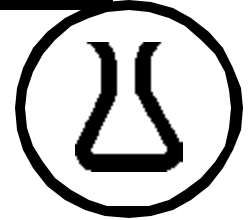


# Agronomists



## Occupational Brief Title Codes:

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## Work Classification Based Related

### D.O.T. Occupations:

- Animal Scientists
- Foresters
- Horticulturists
- Range Managers
- Seed Analysts
- Soil Scientists
- Wood Technologists

## Interests Based Related

### G.O.E. Occupations:

- Botanists
- Forest Ecologists
- Horticulturists
- Plant Breeders
- Plant Pathologists
- Range Managers
- Soil Conservationists
- Soil Scientists
- Wood Technologists

## Skills Based Related

### O\*NET Occupations:

- Agricultural Inspectors
- Animal Scientists
- Farmers and Ranchers
- First-Line Supervisors and Manager/  
Supervisors-Agricultural Crop Workers
- First-Line Supervisors and Manager/  
Supervisors-Fishery Workers
- Purchasing Agents and Buyers, Farm  
Products
- Soil Conservationists
- Soil Scientists

*Agronomists* (a`gron-o-mists) work with field crop production and soils management to develop higher yields, better crop varieties, and higher quality products while maintaining or improving the environment.

The well-being of humanity depends on a profitable and sustainable agriculture. Gardeners, farmers, and ranchers depend on soils and the crops that grow on them. Bankers give or refuse loans to landowners according to the value of the land. Geneticists produce new crop strains with special traits. Seed technologists assure consumers of high quality seeds for farms, vegetable gardens, flowers, and turf. Conservationists work to save soil and water resources.

The growing population, combined with food shortages, is a major concern of agronomists. They are helping to maintain and increase food production and thus alleviate hunger throughout the world.

Agronomists develop improved methods of planting, cultivating, fertilizing, and harvesting crops. They analyze soils to check fertility, increase yields, control crop quality, and reduce erosion. Their efforts also help to control diseases, insects, and weeds.

A major concern of agronomists is the environment. They conduct all their processes with a strict adherence to environmental standards. In fact, they improve these standards whenever and wherever possible.

## Work Performed

Agronomists may deal with one or many branches of crop science and soil science. They may do research, teach, work in agricultural extension programs, or apply what they know about field crops and soil management to practical use. Generally, they work in soil and water resources and crop sciences. In all their work they are careful to maintain and improve environmental standards.

## Crop Production and Management

Agronomists in crop production and management work to find the most efficient ways to produce and use crops. They study seedbed preparation, and how plants respond to changing soils and water and fertilizers applied. They search to establish the best methods and the best times to plant and cultivate crops. They look at procedures for rotating and harvesting crops.

Agronomists search for methods to control diseases, weeds and insects, and to minimize weather stress on crops. To find the best procedures, they test and note the responses of plants to heat, cold, rain, wind, length of day, and sunlight. They observe the quality, yield, and ripening time of crops.

Agronomists also study the effects of soil, physical, and chemical characteristics, water level, and drainage on crop plants. They keep in mind the rules for correct land use, as well as the profits. They use their knowledge of plant structure (both normal and abnormal), entomology (study of insects), ecology, soil conservation, soil science, and other studies that relate to crop growth and yield. They continually evaluate results from their tests and studies.

## **Crop Improvement**

Agronomists in this area breed new crop strains. They produce seeds and plants that resist disease, insects, drought, winterkill, or other crop destroyers. Using both traditional cross-pollination and high-tech molecular DNA genetic techniques they develop plant or seed strains with a higher yield or better quality. Using tissue culture they may grow cells in test tubes to develop plant strains that will meet specific criteria: special kind of grain sorghum, for instance, that can be harvested with a combine.

Agronomists select techniques of growing ground cover plants that will minimize soil erosion. They may develop plants with heavy root systems that help the soil hold water and at the same time allow drainage. They find ways to use unique plants collected from around the world. Hybrid strains of corn and alfalfa, for instance, give growers high-yield crops that resist disease, are drought and heat tolerant, and are easy to harvest.

## **Soil Improvement**

Research in soil chemistry helps improve crop yield and quality. Since soils vary in their makeup, they may need different chemicals to make them productive. Limestone and chemical fertilizers help soil be more productive. To avoid plant stress, agronomists test soils and plants to determine their nutrient needs and to match soils with crops.

Much research is very technical. Agronomists use computers, electron microscopes, radioisotope detectors, satellites, and telemetry units. In remote sensing, agronomists collect information from satellites to identify crop types and presence of diseases, and to determine the moisture content of both crops and soils.

With these data they can predict crop yields both in the United States and overseas. This input can be valuable to policymakers who make decisions on both domestic and foreign affairs, and to individual farmers.

## **Soil Survey and Classification**

Any project that deals with land requires a study of the amounts and kinds of soil in the soil system. Agronomists determine the physical and chemical properties of samples in the field and in the laboratory. They sort soil units by origin, form and structure, or use. They group soils by water-holding capacity, texture, fertility, content of clay minerals, drainage, and sources that make up the soils.

Agricultural industry, planning boards, and groups such as land developers use these facts to choose sites least damaging to the land and best suited to human needs. Knowledge acquired from these studies is useful in airport construction, road building, waste disposal, and building construction.

## **Soil and Water Management**

Some agronomists work in soil and water management. The many demands on the soil and increased cropping

have made soil management a complex science. Two demands are food production and water control for irrigation, recreation, industry, and home use. Soil management takes in chemistry, physics, mineralogy, microbiology, and soil fertility.

The principles of soil management apply wherever plants grow—tundra, desert, range, forest, or farmland. Agronomists in soil management work not only to make the land yield more bountiful crops but also to improve human and animal nutrition. They test soil to learn whether it has the components required for productive plant growth.

Agronomists may decide which chemicals or what tillage the soil needs to keep it healthy. Their efforts have brought about contour and terrace farming, and minimum tillage. These practices keep the soil from washing into waterways.

## **Environmental Quality**

Agronomists are concerned with the soil-plant-air-water system as it relates to the environment. They are conducting research on the use of soil for recycling solid wastes, and on the movement of chemicals like pesticides from soil to surface and groundwater. They are developing ways to correct chemically contaminated soils, and have studied the impacts of acid rain on soil and plants.

## **Working Conditions**

Agronomists working in offices and laboratories work in clean, comfortable, and well-lighted surroundings. Other agronomists work outdoors in all kinds of weather and in all kinds of settings. Those in fieldwork may deal with rough terrain, mud, dust, and insects in the United States and in developing nations worldwide. Those working for the government, cooperative extension programs, and other agencies may travel. Some work in rural districts. Others work in and around cities.

## **Hours and Earnings**

Many agronomists work regular hours. Those in research often work long or irregular hours. Those in agricultural extension work have no set hours. During the day they may drive their car to check on projects. Meetings in the evening are common. Agronomists in industry laboratories work company hours, but those with more contact with the public through sales or consulting may have more irregular hours.

According to the Bureau of Labor Statistics, which classifies agronomists with all other food and agricultural scientists, in the year 2000 these workers earned an average of \$52,160 a year. Wages ranged from a high of more than \$83,740 a year to a low of less than \$31,910 a year. Earnings vary depending on geographic location, employer, and years of experience.

## **Education and Training**

Educational requirements depend on the kind of work agronomists do. For almost all jobs they should have at least a bachelor's degree. Many jobs require a master's or a Ph.D. degree.

High school students should have a firm background in biology, physics, mathematics, and computer science—as well as English. In college students expand their studies of these sciences and also study other subjects like geology, botany, and microbiology. They should take courses like genetics, plant pathology, soil chemistry, plant physiology, entomology, biochemistry, meteorology, and other applied sciences. Mineralogy and crystallography (the system and structure of crystals) are valuable subjects. Courses in social sciences and a foreign language will help these scientists learn to work with people.

Many jobs, especially those in teaching, research, and agricultural extension services, require agronomists with a master's or a doctoral degree. Further study may consist of a soil science or crop science specialty.

As a rule, graduate students must complete fieldwork and research, along with classroom studies. They must also prepare a thesis or a dissertation on research they have conducted.

## **Certification and Professional Societies**

The American Society of Agronomy is a scientific and educational organization dedicated to fostering research, communications, education, and professionalism among people working in agronomy and related activities. Affiliated with the American Society of Agronomy are the Crop Science Society of America and the Soil Science Society of America for individuals who specialize in one of those two distinct sciences. The American Society of Agronomy carries on a Certification program for agronomists, crop scientists, specialists, and soil scientists. It identifies individuals who have met and maintain standards in education, knowledge, experience, and ethics.

## **Personal Qualifications**

Agronomists must be able to work well both alone and with people. Agronomists should be alert and intelligent. They should have good work habits, an interest in nature and the environment, and perseverance. A creative imagination and keen observational skills are important for research. A good command of English will help them explain issues and write clearly about their findings.

Occupations can be adapted for workers with disabilities. Persons should contact their school or employment counselors, their state office of vocational rehabilitation, or their state department of labor to explore fully their individual needs and requirements as well as the requirements of the occupation.

## **Where Employed**

Agronomists work both in the United States and overseas. Some work for service companies and public relations firms who deal with agronomy. Agricultural extension agents and salespeople work with agribusiness and industrial firms at their headquarters or in field stations in the United States and overseas.

Many agronomists with sales skills sell agricultural machinery, chemicals, and supplies. Others teach in colleges and land-grant universities. Agronomists in research are employed by industry, universities, and governmental agencies.

Many agronomists work for the federal government, most for the U.S. Department of Agriculture, Agricultural Research Service, or Forest Service. Agronomists are employed in environmental protection. They head projects associated with recycling solid wastes into the soil, and the reclaiming and revegetating of disturbed lands such as toxic dumps or mining and construction sites.

Agronomists also work for city governments. They oversee projects such as parks and recreation beautification, zoning, construction, land use planning, turf management, and highway landscaping, to mention a few.

## **Employment Outlook**

The expanding world population will require the continued training and employment of agronomists to meet the worldwide need for food. The U.S. Census Bureau said by 2100, the U.S. population will have doubled. The need for food will continue to be critical. The efforts and findings of agronomists will help increase food supplies. Positions are plentiful for individuals with the required education and skills. Public and private agencies as well as agribusiness need qualified agronomists.

## **Entry Methods**

College graduates, with the help of the school placement office and the placement service of the American Society of Agronomy, may meet with recruiters from employers in private industry or from nonprofit research organizations. They may send resumes to employers for whom they would like to work.

To get a job with the federal government, they may apply at any local branch of the Office of Personnel Management. Many government agencies also have their own employment offices.

Most new agronomists begin as trainees in the field or as technicians in a laboratory. If they get work with a private firm, they can start in testing or inspection jobs, or become technical sales and service agents. Those with more education may head projects, manage farming operations, or take on similar responsibilities. Those entering the work with a graduate degree will be better prepared to do research.

### **Advancement**

Agronomists with ability and experience will advance to fill higher ranking jobs with more pay. They may head government research programs. Those with a doctoral degree may conduct independent research or become administrators for commercial firms. Some agronomy teachers in a college or university may become deans or administrators. Agronomists who prefer to be independent may become farmers, ranchers, or consultants.

### **For Further Research**

**American Society of Agronomy**, Career Development and Placement Service, 677 South Segoe Road, Madison, WI 53711.

*Exploring Careers in Agronomy, Crops, and Soils.* 26 pages, illustrated. Free.

**National Association of County Agricultural Agents**, Secretary, 905 Joe Creason Drive, Benton, KY 42025.

*The County Agent, Dedicated to Professional Excellence.* Free.

**National FFA Organization**, P.O. Box 15160, Alexandria, VA 22309.

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