary purpose remain un-



changed.

From the standpoint of style and method, the book is a success. It discusses the various subjects in such a manner as to elicit the respect of adolescents and adults alike. It approaches the topics in a straight forward, business-like manner and does not indulge in the puerile sentimentalities frequently found in texts in Elementary Agriculture. The experiments that are suggested are carefully chosen and constitute a valuable part of the book. Ordinarily, the questions at the end of the chapters in the Elementary Agricultures are rather disgusting because of the stereotyped form of most of them. It is not so in this text. The questions and problems are highly suggestive and lead the pupils to apply the information obtained in the chapter.

Regardless of the purpose stated in the preface, the book seems to emphasize the vocational side of the subject. All the way through there appears to be a purpose to guide inhabitants of the country into better methods of farming and better management of the farm. The work outlined in soil and fertilizers is especially good for elementary work intended for vocational training, This occupies about one-fifth of the space of the book. Where allowance is made for the numerous experiments that are suggested, from thirty to forty percent of the time of the class must be given to these two closely related subjects. This might be taken to indicate the emphasis placed upon



the vocational side, since the fertility of the soil is so very important in the practice of farming. Crop production, also, is treated rather fully, especially corn. Here, again, it appears to be farmer boys for whom the book was written.

The author has assumed that the study of botany has preceded the study of Agriculture in the high school. Therefore he has given very little attention to the form and physiology of plants. Such an assumption is hardly justifiable. The improvement of the home grounds and home life, and the enrichment of community life have been disregarded. The garden has been dismissed in a few paragraphs. The author might object that these topics should be discussed fully in other courses in the school, and that time does not permit their being included in this course. However, the writer has found in using the text in high school classes that considerably more work can be done by a class of mature high school pupils than is provided for in the text. Much supplementary work is needed. On the whole, the book greatly surpasses a very large majority of the books on the subject. It is a valuable book for rural classes, and is perhaps the best book available for the course the writer is suggesting.

Upham says ~~in~~ his book, "An Introduction to Agriculture," is intended for seventh and eighth grade pupils. It is not intended as a guide to farming, but it is an effort to "touch those matters which would be most useful to pupils in our rural schools, and especially to give the



underlying theory for many farm processes and practices."

Such a purpose proves to be very indefinite when it is used to determine the content of the course. Opinions differ widely as to what will be included in "those matters which would be most useful to pupils." In fact, the term "useful" may be interpreted in the narrow sense of "practical" or it may be given a more general interpretation. The text presents an extensive outline of agricultural material and in many parts the discussion is so meager and general that no very definite idea is left with the pupil.

Perhaps the greatest weakness of the book is the method of presenting the subject-matter. The text does not suggest enough activity for the pupils. Instead of having the pupils observe and draw conclusions, the author makes the course too bookish. Too little attention, perhaps, is given to the things that influence the life of the farmer. The text is too elementary for use in high schools and it will probably be found better to change the emphasis for city pupils.

Vorhees gives as the purpose of his book, "First Principles of Agriculture," an effort "to state in logical order the elementary principles of scientific agriculture and to show the relation of these scientific facts to farm practice." The book is intended for rural pupils. In some way the purpose has led the author to devote fifty percent of the space of the book to soils and fertilizers, and about eighteen percent to animal nutrition. This leaves a small amount of the book in which to discuss other phases of the subject. About eight percent is devoted to field



crops, nine percent to dairying, and six percent to animal breeding, and the rest is disregarded.

When we consider the great emphasis placed upon soils, fertilizers, and feeds we are forced to believe that the author is viewing the course through the eyes of an agricultural chemist. It is natural, perhaps, for a man who is an authority on fertilizers to devote 32 percent of a text book in Elementary Agriculture to the subject, but there are, perhaps, few people who will concede that the subject has that relative importance for the average eighth grade pupil.

The author has, probably, accomplished the purpose stated in the preface. But such purpose fails to guide in the choice of subject-matter. No laboratory work is provided. The book seems poorly adapted as a text in any class.

The text, "Agriculture Through the Laboratory & School Garden," by Jackson and Daugherty is unique in that it represents the work done by the authors in their classes. The purpose of the book as expressed by the authors is "that the classes in Agriculture of the State Normal School of Kirksville, Missouri, might have in one book the directions for all laboratory experiments and exercises, and such information as would enable them to understand the results of these experiments." Such a purpose gives us no intimation of what decides the choice of material in the course.

The title of the book is significant. When one has



read the book one feels that the farm has been left out. The book is too much an assemblage of more or less disconnected chapters with little regard to the practical application on the farm. The view of Agriculture as set forth in the book seems much too narrow, especially, so if it is designed to prepare teachers of the subject for the public schools .

Thirty percent of the space is given to soil and fertilizers. When the experiments suggested are considered, one may conclude that at least forty percent of the time is given to this part of the work. Animal husbandry occupies a very minor place in the course. A few pages are devoted to feeding, and a chapter on dairying has been donated by Professor Eckles. Plant propagation, insects, and landscape gardening are treated rather fully, while vegetable gardening, fruit production, farm improvements, and the physiology of plants are disregarded.

One cannot but wonder what has guided the authors in the selection of the content of the course. It is generally understood that the primary function of normal schools is to prepare teachers. If this content is designed for the classes of the Normal School, are we to infer that a teacher of Agriculture in the public school need not know anything further of the great live stock industry of the country, and of specific types and grades of live stock? Was it that in teachers or equipment the Normal School was unprepared to give such work to the class, and hence, it was not



put in the book?

We must concede that the authors realized the purpose set forth in the preface of the book. An abundance of laboratory and field work is furnished and the experiments are carefully planned. The text, too, is of secondary grade. Perhaps the most severe criticism on the book as a text for students of rural problems is the failure to discuss clearly the real conditions on the farm, and the unbalanced nature of the book.

The purpose of Goff and Mayne's text, "First Principles of Agriculture", is to furnish to pupils of the upper grades of the grammar school a text book that will "cover pretty thoroughly the numerous departments of our complex agriculture" and yet "not be too difficult for the boys and girls in the rural school." The author explains that much has been omitted that might seem essential, but the limitations to the size of the book necessitated omissions. The book is written especially for rural pupils and assumes that the pupil knows the general conditions of rural life.

An examination of the contents of the book shows that one-fourth has been given over to animal husbandry and one-fifth to a study of plants in general. Of the other subjects discussed weeds have the most space (11 percent). Field crops, vegetable gardening and community life are practically disregarded.

The text shows great care in adapting the agricultural material to the understanding of young pupils.



Simple experiments are suggested and discussed in such a way as to be very helpful to the inexperienced teacher. State Superintendent Evans' report for 1912 shows that thirty percent of the counties of Missouri have Goff and Mayne's text as the required text in Agriculture.

The book is too elementary for eighth grade pupils, but proves very satisfactory for sixth grade rural pupils. The authors have accomplished the purpose given. The main emphasis seems to be put on the vocational side of the subject.

"New Elementary Agriculture" is a composite book, made up of contributions from five different men. State Superintendent Fowler of Nebraska says that the book has been prepared in answer to a demand resultant from a state law requiring teachers to pass an examination in the elements of agriculture.

If such is the purpose of the book, it fails utterly in its purpose. A teacher who has no broader view of Agriculture than is presented in the text would be poorly prepared to pass a satisfactory examination and much more poorly prepared to teach the subject. As an after thought a few "exercises" are given in the revised edition to enable the book to be used as a text to a better advantage.

It must be said for the text that it is written in a delightful style; it reads almost like a story book. It is rather remarkable that such a composite book is so



uniform in style. However, this very style seems to indicate that the authors are thinking of the reader in his room reading about agricultural environment, rather than considering him surrounded with agricultural material in field and laboratory and endeavoring to understand the phenomena observed.

Perhaps the emphasis placed on certain phases of the subject might be seriously questioned. Why should twenty-five percent of the space be put on insects while only six percent is given to a study of soil and its general management? Why should thirteen percent be given to weather conditions and only six percent to field crops? This unbalanced condition of the text is probably due to its composite nature. It will be noted, also, that many topics that are ordinarily regarded as important are omitted entirely.

This text would not meet the needs of the ordinary rural school and much less would it be suitable for the city high school.

A comparison of the ten texts referred to shows a wide variation in the selection of material and the emphasis placed on each phase of the subject as shown by the number of pages devoted to it. Most of the texts attempt to give a general notion of practically the whole field of Agriculture. A few books (Voorhees, Besser-Bruner-Swezey, Jackson and Daugherty) are rather notable exceptions.



The percent of books devoted to the general nature and management of the soil varies from six to fifty. The space for the study of form and physiology of plants varies from nothing to twenty percent. Propagation and pruning of plants occupies nearly sixteen percent in some, while in others it is disregarded. Animal nutrition varies from one and one-half percent to seventeen.

We have found that, in general, the text books in Elementary Agriculture have no very definite purpose. They are not designed for any particular class of pupils. The cultural and the vocational aim is claimed for almost every text. It is true that almost any course in Agriculture that might be given would have a vocational and a cultural value, but the importance of either of these values to a particular pupil or class of pupils will determine the choice of subject-matter best fitted to give that particular value. In the smaller schools where the limited number of teachers requires a less careful classification of pupils, it may be desirable to select a content that will be a compromise between the cultural and the vocational. Thus both classes of pupils may profit by the instruction. In the city schools where classes are large and must be divided into sections, it is possible to classify more thoroughly and select the content in accordance with a more definite purpose.

Perhaps, for financial reasons there will never be published texts that are so carefully planned for a



particular class of pupils. Then, too, it will probably never be expedient for a teacher to follow any text book slavishly. Thus it becomes necessary for each teacher to determine the purpose of the course and to select the content according to this purpose regardless of text books.

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CONTENT OF THE COURSE.

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It has been found that the texts in Elementary Agriculture are poor guides in the selection of the content of a course designed to give to city pupils a full appreciation of rural environment and activities. It is the purpose of this chapter to suggest in a brief outline the nature and sequence of a course according to purposes discussed above.

It must be assumed that city pupils have no very definite and accurate ideas of farm conditions. Much that is every-day experience to rural pupils is unfamiliar to city pupils. It will be necessary for city pupils to learn farm conditions as well as the reasons. Much of the subject-matter must resemble that ordinarily given, since farm activities and problems should be understood if appreciation is to be realized. The emphasis, however, and the point of view will be different from those found in any of the text books. Farm life is the important consideration in the course. Hence the writer recommends that fully one-fourth the time be put on the discussion of the home life and community life in the country. Other subject-matter will be studied in so far as it contributes to an appreciation of rural life and its environment.

All that can be hoped for in the outline is to suggest the general scope, sequence, and point of view of the course. The content will be discussed in the following chapter.



## STUDY OF INSECTS.

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### 1. Importance of Insects:-

Relative number; economic importance; insects as carriers of disease: fly, mosquito, Texas fever tick, etc.; insects as pollinators; useful insect products.

### 2. Form, Physiology and Life History of Insects.

### 3. Natural Agents Tending to Control Insects:-

Parasitism; birds; toads; frogs; diseases.

### 4. Method of Feeding vs. Method of Control.

### 5. Classification of Insects:-

Straight-winged, half-winged, two-winged, etc.

### 6. Harmful Insects of the Orchard:-

Codling-moth, borers, fall webworm, curculio, etc.; life history, damage, control.

### 7. Harmful Insects of the Field:-

Hessian fly, chinch bug, wire worms, grasshoppers, etc.; life history, damage, control.

### 8. Harmful Insects of the Garden:-

Cabbage butterfly, striped cucumber beetle; squash bug, Colorado potato beetle, etc.; life history, damage, control.

### 9. Harmful Insects of Shade Trees:-

Tussock moth, gipsy moth, brown-tailed moth, tent caterpillar, bagworm, etc.; control.

### 10. Insects Affecting Live Stock:-

Bee flies, horn flies, etc.; control.



### 11. Useful Insects:-

Honey bees, bumble bees, wasps,  
dragon flies, lace-wig flies, lady  
birds, etc.; work done.

### Laboratory and Field Work:-

1. Identify insects in the field. Collect and preserve specimens for school collection.
2. Use locust, butterfly, and a bug to study form and physiology of insects.
3. Rear moth or butterfly from egg or from larva.

### References:-

1. Bureau of Entomology, Circular 32: Larger Apple Tree Borer.
2. Bureau of Entomology, Circular 124: San Jose Scale & its Control.
3. Bureau of Entomology, Circular 71: House Flies.
4. Bureau of Entomology, Circular 87 : Colorado Potato Beetle.
5. Bureau of Entomology, Circular 80 : Codling Moth in the Ozarks.
6. Bureau of Entomology, Circular 113: The Chinch Bug.
7. Comstock; Insect Life.
8. Division of Entomology, Bulletin 3 (New Series): San Jose Scale.



9. Division of Entomology, Bulletin 16, (New Series):  
Hessian Fly.
10. Division of Entomology, Bulletin 15, (New Series):  
Chinch Bug.
11. Farmers' Bulletin 99:Three Insect Enemies of  
Shade Trees.
12. Farmers' Bulletin 54:Some Common Birds in their  
Relation to Agriculture.
13. Farmers' Bulletin 132:Insect Enemies of Growing Wheat.
14. Farmers' Bulletin 155:How Insects Affect Health in  
Rural Districts.
15. Farmers' Bulletin 450:Some Facts About Malaria.
16. Kellogg:American Insects.
17. Ohio, Bulletin 194: More Important Insects  
Affecting Ohio Shade Trees.
18. Semper: Injurious Insects.
19. Smith: Economic Entomology.



## STUDY OF WEEDS.

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### 1. Nature of Weeds:-

Definition; origin of "bad"weeds: adaptation to unfavorable environment; how individual weeds have become troublesome by adaptation; why so few native "bad" weeds.

### 2. Importance of Weeds:-

Nature's use of weeds; relation of weeds to cultivated crops; weeds as medicine; why weeds should be suppressed; relationship between weeds and cultivated/plants; example of Kale, Brussel's sprout, Kohl-rabi, ruta-baga and cauliflower from a European weed; opportunity for improvement.

### 3. Control of Weeds:-

Kinds of weeds; methods of propagation and dispersal; importance of purity of seed; methods of controlling annuals, biennials, perennials.

### 4. Method of Classifying Plants:-

Families, genera, species, varieties.

### 5. Study of Individual Weeds:-

Relationship; description; origin and spread; means of control.

### Laboratory and Field Work:-

Identify 40-50 weeds in the field. Study more in detail the form and habit of 10-15 "bad" weeds. Collect weed seed and prepare for laboratory



collection. Examine commercial seeds for impurities.

References:-

1. Farmers' Bulletin 306: Dodder in Relation to Farm Seeds.
2. Farmers' Bulletin 188: Weeds Used in Medicine.
3. Farmers' Bulletin 86: Thirty Poisonous Plants.
4. Farmers' Bulletin 28: Weeds and How to Kill them.
5. Gray's Manual of Botany.
6. Michigan Bulletin 260: Seeds of Michigan Weeds.
7. Ohio Bulletin 175: Ohio Weed Manual.
8. Shaw: Weeds and How to Eradicate Them.



STRUCTURE AND PHYSIOLOGY OF PLANTS.

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1. Study of Seed Structure:- (Exercises 1,2,3).  
Seed coats; cotyledons; plumule; stored food;  
relation of stored food to economic value of seed.
2. Germination of Seeds:- (Exercises 4,5,6,7.)  
Nature of germination; compare germination with  
decay; conditions necessary for storage of seed;  
conditions necessary for germination; how control  
conditions; variation of degree of warmth required;  
relation to time of planting.
3. How Plants Come Up:- (Exercises 8,9,10)/  
Disposal of cotyledons; effect of soil condition on  
rising stem; effect of depth of planting; natural  
transplanting.
4. Study of Plant Roots:- (Exercise 11).  
Fleshy roots; fibrous roots; tap roots; structure of  
root; purpose; advantages of each type.
5. Study of Stem:- (Exercise 12).  
Purpose; kinds; structure; position of buds; leaf  
scars; rings of length growth; annual rings of growth;  
underground stems; storage of food in stems; plant's  
use of stored food.
6. Study of Buds:- (Exercise 13).  
Nature; function; kinds; characteristics.
7. Study of Leaves:- (Exercises 14,15,16,17).  
Form; relation to light; functions; conditions for  
starch formation; location and function of stomata;



effect of defoliating plants.

8. Study of Flowers:→ (Exercise 18).

Purpose of flowers; parts and function of each; nature of various flowers, as corn, squash, oak, willow; pollination; methods of securing pollination; nature of seed, embryo, fruit.

9. Study of Plant Feeding:- (Exercises 19,20,21,22).

Cellular struction of plants; nature of root hairs; osmosis; soil solution; root pressure; turgor; rise of sap; selective absorpction; assimilation; elaborated sap; course of sap; method of "deadening" a tree; effect of "ringing" fruit trees.

Laboratory Work:-

1. Identification of various seeds of field and garden.
2. Study of seed structure using corn, beans, peas, squash.
3. Test for stored food using iodine for starch, Millon's reagent for protein, osmic acid (1%) for fat.
4. Experiment to show need of water for seeds to germinate.
5. Experiment to show need of air for seeds to germinate.
6. Experiment to show need of warmth for seeds to germinate.
7. Compare different seeds as oats, wheat, radish, lettuce, squash, etc.
8. Make germination tests of corn clover, etc.,
9. Experiment to show how different plants as corn, peas, beans, oats, squash, etc., come up.



10. Experiment to show the use plants make of cotyledons.
11. Experiment to show the effect of depth of planting.
12. Examination of fleshy-rooted plants, as turnip, beet, radish, sweet potato, etc. Examination of fibrous roots as of wheat. Examination of tap roots, as dandelion, horse nettle, clover, etc. Experiment to determine the course of moisture upward.
13. Study stems of corn and various trees to note structure of stem, method of growth, etc.
14. Identify fruit buds and leaf buds on fruit trees.
15. Experiment to show transformation in leaves.
16. Experiment to show oxygen is given off.
17. Examination of stomata.
18. Experiments to show conditions of starch formation.
19. Examination of parts of a flower.
20. Experiment to show diffusion.
21. Examination of plant cell, as root hair, *Spyrogyra*, *Elodea*, etc.
22. Experiment to show osmosis.
23. Experiment to show course of sap up the stem.

References:-

Any standard texts.



## SOIL.

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## 1. Soil a Heritage to be Transmitted:-

Importance of conservation; how soil deteriorates; example of abused soils: tobacco and cotton regions; example of old soils well maintained: China, Germany, France.

## 2. Complex Nature of Soil:-

Mineral compounds, organic matter, water, microscopic plants and animals, decomposition products; soil and subsoil.

## 3. Origin of Soil:- (Exercise 1).

Work of air, water, weather, glaciers, wind, plants, animals.

## 4. Texture and Structure of Soils:- (Exercises 2,3,4,5).

Sand, loam, clay; variation in size of particles; effect of stirring soils when wet; how restore granular structure; "light" vs. "heavy" soils .

## 5. Relation of Soil to Water:- (Exercises 6,7,8,9,10).

Function of soil water; sources; forms of water in soil; power to retain water; power to absorb rainfall; power to pump water from below; obstructions to capillarity; conservation of moisture; underdrainage.

## 6. Soil Fertility:-

Plant foods in soil and their sources; available vs. unavailable; relation of water, air, size of soil particles, temperature and organic matter to



soil fertility; plant foods most often lacking; how supplied; importance of legumes; nitrification; crop rotation and fertility; toxicity of soils; use of lime on soils; diversified farming and soil fertility.

#### 7. Tillage of Soil:-

Purposes of tillage; tillage tools; relation of tillage to air, moisture, organic matter, structure, temperature, and plant food.

#### 8. Irrigation.

#### Laboratory and Field Work.

1. A field trip to note evidences of soil formation.
2. Examination of characteristics of sand, loam, clay.
3. Thoroughly mix sample of soil with water in tall glass cylinder and allow to settle and note separation of particles according to size.
4. Stir samples of sand, loam, and clay with water to a stiff dough, mold into balls, and dry in sun or in oven.
5. Try alternate wetting and drying the clay mud ball; try 1% of lime in mud ball; try freezing mud ball.
6. Compare power of sand, clay, and leaf mold to retain moisture by saturating with water the same weight of each and determining increase in weight.
7. Percolation experiment with sand, loam, clay.
8. Capillarity experiment with sand, loam, clay.
9. Use clods and chaff to obstruct capillarity.
10. Test efficiency of dust mulch in conserving moisture.



References:

1. Farmers' Bulletin, No. 266: Management of Soils to Conserve Moisture.
2. Farmers' Bulletin, No. 257: Soil Fertility.
3. Farmers' Bulletin, No. 192: Barnyard Manure.
4. Farmers' Bulletin, No. 77: Liming of Soils.
5. Farmers' Bulletin, No. 44: Commercial Fertilizer.
6. Farmers' Bulletin, No. 278: Leguminous Crops.
7. Fletcher: Soils.
8. King: The Soil.
9. Lipman: Bacteria in Relation to Country Life.
10. Missouri, Circular No. 38: The Principles of Maintaining Soil Fertility.
11. Ohio, Bulletins, No. 159 & 206: The Maintenance of Fertility.
12. Snyder: Soils and Fertilizers.
13. Vivian: First Principles of Soil Fertility.



## FIELD CROPS.

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### 1. Corn:

#### (1) The Corn Crop:-

Climatic conditions required; countries adapted to the crop; "Corn belt"; importance of the crop; types of corn.

#### (2) Corn Production:-

Soil best adapted for corn; preparation of soil; growing season; planting; tillage; harvesting; insect pests and their control.

#### (3) Corn Products and Uses:-

Stover; ears; silage; meal; hominy; breakfast foods; paper; pipes; pith; alcohol and whiskey; corn oil, corn oil cake, rubber, gluten feeds, bran; starch, glucose, gum.

#### (4) History and Improvement of Corn:-

Origin and early cultivation; means of improvement; flowers of corn; characteristics of desirable type of ears and plants; method of seed selection; germination tests.

### 2. Wheat:

#### (1) The Wheat Crop:-

Importance; distribution; soils and climate best suited; wheat ranches of West.

#### (2) Wheat Production:-

Growing season; preparation of seed bed; har-



vesting; insects and diseases.

(3) Wheat Products.

(4) History and Improvement.

3. Other Cereals:-

Oats, rye, barley.

4. Hay and Forage Crops:-

(1) Legumes; clover, alfalfa, cowpeas; nature and importance.

(2) Grasses: timothy, bluegrass, red top, etc.

5. Cotton:-

Importance of the crop; distribution; requirements of climate; method of production; harvesting; insect pests; uses.

Laboratory Work:-

Identify seeds of field crops. Germinate seeds and identify young plants. Observe mature plants in school collection. Compare excellent ears of corn with mediocre.

References:-

1. Farmers' Bulletin 253: Germination of Seed Corn.
2. Farmers' Bulletin 409: School Lessons on Corn.
3. Farmers' Bulletin 415: Seed Corn.
4. Farmers' Bulletin 303: Corn-Harvesting Machinery.
5. Farmers' Bulletin 313: Harvesting and Storing Corn.



6. Farmers' Bulletin 318: Cowpeas.
7. Farmers' Bulletin 215: Alfalfa Growing.
8. Farmers' Bulletin 414: Corn Cultivation.
9. Farmers' Bulletin 424: Oats: Growing the Crop.
10. Hunt: The Cereals in America.
11. Hunt: Forage and Fiber Crops in America.
12. Kansas, Bulletin 175: Grasses.
13. Kansas, Bulletin 176: How to Grow Wheat in  
Kansas.
14. Missouri, Circular 50: Selection of Corn for  
Seed and for Show.
15. Ohio, Bulletin 225: Farm Grasses of Ohio.
16. Orange Judd Company: The Book of Corn.
17. Purdue, Bulletin 110: Corn Improvement.



## ANIMAL HUSBANDRY.

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### 1. Livestock Industry:-

Importance of animals on the farm; extent of the industry; livestock as an investment; fascination of stock raising.

### 2. Improvement of Animals:-

Origin of breeds; heredity; some causes of variation; natural and artificial selection; significance of pedigrees; examples of striking improvement; sports.

### 3. Animal Nutrition:-

Animal's need of food; composition and functions of feed; kinds of feeds; processes of nutrition; factors influencing digestibility of feed; compounding of rations.

### 4. Horses:-

Status of the horse; types of horses; farm horses; characteristics of roadster, coach, and draft horses; most important breeds; care and feeding of the horse; training of the horse; some famous horses; history.

### 5. Mules:-

Nature; desirable characteristics; advantages; uses; distribution of industry; history.

### 6. Cattle:-

#### (1) Beef Industry:-

Cattle ranches of the West; life of the cowboy; passing of range land; influence on beef industry; cattle raising on high-priced land; best type of beef cattle; most important breeds.



5. (2) Dairy Industry:-(Exercises 2,3,4,5,6,7).

Importance of the industry; improvement of dairy cattle; dairying as an occupation; dairy type; important breeds; nature of milk secretion; factors influencing composition and amount of milk; souring of milk; separation of cream; principles of Babcock test; butter-making; commercial forms of milk; milk as a carrier of disease germs; care and feeding of dairy cows.

7. Hogs:-

Importance of swine industry; hogs for profit; types of hogs; desirable conformation; important breeds; hog cholera and its control; history of hogs.

8. Sheep:-

Distribution of sheep; sheep-raising on the range; shearing and marketing wool; competition in wool; effect of cotton industry on wool; types and breeds best suited for wool production; sheep on the farm; mutton type; drawbacks to sheep-raising; history of sheep.

9. Poultry:- (Exercises 8,9,10,11.)

Importance of poultry industry; importance of poultry on the farm; types and breeds; history; improvement of flock; care and feeding; nature of egg; incubation and brooding; care of eggs for market; storage of eggs.

Laboratory and Field Work:-

1. Field trip to observe types and breeds of livestock.



2. Test for butter fat by Babcock test.
3. Compare keeping qualities of pasteurized and unpasteurized milk.
4. Compare relative number of bacteria in certified milk, pasteurized milk, and milk bought on the street.  
(Performed by instructor.)
5. Microscopic examination of some common bacteria, as *B. subtilis*.
6. Microscopic examination of fat globules.
7. Household tests for oleomargarine.
8. Trip to poultry farm.
9. Candling and examining market condition of eggs.
10. Examination of uncooked egg and hard-boiled egg.
11. Use liquid glass to store eggs.

References:-

1. Bureau of Animal Industry, Circular 153: Dissimination of Disease by Dairy Products & Methods for Prevention.
2. Bureau of Animal Industry, Circular 63: A Review of Some Experimental Work in Pig Feeding.
3. Bureau of Animal Industry, Bulletin 141: Improvement of Farm Egg.
4. Craig: Judging Live Stock.
5. Cornell, Bulletin 282: Seven Methods of Feeding Young Chicks.
6. Cyclopedia of American Agriculture.
7. Sheep Feeding and Farm Management.



8. Eckles: Dairy Cattle and Milk Production.
9. Farmers' Bulletin 22: The Feeding of Farm Animals.
10. Farmers' Bulletin 71: Essentials in Beef Production.
11. Farmers' Bulletin 233: Beef vs. Dairy Types for Beef.
12. Farmers' Bulletin 106: Breeds of Dairy Cattle.
13. Farmers' Bulletin 29: Souring of Milk and Other Changes in Milk Products.
14. Farmers' Bulletin 63: Care of Milk on the Farm.
15. Farmers' Bulletin 74: Milk as a Food.
16. Farmers' Bulletin 131: Household Tests for the Detection of Oleomargarine and Renovated Butter.
17. Farmers' Bulletin 413: Care of Milk and Its Use in the Home.
18. Farmers' Bulletin 490: Computations of Dairy Rations.
19. Farmers' Bulletin 96: Raising Sheep for Mutton.
20. Farmers' Bulletin 128: Eggs & Their Use as Food.
21. Farmers' Bulletin 41: Fowls: Care and Feeding.
22. Farmers' Bulletin 51: Standard Varieties of Chickens.
23. Farmers' Bulletin 236: Incubation and Incubators.
24. Farmers' Bulletin 452: Capons and Caponizing.
25. Farmers' Bulletin 287: Poultry Management.
26. Henry: Feeds and Feeding.
27. Illinois, Circular 152: Feeding Dairy Cows.
28. Illinois, Circular 26: Food Requirements of Growing and Fattening Swine.
29. Jordan: The Feeding of Animals.
30. Kansas, Bulletin 163: Hog Cholera and Vaccination.



31. Missouri, Circular 44: Feeding for Milk Production.
32. Plumb: Types and Breeds of Farm Animals.
33. Purdue, Bulletin 145: Testing Cream for Butterfat.
34. Pennsylvania State College, Bulletin 114: Computation of Dairy Rations.
35. Roberts: The Horse.
36. Robinson: First Lessons in Poultry Keeping.
37. Robinson: Principles and Practice of Poultry Culture.
38. Smith: Veterinary Physiology.
39. Van Syke: Modern Methods of Testing Milk and Milk Products.
40. Wing: Sheep Farming in America.
41. Wisconsin, Bulletin 151: Condimental Stock Foods.



## PROPAGATION OF PLANTS.

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### 1. By Seedage:-

Origin and nature of seed; plants that rarely produce seed; plants that do not "come true"; bud variation; desirability of other means of propagation.

### 2. By Bud:-

Nature of bud; value in reproducing parent.

### 3. Methods of Propagation by Bud:-

(1) Root tips. (Exercise 1.)

(2) Bulbs and Corms. (Exercise 2.)

(3) Runners or stolons. (Exercise 3)

(4) Layering

(5) Cuttings:-

Kinds; length; care of cuttings; propagating soil; bottom heat; propagating ovens; origin of roots and leaves; plants propagated by cuttings. (Exercise 4)

(6) Graftage:-

Scion and stock; principles involved; kinds of grafting; budding; uses of graftage; grafting wax. (Exercise 5.)

### 4. Importance of Plant Propagation.

#### Laboratory Work:-

1. Observe root tip of black raspberry. Plant in forcing bed or outdoors.



2. Observe and plant bulb of lily, hyacinth, or tulip; also corm of gladiolus or crocus.
3. Observe stolon of strawberry.
4. Make and grow cuttings of potato, sweet potato, blackberry root, geranium, coleus, altermanthera, begonia, heliotrope, sweet alyssum, marguerite, carnation, etc. (Use hotbed or greenhouse).  
Examine callus formed on grape cuttings made in the fall. Plant in a forcing bed.
5. Make root graft of apple; illustrate different kinds of graft; graft pot plants by approach (potato and tomato, geraniums, coleuses). Force a seedling peach into growth indoors and bud in numerous places. After buds have set, force some buds into growth by wounding top of tree to check growth.

References:-

1. Bailey: The Nursery Book.
2. Bailey: Manual of Gardening.
3. Farmers' Bulletin, 157: Propagation of Plants.
4. Missouri, Circular 13: Plant Propagation.





## PRUNING.

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### 1. Natural Pruning:-

Conditions causing natural pruning. (Observe examples in parks, etc); relation to forestry and lumbering.

### 2. Purposes of Artificial Pruning:-

Remove dead wood, prevent formation of crotches, etc.

### 3. Time to Prune:-

Effect of winter pruning, of summer pruning.

### 4. Removal of Large Timber:-

Method, treatment.

### 5. Pruning of Roots and Tops in Transplanting.

### 6. Healing of Wounds.

### 7. Pruning Tools.

### References:-

1. Bailey: The Pruning Book.



## FRUIT GROWING.

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1. **Fruit Industry of United States:-**  
 Importance; great fruit districts; conditions making fruit districts possible; transportation and marketing.
2. **Management of Orchards:-**  
 Cultivation, cover crops, mulches, fertilizing, spraying.
3. **Frost Injuries:-**  
 Influence of location; effect of bodies of water; air-drainage; orchard heating.
4. **Apples, Peaches, Cherries and Plums:-**  
 Propagation; plan of fruiting; pruning; insects and diseases; system of spraying; cultivation; varieties; season.
5. **Grapes:-**  
 Propagation; pruning; plan of fruiting; bagging fruit; systems of pruning; varieties.
6. **Blackberries, Raspberries, Gooseberries:-**  
 Propagation, pruning, plan of fruiting, cultivation.
7. **Strawberries:-**  
 Propagation; cultivation; renewal of bed; mulching; varieties; season; harvesting and marketing.

### Laboratory Work:-

Demonstrate pruning of different fruits. Note various varieties of apples, etc.



References:-

1. Bailey: Principles of Fruit Growing.
2. Bailey: Pruning Book.
3. Bailey: Nursery Book.
4. Bailey: Encyclopedia of Horticulture.
5. Becket: The Book of the Strawberry.
6. Card: Bush Fruits.
7. Farmers' Bulletin 181: Pruning.
8. Farmers' Bulletin 113: The Apple and How to Grow It.
9. Hedrick: Grapes of New York.
10. Kansas, Bulletin 174: Spraying the Apple Orchard.
11. Munson: Foundations of American Grape Culture.
12. Missouri, Bulletin 61: Apple Growing in Missouri.
13. Missouri, Bulletin 55: Pruning Peach Trees.
14. Missouri, Circular 35: Protecting Orchards against Frosts and Freezes.
15. Missouri, Circular 31: Hardiness of Peach Buds, Blossoms, and Young Fruit as Influenced by the Care of the Orchard.
16. Ohio, Bulletin 232: Spray Calendar.
17. Ohio, Bulletin 191: Spraying Apples.
18. Paddock: Fruit Growing in Arid Regions.
19. Powell: Fruit Packages.
20. Purdue, Circular 17: The Farmers' Orchard.
21. Purdue, Bulletin 118: How to Control San Jose Scale.
22. Purdue, Circular 21: Spraying the Orchard.
23. Thomas: American Fruit Culture.
24. Waugh: Fruit Harvesting, Storing and Marketing.



## VEGETABLE GARDENING.

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### 1. Hotbeds and Coldframes:-

Importance; best location; construction; time to start; management; plants to be grown in hotbeds; "hardening off"; transplanting.

### 2. Garden Soils:-

Best soil type; importance of a warm soil; methods of ameliorating unsuitable soil.

### 3. Preparation of Seed Bed:-

Fall-plowing; ideal seed bed; advantages and disadvantages of planting in raised beds or ridges; garden tools.

### 4. Farmer's Garden:-

Importance; plan of garden; relation to labor.

### 5. Garden Crops and Their Requirements:-

Crops; radishes, lettuce, beets, carrots, turnips, parsnips, potatoes, onions, cabbage, tomatoes, celery, peas, beans, cucurbits, sweet corn, asparagus, rhubarb; soil; temperature; season; best varieties; cultivation; uses.

### Laboratory Work:-

Make hotbed and coldframe; grow radishes, lettuce, etc., to maturity; grow cabbage, tomatoes, etc., to transplant; "harden off" in coldframe; transplant to school garden; order seeds by catalog; plant school garden according to season.



References:-

1. Bailey: The Principles of Vegetable Gardening.
2. Bailey: Garden Making.
3. Farmers' Bulletin, No.255: The Home Vegetable Garden.
4. Farmers' Bulletin, No.460: Frames as a Factor in Truck Growing.
5. Green: Vegetable Gardening.
6. Missouri, Circular No.33: Hotbeds and Coldframes - Their Preparation and Management.



## FARM MACHINERY.

### 1. Tillage Machinery:-

Breaking plows: sod plow, stubble plow, disc plow, sulky plow, gang plows; harrows; roller; drag; cultivators (one-row, two-row); eveners; compare with earlier.

### 2. Seeding Machinery:-

Corn planters (check rower, drill, lister); drills for small cereals and grasses: hoe-drill, wheel-barrow drill, endgate seeder, hand drill; potato planter; compare with earlier.

### 3. Harvesting Machinery:-

#### (1) Corn:-

Corn sled, binder, shocker, picker, shredder, ensilage cutter; compare with earlier.

#### (2) Other Cereals:-

Binder, header, combined harvester and thresher, thresher; compare with earlier.

#### (3) Hay:-

Mower; rakes (sulky, sweep, side delivery); tedder; loader (endless apron); hay fork; hay sling; baler; compare with earlier.

### 4. Other Implements:-

Manure carrier, manure spreader, stalk cutter, wood saw, etc.

### 5. Power-Machinery:-

(1) Tread mill: principle and use.

(2) Wind mill: principle, advantages, and disadvantages.

(3) Sweep: principle and use.



(4) Gasoline engine:

Principle; compare with steam engine; uses of stationary engine: pumping, sawing, grinding, churning, separating cream, electric lighting; principle of shafting and pulleys; uses of tractors and motor trucks.

6. Importance of Improved Farm Machinery:-

Relation of machinery to farm labor; demand for more economical production; effect of kind of machinery on character of citizens; effect of machinery on type of farm horses; influence of topography, etc., on type of machinery.

References:-

1. Davidson and Chase: Farm Machinery and Farm Motors.
2. Davidson: Farm Machinery.
3. Farmers' Bulletin No. 303: Corn Harvesting Machinery.



## HOME LIFE ON THE FARM.

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### 1. Selecting the Farm:-

Kind of farming; climate; healthfulness; community neighbors; roads; proximity to market, railroad, church, school, etc.; character, size, and topography of farm; improvements; location of home grounds; natural scenery; special features.

### 2. Home Grounds:-

#### (1) General Plan of the Home Grounds:-

Size; arrangement of yard, garden, barnyard, poultry yard, etc.; location of walks and roads.

#### (2) The Lawn:-

Grading, preparation of soil, kind of grass, seeding or sodding, caring for the lawn.

#### (3) Planting the Grounds:-

Purpose in the planting; natural style; use of mass planting and border planting; the open lawn; suitable shade trees, their nature and use; ornamental shrubs; those suited for background of border, front of border, near entrance to building, specimens; location of flower garden and flower beds; kinds of annual and perennial herbaceous plants used; kinds of vines and their use; screening unsightly buildings and views by plantings.

#### (4) Window Boxes.



### 3. The Buildings:-

#### (1) House:-

Modern farm houses compared with old; plan of house; verandas; heating; water, bath and toilet; methods of forcing water to the house: hand pump, engine, windmill, hydraulic ram; elevated tank and pneumatic tank; lighting system: electricity or acetylene; laundry.

#### (2) Barns, Silos, Hog Houses, etc.

#### (3) Other Buildings:-

Poultry house, ice house, fuel house, etc.

### 4. Conveniences Available for the Housewife:-

Oil stove, fireless cooker, ice box, hot and cold water in the house, vacuum cleaner, electric light and fans, bath and toilet, laundry, cream separator, etc.; importance of lessening the drudgery of farm women.

### 5. Problem of Farm Labor:-

Importance of substituting machine work for manual labor; demand for intelligent labor.

### 6. Recreations:-

Hunting, fishing, boating, swimming, camping, picnicing, skating, sled-riding, etc.

### 7. Social Opportunities in the Home:-

"Southern" hospitality; house parties; informal gatherings; church socials; club entertainments; "moonlights", etc.



8. Farming as an Attractive Business and Life:-

Importance of the spirit of experimentation;  
need for broad education; independence of the  
farmer; opportunity for leisure; opportunity  
to be a student of problems of rural life;  
service to community; pleasure of fine horses;  
close to nature.

References: -

See next division.



## COMMUNITY LIFE.

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### 1. The Spirit of the Community:-

Importance of congenial inhabitants;  
loyalty to community; need of intelligent,  
progressive, unselfish, permanent inhabitants.

### 2. Religious Organizations:-

Church, Sunday school, Y.M.C.A., etc.; advantages  
and disadvantages; relation to good roads;  
relation to social life; importance of resident  
pastor; problems of the rural church.

### 3. Social and Literary Organizations:-

Literary clubs, debating societies, grange,  
home makers' societies, corn growers' association,  
bureau of Agriculture, fraternal orders, etc.;  
purpose of each; influence on community; nature  
of work done; possibilities of each.

### 4. Co-operative Organizations:-

#### (1) Manufacturing:-

Creamery, canning companies, etc.; advantages  
in more efficient work, less drudgery, financial  
profit.

#### (2) Marketing:-

Fruit and other products; commission men; other  
middle men; advantage of cooperation to sell in  
car lots; avoid glutting markets; examples of  
cooperative selling of fruit, live stock, etc.



## (3) Buying:-

Cooperative stores; joint ownership of sires, farm machinery, etc.

## (4) Banking:-

Need of such a system; example in Germany; action of government.

## 5. Rural School:-

Improvements made; present needs; rural high schools; agricultural instruction in rural school; school a social center; consolidated districts; relation to good roads; improved building and grounds.

## 6. County Fairs:-

Purpose; method of holding; advantages to community.

References:-

1. Bailey: The Country Life Movement.
2. Bailey: Manual of Gardening.
3. Bashore: The Sanitation of a Country Home.
4. Blake: What the Farmer can do to Lighten his Wife's Work. Ladies' Home Journal, Feb. 15, 1911.
5. Cobleigh: Handy Farm Devices and How to Make Them.
6. Coulter: Co-operation Among Farmers.
7. Farmers' Bulletin, No. 270: Modern Conveniences for the Farm Home.
8. Farmers' Bulletin, No. 248: The Lawn.
9. Farmers' Bulletin, No. 195: Annual Flowering Plants.



10. Farmers' Bulletin, No. 185: Beautifying the Home  
Grounds.
11. Hetherington: Play for the Country Boy:- "Rural Man-  
hood", May, 1911.
12. Illinois, Circular No. 138: The Small Home Yard.
13. Synde: Home Waterworks.
14. McKeever: Farm Boys and Girls.
15. Myrick: How to Co-operate.
16. Ontario Agricultural Department, Bulletin 192:  
Canada Cold Storage.
17. Plunkett: The Rural Life Problem of the U.S.
18. Powell: How to Live in the Country.
19. Roberts: The Farmstead.
20. Robertson: The Satisfaction of Country Life.
21. Stern: Neighborhood Entertainments.
22. Streeter: The Fat of the Land.
23. Utah, Circular 7: Labor Saving Devices for the  
Farm Home.
24. Waugh: Landscape Gardening.



## CONCLUSION.

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A brief discussion of the foregoing outline is considered desirable that a perfect understanding of the writer's view point may be assured.

In deciding the order of sequence in the course the seasonal arrangement has been adopted in so far as it does not seriously interfere with the natural development of the subject. There is a distinct advantage in siezing the opportune time for the study of the various phenomena. There is no other time in the school year that is quite so good for the study of insects and weeds as in the early fall. Then the insects can be found in great abundance by the teacher and class, and the weeds are hastening to form flower and seed before frost. The most opportune time for the study of hotbed and gardens is in the early spring when the garden produce is most appreciated. The study of home and community life in the country will be most appreciated by city pupils at the close of the course when all the experiences of the year may be drawn upon to help interpret rural conditions. Every division of the subject can be made to increase the appreciation of rural life, but this final discussion serves to make more definite the real conditions of life on the farm. Thus, insects, weeds, gardening, and home and community life are assigned to the seasons when they seem most opportune. Farm machinery is so related to home life that it is considered desirable to study it just before



home life. There may be a slight advantage in having the work in soil precede the work on plants. The reverse order is suggested here because it will be more convenient to perform the experiments earlier in the fall if there is no green-house available. There is no particular advantage claimed for the rest of the arrangement. There may be something gained by discussing egg production and milk production at a time when eggs and butter are especially high. Pruning comes at a very opportune time, but propagation might more naturally follow work on plants if provision were made for heat. At the period in which it comes, the hotbed may be used to furnish bottom heat.

The relative importance of the different parts of the course for the problem at hand cannot well be indicated in the outline. That the writer's estimate of the value of the various subject-matter in accomplishing the purpose of the course may be more clearly indicated, the following estimate of time is given:



Subject.	Weeks.	Per Cent.	Season.
Insects ) Weeds )	4	10	Sept. 2 - 27
Plants	4	10	Sept. 30 - Oct. 25
Soil	5	12 1/2	Oct. 28 - Nov. 29
Field Crop	2	5	Dec. 2 - 13
Animal Husbandry	4	10	Dec. 16 - Jan. 18
Propagation ) Pruning ) Fruit Production )	5	12 1/2	Jan. 21 - Feb. 22
Vegetable Gardening	4	10	Feb. 25 - Mch. 22
Machinery	2	5	Mch. 25 - Apr. 5
Home Life ) Community Life )	10	25	Apr. 8 - June 14

It is to be understood that the number of weeks given in the table is to be interpreted as only approximations. Frequently one division of the subject will run over into another. The school gardens will be taken care of until the close of the school year at least. In the same way subjects requiring no laboratory work may be frequently discussed while results of experiments are being awaited. The better plan, however, is to look far enough ahead so the experiments can be started in time that results will be ready when they are needed.

The amount of work suggested is more than most classes from the first or second grade of the high school



will be able to do well in one year. Yet it is the writer's opinion that often much more time is taken on experiments than is necessary. Often as much can be learned from observing an experiment prepared by another as from personal work. Thus experiments may be divided among groups of pupils and all pupils be required to note results. Some experiments may be performed by the teacher before the class. In this way it is possible for the class to approach the subject through the laboratory and yet not waste time in performing experiments the result of which is known before the experiment is begun.

The references that are given are not intended to be in any way exhaustive, but merely suggestive. Some of the reading given is too technical and too exhaustive to be assigned to high school pupils unless careful selection is made of the pages dealing with the particular point under discussion. This is especially true of some of the government publications.

The equipment of the school need not be extensive. Most of the necessary apparatus is used in work in other departments of the school. A green-house is desirable but not imperative. Room for a school garden should be provided if it is at all possible. Carefully planted grounds at the school or in the neighborhood are valuable for teaching the principles of ornamental planting and the characteristics of many ornamental shrubs, etc.



The qualifications of the teacher are of more importance than any equipment of the school. He should not only be carefully trained in the science and practice of Agriculture, but he should thoroughly understand life in rural districts and should be able to see clearly its advantages and disadvantages, and the progress that is being made in the more progressive sections.

Insect life is a very important part of rural environment. The pupil can not fail to appreciate the intimate relation that exists between insects and the results of farming. The pupil learns that the farmer must contend against stubborn enemies, but that he is assisted in various ways by insects that often escape notice. The technicalities of structure and function and the minute details of life history should be largely omitted. Where insects live, how they pass the winter, what they do, and where are the weak points in the injurious species, are the considerations to be emphasized. A passing acquaintance with a great number is more desirable than technicalities of a few.

As one enjoys being able to call birds, trees, and insects by name, so there is satisfaction in identifying weeds in the field. Aside from the farmer's problem of controlling weeds, an appreciation of the "weed" characteristics that enable weeds to be produced, and an understanding of nature's use of them in restoring lost



fertility are important results from the study of weeds. Only a relatively short time can be given to the subject.

The study of the fundamentals of plant life and form is desirable to enable the pupil to appreciate the relation between plants and soil, and the great principles of crop production. The importance of the subject justifies greater emphasis than is given to insects or weeds.

The work may be considered chiefly as a bit of preparatory work. An effort is made to suggest some of the problems the farmer must solve, and to show that farm labor ceases to be drudgery when it becomes highly intellectual.

In the same way, a knowledge of the very complex nature of soil and the ways in which man can offset, within limits, the natural disadvantages of soil or climate indicates that the man who intelligently manages his soil has the satisfaction that comes from doing scientific work. What once seemed "dirt" to the pupil is suddenly transformed into a complicated mass of mineral and organic food material in which physical, chemical, and vital agencies are combining to forward or thwart man's effort to feed the millions. The plant that once seemed an insignificant thing that grew in some mysterious way becomes a complicated machine that transcends the power of man in its manufactured products. Instead of being merely an agent to supply food for man, the plant becomes an individual with a life history and a



purpose of its own. With the broader and richer conception of soil and plants, and their relation, comes a keener appreciation of the life of the farmer whose work deals so largely with soil and plants.

The few weeks assigned to a study of particular field crops should suffice to show how man has taken advantage of the efforts of special plants in laying up food material for the growing embryo, how he has succeeded in improving the plant's environment and enabled it to accomplish more than would be otherwise possible, and how by careful selection of individuals he has developed superior varieties. Here, again, the student can not fail to appreciate the satisfaction in the life of an intelligent farmer.

The work in animal husbandry must be given a smaller place than if it were intended for vocational training. The pupil should be able to appreciate the dash and vivacity of the coach horse and the power of the massive draft horse. He should be able to consider some animals as machines for transforming food material into finished products for the use of man, while others are kept for pleasure. He should understand how strongly the farmer becomes attached to his animals and the satisfaction that comes from superior live stock. An understanding of the methods of improvement of farm animals, also, adds to the appreciation of the farmer's



opportunity. The general importance of dairy products and poultry, perhaps, merits a more detailed discussion. The nature of the products of these two industries is such that rather careful attention should be given to their care and handling.

A discussion of the propagation and pruning of plants, and the production of fruit and vegetables not only serves to show an interesting and attractive part of a farmer's work, but it opens up new ways for the city boy to spend his leisure in pleasurable employment. One tree in the home grounds may be made to yield a great variety of fruit by means of grafting and budding. Various combinations may be made of different plants for pure enjoyment. The hotbed is not only a pleasurable possibility of the country home, but of the city lot as well. Just so, the fresh, crisp vegetables coming from the back yard of the city lot yield perhaps more pleasure to the city boy than the farmer experiences in his more extensive garden.

A brief study of a number of the modern types of farm machinery and a comparison with older types serves to impress the pupil with the great progress that is being made in removing the drudgery from farm life and in reducing the cost of labor. Horses and power-machinery are displacing the farm hand. The more complicated machinery demands more skilled workmen and



elevates the labor. Especially important is the place the gasoline engine is coming to occupy on the farm. It is not only greatly saving the time of the farmer, but it is making possible modern conveniences for the house and relieving the housewife of much of her drudgery. Its use varies from running the dishwasher in the kitchen to driving fence posts in the field.

The richest material of the course is that which deals directly with the home and community life of the farmer. All that has preceded has combined to increase the pupil's interest and appreciation. He approaches this study with an understanding of many of the farm activities and the scientific principles involved. He realizes the diversified nature of the farmer's work and the scientific training necessary to cope with the various problems. With this insight into rural life the pupil is anxious to learn of the home life and community life of the farming population.

This part of the subject-matter is of such importance from the standpoint of the problems outlined in the first chapters that the writer considers it justifiable to recommend fully twenty-five per cent of the time of the class for this work. A number of valuable books and other publications have been suggested, and considerable reading will be expected. It



is not intended to imply that every farm or even the average farm has all the conveniences that are outlined. Here and there, farmers are living up to their opportunities. The pupil should realize that all of this is possible to the farmer who has the capital and the initiative. In the same way, relatively few communities are enjoying all that might be expected. The pupil should not be given a distorted view of real rural community life, but he should be lead to realize the great contrast between the relation of neighbor to neighbor in the country and that in the city. The problems of church, school, and rural society are real problems of to-day and should be discussed as such. The study of landscape gardening necessary to an appreciation of a satisfying home grounds, not only gives appreciation of rural conditions, but gives a training that is very useful in the city.

In conclusion, it seems clear that the subject-matter suggested, if properly presented, will appeal strongly to pupils of the city high school. Whatever else may be expected of the course, a full appreciation of rural life and environment seems assured.

















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