

Agriculture: Features and Characteristics—An Overview

P.K. Paul^{1*}, R.R. Sinha², Anil Bhuiwalli³, K.S. Tiwary⁴, Pappachan Baby⁵, Ricardo Saavedra⁶

¹Executive Director, MCIS, Department of CIS, Information Scientist (Offg.), Raiganj University, India, Asia

²Pro Vice Chancellor (Asian Region), Commonwealth Vocational University, Kingdom of Tonga, Oceania

³Vice Chancellor, Raiganj University, West Bengal, India

⁴Dean (Science & Management), Raiganj University, West Bengal, India

⁵Head (Asian Region), Ballsbridge University, Commonwealth of Dominica, North America

⁶Director & Chair, International Programs, Azteca University, México, North America

*Corresponding Author: pkpaul.infotech@gmail.com

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Abstract- Agriculture is a broad concept and deals with various kinds of methods regarding the betterment in cultivation and farming and cultivation is considered as a small part of the agriculture. The expert expressed that Agriculture is a scientific study, procedure and policies in cultivation and farming. Normally it is considered that farming is done in a small area but agriculture is broader. Moreover, farming is considered in a family or group of families or small number of people engaged for the agriculture or in the process of food production. There are various inputs and methods in Agricultural Systems and also run by the industrial support and thereafter it is refereeing as Industrial Agriculture. It is far different than traditional agricultural systems wider regarding the production of food for humans and animal. Internationally the population has changed and increasing therefore the methods of agricultural systems also shifting into newer and innovative one. Though in western world the 'green revolution' has changed agricultural systems many ways and thereafter farms have engaged in agriculture with solid and rapid productively and with types. Among the changes few valuable are hydroponics, plant breeding, hybridization, gene manipulation, healthy soil management, modern weeding controlling, Genetic engineering, use of Nanotechnology, Information Technology etc. are important for enhancing higher yields and disease resistance. The advancement of the technologies is noticeable in agricultural sciences including the Information Technology and Management applications. This is conceptual paper and deals with various aspects of agriculture especially with evolution, types, methods, emerging concern, related and allied areas of agriculture in brief.

Keywords - Agriculture, Agricultural Science, Modern Agro Systems, Agricultural Methods, Foods, Development

I. INTRODUCTION

Agriculture simply consider as a tool and way for producing as well as cultivating different kind of products such as crops, vegetables, plants etc. however later on few other facets have been added into this viz. timber, fertilizers, animal leather, sugar, alcohol, nursery plants, tropical fish drugs and even silk, wool, cotton and so on. According to the modern statistics worldwide a majority of the professions till lies with various types of agricultural professions. Internationally 11 regions are engaged with the agricultural productivity independently. Initially only plants and vegetables etc. are considered with the agricultural products but thereafter the circumstances has changed radically and animals are also been considered as agricultural products along with the animal sciences and husbandry. This led further the enhanced production and environment also been associated with the agriculture such as global warming, natural disaster etc. The development of Genetic Engineering in agricultural systems also changed the picture radically. Other emerging subjects including technologies changing the scenario of agricultural systems

and therefore various newer engagement in the agricultural category also been noted and in developed countries the profession of agriculture has been decreased significantly [2], [5], [16]. Apart from the science and technologies the field of chemistry in agriculture also considered as important and notable changes—

- By the uses of the chemical fertilizer.
- In use of chemical insecticides.
- In healthy chemical fungicides.
- For the purpose of the soil makeup and development.
- Regarding the agricultural products etc.

Agricultural Science is an interdisciplinary area and apart from biology it also deals with the Management, Commerce and Economics etc. and still growing.

II. OBJECTIVE

The present paper entitled 'Agriculture: Features and Characteristics—An Overview' is aimed with following aim and objectives—

- To know about the basics of Agricultural Sciences with its evolution and development in brief.
- To know about the basic features and nature of Agricultural Sciences in brief.
- To find out the nature and characteristics of the agricultural science by analyzing its emerging methods and types.
- To learn about the basic way of crops cultivation and management in brief.
- To learn about the territories of the Agriculture in brief with reference to the allied areas of the agriculture.

III. AGRICULTURE: AN OVERVIEW

Agricultural Sciences can be considered as an Applied Science composed with various kind of methods, tools and principles and all these are dedicated in the cultivation such as crops, bio chemical products, plants, livestock and animals etc. The sedentary human civilization was possible in agriculture to makes enable people for the foods and survives. The agriculture concept was initiated about thousands years ago i.e. about 105,000 years ago where as nascent farmers started it about 11,500 years ago [8], [12], [22]. Though in later period animals were also considered within agriculture such as pigs, sheep and cattle about 10,000 years ago. Agriculture is being associated with so many biological areas viz.—

- Agronomy.
- Plant breeding and Allied Sciences.
- Bio Chemistry.
- Forestry and Forest Management.
- Soil Science and Management.
- Genetic Engineering
- Bio Technology
- Microbiology

However apart from the Biological Sciences it has also been associated with other areas and field of study for its better operations viz.—

- Business & Commerce
- Management Sciences
- Information Technologies
- Disaster Management etc.

Gradually Agriculture is being considered as a techniques and scientific procedure and thereafter agriculture became a field of study.

Agriculture, Agricultural Science: Features, Characteristics & Attributes

Historically in the 18th century experiments been noted with the gypsum with the fertilizer by the Johann Friedrich Mayer and thereafter constructive and healthy research in 1843 at RRS, England with the initiatives of John Lawes and Henry Gilbert. In 1887 Hatch Act at America gave a provision regarding the funding to the farmers and thereafter the growth of the Agricultural Sciences treated as remarkable. The USDA began agricultural entomology research in 1881 and gradually other countries of Europe and Japan and few other countries did a lot for the solid

promotion and development of the Agricultural Sciences [9], [21].

Agriculture also been started with the commercialization of plants, natural products including animal products and gradually other products. Even other areas items viz. leather, alcohols, cotton, wool, biomass, even biodiesel, nursery plants, fish etc. been also started in agricultural sector gradually (refer fig: 1 and 2). As far as it nature and feature is concerned the following may be considered as important in this regard—

Interdisciplinary

Agriculture is a Science of Sciences or better to describe as a Field of Fields and therefore it is interdisciplinary in nature connected with various fields, professionals all together for the betterment of the agriculture, allied areas, and human development. It includes the areas from the Agronomy, Plant breeding and Allied Sciences., Bio Chemistry, Forestry and Forest Management, Soil Science and Management, Genetic Engineering, Bio Technology, Microbiology and so on [3], [13], [24].

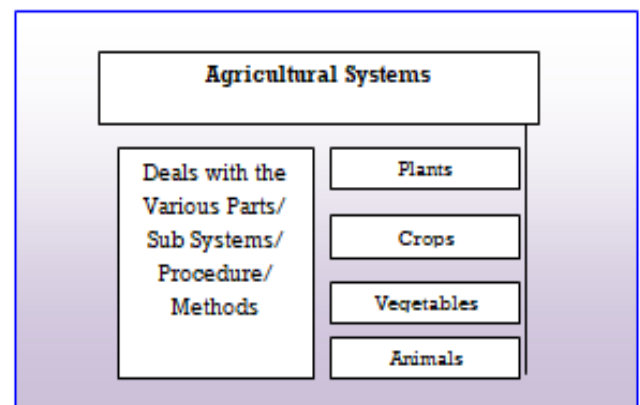


Fig: 1-Agricultural Systems and Common Products Categories

Multidisciplinary

Agricultural Sciences furthermore is also multidisciplinary area various subjects individually make it as broad. The areas of the Agricultural Sciences are associated with the following (but not limited to)—

- Biological Sciences
- Social Sciences
- Management Sciences and so on.

Applied Science

Agricultural Science no doubt thus deals with all the nature of the Applied Science and dedicated in the foods, agro products etc. And it is helps in other subjects as well. The areas of applied nature of Agriculture is also being enhancing and emerging.

Social in Nature

The branch Agriculture not only associated with the biological sciences but also various social sciences viz. economic science, social and human development etc. for the fulfillment of the aim and agenda of agriculture [10], [25].

Biological Ingredients Affiliated

Different kind of core biological ingredients become common and important in Agriculture and this include the agronomy, plant breeding, genetics, soil sciences, environmental science, microbiology etc. Further, it is also deals with the pests and its management, environmental management including waste management, soil degradation and so on. Therefore, biological sciences are considered as important and valuable in Agricultural Sciences.

Engineering Tools Depended

Agricultural Sciences depends on various kind of Engineering tools, techniques and procedure and more clearly various Engineering subjects. Due to its role and association with the engineering Agricultural Engineering Agricultural Technology nomenclature also been developed. Various other technologies also considered as important in Agricultural Sciences such as—

- Genetic Engineering,
- Information and Communication Technology,
- Nanotechnology etc. and these are still rising.

Managerial in Nature

Agricultural Science is very close and depended on Management Sciences for various reasons for the agricultural systems, cultivation including in the products management. Some of the aspects of Management are include—

- Agricultural Information Systems designing and development
- Marketing of Agricultural Products.
- Healthy Supply Chain Management
- Agricultural Business and so on.

Apart from the Management Agriculture is also associated with the Commerce, Economics and other allied Management areas as well [11], [17], [26].

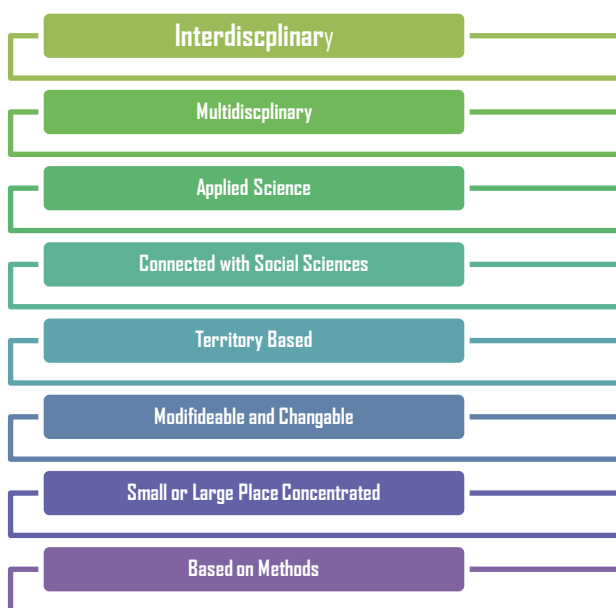


Fig:2-Basic Attributes of Agriculture and Agricultural Science

Territory Based

Agricultural Sciences is also territory based and based on methods of cultivation it may differ. For example, **Pastoralism** (a kind of techniques) is required in managing domestic animals and here livestock are moved one to another place. Therefore, region wise Agriculture can be considered with different features and attributes viz. Sahara, Central Asia, North-Eastern India the agro products are not same.

In Northeast India, Southeast Asia, Amazon Basin **Shifting Cultivation** can be seen which is practiced in a small area and forest region. In the abundant rainfall this kind of agricultural systems is noticed due to rapid growth of the trees [14], [23], [28].

Subsistence farming is practiced for a family or local need only and it is widely practiced in the monsoon Asia, South East Asia and about 2.5 billion farmers worked with such farming and similar to Subsistence farming **Intensive Farming**, is also growing where maximum productivity is planned with a low fallow ratio. Here higher uses of the fertilizer, IT, automation etc. can be noted; in the developed countries it has widely started and even in developing countries.

Agro Products Based on Methods

Agricultural Sciences radically changing its methods as well as concepts and some of the important are concerns are **Genetic Engineering** which is an emerging interdisciplinary area dedicated in modernizing, productivity enhancement in the agricultural products including crops, plants etc. and even in domestic animal also this is increasing rapidly throughout. However, it has some of the disadvantages, challenges regarding the health and environment. **Organic farming** is another emerging agricultural method where uses of the artificial products are limited and it may include the less chemical products also. Here therefore less pesticides, fertilizers, antibiotics, growth hormones etc. are practiced. This agricultural initially started in 20th century for higher agricultural production and today 70 million hectares are practiced these methods due to humans and environmental benefits.

Corporate farming is run by the big companies and happen in large-scale by the corporate. This kind of method helps in immediate profit; though this type of farming is destroying traditional farming therefore proper mechanism, policies are required for conducting corporate farming. **Vertical Farming** also emerging agriculture where crops, plants are cultivated in vertical form in stacked layers and it leads agriculture space related problem. Further this kind of farming is environment friendly and thus also known as environmental agriculture. Various other techniques like aquaponics, aeroponics etc. are also used in this method. This is further done in a controlled condition and mainly in a building or floor etc [4], [6], [18].

Therefore, from the above, it is clear that Agriculture is method based and depending upon nature it may vary.

Agriculture is a System

System is the combination of many parts or sub systems. As we aware that Agriculture is the combination of the many sub systems and therefore Agriculture is considered as a System and called as Agricultural System.

May be Plant based and Animal

Due to the nature of the Agricultural Systems it could be consider as a tool for producing agricultural products of plants, crops, seeds etc. and on other hand it could be consider of cultivating animals especially domestic animals.

Environmentally Connected

The Agriculture is done in the fields and lands means within the core part of component of the environment and therefore it is directly connected with the environment. Furthermore, agriculture is also responsible for the damaging the traditional environment of the soil and ecology due to wider uses of the harmful chemicals, fertilizers etc.

May be inside and outsiders' territories

Agriculture can be considered as a component not only of external world i.e. field but also in inside a small territory or location, in a building/s, in some of the floors as well (in case of vertical farming).

The Natural Food and Products can be Modified

The agricultural products and foods can be modified using genetic engineering tools and technologies and the resulted foods can be known as genetically modified foods. The gene and cell here can be deleted, add and modified based on need and keeping in mind the aspects of ethics, environment and other allied issues [7], [15], [19].

Can be Cultivated by a small or larger means and entities

Agriculture based on need can be cultivated in a small area and by a small number of people and it can also be done in a larger place and by a large number of human resources or even by the companies or corporations etc. i.e. corporate farming; refer fig: 3.

We can see various types of cropping systems and these are varying in different respect viz. resources, territory, climate, governmental policies, economic policies, nature the locality and farmers etc.

For example, shifting cultivation is done in a forest where forests are firstly burned and then pest control based methods are used. Multiple Cropping is another practice where many crops are grown sequence wise in a particular year and here uses of the pesticides and fertilizer are noticeable. In agro forestry is widely practiced. In another context vegetables/ plants and other hand animal are basically keep in a same place or cultivated. Mixed farming is another one which is depends on various external and internal factors. Internal factors are may be the Local soil characteristics, Composition of the family and farmers' ingenuity. Whereas External factors are

concerned with the aspects of weather including climate, market prices, political stability, technological aspects and so on. In mixed farming farmers are given importance in the suitability and flexibility in cultivation [1], [20], [27].



Fig: 3-Agriculture in different ways.

Allied Areas of Agricultural Sciences

Agricultural Science is a broad area and there are many areas incorporated and develop from the field such as ***Agricultural Engineering*** which is responsible for the designing and development of the farm and cultivation related equipment, machines, etc. Agricultural Engineering is dedicated in new designing and modification of existing systems and also in developing dams, agro machines, agro tractors, including environmental management tools etc. The aspects of Agricultural waste systems, sustainable product development for the agriculture is also falling under the Agricultural Engineering. Moreover, the Development of Biofuels, food processing plants design and development, water pollution control system etc. consider as important in Agricultural Engineering. The agricultural waste-to-energy projects also consider as valuable and important in this field.

Agricultural biotechnology is another allied branch of Agricultural Sciences and important in traditional breeding techniques, scientific tools and technological development including in the plant pathology, genetic engineering, crop technology and so on. Further it is dedicated in living organisms, and improving plants, tools in agriculture etc. ***Agricultural Chemistry*** is a kind of study of chemistry which is applicable in agricultural activities viz. cultivation and planting for the higher agricultural products utilization, environmental protection and matters etc. and further it is providing importance in plants, animals, and environment and so on. Here food and fiber, utilization of agricultural products, chemical as a raw can also be considered valuable.

Agricultural Soil Science is the combination of the Agricultural Science and Soil Science and it is a holistic method and study in relation to integral part of terrestrial

ecosystems and applicable in the use of soil including production of food, fiber crops, soil sustainability enhancement and so on. In the erosion, compaction of the

soil, farm ecosystem also this field is considered as important and valuable.

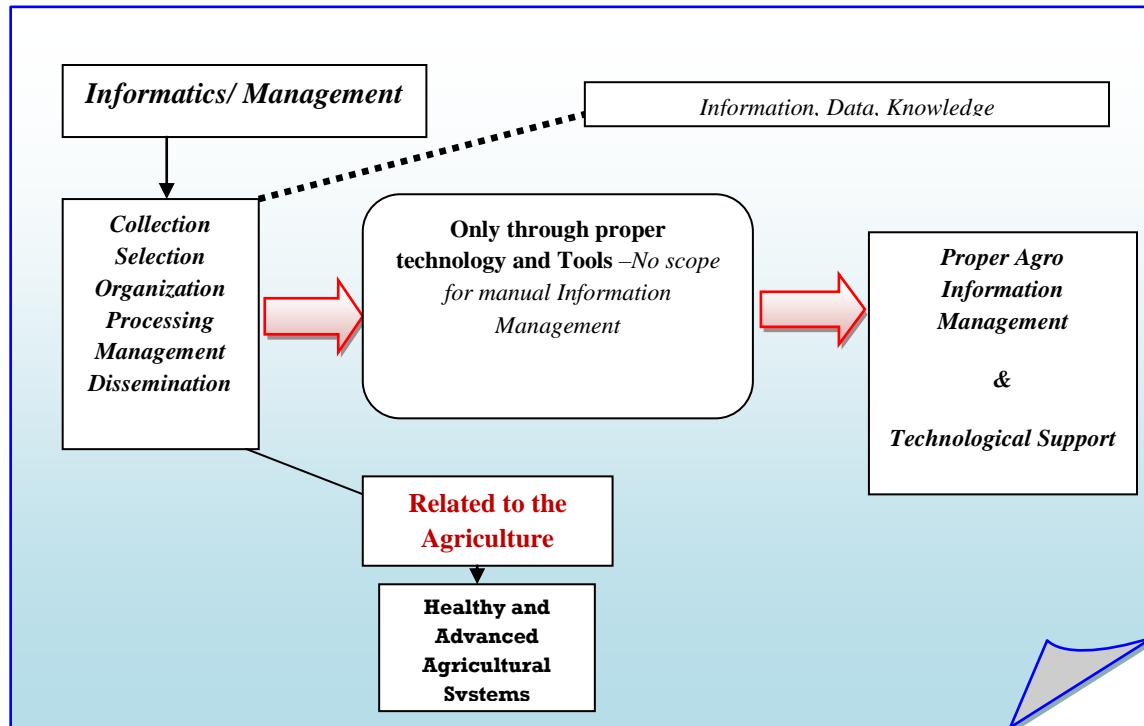


Fig. 4- Management and IT in modernizing agricultural development

Agricultural Economics is an interdisciplinary area and can be called as Economics and allied area's applications in the agriculture and allied areas and the field is also associated with the sub fields like economics, econometrics, development economics, environmental economics etc. This is required in number of affairs viz. Food Policy, Agricultural Policy, Environmental Policy etc. **Agricultural Management** is needed in Agricultural System development and needed managing agricultural activities and assets including in pre-production and post production of the Agricultural. Agricultural Management has diverse areas and effectively applicable in managing agriculture i.e. Agribusiness. **Agricultural Informatics** is a combination of 'Agricultural Science' and 'Informatics/Information Science'. Therefore, it is an interdisciplinary field and here information management principles commonly applicable in various Agricultural areas and sectors using information, IT and technological support (refer fig: 4).

IV. CONCLUSION

All kind of human being are depends foods and therefore agriculture is treated as important. Internationally agricultural professions considered as important and about 60% of the world population deals with the agro based jobs. Though during this increasing population time, the sustainable agriculture is the need of hour. And, in developing countries also various related jobs and fields can noted. The field of Agriculture is changing and various methods are adding into this. Different fields and

areas from different branches are also associated with the Agriculture and it is still growing. Therefore, the features, methods are also changing with the agricultural fields. Technological and management applications are also important and increasing in agriculture for the healthy, productive and eco-friendly development!

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