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Caritas INDIA
The Joy of Service...

Report on

Value Chain Study of Potential Farm Products



Study undertaken by:

MART
Business Mind Social Heart

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Caritas Austria

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Report of Value Chain study of Potential Farm Products

1. Introduction

Smallholder Adaptive Farming and Biodiversity Network (SAFBIN) is engaged in an action research programme led by Caritas Organisations of 4 countries including India supported by Caritas Organisations in Austria, Italy, Luxemburg and Switzerland.

The programme focusses on smallholders considering them as a huge possibility in changing the future of agriculture in terms of their adaptive practice of using simplest means of sources of inputs. While exhibiting higher productivity and cropping intensity they have comparatively much lesser consumption of resources and attaining higher income and resilience to climate change. They ably adapt to become practitioner researchers in their own field and are devising simple yet effective unique local practices to accommodate to the climate change factors.

SAFBIN aims to improve the food and nutritional security of small farmers is inspired by the achievements and mutual learning process of the Caritas Partners in a successful previous phase on Agriculture Research for Development (ARD). This programme is primarily contributing to achieve Sustainable Development Goal 2 of the United Nations: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture in South Asia". The Program is implementing in collaboration with Caritas India, Caritas Austria and Caritas Swiss to strengthen and bring about local food and nutritional security among small and marginal farmers in 15 most marginalised communities.

The programme is implemented to achieve two major outcomes

i) Improved food and nutritional security and resilience of Small holder farmer families and
ii) Increased income of the smallholder farmer families.

To achieve these outcomes the programme has 5 outputs which are;

1. Resilient and capacitated Small farm households increased farm production and surplus with adaptation to climate change and disaster while maintaining ecosystem and soil health
2. Improved capacities of small farm households to consume a balanced diet
3. Smallholder farmers enhanced their land tenure security and access to water, seed, entitlements and knowledge
4. Increased dialogue around Small farmers in policy and actions (around research, extension and technology development) forums
5. Value chain of Small-Farm-Agri-Foods (SFAF) developed with their sustainable production & consumption

2. SAFBIN Project- Madhya Pradesh

Caritas India launched Smallholder Adaptive Farming and Biodiversity Network (SAFBIN) launched in Vidisha and Sagar Districts of Madhya Pradesh in collaboration with Manav Vikas Seva Sangh during Nov-2018. SAFBIN aims to improve the food and nutritional security of small farmers is inspired by the achievements and mutual learning process of the Caritas Partners in a successful previous phase on Agriculture Research for Development (ARD). SAFBIN is a multi-dimensional and multi-sector programme aimed to address the agricultural development challenges of developing and emerging countries. The innovative models piloted by the smallholder farmers from four rain-fed Agro-Ecosystems (AES) in South Asia is implementing scalable and replicable in all similar Agro-Ecosystems. This programme is primarily

contributing to achieve Sustainable Development Goal 2 of the United Nations: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture in South Asia". The Program is implementing in collaboration with Caritas India, Caritas Austria and Caritas Swiss to strengthen and bring about local food and nutritional security among small and marginal farmers in 15 most marginalized communities. Total 3878 households from 25 Villages of 16 gram panchayats & 4 Blocks from 3 Districts i.e. Mandla. Vidisha and Sagar districts of Madhya Pradesh is covering by this programme.

SAFBIN programme follows farmer led collective on-farm adaptive research, farming system and partnership approaches to empower the smallholder farmers in:

- Doubling farm production and income.
- Access to balanced diet and nutritional self-sufficiency.
- Control over land and secured access to knowledge and farm-based entitlements.
- Resilience to climate change and disaster while maintaining farm ecosystem.
- Multi-level cooperation and partnership for smallholder friendly policies.
- Sustainable food production and consumption of small-farm-agri-foods for urban middle-class consumers.

Demographic Reach

Sl.	Content	Sagar	Vidisha	Mandla	Total
1	Total Number of villages	10	5	10	25
2	Total Number of Gram	9	2	5	16
3	Total Number of Blocks	1	2	1	4
4	Total Number of Districts	1	1	1	3
5	Total Covered Population	12003	1152	7499	20654
6	Total Households	1938	473	1467	3878
7	Male & Female (population)	6213 & 5790	594 & 558	3773 & 3726	10580 & 10074

Outputs

- Introduction on relevant new farm components for developing IFS and enhanced efficiency.
- Organizing appropriate nutrition focused farm diversification for enhanced access to nutrition.
- Promoting alternate /new uses of existing / introduces farm resources including recycling/ reuse/up cycling of farm waste.
- Almost 1366 smallholder families (920 male & 446 female) are orientated on IFS.
- Organize nutrition and hygiene awareness campaigns & supporting village resources center to maintain and provide information on nutrition and hygiene.
- Promoting use of organic inputs and nutrient recycling.
- Farm biomass production has diversified and is economically used.
- Value Chains of SHF farm products established with market linkage.
- Small farm friendly farming systems models are developed and used.
- Small farm household members are aware about vital aspects of nutrition, basic hygiene practises and know how to ensure a quality / balanced diet.
- Small farms have enhanced access to water. & SHF have enhanced access to indigenous seeds and reproductive materials of good quality.
- Eligible SHF have enhanced access to Public Service Entitlements.
- Small farm-oriented knowledge and information are available.
- Small Farm ecosystem and soil health improved.
- Middle Class Consumers Groups engaged in Producer-Consumer-Alliances, jointly facilitate, advocate and influence demand for Small-Farm-Agri-Foods.
- Multi-stakeholder partnerships are functional at local, national, regional and international level.

3. Scope of study

Caritas India launched Smallholder Adaptive Farming and Biodiversity Network (SAFBIN) launched in Vidisha and Sagar Districts of Madhya Pradesh in collaboration with Manav Vikas Seva Sangh during Nov-2018. Total 3878 households from 25 Villages of 16 gram panchayat & 4 Blocks from 3 Districts i.e. Mandla. Vidisha and Sagar districts of Madhya Pradesh is covering by this programme. As a matter of running the programme for about 2 years, Caritas India seeks to undertake a value chain and market study of potential crops in its intervention area to prioritise its strategy in promotion of small farm agri produce for the small holders. MART is commissioned to conduct the value chain study to suggest strategies and recommendation to improve upon the programme.

4. Objectives of the study

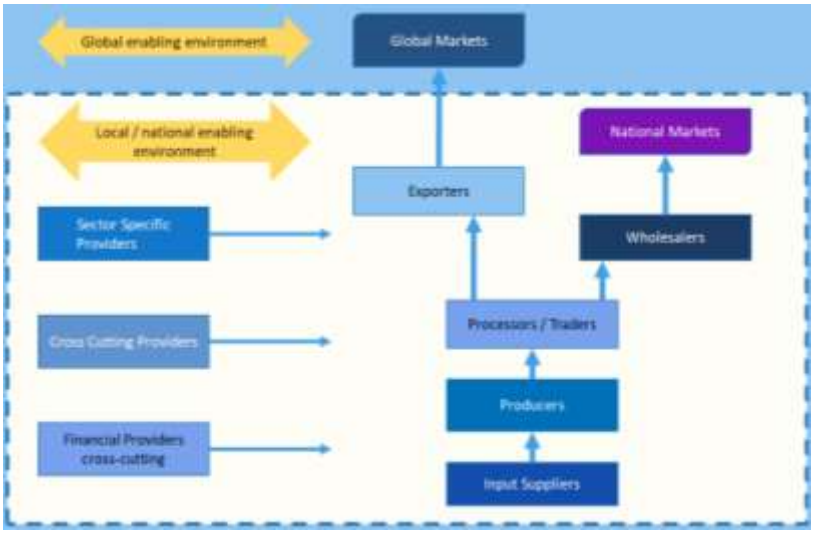
The objectives of the study is to

- Undertake a value chain study and in-depth market research to identify the potential farm products
- Develop a small-scale business plan (value chain) for the smallholder farmers' collectives.
- Suggest a detailed strategy for promotion of potential crops for Caritas India towards effective programme implementation

5. Methodology

The Value Chain Approach

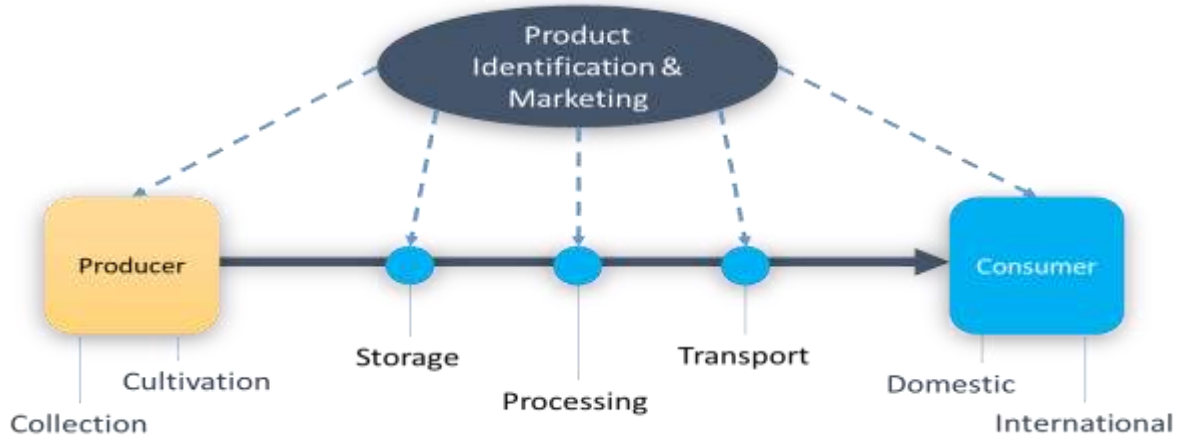
A value chain can be defined as all the firms that buy and sell from each other in order to supply a particular set of products and services to final consumers. Value chains encompass the full range of activities and services required to bring a product or service from its conception to sale in its final markets—whether local, national, regional or global. Value chains include **input suppliers, producers, processors and buyers.** They are supported by a range of **technical, business and financial service providers.**



The value chain consists of all the functions that occur from raw material producer to the final consumer of a finished product. The functions involved in value chain are: production, collection, processing, storage, transport, marketing, and sale.

The relative importance of each of these differs from product to product, they may not occur sequentially and some may even be repeated or omitted for particular products. Some chains, particularly for locally traded products, are very short and simple. The producer is responsible for cultivation and/or harvesting. Depending on the product, storage, processing and transport (in no definite order) must then take place. These steps may be more or less complex depending on where the product is produced, the nature of the product, the degree of processing, and the consumer requirements. For some products, such as fresh fruit,

perishability is a serious concern, requiring careful storage and handling and rapid transport to market, or some level of primary processing close to the point of origin.



The value chain contains several stages where particular production, local value addition and marketing processes take place.

Stage	Key inputs/functions
Inputs supply	Seed, fertilizer, pesticides, labour etc.
Pre-production	Land development, sowing, seed treatment, fertilizers application etc.
Production	Weeding, application of fertilizers and pesticides, technology, land productivity, water management, cropping patterns, multiple crops etc.
Harvesting	Technology, labour power, implements, transportation etc.
Post-Harvesting	Cleaning, drying, transportation, storage etc.
Value-addition	Aggregation, Grading, minimum processing, milling, packing, etc.,
Marketing	Local market, petty traders, middlemen, market yards, wholesale merchants, millers, processing units, wholesale or retail selling etc.

MART approached the study in 4 important steps as highlighted in the following analytical framework.

6. Analytical Framework of the Study

Activities	Key Steps	Outputs
– Review project documents – Review of select secondary documents	Phase 1 Pre-Study Preparation	– Finalise study methodology & plan – Prepare survey tools & data capture format
- Extensive review of publicly available documents - Discussion with Caritas team	Phase 2 Potential crop selection	- Better understanding achieved on production of crops and farmers practices - 6 potential crops selected and mutually agreed for value chain analysis study
- Survey of input suppliers & support services providers - Interact with govt. & agri-research agencies - Interaction with farmers	Phase 3 Value-chain analysis of 6 potential crops	- Prepare & present selected crop value-chain map by product - Delineate and analyze role and responsibility of stakeholders

- Market players interaction for selected districts - Data reconciliation & analysis		- Price and value propositions at all stakeholders level - Gaps and constraints in the value chain - SWOT - Recommendation
- Draft Report Submission - Feedback on draft report - Final Report Submission	Phase 4 Draft & Final Report	- Incorporation of feedback on draft report and writing the final report - Presentation of Findings and Analysis

7. Key Features of the Study Design

The Study has been divided into 4 phases as defined in the analytical framework. The phases are sequential in nature and followed the logical process of identifying potential crops to conducting value chain studies for each crop culminating in production of report covering findings and analysis.

The **Value Chain Analysis** included the following –

- Detailed Primary level data collected from selected crop geographies on all 6 selected vegetable crops.
- IDIs were conducted to collect information about key activities related to resources, skills, technology, infrastructure, institutions, finance, market and existing livelihoods etc.
- Individuals engaged in crop production and marketing interviewed to collect detailed information for understanding the value chain aspects.
- For each activity a number of stakeholders from government, service providers and market across the value chain interviewed to gather information

The following is a list of value chain actors covered under various respondent categories during the market survey.

Location	Market Players	Service provider	Enablers	Project Staffs	Community
Project Village	• Aggregator • Trader	-	-	-	• Marginal & small Farmers • Progressive farmers
Block town	• Aggregator • Trader	• Input suppliers • Transporter	• Agri department	-	-
District town	• Trader • Institutional buyers	• Input suppliers • Financial Institution • Transporter	• Govt. department	• Caritas team	• Agri-research agencies

8. Brief district overview

8.1. Mandla District

Mandla district is located in the east - central region, an eastern district of Jabalpur division, Mandla district forms a part of the Satpura hills, which separates the cotton growing areas of the south from the wheat-growing extension of the Malwa Plateau on the north and is the water-shed of three district river systems. Lying between the latitudes 22o 02"and 23o 22' North and longitudes 80o 18' and 81o 50' East, the district is at an altitude of 443 to 1,100 meters from the mean sea level.



The extreme length of the district is about 133 Kms. from north to south and extreme breadth is 182 Kms from east to west. It covers a total area of 8771 Sq. Kms consists of 9 blocks 6 Tehsils and 1221 habitable villages in the district. Mandla has population of 1,054,905 of which male and female were 525,272 and 529,633 respectively as per census of 2011. It is a tribal dominated district, located in the hilly and forest areas of Maikal hill range of the Satpuras, in mostly scattered habitation.

The soil of the district is black and stony. The net area irrigated was 44,610 hectares. 6 The total land area of Mandla district was 386,502 hectares in 2009-10; 80,654 hectares was under forest area, 53,130 hectares area was not available for cultivation, 20,140 hectares was under other uncultivated land excluding fallow land, 44,610 hectares was cultivable land, 65,434 hectares was under fallow land and the remaining 275,073 hectares was cropped area. .Trend of area/productivity of 3-4 major crops grown in Kharif & Rabi, cropping pattern.

The Major crop of the district are Paddy (111400 ha), Maize (19000 ha), Pigeon pea (3100 ha), Urad (2900 ha) in Kharif followed by Wheat (38800 ha), peas (15300 ha), Mustard (14300 ha), Lentil (11,500 ha) and Gram (6138 ha.) in Rabi. The Topography of the district is undulating and Soil type is light soil (11, 21, 48 ha), Medium soil (78016 ha), Heavy soil (53636 ha).i.e.46, 32 &22 % respectively.
Mandla is situated 452m above sea level. Mandla has a tropical climate. In winter, there is much less rainfall in Mandla than in summer. According to Köppen and Geiger, this climate is classified as Aw. The average annual temperature in Mandla is 25.3 °C | 77.6 °F. The annual rainfall is 1392 mm | 54.8 inch.
The soils in the area are generally of clayey loam types with sandy loam soil in some areas. In the northern and central parts of the District, the undulating plateau with mounds are covered with slightly deep soil, well drained, fine to fine loamy soils on gentle slopes marked by moderate erosion. The southern hilly region is covered by very shallow loamy soils, somewhat excessively drained. The soils developed on moderately steep slopes are marked by severe erosion. The soils have been classified as Ustocherpts/ Ustorthents/ Rhodustalfs/ Haplustalfs/ Haplusterts, as per pedagogical taxonomy.

Major Field Crops cultivated- Mandla									
Name of the Crops	Kharif			Rabi			Total		
	Area cultivated ('000 ha)	Production ('000 t)	Productivity (kg/ha)	Area cultivated ('000 ha)	Production ('000 t)	Productivity (kg/ha)	Area cultivated ('000 ha)	Production ('000 t)	Productivity (kg/ha)

Rice	115.1	75.7	696				115.1	75.7	696
Minor millets (Kodo-kutki)	39.7	9.5	233				39.7	9.5	233
Wheat				29.4	26.1	929	29.4	26.1	929
Maize	18.5	21.4	1179				18.5	21.4	1179
Peas				16.8	3.9	241	16.8	3.9	241
Mustard				16.2	12.8	828	16.2	12.8	828
Lentil				14.8	5.8	408	14.8	5.8	408
Niger	8.3	1.6	203				8.3	1.6	203
Chickpea				5.8	3.4	628	5.8	3.4	628
Pigeonpea	3.9	3	809				3.9	3	809
Soybean	2.6	1.1	733				2.6	1.1	733

8.2. Sagar District

The district Sagar lies in the north central region of Madhya Pradesh & situated in between 23 degree 10' and 24 degree 27' north latitude and between 78 degree 4' and 79 degree 21' east longitude, the district has a truly central location in the country. District Sagar has 2015 villages, out of which 1901 are inhabited, coming under 755 Gram Panchayats. The district is divided into eleven Tehsils and eleven Community Development Blocks, According to 2011 census, the district encompasses a geographical area of 10252 sq. km and has a population of 2378458 (persons) including 1256257 males & 1122201 females with sex ration of 893. The major religions of the district is Hindu (92.43%) & Muslim (4.35%) and community dominates in the districts are Sonis, Jains and Yadavs. The literacy rate of the district is 76.46% and male female literacy ration is 84.85% & 67.02% respectively. Labour force participation rate is 58.39% and main source of income is from Agriculture sector. The per capita income is Rs. 77020 during 2018.

Climate, Soil & Rainfall

The Agro-Climate of the district Sagar contains Vindhya plateau Zone (MP-5) & Agro-Climatic region is Central Plateau and Hill region (VIII). The major soil quality of the district is deep black soils (55.9%) followed by shallow soil (28.2%) and medium deep black soil (15.7%). The Annual rain fall of the district is 1197.6 MM and annual rain day is 56. The maximum temperature during extreme summer reaches as high as 47C and the minimum during winter dips up to 5C. The maximum normal temperature varies between 25 and 35C and minimum normal between 10 to 20C. The relative humidity ranges from 40 to 70 % throughout the year

Land

The total privately owned land is 570,195 ha owned by 355,777 farming families out of these, marginal farmers and small farmers constitute about 39% each. Collectively, they own 40.3% of land, whereas top 1.6% of farmers own 14.9% of land. This skewed distribution is likely to give unequal benefits to the different classes, thus affecting sustainability of such interventions. This aspect should be factored into the planning of any development interventions in the district.

Category	No of Farmers	As%	Area (Ha.)	As %
Marginal farmers	137,325	38.6	95,208	16.7
Small farmers	138,853	39.0	134,716	23.6
Semi medium farmers	31,172	8.8	108641	19.1
Medium farmers	42,646	12.0	146397	25.7
Large farmers	5,781	1.6	85233	14.9
Total	355,777	100	570195	100

The gross cropped area of the district is 736300 hectare, out of which net shown area is 537400 hectors and 198900 hectors area sown more than once. The net irrigation area of the district is 241100 hectares and 296400 hectares are rain fed area. The main source of irrigation is open well which contributes 47.9% to the total irrigation area followed by Bore-well (15.2%) and Canals (3.4%)

Agriculture Scenario

The District of Sagar is predominantly a Rabi area. Wheat crop is the agricultural staple. Other staple crops are gram, linseed and jowar. Mixed cropping is resorted to as a measure of insurance against the vagaries of nature. Rabi is the main cropping season, though the proportion of Rabi to Kharif has varied from time to time. Occasionally, the Kharif crop exceeded the Rabi when wheat crop was badly affected by rust or frost or when bad season hampered Rabi sowing. When the season conditions came to normality the Rabi crops were gradually restored to their original position of prominence. Conversely whenever there are heavy and continuous rains through July and August which prevent the ploughs from getting to work, or Kharif crops get rotten particularly in low-lying and water-logged areas, they are ploughed and diverted to Rabi sowings. The climatic conditions thus largely determine the relative weightage given to Kharif and Rabi crops in a particular year. Major crops of the Sagar district are as given below;

Major Field Crops cultivated & its Production (Sagar)									
Name of the Crops	**Kharif**			**Rabi**			**Total**		
	Area cultivated ('000 ha)	**Production ('000 t)**	**Productivity (kg/ha)**	**Area cultivated ('000 ha)**	**Production ('000 t)**	**Productivity (kg/ha)**	**Area cultivated ('000 ha)**	**Production ('000 t)**	**Productivity (kg/ha)**
Soybean	**254.9**	**170.8**	**828**				**254.9**	**170.8**	**828**
Chickpea				**197**	**176.8**	**1123**	**197**	**176.8**	**1123**
Wheat				**180**	**151.1**	**765**	**180**	**151.1**	**765**
Lentil				**66**	**29.7**	**432**	**66**	**29.7**	**432**
Black gram	**22.7**	**7.2**	**338**				**22.7**	**7.2**	**338**
Rice	8.7	4.9	1141				8.7	4.9	1141
Maize	8	4.5	1110				8	4.5	1110
Pea				8	3.8	476	8	3.8	476
Linseed				6.3	2.7	494	6.3	2.7	494
Sorghum	4.3	4.3	565				4.3	4.3	565

As stated in the above table, 5 major crops which is cultivation more than 20 hectors and have a remunerative production i.e. soybean, chickpea, wheat, lentils, & Black gram. Considering to the supply side wheat have a better marketing system & government fixed MSPs, which give remunerative income to farmers. As Lentils are used for domestic consumption, need not to be intervention on it. Out of the 5 major crops now it looks to take a review for further intervention & market strategy on it.

9. Value Chain of Crops

Crop 1- Koda/Kutki

Overview



Figure 1 kodo millet

Kutki millet is grown during the monsoon season. Kutki millet has a short growth cycle, water efficient and adaptable to a variety of growing conditions. They may be cultivated in rain fed, marginal areas with low soil fertility, and at altitudes of up to 2100 meters. Kutki millet is grown on less fertile lands, such as hilly tracts, and is used as an intercrop with legumes, gram, or sesame, requiring little to no inputs. Thus, kutki millet enables farmers to increase their overall farm production, by utilizing areas of land not suitable for other crops, such as rice and wheat. Kodo and kutki are millet varieties that belong to the same family of crops. Kodo millet (Paspalum scrobiculatum) and Kutki millet (Panicum sumatrense), also called little millet, are small-seeded cereals and among the oldest cultivated crops in South Asia. These millets are drought-tolerant crops and can even survive in conditions where the soil is of marginal quality. The nutritional content of the millet, however, exceeds that of both rice and wheat. They are a rich source of protein and fibre. With 66.6% carbohydrates and 353 kcal per 100g, these millets have the potential to efficiently tackle malnutrition and stunting among children.



Figure 2 kutki millet

In Madhya Pradesh the area of cultivated kodo and kutki in Mandla and Dindori districts was around 60,000 ha in 2016 but it has been in decline as compared to historic levels although majority of millet producers emphasized on the importance of kodo and kutki. The yields estimated is 2.5 quintal/acre and that of kutki is between 1-2 quintal /acre in an average.

Rational of Crop selection

Madhya Pradesh is one amongst the states in India with the poorest level of children nutrition. Kodo and kutki millets provide good sources of phosphorus and iron and higher protein content than rice. Because of this high nutritional value and their capacity to even thrive on poor quality soils under water-limited conditions, it has great potential to help alleviate nutrition insufficiencies in the State.



Figure 1
Kodo-Kutki kheer in villages of Mandla

In Mandla and nearby Dindori area, kodo and kutki continue to play an important role in subsistence of tribal communities. Therefore, promotion of these crops can be effective in providing a viable income earning opportunity for these producers, as well as contributing to a more nutrition-sensitive and climate resilient

agricultural production. Millet crops off late have a lot of focus in national and international arena emphasizing its stress on promoting traditional gluten-free superfoods. Urban consumers in Madhya Pradesh are mainly habituated consuming small millets as a fasting food mainly moredhan but kodo and kutki could be a suitable option for them if appropriate awareness is raised about its nutritional value.
The results showed that in the rural areas of Mandla and Dindori, kodo and kutki have a very important subsistence role for tribal communities, who prefer them equally or more than rice. They consume kodo cooking it into rice, khichdi apart from its gruel. Kutki is mainly prepared as rice, kheer (a kind of porridge) and as gruel. Children like the taste of millets and especially prefer the kheer for its sweet taste. In Mandla town, consumers were aware of millets but showed a stronger preference for paddy rice because of its greater availability, lower price, ease of processing, and preferred taste. Consumers in the cities of Bhopal and Jabalpur were having little understanding about the products and its consumption.

There has been multiple intervention to bring Kudo and Kutki into the larger demand platform to make that remunerative for farmers. In 2013 in the Mid-Day Meal (MDM) Scheme it was aimed at improving child nutrition in the area by using kodo-kutki to make sweet bars as breakfast for school children. District specific intervention was introduced under the Aajeevika scheme and the tribal community was asked collectivise kodo and kutki since the tribals were exploited in bartering of kodo or kutki with rice or wheat. This was not successful due to multiple factors.

Production scenario

In Mandla area, especially in the Caritas intervention area small holder farmers are intervened for integrated farming practices. Kodo and Kutki are the most traditional cultivation practices mainly by the indigenous communities and communities closely living near to them in the rural areas of both the blocks in the district. Traditionally before the advent and popularisation of paddy cultivation, Kodo and Kutki were in practice and that contributed to important food and nutrition needs of households in these villages. Majority of the farmers are now cultivating paddy since rice has become the most preferred cereal. However, the practice of Kodo and Kutki is in practice and most of the households cultivate these crops though with a limited scale. In an average a small holder household cultivates quarter or half of an acre kodo and kutki in a year. Kodo is processed in mill available at Bichhia before eating. As per practice both the crops are cultivated on a rotation basis. As a part of intercropping arhar is generally cultivated with kodo and kutki to feed household protein consumption needs.
As stated by the farmers, if there is no need much more financial investment, but financial linkage/ support is a major challenge for the farmers. All the farmers are not getting the formal financial linkages in time for which they are choosing local MFIs for fulfil their cash need. The MFIs are sanctioning Rs.25K-/ Rs. 40K/- in 1st loan and it increases Rs.80K to 1lakhs during the 2nd loan. They are charging 2% monthly interest and collecting the instalments fortnightly. The repayment of loan instalments creates a lot of pressures on farmers & altimetry selling their produces as soon as they harvested without waiting to the reasonable market price for the produces.

Pre-Production Practice

As per the interaction with farmers, kodo is comparatively more consumed than kutki. Both kodo and kutki are cultivated in dry up lands where water logging does not happen. Land is prepared like any other Kharif season crop. Before undertaking the *kodo kutki* cultivation the land preparation is done in May. One deep ploughing called summer ploughing is done and the land is left till June. After the advent of rain *Jutai*/ ploughing of land is done and after leaving for one week broadcasting of *kodo* seeds is done. The farmers use traditional local variety of seeds that are kept preserved at home from the previous year's harvest. In an acre 20-24 kgs of Kodo seeds are used while in *kutki* it is 14 kgs per acre. Usually farmers

are using ***SITAHI & BHADELI*** variety of kutki & ***CHHOTI & BADI*** variety of kodo cultivation. Farmers in both the blocks have no access to high yield varieties of seeds available in other parts of the state and outside.

Production Practice

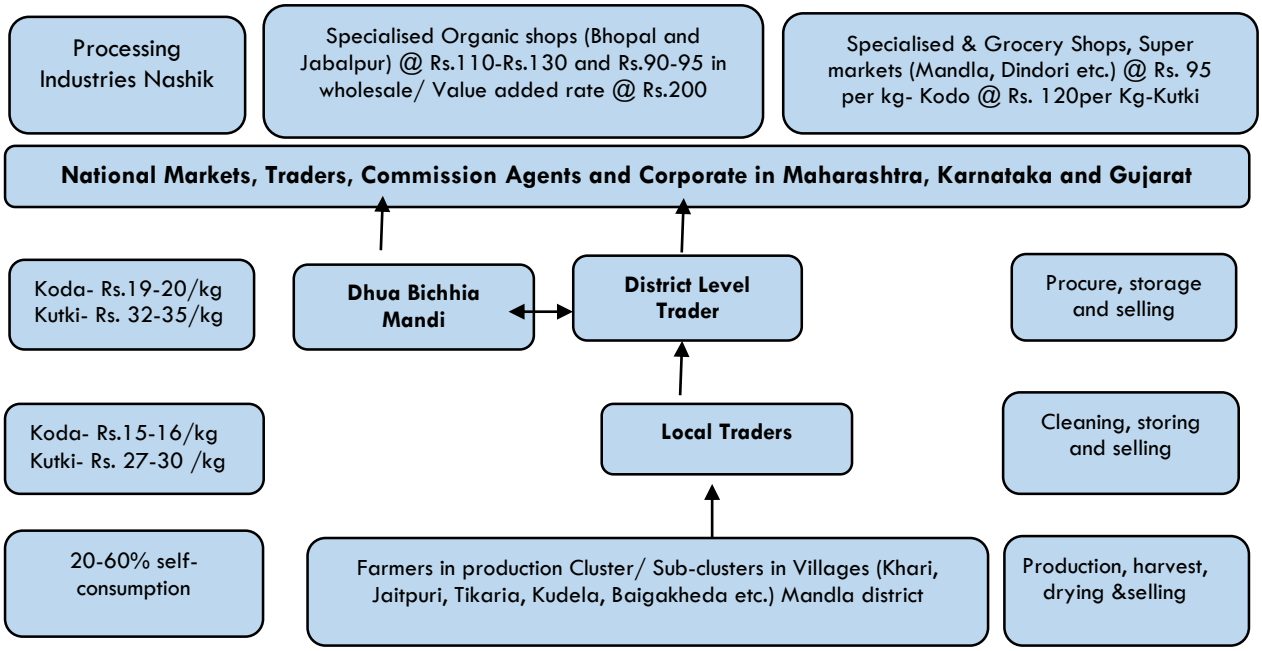
In case of Kodo & kutki *Jutai/* ploughing is done once or twice and *buaai/sowing* is done late. *Nidai/weeding* is not done in case of kutki cultivation. There is no practice of weeding being done in case of Kutki cultivation as it withstands weeds as per belief of farmers. The farmers don't use any kind of organic manure and chemical fertilisers and pesticides. While some farmers use up to half tractor trolley of cow dung manure for koda, for kutki they don't use this. As per their understanding they understand the land itself has adequate natural compounds that supports good koda and kutki production unless there is untimely rain that damages the crop. As stated by farmers, they seen a little pest attack or disease on kudo and kutki crop.

Post-Production Practice

Both the kodo & Kutki started ripens in late October and November. The crop is manually cut and bound in stalks and left in the farm field for 3-4 days to dry. After that it is taken to home and kept in *khalian*- space prepared at the front yard. After that in a week *gahai*- threshing is done for one day using bullocks and the grains are cleaned and collected. The grains and stored in *Kothi*- a big size earthen pot available in every farming households in the area. The productivity of kodo is 4-5 quintal per acre. The productivity of kutki is 2-3 quintals per acre currently.

De-husking kodo millet is a tough task as they contain seven inedible layers that need to be removed prior to consumption. Despite kodo and kutki millets' many valuable properties, their cultivation, consumption and marketing remains underdeveloped compared to other cereals in India. There are indications that consumer demand for small millets is growing in more urbanised centres like Delhi, Mumbai, Bangalore and Chennai and southern India due to a growing awareness and value of health, nutrition, going back to roots and eco consciousness. Madhya Pradesh, where kodo and kutki are cultivated largely in tribal belts on marginal lands have larger marketing issues to make the cultivation remunerative to the farmers.

Value chain map



Value chain Functions

This value chain diagram is prepared based on the interaction with supply and demand side stakeholders that relates more to the value chain of Kodo and Kutki production in two blocks of Bichhia and Mawai block in Mandla district where Caritas is working. The value chain is short that involves 3 players in the block and that goes to district and terminal markets. The role of stakeholders involved in the value chain is briefly discussed below.

Role of stakeholders in marketing

Village level traders

The selling of kodo and kutki by farmers who have a small scale of marketable surplus is mainly through the local traders. In each village there are couple of local traders who deal with kodo and kutki along with other crops harvested in the locality. Kodo and kutki are sold fairly post harvesting the crops by farmers as they require cash for meeting their expenses. However, with changing awareness and exposure of market, now many farmers prefer to store kodo and kutki keeping in view of market rates which normally offer a better rate selling after 2-3 months after harvesting season completes. The local traders operate at lowest level of market chain and their role is mainly like commissioned agents. They are offered a margin of profit by the district level traders after the produce is lifted from the farmer. The district level traders mostly engage the local level traders in the product clusters to lift koda and kutki in large scale. The district level traders are connected to traders, processing units operating at state and outside. In most of the cases the price offered by the local trader is 2-3 rupees less than the existing market price. The local trader keeps in close contacts the households having marketable surplus and when it is time, he lifts the product from the door step of the farmer. The weighing is done using traditional balance of measurement. The trader offers rate taking into consideration of the scale of produce available, moisture, produce cleanliness, size and colour(blackening of grains is not taken). Cash payment is done on the spot to the seller. Always there is an attempt by the local trader to lower the price citing product quality and cheating in weighing.

State wise Wholesale Prices Monthly Analysis for Kodo Millet (Varagu) June, 2021

State	Prices June, 2021	Prices May, 2021	Prices June, 2020	% Change(Over Previous Month)	% Change(Over Previous Year)
Madhya Pradesh	2132.4	2165.45	1685	-1.53	26.55
Average	2051.2	2143.17	1852.77		

District Level trader

The village level trader has link to trader operating at block level with their network at district, state and outside as well as mandi available at D.Bicchia. Since the local trader who does not have capacity to retain the produce in large scale in his own capacity sells, they aggregate the produce in a couple of days to a level it becomes truck load/s before selling to district level trader. If they have a good scale which in most cases possible post harvesting season they immediately sell to the district level trader or mandi. The district level traders are connected to terminal market players in MP, Nashik and Maharashtra and Gujarat who are corporate players, Processing companies etc. having large scale investment. In terms of his role
The produce from the fields of blocks nearer to Mandla district headquarters goes to feed the district level traders and mandi and then it goes outside the district and state. The traders just procure the produce and sell to the next corporate and national level processors. The produce is often transported to Indore, Bhopal, Khandwa, and Jabalpur and outside the state. Nashik is one of the major m The profit margins at this level

are lower than that of the town level trader as these players operate more on volumes. The margin of profit depends upon the product stored in terminal markets, quality of the produce and time period of procurement.

Economics of Kodo/ Kutki cultivation/ Acre

The acre economics is calculated on the basis of average cost of cultivation for all variety and method of existing cultivation of Kodo/ Kutki.

A	Labour	Units	Cost (Rs)
1	Tractor ploughing @ Rs 800/Hr for twice including land leveling	1hr x 2	1600
2	Seed Sowing	1 MD	200
3	Application of cow-dung	2MD	400
4	Harvesting manually & Transporting to threshing floor	8MD	1600
5	Manual Thrashing, Winnowing, Bagging, transport, Storing	Lump sum	700
	Sub total		***4500***
B	**Inputs**		
1	Cost of Seed @ Rs 50/Kg	5 Kg	250
2	Cost of Organic manure (cow Dung)	Lump sum	1500
3	Cost of Plant protection (organic manure)	Lump sum	250
	Sub Total		***2000***
	Miscellaneous/Contingency@ 5%		**325**
	Total Cost (A+B)		**6825**
C	**Projected Yield and Income**		
1	Income from selling of Kutki @ Rs 3000 Per quintal	3 Qntl.	9000
	Income from selling of Kodo @ Rs 1600 Per quintal	5 Qntl.	8000
	Net Income from Kutki (total Income – Total cost)		**2175**
	Net Income from Kodo (total Income – Total cost)		**1175**
	Return on Investment (Kutki)		**31.87%**
	Return on Investment (Kodo)		**17.22%**

*The cost factors are tentative in nature

SWOT

The study analyses the Strengths, Weaknesses, Opportunity and Threats of Black gram value chain to come up with value chain development strategy.

Strength	Weakness
• Suitable soil and climatic conditions for Kodo/ Kutki • Black gram has potential enhance the soil health • Involvement of maximum nos. of farmers • Growing domestic demand for Kodo/ Kutki • Availability & Use of modern tools and equipment • Easy marketability	• Lack of Soil test & soil health knowledge. • Lack of rotation or use of improved seeds. • Lack of knowledge in PoP of Kodo/ Kutki • Lack of critical irrigation facility • Lack of appropriate dose of fertilizer & pest • Lack of product holding capacity. • Lack of Value addition at farmer's level.
Opportunity	**Threat**
• Scope for the CLF to get into new business operation for input and output • Growing population and demand for Kodo/ Kutki • Processing and value addition initiative can take up • Collectivization of input & output business • Technical support from CARITAS-INDA and CLFs to strengthen Black gram value chain	• Lack in scale of produce at farmer level • Increased prices and non-availability of inputs may hamper the farmer's motivation. • Cloudy weather and rains during flowering • Disease and pest attack • Interference by middle man in the process of marketing

Issues and Constraints in kodo and kutki production

- Subsistence farming of kodo and kutki among indigenous and rural farmers poses issues to farm productivity.
- Small patches of land and low scale production. Farmers devote an average of 20-50 cents of land leading to low scale of production
- Koda and kutki is cultivated under rain fed situations and any drastic change in the climate leads to crop failure.
- Soil testing is not done by majority farmers and soil health depend upon natural factors.
- Self-stored traditional seeds are used which are not tested for germination by majority of farmers.
- No idea about appropriate seed rate leads to increase in cost of cultivation and hampers productivity
- There is a dearth of knowledge among majority farmers about importance of tillage and method of planting. Broadcasting of kodo and kutki leads to low productivity.
- Lack of knowledge and practice on integrated nutrient management (INM) and even the farmers' knowledge organic cow dung manure is not adequate. Yield is often reduced by 10-30% by the standards due to deficiencies of major nutrients for plant growth.
- Weeding in kodo is done once but for kutki it is absolutely not done for once.
- Awareness on plant protection and pests reduces production significantly.
- Individualized selling and lack of economies of scale is a major issue in incremental price realization among farmers. Although SHFC are formed by Caritas India, there are issues where few SHFCs adopts to collectivization and sale.
- The produce is often dried in the fields without appropriate drying infrastructure, resulting in irregular produce quality and as a result, irregular returns.
- Individual marketing and pre-production credit linkage restrict farmers from getting better returns.
- Marketing channels do not support low marketable surplus available with farmers to offer competitive price for kodo and kutki.

Recommendation for Value Chain strengthening

Minor millets are today important for the livelihoods and food security of the farmers cultivating the crops and they have the potential to maintain and even further regain importance in the future as a modern and healthy alternative to rice. These benefits should be appropriately tapped by the tribal farmers who traditionally have refined the cultivation technics of kodo and kutki millets through centuries and for whom such millets have immense food and cultural values. By supporting local production and market of millet in Dindori and Mandla district, this area can again become one of the important centres for millet production in India. Efforts by government and NGOs towards conservation, cultivation, consumption of millets is appreciable, but a stronger and more focused approach is needed to arrest the decline of cultivation area and revive the consumption of millets by giving it a respectable tag of crop that is adapted to the environment of the districts and healthy food for all.

Institutional Development	○ Every village should have SHFC promoted and strengthened under SAFBIN project with a focus on developing kodo and kutki cluster for agriculture development ○ There should be a cluster taking villages situated contiguously and having farmers cultivating kodo and kutki. ○ There should be democratically selected cluster committee to drive the kodo and kutki cultivation in the clusters with transparent guidelines developed for all farmers to follow. ○ All the financial transaction of the cluster should be transparent and conquered by the representatives of SHFC members

	○ Producers would be responsible to aggregate the produce as per the guidelines given by the cluster.
Cluster promotion and mobilization	○ Selection of villages producing kodo and kutki. ○ Selection of villages for interventions on kodo and kutki. ○ Community understanding on dynamics of production and productivity of kodo and kutki. ○ Village level awareness meeting. ○ Identification/ promotion of potential/interested groups to form SHFCs for cluster promotion. ○ Selection of leaders from selected groups for strategy development. ○ Exposure/training on technical aspects and sustainable kodo and kutki promotion (soil treatment, inter-cropping, de-cubing, drying, storage etc.). ○ Exposure/ training on institution promotion and management. ○ Coordination with line department and other role players for convergence and support. ○ Introduce of soil testing kits, moisture testing machine, sprayer and Sheller machine in the cluster villages. ○ Finalization of input supply modality at cluster level. ○ Cluster members are guided by implementing agency- CARITAS and its implementing partner to plan and execute value chain functions exclusively defined for all involved. ○ Implementing agency shall provide the inputs (seed, fertilizer, pesticide) to farmers as per the resolutions taken by Producer Group. Consultancy and support shall be taken from experts and line departments. ○ Capacity building of farmers is ensured by the implementing agency. ○ Ensuring soil treatment practice by the farmers through soil tests and fertilizer application. ○ Sharing and orientation of the fund-flow and input assessment. ○ Ensuring post-production management practice of farmers/ producers.
Capacity Building Initiatives	○ Exposure/training on technical aspects and sustainable kodo and kutki promotion (soil treatment, inter-cropping, de-cubing, drying storage etc.). ○ Exposure/ Training on institution promotion and management. ○ Exposure/training on technical aspects like quality control, value addition, and storage. ○ Exposure/ training on successful collective marketing interventions and cluster management. ○ Exposure for market explores and market understanding. ○ Exposure/training on cluster management, collective marketing and market access. ○ Skill development of members on value addition. ○ Exposure to processing units for value addition.
Infrastructure and technology development	○ Soil testing kits provided by the department would be available at cluster level. ○ Soil treatment practice should be followed through soil testing, application of compost and proper dose of fertilizer, IPM and inter-cropping. ○ Post harvesting practice through proper drying and de-shelling by use of drying ward, sheller machine and moisture testing machine. ○ Moisture testing machines for each farmers club/ village would be provided by the department. ○ De-shelling machine for each farmers club/ village would be provided by the department. ○ At least 5 spear machines for each farmers club/ village would be provided by the department. ○ Drying ward for each farmers club/ village would be provided through convergence with the line department. ○ Storage and market linkage through proper packaging, storing in dry place, collective marketing and market explore.

	○ Store house/ godown for cluster/ sub cluster point level would be provided through convergence with the line department
Introduction of collective marketing.	○ Finalizing procurement modalities ○ Sharing the concept of kodo and kutki promotion and collective marketing. ○ Fixation of minimum rate for buying within groups and from outside. ○ Ensuring procurement of committed quantity by the participating groups ○ Exposure/training on technical aspects like quality control, value addition and storage) ○ Exposure/ training on successful collective marketing interventions and record keeping. ○ Arrangement of fund flow through convergence and coordination with line department. ○ Simultaneously making plans for construction of drying yard, storehouse and other Infrastructure. ○ Liaison and bargaining with traders, finalizing selling modalities (selling price and mode of payment), making arrangements for gunny bags, packaging and transportation. ○ Disbursement of payment to cluster members/ producer.
Strengthening of collective marketing	○ Strengthening the concept of collective marketing and market accessibility of community ○ Formalization of institutions and completion of all legal aspects. ○ Increase in quantity and maintain quality parameter ○ Exposure/training on cluster management, collective marketing and market access ○ Skill development of members on value addition ○ Exposure to processing units for value addition ○ Market exploring and dealing with traders ○ Finalization of selling modalities including quality, price fixation, transportation, payment and date of lifting ○ Account keeping and maintaining transparency ○ Profit sharing and sharing the experience with the community. ○ Planning for possible avenue of value addition practices and related modalities

Crop-2 Soybean

Overview



Soybean is a species of legume (Glycin Max) native to eastern Asia. It is classified as an oil seed rather than a pulse due to its high oil content and its more popular use as a source of vegetable oil and industrial application such as bio-diesel. Soybean is the foremost provider of vegetable protein and oil. The busy, green soybean plant is a legume related to peas, groundnut and alfalfa. Soybean is also known as the "Golden Bean", "Miracle Crop" as it has become one of the most valuable food crops for the world majorly because of its protein content per hectare which is higher than most of the other crops.

- Rational for crop Selection

Rational for crop Selection

With rising population of the world, the demand for protein enriched food is increasing rapidly. Being a protein enriched crop, soya is likely to fulfil the requirements of animal feed such as that will form a large chunk of fulfilling this protein demand for humans. Apart from animal feed, soya is being used heavily in biodiesel. Soy contains 35-38 percent of its calories from protein that too of highest quality. Around 40% of soy calorie is derived from fat, which is being used in both ways of food industry as well as directly by consumers. Soybean is one of the few plants which contains omega – 3 fatty acids which are essential for infants and also help to reduce risk of heart diseases and cancer. Thus, the long list of benefits of soya makes it a valuable agricultural commodity.

Madhya Pradesh is considered as the soybean bowl of India, followed by Maharashtra and Rajasthan. In Madhya Pradesh, the soybean area has gone up by about 12% in 2020-21 and crop production is estimated to be around 58.530 lakh tonne, as against 40,107 lakh tonnes in 2019-20. Area under soybean in Maharashtra is expected to rise by 5% to 39.292 lakh hectare and production by over 14% to 45.131 lakh tonne.

Production Process

In India, soybean is highly dependent on the monsoon and fluctuates in year to year. It is purely a Kharif crop, whose sowing begins by end-June with the arrival of south-west monsoon. The crop, which is ready for harvest by the end of September, starts entering the market from October beginning onwards. Crushing for oil and meal starts from October, peaking during the subsequent two-three months.

In Madhya Pradesh, majority of the farmers in the area are into Soybean cultivation in the Kharif Season. As the seasonality is concerned, farmers are into land preparation activity during the month of May and June. Followed by land preparation seed sowing is in practice in the month of June. The vegetative growth of the plant is seen in the month of July and the yield harvest starts from the month of September- October. The crop calendar of Soybean is given below for reference.

May	**June**	**June-July**	**July-August**	**September**	**October**
Land preparation, ploughing etc.		Seed sowing	Vegetative stage of, weeding, pest and disease management	Harvest and post-harvest management of Soybean	

Pre-Production practices

Farmers used to get their land prepared after the yield of Wheat. The weeds are cleared and the field is ploughed by buffaloes or tractors to a depth of few inches. Manures are added to the soil. The field is then ready for receiving seed sowing. Two to three times ploughing is required to make the land ready for Soybean in Kharif season. Usually they are using their own harvesting product as seed purpose & 3243 variety is most commonly used by the farmers. They are repeatedly using their own seed for sowing for a long period and also exchanging the seeds within the farmers of the villages in case if crop loss or inferior quality of products. They are using 50-55 kg seed per acres for broadcasting.

Production practices

Soybean seed sowing is started from the month of June following manual broadcasting practices. The vegetative growth of the plant is seen in the month of July. The crop fields require regular maintenance, such as occasional weeding and thinning. For weeds management, majority of the farmers are applying re-emergence Herbicide. However, the timely weeding adds on to the good growth of plants & fruit bearing environment. In general farmers are applying NPK & DAP based fertilizer along with growth promoters as per the advice of the local input dealers. The awareness level of the farmers is not so good

to identify the appropriate dose of fertiliser & pesticides and always guided by the seed retailers. On an average each of the farmers are applying50 Kg DAP & 50 Kg NPK fertilizer including hormone substance and pesticides worth Rs.2500 per acre.

Post Production practices:

Farmers start harvest from the month of September- October when pods start drying & looking brown in colour, Crop Harvested by manual cutting & dried on the crop field for 2-3 days as required and then threshed. Threshing can be done either manually or by using of threshers and mustard seed packaged in gunny bag. Farmers are harvested 6-7 quintal of grain per hector from non-irrigated crop & yield 8-10 quintals per hector from irrigated crop/ or in well rainfall areas.

Market mechanism

Farmers are selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. No such aggregation of produce is happening at the village level. Subsequently, due to low scale of produce, none of the farmers are directly engaged with the Mandi/ wholesale market situated in Sagar. Almost all the farmers are selling to the village / local town level traders indevedually.

Economics of Soybean cultivation/ Acre

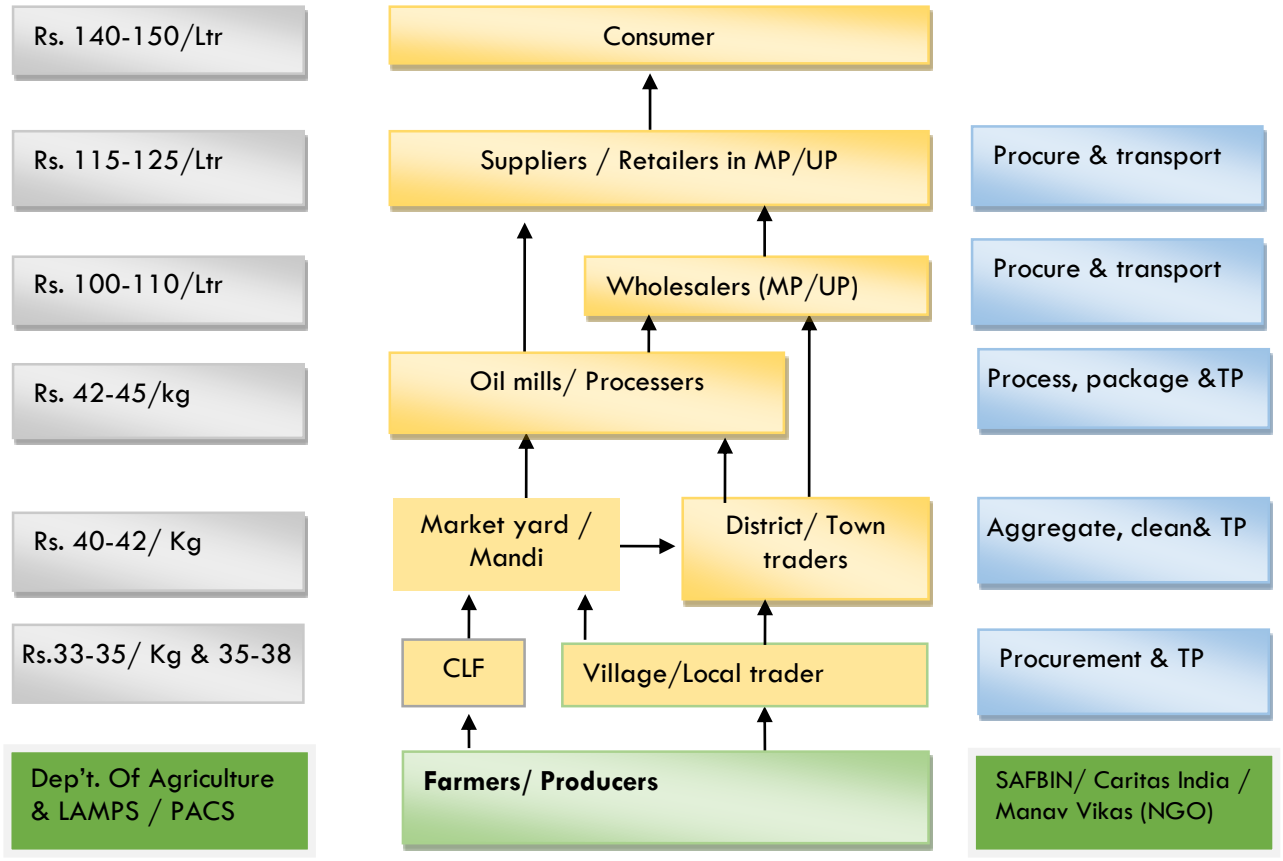
The acre economics is calculated on the basis of average cost of cultivation for all variety and method of cultivation of Soybean.

A	Labour	Unit/MD	Cost(Rs)
1	Tractor ploughing @ Rs 800/Hr	2hr	1600
2	Weeding removal, cleaning field and bunds @ Rs 200/day	10MD	2000
3	Land Preparation, levelling and Sowing	5MD	1000
4	Application of Compost, NPK, Pesticides,	2MD	400
5	Harvesting (Mechanical / manual)	10MD	2000
6	Thrashing, Winnowing, Bagging, transport, Storing	Lump sum	1500
	Sub total		***8500***
B	**Inputs**		
1	Cost of Seed (32-34) @ Rs 110/ - per kg	50	5500
2	Cost of NPK. DAP & d Hormone substance	Lump sum	2000
3	Cost of Plant protection chemicals and herbicides	Lump sum	2500
	Sub Total		***9000***
	Miscellaneous/Contingency@ 5%		875
	Grand Total Cost		**18375**
C	**Projected Yield and Income**		
	Grain yield (Qntl.) per Acre	7 Qntl/Acre	
	Income from grain @ Rs 3400 Per quintal		23800
	Total Income		23800
	Net Income (total Income – Total cost)		**5425**
	Return on Investment		**29.52%**

*The cost factors are tentative in nature

Value chain map

A brief overview of the Soybean value chain with the key actors and their roles has been mapped in the following section.



Stakeholders and their role

The below mentioned table describes the major functions carried out by each of the value chain players and the kind of profit realization at tech players points.

Value chain Player	Functions	Price at different supply chain point (Rs / kg)
Farmers	• Production functions • Post production functions	33-35/ per Kg (as per present price trend)
Local traders	• Business functions • Procurement & Temp. storage • Transportation	Rs.40-42/ per kg
Wholesale trader	• Business functions • Procurement & Storage • Transportation	Rs. 42-45/ per kg
Soya oil Millers	• Procurement & Storage • Grading & Packing • Milling & conversion loss • Brand promotion • Transportation	75-80 (oil) The price variation is as per s quality, and distance markets from production clusters

Soya product wholesalers	• Business functions • Procurement & Temp. storage • Transportation	Rs.100-110(oil) The price variation is as per s quality, and distance markets from production clusters
Soya product retailers	• Retailing • Storage	Rs.115-125/ Litre(oil) The price variation is as per s quality, and distance markets from production clusters
Consumer	• Consumption	Rs. 140-150 (oil)

Overall Value chain functions

Farmers generally produce soybean in Kharif season. For input around soybean, farmers are mostly depending upon local input shops and the Primary agriculture cooperative societies in their respective areas. Majority of the farmers are selling about 90% of their produce to the village / local town level traders. The price difference as reported by farmers between Sagar district Hq and villages is about Rs.200-500 per quintal, depending upon the demand of soybean in the market.

The produce from the local traders / village level traders rooted to the Sagar based wholesale traders or to the APMC markets. APMC Market is the main trading point, where all level of traders operates. The price trend of soybean is determined by the national level markets of M.P. and Maharashtra etc.

Other stakeholders in Soybean Value Chain:

Market Players

Village / local town level traders

Village / Panchayat level traders are found to be active in the region. These traders are into procurement of all seasonal produce from farmers. They have contracts with the district level wholesale traders and the millers. The procurement price of these traders are always Rs.200-500 lesser than the price of Sagar wholesale traders. Few of these traders are also operates in the APMC market at the district level.

Town level wholesale traders

These traders mostly operate from Indore- Dewas soybean processing industries. They have their network throughout the state and involved in soybean procurement throughout the year. They have their own / hired storage space to keep stock as per requirement in different areas of the state. They also procure from other state level markets based upon the demand and also supply their procured produce to consuming state wholesalers.

Soya processing mill

The Soybean Processors Association of India, popularly known as SOPA, is the only national level body representing the soybean processors, farmers, exporters and brokers in India working towards the aim to strengthen soybeans as a viable crop. The main objective of SOPA is to encourage the development and promotion of Soya-Based products in the interest of the farmers as well as the processors. There are large scale soya processing unit near Dewas, Indore of Madhya Pradesh. Small scale soya oil processing units are also available at the district level of Sagar.

APMC Market yard, Sagar District

There is Mandi/APMC regulated market at the district Hq of Sagar. Mostly big traders are empanelled themselves in the market and procures required amount of seasonal agriculture produce from farmers and local traders. Millers are also procure their required amount of soybean from APMC Market.

Standard quality of Mustard

The size, colour, wholeness, moisture is some of the important quality parameters of Soybean; bigger the size of grain with attractive colour has good demand in the market. The detailed standard of soya is;

1. Have reasonably uniform size, shape and colour, characteristic of the variety/ form
2. Clean, whole-some and free from impurities, admixture of foreign substances
3. Be in sound merchantable condition;
4. Not have moisture exceeding 10% -12%

SWOT analysis of Soybean Value Chain in Sagar

The study analyses the Strengths, Weaknesses, Opportunity and Threats of Soybean value chain to come up with value chain development strategy.

Strength	Weakness
• Suitable soil and climatic conditions for cultivation • Existence of strong supply chain in Mandla • Involvement of maximum nos. of farmers • Growing domestic demand for mustard • Availability & Use of modern tools and equipment • High productivity in comparison to other pulse crops Easy marketability	• Lack of Soil test & soil health knowledge. • Lack of rotation or use of improved seeds. • Lack of knowledge in PoP of Mustard • Lack of critical irrigation facility • Lack of appropriate dose of fertilizer & pest • Lack of product holding capacity. • Lack of Value addition at farmer's level.
Opportunity	**Threat**
• Scope for the CLF to get into new business operation for input and output • Growing population and demand for Mustard oil • Processing and value addition initiative can take up • Collectivization of input & 0utput business • Technical support from CARITAS-INDA and CLFs to strengthen the value chain	• Lack in scale of produce at farmer level • Increased prices and non-availability of inputs may hamper the farmer's motivation. • Cloudy weather and rains during flowering • Disease and pest attack • Interference by middle man in the process of marketing

Major issues and challenges

The study comes up with certain issues and challenges, which are directly or indirectly affecting the efficiency of the soybean value chain. While discussion with value chain actors, the below mentioned issues emerged, which needs to be addressed to strengthen the soybean value chain.

1. **Soybean average production ratio is below the level of major producing states:** As reported by the farmers in the operational villages, farmers are getting yield of about 6-7 quintal of soybean per acre. The variation of yield is mostly depending upon the irrigation. While the average production ratio in major producing area is about 10-12 quintal per acre, the farmers in the operational villages are having less yield.

2. **Limited / no soil testing to know the soil health:** Soil testing and soil health measures being a critical component of modern agriculture system, it is not in practice. Farmers are giving less priority to this, as most of the farmers have scope to test the quality of their soil and adopt the advisory measures recommended by the soil scientists to enhance the soil health to increase productivity. As observed, the use of nutrients / fertilizers is in a stereo type mode. To reduce the cost of production, it is important to apply the deficit type of nutrients in the soil to maintain the production standard as well as reduce the cost of production.
3. **Low scale of produce at the individual farmer level to get engaged with APMC market:** In terms of Market engagement, small quantity of produce at the individual farmer level becomes non-economical to transport it to the APMC market situated in the district headquarter at Mandla. Price of products is fixed by the mandi traders as they have mutual agreement before interring to mandi
4. **Low scale of produce at the individual farmer level to get engaged with APMC market:** In terms of Market engagement, small quantity of produce at the individual farmer level becomes non-economical to transport it to the APMC market situated in the district headquarter at Sagar.
5. **Climate change:** There is a visible change in climate i.e. Prolonged summer, longer dry spells erratic rainfall, frequent droughts, and flash floods. This has repercussions on the cropping cycle and yield
6. **Lack of appropriate inputs:** farmers are using their own harvested products for seed repeatedly without proper treatment. Again they are not using appropriate dose of fertilizers which resulting low productivity.
7. **Credit facility:** The small holding farmers are always facing financial problems & not getting loan facility in time. Due to lack of financial strength, they are not using improved inputs & also selling their produces immediately in low price.
8. **Pest and disease management:** Extension around pest and disease management is limited to the input suppliers only. Mostly farmers contact the nearest input traders for any kind of advisory around pest and disease management. Further, the market driven approach is considered by the input supplier by recommending high value / push new molecules. For that matter, professional advisory service is required to the farmers to manage pest and disease in a cost-effective manner.

Strategy and recommendations

With the mandate to enhance the productivity of the farmers, it is important to come up with certain strategy to overcome the issues and challenges faced by the farmers. The farmer producer organisation may safe- guard the interest of the member farmers to come up with necessary action plan which can enhance the productivity of the member farmers, as well as create business opportunity for the sustainability of the producer company.

1. **Efforts should be taken care to maximize farmers base in Soybean production system:** Soybean being a produce having economic, the farmers of MP adopted this cultivation 10 years back very rapidly. But most of the soybean growing farmers shifted to the cultivation of black gram and Til as it becomes less economic for the farmers. To enhance production and Soybean area, the following methods needs to be considered.

    - Large paddy fallow area can be brought under Soybean cultivation in Kharif season
    - Use of short duration high yielding varieties to fit multiple cropping programmes to be grown.
    - Basal placement of phosphatic fertilizers and treating the seed with Rhizobium culture and other non-chemical practices to lessen the input cost of the cultivation of Soybean.
    - Adoption of improved package and practices.

- Policy advocacy for the timely input supply and buy back guarantee may also be taken up by the existing farmer cooperatives of the operation area.

2. **Emphasis should be given to enhance the quality standard of the produce for better marketability:** The harvest and post-harvest practices are very critical to maintain the quality of the produce. Emphasis may be given to bring uniform quality in scale. Grading of produce based upon its variety with scale can enhance the bargaining power among farmers. This can be achieved at the farmers' producer organisation / cluster level.

3. **Introduction of Moisture meter for quality checking:** Required 12% Moisture level is one of the important quality parameters of Soybean. Presently the moisture testing measures adopted at the village level market formats are manual in nature i.e. chewing of grain to assess the moisture. Further, introduction of moisture meter at the village level can bring accuracy in moisture level assessment, hence the unfair trade practices will be reduced to certain level.

4. **Promotion of collectivization around input procurement:** Since the adequate quantity and timely supply of quality agriculture input (seed, micro nutrient, fertilizer, plant protection chemicals, tools etc.) is important, supply from the farmers' cooperative through Govt agency definitely support the farmers. As an alternative, identification of reliable vendors in that locality who meets both the parameters i.e. quality of the product and appropriate pricing is very important. As individual procurement of these input at the farmer level is costly, time consuming affair, it is recommended to promote collectivization process in the village for the procurement of these inputs collectively. Instead of each farmer go to the market for procurement, it better to prepare a village level indent of the entire requirement and purchase from a single buyer to avail discount on bulk procurement along with low transportation cost. For that matter, the farmer producer company (presently cluster) can expand its existing agro input business vertical to procure these indented inputs in bulk for member and non-member farmers. Further the farmers can avail the inputs in competitive price and the business turnover of the producer company will increased.

5. **Promotion of Improved agriculture practices:** As observed in the data, the soybean production villages is still below the average production ratio. To enhance the production, it is important to capacitate famers to adopt improve agriculture practices. Phase wise knowledge on improved practices i.e. pre-sowing, sowing, vegetative, harvest and post-harvest stage (Market information) etc. are very much required. Timely advisory services through govt. led system around pest and disease management is again important. Promotion of demonstration plots to provide extension around sustainable agriculture practices is important. As the research findings on improved practices, crops & varieties etc. are not reaching to the farmers, the producer company / project must attempt to take those findings to the village in form of demonstration. To increase the reach, it is important to have demonstration of improved agriculture practices.

6. **Collectivization of output and engagement of Producer Company in the APMC market yard throughout the year:** Proper collective action at the primary producer level for aggregating their produce holds promise of ensuring better prices in comparison to the individual selling mechanism. The producer company can facilitate the aggregation process of Output to ensure economics of scale to ensure higher price realization to the farmers by getting engaged with the APMC market at the district level. For a group of farmers who have agreed to work together to market their produce profitably, 'aggregation of produce' is an alternative marketing strategy (already initiated in the operation areas) which would not only ensure high scale of surplus produce to reach the higher order market but would also help to realize better price through uniform quality of the produces and collective negotiation across trade channels.

Crop-3 Chickpeas

Overview



Chickpea or chana is a very important pulse crop that grows as a seed of a plant named Cicer arietinum in the Leguminosae family. This light brown coloured pulse is considered to be a good source of protein and is also called by the name of Garbanzo beans. Chickpea is a highly nutritious pulse and places third in the importance list of the food legumes that are cultivated throughout the world. It is used as an edible seed and is also used for making flour throughout the globe and having a capacity to stand in drought conditions. This crop doesn't have the requirement of being fed with nitrogen fertilizers. Chickpea is a highly nutritious pulse and places third in the importance list of the food legumes that are cultivated throughout the world. Chickpea seed has carbohydrate (38-59%),fiber √(3%), √oil (4.8 to 5.5%), √ash (3%), Calcium (0.2%) and phosphorus(0.3%).

The varieties of chickpea are separated on the basis the seed size, colour and taste. Two of those varieties, namely Kabuli and Desi, can be separated on the basis of their following features, i.e. (a) Desi chickpea – spilt peas and are relatively smaller in size having a thicker seed coat. They appear dark brown in color and they can be used and served in many ways and (b) Kabuli Chickpeas – Kabuli chickpeas have a whitish-cream color and are relatively bigger in size having a thinner seed coat. They are generally used in soups /salads or as flour.

Rationality of Product selection



Chickpea is a major pulse crop in India, widely grown for centuries and accounts for nearly 40 percent of the total Pulse production. Chickpea is also widely appreciated as health food and as a protein-rich supplement to cereal-based diets. It contains 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates. India is the largest producer of this pulse contributing to around 70% of the world's total production. There are mainly two types of chickpea produced i.e. Desi and Kabuli. In studied region, mostly farmers are into production of Desi variety of Chickpea. Desi type chickpeas largely dominate the ratio of production in India. Though chickpea is grown in majority of the Indian states, but predominantly, Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Andhra Pradesh are known to be the leading producing states. Chhattisgarh is also contributing a large chunk of Chickpea to national production volume. As far as Sagar district is concern, Chickpea is cultivated in about 197000 hectare with total production of about 176800 MT. The average yield of the district is roughly about 6- 10 quintal per acre depending on irrigation facility.

Crop Description

Chickpea Seeds are spherical in shape, wrinkled or smooth with a pointed beak. **Its head is similar to chicken's head with a characteristic 'beak' hence called as chickpea. It** is a small herbaceous branched plant with maximum height of 45-60 cm with good branching ability, especially suited for late sown and rice fallow areas. A single plant produces approximately 50-150 pods. As a winter season legume, it requires fairly cold and dry climate and having 60-90 cm rainfall per annum is best for the crop.

Farmers of Sagar district usually cultivating the Desi or brown gram (C*arietinum*) which colour of seed coat ranges yellow to dark brown & usually small in seed size. Chickpea is grown in light sandy loam to moderately heavy loam in north to black cotton soils of Central Plateau. However, sandy loams to clay loam soil with maximum 8.5 PH are best for the crop. Chickpea is sown after the harvest of Kharif crops, in rotation with cereal crops helps in controlling soil-borne diseases. The most common cropping system of chickpea are following the crop Rotation like; Kharif fallow – Gram, Paddy – Gram, Maize – Gram, and Jowar – Gram; Inter cropping like Chickpea + Mustard (2:1 to 4:1); Chickpea + Linseed (2:2); chickpea + wheat (2:2) etc.

Pre-production operation

Farmers are using desi Chickpea/ Khajara Chickpea (small seeded) variety for sowing during October for rain fed cultivation and sowing during November for irrigated land. Small seeded variety required 50 – 60 Kg/Ha whereas 80-90 Kg/Ha for late sowing cultivation. For Rain fed cultivation 30cm x 10cm, and for late sowing cultivation 25cm x 10cm space has been maintaining by the farmers. They treated the seed with Kirosen/ Tricoderma/ cow urine/thiram or carbendazim before 2- 3 hour before sowing.

Some of the farmers are using about 5 tons FYM or compost for better yields and Fertilizer Use Efficiency. As farmers are sowing the chickpea seed after rice/ wheat/ jowar etc., it need not applied a basic dose of fertilizers for this crop. As rain fed crop, invariably suffers from moisture stress as 'terminal drought, at most critical pod development stage due to high atmospheric and soil temperature coupled with high wind velocity. So, to minimize transpiration loss and conserving residual soil moisture, few of the farmers irrigating once to twine during entire crop period where irrigation facility is available. Under assured irrigation, one irrigation each at maximum branching and pod development resulted in 25-70% increase in yield in absence of winter rain. Being a dwarf stature crop, chickpea suffers adversely by heavy weed infestation. One hand weeding/inter culture with hand hoe or wheel hoe taken during 30-45 days after sowing and another at 55-60 days, if second flush of weeds appear heavily other-wise crop will suppress the weed by itself. For crop protection measure, farmers are using the organic pesticides for pest & insecticide control.

Production operation

Crop become ready for harvest when leaves begin to fall, stem and pod turn brown or straw in colour and seeds are hard and rattle (most important) with 15% moisture inside them. Over ripening may lead to fall of pods as well as shattering and seed cracking if seed moisture falls below 10% due to delay in harvesting. The crop manually plucked by using daily labour.

Post-Production operation

The crop is allowed to dry for 2-3 days on the farming field (depending on crop situation) and threshed by manually power drawn thresher followed by winnowing. The clean seed should be sun dried for 1-2 days to bring their moisture content at 9-10%. They packed in gunny bag & stored in dry place. Generally, farmers are producing 10-12 quintal per hectare.

Production and Productivity of Chickpea:

The production of Chickpea as reported by the farmers is coming around 5-7 quintal per acre; whereas the district production is about 12-15 quintal per acre.

Produce	Average yield in irrigated condition	Average yield in non-irrigated condition
Chickpea	8-10 quintal	5-6 quintal

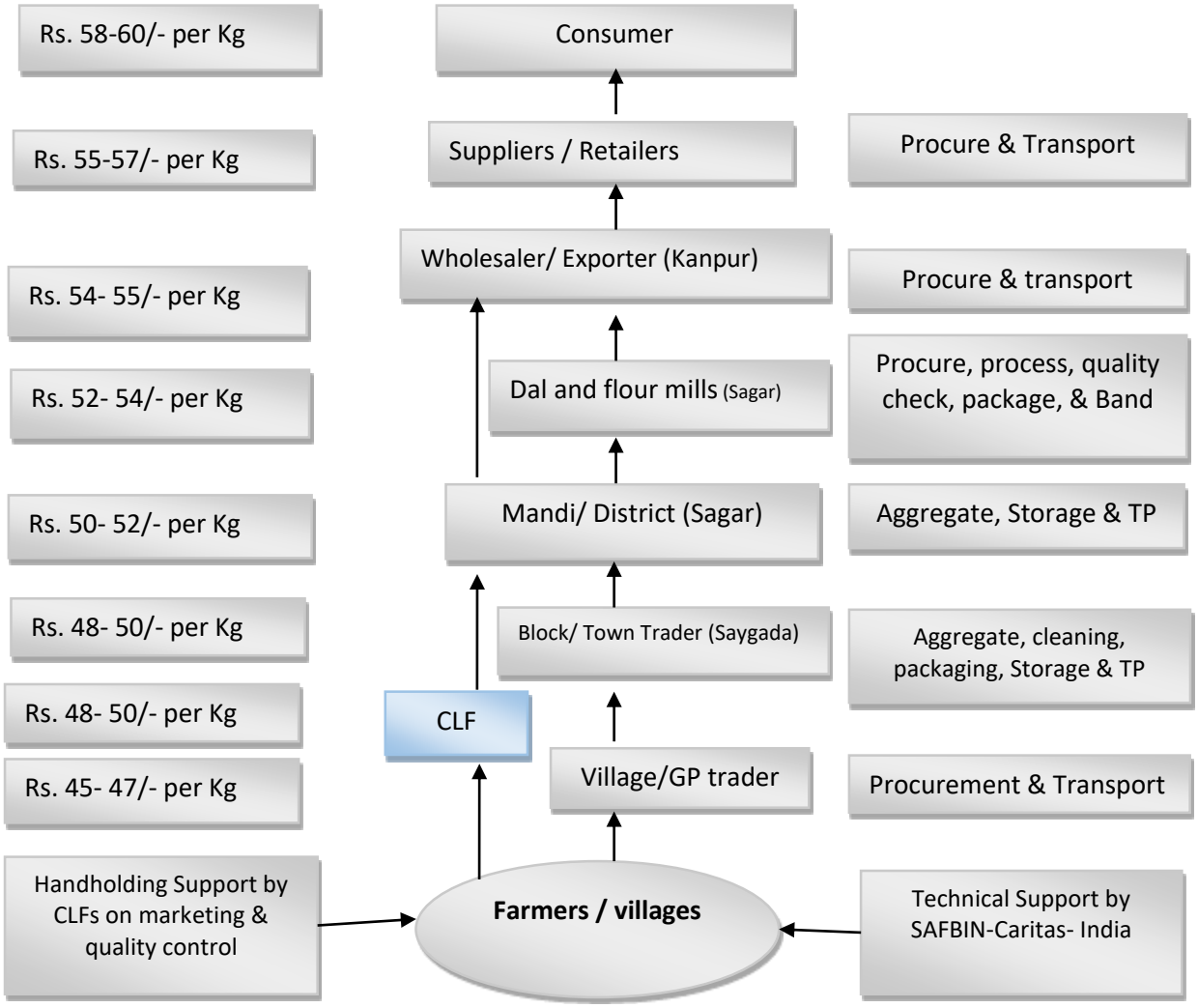
Market mechanism

Farmers are selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. No such aggregation

of produce is happening at the village level. Almost all the farmers are selling to the village / local town level traders soon after harvesting of chickpea, they sold to local village level trader without sorting, grading or testing of moister. The local trader offering Rs. 45 to 47 per kg. The local trader selling the product to Panchayat/ Block level trader with a margin of Rs. 2-3 per kg without any intervention on the product. The Block level trader aggregate all the product from the local/ panchayat level traders & intervene primary sorting on it. He sold the product to the district level traders or dal processer with a margin of Rs-1.5 to 2.5 per Kg. the District level trader sold the products to the Processer and National level trader/ expert agency with a margin of Rs. 1-2/ per kg.

Value chain map of Chickpeas

A brief overview of the Chickpeas value chain with the key actors and their roles has been mapped in the following section.



Overall Value chain functions

Farmers in the studied villages generally produce Chickpea in Ravi season. For input around chickpea, farmers are mostly using their harvested products for seed purposes and cow-dong as fertiliser in some cases. Majority of the farmers are selling about 80% of their surplus produce to the village / local town level traders & remaining 20% of the produce is kept for household consumption. Farmers are generally process the produce into Chana Dal and flour for own consumption.

The produce from the local traders / village level traders rooted to the district level trader through block/GP level traders. The price trend of Chickpea is determined by the national level markets of M.P.

and Maharashtra etc. Along with the regular process of trading, the import chickpea dal plays a very critical role is determining the price trend of the produce. As reviled by the traders, the import quality of Dal is comparatively chipper and of good quality. Further import of low-priced produce generally downsizes the price of chickpea (raw) in the market. To control the price trend, recently govt. has increased the MSP from 48 rupees to 50.50 rupees which may benefit to farmers in certain level. Another critical dynamic observed from the market that the big wholesalers used to hoard a large volume of produce to create an artificial shortage in the market to influence the price trend.

Major functions of stakeholders

Village / GP level traders:

Village / Panchayat level traders are found to be active in the studies region. These traders are into procurement of all seasonal produce from farmers. They have contracts with the Block/ district level wholesale traders and the millers. The procurement price of these traders are always Rs.200-500 lesser than the price of Sagar wholesale traders.

Block/ Town level traders:

These traders are mostly operates from Sayagada & Sagar. They have their network throughout the Block area and involved in Chickpea procuremnt throughout the year. They have their own / hired storage space to keep stock as per requirement and doing the primaru processing like; sorting, grading. Packaging etc.

District level Traders

District level traders are operting from Sagar & most of them are operated in APMC marekt, Sayagada and procuring from the Local/GP level & Block leve traders. They also procure from other state level markets based upon the demand. Along with supply to dal processing industries, they also supply their procured produce to consuming state wholesalers.

APMC Market yard, Saygarh of Sagar District:

Sayagarh Mandi is one of the most accessed market yard procoring the product from farmers through their registared traders basiccaly the district & town level traders. Farmers have less interested to sell their product in mandi due to lots of legal issues & price cute in miss matching of product quality. Mostly big traders are enpanneled themselves in the market and procures required amount of seasonal agriculture produce from farmers and local traders through action sale. Millers are also procure their requird amount of chickpea from APMC Marekt.

Dal and flour processig mill:

Chickpea processing unit situated in Sagar district & most of the mill are in production of dal & flour. The product is marketed to the grain wholesalers of multiple states from whom the products are rooted to the retailersa and to the consumers. The industries are generally procures their raw materials from district level wholesalres and the APMC Market.

Wholesaler/ Exporter:

Wholesaler & exporter are mainly operating from Kanpur & Sagar. They are mainly procuring the product from district & town level traders and finising products like Dal & Flours fro processining units and again sale to the retail chain & few to exports.

Export and Import dynamics of Chickpea:

Every year India import chickpea from multiple countries to meet the domestic demand of Chickpea; part of the Indian chickpea production also exported too. The export and import of chickpea plays a very important role in price determination of Chickpea in domestic markets. Recently the govt. has enhanced the import duty on Chickpea to reduce the import chickpea volume and give additional benefits to the exporter to regulate the price of chickpea in domestic markets.

Chickpea export and import	Quantity of Export and Import	Percentage of Export and Import to various countries
Export of Chickpea from India	87.91 thousand MT (2016-17)	Pakistan (21.6%), U Arab EMTS (10.6%), Algeria (11.6%), Saudi Arab (9.5%), Sri Lanka (7.3%)
Import of Chickpea by India	1080.63 thousand MT (2016-17)	Australia (85.1%), Russia (4.7%), Tanzania (3.8%), USA (1.4%), Canada (0.91%),

Market determinants of Chickpea:

In terms of market certain factors are there which determines the price and demand and supply of chickpea in a given period of time. These factors are:

- Production level of Chickpea in major producing India states
- Rainfall level and level of moisture in the soil
- Black-marketing and hoarding by national and state level traders
- Crop situation in the countries from where India imports the crop
- Export demand
- Prices of the other competitive pulses produced

FAQ Standard of Chickpea:

The size, colour, wholeness, moisture are some of the important quality parameters of Chickpea; well cleaned grain with attractive colour has good demand in the market. The detailed Fair Average Quality (FAQ) standard of Chickpea is given below for reference.

a) Have reasonably uniform size, shape and colour, characteristic of the variety/ form; and free from molds, weevils, obnoxious smell.

b) Clean, whole-some and free from molds, weevils, obnoxious smell, discoloration, admixture of deleterious substances

c) Be in sound merchantable condition;

d) Not have moisture exceeding 12% and

e) Have good cooking quality.

Economics of Chickpea cultivation/ Acre:

The acre economics is calculated on the basis of average cost of cultivation for all variety and method of cultivation of Chickpea.

A	Labour	Units	Cost(Rs)
1	Tractor ploughing @ Rs 800/Hr	1.5hr	1200
2	Land Preparation, levelling and Sowing	3MD	600
3	Weeding removal, cleaning field and bunds	4MD	800
4	Application of FYM/Compost & organic manure	Lump sum	500
5	Irrigation (Need Based)	0nce/twice	800
6	Harvesting (Mechanical / manual)	Lump sum	1500
7	Thrashing, Winnowing, Bagging, transport, Storing	Lump sum	1000
	Sub total		***6400***
B	**Inputs**		
1	Cost of Seed @ Rs 60/Kg	40	2400
2	Cost of Organic manure	Lump sum	500
3	Cost of Plant protection (organic manure)	Lump sum	300
	Sub Total		***3200***
	Miscellaneous/Contingency@ 5%		480

	Total Cost (A+B)		**10080**
	Projected Yield and Income		
1	Grain yield (Qntl.) per Acre	8 Qntl. /Acre	
A	Income from grain @ Rs 4500 Per quintal	8 Qntl.	36000
B	Chickpea plant residues @250 per quintal	5 Qntl.	1250
	Total Income		**37250.00**
	Net Income (total Income – Total cost)		**27170.00**
	Return on Investment		**269%**

*The cost factors are tentative in nature

SWOT

The study analyses the Strengths, Weaknesses, Opportunity and Threats of Chickpea value chain to come up with value chain development strategy.

Strength

- Suitable soil and climatic conditions to grow Chickpea
- Chickpea has potential enhance the soil health
- Existence of strong supply chain
- Involvement of maximum nos. of farmers
- Growing domestic and export demand for Chickpea
- High productivity in comparison to other cereal crops
- Ensured minimum support price
- Availability & Use of modern tools and equipment

Weakness

- Lack of Soil test & use of inappropriate manure.
- Lack of rotation or use of improved seeds.
- Lack of practice of improved cropping
- Lack of Irrigation facility to address critical irrigation needs
- Unavailability of labour force in season
- Lack of product holding capacity.

Opportunity

- Scope for the producer company to get into new business operation for input and output
- Growing population and demand for chickpea
- Employment opportunity
- Processing and value addition initiative can take up
- Agri- input business to ensure supply of input
- Support from CARITAS-INDA and producer company to strengthen chickpea value chain

Threat

- Spurious input may enter the market with high demand
- Climate change
- Low level of soil moisture
- Attack of Pest & Insects

Major issues and challenges in Chickpea production system:

The study comes up with certain issues and challenges, which are directly or indirectly affecting the efficiency of the chickpea value chain. While discussion with value chain actors, the below mentioned issues emerged, which needs to be addressed to strengthen the chickpea value chain.

a) **Chickpea average production ratio is below the level of major producing states:** Farmers are getting yield of about 5-6 quintal of chickpea per acre in rain fed cultivation & 8-10 quintal from irrigated cultivation. The variation of yield is mostly depending upon the irrigation. While the average production ratio in major producing area is about 7-8 quintal per acre which is very less to the standard quantity of production.

b) **Limited / no soil testing to know the soil health:** Soil testing and soil health measures being a critical component of modern agriculture system, it is not in practice. Farmers are giving less priority to this & use of nutrients / fertilizers is in a very minimal. It is important to test the soil health & apply the deficit type of nutrients in the soil to maintain the production standard as well as reduce the cost of production.

c) **Low scale of produce at the individual farmer level to get engaged with APMC market:** In terms of Market engagement, small quantity of produce at the individual farmer level becomes non-economical to link with APMC market.

d) **Climate change:** There is a visible change in climate i.e. Prolonged summer, longer dry spells erratic rainfall, frequent droughts, and flash floods. This has serious repercussions on the cropping cycle and yield

e) **Lack of standard/ less input:** Farmers are not using improved variety of inputs. Usually repeating use of own seed & lack of supply of fertilizers & pesticides in the crop.

f) **Irrigation / timely irrigation requirement to meet the critical irrigation needs:** In the continuous dry spell in the Ravi season, farmers required irrigation support to manage the critical irrigation need of chickpea crop.

g) **Limited / no capacity building of women farmers around improve agriculture practices:** Women are contributing maximum labour days in different stage of chickpea production; unfortunately, they are not included in the knowledge / capacity building process.

h) **Pest and disease management:** Extension around pest and disease management is limited to the input suppliers only. Mostly farmers are using the organic manure/ liquor to control the pest and disease management. For that matter, professional advisory service is required to the farmers to manage pest and disease in a cost-effective manner.

Intervention points

- Enhancing productivity of Chickpea by demonstrating use of improved variety seeds and package of practices through Training & Exposure visit;
- Improve the knowledge on soil testing & soil health treatment regularly.
- Enhance farmers knowledge on integrated pest management both in chemical & organic practices
- Support for additional coverage similar to support under National Food Security Mission (NFSM)
- Strengthening of collective marketing of output business with value addition interventions.
- Facilitating value addition through promoting Entrepreneur owned Mini Dal Mills at cluster level.
- Mini Dal Mill to offer hiring services & also sale processed Dal to higher level Traders and retail shops.
- Linkage of farmers with different schemes of Agriculture Department

Strategy and recommendations:

With the mandate to enhance the productivity of the farmers, it is important to come up with certain strategy to overcome the issues and challenges faced by the farmers. The producer company with the support of CARITAS-India needs to safe guard the interest of farmers to come up with necessary action plan which can enhance the productivity of the member farmers, as well as create business opportunity for the sustainability of the producer company.

1. **Efforts should be taken care to maximize farmers base in Chickpea production system:** Chickpea being a produce having economic, food value to the villagers along with it also helps in fixing atmospheric nitrogen and contributes to the build-up of organic matter in the soil. In the present context, 40-50% of the wheat farmers are into production of Chickpea in Ravi season. Further little push is required to include more numbers of farmers into the production system to enhance the economic as well as nutrition security of the villagers.

To enhance production and Chickpea area, the following methods needs to be considered.

- Large wheat fallow area can be brought under Chickpea cultivation in Ravi season
- Bringing an additional area under short duration high yielding varieties to fit multiple cropping programmes to be grown as catch crop.
- Developing cropping systems like companion/mixed/ inter cropping for growing pulse
- Basal placement of phosphatic fertilizers and treating seed with Rhizobium culture.

- Adoption of improved package and practices.
- Evolution of better plant-types of Chickpeas for boosting pulse production.

2. **Introduction of HH level storage system to intact the quality of produce for off season premium:** It was observed that the price of Chickpea generally increased in the off season. Further, it is difficult at the farmers level to intact the quality of Chickpea at the present HH level storage system. With this background, it is recommended to introduce "Super Bag" method of grain storage system at the HH level for enhance its economic and food value.

3. **Emphasis should be given to enhance the quality standard of the produce for better marketability:** The harvest and post-harvest practices are very critical to maintain the quality of the produce. The quality of the produce in the studied villages need to upgraded through keeping uniform quality following sorting & grading of produce. Again tradable scale can enhance the bargaining power among farmers trough farmers institutions like; Farmers producer company.

4. **Introduction of Moisture meter for quality checking:** Required 12% Moisture level is one of the important quality parameters of Chickpea. Presently the moisture testing measures adopted at the village level market formats are manual in nature i.e. chewing of grain to assess the moisture. Further, introduction of moisture meter at the village level can bring accuracy in moisture level assessment, hence the unfair trade practices will be reduced to certain level.

5. **Promotion of collectivization around input procurement:** Since the adequate quantity and timely supply of quality agriculture input is important for enhance productivity, so emphasis needs to identify reliable vendors in that locality who meets both the parameters i.e. quality of the product and appropriate pricing. As individual procurement is costly, time consuming affair, it is recommended to promote collectivization process through FPC. The producer company can expand the agro input business vertical to procure these indented inputs in bulk for member and non-member farmers.

6. **Promotion of Improved agriculture practices:** As observed in the data, the Chickpea production in the studied villages is still below the average production ratio. To enhance the production, it is important to capacitate famers to adopt improve agriculture practices. As the research findings on improved practices, crops & varieties etc. are not reaching to the farmers, the producer company / project must attempt to take those findings to the village in form of demonstration & capacity build (Exposure & Training).

7. **Capacity building of women farmers on improved agriculture practices:** Women workforces are primarily engaged in multiple activities in chickpea production system. But they have not adequate knowledge around chickpea production system. To enhance the productivity of the farmers, it is necessary to build the capacity of the women members of the HH.

8. **Collectivization of output and engagement of Producer Company in the APMC market yard throughout the year:** Proper collective action at the primary producer level for aggregating their produce holds promise of ensuring better prices in comparison to the individual selling mechanism. The producer company can facilitate the aggregation process of Output to ensure economics of scale to ensure higher price realization to the farmers by getting engaged with the APMC market at the district level.

9. **Mobilization of irrigation structure and water bodies from the govt.:** Irrigation is the primary issue, which hinders the larger coverage of Chickpea area in the villages. Further the project needs to plan to enhance the irrigated cultivable are to enhance the chickpea production area.

Crop-4 Black gram

Overview



Black gram (Vigna Mungo L.) origin in India, is one of the important pulses crop, grown throughout the country. The crop is resistant to adverse climatic conditions and improve the soil fertility by fixing atmospheric nitrogen in the soil. It has been reported that the crop produces equivalent to 22.10 kg of N/ha., which has been estimated to be supplement of 59 thousand tons of urea annually. The pulse 'Black gram' plays an important role in Indian diet, as it contains vegetable protein and supplement to cereal-based diet. It contains about 26% protein, which is almost three times that of cereals and other minerals and vitamins. Urad differs from other pulses in its peculiarity of attaining a mucilaginous pasty character when soaked in water. In the south, it is consumed in variety of ways across the form north to south in preparation of different regular and popular dishes like *vada, idli, dosa, halwa, imarti* in combination with other food grains. Besides, it is also used as nutritive fodder, especially for milch animals.

Rationality of Product selection

As regards the total contribution from states, Madhya Pradesh stand first in respect of area (19.40%) followed by U.P. (17.88%) and Andhra Pradesh (11.69%), whereas in production U.P. stands first (16.98%) followed by Andhra Pradesh (16.75%) and Madhya Pradesh (15.07%). The highest yield was recorded by the state of Bihar (898 kg/ha) followed by Sikkim (895 kg/ha) and Jharkhand (890 kg/ha) the National yield average was (585 kg/ha). The lowest yield was recorded in the state of C.G. (309 kg/ha) followed by Odisha (326 kg/ha) and J&K (385 kg/ha).

Black gram is a highly priced pulse, very rich in phosphoric acid. India currently represents the largest producer of black gram accounting for more than 70% of the global production. India is followed by Myanmar and Pakistan in black gram production. In India during Kharif 2020-21, black gram area is up by 387% at 8.77 lakh ha (21.67 lakh acres) as against 1.88 lakh ha (4.65 lakh acres) last year. The top three black gram growing states are Madhya Pradesh 4.45 lakh ha, Maharashtra 1.79 lakh ha & Rajasthan 0.71 lakh ha.

Crop Description

Black gram is a short duration and photo insensitive varieties, fit well in different cropping situations, especially intensive crop rotations. Self-fertilization is the general rule of this crop. It is an annual herbaceous plant attaining a height of 30 to 100 cm. The leaves are large, trifoliate and hairy, generally with a purplish tinge. The inflorescence consists of a cluster of five to six flowers at the top of a long hairy peduncle. The pods are long and cylindrical being about 4-6 cm in length. There are 4-10 seeds in a pod. The seeds are generally black or very dark brown but split seed is white in colour. The germination of seed is of epigeal type. Black gram is divided into two sub species, i.e. *V. mungo var. niger*: Matures early, having bold seeds & black colour & *V. mungo var. viridis*- longer maturity duration having small seed with green colour.

Production Scenario of Black gram

Pre-Production operation

Soil & Climate

Being a crop of tropical region, it requires hot and humid climate for best growth. Due to this reason, it is grown in all season in the areas where temperature in winter is quite high. Water logging is fatal for root development and nitrogen fixation during early vegetative stage. A well-drained loamy to sandy loam soil free from soluble salts with pH of 6.5 to 7.8 and neutral in reaction is best suited for this crop.

Land Preparation Seed treatment

Land is prepared like any other Kharif season pulse crop. However, during summer, it requires a thorough preparation to give a pulverized free from stubbles and weeds completely. As availability of FYM, few of the farmers applying it during field preparation. Few of them also Appling fly-ash to control over insect attack. In the specific state concerned, Pant Urd-30 & 31, JU-3, and KU96-3. TPU-4, JU-2, Khargone-3 is suitable for cultivation, but farmers of Sagar district are using their traditional seed every years repeatedly. Seeds need to treat with thiram (2g) + Carbendazim (1g) or Carbendazim @ 2.5 g/kg seed to control the soil & seed germinated disease but farmers are treated the seed following organic manure. Seed requirement different from season to season like for Kharif it is 18-20 Kg & for Rabi it is 20-25Kg seed for hector.

Production operation

Seed sowing

Farmers are sowing their traditional seeds every years repeatedly. Out of the total black gram farmers 90% farmers are cultivation in upland during Kharif & only 10%$ are cropping during Rabi season. For Kharif season crop, 18-20 kg of seed per hectare sown during June to July & 20-25 Kg seed per hectare, for Rabi crop sown during September to October

Season	Jun	Jul	Aug	Sept	Oct.
Kharif	18-20kg				
Rabi				20-25kg	

Plant nutrient & Water management

Being a leguminous crop, Black gram needs a small quantity of nitrogen for early growth period on the soils poor in organic matter. In such a condition farmers are using 75-80 kg of DAP per hectare. Farmers are testing the soil but not get sufficient guidance for application of appropriate dose of fertilize. Some of the farmers are also using the organic manures and liquids for soil fertility. Irrigation is not needed for rainy season crop but good drainage is essential. Generally, farmers are not irrigating the crop as they are cropping in Kharif season where rainfall & moisture contains in the field. Irrigation requires for the Rabi season crops & frequency of irrigation depend upon the soil type and weather, prevailing during the growth period.

Weed control & Plant Protection

One or two times of hand weeding has been taken by the farmers up to 30- 40 days of sowing depending upon the weed intensity. For control over the pests & insecticides, farmers are applying of organic liquors as & when required the crop. Some of the farmers also uses chemicals too use Basalin 1 kg per ha in 800-1000 litres of water as pre-planting spray. Application of 100-125g. /ha at 0-3 days controls wide spectrum of weeds.

Post-Harvesting Operation

Harvesting and threshing

Black gram harvested when most of the pods turn grey brown or dry but over maturity may result in shattering. Crop Harvested by manual cutting & dried on the crop field for 2-3 days as required and then threshed. Threshing can be done either manually or by using of threshers. After well cleaned and washed, the dry Black gram seed packaged in gunny bag & stored in dry plan. Farmers are harvested 5-6 quintal of grain per hector from non-irrigated crop & yield 6-7 quintals per hector from irrigated crop.

Production and Productivity

The production of Black gram as reported by the farmers is coming around 5-6 quintal per hac; whereas the standard production range is about 8-9 quintal per hac.

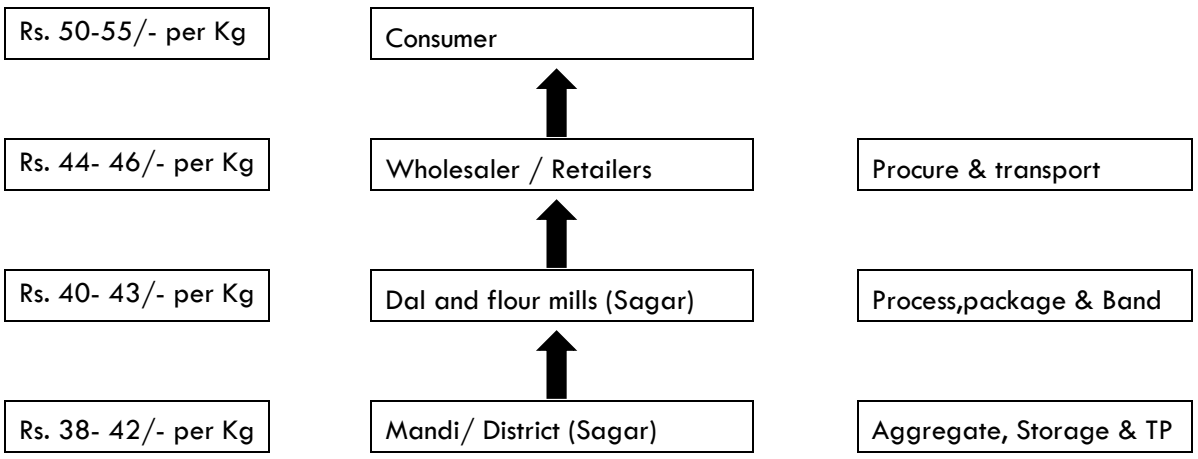
Produce	Average yield in irrigated condition	Average yield in Non-irrigated condition
Black gram	5-6 quintal	6-7 quintal

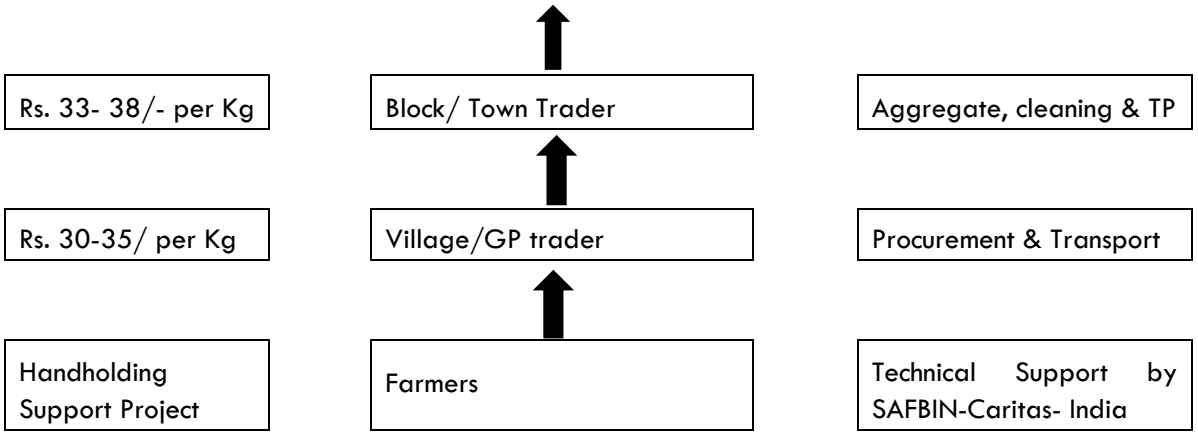
Market mechanism

Farmers are selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. No such aggregation of produce is happening at the village level. Almost all the farmers are selling to the village / local town level traders soon after harvesting, they sold to local village GP level trader without sorting, grading or testing of moister. The local trader offering Rs. 30 to 35 per kg. The local trader selling the product to Block/Town level trader with a margin of Rs. 3-4 per kg without any intervention on the product. The Block level trader aggregate all the product from the local/ panchayat level traders & intervene primary sorting on it. He sold the product to the district level traders or dal processer with a margin of Rs-4-5 per Kg. the District level trader sold the products to the Processer and wholesaler with a margin of Rs. 2-4/ per kg. The same produce purchasing by the costumer @Rs.50-55 per kg.

Value chain map of Black gram

A brief overview of the Black grams value chain with the key actors and their roles has been mapped in the following section. Supply Chain of Black gram:





Overall Value chain functions

Farmers in the studied villages generally produce Black gram in Kharif season. For input around Black gram, farmers are mostly using their harvested products for seed purposes and cow-dong as fertilizer. Few of the farmers (10%) are using DAP & Chemical pesticides for nutrition & pest management. Majority of the farmers are selling about 70% of their surplus produce to the village / local town level traders & remaining 30% of the produce is kept for household consumption. Farmers are generally process the produce into Dal for own consumption. No processing & value addition are taken a farmers/ producer's level.

The produce from the local traders / village level traders rooted to the district level trader through block/GP level traders. The price trend of Black gram is determined by the district level markets of M.P. Along with the regular process of trading, the Black gram dal & deshelling seed have a major market demand. The dal processing meal are controlling over the price of processing products. Another critical dynamic observed from the market that the big wholesalers used to hoard a large volume of produce to create an artificial shortage in the market to influence the price trend. Since 2016 the production, productivity as well as the price of the product in running in downward trend.

Major functions of stakeholders in Value Chain

Village / GP level traders:

Village / Panchayat level traders are found to be active in the studies region. These traders are into procurement of all seasonal produce from farmers. They have contracts with the Block/ district level wholesale traders and the millers. The procurement price of these traders are always Rs.1000-1500/ per qntal lesser than the price of Sagar wholesale traders.

Block/ Town level traders:

These traders are mostly operates from Sayagada & Sagar. They have their network throughout the Block area and involved in Black gram procuremnt throughout the year. They have their own chanel for procurement & infrasture for keep stock as per requirement and doing the primary processing like; sorting, grading. Packaging etc.

District level Traders

District level traders are operting from Sagar & most of them are operated from Sayagada/ Sagar and procuring from the Local/GP level & Block leve traders. They also procure from other state level markets based upon the demand. Along with supply to dal processing industries, they also supply their procured produce to consuming state wholesalers.

Dal and flour processing mill

Black gram processing unit situated in Sagar district & most of the mill are in production of dal & flour. The product is marketed to the grain wholesalers of multiple states from whom the products are rooted to the retailersa and to the consumers. The industries are generally procures their raw materials from district level traders or wholesalres .

Wholesaler/ Retailers

Wholesaler & exporter are mainly operating from Kanpur & Sagar. They are mainly procuring the product from district & town level traders and finising products like Dal from processining units and again sale to the retail chain.

Market determinant of Black gram

The size, colour, wholeness, moisture are some of the important quality parameters of Black gram; well cleaned grain with attractive colour has good demand in the market. The detailed Fair Average Quality (FAQ) standard of Black gram is given below for reference.

f) Have reasonably uniform size, shape and colour, characteristic of the variety/ form
g) Clean, whole-some and free from moulds, weevils, obnoxious smell, discoloration, admixture of deleterious substances
h) Be in sound merchantable condition & not have moisture exceeding 12%

Economics of Black gram cultivation/ Acre

The acre economics is calculated on the basis of average cost of cultivation for all variety and method of existing cultivation of Black gram.

A	Labour	Units	Cost (Rs)
1	Tractor ploughing @ Rs 800/Hr for twice including land	1hr x 2	1600
2	Seed Sowing	1 MD	200
3	Weeding removal, cleaning field and bunds	4MD	800
4	Application of FYM/Compost & organic manure	Lump sum	300
5	Harvesting manually	4MD	800
6	Thrashing, Winnowing, Bagging, transport, Storing	Lump sum	1000
	Sub total		***4700***
B	**Inputs**		
1	Cost of Seed @ Rs 8/Kg	Rs.100/kg	800
2	Cost of Organic manure + DAP & Pesticides	Lump sum	800
3	Cost of Plant protection (organic manure)	Lump sum	200
	Sub Total		***1800***
	Miscellaneous/Contingency@ 5%		**325**
	Total Cost (A+B)		**6825**
C	**Projected Yield and Income**		
1	Income from selling of grain @ Rs 4000 Per quintal	2 Qntl.	8000
2	Black gram plant residues @250 per quintal	4 Qntl.	1000
	Total Income		**9000**
	Net Income (total Income – Total cost)		**2175**
	Return on Investment		**31.87%**

*The cost factors are tentative in nature

SWOT

The study analyses the Strengths, Weaknesses, Opportunity and Threats of Black gram value chain to come up with value chain development strategy.

Strength	Weakness
• **Suitable soil and climatic conditions for Black gram** • **Black gram has potential enhance the soil health** • **Involvement of maximum nos. of farmers** • **Growing domestic demand for Black gram** • **Availability & Use of modern tools and equipment** • **Easy marketability**	• Lack of Soil test & soil health knowledge. • Lack of rotation or use of improved seeds. • Lack of knowledge in PoP of Black gram • Lack of critical irrigation facility • Inappropriate dose of fertilizer & pest • Lack of product holding capacity. • Lack of Value addition at farmer's level.
Opportunity	**Threat**
• **Scope for the CLF to get into new business operation for input and output** • **Growing population and demand for Black gram** • **Processing & value addition initiative can take up** • **Collectivization of input & Output business** • **Technical support from CARITAS-INDA and CLFs to strengthen Black gram value chain**	• Lack in scale of produce at farmer level • Increased prices and non-availability of inputs may hamper the farmer's motivation. • Cloudy weather and rains during flowering • Disease and pest attack • Interference by middle man in the process of marketing

Major issues and Constraints in Black gram production system

The study comes up with certain issues and constraints, which are directly or indirectly affecting the efficiency of the Black gram value chain. While discussion with value chain actors, the below mentioned issues emerged, which needs to be addressed to strengthen the Black gram value chain.

• Pre-Production Practices
• Quality seed is not used by farmers & repeated use of their own seed • Lack of knowledge in soil testing & soil health treatment • Land preparation and effective nutrient management is not occurring
Production Practices:
• Seed spacing not maintained during seed sowing & using more quantum • Low level of fertilizer & pesticides application in crop • Mostly dependent on monsoon & no scope for irrigation in critical need. • Pest and insecticides attack to crop mostly during flowering • Lack of knowledge in package of practices of Black gram cultivation
Post Production Practices:
• Farmers are drying the plant at crop field after cutting affects the quality of seed • Threshed on the ground and as a result, foreign materials get mixed with it. • After threshing, the produce is not properly dried or winnowed • Farmers are not maintaining the proper moisture • Average yield per Hac is 5-6 q that are well below the ideal condition of 8-10 quintals • Lack of awareness about primary processing viz. sorting, grading and cleaning • Absence of primary and secondary level processing • Farmers are selling immediately after harvesting of crop • Lack of crop holding capacity leads lesser price to the produce.

Intervention points

- Enhancing productivity of Black gram by demonstrating use of improved variety seeds and package of practices through Training & Exposure visit;
- Improve the knowledge on soil testing & soil health treatment regularly.
- Enhance farmers knowledge on integrated pest management both in chemical & organic practices
- Support for additional coverage similar to support under National Food Security Mission (NFSM)
- Strengthening of collective marketing of output business with value addition interventions.
- Facilitating value addition through promoting Entrepreneur owned Mini Dal Mills at cluster level.
- Mini Dal Mill to offer hiring services & also sale processed Dal to higher level Traders and retail shops.
- Linkage of farmers with different schemes of Agriculture Department

Strategy and Recommendations:

With the mandate to enhance the productivity of the farmers, it is important to come up with certain strategy to overcome the issues and challenges faced by the farmers. The CLF with the support of CARITAS-India needs to safe guard the interest of farmers to come up with necessary action plan which can enhance the productivity of the farmers, as well as create sustainable business opportunity for the CLF.

- **Maximize farmers base in Black gram production system:** Black gram being a produce having economic, food value to the villagers along with it also helps in fixing atmospheric nitrogen and contributes to the build-up of organic matter in the soil. In the present context, only 10% of the wheat farmers are into production of Black gram in Ravi season. Further little push is required to include more numbers of farmers into the production system to enhance the economic as well as nutrition security of the villagers.

- Enhance the Black gram production & productivity: Farmers are getting yield of about 5-6 quintal of Black gram per hac in rain fed cultivation & 6-7 quintal from irrigated cultivation. The variation of yield is mostly depending upon the irrigation. While the average production ratio in major producing area is about 8-9 quintal per hac which is quite less to the standard quantity of production. To enhance production and Black gram area, the following methods needs to be considered.
    - Large wheat fallow area can be brought under Black gram cultivation in Ravi season
    - Introduce of short duration high yielding varieties to fit multiple cropping to be grown.
    - Developing cropping systems like companion/mixed/ inter cropping for growing pulse
    - Adoption of improved package and practices for boosting pulse production.
- Improve the soil testing & soil health treatment: Soil testing and soil health measures being a critical component of modern agriculture system, it is not in practice. Farmers are giving less priority to this & use of nutrients / fertilizers is in a very minimal. It is important to test the soil health & apply the deficit type of nutrients in the soil to maintain the production standard as well as reduce the cost of production

- Introduction of HH level storage system to intact the quality of produce for off season premium: It was observed that the price of Black gram generally increased in the off season. Further, it is difficult at the farmers level to intact the quality of Black gram at the present HH level storage system. With this background, it is recommended to introduce grain storage system at the HH level for enhance its economic and food value.

- Emphasis should be given to enhance the quality standard of the produce for better marketability: The harvest and post-harvest practices are very critical to maintain the quality of the produce. The quality of the produce in the studied villages need to upgraded through keeping uniform quality following sorting & grading of produce. Again tradable scale can enhance the bargaining power among farmers trough farmers institutions like; Farmers CLF.

- Introduction of Moisture meter for quality checking: Required 12% Moisture level is one of the important quality parameters of Black gram. Presently the moisture testing measures adopted at the village level market formats are manual in nature i.e. chewing of grain to assess the moisture. Further, introduction of moisture meter at the village level can bring accuracy in moisture level assessment, hence the unfair trade practices will be reduced to certain level.

- Promotion of collectivization around input procurement: Since the adequate quantity and timely supply of quality agriculture input is important for enhance productivity, so emphasis needs to identify reliable vendors in that locality who meets both the parameters i.e. quality of the product and appropriate pricing. As individual procurement is costly, time consuming affair, it is recommended to promote collectivization process through CLF. The CLF can expand the agro input business vertical to procure these indented inputs in bulk for member and non-member farmers.

- Promotion of Improved Packages of practices: As observed in the data, the Black gram production in the studied villages is still below the average production ratio. To enhance the production, it is important to capacitate famers to adopt improve agriculture practices. As the research findings on improved practices, crops & varieties, IPM etc. are not reaching to the farmers, the CLF / project must attempt to take those findings to the village in form of demonstration & capacity build (Exposure & Training).

- Capacity building of women farmers on improved agriculture practices: Women workforces are primarily engaged in multiple activities in Black gram production system. But they have not adequate knowledge around Black gram production system. To enhance the productivity of the farmers, it is necessary to build the capacity of the women members of the HH.

- Promotion of primary and secondary level processing: Facilitating value addition through processing by promoting individual Entrepreneur owned Mini Dal Mills at cluster level. The Mini Dal Mill to offer hiring services & also sale processed Dal to higher level Traders and retail shops.

- Collectivization of output and engagement of CLF throughout the year: Proper collective action at the primary producer level for aggregating their produce holds promise of ensuring better prices in comparison to the individual selling mechanism. The CLF can facilitate the aggregation process of Output to ensure economics of scale to ensure higher price realization to the farmers by getting engaged with the market at the district level.

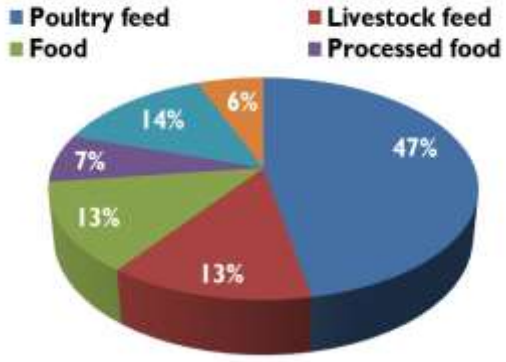
- Mobilization of irrigation structure and water bodies. Irrigation is the primary issue, which hinders the larger coverage of Black gram area in the villages. Further the project needs to plan to enhance the irrigated cultivable are to enhance the Black gram production area.

Crop-5 Maize

Overview



Maize (Zea mays L) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. Among the maize growing countries India rank 4th in area and 7th in production, representing around 4% of world maize area and 2% of total production. The productivity in India is almost half of world the average per day productivity of Indian maize is at par with many lead maize producing countries. In India, maize is principally grown in two seasons, Kharif maize represents around 83% of maize area in India, while rabi maize correspond to 17% maize area. Over 70% of Kharif maize area is grown under rain fed condition with prevalence of many biotic and abiotic stresses. The stress prone ecology contributes towards lower productivity of Kharif maize (**2706 kg/ha**) as compared to Rabi maize (**4436 kg/ha**), which is predominantly grown under assured ecosystem.



Among cereals maize has highest growth rate in terms of area and productivity. Since 2010 maize productivity in India is **increasing @ over 50 kg/ha/year**, which is highest among food crops. Among Indian states Madhya Pradesh and Karnataka has highest area under maize (15% each) followed by Maharashtra (10%), Rajasthan (9%), Uttar Pradesh (8%) and others. After Karnataka and Bihar, Madhya Pradesh is the highest maize producer. Andhra Pradesh is having highest state productivity. Some districts like Krishna, West Godavari etc. records as high as 12 t/ha productivity. Bulk of the maize production in India, approximately 47%, is used as poultry feed. Of the rest of the produce, 13% is used as livestock feed and food purpose each, 12% for industrial purposes, 14% in starch industry, 7% as processed food and 6% for export and other purposes.

Rationale for product selection

According to Madhya Pradesh agriculture contingency plan for Mandla district, there is 28.78 percent of cultivable land, 61.43 percent forest land, 2.22 percent cultivable wasteland and 3.25 percent current fallow land in the district. The primary crop of the district is rice, gram and wheat and maize. Maize has a tremendous potential to contribute to household nutrition and therefore it has been increasingly cultivated though in a small scale by majority of farmers. However, cultivating maize on a commercial basis has many issues. The value chain has been impacted by multiple challenges like low farm productivity, improper storage, poor harvest, amongst others.

In the last few decades, maize and cotton are the two commodity sectors whose growth story has primarily been driven by technology and private sectors. There has been a significant increase in productivity and because of better profitability, maize farmers have also reallocated space for the grain. Also maize has a great potential for crop diversification. Further, a study by National Centre for Agricultural Economics and Policy Research (NCAP) has showed that there is an increasing demand for maize in the industry sector

which caters to consumer needs like textiles, paper, glue, alcohol, confectionery, food processing and pharmaceutical industry etc., of which the demand keeps on increasing with population pressure. Therefore, it is relevant that in the Caritas's intervention on integrated crop promotion has also included maize cultivation farmers. Though, all the target farmers are small holders and most of the farmers grow maize at a smaller scale particularly land available at the front or backyard of the homestead plot mainly for self-consumption purpose, there is a potential to promote and upscale the maize cultivation which can generate incremental income in addition to fortifying household nutritional status of farmers households.

Crop Description

In Mandla area, especially in the Caritas intervention area small holder farmers with less than 5 acres of cultivable land available per household are targeted. Caritas India promotes integrated farming among the small holders and the main focus is to strengthen the food security and household nutrition through diversification of crops. In the intervention area, apart from rice, cultivated as a main crop which has a direct link with food security of households, the farmers also cultivate Koda & Kutki, Ragi, Urad, Arhar, mustard and maize etc. Maize as a crop are increasingly adopted by farmers for its contribution to household nutritional needs. Though the cultivation practice is limited to majority farmers in the area, smaller patches of land are dedicated for cultivation. The land available near backyard or front yard of the house of a small holder farmer is mainly used for maize cultivation. In an overall estimate there has been 10% marketable surplus available with small holder farmers and due to lack of aggregation and collectivisation, the scale of maize for selling is very low.

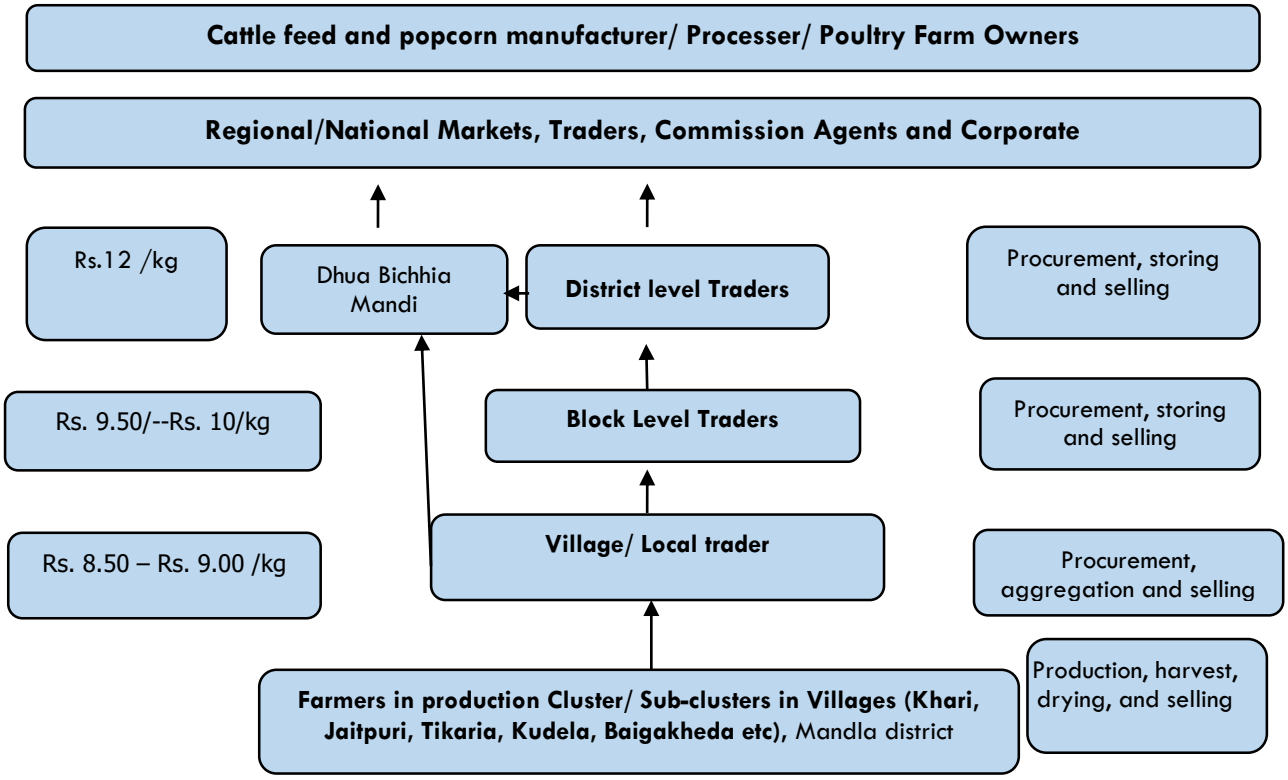
Production Scenario of Maize

Pre-Production/Production & Post-Production

Traditional local variety of seeds are used which are kept in store from the previous year harvest. Maize along with mustard are mainly cultivated in a seasonal rotation in rain fed situation in Kharif. Maize in Rabi is rare as there is only 4% areas under irrigation and less than 10% of the farmers (mainly big farmers) have their own source of irrigation mainly in the form of ponds and canal.

In the study area majority (80%) farmers used to cultivate maize for domestic consumption and the average land dedicated to maize in Kharif is 10-20 cents.

Value chain Map



The value chain diagram of maize is prepared based on the interaction held with small holders farmers involved in maize cultivation. This captures the dominant practice followed in marketing of maize. The map portrays the product movement from producers to terminal market along with variation of price realisation at individual stakeholders' level. Besides the map also captures the functions of stakeholders in raising value of the produce that fetches them incremental prices. However, the price realisation at each level is not absolute since there is also expenses on value addition and processing. However, the broader picture of price appreciation is reflected in the value chain map.

Value chain functions

The value chain as depicted in the above diagram operates with 4 key stakeholders involved in the market chain. The first level of flow of the product in to the market chain are the village/local level traders whereby the product flows into block level trader, district level trader and state level trader before it reaches the apex level processors and product manufacturers. The value proposition of maize changes as per the price trends depicted in the above diagram. Its starts from Rs.8.50 at the farmers level to reach Rs. 12/- and multiplies manifold depending upon the end product produced at the level of manufacturers.

Stakeholders in the value chain

The following are the stakeholders and their roles is described below.

Village/Local level Trader

The local level traders/ town level trader/ agents are the key persons associated with the producer since long. They operate in a cluster of few Gram Panchayats. They do not exclusively deal with maize only but all types of cereal, pulses and vegetables whatever surplus production is available in those clusters. There are also 2-3 such village level traders who knows the geography and products well since they have been operating in those areas for years. They have a clandestine understanding among themselves and respect their counterparts' jurisdiction of operation in procurement of maize and other produce.

They pay visit to the villages weekly and contact households who have surplus of maize. They have idea of which village and which households have marketable surplus. They keep track of the households and the time of harvest. Most often they contact the households prior to the harvesting and also offer some advance to purchase maize. In this way they develop a relationship with the producers which is based on trust. Since many farmers have low marketable surplus, and there is hardly any aggregation by farmers at the village level, linkage to big farmers or wholesalers is not feasible. This disadvantage makes room for the village farmer to exploit the small holder farmers in weighing, product quality parameters eventually offering lower rates that available market price.

Block Level Trader

A local/town level trader benefits at Rs 20-30/bag for every bag of 60 Kg maize. Basically, the village/ local traders, town level traders and their agents procure the product from the village point at Rs. 750-800 per quintal. If the moisture content is more than 14%, then the rate of procurement decreases and the trader again dries the product. The price margin at which maize is sold onwards is around Rs 850 -900 per quintal. The block level traders have medium storage infrastructure where they aggregate in terms of truck loads for movement to district level trader. The traders are also pay taxes for selling the product.

District Level trader

District level traders operate from Mandla. The produce from the fields of blocks nearer to Mandla district headquarters goes to feed the district level traders maize business. The traders just procure the produce and sell to the next corporate and national level processors for manufacturer of maize based food, cattle feed/ poultry feed and consumers of raw maize in the state. The produce is often transported to Indore, Bhopal, Khandwa, and Jabalpur and outside the state. The profit margins at this level are lower than that of the town level trader as these players operate more on volumes. The margin of profit depends upon the product stored in terminal markets, quality of the produce and time period of procurement.

Regional/National market

The traders at regional hubs dry and clean the produce as it goes for feed industries. The standard packaging size is 60 Kg. The regional traders, commission agents feed maize into the regional and national markets especially the cattle feed and poultry feed manufacturers and other food processing units at the rate of Rs.1,100- 1,300 per quintal. The traders pay GST and 1% RMC Tax for inter-state trading.

Market mechanism

The main Most of the farmers are smallholders. Maize is basically grown for domestic consumption. 10% of their marketable surplus are sold to the village / local town level traders & remaining 90% of the produce is consumed at household level and kept stored for next year seed purpose. Therefore, the marketing mechanism of maize in Mandla district especially in the operational blocks of Caritas is governed by the scale of maize available. Since scale of maize production is low, the market chain has not very active beyond local trader. The village/local trader who deals with the farmers to buy produce at a small scale and after aggregation sells it to block level trader. Each block level trader has few local traders in the chain and thereby he could generate a scale which is lifted by the district level trader. Apart from simple value additions i.e. cleaning and packaging of maize no other value addition is done till maize reaches corporates and processors operating at national level. Grinding of maize for local consumption is in practice at the local level. As in case of other agri products big wholesalers used to monopolises the trade by hoarding stocks and control the price as per their benefit.

Economics of Maize cultivation/ Acre

The acre economics is calculated on the basis of average cost of cultivation for all variety and method of existing cultivation of Black gram.

Economics of Maize cultivation/ Acre			
A	**Labour**	**Units**	**Cost (Rs)**
1	Tractor ploughing @ Rs 700/Hr for twice including land preparation and cow dung manuring	1hr x 2	1400
2	Broadcasting of seeds	2 MD	300
3	Weeding removal, cleaning field and bunds@ Rs.150/- MD	6 MD	900
4	Application of cow dung manure	2MD	self
5	Harvesting manually @ Rs.150/	10 MD	1000
6	Deseeding	Lump sum	1000
	Sub total		**4600**
B	**Inputs**		
1	Cost of Seed @ Rs.20/Kg (desi)	4 Kg	80
	Sub Total		**80**
	Total Cost (A+B)		**4680**
C	**Projected Yield and Income**		
1	Income from selling of grain @ Rs 900 per quintal after self-consumption	6 Qtl.	5400
	Total Income		**800**
	Net Income (total Income – Total cost)		
	Return on Investment		**17.00%**

*The cost factors are tentative in nature

SWOT

The study analyses the Strengths, Weaknesses, Opportunity and Threats of Black gram value chain to come up with value chain development strategy.

Strength	Weakness
• Suitable soil and climatic conditions for Black gram • Black gram has potential enhance the soil health • Involvement of maximum nos. of farmers • Growing domestic demand for Black gram • Availability & Use of modern tools and equipment • Easy marketability	• Lack of Soil test & soil health knowledge. • Lack of rotation or use of improved seeds. • Lack of knowledge in PoP of Black gram • Lack of critical irrigation facility • Lack of appropriate dose of fertilizer & pest • Lack of product holding capacity. • Lack of Value addition at farmer's level.
Opportunity	**Threat**

- Scope for the CLF to get into new business operation for input and output
- Growing population and demand for Black gram
- Processing and value addition initiative can take up
- Collectivization of input & 0utput business
- Technical support from CARITAS-INDA and CLFs to strengthen Black gram value chain
- Lack in scale of produce at farmer level
- Increased prices and non-availability of inputs may hamper the farmer's motivation.
- Cloudy weather and rains during flowering
- Disease and pest attack
- Interference by middle man in the process of marketing

Issues and Constraints

- Farmers use 10-20 cent land for maize cultivation and keeping in view of this small patches the viability of production and productivity is limited.

- Maize cultivation is done under rain fed situations in Khari and frequent erratic rainfall often ruins productivity.

- Soil testing is not done by majority farmers. Although, maize can be grown successfully in variety of soils ranging from loamy sand to clay loam. However, soils with good organic matter content having high water holding capacity with neutral pH are considered good for higher productivity.
- The farmers do not adequately understand maize as a sensitive crop to moisture stress particularly excess soil moisture and salinity stresses; to avoid low lying fields having poor drainage and also the field having higher salinity.

- Ideally during Kharif season the sowing operation is 12-15 days before the onset of monsoon. Since the maize is mostly cultivated by farmers in rain fed areas, the sowing time should be coincided with onset of monsoon. The Optimum tie of sowing last week of June to first fortnight of July is mostly not adhered by farmers which also hampers the productivity.

- Self-stored traditional maize seeds are used which are not tested for germination by majority of farmers. Though traditional maize is grown that requires appropriate seed rate which is not clearly known by farmers.

- Tillage and crop establishment is the key for achieving the optimum plant stand that is the main driver of the crop yield. The method of planting plays a vital role for better establishment of crop under a set of growing situation. There is a dearth of knowledge among majority farmers about importance of tillage and method of planting.

- As response of maize to applied organic manures is notable and hence integrated nutrient management (INM) is a very important nutrient management strategy in maize based production systems. The farmers' knowledge on INM is very limited. Since soil testing results are not very clearly understood/explained to the farmers, the farmers knowledge on nutrients applied either through organic or inorganic sources, the rate of nutrient application is not appropriately followed. Yield is often reduced by 10-30% by the standards due to deficiencies of major nutrients where clear symptoms of deficiency are observed in the field.

- Weeds are the serious problem in any crop including maize, particularly during Kharif /monsoon season the weeds compete with maize for nutrient which can cause yield loss up to 35 %. The farmers doing maize cultivation do not timely undertake weed management resulting in lower yield.

- Major pest of maize is Stalk borer and Termite that significantly contribute to reduction in production. Majority of farmers do not have knowledge on the pests, prevention and timely action since there is a leniency for investing extra on the organic/non organic pesticides which are often found expensive. Some farmers who use neem based/chemical pesticides often don't have any idea on appropriate timing and dosage of use leading to increased cost of cultivation without increase in productivity.

- Individualized selling and lack of economies of scale is a major issue in incremental price realization among farmers. Although SHFC are formed by Caritas India, there are issues where few SHFCs adopts to collectivization and sale.

- The produce is often dried in the fields without appropriate drying infrastructure, resulting in irregular produce quality and as a result, irregular returns.

- Individual marketing and pre-production credit linkage restrict farmers from getting better returns.

- Marketing channels do not support low marketable surplus available with farmers to offer competitive price for maize.

Recommendation for Value Chain strengthening

Drying and de-shelling maize from maize cobs are the most common value addition functions at the farmer level. Further on, little value addition takes place till it reaches the terminal market. While the maize is used to manufacture corn flakes, poultry feed and cattle feed, the challenges for manufacturing of poultry feed lies with the fact that there are very stringent quality norms which need to be followed failing which the feed might get contaminated and result in mortality of poultry birds. A very strong institution with efficient production, quality control and marketing capability is thus required for appropriately managing cattle and poultry feed units.

Institutional Development	○ Every operational village should have SHFC promoted and strengthened under SAFBIN project with a focus on developing maize cluster for agriculture development ○ There should be a cluster taking villages situated contiguously and having farmers cultivating maize. ○ There should be democratically selected cluster committee to drive the maize cultivation in the clusters with transparent guidelines developed for all farmers to follow. ○ All the financial transaction of the cluster should be transparent and conquered by the representatives of SHFC members ○ Producers would be responsible to aggregate the produce as per the guidelines given by the cluster.
Cluster promotion and mobilization	○ Selection of villages producing maize. ○ Selection of villages for interventions on maize. ○ Community understanding on dynamics of production and productivity of maize. ○ Village level awareness meeting. ○ Identification/ promotion of potential/interested groups to form SHFCs for cluster promotion. ○ Selection of leaders from selected groups for strategy development. ○ Exposure/training on technical aspects and sustainable maize promotion (soil treatment, inter-cropping, de-cubing, drying, storage etc.). ○ Exposure/ training on institution promotion and management.

	○ Coordination with line department and other role players for convergence and support. ○ Introduce of soil testing kits, moisture testing machine, sprayer and Sheller machine in the cluster villages. ○ Finalization of input supply modality at cluster level. ○ Cluster members are guided by implementing agency- CARITAS and its implementing partner to plan and execute value chain functions exclusively defined for all involved. ○ Implementing agency shall provide the inputs (seed, fertilizer, pesticide) to farmers as per the resolutions taken by Producer Group. Consultancy and support shall be taken from experts and line departments. ○ Capacity building of farmers is ensured by the implementing agency. ○ Ensuring soil treatment practice by the farmers through soil tests and fertilizer application. ○ Sharing and orientation of the fund-flow and input assessment. ○ Ensuring post-production management practice of farmers/ producers.
Capacity Building Initiatives	○ Exposure/training on technical aspects and sustainable maize promotion (soil treatment, inter-cropping, de-cubing, drying storage etc.). ○ Exposure/ Training on institution promotion and management. ○ Exposure/training on technical aspects like quality control, value addition, and storage. ○ Exposure/ training on successful collective marketing interventions and cluster management. ○ Exposure for market explores and market understanding. ○ Exposure/training on cluster management, collective marketing and market access. ○ Skill development of members on value addition. ○ Exposure to processing units for value addition.
Infrastructure and technology development	○ Soil testing kits provided by the department would be available at cluster level. ○ Soil treatment practice should be followed through soil testing, application of compost and proper dose of fertilizer, IPM and inter-cropping. ○ Post harvesting practice through proper drying and de-shelling by use of drying ward, sheller machine and moisture testing machine. ○ Moisture testing machines for each farmers club/ village would be provided by the department. ○ De-shelling machine for each farmers club/ village would be provided by the department. ○ At least 5 spear machines for each farmers club/ village would be provided by the department. ○ Drying ward for each farmers club/ village would be provided through convergence with the line department. ○ Storage and market linkage through proper packaging, storing in dry place, collective marketing and market explore. ○ Store house/ godown for cluster/ sub cluster point level would be provided through convergence with the line department
Introduction of collective marketing.	○ Finalizing procurement modalities ○ Sharing the concept of maize promotion and collective marketing. ○ Fixation of minimum rate for buying within groups and from outside. ○ Ensuring procurement of committed quantity by the participating groups

	○ Exposure/training on technical aspects like quality control, value addition and storage) ○ Exposure/ training on successful collective marketing interventions and record keeping. ○ Arrangement of fund flow through convergence and coordination with line department. ○ Simultaneously making plans for construction of drying yard, storehouse and other Infrastructure. ○ Liaison and bargaining with traders, finalizing selling modalities (selling price and mode of payment), making arrangements for gunny bags, packaging and transportation. ○ Disbursement of payment to cluster members/ producer.
Strengthening of collective marketing	○ Strengthening the concept of collective marketing and market accessibility of community ○ Formalization of institutions and completion of all legal aspects. ○ Increase in quantity and maintain quality parameter ○ Exposure/training on cluster management, collective marketing and market access ○ Skill development of members on value addition ○ Exposure to processing units for value addition ○ Market exploring and dealing with traders ○ Finalization of selling modalities including quality, price fixation, transportation, payment and date of lifting ○ Account keeping and maintaining transparency ○ Profit sharing and sharing the experience with the community. ○ Planning for possible avenue of value addition practices and related modalities

Crop-6 Mustard

Overview



Indian vegetable oil economy is the fourth largest in the world next only to USA, China and Brazil accounting for about 14 percent of world's oilseed area and 7 percent of world's oilseeds production, besides significantly contributing to worlds' oil-meal production (about 6 %) and its exports (about 4 %). India contributes about 6 percent of world vegetable oil production, 11 percent of world vegetable oil imports and about 9 percent of world's edible oil production. There are nine important oilseed crops cultivated in India viz. Groundnut, rapeseed-mustard, soybean, sunflower, safflower, sesamum, niger, castor and linseed. Groundnut, rapeseed-mustard and soybean constitute 82 percent of total domestic supply of edible oils. Over 90 percent of oilseeds production is centred in nine states viz. Madhya Pradesh, Rajasthan, Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu, Uttar Pradesh and Haryana. Rajasthan with an area share of around 20 percent contribute over 40 percent to oilseed production in the country. The cultivated species in India comprises B. juncea, (Indian Mustard), B. campestris (var. brown sarson, var. yellow sarson and var. toria), B. napus (Gobhi Sarson), B. carinata (Karan Rai) and Eruca sativa (Taramira) B. juncea contributes over ninety percent of area and production under rapeseed mustard in India. Rapeseed-mustard constitute one fourth area of oilseeds grown in the country.

Rational for crop Selection

Rapeseed-Mustard production hot spots in India Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat constitute 90 percent of production in the country. Rajasthan alone contribute almost half of the mustard production in the country. There are six hot spots where mustard production is concentrated (65%). Around 18 thousand hac land of the district is under the mustard cultivation. The total production of mustard is around 12.8 production per hac and productivity of 828 Kg per hac (KVK, Mandla). Mustard is usually grown in the rabi season in rainfed condition and usual time of sowing is 2nd week to 4th week of Oct of every year.

In India Madhya Pradesh contributes about 40 per cent production in mustard production and also contributes about 0.3million hectare area, 0.21 million tonnes production. Indian mustard (Brassica juncea) is predominantly cultivated in the state.

Production Process

In operational areas farmers sow mustard on residual moisture or in few cases mustard is sown with a pre-sowing irrigation. 1-2 irrigations are given to mustard crop if required. The sowing of mustard is undertaken from the second week of September to end of October depending upon temperature, water availability and harvest of previous crop. Most of farmers still practice broadcasting method of sowing. Usually, the farmers mix sand with the seeds after the seed treatment and sow it in the field. In single cropping system, mustard is grown in fallow lands after rainy season. Mustard is also grown as an inter-crop and mixed crop with wheat or pulses. In many areas, there is practice of planting mustard on the bund of wheat field. Farmers are start harvesting from February onwards following their traditional post

harvesting practices. Low cost of cultivation against wheat, low labour and water requirement, depleting underground water and comparatively higher returns were some the factors that made farmers to choose mustard over other crops of the season. However, inadequate market support and assured higher returns from wheat were some of the reasons for dissatisfaction from mustard crop cultivation.

Pre-Production practices

Majority of the farmers in the area are into mustard cultivation in the Rabi Season. As the seasonally is concern, farmers are into land preparation activity during the post paddy month after Kharif season i.e. in the month of September and October. The weeds are cleared and the field is ploughed by buffaloes or tractors to a depth of few inches. Farmers are adding cow dung during preparation of farm. Before sowing the seed, farmers are also applying 40-50 kg of DAP in the soil. The field is then ready for receiving seed sowing. Two to three times ploughing is required to make the land ready for mustard in Rabi season. Usually they are using their own harvesting product as seed purpose. They are repeatedly using their own seed for sowing for a long period and also exchanging the seeds within the farmers of the villages in case if crop loss or inferior quality of products. They are using 5 kg seed per acres for broadcasting.

Production practices

Farmers are sowing the seed during October to November soon after completion of field preparation. The vegetative growth of the plant is seen in the month of December and the yield starts from the month of Feb. Usually, it is grown along with maize and wheat. Mustard fields require very less regular maintenance, such as occasional weeding and thinning out the more crowded patches, level of water is to be maintained according to the growth and the fields are drained dry before the crop is harvested.

In general farmers are not applying any fertilisers in to the crop except the Dap application before the seed sowing. Farmers are using both the organic & chemical pesticides to control over pest & insecticides attack. The Organic pesticides is not much more effective against the pest attack, they bound to use the chemical products. Therefore, on an average each of the farmers are applying fertilizer and pesticides worth Rs.1500 per acre.

Post production practices

Mustard harvested when most of the plants turn grey brown or dry but over maturity may result in shattering. Crop Harvested by manual cutting & dried on the crop field for 1-2 days as required and then threshed. Threshing can be done either manually or by using of threshers and mustard seed packaged in gunny bag. Farmers are harvested 2-2.5 quintal of grain per hector from non-irrigated crop & yield 3-5 quintals per hector from irrigated crop/ or in well rainfall.

Market mechanism

Most of the farmers are selling about 90% of their surplus produce to the village / local town level traders & remaining 10% of the produce is kept for household level for consumption & storage for seed purpose. Many of the farmers' process in nearby small oil expeller unit to produce oil for own household requirement and the oil expeller unit keep the oil cakes for sale. The produce from the local traders / village level traders rooted to the Mandla based wholesale traders. The presence of foreign material and impurities determine the price of the produce. Another critical dynamic observed from the market that the big wholesalers used to hoard a large volume of produce to create an artificial shortage in the market to influence the price trend.

Economics of mustard cultivation/ Acre

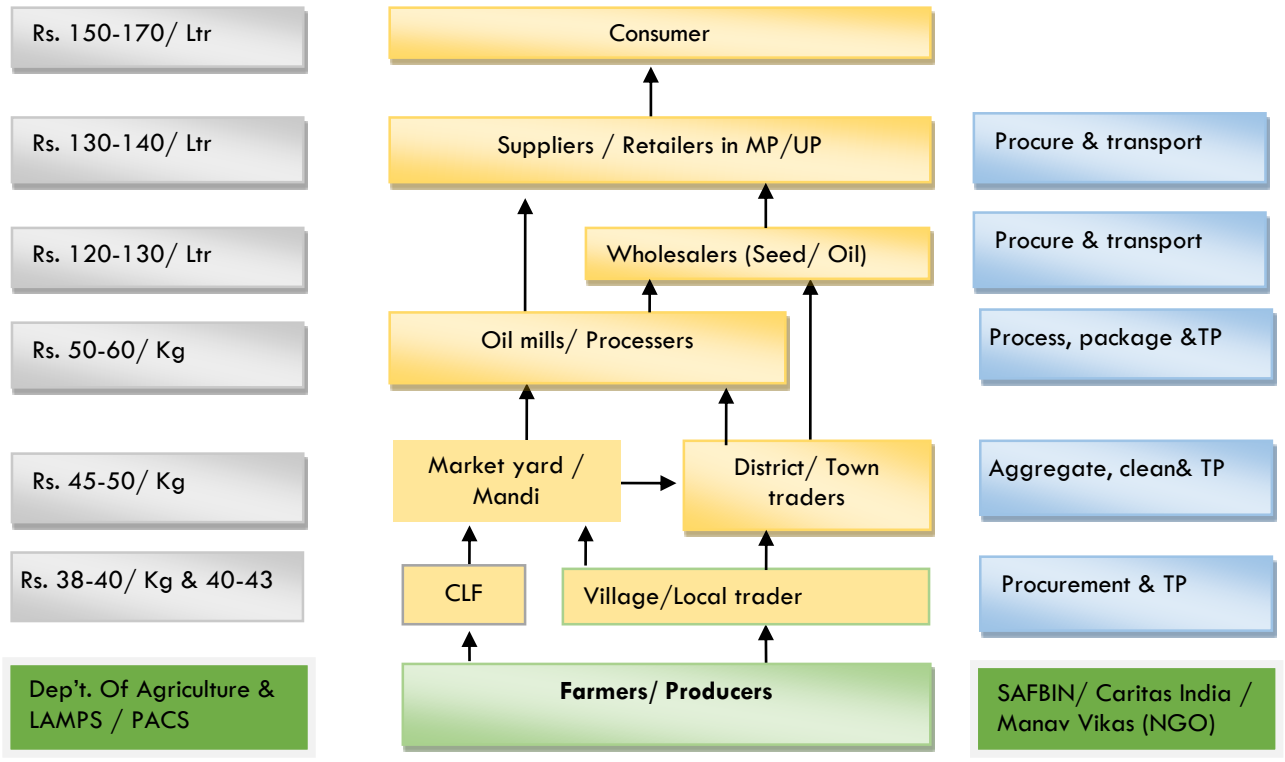
The acre economics is calculated on the basis of average cost of cultivation for all variety and method of cultivation of mustard.

A	Labour	Unit/MD	Cost(Rs)
1	Tractor ploughing @ Rs 800/Hr	2 hr	1600
2	Weeding removal, cleaning field and bunds	4MD	800
3	Land Preparation, levelling and Sowing	4MD	800
4	Application of Compost, DAP, Pesticides, PPC	2MD	400
5	Harvesting (Mechanical / manual)	7MD	1400
6	Thrashing, Winnowing, Bagging, transport, Storing	Lump sum	1000
	Sub total		***6000***
B	**Inputs**		
1	Cost of Seed @ Rs 100/Kg	5 Kg	500
2	Cost of DAP and Hormone substance	Lump sum	1250
3	Cost of Plant protection chemicals and herbicides	Lump sum	250
	Sub Total		***2000***
	Miscellaneous/Contingency@ 10%		800
	Grand Total Cost (A+B)		**8800**
C	**Projected Yield and Income**		
	Income from grain @ Rs 4000 Per quintal	3 Qntl/Acre	12000
	Total Income		12000
	Net Income (total Income – Total cost)		**3200**
	Return on Investment		**36.36%**

*The cost factors are tentative in nature

Value chain map of Mustard

A brief overview of the Mustard value chain with the key actors and their roles has been mapped in the following section.



Value chain Players, Major Functions and Landing price at each player's points

The below mentioned table describes the major functions carried out by each of the value chain players and the kind of profit realization at tech players points.

Value chain Player	Functions	Price at different point of supply chain (Rs / kg)
Farmers	• Production functions • Post production functions	RS. 38-40 Kg (as per present price trend)
Local traders	• Business functions • Procurement • Transportation • Temporary storage	Rs.45-50 Kg (whole grain)
District/ Town trader Sayagada	• Business functions • Procurement • Transportation • Temporary storage	Rs-50-55/Kg (whole grain)
Oil Millers /processing	• Storage • Milling & conversion loss • Grading & Packing • Quality control & Brand • Transportation	Rs.50-60 per Kg (Whole grain) The price variation is as per size, quality, colour and distance markets from production clusters
Mustard oil wholesalers	• Business functions • Procurement • Transportation • Temporary storage	Rs. 120-130 (oil) Rs. 58-60 (Whole grain) The price variation is as per s quality, and distance markets from production clusters
Mustard/ oil retailers	• Retailing • Storage	Rs. 130-140 (oil) Rs.60-65 per Kg (Whole grain) The price variation is as per s quality, and distance markets from production clusters
Consumer	• Consumption	Rs.150-170/ Litre (oil)

Overall Value chain functions

Farmers in the studied villages generally produce mustard in Rabi season. For input around mustard, farmers mostly depend upon local input shops and sometimes agriculture dep't extension in their respective areas. Majority of the farmers are selling about 60% of their surplus produce to the village / local town level traders. The price difference as reported by farmers between Mandla and villages is about Rs.700-1000 per quintal, depending upon the demand of mustard in the market. Remaining 40% of the produce is kept for household level for consumption. Many of the farmers process in nearby small oil expeller unit to produce oil for own household requirement and the oil expeller unit keep the oil cakes for sale.

The produce from the local traders / village level traders rooted to the Mandla based wholesale traders. The price trend of mustard is determined by the national level markets of M.P. and Maharashtra etc. There are two large scale oil processing mills situated in Mandla area, who all are into regular processing of mustard through wholesalers and retailers of the region. The presence of foreign material and impurities determine the price of the produce. Another critical dynamic observed from the market that the big

wholesalers used to hoard a large volume of produce to create an artificial shortage in the market to influence the price trend.

Stakeholders in Value Chain

Market Players

Village / local town level traders:

Village / Panchayat level traders are found to be active in the studies region. These traders are into procurement of all seasonal produce from farmers. They have contracts with the district level wholesale traders and the millers. The procurement price of these traders are always Rs.700-1000 lesser than the price of Mandla wholesale traders.

Town level wholesale traders

These traders are mostly operate from Shahhgarh(Block Hq) and Mandla. Big oil expelling unit are present in Shahgarh which procure the mustard from the farmers. They have their network throughout the state and involved in Mustard procurement throughout the year. They have their own / hired storage space to keep stock as per requirement. They also procure from other state level markets based upon the demand. Along with supply to oil processing industries, they also supply their procured produce to consuming state wholesalers.

Oil processig mill

The oil processing units are present near the block Hq (Shahgarh)The product is marketed to the wholesalers of multiple states from whom the products are rooted to the retailers and to the consumers. The industries are generally procures their raw materials from multiple sources i.e. local traders, district level wholesalres. During the discussion with the traders, the millers shown their interest to procure directly from the producer company / farmers groups.

Standard quality of Mustard

The size, colour, wholeness, moisture is some of the important quality parameters of mustard; bigger the size of grain with attractive colour has good demand in the market. The detailed standard of mustard is given below for reference.

- Have reasonably uniform size, shape and colour, characteristic of the variety/ form
- Clean, whole-some and free from impurities, admixture of foreign substances
- Be in sound merchantable condition;
- Not have moisture exceeding 10%

Marketing standard of mustard

Farmers are selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. No such aggregation of produce is happening at the village level. Subsequently, due to low scale of produce, none of the farmers are directly engaged with the APMC wholesale market situated in Mandla. Almost all the farmers are selling to the village / local town level traders indevedually.

Standards of various agricultural commodities are popularly called AGMARK Standards which differentiate between quality by having three grades for Mustard and Rape seed. The grades are differentiated on the basis of foreign matter, dead badly dis-colored and damaged, unripe shriveled and slightly damaged, small atrophied seeds, admixture of other varieties of seed etc. The quality of mustard leads to the price and acceptance. Mustard seeds to be accepted in ware house shall be:

- Free from visible molds and insect infestation live or dead, any other deleterious substance and musty odor
- Free from harmful seeds such as Argemone seeds.
- Reasonably dry, and
- In sound merchantable condition, having the pungent characteristic smell of the variety of the mustard supplied.

SWOT

The study analyses the Strengths, Weaknesses, Opportunity and Threats of mustard value chain to come up with value chain development strategy.

Strength

- Suitable soil and climatic conditions for cultivation
- Existence of strong supply chain in Mandla
- Involvement of maximum nos. of farmers
- Growing domestic demand for mustard
- Availability & Use of modern tools and equipment
- Easy marketability

Weakness

- Lack of Soil test & soil health knowledge.
- Lack of rotation or use of improved seeds.
- Lack of knowledge in PoP of Mustard
- Lack of critical irrigation facility
- Lack of appropriate dose of fertilizer & pest
- Lack of product holding capacity.
- Lack of Value addition at farmer's level.

Opportunity

- Scope for the CLF to get into new business operation for input and output
- Growing population and demand for Mustard oil
- Processing and value addition initiative can take up
- Collectivization of input & 0utput business
- Technical support from CARITAS-INDA and CLFs to strengthen the value chain

Threat

- Lack in scale of produce at farmer level
- Increased prices and non-availability of inputs may hamper the farmer's motivation.
- Cloudy weather and rains during flowering
- Disease and pest attack
- Interference by middle man in the process of marketing

Major issues and constraints in value chain

The study comes up with certain issues and challenges, which are directly or indirectly affecting the efficiency of the mustard value chain. While discussion with value chain actors, the below mentioned issues emerged, which needs to be addressed to strengthen the mustard value chain.

- Mustard average production ratio is below the level of major producing states: As reported by the farmers in the studied villages, farmers are getting yield of about 1-2 quintal of mustard per acre. The variation of yield is mostly depending upon the irrigation. While the average production ratio in major producing area is about 5-8 quintal per acre, the farmers in the studied villages are having less yield.

- Limited / no soil testing to know the soil health: Soil testing and soil health measures being a critical component of modern agriculture system, it is not in practice. Farmers are giving less priority to this, as most of the farmers have scope to test the quality of their soil and adopt the advisory measures recommended by the soil scientists to enhance the soil health to increase productivity. As observed, the use of nutrients / fertilizers is in a stereo type mode. To reduce the cost of production, it is important to apply the deficit type of nutrients in the soil to maintain the production standard as well as reduce the cost of production.
- Low scale of produce at the individual farmer level to get engaged with APMC market: In terms of Market engagement, small quantity of produce at the individual farmer level becomes non-economical to transport it to the APMC market situated in the district headquarter at Mandla. Price of products is fixed by the mandi traders as they have mutual agreement before interring to mandi.
- Lack of appropriate inputs: farmers are using their own harvested products for seed repeatedly without proper treatment. Again they are not using appropriate dose of fertilizers which resulting low productivity.
- Credit facility: The small holding farmers are always facing financial problems & not getting loan facility in time. Due to lack of financial strength, they are not using improved inputs & also selling their produces immediately in low price.
- Irrigation / timely irrigation requirement to meet the critical irrigation needs: In the continuous dry spell in the Rabi season, farmers required irrigation support to manage the critical irrigation need of mustard crop.
- Pest and disease management: Extension around pest and disease management is limited to the input suppliers only. Mostly farmers contact the nearest input traders for any kind of advisory around pest and disease management. Further, the market driven approach is considered by the input supplier by recommending high value / push new molecules. For that matter, professional advisory service is required to the farmers to manage pest and disease in a cost-effective manner.

Strategy and recommendations

With the mandate to enhance the productivity of the farmers, it is important to come up with certain strategy to overcome the issues and challenges faced by the farmers. The farmers' producer organisation with the support of CARITAS needs to safe guard the interest of the member farmers to come up with necessary action plan which can enhance the productivity of the member farmers, as well as create business opportunity for the sustainability of the producer company.

- **Efforts should be taken care to maximize farmers' base in mustard production system**: In the present context, 40-50% of the wheat growing farmers are into production of mustard in Rabi season. Further little push is required to include more numbers of farmers into the production, the following methods needs to be considered.

    a) Large wheat fallow area can be brought under Black gram cultivation in Ravi season

    b) Introduce of short duration high yielding varieties to fit multiple cropping to be grown.

    c) Developing cropping systems like companion/mixed/ inter cropping for growing pulse

    d) Adoption of improved package and practices for boosting pulse production

    e) Evolution of better plant-types of Mustard for boosting oilseed production.

- **Introduction of HH level storage system to intact the quality of produce for off season premium:** It was observed that the price of mustard generally increased in the off season. Further, it is difficult at the farmers level to intact the quality of mustard at the present HH level storage system. The collectivization process and storing may fetch a good margin of the crop.

- **Emphasis should be given to enhance the quality standard of the produce for better marketability:** The harvest and post-harvest practices are very critical to maintain the quality of the produce. For that matter, quality produce has high market demand. Though the quality of the produce in the studied villages is up to standard; but emphasis should be given to bring uniform quality in scale. Grading of produce based upon its variety with scale i.e. tradable scale can enhance the bargaining power among farmers. This can be achieved at the producer company / cluster level.

- **Promotion of collectivization around input procurement:** Since the adequate quantity and timely supply of quality agriculture input (seed, micro nutrient, fertilizer, plant protection chemicals, tools etc.) is important for paddy productivity, so emphasis needs to give to identify reliable vendors in that locality who meets both the parameters i.e. quality of the product and appropriate pricing. As individual procurement of these input at the farmer level is costly, time consuming affair, it is recommended to promote collectivization process in the village for the procurement of these inputs collectively. Instead of each farmer go to the market for procurement, it better to prepare a village level indent of the entire requirement and purchase from a single buyer to avail discount on bulk procurement along with low transportation cost.

  For that matter, the farmer producer organisation can expand its existing agro input business vertical to procure these indented inputs in bulk for member and non-member farmers. Further the farmers can avail the inputs in competitive price.

- **Promotion of Improved agriculture practices:** As observed in the data, the mustard production in the studied villages is still below the average production ratio. To enhance the production, it is important to capacitate famers to adopt improve agriculture practices. Phase wise knowledge on improved practices i.e. pre-sowing, sowing, vegetative, harvest and post-harvest stage (Market information) etc. are very much required. Timely advisory services through govt. led system around pest and disease management is again important. Promotion of demonstration plots to provide extension around sustainable agriculture practices is important. As the research findings on improved practices, crops & varieties etc. are not reaching to the farmers, the producer company / project must attempt to take those findings to the village in form of demonstration. To increase the reach, it is important to have demonstration of improved agriculture practices.

- **Establishment of low-**cost oil expeller: CARITAS may plan for establishing the low-cost oil expeller at the Panchayat level in "Business Model". One entrepreneur may be selected to start in the region so that the farmers can able to get more benefit through crushing of the seeds and also the cakes for the cultivation purpose.

- **Collectivization of output and engagement of Farmer Producer Organisation in marketing:** Proper collective action at the primary producer level for aggregating their produce holds promise of ensuring better prices in comparison to the individual selling mechanism. The producer company can facilitate the aggregation process of Output to ensure economics of scale to ensure higher price realization to the farmers by getting engaged with the APMC market at the district level. For a group of farmers who have agreed to work together to market their produce profitably, 'aggregation of produce' is an alternative marketing strategy, which would not only ensure high scale of surplus produce to reach the higher order market but would also help to realize better price through uniform quality of the produces and collective negotiation across trade channels.

Overall Market trends

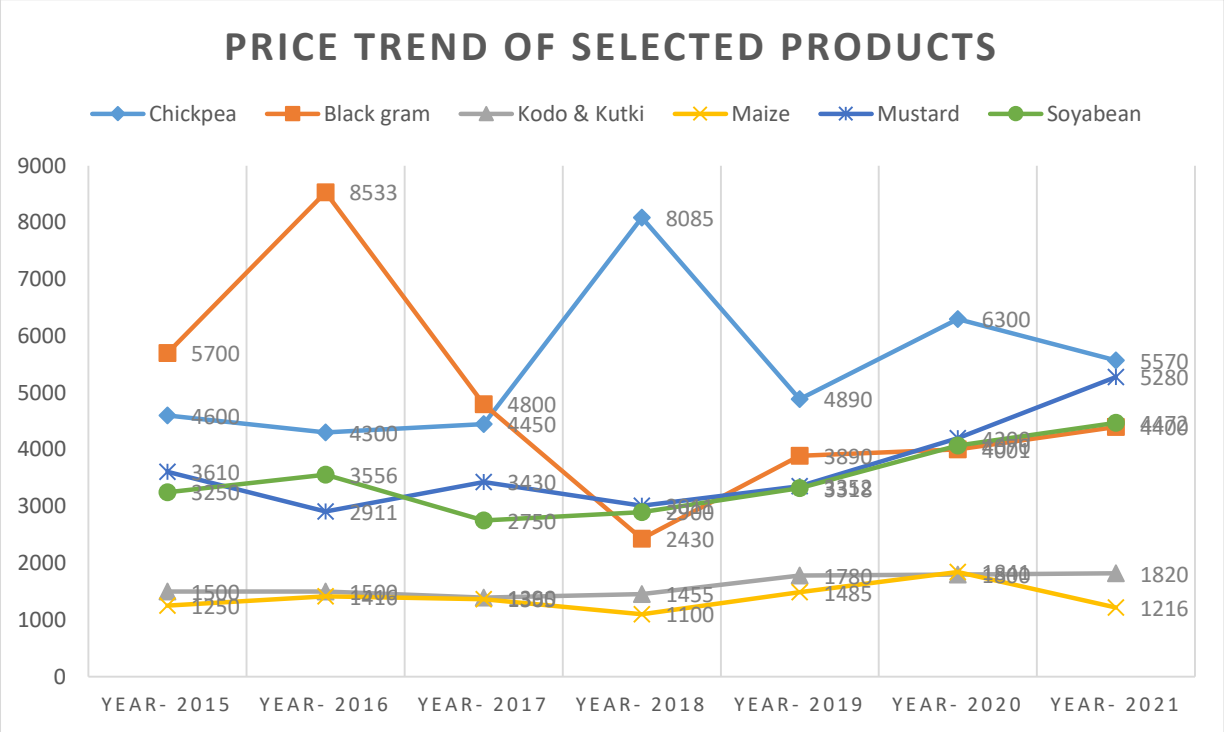
The overall market trends of 6 potential products show that while there has been decreasing price trend for black gram, mustard, chickpea and Soybean has shown a steady increase in market price trends over last 6 years. Kod/Kutki and maize have fluctuating price trends. The table below captures the product wise price trends of Madhya Pradesh.

1. Last 6 Years Market Price of selected Products In Madhya Pradesh

Products	Year-2015	Year-2016	Year-2017	Year-2018	Year-2019	Year-2020	Year-2021
Chickpea	4600	4300	4450	8085	4890	6300	5570
Black gram	5700	8533	4800	2430	3890	4001	4400
Kodo & Kutki	1500	1500	1390	1455	1780	1800	1820
Maize	1250	1416	1365	1100	1485	1841	1216
Mustard	3610	2911	3430	3011	3352	4200	5280
Soyabean	3250	3556	2750	2900	3318	4070	4472

Source- :- https://agmarknet.gov.in/PriceAndArrivals/reportt5CommodityDailyReport.aspx

The price trends of 6 products across 6 years in shown in the graph below.



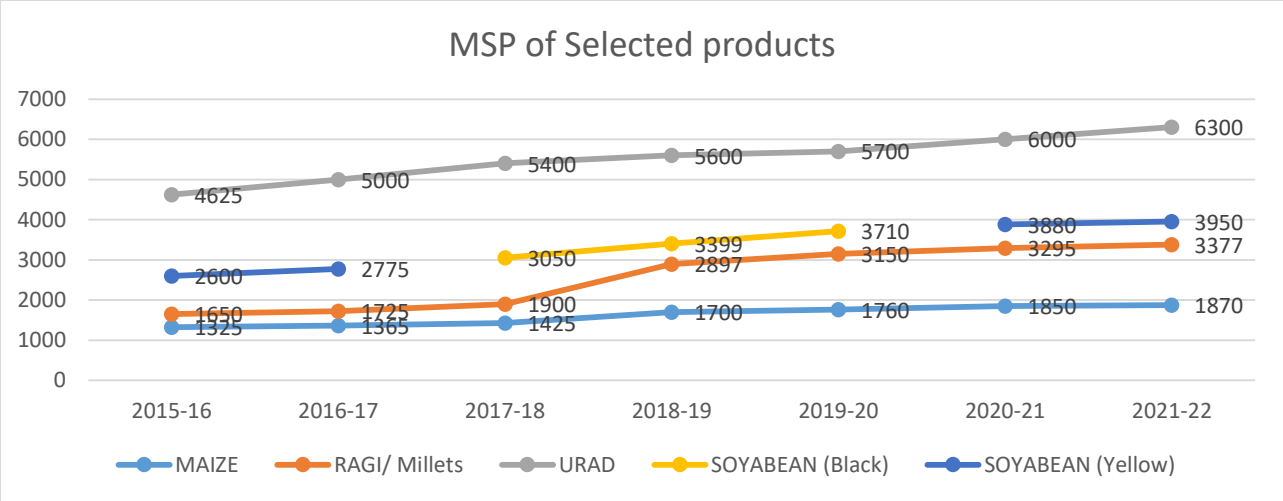
2. Minimum Support Prices Fixed by Government (Last 7 Years) - (Rs. Quintal)

The minimum support price of 6 potential products are given below in the table below. This MSP of 6 crops are linked with market trends, where the big players use the MSP as a benchmark and control the price by offering prices in line with MSP.

Commodity	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22

MAIZE	1325	1365	1425	1700	1760	1850	1870
RAGI/ Millets	1650	1725	1900	2897	3150	3295	3377
URAD	4625	5000	5400	5600	5700	6000	6300
SOYABEAN (Black)	-	-	3050	3399	3710	-	-
SOYABEAN (Yellow)	2600	2775*				3880	3950

Source- ***https://farmer.gov.in/mspstatements.aspx***



Strategy and Road map for enterprise plan for SHGs/PG around FPOs

The product-based cluster promotion strategies are as follows:

- Productivity Enhancement
  - Ensured, adequate and timely input supply across all agri & horticulture clusters
  - Introduction of improved variety of inputs especially for Horticulture crops.
  - Best package of practices for cultivation.
- Institution Building
  - Forming and Strengthening of PGs
- Capacity Building
  - Business knowledge and skill training, marketing and enterprise promotion to the PG members and FPOs
  - Rules and regulations, role and responsibility, leadership and management.
  - Exposure to market and successful enterprises.

- Infrastructure and Technology
  - Promotion of market led infrastructure (Drying yard, weighing scale, cleaning, grading and sorting machines, go down and storage etc).
  - Technology installation (installation of dal processing unit etc.).
- Market Access
  - Facilitation of aggregation of surplus produce and Collective marketing
  - Linkages with higher order and remunerative markets
  - Institutional linkages(Retail chains etc)
- Handholding Support
  - Step by step implementation plan
  - Deployment marketing support agency
- Promotion of supporting enterprises and entrepreneurs
  - Traders – individuals, farmer groups
  - Processors – individuals
  - Service providers –soil testing entrepreneurs
- Convergence and collaboration with existing schemes and programs.

Step by Step Plan for IGA Promotion by SHGs

Activity	Sub-activities
Stage I	
Opportunity mapping (in participatory manner)	➢ Team Leader and Project Officers with the involvement of respective volunteers, should map the area (supply-demand analysis) by involving community to identify locally sustainable activities. The market mapping exercise at the village level along with SHGs/PG and to list out demand driven activities ➢ Listing critical opportunities, gap analysis and prepare intervention plan
Stage II	
Sharing the information at SHG/PG and village level	➢ The information gathered (as mentioned above) should be shared at the community level to select economic activities ➢ Encourage women to share the discussion with family members for their support and consent ➢ In certain cases the SHGs/PG can be encouraged to visit local haat to assess the demanded products that can be started by them as business ➢ Specific focus should be given to two sets of women i.e. starters: those who are already into some business and nonstarter who are interest for starting new

Selection of activities by SHGs/PG	➢ Women members select economic activities ➢ Group based activities should be identified to develop a need based intervention plan
Capacity building on skill and business knowledge	➢ All the members should go through two sets of training o Skill enhancement training (through expert agencies) o Business knowledge (focus on developing a business plan having detailed marketing plan) ➢ Interaction with service providers
Linkages	➢ Financial linkages (through programmes and schemes / bank linkage) ➢ Linkage with service providers available in the local area (government and private)
Stage III	
Follow up support	➢ Caritas India Staffs should continuously provide follow up support and conduct problem solving meeting at the village level
Developing village level business facilitator	➢ The project should build up a village level cadre to ensure business planning process in all project villages ➢ Capacity building inputs to be imparted to them on range of themes

Alternate Marketing Strategy

It is with this backdrop that **proper collective action** at the primary producer and collector level holds promise of ensuring better prices by reducing dependence (hence exploitation) and ensures development of a system, which would sustain the initiative. Apart from establishing a market linkage developing a sustainable system, which would provide continuous benefits to the producers, is the real challenge. A one-time linkage creates more problems than benefits at the community level and, if not panacea, a healthy collective marketing system, given the current scenario, offers maximum benefits. Many best practices across the subcontinent suggest a process intervention is required to develop a win-win system.

One of the salient characteristics of Agriculture and Horticulture sector is its seasonality and it is for the community to judiciously utilize faculties to carve maximum benefits from it. The agriculture calendar here is restricted to only one or two crops – paddy & wheat. Whatever minor millets and pulses were cultivated are now increasingly replaced by more remunerative crops. It is facilitator who will have to play the role of a positive catalyst to share, convince and demonstrate the impact of an intervention meant for increasing their income. Collective action is not merely a group of likeminded persons having a common interest; it is the manifestation of the collective interest of the people whose success would be crucial in spreading the message.

The marginal farmer sells his minimum marketed surplus to the local trader for getting immediate cash. This in fact is the root of all exploitations ranging from price-cutting, faulty weighing etc. In the present context to check his sporadic individual selling and to accrue better prices, collective action is imperative and the only way out to extend reach to remunerative markets, which require minimum scale of volume. Without collective action plight of a marginal farmer would increase since the pressure on land and competition is bound to increase.

Challenges

- Awareness generation among farmers and collectors about the benefits of collective action
- Leadership creation to carry marketing function
- Transparent system in place
- Immediate financial transaction with the farmers
- Market information
- Market linkage

- Handling competition and market fluctuation
- Ability to handle pressure of traders who otherwise will be at loss

PG with the support of Caritas India should initiate collective marketing approach. A well-defined operational plan to undertake collective marketing is shared below.

Action Plan for Collective Marketing

Sr. No.	Activities
1a	Selection of villages, estimating resource availability, product profiling and Value Chain Report
b	Selection of villages for intervention
c	Scale assessment at village level
d	Understanding market dynamics for the produce
2	Sharing the concept with PG and villagers
3a	Sharing and orientation of the concept and fund flow to PG
b	Exposure visit of President, Secretary and Animator to successful collective marketing interventions
4	Village level awareness meeting with the cluster members, Animator, SHGs
5a	Identification of potential/interested SHG / Producer Group / CIGs
b	Selection of leaders from selected groups
c	Proper training to the PG leaders
d	Exposure/training on technical aspects (value addition, storage, record keeping)
e	Obtaining license from Gram Panchayat for trading, wherever applicable
6 a	Finalizing procurement modalities
b	Fixation of minimum rate for buying within groups and from outside
c	Exposure of PG / SHG Leaders for quality control
d	Ensuring procurement of committed quantity by the participating groups
7 a	Preparation of business plans and submission to financial institutions for disbursal
b	Disbursement of funds
8	Simultaneously making plan for construction of drying yard and other equipment's*
9a	Market watch and community leaders' negotiation with traders and other market players
b	Liaison and bargaining with traders by the SHGs and PG office bearers
c	Listing of collection of produce and record keeping
d	Finalizing selling modalities
e	Making arrangements for gunny bags, packaging, transportation and hamali (if required)
f	Selling price fixation including mode of payment
g	Date of transportation
h	Making arrangements for lifting of produce from the cluster locations
10	Account keeping including miscellaneous expenses - transparency meeting
11	Selling to traders
12	Receiving and disbursement of payment to Cluster and sub-clusters
13	Disbursement of payment to individual members, calculation of profit
14	Ensuring timely repayment of loan to financial institutions
15	Experience sharing with community – SHG,PG and Cluster members
16	Planning for other produce



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