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Climate Change
Innovation
Programme

Operational Strategy for Climate Resilient Value Chain Development of Mango & Arhar in Odisha

Adapting to Climate Change in Agriculture:
Climate Resilient Agriculture Practices

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The views expressed in this report do not necessarily reflect the UK government's official policies.

Abbreviations and Acronyms

AAO	Assistant Agriculture Officer
ADH	Assistant Director of Horticulture
AEZ	Agri Economic Zone
AHO	Assistant Horticulture Officer
APEDA	Agricultural & Processed Food Products Export Development Authority
APICOL	Agricultural Promotion & Investment Corporation of Odisha Limited
APMC	Agricultural Produce Market Committee
ATMA	Agriculture Technology Management Agency
CCIP	Climate Change Innovation programme
CGPDTM	Controller general General of Patents, Designs & Trade Marks
CHC	Custom Hiring Centre
CHES	Central Horticulture Experiment Station
CSA	Climate Smart Agriculture
DAO	District Agriculture Officer
DDA	Deputy Director Agriculture
DDH	Deputy Director Horticulture
DFID	Department for International Development
FIG	Farmers' Interest Group
FPO	Farmers' Producer Organisation
GP	Gram Panchayat
ICT	Information Communication Technology
IMAGE	Institute on Management of Agricultural Extension
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
KVK	Krishi Vigyan Kendra
MIDH	Mission for Integrated Development of Horticulture
MT	Metric Tonne
NABARD	National Bank for Agriculture & Rural Development
MSME	Micro, Small & Medium Enterprises
NAFED	National Agricultural Cooperative Marketing Federation
NAM	National Agriculture Market
NFSM	National Food Security Mission
NGO	Non-Government Organisation
NHB	National Horticulture Board
NHM	National Horticulture Mission
NMAET	National Mission on Agriculture Extension and Technology
NMSA	National Mission for sustainable Agriculture
NPOP	National Program for Organic Production
NRCWA	National Research Centre For Women in Agriculture
ORMAS	Odisha Rural Development & Marketing Society
OSSOPCA	Odisha State Seed and Organic Products Certification Agency
OSAMB	Odisha State Agricultural marketing Board
OUAT	Orissa University of Agriculture and Technology
RI	Resource Institution
RKVY	Rastriya Krishi Vikas Yojana
SFAC	Small Farmers' Agribusiness Consortium
SHG	Self Help Group

Glossary

Agro-Climatic Zone	An "Agro-climatic zone" is a land unit in terms of major climates, suitable for a certain range of crops and cultivars. The planning aims at scientific management of regional resources to meet the food, fibre, fodder and fuel wood without adversely affecting the status of natural resources and environment.
Farming System	It designates a set of agricultural activities organized while preserving land productivity, environmental quality and maintaining desirable level of biological diversity and ecological stability.
Farmers Producer Organization (FPO)	Collectivization of Producers especially small and marginal farmers so as to form an effective alliance to collectively address many challenges of agriculture such as improved access to investment, technology, inputs and market.
Intercropping	Intercropping is a multiple cropping practice involving growing two or more crops in proximity.
Canopy management	Canopy management is the manipulation of tree canopy to optimize the production of quality fruits. It includes both training and pruning operations which affect the quantity of sunlight intercepted by trees.
NFSM	Nation Food Security Mission (NFSM) is a Govt. of India scheme launched in 2007; with an objective of increasing production of rice by 10 million tonnes, wheat by 8 million tonnes and pulses by 2 million tonnes by the end of eleventh five-year plan.
NMSA	National Mission for Sustainable Agriculture (NMSA) is a Govt. of India scheme to cater to key dimensions of 'Water use efficiency', 'Nutrient Management' and 'Livelihood diversification' through adoption of sustainable development pathway by progressively shifting to environment friendly technologies, adoption of energy efficient equipment, conservation of natural resources, integrated farming etc.
RKVY	Rastriya Krishi Vikas Yojana (RKVY) is Govt. of India scheme aims at achieving 4% annual growth in the agriculture sector during the XI Plan period, by ensuring a holistic development of Agriculture and allied sectors (Fisheries Department, Horticulture, Animal Husbandry etc.
NHM	National Horticulture Mission (NHM) is a Govt. of India program to promote holistic growth of the horticulture sector through an area based regionally differentiated strategies
MIDH	Mission for Integrated Development of Horticulture (MIDH) is a Centrally Sponsored Scheme for the holistic growth of the horticulture sector covering fruits, vegetables, root & tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo.

INM	Integrated Nutrient Management (INM) refers to the maintenance of soil fertility and of plant nutrient supply at an optimum level for sustaining the desired productivity through optimization of the benefits from all possible sources of organic, inorganic and biological components in an integrated manner
IPM	Integrated Pest Management (IPM) aims at careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment.
Cold Chain	A cold chain or cool chain is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of refrigerated production, storage and distribution activities, along with associated equipment and logistics, which maintain a desired low-temperature range.
NAM	National Agriculture Market or e-NAM is a pan India, unified national electronic agriculture market for agricultural products. It was launched by Ministry of Agriculture & Farmers' Welfare, Govt of India, to facilitate farmers, traders, buyers, exporters and processors with a common platform for trading commodities.
ORMAS	Odisha Rural Development & Marketing Society (ORMAS) has been rendering services in livelihood promotion and rural product marketing in Odisha.
MSME	Micro, Small & Medium Enterprises (MSME) has been created with an objective to facilitate, promote and enhance competitiveness of MSMEs in the state. It is a State Government initiative to rejuvenate, give topmost priority and thrust for facilitating and co-coordinating the growth and development of the MSME sector.
OSAMB	Odisha State Agricultural marketing Board aims at improving farmers/ producers' access and linkage to the agricultural markets, functionalization of agricultural markets for better utilization of available market infrastructures and marketing services and strengthening of existing markets.
BBF	A raised land configuration 'Broad Bed Furrow' (BBF) system helps the soil to preserve the water level for a longer period. Holding moisture intact, the bed stimulates crop's growth. This system not only help in water conservation for better crop yield but also help adapt to the changing climate.

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Executive Summary

The project "Adapting to Climate Change in Agriculture: Climate Resilient Agriculture Practices" intends to strengthen the capacity of the Agriculture Department to design, pilot, adopt and disseminate climate resilient agriculture practices and value chains of Mango and Arhar through extensive handholding support for design and training at various stakeholder levels both within the government and at the farmer level. The overall objective of this project is to support informed interventions along the value chain of Mango and Arhar, to build resilience to the likely adverse impacts of climate change. These interventions could be made by government; community-based organizations, private sector entities and other stakeholders.

For more than a decade now, the state has experienced contrasting extreme weather conditions: from heat waves to cyclones, from droughts to floods. The extreme weather or climate induced natural calamities occurring alone or in combination create agricultural instability in the state. The production and productivity of crops which face risks and uncertainties like deficient rainfall, pests attack, non-availability of credit, price fluctuations, failure of farming method, etc. play crucial role in the growth of agriculture sector. Major factors like natural shocks of floods, droughts, severe cyclone, etc. and price variations in agricultural products contributed significantly to the varying degrees of growth rates. Continuing climate variation is predicted to alter the sectoral growth, including the ability of the poor to engage in farm and nonfarm sector activities.

In consultation with the state government, two climate resilient crops - Mango and Arhar have been selected for value chain analysis and development of ideal climate resilient operational strategy in Odisha. Arhar is one of the hardy, drought tolerant perennial legume crop with a wide range of rainfall tolerance. It has wide adaptability to different climates and can grow on a wide range of soils with tolerance to a wide range of pH. As a pulse crop, Arhar has the ability to biologically fix nitrogen. It contains high levels of protein and important amino acids thus contributing to food security and combat malnutrition. A perennial crop like Mango can stay alive under desiccating conditions and this capacity can be highly advantageous for yield in

succeeding growing seasons. It can withstand dry weather and is moderately drought tolerant. It has the capability to grow in a wide range of vegetation zones and can enhance carbon sink. It is one of the most popular, nutritionally rich fruits with health promoting qualities.

The National Agriculture Policy gives thrust on strengthening rural infrastructure to support faster agricultural development, promote value addition and accelerate the growth of agribusiness centres in rural areas. There are many schemes and sub-schemes and missions like Mission for Integrated Development of Horticulture (MIDH), National Horticulture Mission (NHM) and National Food Security Mission (NFSM) which can be leveraged for the integrated development of Mango and Arhar. Institutions/ agency like Agricultural and Processed Food Products Export Development Authority (APEDA), National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and Small Farmers' Agribusiness Consortium (SFAC) are providing marketing facilities for Mango and Arhar.

There are issues and challenges in climate resilient value chain development of Mango and Arhar in Odisha. Low level of awareness among farmers regarding climate resilient practices and inadequate availability of climate resilient varieties make the farmer vulnerable to climatic aberrations, low adoption of scientific cultivation practices among farmers contributes to lower production and productivity. Inadequate aggregation, storage and cold chain facilities enhance post-harvest losses and reduce quality of produce. Low market awareness among farmers, lack of organized marketing mechanism and less prominence of collective marketing increase exploitation by middle man and result in poor price realization.

Strategy recommendations for climate resilient value chain development of Mango and Arhar in Odisha are presented below.

	Stage	Strategy Recommendation	Priority
MANGO	Pre-Production	Promotion of climate resilient varieties of Mango like Arka Neelachal Kesari, Keshar and Totapuri	High
	Production	Promotion of micro irrigation in Mango orchards for better water use efficiency, reduction of water wastage	High
		Canopy Management in Mango orchard for appropriate light penetration, better productivity and uniform ripening	High
		Promotion of integrated pest management (IPM) practices in Mango orchards	High
		Promotion of intercropping in Mango orchard for optimum land utilization, improvement of soil health and additional income	Medium
	Post-Harvest & Processing	Establishment of aggregation and pack house facilities at cluster level for reduction of wastage and transportation loss, enhanced marketability and better price of Mango	High
		Establishment of ripening chambers at cluster level for efficient, controlled and safer ripening of Mangoes	High
		Development of cold chain facilities for reduction of post-harvest losses, enhancement of shelf life and price stabilization of Mango	High
		Establishment of processing units at cluster level for reduction of post-harvest losses, value addition, extended shelf life, enhanced marketability and better price realization for the processed Mango products	High
	Marketing	Development of Market linkages for market assurance, better price realization and minimization of distress sale of Mango	High
		Promotion and strengthening of Farmer producer organizations (FPOs) for climate resilient value chain development of Mango	High

	Stage	Strategy Recommendation	Priority
ARHAR	Pre-Production	Promotion of short duration & high yielding climate resilient varieties of Arhar like UPAS-120, Manak, Asha, Paras	High
	Production	Promotion of Integrated nutrient management practices in Arhar for maintenance of soil fertility and enhancement of productivity by optimizing the benefits of the plant nutrients from organic, inorganic and biological sources	High
		Promotion of Broad Bed Furrow (BBF) system of planting in Arhar for in-situ conservation of water, better crop yield, better water productivity, better drainage, proper aeration in seed bed & root zone and better adaption to climate change	High
		Promotion of monocropping of Arhar in Rabi season for better land utilization, enhancement of soil fertility, additional production of Arhar and farm income and contribution towards food security	High
		Promotion of intercropping and bund plantation for risk distribution among different crops, increased and staggered income, better utilization of land and soil	Medium
	Post-Harvest & Processing	Establishment of aggregation and pack house facilities at cluster level for reduction of wastage and transportation loss, enhanced marketability and better price of Arhar	High
		Establishment of dal processing units at cluster level for reduction of post-harvest losses, value addition, extended shelf life, enhanced marketability and better price realization for the processed Arhar	High
		Provision of storage facilities for Arhar for reduction of post-harvest losses and minimization of distress sale	Medium
	Marketing	Development of Market linkages for market assurance, better price realization and minimization of distress sale of Arhar	High
		Promotion and strengthening of Farmer producer organization (FPOs) for climate resilient value chain development of Arhar	High

The strategies can be successfully translated in the field through Government functionaries with the support of private sector involvement and community.

Apart from the recommended strategies mentioned above, there is also a need to strengthen existing practices for development of climate resilient value chain of Mango and Arhar in the state. These include embedding climate resilient practices in the training curriculum for capacity building of stakeholders, ensuring soil health cards to all farmers as well as application of recommended dose of eco-friendly plant nutrients and insurance of all Mango orchards and Arhar farms against climatic hazards.

SECTION 1

Background

The Climate Change Innovation programme (CCIP) funded by Department for International Development (DFID), UK has been working in partnership with the Government of Odisha since 2014 to integrate climate change adaptation into policies, plans and budgets. It also aims to contribute to Odisha's capacity to attract and leverage climate change investment. Based on consultations with the Department of Agriculture and Farmers' Empowerment, Govt. of Odisha, a deep and broad understanding of the context, opportunities and challenges for climate change governance in Agriculture in Odisha, was identified for the larger and longer-term initiatives for the benefit of the state and its agrarian population.

The project "Adapting to Climate Change in Agriculture: Climate Resilient Agriculture Practices" intends to strengthen the capacity of the Agriculture Department to design, pilot, adopt and disseminate climate resilient agriculture practices and value chains of Mango and Arhar through handholding support for design of value chains and training at various stakeholder levels both within the government and at the farmer level. The overall objective of this project is to support informed interventions along the value chain of Mango and Arhar, to build resilience to the likely adverse impacts of climate change. These interventions could be made by government; community-based organizations, private sector entities and other stakeholders for replication and/or scaling up. The measures are likely to enhance the value share of the small and marginal farmers and other vulnerable groups in the process.

Odisha's fluctuating weather conditions suggest that it is reeling under climatic chaos. For more than a decade now, the state has experienced contrasting extreme weather conditions: from heat waves to cyclones, from droughts to floods. They have not only become more frequent but have hit areas that were never considered vulnerable. As a result, Odisha's economy has suffered. Agriculture, which is considered as the state's backbone, has been hit worst due to such changes in the microclimate and natural calamities. The extreme weather or climate induced natural calamities occurring alone or in combination create agricultural instability in the state. The production and productivity of

crops play crucial role in the growth of agriculture sector; which unfortunately faces risks and uncertainties like deficient rainfall, pests attack, non-availability of credit, price fluctuations, failure of farming method, etc. Major factors like natural shocks of floods, droughts, severe cyclone, etc. and price variations in agricultural products contributed significantly to the varying degrees of growth rates. Climate change has the potential to derail the current growth strategy and deepen poverty in the state. Continuing climate variation is predicted to alter the sectoral growth, including the ability of the poor to engage in farm and non-farm sector activities.

Considerable divergence of opinion exists whether a value chain should be for a different climate resilient crop or crops that are resilient in the context of the state, their value chain needs to be strengthened. This study aims for the latter. As part of the process, a multi-criterion analysis was undertaken to prioritise the crops that are climate resilient in an earlier scoping study. In consultation with the state government, two climate resilient crops - mango and arhar have been selected for value chain analysis and development of climate resilient operational strategy in Odisha.

Arhar is one of the hardy, drought tolerant perennial legume crop with a wide range of rainfall tolerance. It has wide adaptability to different climates and can grow on a wide range of soils with tolerance to a wide range of pH. As a pulse crop, arhar has the ability to biologically fix nitrogen. It contains high levels of protein and important amino acids thus contributing to food security and combat malnutrition.

A perennial crop like mango can stay alive under desiccating conditions and this capacity can be highly advantageous for yield in succeeding growth seasons. It can withstand dry weather and is moderately drought tolerant. It has the capability to grow in a wide range of vegetation zones and can enhance carbon sink. It is one of the most popular, nutritionally rich fruits with health promoting qualities.

The present work intends to develop implementable climate resilient operational strategy for sustainable value chain development of Mango and Arhar in Odisha. This is based on a prior baseline analysis[1] of the current value chains, key issues, opportunities and constraints to strengthen the value chain further by taking in the views of all stakeholders.

1 Baseline Report for Mango and Arhar Value Chain - Adapting to Climate Change in Agriculture: Climate Resilient Agriculture Practices, Climate Change Innovation Programme, September 2017

SECTION 2

Current Scenario of Mango and Arhar in Odisha

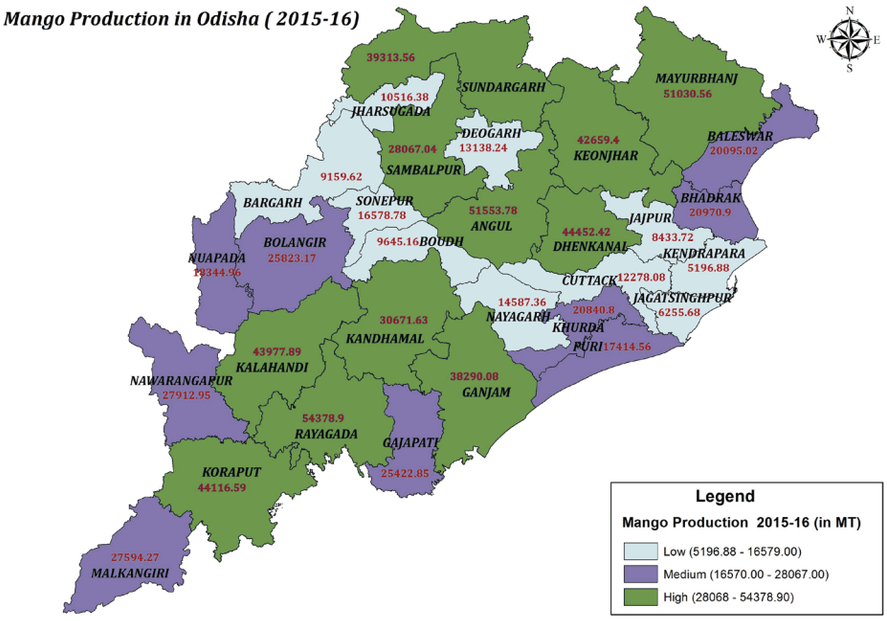
Mango is the leading fruit crop of Odisha. Apart from its delicious taste, it is rich in vitamin A & C. Mango fruits are being utilized at all stages of its development; both in its immature and mature state. Raw fruits are used for making chutney, pickles and juices. The ripe fruit besides being used for dessert are also utilized for preparing several products like squashes, syrups, nectar, jams and jellies. The Mango kernel also contains 8-10 percent good quality fat which can be used for soap and a substitute for cola in confectionery. Mango can withstand dry weather and is moderately drought tolerant. It has the capability to grow in a wide range of vegetation zones and can enhance carbon sink. It is one of the most popular, nutritionally rich fruits with health benefits.

Odisha produces around 8 lakh tonnes of Mango per year. About 40% of Mango[2] that are produced in the state are of hybrid varieties such as Amrapalli, Dussehri, Mallika, Keshari and Lengada and the rest are of local and indigenous varieties. Leading producers are Rayagada, Angul, Mayurbhanj, Dhenkanal and Koraput. The varieties that are most sought after in the market are Baiganpalli, Dussehri, Amrapalli, Keshari and Totapuri.

Mango is being produced in all districts of Odisha. The top ten districts in terms of the production during 2015-16[3] are Rayagada (54379MT), Angul (51554 MT), Mayurbhanj (51031MT), Dhenkanal (44452MT), Koraput (44117MT), Kalahandi (43978MT), Keonjhar (42659MT), Sundergarh (39314MT), Ganjam (38290MT) and Kandhamal (30672MT). District wise production of Mango is displayed in figure-1.

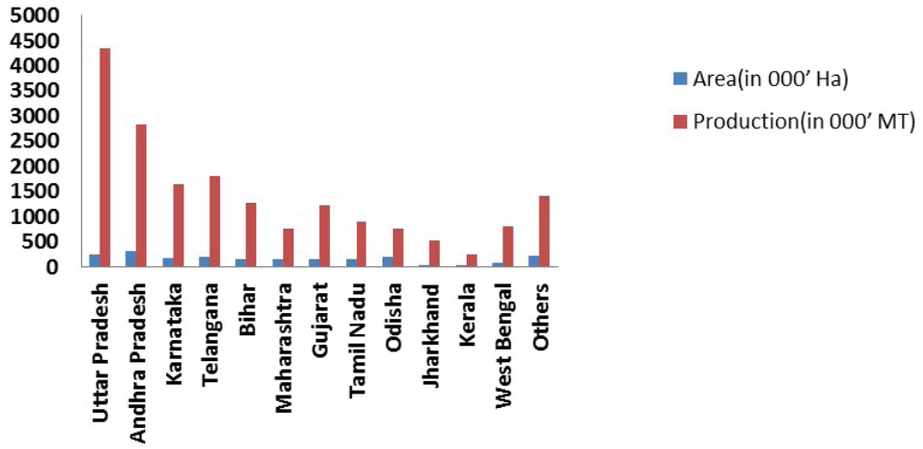
2 Times of India (May 5,2104)
3 Directorate of Horticulture, Govt. of Odisha

Figure 1: Mango production in Odisha (2015-16)



The state average productivity of Mango is 1.52 MT per acre. In terms of Mango production, Odisha stands at 9th position in the country. State wise area & production of Mango is shown in figure-2.

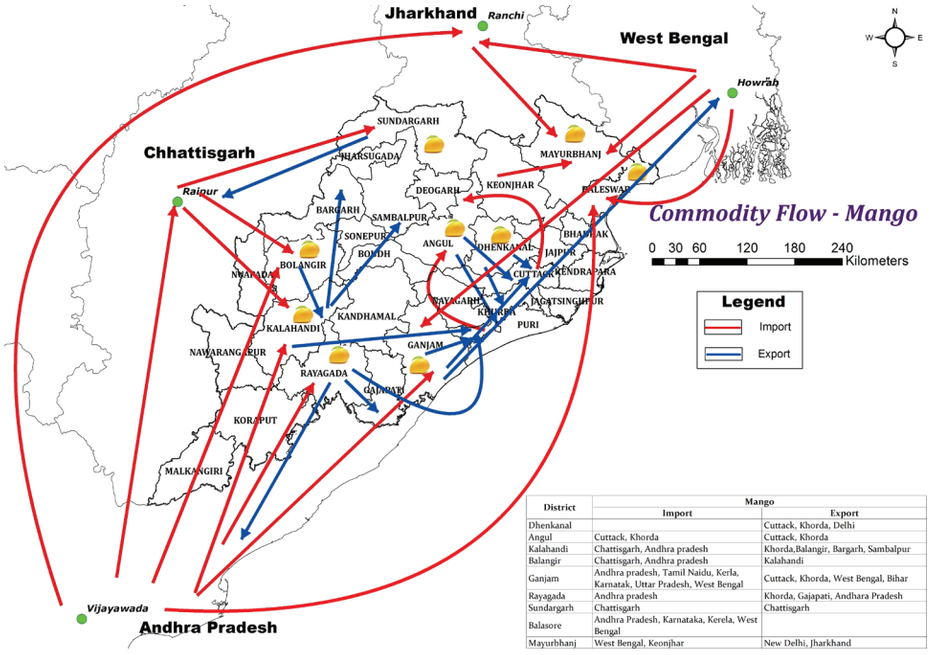
Figure 2: Area & Production of Mango in States



Source: India Horticulture Database

Mangoes from most of the Mango producing districts in the state are being supplied to and/or procured from other districts for marketing. The districts along the state boundary are having transaction with the adjacent states for supply and/or procurement of Mango. The flow of Mango across the districts and states for marketing is displayed in the figure-3. From Dhenkanal, Mango is supplied to Delhi, Cuttack and Khurda. Angul supplies Mango to Cuttack and Khurda and procures Mango from those districts. Mangoes from Chhattisgarh and Andhra Pradesh are supplied to Kalahandi district and from Kalahandi district it is supplied to Khurda, Balangir, Bargarh and Sambalpur. The varieties like Dashheri and Amrapalli are mostly sent to North India as these varieties ripen early in Odisha than UP, Maharashtra and AP.

Figure 3: Commodity Flow - Mango



District	Mango	
	Import	Export
Dhenkanal		Cuttack, Khorda, Delhi
Angul	Cuttack, Khorda	Cuttack, Khorda
Kalahandi	Chattisgarh, Andhra pradesh	Khorda,Balangir, Bargarh, Sambalpur
Balangir	Chattisgarh, Andhra pradesh	Kalahandi
Ganjam	Andhra pradesh, Tamil Naidu, Kerla, Karnatak, Uttar Pradesh, West Bengal	Cuttack, Khorda, West Bengal, Bihar
Rayagada	Andhra pradesh	Khorda, Gajapati, Andhara Pradesh
Sundargarh	Chattisgarh	Chattisgarh
Balasore	Andhra Pradesh, Karnataka, Kerela, West Bengal	
Mayurbhanj	West Bengal, Keonjhar	New Delhi, Jharkhand

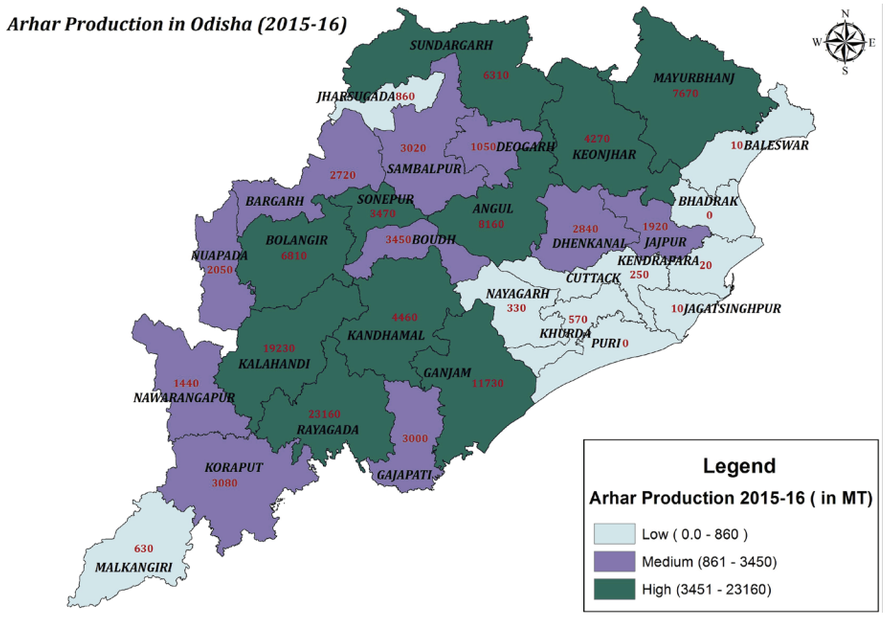
Essentially a prime table fruit, Mango pulp is perfectly suited for conversion to juices, nectars, drinks, jams, fruit cheese or to be eaten by itself or with cream as a superb dessert. It can also be used in puddings, bakery fillings, and fruit meals for children, flavours for food industry, and to make the most delicious ice cream and yoghurt. While the raw fruits are utilized for products like chutney, pickle, amchoor (Mango powder), green Mango beverage, etc. ripe ones are used in making pulp, juice, nectar, squash, leather, slices, etc. Companies like Milky Moo and Ruchi are preparing Aam dahi and Mango pulp respectively. Priya is a leading company in Mango pickles. In Odisha large-scale processing of Mango is very limited. The households in rural areas, prepares Mango pickle, dried Mango, Aam papad and consume it at the household level.

Arhar is an important legume crop cultivated in Odisha. It is the third highest4 pulse in terms of production after green gram and black gram. The crop is being cultivated in marginal land. It enriches the soil through symbiotic nitrogen fixation. Arhar is one of the hardy, drought tolerant perennial legume crops with a wide range of rainfall tolerance. It has wide adaptability to different climates and can grow on a wide range of soils with tolerance to a wide range of pH. It contains high levels of protein and important amino acids thus contributing to food security and combat malnutrition

Arhar is produced in almost all districts in Odisha. Top ten Arhar producing districts in Odisha during 2015-16[5] are Rayagada (23160MT), Kalahandi (19230MT), Ganjam (117430MT), Angul (8160MT), Mayurbhanj (7670MT), Bolangir (6810MT), Sundargarh (6310MT), Kandhamal (4460MT), Keonjhar (4270MT) and Subarnapur (3470MT). District wise production of Arhar in Odisha during 2015-16 is presented in the figure-4. The state average productivity of Arhar is 3.52 Qt per acre.

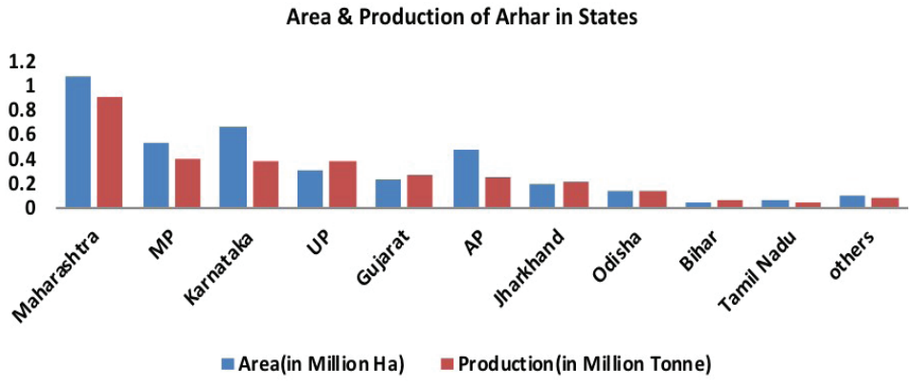
4 OUAT strategies for pulse production in rice fallows of Odisha
5 Directorate of Agriculture & Food Production, Govt. of Odisha

Figure 4: Arhar production in Odisha (2015-16)



The state is producing 1.22 Lakh MT of arhar. Majority of the Arhar grower are using local varieties. The leading production centers are Rayagada, Kalahandi, Ganjam and Angul. Odisha stands at 8th position in the country in terms of area and production of Arhar as shown in figure-5.

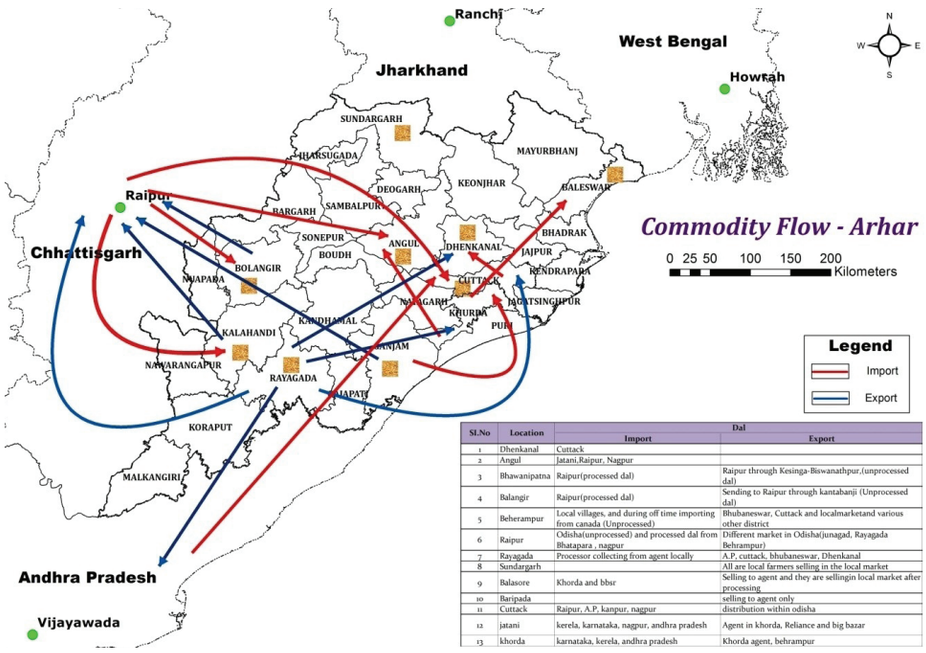
Figure 5: Area & Production of Arhar in States



Source: Ministry of Agriculture

To meet the demand of the state, processed Arhar dal is procured from neighbouring states. The state has few big processing units, for which most of the Arhar produced in the state goes to Raipur for processing. This processed dal comes to Odisha for selling. There is ample scope for processing in the state.

Figure 6: Commodity Flow- Arhar



Sl.No	Location	Dal	
		Import	Export
1	Dhenkanal	Cuttack	
2	Angul	Jatani,Raipur, Nagpur	
3	Bhawanipatna	Raipur(processed dal)	Raipur through Kesinga-Biswanathpur,(unprocessed dal)
4	Balangir	Raipur(processed dal)	Sending to Raipur through kantabanji (Unprocessed dal)
5	Beherampur	Local villages, and during off time importing from canada (Unprocessed)	Bhubaneswar, Cuttack and localmarketand various other district
6	Raipur	Odisha(unprocessed) and processed dal from Bhatapara , nagpur	Different market in Odisha(junagad, Rayagada Behrampur)
7	Rayagada	Processor collecting from agent locally	A.P, cuttack, bhubaneswar, Dhenkanal
8	Sundargarh		All are local farmers selling in the local market
9	Balasore	Khorda and bbsr	Selling to agent and they are sellingin local market after processing
10	Baripada		selling to agent only
11	Cuttack	Raipur, A.P, kanpur, nagpur	distribution within odisha
12	jatani	kerela, karnataka, nagpur, andhra pradesh	Agent in khorda, Reliance and big bazar
13	khorda	karnataka, kerela, andhra pradesh	Khorda agent, behrampur

Arhar from most of the Arhar producing districts in the state are supplied to and/or procured from other districts and states for marketing. The flow of Arhar across the districts and states for marketing as presented in the figure-6 shows that, Dhenkanal district is procuring Arhar dal from Cuttack; Angul is procuring Arhar from Khurda, Chhattisgarh and Maharashtra. The Kalahandi and Balangir districts are procuring Arhar dal from Chhattisgarh (Raipur).

CURRENT POLICY FRAMEWORK

National Agriculture Policy gives thrust on strengthening rural infrastructure to support faster agricultural development, promote value addition and accelerate the growth of agri-business centres in rural areas. To encourage horticulture cultivation in general and Mango cultivation, various schemes and programs have been launched by Govt. of India. One of the schemes is Mission for Integrated Development of Horticulture (MIDH) which is a scheme for holistic growth of the horticulture sector. This scheme consists of different sub schemes and one among the sub-scheme is National Horticulture Mission (NHM). The MIDH scheme also works with National Mission on Sustainable Agriculture (NMSA) for development of micro irrigation for all horticultural crops. One of the objectives of the MIDH is to encourage aggregation of farmers into farmers' groups like Farmer Interest Groups (FIGs)/Farmer Producer Organizations (FPOs) and Farmer Producer Companies (FPCs) to bring economy of scale and scope.

For enhancing the productivity of pulses, Govt. of India has launched National Food Security Mission (NFSM)-Pulse during 12th Five Year Plan. Arhar cultivation is given emphasis under this program along with other pulses like Green gram & Black gram. NFSM (Pulse) gives emphasis on value chain development along with higher productivity. State Agriculture policy, 2013 lays emphasis on irrigation infrastructure development for all farm fields, establishment of commercial agri-enterprises, processing units, dairy and fisheries unit. Apart from the above, the policy also

emphasises on input management, soil health, research & education, agriculture extension, skill development, watershed development, organic farming, integrated farming, post-harvest management etc.

The National Horticulture Board (NHB) was set up by the Government of India in 1984 with a mandate to promote integrated development of horticulture. To help in coordinating, stimulating and sustaining the production and processing of fruits and vegetables and to establish a sound infrastructure in the field of production, processing and marketing with a focus on post-harvest management to reduce losses. National Agricultural Cooperative Marketing Federation of India Ltd. popularly known as NAFED set up in 1958 undertakes internal trade and export/import of agricultural and horticultural commodities. Agricultural & Processed Food Products Export Development Authority (APEDA), Ministry of Commerce promotes and coordinates development of Agri-Export Zone (AEZ) for horticultural crops. The Small Farmer's Agri-business Consortium (SFAC) has been helping in the promotion and strengthening of Farmer producer Organisations (FPOs) across the states. National Agriculture Market (e-NAM) is a pan India electronic trading portal which networks the existing APMC mandis to create a unified national market for agriculture commodity. In Odisha, mandis like Kantabanji, Kendupatna, Parlakhemundi, Tikabali, Koraput, Nabarangpur, Bahadajhola, Sakhigopal, Rayagada and Kuchinda are enrolled mandis under e-NAM.

SECTION 3

Key Climatic Challenges

There are certain issues and challenges that obstruct the climate resilient[6] value chain development of Mango and Arhar in the state. They affect the quality as well as productive output of the value chain. These climatic challenges need to be addressed for enhancing soil productivity, crop productivity and sustainability. The value chain players at different levels shall also be benefitted if the challenges are addressed on priority.

Table-1 depicts the key climatic challenges for climate resilient value chain development of Mango and Arhar in Odisha.

Table 1: Key Climatic Challenges

Key Climatic Challenges		
Stage	**Mango**	**Arhar**
Pre- production	• Low level of awareness among farmers regarding climate resilient pre-production practices like soil testing & soil health management, land & pit preparation, selection of variety and quality planting material, pre-planting treatment, input planning, budgeting and climate risk management • Inadequate availability of climate resilient varieties • Most of the Mango growers are ignorant about soil health status of their Mango orchard	• Inadequate availability of suitable short duration climate resilient high yielding varieties • Low level of awareness among farmers regarding climate resilient pre-production practices like soil testing & soil health management, land preparation, selection of variety and quality seed, seed treatment, input planning, budgeting and climate risk management • Most of the Arhar growers are ignorant about soil health status of their Arhar field

6 The capacity for a socio-ecological system to: (1) absorb stresses and maintain function in the face of external stresses imposed upon it by climate change and (2) adapt, reorganize, and evolve into more desirable configurations that improve the sustainability of the system, leaving it better prepared for future climate change impacts (Wikipedia)

Key Climatic Challenges		
Stage	**Mango**	**Arhar**
Production	• Low level of awareness among farmers regarding climate resilient production practices like soil and water conservation and management, rain water harvesting, drainage management, micro irrigation management, efficient & environmentally sound pest and nutrient management, integrated weed management, canopy management, integrated farming, intercropping, contingency planning, effective use of weather information system and climate risk management • Improper water management in the Mango orchard • Low adoption of canopy management practices in Mango • Low adoption of intercropping in Mango orchard • Mango orchards are not insured against climatic hazards • Pre-harvest losses due to pest & disease infestation because of climate change	• Low level of awareness among farmers regarding climate resilient production practices like soil and water conservation and management, rain water harvesting, drainage management, micro irrigation management, efficient & environmentally sound pest and nutrient management, integrated weed management, intercropping, bund planting, integrated farming, contingency planning, effective use of weather information system and climate risk management • Low adoption of appropriate climate resilient nutrient management practices • Low adoption of Broad Bed Furrow (BBF) system of planting in Arhar • Low adoption of monocropping of Arhar in Rabi season • Low adoption of intercropping in Arhar • Low coverage under crop insurance
Post-harvest & Processing	• Low level of awareness among farmers regarding climate resilient post-harvest technique like cleaning, sorting, grading, processing, packaging, cold chain management and climate risk management • Inadequate facility for aggregation and value addition of Mango at cluster level • Inadequate provision of ripening chambers for Mango at cluster level • Inadequate provision of cold chain facilities for Mango at cluster level • Inadequate provision of processing facilities for Mango at cluster level	• Low level of awareness among farmers regarding climate resilient post-harvest technique like cleaning, sorting, grading, processing, packaging and climate risk management • Inadequate facility for aggregation and value addition of Arhar at cluster level • Inadequate provision of processing facilities for Arhar at cluster level • Inadequate provision of storage facilities for Arhar at cluster level
Marketing	• Low level of knowledge on market related information on Mango • Exploitation by middle men due to lack of assured market of Mango • Low bargaining power of individual farmer and lack of organized marketing mechanism[7] for Mango • Less prominence of collective marketing of Mango	• Low level of knowledge on market related information on Arhar • Exploitation by middle men due to lack of assured market of Arhar • Low bargaining power of individual farmer and lack of organized marketing mechanism for Arhar • Less prominence of collective marketing of Arhar

7 A mechanism by which the use of money exchanged by buyers and sellers with an open and understood system of value and time trade-offs in a market tends to optimize distribution of goods and services.(Wikipedia)

SECTION 4

Strategy Recommendation

The strategy for climate resilient value chain development of Mango and Arhar in Odisha has been formulated based on the key findings of baseline study and consultations with different stakeholders at field and state level consultation workshop. This includes the strategies for pre-production, production, post-harvest, processing and marketing aspects for sustainable climate resilient value chain development of Mango and Arhar. The recommendations are elaborated below.

4.1 STRATEGY RECOMMENDATION FOR CLIMATE RESILIENT VALUE CHAIN DEVELOPMENT OF MANGO IN ODISHA

4.1.1 PRE-PRODUCTION

Strategy recommendation for climate resilient value chain development of Mango during pre-production stage is presented here under (Table-2).

Table 2: Strategy recommendation for Mango during pre-production stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Inadequate availability of climate resilient varieties	Promotion of climate resilient variety	• Production of quality planting materials of climate resilient varieties of Mango like Arka Neelachal Kesari (drought resistant early variety) and Keshar, Totapuri (processing varieties) under controlled condition in Govt and private nurseries for distribution to the farmers (refer annexure 1, A1) • Replacement of existing variety with climate resilient varieties @ 5% per year • Awareness building among Mango growers regarding benefit of climate resilient variety • Incentivization of farmers for shifting to climate resilient Varieties	High

The roles and responsibilities of different stakeholders for implementation of pre-production strategies for climate resilient value chain development of Mango are mentioned below (Table-3).

Table 3:Role of stakeholders for implementation of strategies for Mango during pre-production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Promotion of climate resilient variety	CHES/OUAT	Development & Multiplication of suitable climate resilient variety	More area covered under climate resilient varieties of Mango
	DDH/ADH/ AHO	Preparation of action plan for replacement of current varieties with climate resilient varieties and follow up, Awareness building among Mango growers through extension functionaries, monitoring and review	
	Govt & Private nurseries	Production of adequate quantity of quality planting materials of climate resilient varieties of Mango for distribution to farmers. A list of nurseries is provided in Annexure 1 of the baseline report	

4.1.2 PRODUCTION

Strategy recommendations for climate resilient value chain development of Mango during production stage are elaborated below (Table-4).

Table 4: Strategy recommendation for Mango during production stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Improper water management in Mango orchard	Promotion of micro irrigation in Mango orchards for better water use efficiency, reduction of water wastage	• Awareness building among Mango farmers on benefit of drip irrigation *(refer annexure-1, A2)* • Demonstration of drip irrigation in Mango orchard *(refer annexure-1, A3)* • Tie up with empaneled manufacturer/dealers for timely installation in the farmers' field	High
Low adoption of canopy management practices in Mango	Canopy Management in Mango orchard for appropriate light penetration, better productivity and uniform ripening	• Awareness building among Mango growers on benefits of canopy management *(refer annexure-1, A7)* • Demonstration of process and methodology of manipulation of tree canopy to optimize the production of quality fruits *(refer annexure-1, A3)*	High
Low adoption of intercropping in Mango orchard	Promotion of intercropping in Mango orchard for optimum land utilization, improvement of soil health and additional income	• Awareness building among Mango growers on benefits of intercropping • Popularization of intercropping with crops like pulses, oilseeds, vegetables and spices. Growing of vegetables, pulses (green gram, black gram) and oilseeds (sesame, groundnut) during first few years of non- bearing life and partial shade loving crops like pineapple, ginger, turmeric, etc. in fully grown orchards.	Medium
Pre-harvest losses due to pest & disease infestation because of climate change	Promotion of integrated pest management (IPM) practices in Mango orchards	• Awareness building among Mango growers on prevention and control of pest & diseases through IPM practices (cultural, biological, organic, chemical, mechanical method) • Demonstration of IPM practices in Mango orchards *(refer annexure-1, A3)* • Training of Mango growers on IPM practices *(refer annexure1, A6)* • Training of Mango growers and women on preservation and processing of premature dropped Mangoes *(refer annexure1, A6)*	High

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Mango during production stage are mentioned below (Table-5).

Table 5: Role of stakeholders for implementation of strategies for Mango during production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Promotion of micro irrigation in Mango orchards	AHO and field extension functionaries	Promotion of micro irrigation through awareness program	Enhancement of water use efficiency leading to reduction of water loss and better production
	Empanelled Company/ Authorised dealers	Field demonstration of drip irrigation system, installation and hand holding support for initial years	
	DDH/ADH	Organizing meeting of AHOs and authorised dealers/ companies to finalize the action plan to ensure supply, installation and after sales service, monitoring and review	
Canopy Management in Mango orchard	AHO and field level functionaries	Promotion of intercropping through awareness program, organising of field demonstrations	Better yield and uniform ripening of Mango due to appropriate light penetration
	DDH/ADH	Monitoring and review	
Promotion of intercropping in Mango orchard	AHO and field level functionaries	Promotion of intercropping through awareness program, organising of field demonstrations	Optimum utilization of land and additional income to farmers
	DDH/ADH	Monitoring and review	
Promotion of integrated pest management (IPM) practices in Mango orchards	AHO and field level functionaries	Promotion of IPM practices through awareness program and organising field demonstration, Organising training program on IPM in Mango, Organising training program on preservation & processing of premature dropped mangoes	Capacity building of farmers, farm women on IPM practices and processing of premature dropped Mangoes Adoption of IPM practices by Mango growers
	DDH/ADH	Monitoring and review	
	OUAT/IMAGE/KVK/ ATMA	Resource Agency, Trainer	

4.1.3 POST HARVEST AND PROCESSING

Strategy recommendations for climate resilient value chain development of Mango during post-harvest and processing stage are mentioned below (Table-6).

Table 6: Strategy recommendation for Mango during post-harvest and processing stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Inadequate facility for aggregation and value addition of Mango at cluster level	Establishment of aggregation and pack house facilities at cluster level for reduction of wastage and transportation loss, enhanced marketability and better price of Mango	• Awareness building among Mango growers on the benefits of value addition and proper packaging • Feasibility mapping • Identification of potential entrepreneurs/ FPOs for establishment of aggregation centre and pack house at cluster level • Establishment and regular functioning of aggregation centre and pack house *(refer annexure-1, A8,A9,A14)*	High
Inadequate provision of ripening chambers for Mango at cluster level	Establishment of ripening chambers at cluster level for efficient, controlled and safer ripening of Mangoes with reduced risk of spillage, dust, breakage, under/over ripening and quality degradation	• Feasibility study for establishment of ripening chamber for Mango • Identification of potential entrepreneurs/FPOs/ investors for establishment of ripening chambers • Establishment and regular functioning of ripening chambers at cluster level (*refer annexure-1, A15)*	High
Inadequate provision of cold chain facilities for Mango at cluster level	Development of cold chain facilities for reduction of post-harvest losses, enhancement of shelf life and price stabilization of Mango	• Feasibility study for cold chain infrastructure • Identification of potential entrepreneurs/ FPOs/investors for development of cold chain infrastructure • Establishment and regular functioning of cold chain infrastructure *(refer annexure-1, A10)*	High
Inadequate provision of processing facilities for Mango at cluster level	Establishment of processing units at cluster level for reduction of post-harvest losses, value addition, extended shelf life, enhanced marketability and better price realization for the processed Mango products	• Feasibility study for establishment of processing unit • Identification of potential entrepreneurs/FPOs/ investors for establishment of processing units • Establishment and regular functioning of Mango processing units at cluster level *(refer annexure-1,A11,A12)*	High

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Mango during post-harvest and processing stage are explained below (Table-7).

Table 7: Role of stakeholders for implementation of strategies for Mango during post-harvest & processing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Establishment of aggregation centre and pack house at cluster level	Directorate of Horticulture/ DDH/ADH	Awareness building among farmers, feasibility mapping, identification of potential entrepreneurs/FPOs/ investors, support in establishing aggregation centre & pack house at cluster level, monitoring & review	Better marketability, Better price realisation
	APICOL/DoI-MSME/ State Agriculture Marketing Board	Extending support/assistance for establishing aggregation centre and pack house	
	Entrepreneur/ FPO	Set up and operate aggregation centre & pack house	
Establishment of ripening chambers at cluster level	Director of Horticulture/ DDH/ADH	Feasibility mapping and planning for future development, identification and supporting of private agri entrepreneur for setting up of ripening chambers, monitoring and review	Efficient, controlled and safer ripening of Mangoes with reduced risk of spillage, dust, breakage, under/ over ripening and quality degradation
	Entrepreneur/ FPO/investor	Establish and operate ripening chambers.	
Development of cold chain infrastructure at cluster level	Director of Horticulture/ DDH/ADH	Feasibility mapping and planning for future development, identification of private agri entrepreneur for setting up of cold chain facilities. Monitoring and review	Reduction of wastage, enhancement of shelf life, maintenance of quality across supply chain, better marketability and better price
	Entrepreneur/ Investors/ FPOs	Establish and operate cold storage unit, pre-cooling chambers, refrigerated van	
	APICOL/DoI-MSME/ OSAMB	Extending support for establishing cold chains	
Establishment of Mango processing units at cluster level	Director of Horticulture/ DDH/ADH	Feasibility mapping and planning for future development, identification of private agri entrepreneur for setting up of processing units. Monitoring and review	Minimisation of distress sale of raw and ripe Mangos, Better price realisation of value added and processed Mango, Employment generation, Reduction of post-harvest loss
	APICOL/DoI-MSME	Support in establishing processing unit	
	Entrepreneur/ FPO/investor	Establish and operate processing unit	

4.1.4 MARKETING

Strategy recommendations for climate resilient value chain development of Mango during marketing stage are elaborated below (Table-8).

Table 8: Strategy recommendation for Mango during marketing stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Exploitation by middle men due to lack of assured market	Development of Market linkages for market assurance of Mango, better price realization and minimization of distress sale	• Estimation of marketable surplus • Identification of prospective buyers like processing industries, trading companies, corporate retail stores, exporters and institutional buyers • Organizing buyer seller meetings at cluster level • Agreement between the parties	High
Low bargaining power of individual farmer, lack of organised marketing mechanism and less prominence of collective marketing	Promotion and strengthening of Farmer producer organization (FPOs) for development of climate resilient value chain, organised marketing mechanism and collective marketing of Mango	• Strengthening of existing Mango FPOs • Promotion of new FPOs for climate resilient value chain development of Mango *(refer annexure-1,A13)* • Agreement between FPO and market players like processing industries, corporate retail stores, institutional buyers, exporters, etc • Support FPOs for value addition, processing & marketing	High

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Mango during marketing stage are explained below (Table-9).

Table 9: Role of stakeholders for implementation of strategies for Mango during marketing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Development of Market linkages for market assurance of Mango	AHO and field level functionaries	Assessment of projected production of different Mango varieties	Market assurance, Better price realization, minimisation of distress sale and wastage
	DDH/ADH/AHO	Organise interface meeting of farmers representatives, FPOs, women SHG with processing industry, trading companies, corporate retail store, exporters and institutional buyers, ensure agreement between buyer & seller, monitoring and review	
	ORMAS/OSAMB	Extend support for market linkage	
Promotion and strengthening of Farmer producer organization (FPOs) for value chain development of Mango	Directorate of Horticulture	Promotion of FPOs by engaging resource institutions as per policy and process guideline for value chain development of Mango, monitoring and review	Enhanced bargaining power for input procurement and output marketing, enhanced accessibility to and usage of quality inputs and services, enhanced accessibility to fair and remunerative market
	SFAC/NABARD	Extend support for FPO promotion	

4.2 STRATEGY RECOMMENDATION FOR CLIMATE RESILIENT VALUE CHAIN DEVELOPMENT OF ARHAR IN ODISHA

4.2.1 PRE-PRODUCTION

Strategy recommendation for climate resilient value chain development of Arhar during pre-production stage is presented hereunder (Table-10).

Table 10: Strategy recommendation for Arhar during pre-production stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Inadequate availability of suitable, short duration climate resilient high yielding varieties of Arhar	Promotion of short duration & high yielding climate resilient varieties of Arhar	• Awareness building among Arhar growers regarding benefit of short duration climate resilient variety • Production and multiplication of short duration climate resilient varieties of Arhar like UPAS-120, Manak, Asha, Paras, DLR-1, BRG-2 (drought resistant/moisture stress tolerant) • Popularization of short duration climate resilient varieties through field demonstration *(refer annexure-1,B1, B3)* • Replacement of traditional varieties (Kandula) with climate resilient short duration varieties @ 10% per year • Incentivization of farmers for shifting to climate resilient varieties	High

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Arhar during pre-production stage are mentioned below (Table-11).

Table 11: Role of stakeholders for implementation of strategies for Arhar during pre-production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Promotion of short duration & high yielding climate resilient variety of Arhar	OUAT/ OSSOPCA	Development & Multiplication of short duration climate resilient varieties of Arhar	More area under short duration climate resilient varieties of Arhar
	Directorate of Agriculture & Food production	Preparation of action plan for timely supply of climate resilient varieties of Arhar, Monitoring and Review	
	DDA/DAO/AAO	Estimation of seed requirement, ensuring availability and supply of suitable varieties of Arhar seed in time, ensuring seed replacement with short duration climate resilient varieties, monitoring & review	

4.2.2 PRODUCTION

Strategy recommendations for climate resilient value chain development of Arhar during production stage are elaborated below (Table-12).

Table 12: Strategy recommendation for Arhar during production stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Low adoption of appropriate climate resilient nutrient management practices	Promotion of Integrated nutrient management (INM) practices in Arhar for maintenance of soil fertility and enhancement of productivity by optimizing the benefits of the plant nutrients from organic and biological sources	• Awareness building among Arhar farmers on the benefits of INM practices • Demonstration on INM in Arhar *(refer annexure-1, B3)* • Imparting training to farmers on INM in Arhar cultivation*(refer annexure-1, B4)* • Ensure adequate stock of nutrients in govt. and private outlets	High
Low adoption of Broad Bed Furrow (BBF) system of planting	Promotion of Broad Bed Furrow (BBF) system of planting for in-situ conservation of water, better crop yield, better water productivity, better drainage, proper aeration in seed bed & root zone and better adaption to climate change	• Awareness building among Arhar farmers on the benefits of Broad Bed Furrow system of planting • Demonstration on Broad Bed Furrow system of planting in Arhar (*refer annexure-1, B3)* • Imparting training to farmers on Broad Bed Furrow system of planting in Arhar (*refer annexure-1, B4)*	High
Low adoption of monocropping of Arhar in Rabi season	Promotion of monocropping of Arhar in Rabi season for better land utilization, enhancement of soil fertility, additional production of Arhar and farm income and contribution towards food security	• Awareness building among farmers on the benefits of monocropping of Arhar in Rabi season • Demonstration on monocropping of Arhar in Rabi season (*refer annexure-1, B3)* • Ensure availability of adequate quantity of climate resilient varieties of Arhar seeds	High
Low adoption of intercropping in Arhar	Promotion of intercropping and bund plantation for risk distribution among different crops, more and staggered income, better utilization of land and soil	• Awareness building among Arhar farmers on the benefits of intercropping and bund plantation • Demonstration on intercropping in Arhar • Promotion of intercropping in different combinations of crops with Arhar like[2] • Arhar+Groundnut in 2:6 row ratio • Arhar+Green gram/ Blackgram in 2:3 row ratio • Arhar+Ragi in 2:4 row ratio • Arhar+Raddish in 2:2 row ratio • Arhar+Okra in 2:2 row ratio	Medium

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Arhar during production stage are presented below (Table-13).

Table 13: Role of stakeholders for implementation of strategies for Arhar during production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Promotion of Integrated nutrient management (INM) practices in Arhar	Directorate of Agriculture and Food Production	Development of training calendar, training module, facilitate training program, meeting of plant nutrient manufactures for ensuring availability and timely supply of required plant nutrients, monitoring and review	Enhanced yield and soil fertility, capacity building of farmers on INM in Arhar
	IMAGE/ATMA/KVK	Resource Agency/Trainer	
	DDA/DAO/AAO	Training need assessment of farmers, identification of trainee, organising training programs, ensuring availability and timely supply of required plant nutrients in the Govt. and private outlets, organising demonstration programs, monitoring and review	
	Extension Functionaries	Awareness building and handholding support to farmers	
Promotion of Broad Bed Furrow (BBF) system of planting in Arhar	AAO	Promotion of Broad Bed Furrow system of planting in Arhar through awareness program, organising field demonstration programs, organising training programs for farmers	Capacity building of Arhar farmers on Broad Bed Furrow system of planting Adoption of Broad Bed Furrow system of planting in Arhar
	DDA/DAO	Monitoring and review	
	IMAGE/ATMA/KVK	Resource Agency/Trainer	
Promotion of monocropping of Arhar in Rabi season	AAO & Extension functionaries	Promotion of monocropping of Arhar in Rabi season through awareness program, organising field demonstration programs	Enhancement of area and production of Arhar in Rabi season Adoption of monocropping of Arhar in Rabi season
	DDA/DAO	Ensure supply of adequate quantity of climate resilient varieties of Arhar seeds, Monitoring and review	
Promotion of intercropping and bund plantation	AAO	Promotion of intercropping & bund plantation through awareness program, organising field demonstration programs	Optimum utilization of land and soil, additional income to farmers
	DDA/DAO	Monitoring and review	

4.2.3 POST HARVEST AND PROCESSING

Strategy recommendations for climate resilient value chain development of Arhar during post-harvest and processing stage are mentioned hereunder (Table-14).

Table 14: Strategy recommendation for Arhar during post-harvest and processing stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Inadequate facility for aggregation and value addition of Arhar at cluster level	Establishment of aggregation and pack house facilities at cluster level for reduction of wastage and transportation loss, enhanced marketability and better price of Arhar	• Awareness building among Arhar farmers on the benefits of value addition and proper packaging • Feasibility mapping • Identification of potential entrepreneurs/ FPOs for establishment of aggregation centre and pack house at cluster level • Establishment and regular functioning of aggregation centre and pack house *(refer annexure-1, B8)*	High
Inadequate provision of processing facilities for Arhar at cluster level	Establishment of dal processing units/dal mills at cluster level for reduction of post-harvest losses, value addition, extended shelf life, enhanced marketability and better price realization for the processed Arhar	• Feasibility study for establishment of processing unit • Identification of potential entrepreneurs/FPOs/ investors for establishment of processing units • Establishment and regular functioning of dal processing units at cluster level *(refer annexure-1, B6,B7)*	High
Inadequate provision of storage facilities for Arhar at cluster level	Provision of storage facilities for Arhar for reduction of post-harvest losses and minimization of distress sale	• Feasibility study for establishment of storage godown/ warehouse • Identification of potential entrepreneurs/FPOs/ investors for establishment of storage godown/ warehouse • Establishment and regular functioning of storage godown/ warehouse at strategic locations *(refer annexure-1, B9)*	Medium

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Arhar during post-harvest and processing stage are described below (Table-15).

Table 15: Role of stakeholders for implementation of strategies for Arhar during post-harvest and processing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Establishment of aggregation centre and pack house at cluster level	Directorate of Agriculture & Food Production/ DDA	Support in establishing aggregation centre & pack house at cluster level, monitoring & review	Better marketability, Better price realisation, minimization of post-harvest loss
	DAO/AAO	Awareness building among farmers, feasibility mapping, identification of potential entrepreneurs/FPOs/investors	
	APICOL/MSME/ OSAMB	Extending support/assistance for establishing aggregation centre and pack house	
	Entrepreneur/ FPO	Set up and operate aggregation centre & pack house	

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Establishment of dal processing units/dal mills at cluster level	Directorate of Agriculture & Food Production/ DDA	Support in establishing dal processing units/dal mills at cluster level. Monitoring and review	Enhanced marketability and better price realization for value added & processed Arhar, extended shelf life, minimization of wastage
	DAO/AAO	Feasibility mapping and planning for future development, identification of potential entrepreneurs/FPOs/ investors for setting up of dal processing units/dal mills at cluster level	
	Entrepreneur/ Investors/ FPOs	Establish and operate dal processing units/dal mills	
	APICOL/MSME/ OSAMB	Extending support for establishing dal processing units/dal mills	
Provision of storage facilities for Arhar at cluster level	Directorate of Agriculture & Food Production/ DDA	Support in establishing storage godown/ warehouse at cluster level. Monitoring and review	Minimisation of distress sale, reduction of post-harvest loss
	DAO/AAO	Feasibility mapping and planning for future development, identification of potential entrepreneurs/FPOs/ investors for setting up of storage godown/warehouse at cluster level	
	Entrepreneur/ Investors/ FPOs	Establish and operate storage godown/warehouse	
	APICOL/MSME/ OSAMB	Extending support for establishing storage godown/warehouse	

4.2.4 MARKETING

Strategy recommendations for climate resilient value chain development of Arhar during marketing stage are elaborated below (Table-16).

Table 16: Strategy recommendation for Arhar during marketing stage

Problem Statement	Strategy Recommendation	Implementable Actions	Level of Priority
Exploitation by middle men due to lack of assured market	Development of Market linkages for market assurance of Arhar, better price realization and minimization of distress sale	• Estimation of marketable surplus • Identification of prospective buyers like processing industries, trading companies, corporate retail stores, exporters and institutional buyers • Organizing buyer seller meetingsat cluster level • Agreement between the parties	High
Low bargaining power of individual farmer, lack of organised marketing mechanism and less prominence of collective marketing	Promotion and strengthening of Farmer producer organization (FPOs) for development of climate resilient value chain, organised marketing mechanism and collective marketing of Arhar	• Strengthening of existing FPOs for Pulses • Promotion of new FPOs for climate resilient value chain development of Arhar *(refer annexure-1, B11)* • Agreement between FPO and market players like processing industries, corporate retail stores, institutional buyers, exporters, etc • Support FPOs for business tie up with Govt. programs like mid-day meal and AAHAR • Support FPOs for value addition, processing & marketing *(refer annexure-1, B6, B7, B8, B9, B10)*	High

The roles and responsibilities of different stakeholders for implementation of strategies for climate resilient value chain development of Arhar during marketing stage are mentioned below (Table-17).

Table 17: Role of stakeholders for implementation of strategies for Arhar during marketing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Development of Market linkages for market assurance of Arhar	AAO and field level functionaries	Assessment of projected production of Arhar	Market assurance, Better price realization, minimisation of distress sale and wastage
	DDA/DAO/AAO	Organise interface meeting of farmers representatives, FPOs, women SHG with processing industry, trading companies, corporate retail store and institutional buyers, ensure agreement between buyer & seller, monitoring and review	
	ORMAS/OSAMB	Extend support for market linkage	
Promotion and strengthening of Farmer producer organization (FPOs) for value chain development of Arhar	Directorate of Agriculture & Food Production	Promotion of FPOs by engaging resource institutions as per policy and process guideline for value chain development of Arhar, monitoring and review	Enhanced bargaining power for input procurement and output marketing, enhanced accessibility to and usage of quality inputs and services, enhanced accessibility to fair and remunerative market
	SFAC/NABARD	Extend support for FPO promotion	

SECTION 5

Strengthening of Existing Practices

Several programs and schemes have been formulated and implemented by Government departments for betterment of the Mango and Arhar farmers of Odisha.

The aims and objectives of these programs are to enhance production and productivity of Mango and Arhar, build capacity and knowledge of the stakeholders, develop value chains and improve socio-economic condition of the primary producers. The farmers as well as other stakeholders have been benefitted by these programs and schemes. They have been adopting the practices and applying knowledge as advised by the subject matter experts, departmental officials and extension functionaries for improving production, productivity, post-harvest handling, marketability and income level. For development of climate resilient value chain of Mango and Arhar in the state, there is need of strengthening of the existing practices as described here under.

5.1 STRENGTHENING OF EXISTING PRACTICES FOR CLIMATE RESILIENT VALUE CHAIN DEVELOPMENT OF MANGO IN ODISHA

5.1.1 PRE-PRODUCTION

Recommendations for strengthening existing practices for climate resilient value chain development of Mango during pre-production stage are given below (Table-18).

Table 18: Recommendations for strengthening existing practices of Mango during pre-production stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers on climate resilient pre-production practices of Mango	Training & Capacity Building of Mango farmers and extension functionaries	Climate resilient pre-production practices are not included in the training curriculum	Climate resilient pre-production practices like soil testing & soil health management, land & pit preparation, selection of variety and quality planting material, pre-planting treatment, input planning, budgeting and climate risk management need to be included in the training curriculum
Most of the Mango growers are ignorant about soil health status of their Mango orchard	Soil testing and issue of Soil health cards to the farmers	Most of the Mango farmers do not have soil health card	All the Mango growers need to be provided with soil health cards Application of recommended ecofriendly nutrients as per the prescribed dose need to be ensured

The roles and responsibilities of different stakeholders for strengthening existing practices during pre-production stage of Mango are mentioned below (Table-19).

Table 19: Role of stakeholders for strengthening existing practices of Mango during pre-production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Climate resilient pre-production practices need to be included in the training curriculum	Directorate of Horticulture	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of Extension functionaries and farmers on climate resilient pre-production practices of Mango Adoption of climate resilient pre-production practices by Mango growers
	DDH/ADH/ AHO	Training need assessment of farmers, identification of trainee, organise training program *(refer annexure1, A5, A6)*, Monitoring and Review	
	Extension Functionaries	Handholding support to farmers	
	OUAT/IMAGE/KVK/ ATMA	Resource Agency, Trainer	

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
All the Mango growers need to be provided with soil health cards and application of recommended eco-friendly nutrients as per the prescribed dose need to be ensured	AHO and field extension workers	Organise awareness program, demonstrate method of soil sample collection, preparation of farmer database, ensuring soil sample collection from Mango farmers, distribution of soil health card and ensure application of recommended nutrients as per the prescribed dose	Application of appropriate dose of recommended eco-friendly nutrients in the Mango orchards Enhancement of soil fertility and crop productivity
	Soil Testing Laboratories	Analysis of soil samples and prescribe appropriate eco-friendly nutrients with dose	
	Director of Horticulture/ DDH	Monitoring and Review	

5.1.2 PRODUCTION

Recommendations for strengthening existing practices for climate resilient value chain development of Mango during production stage are mentioned below (Table-20).

Table 20: Recommendations for strengthening existing practices of Mango during production stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers regarding climate resilient production practices of Mango	Training & Capacity Building of Mango farmers and extension functionaries	Climate resilient production practices are not adequately covered in the training curriculum	Climate resilient production practices for Mango cultivation like soil and water conservation and management, rain water harvesting, drainage management, micro irrigation management, efficient & environmentally sound pest and nutrient management, integrated weed management, canopy management, integrated farming, intercropping, contingency planning, effective use of weather information system and climate risk management need to be included in the training curriculum
Mango orchards are not insured against climatic hazards	Provision of crop insurance for fruit crops like Banana, Pineapple	Mango crop is not covered under crop insurance	All Mango orchards need to be insured against climatic hazards

The roles and responsibilities of different stakeholders for strengthening existing practices during production stage of Mango are described below (Table-21).

Table 21: Role of stakeholders for strengthening existing practices of Mango during production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Climate resilient production practices for Mango cultivation need to be included in the training curriculum	Directorate of Horticulture	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of Extension functionaries and Farmers on climate resilient production practices of Mango Adoption of climate resilient production practices by Mango growers
	DDH/ADH/ AHO	Training need assessment of farmers, identification of trainee, organise training program *(refer annexure1, A6)*, Monitoring and Review	
	Extension Functionaries	Handholding support to farmers	
	OUAT/IMAGE/ KVK/ATMA	Resource Agency, Trainer	
All Mango orchards need to be insured against climatic hazards	Horticulture Directorate	Organising meeting of agriculture insurance companies and propose for inclusion of Mango crop under crop insurance	Coverage of all Mango orchards under crop insurance Expansion of area under Mango farming
	AHO/ADH/ DDH	Preparation of list of Mango farmers, meeting with insurance company representatives and ensure coverage of all Mango orchards under crop insurance	
	Insurance Companies	Execute necessary formalities and documentation for insurance coverage of Mango orchards	

5.1.3 POST HARVEST AND PROCESSING

Recommendations for strengthening the existing practices for climate resilient value chain development of Mango during post-harvest and processing stage are mentioned below (Table-22).

Table 22: Recommendations for strengthening existing practices of Mango during post-harvest & processing stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers regarding climate resilient post-harvest technologies of Mango	Training & Capacity Building of Mango farmers and extension functionaries	Climate resilient aspects of post-harvest management and processing of Mango are not adequately covered in the training curriculum	Climate resilient aspects of post-harvest management, value addition, cleaning, sorting, grading, processing, packaging, cold chain management and climate risk management need to be included in the training curriculum for farmers, processors /entrepreneurs, FPOs and women groups

The roles and responsibilities of different stakeholders for strengthening existing practices during post-harvest and processing stage of Mango are presented here under (Table-23).

Table 23: Roles of stake holders for strengthening existing practices of Mango during post-harvest & processing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Climate resilient aspects of post-harvest management of Mango need to be included in the training curriculum for farmers, processors/ entrepreneurs, FPOs and women groups	Directorate of Horticulture	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of farmers, processors/ entrepreneurs, FPOs and women groups on climate resilient aspects of post-harvest management and processing of Mango Adoption of climate resilient methods of post-harvest and processing of Mango by the farmers, processors/ entrepreneurs, FPOs and women groups
	DDH/ADH/AHO	Training need assessment of farmers, processors, identification of trainee, organise training program *(refer annexure1, A6)*, Monitoring and Review	
	ATMA/KVK/ OUAT/Line Departments	Resource Agency/Trainer	

5.1.4 MARKETING

Recommendation for strengthening the existing practices for climate resilient value chain development of Mango during marketing stage is given below (Table-24).

Table 24: Recommendations for strengthening existing practices of Mango during marketing stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of knowledge on market related information of Mango	Dissemination of market information to farmers through mobile message under "Digital mandi "scheme	Most of the Mango growers are not covered under the scheme	All Mango farmers need to be covered under the scheme to get update market related information of Mango
Lack of organised marketing mechanism for Mango at cluster level	Provision of Krushak Bazar (farmer market) for the farmers to sell their agricultural produces directly to the consumers	Most of Krushak Bazars are not functioning	Development of Krushak Bazars at cluster level All Krushak Bazars need to be functional with adequate infrastructures Strengthening of existing markets and marketing extension services

The roles and responsibilities of different stakeholders for strengthening existing practices for market promotion of Mango are mentioned here under (Table-25).

Table 25: Roles of stake holders for strengthening existing practices of Mango during marketing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Inclusion of all Mango farmers under "Digital Mandi" scheme	DDH/ADH/ AHO	Awareness creation among Mango farmers Ensuring inclusion of all Mango farmers into "Digital Mandi" scheme	Availability of update market information to the Mango farmers Better marketing decision by farmers Better price realisation by farmers
	Odisha State Agricultural marketing Board (OSAMB)	Inclusion of all Mango farmers "Digital Mandi" scheme through regulated market committees (RMC) Monitoring and supervision of the program Updating of market related information	
Development of Krushak Bazars at cluster level All Krushak Bazars need to be functional with adequate infrastructures Strengthening of existing markets and marketing extension services	Odisha State Agricultural marketing Board (OSAMB)	Development of Krushak Bazar Strengthening of existing markets Rendering marketing extension services to ensure buyer-seller linkages, innovative marketing practices and strengthening agricultural supply chains Dissemination of marketing information Functionalization of agricultural markets	Enhanced market accessibility for both producers and consumers Minimisation of transportation loss and cost, Minimisation of interference of middle man Better price realization by farmers
	Odisha Rural Development and Marketing Society (ORMAS)	Promotion of marketing events, sales tie up and product development	

5.2 STRENGTHENING OF EXISTING PRACTICES FOR CLIMATE RESILIENT VALUE CHAIN DEVELOPMENT OF ARHAR IN ODISHA

5.2.1 PRE-PRODUCTION

Recommendations for strengthening existing practices for climate resilient value chain development of Arhar during pre-production stage are given below (Table-26).

Table 26: Recommendations for strengthening existing practices of Arhar during pre-production stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers regarding climate resilient pre-production practices of Arhar	Training & Capacity Building of farmers and extension functionaries	Climate resilient pre-production practices are not included in the training curriculum	Climate resilient pre-production practices like soil testing & soil health management, land preparation, selection of variety and quality seed, seed treatment, input planning, budgeting and climate risk management need to be included in the training curriculum

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Most of the Arhar growers are ignorant about soil health status of their Arhar field	Soil testing and issue of Soil health cards to the farmers	Most of the Arhar farmers do not have soil health card	All the Arhar growers need to be provided with soil health cards Application of recommended eco-friendly nutrients as per the prescribed dose need to be ensured

The roles and responsibilities of different stakeholders for strengthening existing practices during pre-production stage of Arhar are mentioned below (Table-27).

Table 27: Roles of stake holders for strengthening existing practices of Arhar during pre-production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Climate resilient pre-production practices for Arhar cultivation need to be included in the training curriculum	Directorate of Agriculture & Food Production	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of Extension functionaries and farmers on climate resilient pre-production practices of Arhar Adoption of climate resilient pre-production practices by Arhar growers
	DDA/DAO/ AAO	Training need assessment of farmers, identification of trainee, organise training program *(refer annexure1, B4)*, Monitoring and Review	
	Extension Functionaries	Handholding support to farmers	
	OUAT/IMAGE/KVK/ ATMA	Resource Agency, Trainer	
All the Arhar growers need to be provided with soil health cards and application of recommended eco-friendly nutrients as per the prescribed dose need to be ensured	AAO and field extension workers	Organise awareness program, demonstrate method of soil sample collection, preparation of farmer database, ensuring soil sample collection from Arhar farmers, distribution of soil health card and ensure application of recommended nutrients as per the prescribed dose	• Application of appropriate dose of recommended eco-friendly nutrients in the Arhar farms • Enhancement of soil fertility and crop productivity
	Soil Testing Laboratories	Analysis of soil samples and prescribe appropriate eco-friendly nutrients with dose	
	Directorate of Agriculture & Food Production/ DDA/DAO	Monitoring and Review	

5.2.2 PRODUCTION

Recommendations for strengthening existing practices for climate resilient value chain development of Arhar during production stage are presented below (Table-28).

Table 28: Recommendations for strengthening existing practices of Arhar during production stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers regarding climate resilient production practices of Arhar	Training & Capacity Building of farmers and extension functionaries	Climate resilient production practices are not adequately covered in the training curriculum	Climate resilient production practices for Arhar cultivation like soil and water conservation and management, rain water harvesting, drainage management, micro irrigation management, efficient & environmentally sound pest and nutrient management, integrated weed management, intercropping, bund planting, integrated farming, contingency planning, effective use of weather information system and climate risk management need to be included in the training curriculum
Low coverage under crop insurance of Arhar	Provision of crop insurance for field crops including Arhar	Some of the Arhar farms are not covered under crop insurance	All Arhar farms need to be insured against climatic hazards

The roles and responsibilities of different stakeholders for strengthening existing practices during pre-production stage of Arhar are mentioned below (Table-29).

Table 29: Roles of stake holders for strengthening existing practices of Arhar during production stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Climate resilient production practices for Arhar cultivation need to be included in the training curriculum	Directorate of Agriculture & Food Production	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of Extension functionaries and farmers on climate resilient production practices of Arhar Adoption of climate resilient production practices by Arhar farmers
	DDA/DAO/ AAO	Training need assessment of farmers, identification of trainee, organise training program *(refer annexure1, B4)*, Monitoring and Review	
	Extension Functionaries	Handholding support to farmers	
	OUAT/IMAGE/KVK/ ATMA	Resource Agency, Trainer	
All Arhar farms need to be insured against climatic hazards	DDA/DAO/AAO	Preparation of list of Arhar farmers, meeting with insurance company representatives and ensure coverage of all Arhar farms under crop insurance, Monitoring and Review	Coverage of all Arhar farms under crop insurance Expansion of area under Arhar cultivation
	Insurance Company	Execute necessary formalities and documentation for insurance coverage of Arhar farms	

5.2.3 POST HARVEST AND PROCESSING

Recommendations for strengthening the existing practices for climate resilient value chain development of Arhar during post-harvest and processing stage are mentioned below (Table-30).

Table 30: Recommendations for strengthening existing practices of Arhar during post-harvest & processing stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of awareness among farmers regarding climate resilient post-harvest technologies of Arhar	Training & Capacity Building of farmers and extension functionaries	Climate resilient aspects of post-harvest management and processing of Arhar are not adequately covered in the training curriculum	Climate resilient aspects of post-harvest management, value addition, cleaning, sorting, grading, processing, packaging and climate risk management need to be included in the training curriculum for farmers, processors /entrepreneurs, FPOs and women groups

The roles and responsibilities of different stakeholders for strengthening existing practices during post-harvest and processing of Arhar are described here under (Table-31).

Table 31: Roles of stake holders for strengthening existing practices of Arhar during post-harvest & processing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	**Role**	
Climate resilient aspects of post-harvest management of Arhar need to be included in the training curriculum for farmers, processors and women groups	Directorate of Agriculture & Food Production	Revision of training curriculum and module, facilitate training program, Monitoring and Review	Capacity building of extension functionaries, farmers, women groups and processors on climate resilient aspects of post-harvest management and processing of Arhar Adoption of climate resilient methods of post-harvest and processing of Arhar by the farmers, processors and women groups
	DDA/DAO/AAO	Training need assessment of farmers, processors, identification of trainee, organise training program *(refer annexure1, B4)*, Monitoring and Review	
	ATMA/KVK/ OUAT/Line Departments	Resource Agency/Trainer	

5.2.4 MARKETING

Recommendation for strengthening the existing practices for climate resilient value chain development of Arhar during marketing stage is given below (Table-32).

Table 32: Recommendations for strengthening existing practices of Mango during marketing stage

Problem Statement	Existing Practice	Gap	Recommendation for Gap reduction
Low level of knowledge on market related information of Arhar	Dissemination of market information to farmers through mobile message under "Digital mandi" scheme	Most of the Arhar farmers are not covered under the scheme	All Arhar farmers need to be covered under the scheme to get update market related information of Arhar
Lack of organised marketing mechanism for Arhar at cluster level	Provision of Krushak Bazar (farmer market) for the farmers to sell their agricultural produces directly to the consumers	Most of Krushak Bazars are not functioning	Development of Krushak Bazars at cluster level All Krushak Bazars need to be functional with adequate infrastructures Strengthening of existing markets and marketing extension services

The roles and responsibilities of different stakeholders for strengthening existing practices for market promotion of Arhar are mentioned here under (Table-33).

Table 33: Roles of stake holders for strengthening existing practices of Mango during marketing stage

Key Priorities	Stakeholder Involvement and Role		Expected Outcome
	Stakeholder	Role	
Inclusion of all Arhar farmers under "Digital Mandi" scheme	DDH/ADH/ AHO	Awareness creation among Arhar farmers Ensuring inclusion of all Arhar farmers into "Digital Mandi" scheme	Availability of update market information to the Arhar farmers Better marketing decision by farmers Better price realisation by farmers
	Odisha State Agricultural marketing Board (OSAMB)	Inclusion of all Arhar farmers "Digital Mandi" scheme through regulated market committees (RMC) Monitoring and supervision of the program Updating of market related information	
Development of Krushak Bazars at cluster level All Krushak Bazars need to be functional with adequate infrastructures Strengthening of existing markets and marketing extension services	Odisha State Agricultural marketing Board (OSAMB)	Development of Krushak Bazar Strengthening of existing markets Rendering marketing extension services to ensure buyer-seller linkages, innovative marketing practices and strengthening agricultural supply chains Dissemination of marketing information Functionalization of agricultural markets	Enhanced market accessibility for both producers and consumers Minimisation of transportation loss and cost Minimisation of interference of middle man Better price realization by farmers
	Odisha Rural Development and Marketing Society (ORMAS)	Promotion of marketing events, sales tie up and product development	

ANNEXURE-1
ONGOING SCHEMES AND NORMS
A. ONGOING SCHEMES & NORMS FOR FRUIT CROPS

Table 34:Ongoing schemes & norms for fruit crops

Sl.No.	Activity	Pattern of Assistance	Scheme
A1	Hi-tech nursery (4 ha) @ 25 lakhs per Ha	100% to public sector limited to Rs 100 lakh/unit and in case of private sector, credit linked back-ended subsidy @ 40% of cost, subject to a maximum of Rs. 40 lakh/unit, for a maximum of 4 ha. as project-based activity on prorate basis. Each nursery will produce a minimum of 50,000 numbers per hectare of mandated perennial fruit crops/ tree spices/ aromatic trees/plantation crops per year, duly certified for its quality.	MIDH
	Small Nursery (1 ha) @ 15 lakhs per Ha	100% to public sector and in case of private sector, credit linked back-ended subsidy of cost, subject to a maximum of Rs. 7.50 lakh/ unit, as project-based activity. Each nursery will produce a minimum of 25,000 numbers of mandated perennial vegetative propagated fruit plants/tree spices/plantation crops per year, aromatic plants, duly certified for its quality	
A2	Integrated package with drip irrigation	Maximum of Rs. 0.60 lakh per ha. (40% of cost) for meeting the expenditure on planting material, cost of drip system, INM/IPM, canopy management etc., in 3 instalments of 60:20:20 subject to survival rate of 75% in 2nd year and 90% in 3rd year).	MIDH
	Without Integration	Maximum of Rs. 0.40 lakh/ha (40% of the cost) for meeting the expenditure on planting material and cost of INM/IPM in 3 instalments (60:20:20).	MIDH
A3	Technology Dissemination through demonstration/ front line demonstration	75 % of cost in farmers' field and 100% of cost in farms belonging to Public Sector, SAUs etc. (up to Rs. 25.00 lakh)	MIDH
A4	HRD for Supervisors & Entrepreneurs	100% of the cost in first year. In subsequent years, cost of infrastructure not to be claimed. Rs. 20.00 lakh/unit	MIDH
A5	HRD for Gardeners	100% of the cost Rs. 15.00 lakh/unit	MIDH
A6	Training of farmers	100% of the cost. @Rs.1000 per day per farmer	MIDH
A7	Canopy Management in Mango Orchard	50% of the total cost subject to a maximum of Rs. 20,000/ha limited to two ha per beneficiary.	MIDH
A8	Promotion of aggregation and pack house facility at cluster level	Credit linked back-ended subsidy @ 35% of the cost of project in general areas and 50% of cost in case Hilly & Scheduled areas for individual entrepreneurs.	MIDH
A9	Mechanized sorting, grading and packing of agricultural / horticultural products	40% of the fixed capital (excluding the cost of the land) subject to a limit of 50.00 lakh (50% limited to 50.00 lakh for SC/ST/Women/ Graduates of Agriculture and Allied Disciplines)	Capital Investment Subsidy for Commercial Agri-Enterprises (CAE)

Sl.No.	Activity	Pattern of Assistance	Scheme
A10	Development of cold chain infrastructure (with maximum cost of Rs. 600.00 lakh.)	Credit linked back-ended subsidy @ 35% of the cost of project in general areas and 50% of cost in case Hilly & Scheduled areas, per beneficiary.	MIDH
A11	Promotion of processing facility at cluster level (Rs 25.00 lakh/unit)	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55% in case of Hilly & Scheduled areas	MIDH
A12	Processing of fruits for commercial purpose	40% of the fixed capital (excluding the cost of the land) subject to a limit of 50.00 lakh (50% limited to 50.00 lakh for SC/ST/Women/ Graduates of Agriculture and Allied Disciplines)	Capital Investment Subsidy for Commercial Agri-Enterprises (CAE)
A13	Promotion and strengthening of Farmer producer organization (FPOs) for value chain development of Mango	Mobilization of farmers into registered producer organizations of around 1000 members each, with inputs of training and capacity building and training (as per model FPO Process Guidelines of DAC) @ 40.75 lakh	MIDH
A14	Pack house	Rs. 4.00 lakh/unit with size of 9Mx6M, 50% of capital cost	MIDH
A15	Ripening chamber	Rs 1.0 lakh/MT Credit Linked Back-ended subsidy at 35% in General areas / 50% in Hilly & Scheduled areas	MIDH

Source: www. midh.gov.in, www.apicol.co.in

B. ONGOING SCHEMES & NORMS FOR PULSES

Table 35: Ongoing schemes & norms for pulses

Sl.No.	Activity	Pattern of Assistance	Scheme
B1	Distribution of high yielding varieties of Pulses (Arhar)	High yielding varieties of seed @25/- per kg or 50% of the cost whichever is less	NFSM(Pulse)
B2	Integrated nutrient management in Pulses (Arhar)	Micronutrient @ Rs 500 per ha, lime @ Rs 1000 per ha and Gypsum/other sources of Sulphur @ 750 per ha Biofertilizer @100 per ha or 50% of the cost whichever is less Plant protection chemicals and bio-pesticides/IPM @ 500/- per ha or 50% of the cost whichever is less Weedicide- Rs 500 per ha or 50% of the cost whichever is less	NFSM(Pulse)
B3	Demonstrations	Demonstration @ Rs.7500 per ha	NFSM(Pulse)
B4	Farmer Training	Rs.14000 per training of 30 farmers for 4session	NFSM(Pulse)
B5	Training of extension workers	Rs. 1.0 lakh per training of 50 trainees	NFSM(Pulse)
B6	Provision of Dal processing unit at cluster level	Establishment of mini dal mills by farmers, farmer groups or registered FPOs (@Rs. 10.00 lakhs, or 30% of the total cost, whichever is lower, as one-time support)	NFSM(Pulse)
B7	Pulse processing and derivatives industries.	40% of the fixed capital (excluding the cost of the land) subject to a limit of 50.00 lakh (50% limited to 50.00 lakh for SC/ST/Women/Graduates of Agriculture and Allied Disciplines)	Capital Investment Subsidy for Commercial Agri-Enterprises (CAE)
B8	Mechanized sorting, grading and packing of agricultural / horticultural products	40% of the fixed capital (excluding the cost of the land) subject to a limit of Rs.50.00 lakh (50% limited to 50.00 lakh for SC/ST/Women/Graduates of Agriculture and Allied Disciplines)	Capital Investment Subsidy for Commercial Agri-Enterprises (CAE)
B9	Development of storage infrastructure	33.33% for registered FPOs, women, SC/ST, Self Help group with maximum ceiling of Rs.300.00 lakh. 25% for others with maximum ceiling of Rs.225.00 lakh.	Integrated Scheme for Agricultural Marketing (ISAM)
B10	Development of Market linkages for market assurance of Arhar	(i)Marketing support to unregistered farmer groups, SHGs, SHG federation etc. for local marketing of pulses and millets (@Rs.2.00 lakh per group of 15 farmers, for one-time support only) (ii)Support for branding and marketing of milled pulses or millets (available only to registered FPOs @ Rs.5.00 lakh per FPO, for one-time support only	NFSM(Pulse)
B11	Promotion and strengthening of Farmer producer organization (FPOs) for value chain development of Arhar	Mobilization of farmers into registered producer organizations of around 1000 members each, with inputs of training and capacity building and training (as per model FPO Process Guidelines of DAC) @ 40.75 lakh	NFSM(Pulse)

Source: www.nfsm.gov.in, www.apicol.co.in, http://agricoop.nic.in

Action on Climate Today (ACT)
For more information,
Email: info@actiononclimate.today
www.actiononclimate.today

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Farmers' Empowerment,
Government of Odisha