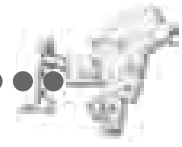# 2. Methodology

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Methodology

The present study on farming systems analysis in North East Region was conducted by the Zonal Project Directorate (Zone III) in collaboration with 40 KVKs in NE region.

2.1 Selection of Districts

The study covered 40 rural districts of the region (Table-1) which were purposively selected based on following criteria:

- The identified districts could represent all the agro-climatic zones (Table-2) of the region

- Major hills and plain farming system of the region were found in these selected districts

- Krishi Vigyan Kendra are in existence in the districts with full staff for at least three years, serving for the farming community in the respective districts

- The districts were selected considering the production potentials in diversified farming and enterprise

Table: 1. State-Wise Distribution of Districts under Study

State	KVK	State	KVK
Arunachal (7)	Lohit, Tirap, West Kameng, East Siang, West Siang, Lower Dibang Valley, Papumpare.	Meghalaya (1)	Ri-Bhoi
Assam (11)	Tinsukia, Cachar, Barpeta, Nagaon, Darrang, Nalbari, Kamrup, Karimganj, Jorhat, Kokrajhar, Sivasagar.	Nagaland (7)	Dimapur, Kohima, Mokokchung, Phek, Tuensang, Wokha, Zunheboto
Manipur (4)	Senapati, Bishnupur, Churachandpur, Ukhrul	Tripura (1)	West Tripura
Mizoram (7)	Aizawl, Lawgtlai, Lunglei, Mamit, Saiha, Serchhip, Kolasib	Sikkim (2)	North Sikkim, West Sikkim

2.2 Agro-climatic zone wise coverage of districts in North East Region.

Agro-climatic Zone	Districts
North-Bank Plain Zone	Sonitpur, North Lakhimpur, Dhemaji
Lower Brahmaputra Valley Zone	Kamrup, Barpeta, Nalbari, Goalpara, Bongaigaon.
Barak Valley Zone	Cachar, Karimganj
Upper Brahmaputra Valley Zone	Golaghat, Sivasagar
Alpine Zone (more than 3500 MSL)	Parts of West Kameng, West Siang, Northern Parts of North Sikkim and West Sikkim, Parts of East Sikkim
Temperate Sub Alpine (1500-3500 MSL)	West Kameng, Parts of East Siang. Tuensang and Zunheboto Parts of North, West and East Sikkim
Sub Tropical Hills (1000-1500 MSL)	Tirap and rest of West Siang, West Garo Hills. Mokokchung, Kohima, Wokha and Mon. Parts of East and West Sikkim Parts of East Siang. Aizawl, Champai, Lunglei, Serchhip.
Sub Tropical Plain (400-1000 MSL)	Bishnupur, Senapati
Mild Tropical Hills (200-800 MSL)	Parts of Dimapur Parts of East Sikkim Mamit, Lawngtlai Churachandpur, Ukhrul
Mild Tropical Plain (0-200 MSL)	Parts of East Siang and Tirap, Southern parts of Dimapur, South Tripura

2.3 Data Collection

Data collection from selected districts was made by using an originally developed Farming System Identification Tool (FSIT). For this purpose, an original FSIT was constructed for compilation of farming systems in the light of the objectives of the study.

For the present study, a list of 34 major farming components was prepared. Under each major component, specific and relevant items were collected through different review of literature, discussion with state extension functionaries, KVK staff as well as investigators on field experiences and were systematically incorporated in the questionnaire.

The questionnaire consisted two parts of which the first part is titled '**Agricultural characteristics of the KVK district'.** This part aims at collecting the bench mark data which in turn is used later for identifying the various farming systems existing in the KVK district. The data required in this part is secondary in nature. This was collected from State Departments, SAUs, ICAR and other official publications. Maximum care was taken to collect data only from authentic sources particularly while using internet as the source of literature.

The second part titled '**Farming systems in the KVK district'** was completed by the KVK staff based on the data collected in first part. The basis/criteria for identifying farming systems were provided with necessary instructions and guidance to the KVK staff. Based on the criteria listed in part two, the agro-ecological situations identified in part – I was classified into homogeneous farming situations. The same was compiled in a table as shown in part two. Based on the farming systems identified the constraints under each element was listed out. The KVKs then developed specific research and development strategy pertaining to each case.

Many Status Reports were referred to before developing the guidelines. The detailed information under the selected major points was collected for analysis of data and were incorporated in the findings. The indicators adopted and farming system components are given below.

1.   **Agricultural characteristics of the district**

1.1   **A brief description of the area**
    1.1.1.   Delineation
    1.1.2.   Population density
    1.1.3.   Literacy percentage
    1.1.4.   Status of agriculture
    1.1.5.   Farmers and farm labour mobility

1.2   Physiography

    1.2.1   Highlands

    1.2.2   Midlands

    1.2.3   Lowlands

    1.2.4   Hilly tract

    1.2.5   General nature of the terrain

1.3   Climates

    1.3.1   Arid, semi-arid

    1.3.2   Tropical, sub-tropical

    1.3.3   Temperate, sub-temperate

    1.3.4   Humid, sub-humid

    1.3.5   Pattern of rainfall in different months

    1.3.6   Surface winds

    1.3.7   Sunshine hours

    1.3.8   Special weather phenomenon

    1.3.9   Critical periods for plant growth

1.4   Soils

    1.4.1   Soil group classification

    1.4.2   Black soils

    1.4.3   Red soils

    1.4.4   Alluvial soils

    1.4.5   Sandy soils

    1.4.6   Laterite soils

    1.4.7   Saline and alkaline soils

    1.4.8   Acid soils

    1.4.9   Fertility status of the soils, in general

1.5   Irrigation

    1.5.1   Area under irrigation

    1.5.2   Irrigation potential

    1.5.3   Source of irrigation (rivers, tanks, open wells, bore wells)

    1.5.4   Ground water potential

1.6   Land use and Cropping Patterns

    1.6.1   Gross cropped area

    1.6.2   Area sown

    1.6.3   Fallow lands

    1.6.4   Grass cover percentage (grass lands)

    1.6.5   Forest cover

    1.6.6   Barren lands

    1.6.7   Crop rotation

    1.6.8   Cropping intensity

1.7   Major Crops

    1.7.1   Principal crops, area, production and productivity

    1.7.2   Crop rotation

    1.7.3   Crop sequencing

    1.7.4   Inter-cropping

    1.7.5   Catch crop, if any

1.8   Socio-economic Characteristics, Land Holding Pattern

    1.8.1   Land holding

    1.8.2   Fragmentation

    1.8.3   Size and shape of lands

    1.8.4   Land tenure system

    1.8.5   Source of finance for farming

    1.8.6   Main source of income for farmers

    1.8.7   Commercial commodities produced

1.9   Farm Machinery and Implements

    1.9.1   Number of tractors

    1.9.2   Number of power tillers

    1.9.3   Type of implements-ploughs, cultivators, discs, harrows, etc.

    1.9.4   Pumps (oil and electrical)

    1.9.5   Harvesters and threshers

1.10   Livestock

    1.10.1   Cattle

    1.10.2   Buffaloes

1.10.3   Sheet and goats

1.10.4   Pigs

1.10.5   Poultry and ducks

1.10.6   Production of milk, meat, eggs, wool, etc.

1.11   Research Resources

1.11.1   Number of research stations

1.11.2   Number of state seed farms

1.11.3   Personnel working

1.11.4   Status of physical facilities in research stations

1.12   Agro-climatic Zones

1.12.1   Various zones in the state

1.12.2   Map showing various zones

1.2.   Agricultural characteristics of the Zone

2.1   Delineation of the Zone

2.1.1   Position in relation to longitude and latitude

2.1.2   Altitude from MLS

2.1.3   Total area

2.1.4   Districts and taluks in the zone

2.1.5   Specific features of the zone

2.1.6   Population and their occupation

2.1.7   Literacy percentage

2.1.8   Various zones (through map)

2.2   Physiography

2.2.1   Geographical tracts

2.2.2   Contour maps

2.2.3   Hills

2.2.4   Rivers, tanks and lakes

2.3   Climate

2.3.1   Type of climate (arid, semi-arid, tropical, sub-tropical, humid, sub-humid, temperate, sub-temperate, etc.)

2.3.2   Rainfall pattern

2.3.3   Maximum and minimum temperatures

2.3.4   Wind velocity

2.3.5   Evaporation

2.3.6   Humidity

2.3.7   Cloudiness

2.4   Soils

2.4.1   Geology

2.4.2   Soil types (red soils, black soils, alluvial soils, forest soils, sandy soils, calcareous soils, saline and alkali soils, lateritic soils acid soils, etc.)

2.4.3   Ill-drained soils

2.4.4   Water holding capacity

2.4.5   Land gradient

2.4.6   Run-off losses

2.5   Irrigation

2.5.1   District and taluk wise irrigated area

2.5.2   Source of irrigation-rivers, tanks, wells (open and borewells)

2.5.3   Ground water potential

2.5.4   Drainage problem

2.5.5   Proposed irrigation projects, if any

2.6   Land use patterns

2.6.1   District and taluk wise land use pattern

2.6.2   Total geographical area

2.6.3   Non-agricultural lands

2.6.4   Cropped lands

2.6.5   Cultivable waste lands

2.6.6   Current fallows

2.6.7   Total cropped area

2.6.8   Net area sown

2.6.9   Grazing lands

2.6.10   Area under different crops

2.6.11   Production and productivity of various crops

2.6.12   Cropping intensity and rotation

2.7   Major crops

2.7.1   Principal crops (district and taluk wise)

2.7.2   Area, production and productivity of each crop

2.7.3   Crop rotation

2.7.4   Sequencing of crops

2.7.5   Inter-cropping

2.7.6   Catch crops

2.7.7   Mixed cropping

2.7.8   Cropping intensity

2.8   Socio-economic Characteristics, Land Holding Pattern

    2.8.1   Population density (district wise)

    2.8.2   Size of holding

    2.8.3   Number of holdings

    2.8.4   Fragmentation

    2.8.5   Size and shape of holdings

    2.8.6   Land tenure system

    2.8.7   Source of finance

    2.8.8   Commodities produced

2.9.   Horticultural crops

    2.9.1   Area under horticultural crops

    2.9.2   Production and productivity for each horticultural crop

    2.9.3   Inter-cropping

    2.9.4   Storage facilities for vegetables

2.10   Agricultural Engineering Status, Farm Machinery Implements, Water Lifting, Devices, Post Harvest Practices, etc.

    2.10.1   Number of tractors

    2.10.2   Number of power liters

    2.10.3   Number of pumps (oil and electrical)

    2.10.4   Plough types (discs, harrows, cultivators, etc)

    2.10.5   Carts

    2.10.6   Sprayers and dusters

    2.10.7   Harvesters and threshers

    2.10.8   Irrigation (method, and device for irrigation)

2.11   Livestock Holding Pattern

    2.11.1   Livestock holding for big farmers, small farmers and marginal farmers

    2.11.2   Livestock holding by agricultural labour

    2.11.3   Average yields of various animals and bird.

2.12   Agricultural Marketing Status and Constraints

    2.12.1   Ways of disposal of farm produce and by-products

    2.12.2   Types of weights and scales

    2.12.3   Market types – whole sale and retail

    2.12.4   Mode of transport

    2.12.5   License fee

    2.12.6   Conveyance facilities (Roads)

2.13   Research Resource in the Zone

    2.13.1   Number of research stations

    2.13.2   Number of ICAR institutes and sub-stations

    2.13.3   State seed farms

    2.13.4   Function of these stations

    2.13.5   Number of personnel working

3.   Agro-ecological situation in the Zone

3.1   Basis/Criteria for Identifying Agro-ecological Situations. Each Farming Situation must be Homogeneous, in General for the Following.

    3.1.1   Soils

    3.1.2   Rainfall

    3.1.3   Physiography

    3.1.4   Altitude

    3.1.5   Irrigation pattern

    3.1.6   Temperature

    3.1.7   Drainage facility

3.2   Summary of Agro-ecological Situations

Based on the criteria listed under the above items, classify the agro-ecological situation into homogeneous farming situations and thus may be furnished in a table as shown in the next page.

Farming situation	Soils	Rainfall	Altitude	Principal crops	Important features	Location (area), extent of area in ha.

3.3.   Agricultural Characteristics of Each Agro-ecological Situation/Farming Situation

    3.3.1   Delineation

    3.3.2   Soils

    3.3.3   Climate

    3.3.4   Physiography

    3.3.5   Irrigation

    3.3.6   Major crops and cropping intensity

    3.3.7   Major cropping systems

    3.3.8   Land use pattern

    3.3.9   Land holding pattern

3.3.10   Populations and socio-economic characteristics

3.3.11   Adoption pattern and production constraints for each crop

3.3.12   General production constraints

3.4   Agricultural Engineering Constraints

3.4.1   Constraints for each crop

3.4.2   Priorities

3.5   Livestock Constraint

3.5.1   Constraints

3.5.2   Research gaps/needs

3.5.3   Extension programmes and gaps

3.5.4   Priorities

3.5.5   Development strategy

3.6   Typical/ Innovative Agricultural Practices with Rationale

There are some practices, which have been evolved by farmers with their own practical experiences. These may be furnished in a tabular form as given below. An example is also given in the same table.

Sl. No.	Farmers innovative practice	Rationale
1.	Longer duration finger millet varieties adopted in dry lands.	This is to avoid the rainy days coinciding with the harvesting stage.

3.7   Research and Extension Linkages

3.7.1   Linkages within the zone

3.7.2   Linkages between research activities

3.7.3   Linkages with extension agencies

3.7.4   University extension oriented programmes

3.7.5   Other extension programmes

3.7.6   Strategy to strengthen research extension linkages

3.8   Research Priorities and Strategy

3.8.1   Research gaps for each farming situation and crop

3.8.2   Research priorities for each farming situation and crop

3.8.3   Research strategy for each farming situation and crop

3.9   Development Strategy

3.9.1   Strengthening training facilities

3.9.2   In-service training of extension staff

3.9.3   Agricultural education

3.9.4   Coordination with irrigation department

3.9.5	Agricultural programmes
3.9.6	Joint field visits
3.9.7	Coordination with field visits
3.9.8	On farm trials/ research

Adoption Pattern by the Farmers

Analysis technology adopted for each farming situation by the farmers is needed and may be furnished in the following proforma.

Sl. No	Farming situation	Recommendation	Rationale

The data collected is divided into four parts for ease of presentation. These are:

1. Agricultural Situation of the district
2. Farming Systems of the district
3. Research priorities and strategies developed and
4. Development strategies
   and are presented in the coming chapters.

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