

Global
Programme
India



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COMPENDIUM OF GOOD PRACTICES ON

CLIMATE CHANGE

RESILIENT

PRACTICES

**Documentation of cultivation of
traditional climate resilient crops
and agricultural practices
(in agriculture field/land)**

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Acknowledgement

This report presents the results of a study and documentation on traditional climate resilient crops and practices. The study was carried out in the four states of Assam, Bihar, Odisha and West Bengal where the Global Programme is being implemented.

Greenpro Natura Consultants would like to express deep gratitude to Caritas India for her selection to conduct this study.

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Abbreviations

FGD Focus Group Discussion

ICAR Indian Council for Agricultural Research

IRRI International Rice Research Institute

ITK Indigenous Traditional Knowledge

KVK Krishi Vigyan Kendra

Background

Agriculture and food production are highly vulnerable to climate change. Extreme weather events such as droughts, heat waves and flooding have far-reaching implications for food security and poverty reduction, especially in rural communities with high populations of small-scale producers who are highly dependent on rain-fed agriculture for their livelihoods and food. Increasing demands on food production and food insecurity. To cope with climate change, farmers need to modify production and farm management practices, such as adjusting planting time, supplementing irrigation (when possible), intercropping, adopting conservation agriculture, accessing short- and long-term crop and seed storage infrastructure, and changing crops or planting more climate-resilient crop varieties.

Agricultural production is currently facing new and accelerating challenges. Climate resilient crops and agricultural is still an under-utilized resource in the development activities. It needs to be intensively and extensively studied and incorporated into formal research and extension practices to make agriculture practices more sustainable. Special efforts are needed to understand, document, and disseminate adoption and Practice of Resilient seeds and farm practices, ITK (Indigenous Traditional Knowledge) is found to be socially desirable, economically affordable, sustainable, environmentally safe, and minimum risk to research users and widely believed to conserve resources. Climate-resilient crops and crop varieties increase farmers' resilience to climate change, but despite their benefits, adoption rates by small-scale producers are not as high as expected in some cropping systems social actors, students towards better planning and implementation for the natural resource management and indigenous health practices.

To address these challenges, building resilience has been proposed in both science and international policy as a future priority for the governance of food and agricultural systems.

Greenpro Natura Consultants has been selected through a bidding process to conduct the study and prepare the report. The lead consultant, Ms. Jasmine Joseph along with Mr. Sunil Simon

Introduction

Climate change is already happening and its effects, especially on rural communities in India, are particularly adverse. It is making farming harder for communities around the world and particularly in countries in South Asia due to its geographical proximity. Over the past few decades, there have been significant changes being observed and witnessed including higher temperatures, lower and higher rainfall and more extreme and unpredictable weather. Climate change is expected to reduce yields of staple crops by up to 30%¹ due to lower productivity and crop failure. It is commonly understood that climate change affects biodiversity, but the loss of biodiversity is also exacerbating climate change, and shifting global weather patterns. Traditional agricultural communities manage biodiversity at various scales, creating dynamic landscape mosaics of fields, gardens, orchards, pastures and ecosystem patches. Agricultural biodiversity and associated traditional knowledge are essential to the climate change resilience of these landscapes² There is an urgent need to promote/revive traditional crop varieties and practices that help in reversing the loss of agrobiodiversity caused due to climate change and market drivers. Indigenous crops are more resilient to climate variations, and farmers have better knowledge of handling them, and traditional crops generally meet the food preferences of communities, making it all the more important to create measures to promote and revive them.

The objective of this publication is to capture and document existing as well as diminishing crop varieties and practices that are climate resilient. The study covers four states of the Global programme, namely Assam, Bihar, West Bengal and Odisha. A compendium of climate resilient practices is presented to refer to traditional practices that can help in addressing climate change impact and reduce losses. The crops and practices have been presented on the basis of identified climate related stresses.

This report is divided into four parts, namely part 1-Introduction, Methodology and State profiles, followed by part 2-which covers the findings and presentation of the identified climate resilient crop varieties, part 3- climate resilient practices and part 4- Recommendations and Conclusions.

¹ Jain, M., *Glob. Environ. Change* **31**, 98–109 (2015).

² Mijatovic, Dunja & van Oudenhoven, Frederik & Eyzaguirre, P. & Hodgkin, Toby. (2012). The role of agricultural biodiversity in strengthening resilience to climate change: Towards an analytical framework. *International Journal of Agricultural Sustainability - INT J AGRIC SUSTAIN.* 11. 1-13. 10.1080/14735903.2012.691221.

Methodology

This section provides an outline of the methodology adopted for the purpose of this study. The purpose of the study is to capture existing as well as diminishing climate resilient traditional crop varieties and practices. Both secondary as well primary data will be collected for the study and documentation. Data will cover farmers to give farm level information, while interview with agriculture experts, lead farmers will done for data validation. As a preparation towards the assignment, state wise mapping of existing ecosystems and cropping systems has been done through secondary sources like ICAR. These will be documented and included in the final document.

The current study will be covering the four states of Assam, Bihar, Odisha and West Bengal. Due to the large geographical coverage of the study, villages in two blocks from each state have been selected. Out of these, participants have been selected through random sampling.

A total of 25 villages in 19 blocks of 12 districts in the four states have been covered in the study.

Data collection has been divided into two phases. The first phase will capture and map the climate resilient traditional and improved crop varieties and climate resilient practices. Focused group discussion will be conducted for this purpose. The exercise will help in capturing data from different sources like village elders, leaders, resource farmers, women and youth. Data collected through the FGD exercise will be used to collect further data and validate them through structured in-depth Interviews (IDI).

Tools for FGD and IDI have been developed on the KOBO app. After consultation with Caritas India team members, the tools were shared with the data collectors. Online orientation on the tools have been provided before any data collection. Virtual support was extended to data collectors as and when required during the process. Feedback during data cleaning have been promptly given to eliminate errors in the data.

The tools for the FGD The tools have been developed to map traditional and existing crop and seed systems, climate resilient practices, and seeds and practices that are extinct. (Annexure 1,2 and 3)

Research and Analysis

This section covers the finding of secondary study done on major-agroecological zones that the four programme state covers. Major source of the data used is ICAR/NICRA. The already existing data will help in validating the findings from the primary data collection and help in the analysis.

This section gives an overview of the major agroecological zones as defined by ICAR and NICRA. It also gives the major crops that are suitable for each of the zones.

1. Agro-ecological Zones

India is divided into 15 Regions delineated on the basis of agroclimatic factors such as soil type, rainfall, temperature, and water resources³.

Table: Agro-ecological Climatic Zone⁴

Agroclimatic Zone	Climate	States (Number of Districts, Total percentage area of state under ACZ)	Crops Kahrif	Crops Rabi
Eastern Himalayan Region	Per humid to humid	Assam (27, 28.53), (West Bengal (3, 4.64)	Rice, Maize	Wheat, Rapeseed & Mustard
Lower Gangetic Plains	Moist subhumid to dry subhumid	West Bengal (15, 100)	Rice, Maize	Wheat, Rapeseed & Mustard
Middle Gangetic Plains	Moist sub humid to dry sub humid	Bihar (38, 57.49)	Rice, Maize, Sugarcane	Wheat, Rapeseed & Mustard
Eastern Plateau & Hills	Moist subhumid to dry subhumid	Odisha (17, 26.66), West Bengal (1, 1.66)	Rice, Maize	Wheat, Linseed

³ Agro-climatic region res & dev planning (central plauto-Hill region), Krishi.ICAR.gov.in

⁴ Impact of Climate Change on Indian Agriculture: An Agro-Climatic Zone Level Estimation, ICAR,2019

State-wise Agroecological Zones

1. Assam

The state characterized by humid and per-humid ecosystem, has 2.7 million ha under cultivation comprising 35% of total area.

a. Agro-Climatic/Ecological Zone⁵:

Dhemaji

- **Agro Ecological Sub Region (ICAR):** Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.
- **Agro-Climatic Zone (Planning Commission) :** Eastern Himalayan Division, Zone II
- **Agro Climatic Zone (NARP):** North Bank Plains Zone

Lakhimpur

- **Agro Ecological Sub Region (ICAR):** Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)
- **Agro-Climatic Zone (Planning Commission) :** Eastern Himalayan Region (VII)
- **Agro Climatic Zone (NARP):** North Bank Plains Zone

Morigon

- **Agro Ecological Sub Region (ICAR):** Bengal And Assam Plains, Eco-Region: Hot Sub humid (Moist) To Humid (Inclusion of Perhumid)
- **Agro-Climatic Zone (Planning Commission) :** Eastern Himalayan Region (VII)
- **Agro Climatic Zone (NARP):** Central Brahmaputra Valley Zone (CBVZ)

b. Cropping System:

In Assam, the irrigated area is hardly 6% of the cultivated area. The soils are acidic in nature and low in fertility.

Rice-rice and rice-rapeseed/mustard are the major cropping systems.

The cropping intensity of the state is 142.8% and total foodgrains production is 3.62 million tonnes.

At present, the predominant farming system of the state is crop + dairy + fishery + pig/duckery/poultry under irrigated condition for all types of farmers' categories.

The state has about 2.3 million ha under rice cultivation, which is mostly rainfed. The state average productivity is about 1.5 tonnes/ha. The major constraints in production are soil acidity, flash floods and low cropping intensity. The major constraints in production of mustard are use of traditional

⁵ Department of Agriculture and Farmer Welfare

varieties, inadequate moisture at sowing time, particularly in rice-fallow areas, delayed sowing, use of high seed rate and major biotic stresses (mustard aphid and *Alternaria* blight)

2. Bihar

Bihar with a geographical area of about 94.2 thousand square km is divided by river Ganges into two parts, the north Bihar with an area of 53.3 thousand square km and the south Bihar having an area of 40.9 thousand square km. Based on soil characterization, rainfall, temperature and terrain, four main agro-climatic zones in Bihar have been identified.

These are: Zone-I, North Alluvial Plain, Zone-II, north East Alluvial Plain, Zone-III A South East Alluvial Plain and Zone-III B, South West Alluvial Plain

a. Agro-Climatic/Ecological Zone:

Bhagalpur

- **Agro Ecological Sub Region (ICAR):** Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)
- **Agro-Climatic Zone (Planning Commission) :** Middle Gangetic Plain Region (IV)
- **Agro Climatic Zone (NARP):** South Bihar Alluvial Plain Zone (BI-3)

East Champaran

- **Agro Ecological Sub Region (ICAR):** Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)
- **Agro-Climatic Zone (Planning Commission) :** Middle Gangetic Plain Region (IV)
- **Agro Climatic Zone (NARP):** North West Alluvial Plain Zone (BI-1)

Munger

- **Agro Ecological Sub Region (ICAR):** Eastern Plain, Hot Subhumid (moist) Eco-sub region (13.1)
- **Agro-Climatic Zone (Planning Commission) Middle Gangetic Plain Region (IV)**
- **Agro Climatic Zone (NARP):** South Bihar Alluvial Plain Zone (BI-3)

Nawadha

- **Agro Ecological Sub Region (ICAR):** Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)
- **Agro-Climatic Zone (Planning Commission) Mid Gangetic Plain Region (IV)**
- **Agro Climatic Zone (NARP):** South Bihar Alluvial Plain Zone (BI-3)

Patna

- **Agro Ecological Sub Region (ICAR):** Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)
- **Agro-Climatic Zone (Planning Commission) Middle Gangetic Plain Region (IV)**
- **Agro Climatic Zone (NARP):** South Bihar Alluvial Plain Zone (BI-3)

Purnea

- **Agro Ecological Sub Region (ICAR):** Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)
- **Agro-Climatic Zone (Planning Commission) Middle Gangetic Plain Region (IV)**
- **Agro Climatic Zone (NARP):** North East Alluvial Plain Zone (BI-2)

Kaimur

- **Agro Ecological Sub Region (ICAR):** Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)
- **Agro-Climatic Zone (Planning Commission)** Middle Gangetic Plain Region (IV)
- **Agro Climatic Zone (NARP):** South Bihar Alluvial Plain Zone (BI-3)

Saharsa

- **Agro Ecological Sub Region (ICAR):** Eastern Plains (15)
- **Agro-Climatic Zone (Planning Commission)** Middle Gangetic Plain Region (IV)
- **Agro Climatic Zone (NARP):** North East Alluvial Zone (II)

b. Cropping System:

Rice, wheat and winter maize are predominant crops of the state

Rice-wheat are the major cropping systems.

The productivity of different crops in the state is less than the national average

Bihar is potentially an important wheat growing state that contributes 5.7% towards national production from 8% of wheat growing area of the country with a low productivity of 1.9 tonnes/ha. The yield gap between farmers' fields and frontline demonstration is about 1.2 tonnes/ha. The area, production and productivity, averaged over last five years are 2.1 million ha, 4 million tonnes and 1.9 tonnes/ha respectively. The major constraints in production are low seed replacement rates, late sowing, low farm mechanization and foliar blight disease.

3. Orissa

The cultivated area in the state is about 5.8 million ha constituting 37% of total geographical area. The red lateritic acidic soils are less productive due to deficiencies as well as toxicities of nutrients. The problem of soil erosion is severe. The important crops of the state are rice, horsegram, mustard and groundnut.

A. Agro-Climatic/Ecological Zone:

Bhadrak

- **Agro Ecological Sub Region (ICAR):** Eastern Ghats, hot moist sub humid eco sub region; Gangetic delta, hot moist sub humid eco sub region; Utkal plain and East Godavari delta, hot dry sub humid eco sub region (18.4)
- **Agro-Climatic Zone (Planning Commission)** East coast plains and hills region (XI)
- **Agro Climatic Zone (NARP):** North Eastern Costal Plain (OR-3)

Ganjam

- **Agro Ecological Sub Region (ICAR):** Eastern Ghats Hot Moist Sub Humid Eco Sub region (12.2)
- **Agro-Climatic Zone (Planning Commission)** East coast plains and hill region (XI)
- **Agro Climatic Zone (NARP):** East and south eastern coastal plain zone (OR-4)

Puri

- **Agro Ecological Sub Region (ICAR):** East and South Eastern Coastal Plain Zone (18.4)
- **Agro-Climatic Zone (Planning Commission)** Sub-humid to humid Eastern and South Eastern Upland (5)
- **Agro Climatic Zone (NARP):** East and south eastern coastal plain zone (OR-4)

Rayagada

- **Agro Ecological Sub Region (ICAR):** Gajrat hills, Dandakaranya and Eastern Ghats hot moist sub-humid eco-sub-region. (12.1)
- **Agro-Climatic Zone (Planning Commission)** East Coast Plains and Hills Region (XI)
- **Agro Climatic Zone (NARP):** North Eastern Ghat Zone (OR-5)

c. Cropping System

Rice and mungbean are the major crops in the state

4. West Bengal

The cultivated area of the state is 5.5 million ha comprising 62% of the total geographical area. About 54% of cultivated area is irrigated and the cropping intensity is high at 176%. The soils are acidic, saline and sodic and low in fertility.

Agro-Climatic/Ecological Zone:

NORTH 24-PARGANAS

- **Agro Ecological Sub Region (ICAR):** Bengal and Assam plains, hot sub humid (moist) to humid (inclusion of per humid) eco-subregion (15.1)
- **Agro-Climatic Zone (Planning Commission)** Lower Gangetic Plain Region (III)
- **Agro Climatic Zone** Coastal Saline Zone (WB-6) New alluvial zone (WB-4)

South 24-PARGANAS

- **Agro Ecological Sub Region (ICAR):** Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)
- **Agro-Climatic Zone (Planning Commission)** Lower Gangetic Plain Region (III)
- **Agro Climatic Zone** Coastal Saline Zone (WB-6)

Cropping System

The important crops are rice, potato, mustard, pulses and jute.

Climate Resilient and diminishing crops/seeds

The following list of climate resilient crop varieties have been identified through the mapping exercise that was done in the four states. The following have been categorised as per crops available in the four states.

1. List of Climate Resilient Varieties

A. Paddy

Variety	Type	States	District	Agro-climatic Zone	Climate Resilience Qualities
Aijung	Traditional	Assam	Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Flood/Submergence resistant
Amona	Traditional	Assam	Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant
Bao dhan (Negeri bao)	Traditional	Assam	Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Bao dhan (Omona)	Traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Bao dhan-'Dangkap'	traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Beroi	Traditional	Assam	Assam-Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Pathogen resistance
Joha	Traditional	Assam	Assam-Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes)
Jul Bao	Traditional	Assam	Assam Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)

Kauribalam	Traditional	Assam	Assam-Morigaon	Bengal And Assam Plains, Eco-Region: Hot Sub humid (Moist) To Humid (Inclusion of Perhumid)	Flood/Submergence resistant Heat Stress Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Kholia bao	Traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Kokua bao	Traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Kula Sali	Traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Lalganga	Traditional	Assam	Assam-Morigaon	Bengal And Assam Plains, Eco-Region: Hot Sub humid (Moist) To Humid (Inclusion of Perhumid)	Flood/Submergence resistant Heat Stress Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Masuri (red & White)	Traditional	Assam	Assam-Morigaon	Bengal And Assam Plains, Eco-Region: Hot Sub humid (Moist) To Humid (Inclusion of Perhumid)	Flood/Submergence resistant Drought Resistant/delayed monsoon Heat Stress Cold resistance Animal (insects nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes)
Ranjit	Traditional	Assam	Assam-Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes)
Sowkua	Traditional	Assam	Assam-Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)

Swarna Masuri	Improved/High Yield Variety	Assam	Assam-Lakhimpur	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region (15.2)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
BB11	Improved/High Yield Variety	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Bhalani	Traditional	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Buddha	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Jaswaul	Traditional	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Loknath	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Nati Mansuri	Improved/High Yield Variety	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Pana mansuri	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Cold resistance
Radha 9	Improved/High Yield Variety	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Rajendr madhuri h	Improved/High Yield Variety	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)

Sarju bavan	Traditional	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Singra*	Traditional	Biahr	Bihar- Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Sona Mansoori	Traditional	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Sukla Mansuri	Improved/High Yield Variety	Bihar	Bihar- Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Swarna	Traditional	Bihar	Bihar- Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Swarna Sub 1(Sonali)	Traditional	Bihar	Bihar- Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Bangabandhu	Improved/High Yield Variety	West bangal	South	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco- Region. (15.1)	Flood/Submergence resistant
Barsha	Improved/High Yield Variety	West Bengal	West Bengal- South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco- Region. (15.1)	Salinity resistance

Bidhan 2	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
CR	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Dudheshwar	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Gobindabhog	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Haldi-Batali (Extinct)	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of	Flood/Submergence resistant Animal (insects, nematodes, mammals)

				Perhumid) Eco-Region. (15.1)	
Hamai (Extinct)	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Jeerakati	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Kalomota	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Katarangi	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Lal miniket	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes,

				Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Miniket	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Pankaj	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant
Patnai	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Salinity resistance
Pratiksha	Improved/High Yield Variety	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)

Masuri (red & White)	Traditional	Odisha	Odisha-Ganjam	Eastern Ghats Hot Moist Sub Humid Eco Sub region (12.2)	Flood/Submergence resistant Drought Resistant/delayed monsoon Heat Stress Cold resistance Animal (insects nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes)
Pooja	Improved/High Yield Variety	Odisha	Odisha-Ganjam	Eastern Ghats Hot Moist Sub Humid Eco Sub region (12.2)	Flood/Submergence resistant Drought Resistant/delayed monsoon Heat Stress Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
RGL	Traditional	Odisha	Odisha-Ganjam	Eastern Ghats Hot Moist Sub Humid Eco Sub region (12.2)	Flood/Submergence resistant Drought Resistant/delayed monsoon Heat Stress Pathogens (Fungi, virus, bacteria, microbes) Animal (insects, nematodes, mammals)
Sarad	Traditional	Odisha	Odisha-Puri	East and South Eastern Coastal Plain Zone (18.4)	Flood/Submergence resistant Salinity resistance Pathogens (Fungi, virus, bacteria, microbes)
Swarna sabarna	Traditional	Odisha	Odisha-Bhadrak	Eastern Ghats, hot moist sub humid eco sub region; Gangetic delta, hot moist sub humid eco sub region; Utkal plain and East Godavari delta, hot dry sub humid eco sub region (18.4)	Salinity resistance Flood/Submergence resistant Pathogens (Fungi, virus, bacteria, microbes)
Taichini	Improved/High Yield Variety	Odisha	Odisha-Puri	East and South Eastern Coastal Plain Zone (18.4)	Flood/Submergence resistant Salinity resistance

					Pathogens (Fungi, virus, bacteria, microbes)

B. Wheat

Variety	Type	Region/States	District	Agro-climatic Zone	Climate Resilience Qualities
Gautam*	Traditional	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Cold resistance
Kundan	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Cold resistance Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Kedar	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Cold resistance Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
R 43	Improved/High Yield Variety	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Cold resistance
Shriram 330	Improved/High Yield Variety	Bihar	Bihar-Supaul	Eastern Plain, Hot Subhumid (moist) Eco-	Cold resistance

				Region (13.1)	
Up 62	Improved/High Yield Variety	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Cold resistance Animal (insects, nematodes, mammals)
2967	Improved/High Yield Variety	Bihar	Bihar-East Champaran	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes)

C. Pulses and Legumes

Variety	Type	Region/States	District	Agro-climatic Zone	Climate Resilience Qualities
Jati Mati Mah (local)	Traditional	Assam	Assam-Lakhimpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Cold resistance Pathogens (Fungi, virus, bacteria, microbes)
Local Black gram	Traditional	Assam	Assam-Dhemaji	Bengal and Assam Plain, hot humid (moist) to humid (inclusion of perhumid) ecoregion.	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Red Lentil	Traditional	Bihar	Bihar-Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant

Desi Chana	Traditional	Bihar	Bihar-Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Khesari (lentil)	Traditional	Bihar	Bihar-Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant
Chaiti desi (arhar)	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Kurthi	Traditional	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Titki masoor	Traditional	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Chaity Moong	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds

				To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	
Kheshai	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Khesari	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	Salinity resistance Animal (insects, nematodes, mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
Local Legumes	Traditional	West Bengal	West Bengal-South 24 Parganas	Eastern Coastal Plain, Hot Subhumid To Semi-	Flood/Submergence resistant Salinity resistance Animal (insects, nematodes,

				Arid Eco-Region (18.5) Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)	mammals) Pathogens (Fungi, virus, bacteria, microbes) Weeds
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D. Maize

Variety	Type	Region/States	District	Agro-climatic Zone	Climate Resilience Qualities
Shalimar sweet corn	Traditional	Bihar	Bihar-Bhagalpur	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)	Flood/Submergence resistant Animal (insects, nematodes, mammals)
Kanchan	Improved/High Yield Variety	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Drought Resistant/delayed monsoon Animal (insects, nematodes, mammals)
Tulbuli	Traditional	Bihar	Bihar-Nawadha	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.2)	Cold resistance

Climate Resilient Good Practices

Climate resilient practices that addresses the climate stresses have been identified and an overview is presented below-

Practice Name	Problem it addresses	States
Early sowing of seeds	Flood	Assam
Climate resilient varieties for crop cultivation	Flood	Assam

Raised bed for cultivation	Flood	Assam
Alternative crop cultivation (Paddy)	Flood	Assam
Seeds are stored in thatched houses	Flood	Assam
Crops are tied in bundle and hanged in the above in the houses	Flood	Assam
Seed selection	Flood	Assam
Short Duration Seeds	Flood Flood	Bihar
Seed storage in plastic gunny bags with neem leaves and straw and stored at high stand	Flood	Bihar
Canal System	Flood	Bihar
Irrigation- Canal	Extreme Heat	Bihar
Tree plantation	Flood-Soil Erosion	Bihar
Land Leveling	Flood	Bihar
SRI	Drought	Bihar
Seed storage in mud vessal	Flood/Insects	Bihar
Silmari leaves-Animal repellent	Animal (insects, nematodes, mammals)	Bihar
Tobacco-cow urine solution	Animal (insects, nematodes, mammals)	Bihar
Bunding	Salinisation	Odisha
Manually watching	Animal (insects, nematodes, mammals)	Odisha
Lift irrigation	Extreme Heat	Odisha
Use of flood tolerant varieties like swarna subvan	Flood	Odisha
Storing seeds in superbags at high bamboo platform with neem leaves	Flood	Odisha
Integrated Farming- Goatry and Poultry	Flood	Odisha

Composting	Pathogens (Fungi, virus, bacteria, microbes)	Odisha
Alchas	Flood	West Bengal
Portable Farming (Bostachas - Sack Cultivation)	Flood	West Bengal
Preserving local varieties	Salinisation	West Bengal
Changing the date of sowing- Early sowing and harvest	Flood	West Bengal
Composting	Flood	West Bengal
make platforms to attract owls- friendly predators	Animal (insects, nematodes, mammals)	West Bengal

Case studies on good practices

CLIMATE RESILIENT PRACTICE

IRRIGATION CHANNELS

As a solution for drought/delayed monsoons

Problem Statement

- Farmers are forced to leave their land fallow because of no irrigation facilities.
- Soil degradation due prolonged drought is leading to unproductive land.

Stress:
Drought

Affected States:
Bihar, Odisha

Affected Area:
Crops, Soil, Land

Impact Severity:
High

Impact Coverage:
High

Solution-

Moisture Management: Irrigation Channels

- Irrigation is very important to increase crop production, farmers can grow additional 2 crops

Solution Strategy:
Conservation

Result:
Conservation

Benefits:
Promotes Soil Moisture

Knowledge:
Modern Knowledge

Farm Components benefitted:
Field Crops, vegetables, fruit trees, Livestock

Features/Uses

- Materials/process required:
 - Identification of old irrigation canals by farmer collectives
 - Joint interface meetings with local government and stakeholders for construction, reconstruction or repair of irrigation channels
 - Division of tasks among the user groups
 - Support from government experts for technical as well as financial support
- Benefit Description:
 - Water from channels are used in the field. Soil moisture is maintained and crops are protected from water shortage.

Compendium of best/good practices on climate resistant crop/agricultural practices in all four program states and diminishing crops or seeds, which can be replicated in future.

To be added after IDI data collection

Crop	Variety	Availability (Common/Rare)	Climate Vulnerability	Crop Strength	Best Practice
					All practices from Land Preparation to Harvesting/Storage-Value addition

CROP Name (+ Scientific Name)

Variety Name

Variety type

Drought Resistance Variety
Region: State + Agroecological Zone



Crop Availability
Common



Planting Details:
Ideal Time: 1 June Ideal Temperature: 30 C



Crop Strength
High Nutrition



Sowing Details:
Method: Transplantation Seed Rate: Kg/Ha



Crop Weakness
Low Productivity



Crop Duration:
Short Duration/60 Days



Use of Crop
Consume as grain, food process, sell



Soil and Land Suitability:
Black Soil, Low Land



Cultural Importance
Good for women's Health



Average Yield
Kg/acre



Characteristics:
Fragrance: High Taste: Strong Nutrition: High



Suitable climate resilient practices:
Mulching

Characteristics: Tolerance Quality
Region: State + Agroecological Zone

Crop Availability
Common

Planting Details:
Ideal Time: 1 June Ideal Temperature: 30 C

Crop Strength
High Nutrition

Sowing Details:
Method: Transplantation Seed Rate: Kg/Ha

Crop Weakness
Low Productivity

Crop Duration:
Short Duration/60 Days

Use of Crop
Consume as grain, food process, sell

Soil and Land Suitability:
Black Soil, Low Land

Cultural Importance
Good for women's Health

Suitable climate resilient practices:
Mulching

Characteristics:
Fragrance: High Taste: Strong Nutrition: High

Methodologies and processes for replication and adaptation in other areas

To be added after IDI data collection

Strategies and methodologies for replication of best practices

Levels	Strategy	Methodology	Processes
Individual Level			
Household Level			
Farm Level			
Collective/Community level			

Annexures

Annexure I

Documentation of cultivation of traditional climate resilient crops and agricultural practices (in agriculture field/land)

Focus Group Discussion Questions and Formats

Names of the team members conducting FGD

(Ice- Breaking Activity)

A. Preliminary Information

1. Full Name of the person responsible for reporting
2. Position in the organisation
3. Phone Number
4. Name of the Partner Organisation
5. State-District - Assam-Dhemaji | Assam-Lakhimpur | Assam-Morigaon | Bihar-Bhagalpur | Bihar-East Champaran | Bihar-Munger | Bihar-Nawadha | Bihar-Patna | Bihar-Purnea | Bihar-Kaimur | Bihar-Saharasa | Bihar-Supaul | Odisha-Bhadrak | Odisha-Ganjam | Odisha-Puri | Odisha-Raygada | West Bengal-South 24 Parganas
6. Name of the Block
7. Name of the Panchayat
8. Name of Village

B. Total Number of Participants in the Focused Group Discussion

1. Total Participants
2. Total Female
3. Total Male
4. Total Other

Focused Group Discussion I - Crop/Variety Mapping

- Group to be asked about to think about all the climate resilient crops and their varieties in their community. (Please explain the meaning of climate resilience if required)
- Brainstorm all the varieties and the recorder may list them down in her/his diary for reference.
- The following question will now guide you to capture information for each particular variety. These questions are to be repeated for each variety. List them season wise. Use the table given below the questions to capture the information (prepare the table in a brown sheet (big)/ joined chart sheets in advance .

C. Crop/variety Mapping

Crop/Variety Details

(Collect the information season wise, crop wise and variety wise by using the questions below. Use the table you made in the brown sheet to document. In case you don't want to use the brown sheet, you can print this section "C" and use the copies for collecting information on each variety. Please make sufficient copies to capture all varieties)

11. Agricultural Season* - Kharif | Rabi | Zaid | Others

(Season wise take information on the questions below eg. First take information of all crops (and varieties) in Kharif)

2. Name of crop*

3. Name of Variety*

(Please use separate rows / sheets for each variety.

If you are unsure about the local name, please put a star against it to confirm later.)

4. Crop Variety Type* - Traditional | Improved/High Yield Variety | Hybrid

5. Crop/Variety Quality* - Common | Rare/Diminishing

6. Growing Seasons Suitability (In which all seasons this variety can be grown)* - Kharif | Rabi | Zaid | Other

7. Land Type (Which land type is suitable to grow this variety)* - Upland | Midland | Low land

8. Soil Type (Which soil type is suitable to grow this variety)* - Alluvial Soil | Red Soil | Black soil | Arid Soil/Desert Soil | Laterite Soil | Saline Soil | Peaty/Marshy Soil | Forest Soil | Sub-mountain Soil | Snowfields

9. Climate Events (Which climate events have the potential to affect the growth/production of this variety) - Heat Wave | Cold Wave | Drought | Flood | Cyclone | Hailstorm | Sea Water Intrusion | Others

10. Resilience Quality⁶ – Abiotic (What are the qualities of this particular variety)* - Flood/Submergence resistant | Drought Resistant/delayed monsoon | Salinity resistance | Cold resistance | Heat Stress

11. Resilience Quality-Biotic (What are the qualities of this particular variety)* - Animal (insects, nematodes, mammals) | Pathogens (Fungi, virus, bacteria, microbes) | Weeds

12. Nutritional Value of the crop* - High | Medium | Low

13. Whether the seeds of this variety is available locally* - Yes | No

⁶ Climate Resilient Crop Varieties for Sustainable Food Production under Aberrant Weather Conditions, ICAR, 2015 | Crop Stresses: Abiotic: Water- Flood, Droughts; Temperature: High, low, Freezing; Nutrients: Deficiency, Toxicity | Biotic: Animals (insects, nematodes, mammals)

14. Name of the Practicing Farmer who can provide detailed information on this variety*

15. Capture the photos of the exercise

D. Information on Climate Events & Vulnerable Sectors

What are the major climate events observed in the past in this village? Which agricultural sectors are affected by these events?

Please fill the table below with **Y** – for affected & **N** – for not affected. Fill information for all applicable events. One table is required to be filled for one village. (If needed, use a brown sheet / chart paper for this table)

Climate Events	Vulnerable Sectors (Y/N)								
	Agricultural crops	Horticultural crops	Fisheries	Poultry & other birds	Small Ruminants	Livestock	Land	Water	Forest
Heat Wave	Y	N	Y	Y	N	N	N	Y	Y
Cold wave	N	N	N	N	N	N	N	N	N
Drought									
Flood									
Cyclone									
Hailstorm									
Sea Water Intrusion									
Other*									
Other*									

*Add any other climate events if necessary

Annexure II

Focused Group Discussion II - Climate Resilient Practice Mapping

(In case the group is not the same as crop mapping, please fill the details in the Section A again for reference)

Names of the team members conducting FGD

(Ice- Breaking Activity)

(Skip the above portion if you are taking data from the same group)

A. Preliminary Information

5. State-District - Assam-Dhemaji | Assam-Lakhimpur | Assam-Morigaon | Bihar-Bhagalpur | Bihar-East Champaran | Bihar-Munger | Bihar-Nawadha | Bihar-Patna | Bihar-Purnea | Bihar-Kaimur | Bihar-Saharasa | Bihar-Supaul | Odisha-Bhadrak | Odisha-Ganjam | Odisha-Puri | Odisha-Raygada | West Bengal-South 24 Parganas

6. Name of the Block 7. Name of the Panchayat

8. Name of Village

B. Total Number of Participants in the Focused Group Discussion

1. Total Participants 2. Total Female

3. Total Male 4. Total Other

E. Climate Resilient Practice Mapping

Vulnerability Mapping

(Collect the information vulnerability wise (all applicable), using the questions below. Use the table you made in the brown sheet to document. Fill each practice in a new row. Add rows if there are more practices)

11. Identified Vulnerabilities in the village*

Extreme Heat | Cold/frost/hail | Drought | Flood | Salinisation | Animal (insects, nematodes, mammals) | Pathogens (Fungi, virus, bacteria, microbes) | Weeds | Others

(Use the table to enter data for one vulnerability at a time)

2. Is it a Major problem?* - Yes | No

Impact Areas in Agriculture

3. Impact Area *(What are the impact areas of this stress?)**

Land quality (land hardening, soil erosion, etc) | Seed Quality and availability | Crop Cultivation and productivity | Water quality and availability | Other | Please specify

4. Impact Proportion (% farmers reporting the problem)*

Low (0-25%) | Medium (25-50%) | High (50-100%)

5. Impact Severity (% damage to crops)*

Low (0-25%) | Medium (25-50%) | High (50-100%)

List of Solutions / Practices

16. Solution- Name of Practice*

6.1 Please describe the practice in one line. (Adaptation/resilience benefits)* *eg. Increases organic matter in soil.....*

7. Knowledge Source (What is the source of knowledge for this practice?) - Village Elders/family | Other farmers/peer/village | Farmers Group/Farmer Field Schools | External (Govt./KVK/NGO)

8. Practice application area (Where is this applied?) - Land | Seed | Crop | Other (specify)

9. % of Farmers Practising (What is the percentage of farmers using this practice?) - Low (0-25%) | Medium (25-50%) | High (50-100%)

10. Name of the Practising Farmer who can provide detailed information on this practice*

11. Capture the photos of the exercise

Reference Information: Soil types names in Hindi

Soil name	Hindi
Alluvial Soil	कछार की मिट्टी, जलोढ़ मिट्टी
Red Soil	लाल मिट्टी
Black soil	काली मिट्टी
Arid Soil/Desert Soil	मरुस्थलीय मिट्टी या रेतीय मिट्टी
Laterite Soil	लैटेराइट मिट्टी
Saline Soil	लवणीय क्षारयुक्त मिट्टी
Peaty/Marshy Soil	जैविक मिट्टी
Forest Soil	वन मिट्टी
Sub-mountain Soil	पर्वतीय मिट्टी
Snowfields	बर्फ के मैदान की मिट्टी

