A STUDY ON AGRICULTURAL SYSTEMS

Susendar E, Amsaveni C
II yr Mechatronics Engineering
SNS College of Technology, Coimbatore -641 035

Abstract: **Agricultural systems science generates knowledge that allows researchers to consider complex problems or take informed agricultural decisions. The rich history of this science exemplifies the diversity of systems and scales over which they operate and have been studied. Modeling, an essential tool in agricultural systems science, has been accomplished by scientists from a wide range of disciplines, who have contributed concepts and tools over more than six decades. As agricultural scientists now consider the "next generation" models, data, and knowledge products needed to meet the increasingly complex systems problems faced by society, it is important to take stock of this history and its lessons to ensure that we avoid re-invention and strive to consider all dimensions of associated challenges. To this end, we summarize here the history of agricultural systems modeling and identify lessons learned that can help guide the design and development of next generation of agricultural system tools and methods. A number of past events combined with overall technological progress in other fields have strongly contributed to the evolution of agricultural system modeling, including development of process-based bio-physical models of crops and livestock, statistical models based on historical observations, and economic optimization and simulation models at household and regional to global scales. Characteristics of agricultural systems models have varied widely depending on the systems involved, their scales, and the wide range of purposes that motivated their development and use by researchers in different disciplines. Recent trends in broader collaboration across institutions, across disciplines, and between the public and private sectors suggest that the stage is set for the major advances in agricultural systems science that are needed for the next generation of models, databases, knowledge products and decision support systems. The lessons from history should be considered to help avoid roadblocks and pitfalls as the community develops this next generation of agricultural systems models.**

Keywords: **Agricultural systems; Models; Next generation; Data; History.**

I. INTRODUCTION

The world has become more complex in recent years due to many factors, including our growing population and its demands for more food, water, and energy, the limited arable land for expanding food production, and increasing pressures on natural resources. Agricultural systems science is an interdisciplinary field that studies the behavior of complex agricultural systems. Although it is useful to study agricultural systems in nature using data collected that characterize how a particular system behaves under specific circumstances, it is impossible or impractical to do this in many situations. Scientific study of an agro-ecosystem requires a system model of components and their interactions considering agricultural production, natural resources, and human factors. Thus, models are necessary for understanding and predicting overall agro-ecosystem performance, for specific purposes. Data are needed to develop, evaluate, and run models so that when a system is studied, inferences about the real system can be simulated by conducting model-based "experiments." When we consider the "state of agricultural systems science," it is thus important to consider the state of agricultural system models, the data needed to develop and use them, and all of the supporting tools and information used to interpret and communicate results of agricultural systems analyses for guiding decisions and policies.

Agicultural systems:
Agricultural Systems is an international journal that deals with interactions - among the components of **agricultural systems**, among hierarchical levels of agricultural systems, between agricultural and other **land use systems**, and between agricultural systems and their **natural, social and economic environments**. Manuscripts submitted to Agricultural Systems generally should include both of the following:
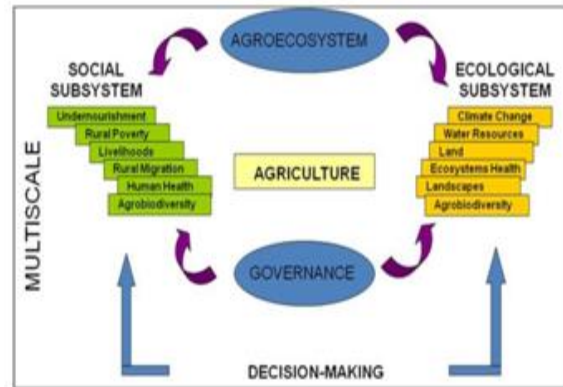• substantive natural science content (especially **farm- or landscape-level** biology or ecology, sometimes combined with social sciences),and
• substantive analysis and discussion of the **interactions** within or among agricultural systems components and other systems.
Preference is given to manuscripts that address whole-farm and landscape level issues, via integration of conceptual, empirical and dynamic modelling approaches.

The scope includes the development and application of systems analysis methodologies (**diagnosis**, simulation and mathematical **modelling**, participatory **modelling**, multi-criteria **assessment, trade-off analysis**, participatory **design**, etc.) in the following areas:

• agroecology **and the sustainable intensification** of agriculture as well as transition pathways for sustainable intensification;
• decision-making and **resource allocation** in agricultural systems;
• the **interactions** between agricultural and non-agricultural landscapes;
• the multiple services provided by **agricultural systems** from **food security** to **environmental services;**
• **adaptation and transformation of agricultural systems in the era of global change;**
• development and application **of tools and methods** for agricultural systems **design, assessment and management;**
• **innovation systems** and multi-stakeholder arrangements that support or promote change and/or informs policy decisions; and
• **big data** and the **digitalisation of agriculture** and their effects on agriculture.

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Types of agicultural systems:
1. Nomadic Herding

Northern Africa, parts of Arabia and parts of Northern Eurasia are the typical regions of this type of farming. This type of farming is based upon the **rearing of animals on natural pastures.** This practice is followed by the people of the semi-arid and arid regions. They keep moving with their animals in search of natural pastures and lead a nomadic life.

2. Shifting Cultivation
It is a type of subsistence farming, where a plot of land has been cultivated for a few years until the crop yield declines due to soil exhaustion and the effects of pests and weeds. Crops such as rain fed rice, corn, wheat, small millets, root crops and vegetables are grown in this system. **85% of the total cultivation in North-East India** is done by shifting cultivation. Once crop yield has stagnated, the plot of land is deserted and the new ground is cleared by slash and burn methods, leaving the land to replenish. This is widely practised by **tribes of tropical Africa, tropical south and Central America and in south-east Asia.**
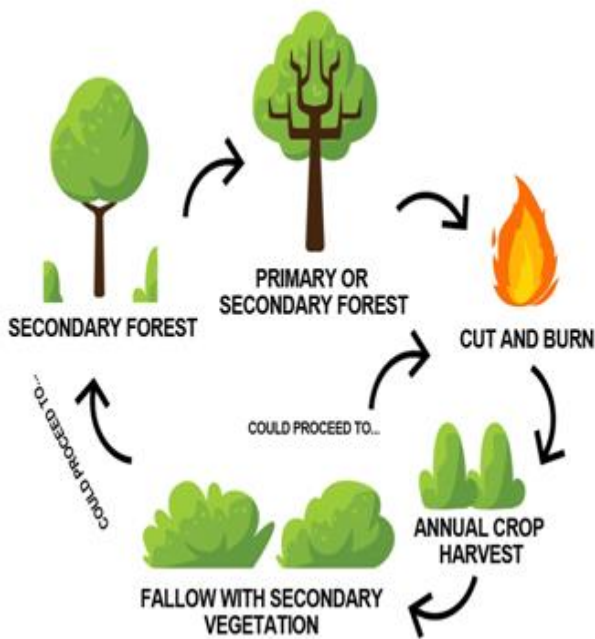
3. Intensive Subsistence Agriculture

In this type of farming system, crops are grown mainly for local consumption. If there is a surplus, then it is sold in the market. This type of farming is largely found in densely populated regions of monsoon Asia.

Basically, there are two types of intensive subsistence agriculture. One is dominated by wet paddy and other is dominated by crops such as sorghum, soybeans, sugarcane, maize, and vegetables. Areas of Intensive Subsistence Farming are**: Tonking Delta** (Vietnam), **lower Menem** (Thailand); **lower Irrawaddy** (Myanmar); and the **Ganga-Brahmaputra Delta, Eastern Coastal Plains** (India).

4. Commercial Dairy Farming

It had its origin in Europe from where it spread to other areas**. Close proximity to the market and temperate climate** are the two favourable factors. Countries like **Denmark and Sweden** have witnessed the maximum development of this type of farming.

5. Commercial Grain Cultivation

This type of agriculture system is mainly practised in the **Eurasian steppes in regions of chernozem soil, Canadian and American Prairies, the Pampas of Argentina, the Veld of South Africa, the Australian Downs and the Canterbury Plain of New Zealand.** In this system of agriculture are characterised by- The main characteristics of this type of agriculture are: highly mechanised cultivation; farms are very large; predominance of wheat; and low yield per acre but yield per capita is high.

6. Livestock Ranching

It is practised mainly in extensive **temperate grasslands** but up to some extent it is also practised in **tropical savannas** (I.e**. Campos and Llanos** of South America). In the permanent ranches, large number of cattle, sheep, goats and horses are kept. They are used to produce beef, mutton and wool for both home market and export.

7. Mediterranean Agriculture

It is practised within the Mediterranean climatic region where winter is wet and summer is dry. Farming is intensive, highly specialised and varied in the kind of crops raised. Many crops such as **wheat, barley and vegetables** are raised for domestic consumption, while other like c**itrus fruits, olives and grapes** are grown mainly for export.

That's why this region is also called **Orchard Lands of the World** and it is the heart of the world's wine industry. This region is famous for world for the production of citrus fruits and grapes in the world.

8. Mixed Farming

This type of agricultural systems is found in the highly developed parts of the world: **north-western Europe, eastern North America, Russia, Ukraine, and the temperate latitudes of parts of the southern continents**. Farming is very intensive and sometimes highly specialised. Traditionally, farmers have practised a mixed economy by raising animals and growing crops on the same farm.

9. Market Gardening and horticulture

It is practised mainly in the same region as that of mixed farming that consists of cultivation of vegetables fruit and flowers solely for the urban market. It is well-developed in the densely populated **industrial districts of north-western Europe** (Britain, Denmark, Netherlands, Belgium, and Germany) and in **North-Eastern USA**. It is also called **Truck Farming.**

additive manufacturing and conventional machining technology manufacturing system Manufacturing Technology.

10. Commercial Plantation

This type of farming has developed in **parts of Asia, Africa and Latin America**, where the influence of the Europeans have been important during the colonial period. Though, practiced over a rather small area, this type of farming is quite important in terms of its commercial value. **Tea, coffee, rubber and oil palm** are the major products of this type of farming. Most of the plantations were developed to provide some of the important tropical crops to the European markets. This is a highly capital intensive farming and most of the crops are tree crops.

II.   CONCLUSION:

The agricultural sector is of vital importance for the region. It is undergoing a process of transition to a market economy, with substantial changes in the social, legal, structural, productive and supply set-ups, as is the case with all other sectors of the economy

"Farming isn't just a job .
It's a way of life.''

III.   REFERENCE:

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