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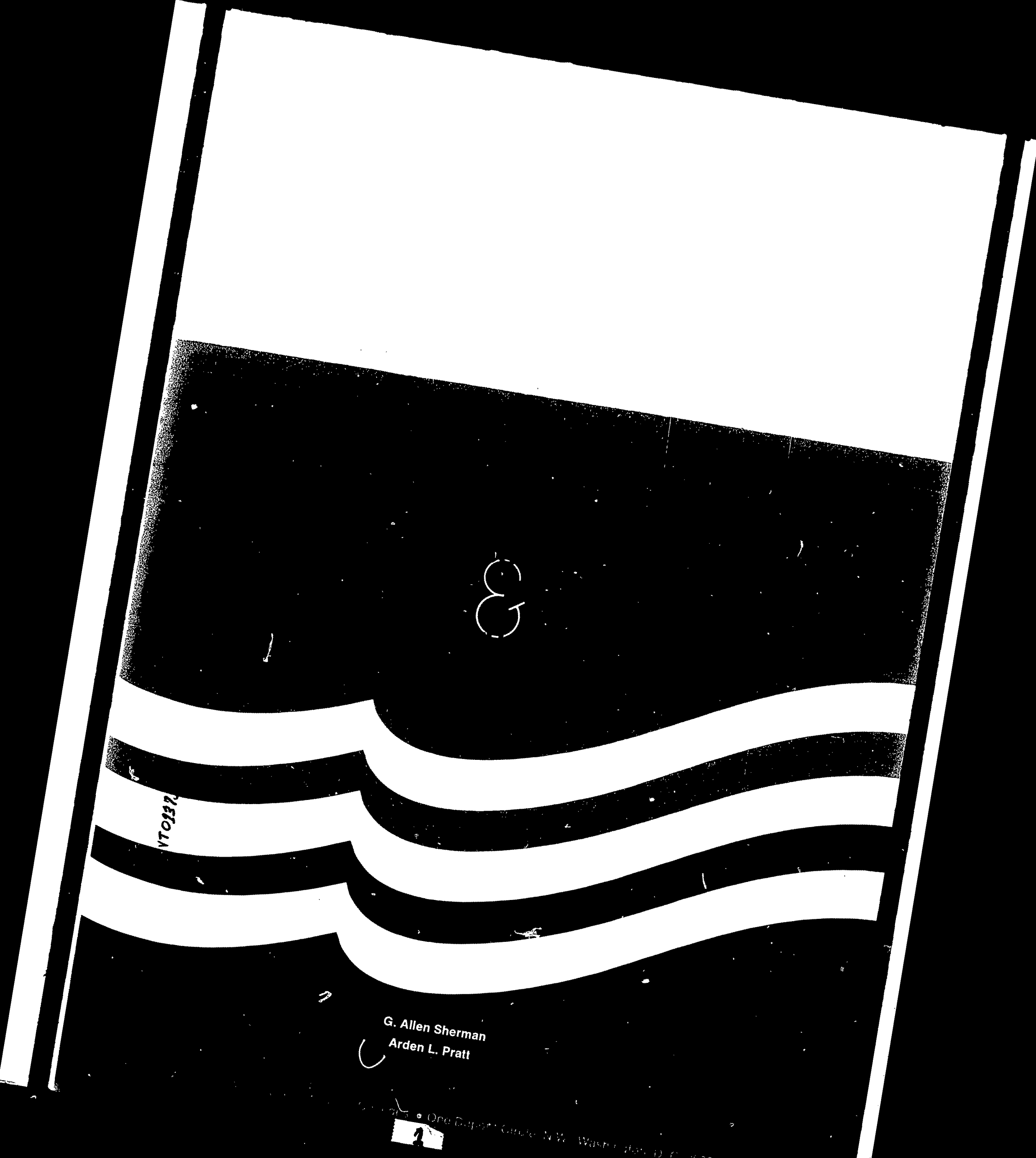
ABSTRACT

The science of agriculture and natural resources has undergone changes in recent years and now offers new job opportunities, using the term agribusiness to denote this expanded concept. In view of these changes, school administrators need to be aware of the educational opportunities in this area of work. This publication is intended to aid the director of instruction in a postsecondary institution seeking information regarding curriculums in agriculture and natural resources. It describes the new, broadened concept of this occupational field, and provides sample courses for technical curriculums, Educational opportunities for urban as well as rural students are pointed out, and suggestions are made for ways to serve some of the educational needs of non-agricultural students. Among the topics treated in the eight chapters of this document are: (1) What are the Opportunities of the Future? (2) Schools and Students, (3) Types of Programs, (4) Courses for Technical Curriculums, and (5) Faculty Selection and Training. (Author/JS)



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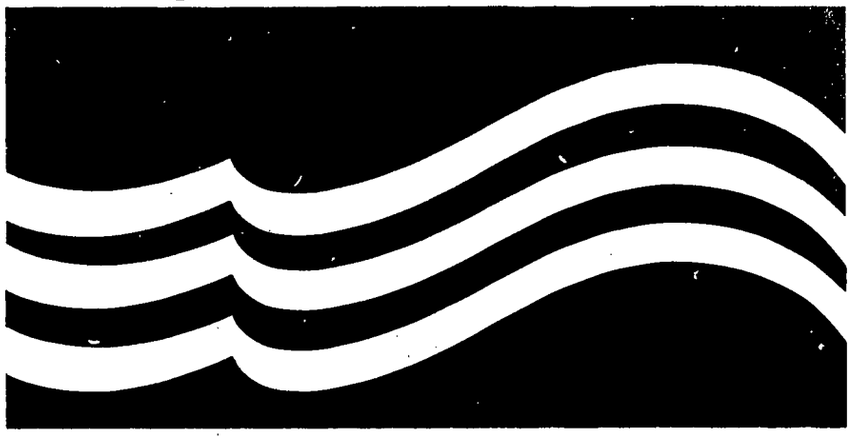
AGRICULTURE & NATURAL RESOURCES



POSTSECONDARY PROGRAMS

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PREFACE

The science of agriculture and natural resources has undergone many changes in recent years and now offers new and dynamic job opportunities. Agri-business, the term now used in place of agriculture, denotes this expanded concept. School administrators should be aware of the educational opportunities that exist for students in this important area of work.

This publication is intended to aid the college president or director of instruction in a postsecondary institution seeking information regarding curriculums in agriculture and natural resources. The new, broadened concept of this occupational field is discussed, and sample curriculums provided.

The educational opportunities for urban as well as rural students are pointed out, and suggestions made for ways in which the department may be used to serve some of the educational needs of non-agricultural students.

The educators who served on the editorial committee for the preparation of this publication represent several areas of the country, many types of programs, and many years of experience. Their suggestions about procedures for organization and administration, derived from their combined experiences, will help to insure the success of any new curriculum offering.

This publication is not intended to give detailed information regarding costs, equipment, and curriculum. It is hoped that the information offered here will precede consideration of such details.

G. Allen Sherman

ACKNOWLEDGEMENTS

The Occupational Education Project of the American Association of Junior Colleges, sponsored by the W. K. Kellogg Foundation, has produced numerous publications during the past four years covering a variety of occupational areas. This publication addresses itself to an area with a traditional name but one quite new to the project: the field of agriculture and natural resources. Recently, this field has stimulated an exciting resurgence of interest among colleges and their students. The purpose of this book is to focus on programs for all levels, including the technical level, and their wide range of objectives.

The publication was produced with the assistance of an advisory committee with long experience in the field. It includes:

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Institute of Agricultural Technology
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Northeastern Junior College
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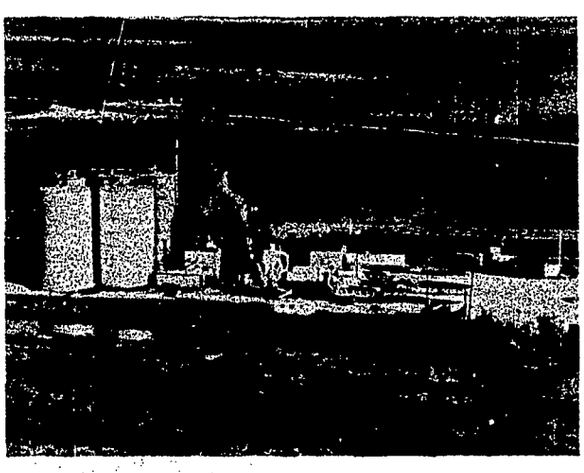
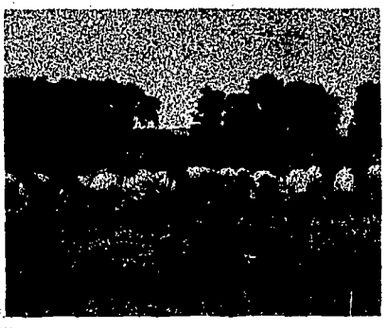
CONTENTS

I. WHAT ARE THE OPPORTUNITIES OF THE FUTURE?





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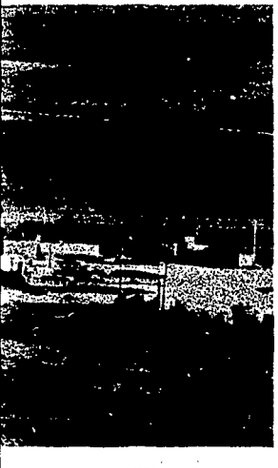

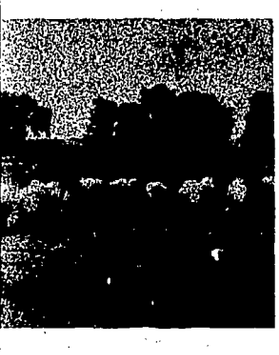

Between 1966 and 1970, the most spectacular enrollment increases in postsecondary occupational education occurred in agriculture and natural resources. These increments occurred in the face of published data indicating that the number of agricultural workers continues to decrease. Yet, at the same time, students completing agricultural studies are still much in demand.

Though they are correct, these statistics are somewhat misleading. There is a decreasing demand for unskilled labor in most occupations, and agriculture is no exception. The number of on-farm labor jobs continues to shrink. However, because of sustained mechanization, agricultural production has mushroomed and there is a constantly growing need for farm products. Everything from preparing the soil to gathering the crop, from incubating the eggs to plucking and freezing the broilers, from planting a seedling to making lumber has been affected by mechanization.

The management and operation of the production unit of agriculture — the farm — has undergone a radical metamorphosis. As the agriculture industry shifts from a labor-intensive to a much more capital-intensive endeavor, the image of the farmer evolves from laborer to competent, technically trained manager. Traditional operations have been changed completely by new methods of implementation, and require an increasing number of middle manpower employees who have technical training or are management-oriented. Usually, this training is obtained in a postsecondary institution. The demand for more education is accompanied by a vast multiplication of job types and opportunities in off-farm, agriculture-related fields.

At this point, a number of pertinent questions might be raised. What are the areas in agriculture and natural resources development and management in which substantial employment opportunities are predicted? What kinds of programs and curriculums can postsecondary educational institutions offer which will prepare individuals to enter middle manpower positions? And what are some of the other implications of establishing programs?

AGRI-BUSINESS

The United States produces more food and natural fiber than any other nation in the world. The volume of agricultural production makes the industry one of the largest in the nation and, if activities associated with it are considered, it is the largest. Projections indicate that these statements will remain true, at least for the foreseeable future.

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All those business activities which are dependent on or related to modern farming may be included in a broadly defined field recently dubbed "agri-business." Most of the occupations in this field will be found in four areas: in agricultural sales and service, in the processing and distribution of agricultural products, in business services, or on the farm. *Figure 1* represents the interrelationship of these areas of the agri-business field as an industrial system. That portion of the field which has been traditionally considered agricultural is shown under the farm.

On-farm Occupations: The farm remains basic to the American economy. As we have already indicated, however, it is undergoing marked changes. Heady, and others at Iowa State University have predicted continued replacement of labor by capital. They expect that from 1965 to 1980, capital requirements for farms will increase 38.5 per cent while the man hours of labor will decline by 31.9 per cent, indicating a decrease of 2 million farm workers during this period. These changes are expected to accompany a decrease in the number of farms from a reported 3.37 million in 1965 to 1.98 million in 1980, in spite of a predicted increase in the total acres farmed. Carpenter and Rodgers of Clemson University have recently reported surveying a number of other studies made at state, regional, and national levels which generally agree that these are the current trends and that they are likely to continue. Nevertheless, hundreds of similar studies reported indicate that employment opportunities in off-farm agricultural occupations requiring knowledge and skills in agriculture are increasing. Some of these studies have focused upon specific technical occupations in fields such as farm machinery, food processing, and others. In all the surveys the results were similar: substantial numbers of job opportunities are predicted.

Because of the growing complexity of procedures and equipment used on the commercial farm, the modern farm must employ better educated workers to assist with the technical and business problems of modern agriculture. The farm worker who is a jack-of-all trades or who is completely unskilled can find little opportunity for employment now, and opportunities will diminish as time passes. Nevertheless, it is clear that the nation will need more, not fewer, technically trained farmers in the future. At present, workers need some degree of specialization to qualify for most jobs. For example, farms producing fruits, vegetables, nuts, seeds, or feed require a number of employees with specialized knowledge of each particular crop. As a result of these specific needs, an individual usually cannot function at the same level of competence on every farm. It is becoming

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increasingly important for the worker who would consistently present a good crop for harvest to gain a background of specialized education. This education will give him necessary entry skills and a knowledge of specific crops, as well as familiarity with the related natural sciences.

Historically, agricultural programs in postsecondary institutions were focussed almost exclusively on production farming. Most of the colleges and other postsecondary institutions retain these curriculum offerings, many with traditional curriculums and course names which have been used for many years. However, while the titles have remained unchanged, the content of the courses has been almost completely changed during the past few years to keep pace with the needs of modern farm workers.

Agricultural Sales and Service: Today's farmer must buy most of the goods used on the farm — items which he formerly produced or made for himself. Hybrid seed, fertilizer, breeding stock, fuel for machinery, animal feed, pesticides, fence wire, and small farm tools are just a few of the multitude of items for which the farmer must depend on a supplier. The farmer, naturally, seeks the hybrid seed and specific fertilizer which his soil and crop requires, enabling him to produce the highest yield. It is the responsibility of the sales and technical personnel employed by the supplier to help him select the proper seed and fertilizer, as well as the necessary tools, and to aid in their application. These people must know the farmer, and be able to suggest solutions to his problems. By serving his needs fully and effectively, they will boost sales for their employers. Agricultural technicians excel in these positions because they can relay technical information and perform a variety of other technical duties based on their understanding of applied agricultural science.

Equipment and machinery used on the modern farm include sophisticated items such as tractors, combines, cotton pickers, and many others. Proper use of equipment is an absolute necessity for the modern farmer if he is to achieve maximum production. The keen competition for the farmer's equipment dollar requires that dealers employ increasing numbers of technically trained men to distribute and service farm machinery. A large number of sales personnel are also employed for the distribution of such items as specialized machinery for food processing, new packaging materials, and agricultural products and by-products.

In this area of agri-business also, postsecondary institutions are organizing new curriculums and changing course offerings to answer current needs. Two areas currently receiving considerable emphasis (on the basis of the number of new two-year


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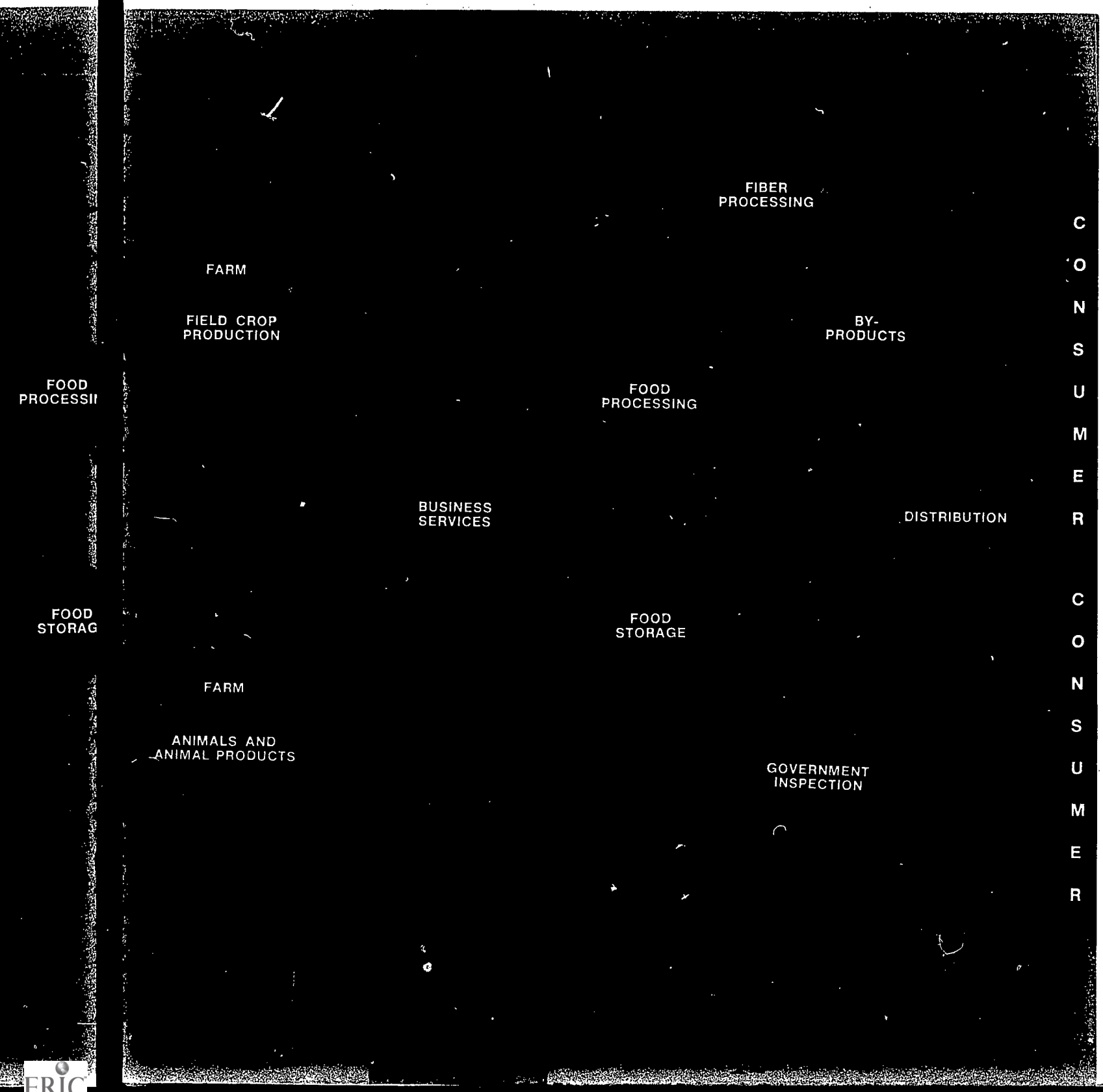
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curriculums) are agricultural supply, and agricultural machinery and equipment. Course offerings in both of these areas are also in great demand in continuing education.

Processing and Distribution: Processing and distribution of the food and fiber produced on farms is of prime importance to the economy as well as to the consumer. Three-fifths of all farm products require some degree of processing prior to use. Because of consumer demands for quality in food products, various governmental agencies and industries have set rigid standards in many areas of processing, packaging, shipping, storage, and sales, thus creating a continuing need for large numbers of fieldmen and technical workers to inspect, grade, and test food products. The processing of agricultural products, including such operations as canning, freezing, and drying requires technicians and skilled workers to operate and maintain the special machines and equipment used for these operations.

Jobs related to the distribution of food products are far more varied than those specifically connected with the carriers. For example, continuous research seeks new methods of packaging, new handling and shipping techniques, and better ways of preserving perishable products. As in most research and development activities, many technical employees are required.

The jobs related to processing and distribution of food products may be performed in a variety of places – in the processing plant or slaughter house, in the market place or on the farm, but for the most part they are considered to be off-farm jobs. The activities connected with them do not generally relate to production. There are, of course, many similar jobs connected with the processing and distribution of the fiber crops including cotton, wool, and flax, and those used for feed.

Agri-business Miscellany: Separation of the broad field of agribusiness into specific, distinct operations is often difficult. For example, a farmer might choose to process his farm's products to a market-ready state, acting as both producer and processor. The frozen food processing plant that contracts with a farmer for his crop often employs fieldmen who must have a wide variety of agricultural production skills and knowledge. It may be the job of a fieldman to inform the farmer when to plant, how to irrigate, how to harvest, and sometimes even the variety of seed to use. In this way the processor trys to help the farmer to produce the best crop possible. However, even when this type of multiple operation is conducted, individual employees usually

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Many business activities requiring business know-how can be handled far more effectively by individuals who have a background of agricultural knowledge. This is true from the farm through the processing plant, from the loan bank to the commodity market.

Increasing use of computers in the field of agri-business is now absorbing a small, but significant number of technical workers. In addition to normal business aspects of sales and service such as packaging, shipping, and inspecting, many aspects of agri-business related to processing and distribution, involve the use of statistical data. Computers are being used increasingly to assist in research and development being conducted in these and other areas of agri-business. In many of these operations, technicians who have broad knowledge of agricultural fields are required to interpret the data and results.

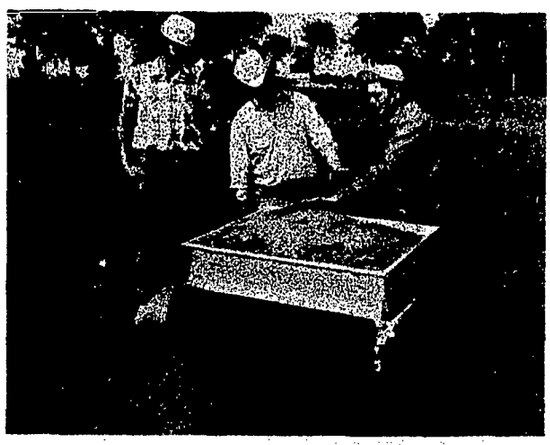
Postsecondary education is responding to these changing and increasing personnel needs. In many institutions, general agri-business programs and curriculums of two years in length are now being offered. Coursework in a variety of specific areas relating to agricultural processing and distribution have also been organized. These curriculums vary widely between institutions – some stress principles of processing, while others emphasize marketing principles or keeping agricultural records. Many shorter programs and courses are now being offered through evening or extension divisions; they can help farm workers and owners to keep abreast of modern methods of processing and distribution.

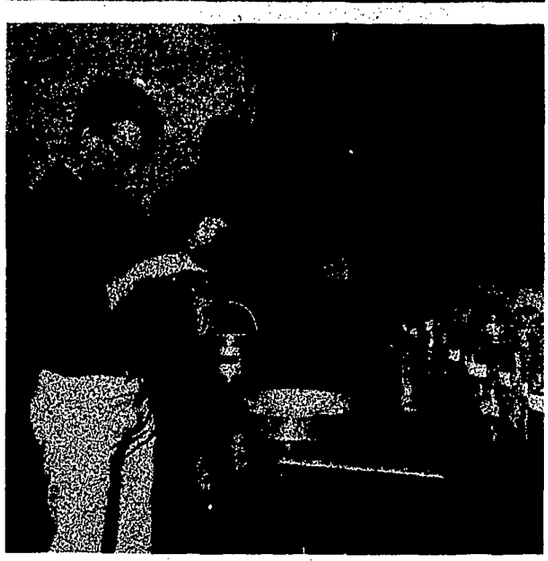
ANIMAL TECHNOLOGY

Technical education in animal science has traditionally been oriented toward farm animals and products derived from them. This is to be expected since production of livestock historically has been and remains, economically speaking, the leading agricultural enterprise in the nation. Furthermore, the fields of dairy and poultry production continue to maintain an important place in the nation's economy. Just as in the agricultural fields (both on-farm and off-farm) previously discussed, a decreasing amount of human labor is required by all of these industries, yet an increasing number of technically competent people are needed.

Another industry dealing with large animals which has been, for the past few years, one of the fastest growing fields related to agriculture, is the horse industry. For the most part, this industry has little to do with production. Employment opportunities are found at breeding farms, farriers, race tracks, and equestrian stables which are seeking to employ technicians knowledgeable in horse husbandry. Most educational programs in animal husbandry or animal science include instruction on horses. In addition, some colleges are now offering entire two-year curriculums in this field.

Many new job opportunities have been created recently for technicians in the field of animal care. Small animal hospitals are finding that technicians can do much of the routine work traditionally performed by the veterinarian. The use of small animals in research activities has greatly increased. Zoos and animal breeders also use technicians trained in animal care. A number of educational programs have been developed to meet the needs of this phase of animal technology. Many of these programs often combine small animal care, research, and veterinary clinical methods and procedures.





ORNAMENTAL HORTICULTURE

The art and science of ornamental horticulture includes the design, planning, growth and maintenance of landscaping. Homes, businesses, factories, parks, and cemeteries all rely upon landscaping for aesthetic and functional purposes. Interest in ornamental horticulture is increasing since it is an important part of the growing concern for the creation and restoration of a more beautiful environment.

The general field of ornamental horticulture may be divided into areas such as nursery management, turf management, arboriculture, floriculture, and landscape development. A new cluster of jobs is developing in the making, selling, servicing, and repairing of the specialized equipment used in ornamental horticulture.

One of the most important areas of employment in this field is agrostology, which includes the growing, planting, and maintenance of turf for homes, parks, golf courses, playing fields, and cemeteries. Programs in this phase of agricultural education are proving to be quite popular in many urban and suburban colleges, since landscape maintenance is a clean, healthful, and enjoyable occupation.

In addition to offering many opportunities for job placement in urban areas, knowledge and skills in ornamental horticulture

offer an opportunity for an individual to enter business for himself. This probably is a long range objective for many agricultural students. Ornamental horticulture offers a better opportunity to fulfill this objective than most others since no large initial investment, like the purchase of a farm, is required.

CONSERVATION AND RENEWAL OF NATURAL RESOURCES

The nation's forests, parks, and rural areas in general are being used by more millions of people each year for recreational purposes. To protect them from disease, insects, and fire, and to insure safe recreation, workers are needed for fire control, reforestation, wildlife management, and recreation direction.

Conservation of forests requires technicians who understand accurate scaling and grading of timber, as well as growing, inventorying, harvesting, and marketing forest products. The number of immediate job opportunities in this field are, however, more limited than in the fields previously discussed.

Soil and water conservation is of the utmost importance to the farmer as well as the forester. Appropriate utilization of grazing land, and installation and use of proper irrigation systems play an important part in getting the maximum production from the available soil. Rejuvenation of the land to a point at which it can be cultivated or used for grazing is another important activity. While it has not been a major problem to this nation in the past, it will take on increased importance as the population of the country and the world augments, and the number of technically trained individuals needed to work in the area will grow.

Maintenance of the balance of wildlife in nature is a responsibility shared by the farmer, the rancher, and the forester working in national or state parks, and forests. Without proper food, protection from disease, and protection from man, much of our wildlife, incl
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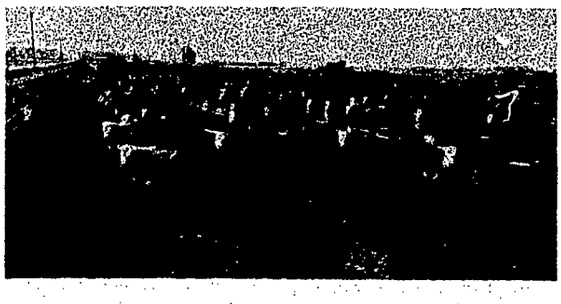
protection from man, much of our wildlife, including many entire species, face extinction. Wildlife refuges, both government owned and privately owned, need technicians to save our wildlife.

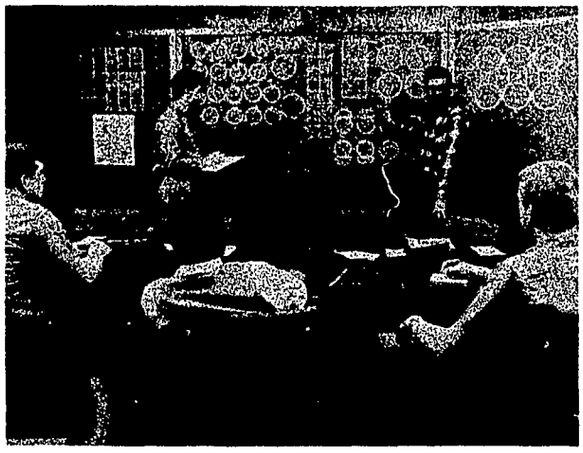
Economical production from our nautral resources, and their successful renewal, will depend measurably upon the number of available technicians. Present postsecondary programs offer instruction in many aspects of the field involving conservation, wildlife conservation, and recreational land management. Most agricultural education programs at postsecondary institutions, whether in this general field or not, place some stress on the renewable resources and include instruction in conservation practices and methods of development of additional resources.

ENVIRONMENTAL CONTROL

Jobs in fields related to environment and ecology, though unknown in the 1960's, are vitally important to this decade. Farms are not free of the problems of pollution. Disposing of waste, dust, odors, pests, and chemicals is a pressing problem. New methods being developed in pest control involve the extensive use of chemicals, many of them in some way hazardous to humans, animals, and plants. Similar complications exist in the use of herbicides. Farm operations are becoming increasingly mechanized, causing air pollution and other problems related to machines and fuel. Quantities of fertilizers are washing into the nation's rivers and streams as pollutants.

Specific training and knowledge will be required for almost all agricultural technicians to meet the challenges posed for pollution control and abatement. Many colleges are introducing relevant courses. However, most curriculums focussing on environmental education are placed under other departments. Only a few colleges have consolidated environmental programs with those in agriculture into a single division or department.





II. SCHOOLS AND S

TWO-YEAR INSTITUTIONS

There are presently more than a thousand two-year postsecondary schools in the United States. This number continues to grow by approximately one every week. These institutions may be either publicly or privately supported and may be called community colleges, junior colleges, technical colleges, or technical institutes. It is in the community colleges, with their rapid birth rate and burgeoning enrollments, that the greatest growth of programs in agriculture and natural resources is taking place. This trend will probably continue. With an ever greater proportion of high school graduates and community residents turning to the community college for assistance and service, it is that institution which has the greatest potential for filling the middle manpower needs of the agricultural and natural resources fields.

The highest enrollments in these programs are now found in California, New York, Illinois, and North Carolina. The number of two-year institutions presently offering programs exceeds 290. Schools such as the State University of New York's Agricultural and Technical Colleges have offered agricultural programs for more than fifty years; many community colleges have organized programs just this year.

A wide variety of agricultural curriculums are offered in these institutions, in most cases designed with specific objectives necessary to fulfill local manpower and student needs. For this reason, curriculums with the same name in two separate colleges may include different topic manner. An agri-business designed to prepare techni elevators. A curriculum wi be designed for the prepar the other hand, in the E have been developed to ed garden supplies business.

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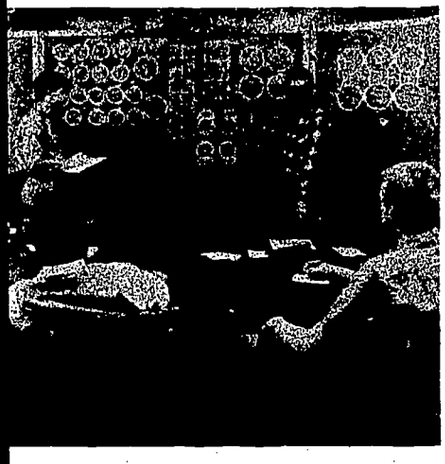

II. SCHOOLS AND STUDENTS

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same name in two separate colleges may include different topics and may be presented in a different manner. An agri-business curriculum in the Midwest may be designed to prepare technical personnel for employment in grain elevators. A curriculum with the same name in the West might be designed for the preparation of farm chemical salesmen. On the other hand, in the East an agri-business curriculum may have been developed to educate sales personnel for the farm and garden supplies business.

Diversity in curriculums based on objectives growing out of differences in regional needs should not be considered a disadvantage. Attempts have been made to standardize some curriculums, for example in the field of forestry. These efforts have not yet been successful. This is probably fortunate, though, since the quality of a curriculum continues to be of much greater importance than its specific content.

FOUR-YEAR INSTITUTIONS

For nearly a century, some four-year colleges and universities have offered programs of two years or less duration in the agriculture and natural resources fields. Michigan State University, Pennsylvania State University, the University of New Hampshire, and the University of Massachusetts are examples of such institutions.

Many differences exist in these four-year institutions in methods of administration and in the use of the teaching faculty. Some schools use the same staff members to teach the four- and

two-year curriculums, while others use a different faculty for each. These, and other differences make it difficult to cite any one curriculum from a four-year institution as typical. But this diversity is usually an advantage, since it enables colleges to adapt to the needs of their region and their students.

AREA VOCATIONAL-TECHNICAL SCHOOLS

The area technical or vocational schools represent a third major type of publicly supported institution offering postsecondary curriculums in agricultural and natural resources. Depending on the state, institutions designated as "area" schools may offer either secondary or postsecondary programs, or a combination of both. It should be noted that the number of institutions of this type offering postsecondary programs in all occupational fields, exceeds the total number of community colleges and four-year institutions doing the same.

Minnesota and Ohio are examples of states having a large number of these schools. Although associate degrees are not usually offered by these institutions, many of their curriculums are on the same level as those offered by two-year colleges. The majority of their programs, however, are oriented more toward skill training and include little or no general education, mathematics, or science.

Very little valuable research on students choosing programs in agriculture and natural resources has been conducted. Observations of many community college educators indicate that the majority of students electing programs in agri-business have been rural youth, many of whom have completed some vocational agriculture in secondary school. On the other hand, many colleges report increasing numbers of students from urban areas entering full-time programs in the area of ornamental horticulture and small animal technology.

In general, successful technicians in any field must have the ability to apply the scientific method in their technology. It is presumed that this ability, with the necessary accompanying skills and knowledge, can be developed through an educational program. Walter Brooking has observed that students who are potentially successful workers in the agricultural and natural resources fields generally exhibit certain common characteristics. They usually have an abiding interest and curiosity about life and living things; they possess an active interest in nature; usually they have been drawn to the outdoors, and outdoor activities, as a youngster; and often they have an interest in machines, or at least a demonstrable mechanical bent.

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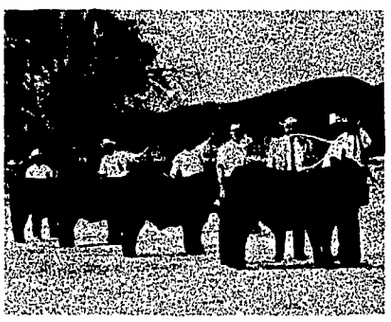
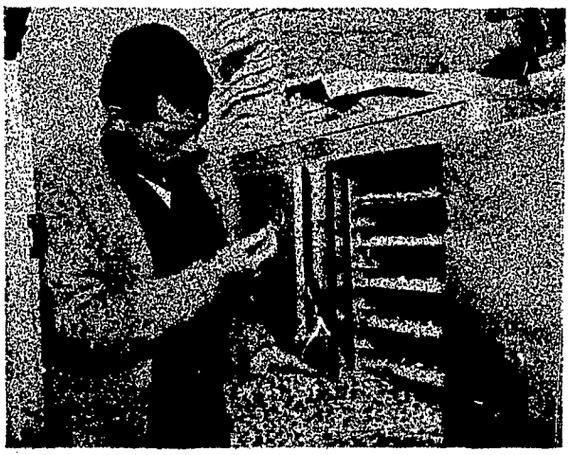
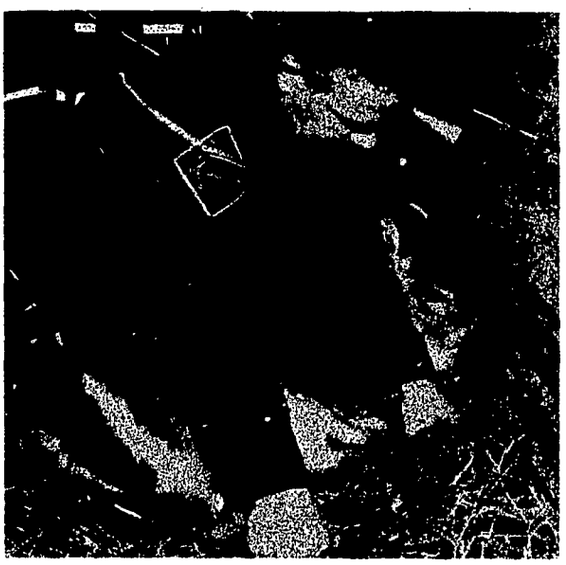
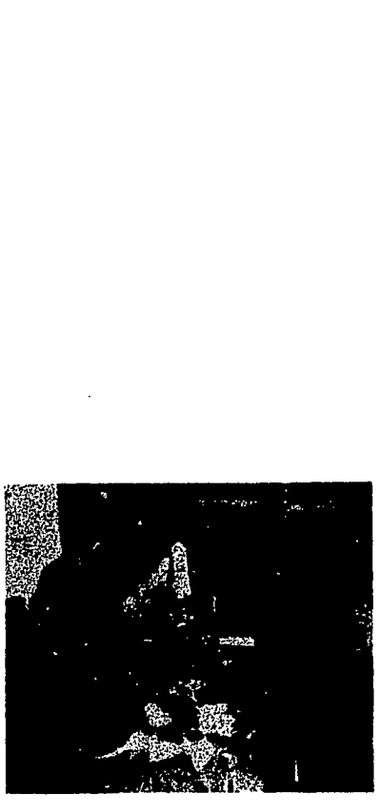
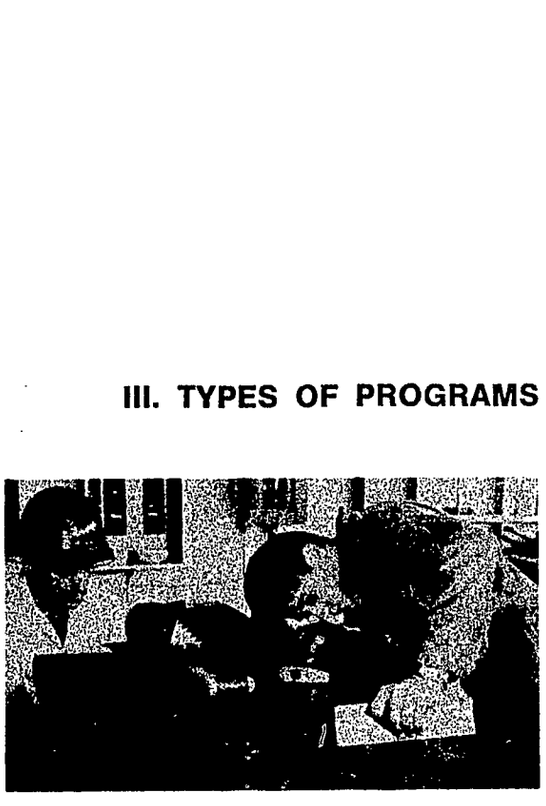






III. TYPES OF PROGRAMS





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TECHNICAL CURRICULUMS

Projections indicate that during the coming decade there will be a great need for industrial manpower at the technical level. The need in the fields of agriculture and natural resources will be at least as great as in others. Norman Harris has estimated that over 75,000 technicians will be needed in these fields during the 1970's.

The agricultural technician was defined by an agricultural education seminar held at the Ohio State University in 1964 as "a worker located between the skilled worker and the professional in the job classification structure, in his work performance, and in his educational attainment. He possesses the skill and ability, working independently or with minimal supervision from a professional, to analyze and interpret information, diagnose problems, make decisions, and make practical applications of theoretical knowledge in performing specific tasks in a specialized field in the production, processing, distribution or marketing of goods and services in agriculture. He must exercise cognitive skills primarily but also must be able to supervise and perform manipulative skills."

ES OF PROGRAMS

Two-year occupational curriculums to prepare technicians have been discussed in detail by several authors. They and many other educators involved in technical education are in more or less general agreement on many aspects of this type of education. These points of agreement include the following:

1. The objectives of the curriculum should be occupation-centered in a field of agriculture and natural resources with the occupational competencies included in the stated objectives.
2. The development of the objective should be accomplished only with the involvement of an advisory committee of lay individuals involved with agricultural business and industry.
3. The curriculum is constructed by correlated groups of concurrent courses which deal with selected aspects of the agricultural field.
4. Specialized or technical agricultural courses should be introduced during the first term of the curriculum.
5. Laboratory, shop, or other practical work in agriculture must accompany and complement theoretical work done in classes. Facilities should be well equipped with a variety of quality items which resemble those used in the area being studied. All students should be able to work individually, although not necessarily on the same item at the same time.

6. Faculty in agricultural programs must be professionally competent, and thoroughly acquainted with current applied biology and agriculture.

7. The depth of the curriculums will usually require a vigorous, two-year program.

The above list obviously is only a partial one. It does not include many other areas of general agreement which are usually taken for granted such as the availability of a good library, the need for the inclusion of general education in the curriculum, and the need for a complete program of supportive services, including counseling. Moreover, the list does not include several controversial points.

The major controversy in agricultural technical education, as well as in other technical programs, centers on the concept that the objectives of an agricultural curriculum should allow for the preparation of students for clusters of related technical occupations. Both sides cite the term "specialized field" in the Ohio State seminar definition to support their position. While the majority of agricultural educators probably support the above statement, a sizeable minority maintain that the objective of a curriculum should be preparation for a specific agricultural occupation. It is recommended that program development should follow the broader objectives. Students who complete curriculums developed with a highly specific objective may later find it quite difficult to change jobs because of their lack of broad-based job-entry skills and knowledge.

Curriculums developed to prepare technicians fitting the above definition are rapidly increasing in the colleges offering them, as are the numbers of students enrolling. Data reported by Manley (see *Table I*) indicates that a 79 per cent increase in student enrollment in agricultural and natural resources technical curriculums occurred between 1966–67 and 1968–69. This very sizeable increase in enrollment was accompanied by an 82 per cent increase in the number of full-time faculty members employed in these curriculums and a 67 per cent increase in the part-time faculty. During this same period, the number of institutions offering agricultural and natural resources technical programs increased 71 per cent while the number of curriculums increased 58 per cent. At this time, the data for 1969–70 has not yet been compiled. Nevertheless, estimated projections indicate that similar increases in enrollments, number of curriculums offered, and other categories also occurred during 1969–70. These estimates are included in *Table I* and the graph displayed in *Figure 2*.

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TABLE I

No. Institutions	
No. Curriculums	
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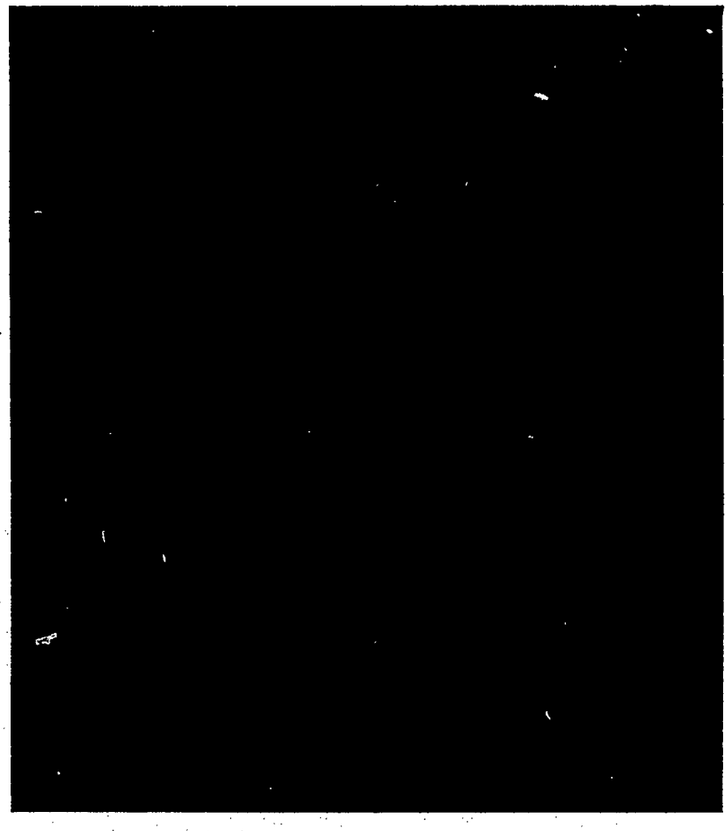
GROWTH OF TECHNICAL EDUCATION
IN AGRICULTURE AND NATURAL RESOURCES
IN THE UNITED STATES
1966–67 to 1969–70

TABLE I

	1966–67	1967–68	1968–69	Estimated 1969–70
No. Institutions Offering	**142**	**197**	**243**	**(290)**
No. Curriculums Offered	**385**	**500**	**608**	**(700)**
No. Full-time Faculty Teaching	**393**	**527**	**716**	**(825)**
No. Part-time Faculty Teaching	**444**	**579**	**743**	**(860)**
No. Students Enrolled	**10,290**	**13,786**	**18,434**	**(21,500)**

Excerpted from the *1968-69 Directory of Technical Education Curriculums in Agriculture and Natural Resources in the United States of America (also containing 1967-68 and 1966-67 Directories),* by Fred W. Manley.



OTHER TYPES OF CURRICULUMS

In addition to curriculums designed to prepare technicians, a variety of others are offered. For example, programs for training skilled workers in the various fields of agriculture and natural resources. These programs are of a different nature than the technical programs, and there should be little problem differentiating between them if objectives for each are clearly stated.

Jobs such as farm machinery mechanic, sawyer, lumber grader, dry kiln operator, saw filer, milk tester, welder, pasteurizer, plant propagator, large equipment operator, and farrier (horseshoer), among others, do not normally require training in a two-year technical curriculum. For many of these jobs, an intensive, specialized course which can be completed in a relatively short time may be all that is needed to give the student job-entry skills. For other jobs, a one-year curriculum leading to a certificate of completion may be required to satisfy the objectives of successful job-entry. In a few cases, a two-year curriculum may be required in which more skill level training and less theory is included than in the usual technical curriculum.

Curriculums or courses of this type are offered in all of the various types of institutions previously described. Most commonly they are offered in area vocational schools or technical institutes, although many community colleges are offering more courses like this, particularly in the evening and continuing education divisions. These schools should be particularly sensitive to changing manpower requirements in the community or state which they serve. Only a constant sensitivity and awareness will allow the institutions to remain flexible enough to alter their courses as the needs of their service area change. Again, this requires continued, close cooperation between institution and employer.

Special programs or curriculums are designed to upgrade the worker in the field, to advance him on the job, or to enable him to qualify for a better job. Curriculums of this type are important because modern technology demands that workers be kept abreast of new ideas and developments. They are often classified as continuing education and usually require less than a full year for completion. These programs can include short courses, a series of special evening classes, summer workshops, a lecture series, or organized curriculums.

The extent of the continuing education offerings will depend upon the educational institution, the community, employment needs, and other factors. Seasons may influence the timing of courses, for example. Since winter is a slack season for agricultural work in many
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tural work in many areas of the country, it is usually a propitious time to schedule courses dealing with field crops, for workers occupied with crop production during the summer. The offerings in agriculture and natural resources may be organized for a wide variety of students. Some of the programs may be directed only to those students who may have previously completed a post-secondary curriculum, or they may be organized for students who have completed secondary school, or for those who never completed school at all. People having left a postsecondary institution prior to completing a curriculum often welcome the opportunity to return to the institution to continue their education on a part-time basis, although often with a different objective than when they first attended. The variety of offerings possible in the fields of agriculture and natural resources is limited only by the students' needs and the ability of the institution to organize and offer programs.

Many two-year institutions have a general open door admissions policy. While this policy can be defined in a variety of ways, the most common interpretation is that any high school graduate or person over 18 years of age who can profit by instruction must be admitted, although this rule is moderated in many colleges to require a high school diploma or equivalency certificate. Many additional colleges have an open door policy in their continuing education programs. As institutions grow more flexible and embrace more and more of the population, the breadth of programs offered must be increased. Technical curriculums generally restrict admissions to high school graduates who can present certain basic courses and at least an average scholastic record. An increasing number of colleges are now offering pre-technical or developmental courses to enable students to enter technical curriculums who otherwise would not meet the qualifications.

At the time technical agricultural and natural resources programs were first introduced in two-year schools, curriculums were very inflexible. The student had little choice – he had to complete a prescribed curriculum in two years in a program leading to the associate degree, or leave the college. However, greater flexibility in program offerings has accompanied the trend toward more open admissions. Many colleges encourage students who do not wish to complete a two-year associate degree curriculum, to select a sequence of courses specifically planned to lead to employment. Students who have completed a program in vocational agriculture in high school or in an area vocational school may wish to enter the college to complete only a few specific courses which will enable them to meet their immediate

occupational objectives. In recognition of the legitimacy of such objectives, many colleges issue certificates of proficiency upon completion of a course or group of courses. These certificates indicate to employers that the individual has completed a particular educational objective and, therefore, is a good employment risk.

Curriculums for students who plan to transfer to a four-year college, after receiving the associate degree or completing two years in a community college, are not discussed here since this publication focuses on occupational curriculums that normally require two years or less to complete. However, in planning the total agricultural and natural resources program in a comprehensive institution, the educational needs of students planning to transfer should be considered along with those who select occupational curriculums. Many courses developed for occupational curriculums cannot be used as college-parallel courses, since the educational objectives of the two are usually not the same, although four-year colleges and universities are increasingly accommodating students by accepting these credits and building advanced courses according to student needs.

A number of community colleges are now arranging with local high schools to allow some students to enroll in college level courses for advanced credit on a part-time basis. While these arrangements are most often made for students in the academic and college-parallel areas, a small number of colleges do admit students to certain occupational courses, such as those in agriculture. Programs of this type serve a dual function: they motivate students to continue their education at the postsecondary level, and they provide counseling by allowing students to sample courses in fields in which they express interest.

THE NON-AGRICULTURAL STUDENT IN AGRICULTURE

Many students not preparing to become workers, possess the characteristics described above for potentially successful workers in agricultural fields. For these students particularly, and for a lot of others as well, many courses offered in the areas of agricultural and natural resources in postsecondary institutions may be useful as general education. Not every course in agricultural curriculums has only occupational objectives. Any introductory course in plant and animal life, for example, would be quite useful to a student planning to become an elementary teacher. Courses expanding the awareness of conservation needs and practices should be encouraged for all students. Courses, for example, in landscaping in which the care and maintenance of

shrubs, flowers, trees, and other ornamental plants are discussed and demonstrated will probably interest homeowners, and even apartment dwellers. Studies of horse husbandry attract a variety of students.

It is better not to use technical courses to fulfill all the general education requirements. The depth of the course might make it too difficult for the non-agricultural student, and the content might be of little or no interest to him. The more advanced technical courses are based on educational experiences and skills gained in previous courses which the non-agricultural student would not have had. However, if courses are modularized, some modular units can be used in the general education offerings. With proper scheduling this can allow the "outside" students and the "majors" to share educational experiences together. Sometimes when students enrolled in occupational programs are placed in classes with students in college-parallel programs, the former are "put down" by the latter. This is less likely to occur when the meeting ground is a course oriented toward an occupational field.

One of the commitments of community colleges to students should be the encouragement of individual exploration and discovery. Individual initiative and curiosity will not take the place of a sound counseling program, though even at its best, counseling has many limitations. At times, the only practical solution for helping an indecisive student make a career choice is to enroll him in courses in a variety of fields. Agricultural programs should be planned to allow for such exploration, so that students are not penalized for their experimentation. Planning should include a flexible schedule with beginning courses planned at a time convenient to both day and evening students. Ideally, the first few weeks of the introductory technical courses should be organized in a manner which would allow the student "shopper" to experience the flavor of the courses. The first courses offered in second-year options could be organized in the same manner. If after a few periods a student decides not to continue, he should be allowed to move to other courses without irretrievably losing the entire term's time.

COMMUNITY SERVICE ACTIVITIES

Community service activities should be a departmental priority. The use of the college's faculty and facilities for the benefit of the community at large will generate interest in and support for the school and its programs. Possible activities are as varied as community needs, and the imagination needed to implement them. A one-day program on corn seed selection or planting

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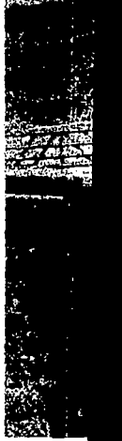

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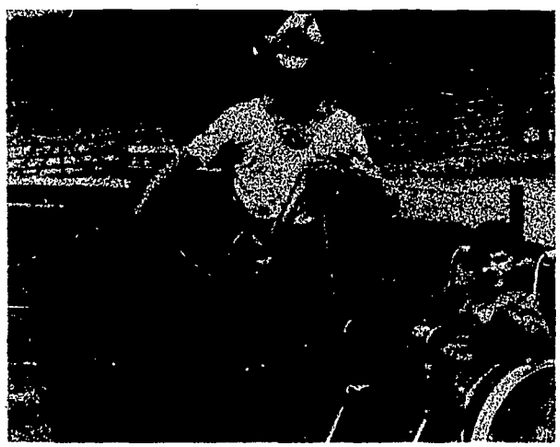
Suburban or exurban colleges which own farm laboratories may use them to forge an important link between the city dwellers and members of the agricultural community. Elementary school classes may be invited to tour the facilities and observe the treatment of animals, foods, and fibers.

Cooperation of the college with groups such as the Farm Bureau, cooperatives, and farm machinery organizations is another area for community service. Inviting groups such as the Farm Bureau or the Grange to hold regular meetings on the college campus helps make their members more aware of the educational programs offered by the institution, and the capabilities of the students who have been in these programs. Farm machinery companies often welcome the opportunity to display and demonstrate new models. This may be done on the college's farm laboratories, or through cooperative demonstrations conducted on local farms.



IV. COURSES FOR TECHNICAL CURRICULUMS

Of all the curriculums previously discussed, programs to train technicians in agriculture and natural resources are probably the most difficult to develop. This is because of characteristics implicit in technical education. Every technical curriculum must contain specific courses, the mastery of which will enable a student to excel in his specialized area as a technician. Courses in other areas, both general and specialized, are also important. Each course should strengthen and augment the others. A loose collection of courses designed so they may be taken at random is unlikely to result in an adequate education for technicians. The following detailed discussion of types of courses considers only those in technical curriculums.

TECHNICAL COURSES

Technical courses are those which teach the student the basic skills, abilities, and knowledge needed for an agricultural specialization. These courses usually make up the largest portion of a technical student's curriculum and may be said to be the specific courses that will prepare him for entry into a technical job in agriculture or natural resources. Specific skills and abilities must, of course, be developed after employment since each job will have its own requirements and characteristics. Nevertheless, the technical courses should enable the student to be somewhat useful and productive from the first day of job entry.

It is difficult to precisely categorize technical courses. The same course may be considered to be technical for one curriculum and related-technical, or only general education, for another. For example, a course in agricultural economics would be considered a technical course in an agri-business curriculum, a related-technical course in a crop production curriculum, and probably a general education course in an agricultural engineering curriculum or one developed to prepare forestry technicians.

The objectives of technical courses make it imperative that

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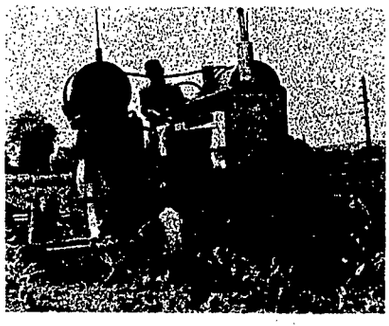

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ical courses make it imperative that they be constantly scrutinized and revised as often as necessary to reflect technological changes. Constant interaction of faculty and staff with members of advisory committees, employers, and indutries in agriculture and natural resources is one of the best ways this can be accomplished.

RELATED-TECHNICAL COURSES

Related-technical courses are so called because they may serve several technical areas. For example, a course in farm machinery or farm power, while obviously technical in nature, may be included in an animal nutrition curriculum to introduce the student to methods used to deliver feed. The same course may be inserted in an agri-business curriculum for the student who wishes to become a crop production specialist, since a knowledge of the equipment used can assist him in making decisions on the job whether or not he ever operates a machine. Other examples of agricultural courses related to several areas would include sanitation and disease control, irrigation and drainage, animal breeding, and soil science.

In most cases, related-technical courses will be offered by the agriculture department. Increasingly, however, business courses, such as business law, advertising, small business management, and accounting are included as related-technical courses in many agri-business and agricultural production curriculums. Since it is apparent that agri-business courses may be taught either in the business or the agricultural department, the question which arises in many colleges is, in which departmental jurisdiction are they to be placed? No matter which department retains ultimate responsibility, the objectives should be worked out carefully and cooperatively between the two. The only major concern should be that the courses meet the objectives of the students for whom they are intended.

Core curriculums can often be developed using the same tech-

nical and related-technical courses to serve students from several specialties. A core curriculum offers several advantages both to students and their institutions. When a core can be developed which is suitable for several curriculums, classes will often be built up to a size permitting economical operation for the institution. This arrangement provides an opportunity for students with diverse occupational objectives to interact and exchange experiences. In addition, core development enables the faculty to spend more time on innovative approaches, such as modularizing the courses in the core curriculum toward a clearly stated set of objectives, and developing educational materials. Such development can individualize instruction which in turn can help to break the lock-step of time limitations for students.

MATHEMATICS AND SCIENCE COURSES

All students in two-year technical agricultural and natural resources programs need a background in mathematics and science. Since the basic objectives of curriculums vary, the courses, too, must vary. They should be designed to meet the needs of the students in specific curriculums.

A theoretical presentation in mathematics or chemistry is probably not the best approach for technical curriculums. Some individuals are able to learn on a theoretical level and translate their knowledge into a practical and usable tool. However, most students who enroll in technical curriculums are unable or unwilling to do so. The theoretical course can become an obstacle standing in the way of occupational objectives rather than a basic tool of knowledge the student needs. The same is true of course content. For example, calculus for the agricultural technician could be a formidable barrier, unnecessary and completely useless. The same might be said of quantum mechanics and other similar topics which might be included in first-year chemistry.

Mathematics courses presently offered in agricultural or related curriculums are variously labeled technical mathematics, forest measurements, agricultural mathematics, college algebra, applied mathematics, and business mathematics. A basic chemistry course in one institution may be called introductory chemistry or agricultural chemistry, while in others it may be known as general chemistry or even applied agricultural bio-chemistry. Biology may be divided into the classical courses in zoology and botany or the latter may be called crop botany depending upon the particular institution or curriculum.

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l curriculums require greater emphasis on math and science than others. Coursework to prepare agricultural engineering technicians and animal science technicians, for example, should cover biological science more thoroughly than is necessary for the preparation of individuals entering the agribusiness field. However, the same concern voiced previously concerning business courses must again be mentioned. No matter in what department biology, botany, chemistry, or mathematics courses are to be taught, the objectives of each course should be clearly stated and used to guide those who will be teaching. Input from students and alumni employed in a related field can be very helpful in crystallizing objectives.

In the listing of course titles above, it is apparent that in some instances the same courses in the technical curriculums are also offered in college-parallel programs. It is important to realize that a botany course offered for the student whose objective is to transfer to a four-year institution probably will not adequately meet the needs of the agricultural technician. Courses specifically designed for technical curriculums generally contain less theory and more laboratory practice than do the "transfer" courses. Technicians' courses usually depend less on cognitive skills and more on manipulative skills and application than do the "transfer" courses. In many ways, these courses are mid-way between those offered for "transfer," and the courses with skill training as the main objective.

GENERAL EDUCATION

While the term general education has a variety of interpretations this publication will view general education courses as those concerned with the common knowledge, skills, and attitudes needed by each individual to be effective as a person, a member of a family, a worker, and a citizen. In the expansive view of many educators, any course or educational experience can be included under general education. Courses such as communications, government, human relations, personal hygiene, history, and economics are usually included in this category. However, this list should not be considered all inclusive, since even courses in technical areas may play a general education role.

Since available time is a critical factor in the development of two-year curriculums, the choice of what is to be included must depend on the value of each course. It is important, therefore, that the content of every course included in the curriculum makes a contribution toward meeting the final objectives of its students. This should be true whether the courses are technical, related-technical, mathematics and science, or general education.

Many states require specific patterns of general education, or a total of credits for the associate degree; others have no stated requirements. These requisites vary considerably from state to state and from college to college. A few colleges demand that as much as one-half of the total number of credits be in general education while in a few colleges no general education is needed for a degree. Area vocational schools which offer no associate degrees tend to require much less general education for satisfactory completion than do the community colleges. In short-term skill training courses with limited objectives there probably will be very little time taken for general education. Usually in the longer curriculums of a year or more considerable time will be given over to various aspects of general education.

It has been observed that students tend to avoid those courses which do not clearly contribute to their final objectives, even though this prevents them from graduating. This is not true, of course, in colleges with an inflexible curriculum in which all courses are required. The attrition in technical agricultural curriculums is frequently caused by failing grades in some of the general courses. Those planning general education for technical students should try to direct course objectives toward realistic requirements that will seem helpful and interesting to students fulfilling career choices. Quite often, the request by an occupational educator for a change in general education, or other course requirements is equated with the lowering of standards. On the contrary, the realistic and meaningful preparation of students, not easier graduation requirements, is oftentimes the reason for change. Those responsible for course development should give careful attention to requests for course alterations.

LABORATORY EXPERIENCE COURSES

The importance of laboratory, shop, and field work in a technical agricultural and natural resources education cannot be overstated. These curriculums simply cannot be meaningful without laboratory experiences. As a minimum bench mark, laboratory time should approximately equal time spent on theory. Most of the technical, related-technical, and basic science courses should include regular lab as an integral part of instruction.

While skills in technical education do not have to be mastered to the same degree as those for craftsman training, laboratory experience is imperative if students are to learn basic skills, and the use of equipment appropriate to their field. The laboratory is a place to apply and test some of the knowledge obtained from lectures. If it is to be of maximum value to the student, he must

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If laboratory tools and machines are typical of those used in industry, students will be moved one step closer to the attainment of job entry skills. However, there is an obvious economic limit imposed when a college attempts to create a series of industry duplicates. Many institutions, rather than duplicating large and expensive equipment, use the community as the laboratory. Either through class visits or individual interaction with industry — on the farm, in the elevator, or on the ranch — students gain experience and observe operations, in reality, not in a mock-up.

BALANCE OF COURSES

In curriculum planning, choosing the number of courses of each type to offer is usually difficult, although adherence to a set of clearly stated objectives should be a great help. A study of technical curriculums in agriculture and natural resources from postsecondary educational institutions across the nation indicates that the following is the average ratio of credits offered in the various course areas:

Technical Courses	40-50 per cent
General Education Courses	20-30 per cent
Mathematics and Science Courses	10-15 per cent
Related-Technical Courses	5-10 per cent

This balance is not standard across the country and often differs for two curriculums within the same institution. However, if a curriculum is introduced and then subjected to constant assessment, evaluation and revision, the balance between the various types of courses will be resolved.

OCCUPATIONAL EXPERIENCE

A formalized arrangement for students to participate in an on-the-job occupational experience while enrolled in an agricultural curriculum is offered by many educational institutions. The arrangement may be called by a variety of terms, including work experience, cooperative employment, or work-study.

Most students enrolled in occupational education welcome the opportunity to earn money in a job related to their studies while they learn. Students may work in nurseries, on a farm, in the forests, at grain elevators or feed yards, for farm machinery and equipment companies, in processing plants, or at a variety of other jobs approved by their college. Employers pay the going wages for work performed and they retain the right to hire and fire the student as they do with any other employee.

The value of cooperative employment cannot be too highly praised. Students who participate in these programs gain competency and experience that cannot be obtained in the classroom. They are usually better technicians when they enter the full-time job market than students who have not had the same opportunity. Many of these students are invited to return to work on a full-time basis by the same employer. Employer and employee have had the opportunity for mutual evaluation. In a few cases, work experience encourages a student to leave the curriculum in which he had originally enrolled. Some students find they don't like the type of work involved while others leave to accept full-time employment prior to completion of the curriculum.

Occupational experience programs are conducted in several different ways. Many institutions require, as a condition of graduation, that their students take a paid job related to their area of study, at least during the summer period between the two years of attendance. In other institutions, the curriculum is arranged to provide time for two quarters of occupational experience prior to graduation. This is most easily accomplished by having two individual students cover one job on a staggered attendance system. A few colleges require a period of successful employment in a related field after all course requirements are completed before the degree will be granted.

Employment experience of this type gives the student an opportunity to work with machines and equipment often too expensive to be purchased by the sc
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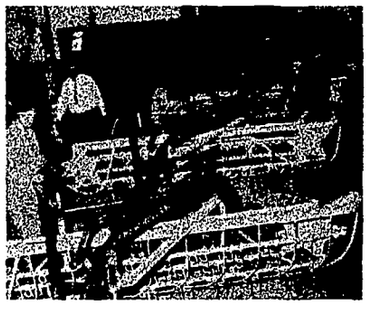
It is important in implementing an occupational experience program that careful consideration be given to the work experience stations where students will be employed. Employers need to be sympathetic to the program and willing to devote some time to working with students, giving them as wide a variety of experiences as possible. Time must be allotted for a faculty or staff member to visit these stations periodically and supervise the activities of the students. Close supervision should help the employer to furnish his students with a variety of experiences, and will assure the school that he is not exploiting students for menial labor.

Some institutions allow course credit for work experience, but the primary purpose is to provide practical know-how. If the credit system is used, the equivalent of one semester, or two quarters of credit is usually the maximum granted. Though occupational experience may not be a requirement for graduation, it is usually strongly recommended.

As an alternative to outside employers, some colleges own extensive, well established farms on which students may obtain some occupational experience. Colleges are often granted the use of parks, botanical gardens, or arboretums for which they assume responsibility for care and maintenance.



V. WHAT CURRICULUMS ARE OFFERED?

Two-year curriculums in agriculture were traditionally designed to prepare students for work on a farm. Typical studies included crop production, animal husbandry, and farm mechanics. Except for rare exceptions, it was not until the 1960's that a variety of new two-year curriculums were introduced into the community colleges dealing with fields concerned with natural resources, such as forestry, wildlife technology, reclamation, and conservation technology. Also during the 1960's the kinds of curriculums offered in the fields related to agriculture were broadened to include an emphasis on agri-business and other off-farm occupations.

Today, there are more than thirty distinctly different technical education curriculums offered in postsecondary institutions. A sampling of those relating to each of the occupations discussed previously are covered in detail in the following section. These are specific examples of successful curriculums, but should not be considered as models.

AGRI-BUSINESS

Processing and Distribution: Since food processing and related aspects make up the largest, most stable business in the world, employment opportunities abound in quality control, supervision of processing operations, packaging, inspection, and in technical sales and service with firms processing meat, poultry, fish, dairy products, fruits, vegetables, cereals, and beverages. Food processing technicians are also needed by federal, state, and local governmental agencies to fulfill the responsibility and need for constant inspection and enforcement of standards in the quality of food, drugs, and beverages offered in the market place.

Courses included in a food processing technology curriculum focussing on the entire field of processing are illustrated in the

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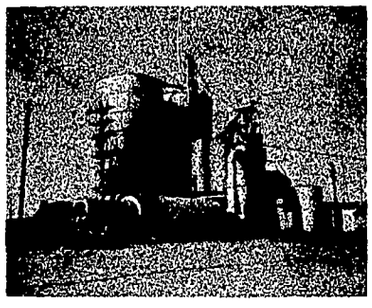

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entire field of processing are illustrated in the accompanying chart. This curriculum, offered at the State University of New York Agricultural and Technical College at Morrisville gives considerable coverage to processing procedures, quality control, sanitation, and equipment. It does not include the distribution aspect of the field as curriculums offered at other institutions do.

FOOD PROCESSING TECHNOLOGY

STATE UNIVERSITY OF NEW YORK
AGRICULTURAL AND TECHNICAL COLLEGE
MORRISVILLE, NEW YORK

FIRST YEAR

- Food Processing
- Food Grades and Standards
- Food Microbiology
- Chemistry
- Microbiology
- Mathematics
- Communications Skills
- Technical Reporting, Drawing, Sketching, and Diagramming
- Occupational Experience

SECOND YEAR

- Food Packaging
- Quality Control
- Food Processing
- Food Plant and Environmental Sanitation
- Food Plant Equipment
- Quantitative Chemical Procedures
- General and Industrial Economics
- Industrial Organizations and Institutions

Sales and Service: There is an increasing need for knowledgeable technicians to supply goods and services to the farmer, and to conduct the same type of activities among various agricultural businesses. Employment opportunities for technicians are probably more numerous in this general area than in all the other areas combined. The postsecondary technical curriculums were developed, for the most part, during the 1960's. They combined specialized courses in both agriculture and business for the first time.

Curriculums considered to be in this category include grain, feed, seed, and farm supply technology; farm chemicals technology; farm equipment service and sales; elevator and farm supply. They may be categorized as agri-business. These curriculums have the specific objectives of providing the specialized training necessary to enable the student to accept employment in feed, grain, and farm supply firms as feed men, grain men, salesmen; in managerial positions; or work with farm equipment dealers as salesmen, partsmen, and service technicians.

Examples of specific curriculums in these sales and service fields include industrial farm chemicals technology, offered by Northeastern Junior College, Sterling, Colorado, and elevator and farms supply technology offered by the Institute of Agricultural Technology of Michigan State University, East Lansing, Michigan. Also given is the agricultural equipment technology curriculum for the preparation of equipment technicians offered at the State University of New York Agricultural and Technical College, Cobleskill. This curriculum is primarily oriented toward the technical aspects of the field but also includes some training in accounting skills.

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INDUSTRIAL FARM CHEMICALS TECHNOLOGY

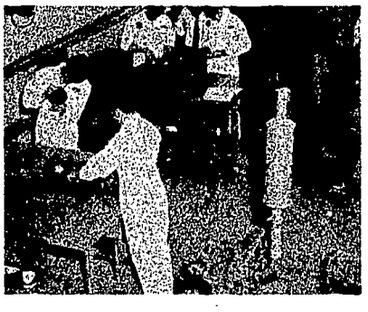
NORTHEASTERN JUNIOR COLLEGE
STERLING, COLORADO

FIRST YEAR

- Agri-business Orientation
- Soil Science
- Agri-business Salesmanship
- Freshman Livestock Judging
- General Chemistry
- Agricultural Mathematics
- Business Mathematics
- General Botany
- Introduction to Organic Chemistry
- Business Communication
- English
- Fundamentals of Speech
- Introduction to Business
- Occupational Experience

SECOND YEAR

- Soil Fertility
- Fertilizer Technology
- Agricultural Pesticides
- Crop Production
- Plant Pathology
- Introduction to Entomology
- Public Relations in Agri-business
- Biochemistry
- Agri-business Management
- Consumer Economics
- Technical Communication
- Bookkeeping and Credit Management



ELEVATOR AND FARM SUPPLY TECHNOLOGY

INSTITUTE OF AGRICULTURAL TECHNOLOGY
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN

FIRST YEAR

- Elevator and Feed Industry
- Cereal, Bean, and Grain Grading
- Farm Crops Production
- Principles of Livestock Feeding
- Soils and Fertilizers
- Agricultural Biochemistry
- Agricultural Economics
- College Bookkeeping
- Writing and Speaking
- Effective Study and Reading
- Placement Seminar
- Placement Training

SECOND YEAR

- Marketing Agricultural Products
- Dairy Feeding and Management
- Elevator Personnel Practices
- Poultry Feeding and Management
- Country Elevator Management
- Swine Feeding and Management
- Elevator Engineering
- Seed and Grain Processing
- Insect Pests and Insecticides
- Retail Merchandising
- Financial and Credit Practices
- Salesmanship

AGRICULTURAL

STATE UNIVERS
AGRICULTURAL
COBLESKILL, N

FIRST YEAR

- Planting and
- Agricultural I
- Agricultural
- Farm Power
- Hydraulics (
- Welding
- Accounting f
- Applied Phys
- Applied Mat
- Communicati
- Drawing, Sk
- Technical R
- Occupational

SECOND YEAR

- Principles of
- Agricultural
- Transmission
- Harvesting E
- Hydraulics (
- Power Unit
- Selling, Distr
- Farm Power
- Advanced W
- General and
- American In

Agricultural Business: A few curriculums in this area are slated to prepare graduates for job entry into the business areas of the agricultural industry. Credit agencies, insurance companies and banks, for example, are in constant need of individuals who have emphasized business education, but who are conversant with agriculture. In curriculums with these objectives, the business courses constitute the technical core of the curriculum while the agriculture courses could be classified as related-technical or general education. The ratio of business and agricultural cours
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AGRICULTURAL EQUIPMENT TECHNOLOGY

STATE UNIVERSITY OF NEW YORK
AGRICULTURAL AND TECHNICAL COLLEGE
COBLESKILL, NEW YORK

FIRST YEAR

Planting and Tillage Equipment
Agricultural Equipment Technology Seminar
Agricultural Chemical Equipment
Farm Power (Gas Engines)
Hydraulics (Basic)
Welding
Accounting for Agricultural Equipment Business
Applied Physics (Mechanics & Electricity)
Applied Mathematics
Communications Skills
Drawing, Sketching, Diagramming
Technical Reporting
Occupational Experience

SECOND YEAR

Principles of Farm Mechanization
Agricultural Equipment Technology Seminar
Transmissions and Final Drives
Harvesting Equipment
Hydraulics (Equipment Applications)
Power Unit Testing and Diagnosis
Selling, Distribution, and Service
Farm Power (Diesel Engines)
Advanced Welding
General and Industrial Economics
American Institutions

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curriculums in this area are
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tion. The ratio of business and agricultural courses varies widely from college to college. In many schools, a number of regular courses from the business department are added to some agricultural courses of a general nature to form the roster. In other colleges, however, specific business courses oriented toward agriculture have been constructed.

Curriculums with these specific business-oriented objectives are usually designated agri-business or agricultural business. The example below represents a group of agriculturally oriented business courses, in this case the plant science option of the

agricultural business and technology curriculum offered at San Joaquin Delta College, Stockton, California. An animal science option is also offered, but the core of business courses, which accounts for twenty-one of the sixty units required for a degree, is identical in both options.

AGRICULTURE BUSINESS AND TECHNOLOGY – PLANT SCIENCE OPTION

SAN JOAQUIN DELTA COLLEGE
STOCKTON, CALIFORNIA

Introduction to Agriculture Business
Management Records
Agriculture Economics
Agriculture Salesmanship
Agriculture Mathematics
Agriculture Marketing
Farm Law
Farm Management
Irrigation and Drainage
Introduction to Agronomy
Economic Entomology
Weeds and Crop Pests
Soil Science
Fertilizers
Plant Science, Animal Husbandry, Agricultural Mechanics, and other electives
General Requirements and Electives

PRODUCTION AGRICULTURE

Even though curriculums related to production agriculture are traditional, they should not be overlooked when planning is underway to train technicians in agricultural and natural resources fields. As pointed out earlier, the number of technicians needed on the farm is increasing, despite general farm employment decreases. When programs are newly established, they should be oriented toward a broad phase of production. For example, curriculums could deal with general areas such as production of field crops, farm animals, poultry, fruits and vineyards, or dairy animals.

Special programs in these areas would vary considerably depending upon the emphasis, and a particular program might not be important in all sections of the United States. Many of them may be one- or two-year curriculums while others need not be that long depending upon the depth of coverage required.

Broad areas of production agriculture that, because of the manpower needs, oug
below.

Field Crop Productio
1. Production of
2. Production of
3. Standards of
4. Irrigation pro

Farm Animal Product
1. Production an
2. Management
3. Efficiency fac

Poultry Production
1. Management
2. Production ra
3. Marketing of
4. Broiler produ
5. Turkey produ

Dairy Production
1. Raising of da
2. Management
3. Dairy records
4. Production ra
5. Artificial inse

Fruits and Vine Crop
1. Deciduous fr
2. Fruit loading
3. Fruit processi
4. Small fruit p
5. Fruit and vin

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CULTURE

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oduction agriculture that, because of the manpower needs, ought to be stressed would include those listed below.

Field Crop Production
1. Production of cereal grains
2. Production of forage crops
3. Standards of production
4. Irrigation problems relating to various crops

Farm Animal Production
1. Production and selection of replacement animals
2. Management of breeding stock
3. Efficiency factors in production and raising farm animals

Poultry Production
1. Management of poultry flocks
2. Production ratios
3. Marketing of poultry products
4. Broiler production
5. Turkey production

Dairy Production
1. Raising of dairy stock
2. Management of dairy herds
3. Dairy records
4. Production ratios and testing
5. Artificial insemination

Fruits and Vine Crop Production
1. Deciduous fruits production
2. Fruit loading and marketing
3. Fruit processing
4. Small fruit production
5. Fruit and vine production

Curriculums have been developed for each of the major areas above. Field and forage crop production technology offered at Mt. San Antonio College, Walnut, California, is outlined below. In some areas, the need for greater specialization has stimulated the formation of more specific curriculums. For example, production of beef is often taught in a separate curriculum.

Other aspects of production agriculture are included in a variety of curriculums. The equipment technology courses shown above have many direct applications to on-farm production. An individual who has completed these could find employment with equal ease on a farm or with an equipment dealer. Many colleges also offer agricultural engineering technology, with emphasis on farm power, or mechanization and automation, areas in which growing numbers of technicians are needed on farms.

FIELD AND FORAGE CROP PRODUCTION TECHNOLOGY

MT. SAN ANTONIO COLLEGE
WALNUT, CALIFORNIA

FIRST YEAR

- Field Crops
- Forage Crops
- Crop Botany
- Agricultural Mechanics
- Soil Science
- Plant Diseases and Pests
- Mathematics
- Agricultural Chemistry
- Agricultural Economics
- Communication Skills

SECOND YEAR

- Cereal Crops
- Weeds and Weed Control
- Crop Marketing
- Seed Production
- Farm Records and Reports
- Farm Power
- Irrigation and Water Management
- Farm Management
- Farm Machinery
- Soil Management
- Social Science
- Occupational Experience

ORNAMENTAL HORTICULTURE

Some institutions offer a single, general curriculum in ornamental horticulture. Others provide a series of options, usually in the second year, based on a first-year core curriculum. Still others may offer separate coursework in one or more specific areas.

There are at least five major areas to be considered when developing curriculums in ornamental horticulture. *Floriculture* is the field concerned with both the wholesale and retail production and marketing of flowers. *Nursery operation* curriculums, usually offered as options, include education and training for propagating, growing, harvesting, and marketing landscape shrubs, trees, and plants. *Landscape* development curriculums cover the fundamentals of good design, plus the study of plant materials, where and how to use them. A fourth area of orna-

ROP PRODUCTION

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major areas to be considered when ornamental horticulture. *Floriculture* both the wholesale and retail produc- vers. *Nursery operation* curriculums, include education and training for rvesting, and marketing landscape *Landscape* development curriculums good design, plus the study of plant to use them. A fourth area of orna-

mental horticulture, also usually offered as an option, is *arboriculture.* This is concerned with all kinds of tree work such as planting, pruning, transplanting, fertilizing, and bracing. For those who wish a career working with *turf grass*, another ornamental horticulture curriculum that at some colleges is offered as an option and at other colleges is a separate curriculum, it provides education in the fertilization, pest control, moving and management of turf areas such as home lawns, cemeteries, parkways, playgrounds, campuses, and golf courses. A turf grass management curriculum at the State University of New York Agricultural and Technical College at Farmingdale, New York, is given below as an example.

TURF GRASS MANAGEMENT

STATE UNIVERSITY OF NEW YORK
AGRICULTURAL AND TECHNICAL COLLEGE
FARMINGDALE, NEW YORK

FIRST YEAR
- Horticultural Applications
- Turf Grass Culture
- Turf Grass Management
- Horticultural Soils
- Herbaceous Plants
- Woody Plants
- Entomology and Plant Disease Control
- Chemistry
- Mathematics
- Botany
- Communications Skills
- Technical Reporting
- Occupational Experience

SECOND YEAR
- Landscape Plans
- Horticultural and Turf Grass Equipment
- Landscape Contracts and Specifications
- Turf Grass Management
- Turf Grass for Golf Courses
- Landscape Construction
- Landscape Surveying
- Tree Pruning and Repair
- Drainage and Irrigation
- Salesmanship
- Business Organization and Management
- General and Industrial Economics

ANIMAL TECHNOLOGY

Technicians are needed by animal breeders and zoos and are being increasingly accepted in veterinary hospitals. There is also a large need for technicians in drug companies, chemical firms, universities, and hospitals that use animals in research. Some curriculums offered in postsecondary schools now specialize in small animals, as in laboratory animal technology; others include consideration of all animals.

An example of a curriculum in this field is veterinary medical technology offered at Central Carolina Technical Institute at Sanford, North Carolina.

VETERINARY MEDICAL TECHNOLOGY

CENTRAL CAROLINA TECHNICAL INSTITUTE
SANFORD, NORTH CAROLINA

FIRST YEAR
- Large and Small Animal Breeds
- Small Animal Care
- Animal Anatomy and Physiology
- Laboratory Techniques
- Animal Parasitology
- Technical Mathematics
- Biology
- Chemistry
- Typewriting
- Grammar
- Composition
- Report Writing

SECOND YEAR
- Veterinary Clinical Practices
- Laboratory Techniques
- Animal Pharmacology
- Small Animal Clinic
- Animal Pathology
- Veterinary Office Practices
- Nutrition
- Oral Communication
- Social Science
- Cooperative Work Experience

CONSERVATION AND ENVIRONMENTAL CONTROL

Preparing personnel who will insure the judicious use of our environmental resources — air, water, soil, plant, and animal life — is a vital function of the broad field of agricultural and natural resources education. Some curriculums in this area have been offered for a number of ye
possibility of national dis
misuse of our environment
use of all natural resources.

Examples of curriculum
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nology, forest management
ural resources managemen
pest control technology, w
graphic technology. The s
forestry technology offere
Science at the University
Hampshire.

FORESTRY TECHNOLO

UNIVERSITY OF NEW HA
THOMPSON SCHOOL OF
DURHAM, NEW HAMPSH

FIRST YEAR
- Elementary Forest Su
- Dendrology (Tree Id
- Forestry Orientation S
- Elementary Forest M
- Applied Silviculture (
- Forest Soils
- Technical Mathematic
- Botany
- Technical Drawing
- Elementary Business
- Communication Skills
- Technical Reporting
- Occupational Experie

SECOND YEAR
- Forest Business Meth
- Timber Harvesting
- Advanced Forest Sur
- Outdoor Recreation
- Forest Products Utili
- Forest Protection
- Advanced Forest Me
- Forest Photo-Interpre
- Wildlife Ecology
- Regional Forest Practi
- Personnel Manageme
- Elements of Social Sc

offered for a number of years; however, current awareness of the possibility of national disaster, brought on by the continued misuse of our environment, has heightened interest in the wise use of all natural resources.

Examples of curriculums in the area of conservation and environmental control include: soil and water conservation technology, forest management, fish and wildlife management, natural resources management, parks and recreation management, pest control technology, water pollution technology, and oceanographic technology. The specific example given for this area is forestry technology offered by Thompson School of Applied Science at the University of New Hampshire, Durham, New Hampshire.

FORESTRY TECHNOLOGY

UNIVERSITY OF NEW HAMPSHIRE
THOMPSON SCHOOL OF APPLIED SCIENCE
DURHAM, NEW HAMPSHIRE

FIRST YEAR

Elementary Forest Surveying
Dendrology (Tree Identification)
Forestry Orientation Seminar
Elementary Forest Measurements
Applied Silviculture (Tree Production)
Forest Soils
Technical Mathematics
Botany
Technical Drawing
Elementary Business Management
Communication Skills
Technical Reporting
Occupational Experience

SECOND YEAR

Forest Business Methods
Timber Harvesting
Advanced Forest Surveying
Outdoor Recreation
Forest Products Utilization
Forest Protection
Advanced Forest Measurements
Forest Photo-Interpretation
Wildlife Ecology
Regional Forest Practices and Utilization
Personnel Management
Elements of Social Science

VI. GETTING IT TOGETHER

After a thorough review of the philosophy, goals, and objectives of the college a decision must be made to develop one or more curriculums in agriculture and natural resources, provided, of course, that it is feasible for the college to do so. A complete occupational survey has been conducted by the college, and it has been determined that the need exists and an adequate number of job opportunities are probably available for those students who will successfully complete the programs. In a separate study it has been determined that a substantial number of students are interested in the curriculums and will probably seek admission if they are offered. What are the next steps in implementing the development of these curriculums?

ORGANIZATIONAL STRUCTURE

The most common organization places administrative responsibility for all agricultural and natural resources programs with a

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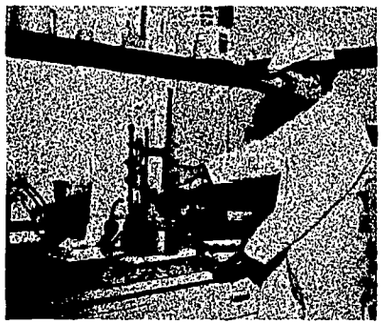

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ation places administrative responsi-
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department head or dean. This structure works well when the top levels of administration understand the philosophy of occupational education and allow the dean or department head to be responsible for the details of operating the program. The administrator chosen to head the program should have equal rank and responsibility with those heading other departments in the college and should be on the same salary level. Since practical experience is desirable for administrators and teachers in agriculture and natural resources, a system of compensation equating experience with academic degrees or graduate work should be considered.

The dean or department head should take charge of curriculum development; a consultant may be employed to develop the program so long as the department head is hired in time to get involved in staff selection. One method that is completely unacceptable, yet is still used by many educational institutions,

involves creating the program from written materials, or "copying" the curriculum of another college, and only employing faculty and staff a short time prior to the first class meeting.

After the department head is selected and the initial curriculum development has taken place, the next steps should be the appointment of an industry advisory committee, selection of staff, and provision for students. These steps should precede the purchase of equipment and should tend to insure the proper priority of expenditures. They should also precede the selection or development of teaching materials for the curriculum.

INDUSTRY ADVISORY COMMITTEES

The importance of selecting and using an industry advisory committee for the entire agricultural and natural resources program or separate committees for each of the curriculums cannot be overemphasized. The committee should act in an advisory capacity only, and should not be a policy-making body. A good committee, used properly, can be helpful in many ways. It can:

1. Help officials of the college assess the need for specific curriculums in agriculture and natural resources
2. Help develop curriculums and offer suggestions to assist in keeping them current
3. Locate cooperating firms
4. Assist in graduate placement
5. Recruit new students
6. Raise financial support for scholarships and programs
7. Suggest and evaluate new ideas and techniques used by the instructional staff.

Advisory committee members should serve at the request of the college president. They should be appointed to specific terms, renewable upon the request of the department.

FINANCING

A financial plan should be prepared before any program or individual curriculum is established. Operating and capital costs, and revenues, should be projected for a period of at least five years. When a new curriculum is initiated, the institution must commit itself for this period of time to ensure the latitude necessary for curriculum development and implementation. At the end of this period, with graduates working in the field, a complete evaluation of the curriculum can be made.

Funds for the introduction of a curriculum in the fields of agriculture and natural resources may be derived from several sources. A fact well understood by those administrators dealing with a variety of fundin
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Complete financial plans
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3. Library, audio-visual
4. Projected enrollment
5. Operational plan

TEACHER RECRUITME

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with a variety of funding sources, but one which program planners and those at the division or department level should be aware, is that many of these funds may be offered on a local matching basis, requiring one or more local dollars for each granted dollar, or will be paid on the basis of reimbursement of after-the-fact expenditures. Such grant conditions should be well understood by everyone prior to committing funds. Miscellaneous sources of funds may include federal funds, administered either from federal offices or through state agencies; state appropriations; local revenues; private foundations; and student tuition.

Complete financial plans should include provisions for:

1. Facilities, staff, and equipment
2. Administrative, clerical, and overhead costs
3. Library, audio-visual, and other learning materials
4. Projected enrollment
5. Operational plan

TEACHER RECRUITMENT

The extremely rapid growth in the number and size of curriculums has resulted in shortages of qualified teachers in certain specific fields, as well as in some geographical areas. Projections indicate that the shortage will probably continue during the next few years. The selection and preparation of faculty is discussed in the next section of this publication. The fact that a shortage may exist in the number of teachers available warrants some administrative concern. If it does exist, a shortage will mean there is competition for available staff or even for the individuals who could become qualified by in-service training.

The college can be of great assistance to the person who must recruit new faculty if, for example, a salary scale is adopted commensurate with similar positions in business and industry. Furthermore, each level on the salary scale should be obtainable through qualifications realistic for the type of individuals likely to be recruited. For example, the qualifications and requirements for placement and advancement on the salary scale should take cognizance of job experience by considering it in some equitable fashion as an alternative to professional training and experience.

Other factors which will assist in attracting good teachers include availability of supportive personnel, such as laboratory assistants and secretarial help; travel allowances for attendance at professional or trade meetings; opportunities to make field visits to industry; opportunities for in-service training and education; and sabbatical leaves.

VII. FACULTY SELECTION AND TRAINING

DESIRABLE CHARACTERISTICS

Ideally, an individual selected for a teaching position in a postsecondary occupational area should be more knowledgeable, though not necessarily more highly skilled, than someone in a similar position in a secondary school. Nevertheless, such an individual should not be as research- or discipline-oriented as is often the case with individuals holding the doctorate. This is not to say that the Ph.D. degree should, in and of itself, disqualify an individual from being selected for such a position; but a doctorate should not be a stated requirement for these teaching positions. The requirements, qualitatively stated, would be that the candidate should have sufficient mastery of the skills in his field of specialization to be able to demonstrate them in a precise and sure manner to the students and he should be able to evaluate and correct others' errors in their application. The candidate must have sufficient academic background to understand, interpret, and explain technical knowledge related to his field. He should have had instruction, at the very least, in the skills of classroom management and instructional organization. Enthusiasm, cheerfulness, friendliness, and practicality are desirable traits in all teachers in occupational education areas.

TWO SOURCES OF TEACHERS

The most common minimum educational requirement for a teacher in a postsecondary agricultural program is probably the master's degree in a discipline specialty. In many instances, a strong minor in another area is also required. However, in as many other cases, a master's degree in a professional area is acceptable if the bachelor's degree was in a discipline specialty. It is recommended that no higher degree than the master's be considered as a qualification or requirement for appointment or advancement in faculty positions. In addition to the minimum education requirement, the prospective teacher should have engaged in a period of practical experience in a field closely related to the one in which he will be teaching.

While the academic path described above is now the most common source of faculty members, business and industry form another source o
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VII. FACULTY SELECTION AND TRAINING

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cademic path described above is now the most e of faculty members, business and industry form another source of teachers, particularly on a part-time basis. Teachers recruited from these areas may vary widely in practical background, education, and degrees. They may include employers, former students of the college's programs, or former teachers who are working or have worked in industry. The principal advantage of employing this type of teacher is that he brings with him up-to-date technical experience from the field. It is usually imperative that a teacher from this background have some professional knowledge and skills to enable him to become a good teacher. Some colleges offer assistance in attaining these to individuals either through preservice or in-service courses on their own campus. Others require the faculty member to attend a nearby four-year institution to get the desired courses in a minimum time.

Allowances for work experience on some equivalent basis to professional or education background are important if the college is to attract good people from industry. It is usually advantageous for a faculty in an agricultural and natural resources curriculum to have some individuals with this type of background. Teachers who have spent long periods working in the field in which they are teaching tend to gain the respect of the students faster than other teachers.

PRESERVICE STAFF SELECTION

The dean or department head should always be alert to identify individuals interested in becoming teachers. Those working in industry or government, or vocational agriculture teachers in secondary schools who have the educational background may be sources.

When new faculty are needed, many colleges provide candidates with funds for travel and meals. This allows the prospective teacher an opportunity to see the college's facilities, meet with the staff, and observe the community. It also enables the faculty and staff of the college to interview the candidate more thoroughly than would usually be possible off the campus.

The fact that the job is primarily teaching and not research should be stressed when employing a new teacher. That teachers in the agricultural programs must spend a great deal of time with students outside of class, on the job or farm, should be openly discussed and understood.

IN-SERVICE TRAINING

Orientation of new teachers, regardless of experience, is of the utmost importance. All new faculty members should be brought

into the college at least two weeks prior to the time their official duties and responsibilities begin. Part of the orientation should be on matters of college-wide concern and should probably be conducted with new teachers from all departments. In addition, each dean or department head should be allotted time to spend with new teachers. Such topics as philosophy, departmental procedures, instructional media, and grading should be extensively discussed. For example, if the college owns a school-farm laboratory, it will be necessary to understand completely its use by students and faculty.

New teachers should be visited by the dean or department head in the classroom at least once each semester during the first year. Additional visits by other faculty members should also be encouraged. Any constructive criticism should be given as soon as possible afterward in an individual or a department conference with the teacher. It may also be desirable to offer direct assistance during certain other times such as the first grading period.

In-service training should not be limited exclusively to new teachers nor restricted to operational or administrative matters. It is important that all teachers keep current in their respective fields. This may be done by holding short on-campus courses at the college by bringing in special consultants, or having individual faculty members conduct sessions in their areas of specialty. Conferences with advisory boards, summer work in industry, active participation in professional and technical societies, sabbatical leaves, and subscriptions to appropriate technical journals are other ways in which the college can encourage, support, and assist faculty members to stay abreast of technical developments.

WORK LOAD

Since laboratory work is an absolute necessity for occupational education curriculums, it is desirable to have laboratory hours equated equally with lecture hours when evaluating faculty load. In programs where work experience or other activities are conducted off campus, and are a part of the regular program, adequate time should be allotted to the teacher for on-the-job supervision of students. The average assigned work load for a teacher in an agricultural program should certainly not exceed twenty classroom hours per week; in many colleges, this total is below eighteen with a few assigning as little as fifteen.

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limited to that unit size or multiples of it. The use of teaching assistants can be helpful in handling larger laboratory classes. Team teaching has been used very successfully in such courses as livestock judging and selection of farm tractors where individual instruction is desirable and safety is a factor; it could probably be used to great advantage in many other courses.

ATTITUDES AND PHILOSOPHY

Perhaps just as important as educational background or experience is the attitude and philosophy of the teacher. Members of the instructional staff as well as the administration must fully understand and be committed to the role and goals of occupational education. Without this understanding and commitment, no program of occupational education will be successful. Faculty members must remember that their primary task is teaching not research. They must be ever mindful of the needs of their students who have chosen occupational programs. As teachers they must be current, keeping the instruction relevant to the needs of their students, and keeping them motivated. They must be innovative and flexible, to insure that each student has the maximum opportunity to learn in whatever manner is best for him. The teacher should be able to constantly relate the material being discussed in the classroom and implemented in the laboratory with its application to industry and the jobs students will eventually perform.

One other very important consideration for success in occupational education is the attitude and philosophy of the faculty members teaching courses the students may take outside the agriculture department. The total faculty of the college should have the same basic goals and objectives. This is impossible without close cooperation between the teachers of the technical courses in agriculture and the courses in general education mathematics and science. Students must be motivated as strongly to learn about English or history as they are to learn about animal science or crop production. The teachers in these other courses must be aware of the needs of industry, to enable them to offer the student what he needs. Course objectives should be clearly laid out and should be reasonable and practical. It is important that faculty members of the agriculture department support those courses, and not denigrate them as has sometimes been the case. Teachers should not be forced to teach occupational students, but rather, should be hired to do so. If they are not philosophically committed to the need for this type of education, the results will be quite negative.

VIII. SUPPORTIVE SERVICES

PUBLIC INFORMATION

A successful occupational education program requires many non-academic or supportive services to supplement the curriculum. These services are especially important when a new program is being offered. Getting information to students, parents, counselors, and the general public is difficult. Many colleges have public information officers to help with the process, but these men are not experts in the agricultural and natural resources fields. Therefore, if they are to do an effective job of communicating to the public concerning the new or on-going programs, they must have input from all members of the faculty and staff. All media should be used, including newspapers, radio, and television.

Other methods and techniques for informing the public about new programs which have been used successfully by colleges include:

1. Conducting field days, or visits to the campus for groups from secondary schools
2. Conducting open houses for the public to visit the campus
3. Visiting schools to talk to faculty and counselors involved in advising students about college and careers
4. Participating in career days at public schools
5. Furnishing speakers to service clubs or other community groups to describe new programs
6. Preparing brochures, pamphlets, catalogs and yearbooks to be distributed to the public and to schools
7. Informing all college personnel about new programs, including student personnel offices, department secretaries, and telephone operators.

STUDENT RECRUITMENT

Recruiting students is a continuing problem for many programs in occupational education. Even with the implementation of the complete public information effort outlined above, a lag of one or more years may be expected between the time a new curriculum is offered by the college and the time when students come to the campus to enroll in large enough numbers to operate economically. Expanding job opportunities for women in fields related to agriculture and natural resources should be publicized, and qualified female students should be recruited as actively as male students. The growing number of opportunities in urban areas should be similarly publicized, and recruitment should be active in the cities as well as rural areas from which most agriculture students have traditionally come.

The recruiting programs should be spearheaded by the agriculture department by close contact with counselors and the public. The agriculture staff should meet occasionally with secondary school agriculture teachers and with 4-H and FFA groups.

COUNSELING

Although the stimulus for public information and recruiting impetus must usually come from the agriculture department, college counselors can greatly assist in the effort. While counselors must represent all departments and cannot cater to anyone, it is imperative that they be well informed about new programs and changes, to enable them to supply incoming students with correct information. The agriculture department must accept the responsibility of keeping the counseling department up to date.

Counselors should always have a supply of current brochures or information to give to students. Furthermore teachers should talk with the counselors as frequently as possible concerning their students, and their abilities, interests, and progress.

PLACEMENT AND FOLLOW-UP

In the absence of any actual evaluative process, the best measure of the success of any program is the ability of its graduates to get and hold on to jobs in a related field. Many colleges have placement offices specifically for this purpose, while in many others, placement of students is entirely the responsibility of the department. However, whether there is a placement office or not, the dean or individual faculty members will often get calls requesting graduates for positions. Placement, in this way, becomes their concern. Both the faculty and placement office should maintain close liaison with potential employers. In times when jobs are plentiful it will usually be impossible to fill all requests. Nevertheless unfilled requests are useful for counseling since they indicate where job opportunities exist.

Many institutions maintain job placement files on each student for a period of time after graduation. It is useful to maintain them for follow-up studies and institutional research. If these files should include students who complete certificate curriculums, as well as those who complete technical, or other degree programs, it is recommended that it be maintained on as many of those who drop out as possible to provide a complete picture of the service the department is rendering. Files such as these can be of assistance in upgrading students who are already employed if a better job occu
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employed if a better job occurs. These records are invaluable for evaluating the instructional program.

Former students should be encouraged to write or visit the school and discuss their situation with former teachers. If a student is moving to a new or better job, this may mean an opening for another recent graduate. Former students can also suggest curriculum changes that should be made, and new techniques that could be installed in the program. These individuals can be of immeasurable assistance to the recruiting program by illustrating the success of the program and by helping to explain to the prospective student what the world of work expects from a technician.

SUMMARY

With all the changes in our farms and technology, agriculture, in its broader sense, has taken on new meaning. Many new jobs have evolved in areas such as agri-business, food technology, wildlife, conservation, international agriculture and environmental improvement, and recreation. Even though the number of farms is declining, the demand for educated personnel is increasing.

Educators contemplating the addition of a department of agriculture and natural resources should take note of the many considerations covered in this publication. Even though there are many new curriculums, not every postsecondary institution should attempt to assemble a program. In some states or regions, it may be best to designate certain curriculums for particular schools, and allow students to move freely from one area to another. Once the decision has been made to establish a department, schools should make certain they are capable of furnishing all of the necessary related courses, as well as supportive educational services needed for a successful curriculum.

BIBLIOGRAPHY

Heady, Earl O., and others. *Manpower Requirements and Demand in Agriculture by Regions and Nationally, with Estimation of Vocational Training and Educational Needs and Productivity.* Ames, Iowa: Iowa State University, 1966. 26 pp. (Ed 016-979 MF $.25, HC $1.40).

Carpenter, Earl T. and Rodgers, John H. *Review and Synthesis of Research in Agricultural Education.* Second edition. Columbus, Ohio: ERIC Clearinghouse on Vocational and Technical Education, The Center for Vocational and Technical Education, Ohio State University, June 1970. 83 pp. (VT 010 881).

Manley, Fred W. *1968–69 Directory — Technical Education Curriculums in Agriculture and Natural Resources in the United States of America, (also containing 1967–68 and 1966–67 Directories).* Occu
Public Instructi

Sidney, Howard,
graphic Techni
ing Company, I

Harris, Norman
tions," *Occupat*
Out. American
for Vocational
1969. 10 pp.

Center for Resea
and Technical
Agricultural E
Columbus, Ohi

rectories). Occupational Research Unit, State Department of Public Instruction, Raleigh, North Carolina, Sept. 1969. 51 pp.

Sidney, Howard, editor. *Agricultural, Forestry, and Oceanographic Technicians.* Chicago, Illinois: J. G. Ferguson Publishing Company, 1969. 344 pp.

Harris, Norman C. "Identifying New and Emerging Occupations," *Occupations and Education: Leaders in the Field Speak Out.* American Association of Junior Colleges, and the Center for Vocational and Technical Education, Ohio State University, 1969. 10 pp.

Center for Research and Leadership Development in Vocational and Technical Education. *Report of a National Seminar on Agricultural Education Preparing Agricultural Technicians.* Columbus, Ohio: Ohio State University, 1964. 188 pp.