

INTRODUCTION TO AGRONOMY

Mirza Hasanuzzaman, PhD

Professor

Department of Agronomy

Sher-e-Bangla Agricultural University

E-mail: mhzsauag@yahoo.com

Concept

The word agronomy has been derived from two Greek words: 'agros' meaning field and 'nomos' meaning to manage. So, literally, agronomy means the art of managing fields, and technically it means the science and economics of crop production through farmland management. In other words, agronomy may be defined as a branch of agricultural science that deals with the principles and practices of field management for producing field crops.

Agronomy is the science and practice of crop production to produce food, feed, fiber, and fuel. Agronomists need to understand plants, soils, insects, microorganisms, climate and how they interact with each other within agroecosystems.

The central theme of agronomy is the soil–plant–environment relationship.

Basic principles of agronomy

A principle means a scientific law that explains natural action. Agronomic principles are the ways and means for better management of soil, plant and environment for maximum economic returns per unit area over years.

The basic principles of agronomy may be listed as:

1. Planning, programming and executing measures for maximum utilization of land, labor, capital, sunshine, rainwater, temperature, humidity, transport and marketing facilities.
2. **Choice of crop varieties** adaptable to the particular agro-climate, land situation, soil fertility, season and method of cultivation and benefiting the cropping system.
3. **Proper field management** by tillage, preparing field channels or bunds for irrigation and drainage, checking soil erosion, leveling and adopting other suitable land management practices.
4. Adoption of **multiple cropping and also mixed or intercropping** to ensure harvest even under adverse environmental conditions.
5. **Timely application of proper and balanced nutrients** to the crop or crops in sequence and improvement of soil fertility and productivity.
6. Choice of **quality seed or seed material** and maintenance of requisite plant density per unit area with healthy and uniform seedlings.
7. **Proper water management** with respect to crop, soil and environment through conservation and utilization of soil moisture as well as by water that is available in excess. Efficient use of this water for life-saving or protective irrigation, scheduling irrigation at critical stages of crop growth and also growing crops in non-traditional seasons or belts with irrigation, rain or residual moisture.
8. Adoption of adequate, need-based, timely and exacting **plant protection measures** against weeds, insect-pests, pathogens as well as climatic hazards.



9. Adoption of suitable and exacting management practices including **intercultural operations** to get maximum benefit from dearer and difficult to get low-monetary and non-monetary inputs. Adequate input supply should be a substitute for deficiencies in management practices.
10. Adoption of **suitable method and time of harvesting** of crops to reduce field damage and to release land for succeeding crop(s) and efficient utilization of residual moisture, plant nutrients and other management practices.
11. Adoption of suitable post-harvest technologies.

Scope of Agronomy

- Agronomy is a dynamic discipline. Because agricultural practices are modified, or new practices are developed with the advancement of knowledge and better understanding of plants and the environment. For example, the availability of chemical fertilizers has necessitated the generation of knowledge on the method, quantity and time of application of fertilizers. Similarly, availability of herbicides for the control of weeds has led to development of a vast knowledge about selectivity, time and method of application of herbicides.
- Gigantic irrigation projects are constructed to provide irrigation facilities. However, these projects created side effects like waterlogging and salinity. To overcome these problems, appropriate water management practices are developed.
- Population pressure is increasing, but area under cultivation is static. More crops have, therefore, to be grown on the same piece of land in a year. As a result, intensive cropping has come into vogue.
- Similarly, no tillage practices have come in place of clean cultivation as a result of an increase in the cost of energy.
- Likewise, new technology has to be developed to overcome the effect of moisture stress under dry land conditions.
- As new varieties of crops with high yield potential become available, a package of practices has to be developed to exploit their full potential.
- The factors restricting increased agricultural production are low soil fertility, crop varieties of low genetic yield potential, inadequate or non-existent control of diseases and insects, non-availability of production inputs, government economic policies affecting agriculture and weak research and extension programs.
- Restoration of soil fertility, preparation of a good seedbed, use of proper seed rates, correct dates of sowing for each improved variety, proper conservation and management of soil moisture and proper control of weeds are agronomic practices to make our finite land and water resources more productive.

Thus, agronomy is a discipline of greater scope.

There are a lot of areas to be developed to gain the highest benefit by utilizing natural resources

- Adoption of site-specific new crop varieties
- Using suitable and efficient agricultural implements suitable for soil and environment
- Balanced fertilization and organic farming to attain sustainable agriculture
- Potential use of farm wastes, city wastes and crop residues to increase soil fertility and productivity
- Appropriate water management practices to improve water use efficiency
- New technologies to overcome stress such as salinity, drought, flood, etc.
- Integrated crop management
- Finding new technologies for seed production and processing



- Development of new technologies for crop harvest and postharvest operations
- Reducing yield gap by using package and practices to explore full potential of new crop varieties
- Intensive cropping system



Classification of Agronomic Crops

According to use of crop plants and their products, agronomic crops are grouped into the following classes:

a) Cereal crops: Cereal crops are the **cultivated grasses** grown for their edible starch grains. In general, the larger grains used as staple food are cereals such as rice, wheat, maize, barley, etc.

Millet crops: Millet crops are the **small-grained cereals**, which are of minor importance as food, and they have a single cover. e. g., foxtail millet, proso millet, finger millet, etc.

b) Oilseed crops: Crops whose seeds are rich in fatty acids and are used to extract vegetable oil to meet various requirements are known as oilseed crops. e.g., mustard, soybean, sesame, linseed, safflower, sunflower, groundnut, etc.

c) Pulse crops: These are leguminous crops whose seeds are used as 'dal' on splitting and are rich in protein. e.g., black gram, lentil, grass pea, cow-pea, soybean, peas etc.

d) Forage crops: It refers to vegetative matter, fresh or preserved, utilized as feed for animals such as cowpea, maize, para grass, oats, napier grass, etc.

e) Fiber crops: Crop plants grown for fiber yield. Fiber may be obtained from seed, such as cotton, stem or bark of such as jute, mesta, sunnhemp and flax; leaf such as agave, pineapple.

f) Sugar crops: Crops grown for the production of sugar and starch; such as sugarcane, sugarbeet, etc.

g) Green manuring crops: The crops, which are grown for incorporating plant materials in soil at the green stage to enrich the soil with nutrients, are known as green manuring crops. e.g., sunnhemp, dhaincha, cowpea, green gram, etc.

h) Narcotic crops: Crop plants or their products that are used for stimulating effects are known as narcotic crops. e. g., tobacco, cannabis, etc.

i) Beverage crops: Crops whose products are used for mild, agreeable and stimulating liquors meant for drinking, such as tea, coffee, cocoa, etc.

Some special purpose agronomic crops

i) Catch crops or emergency crops or contingent crops: These are crops cultivated to catch the forthcoming season. They replace a main crop that has failed due to natural hazards and utilize the remaining period of the season. They are generally of very short duration, quick-growing, fast-bulking, harvestable or usable at any time during their field duration and adaptable to the season, soil and cultural practices. e.g., green gram, black gram, cow pea, etc.

ii) Cash crops: These crop plants are grown for sale to earn hard cash. e.g., jute, tobacco, cotton, etc.

iii) Cover crops: These crop plants are able to protect the soil surface from erosion (wind, water or both) through their ground-covering foliage and/ or root mats. e.g., black gram, groundnut.

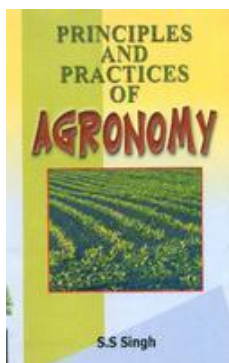
iv) Mulch crops: These crop plants are grown to conserve soil moisture from bare ground by their thick and multi-layered foliage, trailing habit and sometimes, self-seeding nature. e.g., cowpea.

v) Restorative crops: These are crops, which provide a good harvest along with enrichment or restoration or amelioration of their soil, such as legumes. They fix atmospheric nitrogen in root nodules and shed their leaves during ripening, thus restoring soil conditions.

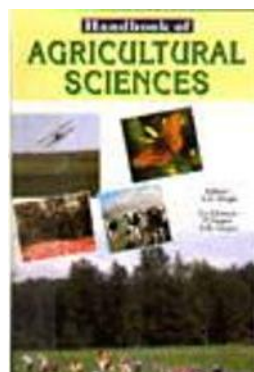
vi) Exhaustive crops: These are crop plants, which, on growing, leave the field exhausted because of a more aggressive nature. e.g., sesame, linseed, etc.



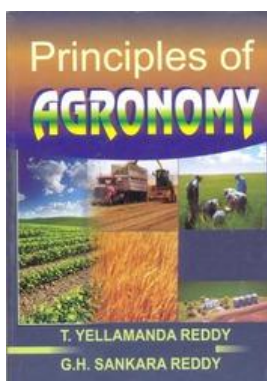
Further Readings:



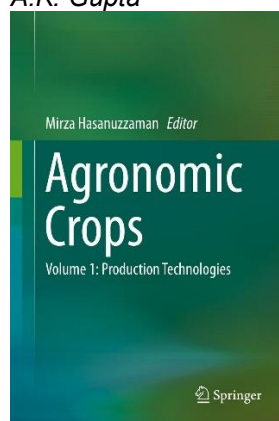
Principles & Practices of Agronomy
S.S. Singh



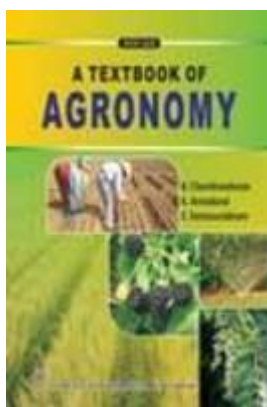
Handbook of Agricultural Science
S.S. Singh
P. Gupta
A.K. Gupta



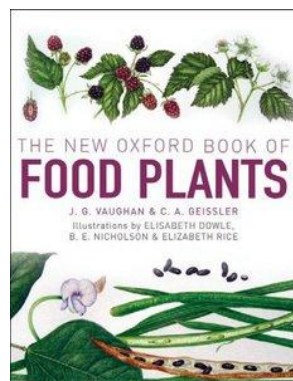
Principles of Agronomy
T. Yellamanda Reddy
G.H. Sankara Reddy



Agronomic Crops Volume 1: Production Technologies
Mirza Hasanuzzaman (Ed)



A Textbook of Agronomy
B. Chandrasekaran
K. Annaduri
E. Somasundaram



The New Oxford Book of Food Plants
J.G. Vaughan
C.A. Geissler

