Topic 5

Intercropping, Sole Cropping, Sequential Cropping, Relay Cropping,

Strip Cropping etc.

Intercropping - The cultivation of two or more crops simultaneously in the same field.

Sole cropping – Growing one crop alone in pure stand, either as a single crop or as a sequence of single crops within the year.

Sequential cropping – Growing two or more crops in a sequence, planting the succeeding crop after the harvesting of the previous one.

Relay cropping – Growing two or more crops in a sequence , planting the succeeding crop after the flowering but before the harvesting of the preceding crop.

Strip cropping - Growing two or more crops simultaneously in alternative plots arranged in strips that can be independently cultivated

Adaptive research - research designed to adjust new technologies to specific set of environmental conditions

Basic research - research undertaken to generate new understanding of systems and processes

Commodity research – research focused on the improvement of a particular commodity

Component technology research – disciplinary oriented research on specific physical and biological production factors.

Cropping pattern – the yearly sequence and special arrangement of crops on a given land area

Crop rotation – the practice of following the crop located on a particular site with a different crop the following season

Farm - any tract of land or waste consisting of one or two parcels devoted to the cultivation of plants and animals under the management of the owner or tenant. The cultivation of aquatic life forms can also be included in this definition. A farm is a productive unit whose primary objective is to increase productivity, profit and the well being of the farm household.

Interdisciplinary – is a multidisciplinary team whose members work jointly on a set of problems within a common framework and expected to cross disciplinary boundaries.

Land equivalent ratio - the land area needed under sole cropping to produce the same amount of crop yield as from one ha of intercropping. It is computed as:

Maize yield in intercrop groundnut yield in intercrop

$$LER = \frac{\text{(2.5 t/ha)}}{\text{Maize yield in sole crop (3.0 t/ha)}} + \frac{\text{(1.2 t/ha)}}{\text{groundnut yield in sole crop (1,8 t/ha)}} = 1.50$$

Multidisciplinary – this is where representatives of different disciplines work towards a common goal but within the confines of their own discipline

On.- farm research with a farming systems perspective – research based on the assumption that in order to develop appropriate technologies for small farmers, it is necessary to understand the circumstances of the farmers and to test proposed technologies in farmer's fields.

On-farm trials - experiments carried out in farmer fields or with their livestock.

Rapid rural appraisal – an informal method of rural data gathering selected to be quicker and more cost effective than the traditional survey methods

Recommendation domain – a group of roughly homogenous farmers with similar circumstances for whom we can make more or less the same recommendation

Strategic research – research aimed at solving specific problems of strategic importance

Systems approach – a scientific method which seeks to understand the complexity of systems

through studying their interrelationships rather than their constituent components

Topic 6

Important crop based farming systems: lowland rice-based, upland cereal based, root crop - based , small scale mixed farming, irrigated small-holder farming, small-holder farming with plantation (perennial) crops and agro-forestry

Crop based farming system is synonymous with cropping system. It refers to the crop production activity of the farm. It describes all the cropping pattern grown on the farm and their interaction with farm resources, other household enterprises, the physical, biological and socio-economic factors of the environment

6.1 Lowland rice-based system

Lowland rice based farming system is an age long practice in Asia. Rice is the staple food crop for millions of people. Fertile alluvial soils abound in the river flood plains and estuaries. This farming system has remained stable over years. This system is gradually becoming important in Africa and Latin America. In Asia the objective is to be self sufficient. New technologies are available

6.2 Upland cereal-based system

The upland-cereal-based system is very popular in the seasonally humid and semi-arid areas of Africa. Sustainability is a major problem since it evolved from shifting cultivation.the system is widely practiced in Africa and drier areas of Asia.. Considerable research has been done to improve the system

6.3 Small-scale mixed farming

The small-scale mixed farming involves the complete integration of crop and livestock production. Animals provide manure for crops and crop residues are fed to animals. Although the system is very sound ecologically little surplus is produced. The system is popular in highlands of Asia, Africa and Latin America

6.4 Irrigated small holder farming

The irrigated small-holder farming is an age old system in the middle-east. Maintenance of irrigation canals and health problems are challenges. Cash crops are as important as subsistence crops. The systems thrives in India, Pakistan, Kenya, Lake Chad etc. The level of technology tends to be high, but there is too much government interference

6.5 Smallholder farming with plantation and perennial crops

The smallholder farming with plantation crops usually have a dominant cash crop. There is high dependence on external prices for farmers produce. Middle men charge excessive profit. Land tenure is a problem. The system is found in all climatic regions. Sri Lanka, Kenya, Ghana, Colombia and Malaysia are examples of locations where they are found..

6.6 Agro-forestry system

Agro-forestry is a land use or farming system in which trees are grown on the same land as crops and/or animals either in a special arrangement or in a time sequence and in which there are both ecological and economic interactions between the tree and non-tree components. Major agro-forestry practices include

6.6.1 Home gardens

This involves simultaneous cultivation of trees, shrubs, medicinal plants and livestock tended within a multistory structure around the homestead which is carefully managed over time

6.6.2 Taungya system

In areas where tree plantation is to be established, farmers are invited to cultivate food crops alongside the seedlings until the canopy close.. Teak plantation has been established in Nigeria, Thailand and Indonesia using this system

6.6.3 Shade tree based system

In establishment of cash crops like coffee or cacao, shade trees species such as *Leucaena leococephala* is cultivated. Aside from providing shade to the developing seedling, nitrogen is added to the soil

6.6.4 Fodder tree based system. .

Livestock production can be made more sustainable by cultivating fodder trees or shrubs that can be browsed by animals

6.6.5 Dispersed trees in annual crop field

Inside cultivated fields economic trees are often planted in a dispersed fashion and protected to provide fuel wood, fodder, edible fruits, nuts, medicines and other products. *Acacia albida* is an example.

Topic 7

7.0 Farming systems research: descriptive and prescriptive

7.1 Background of agricultural research in Nigeria

Agricultural research in Nigeria was started by colonial government with the aim of promoting export crops for colonial industry. Research on food crops came on board after independence in

1960. It was not until the 1970's that concern was raised about the relevance of research to needs of farmers. Agricultural Research was not strongly linked to extension. The farming systems research approach came into being in the early 1980's because farmers were not adopting improved technologies during the era of green revolution. The innovations did not fit the technical and socio-economic circumstances of the farmers

Framework for farming systems research includes the descriptive or diagnostic stage, as well as the Prescriptive farming systems research (design, testing and extension stages)

7.2 Diagnostic stage

It is during this stage that the constraints that the farmers are having , the flexibility and missed opportunities that exist in the farming systems are determined by the research team. These are prioritized with possible solutions identified and scrutinized.

7.3 Prescriptive stage

Improved technologies needed to overcome identified constraints are tested on-station before they are taken on-farm. This is necessary if the number of variables is large. In the testing stage, farmers and extension agents are involved as partner.