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Centre for Environment Education

Towards Green and Socially-Sound Recovery in Rural and Farm Sector

CASE STUDY OF GROUNDNUT FARMERS IN JASDAN BLOCK, DIST. RAJKOT, GUJARAT

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ABOUT US

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INTRODUCTION

Groundnut is among the most important crops for farmers of arid and semi-arid regions where livelihoods depend on animal husbandry and agriculture. In the Saurashtra region of Gujarat, farmers practice rainfed farming and most of the agriculture production takes place in the kharif season. Farmers are dependent on the monsoon due to limited sources for irrigation. Traditionally, only local varieties of groundnuts such as *Sandhiya* and *Jini* were being cultivated for subsistence needs, with manual cultivation practices using bullocks. There was no mechanization and very limited processing. The demand and prices for groundnut were not attractive. Seeds were preserved by the farmers for the next season. With the introduction of the improved variety of *G-20*, production has increased but so has farmers' dependency on the market for seeds. There has been increasing demand for groundnut edible oil and therefore processing units at the village level can fetch profit for farmers. Therefore, this study was conducted to assess the impact of COVID-19 on groundnut farming and to understand the value chains of the groundnut production system. The aim was also to assess the possibilities of green and socially-sound recovery strategies.

APPROACH

1. The GHG emission for agriculture inputs and outputs supply chain inventories and primary processing (sorting, grading, storing) was calculated using the Cool Farm Tool (CFT). The data required for the Cool Farm Tool was collected using the GHG emission data collection tool.
2. To study the value chain of groundnut, both primary and secondary data were collected by interviewing various value chain intermediaries such as farmers, transporters, traders, and APMC commission agents and using datasets from the Centre for Monitoring Indian Economy (CMIE) and APMCs.

STUDY AREA

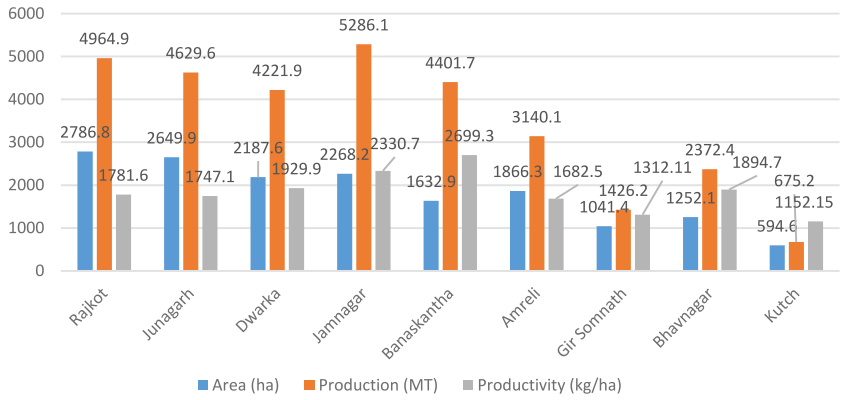
A study of the value chain of the groundnut crop was undertaken in three villages Rajavadla (Jam), Ramaliya and Barvala of the Jasdan Block, Rajkot district. The villages are located 20-25 kilometers from the block headquarters. Groundnut and cotton are the main crops in these villages along with fruits and vegetables. The population is a majority of people from *the Koli, Bharwad,* and *Rajput* communities. The table below presents the population status as per the 2010-11 census.

Sr. No.	Particulars	Rajavadla (Jam)	Ramaliya	Barvala
1	Total Land (Ha)	1230.39	1043.56	1434.07
2	Household	389	265	299
3	Population	2294	1378	1700
3.1	Schedule Caste Population	39	92	108
3.2	Schedule Tribe Population	0	1	0
4	Marginal Farmers	349	4	167
5	Agriculture Labour	39	0	111

Groundnut production at the national, state and district levels

1. The global production of groundnut was 46.58 million tonnes on 27.04 million hectares land with an average productivity of 1.72 tonnes in 2017. Among the major groundnut-producing countries, China ranked first with a 36.69 per cent share of global production followed by India (14.28%), Nigeria (9.12%), the USA (6.39%), and Sudan (3.54%). Globally, India ranked first in the area under groundnut cultivation but has less productivity as compared to the USA and China and even in the rankings of the average productivity of the world.
2. In India, the area under cultivation of groundnut has increased by 903.8 per cent in the past fifteen years and the production of groundnut has increased by 170.9 per cent (Directorate of Economics Statistics, 2021).
3. The average yield of groundnut in India has increased from 0.69 MT/ha in 2005-06 to 2.5 MT/ha in 2020-21 (Directorate of Economics Statistics, 2021) but it is lower than other high-production countries. The groundnut yield in China is 18.31 MT/ha.
4. In India, Gujarat has the highest production of groundnut among the states. Groudnut is also grown in Rajasthan, Tamil Nadu, Andhra Pradesh, and Karnataka. Gujarat ranked first in area under groundnut cultivation as well as production with 34.18 per cent and 42.88 per cent share respectively. Rajasthan ranked second in production with 13.72 per cent, followed by Andhra Pradesh (11.34%), Tamil Nadu (10.61%), and Maharashtra (6.09%). Tamil Nadu reported the highest productivity (2.9 MT/ha) followed by Gujarat (2.2 MT/ha) and West Bengal (2.3 MT/ha). Despite its top rank in area and production, Gujarat reports lower productivity as compared to Tamil Nadu, as most of the groundnut crop in Gujarat is cultivated in rainfed conditions (CMIE, 2022).
5. Gujarat state has 2.16 lakh ha under groundnut cultivation and produced 4,645.42 thousand MT of groundnut. Within Gujarat, Junagadh, Jamnagar, Rajkot, and Amreli are the highest groundnut-producing districts (Junagadh Agriculture University, 2022).

District-wise area, production and productivity

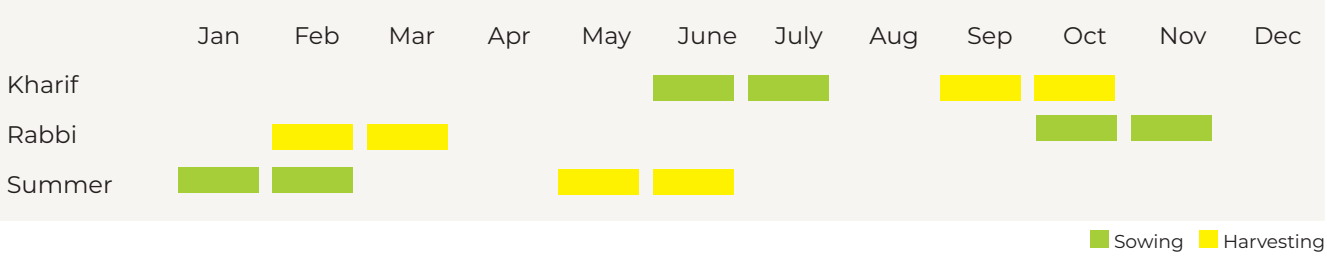


Sources:(Junagadh Agriculture University, 2022)

Key findings at the cluster level

1. The total cultivable land in this study cluster is 338 acres. The area under groundnut farming is 239 acres which is 70.6 per cent of the total cultivable land. The farmers take other crops such as cotton, chilli, pulses and vegetables.

2. Groundnut can be grown in all seasons but kharif season production accounts for about 80 per cent of the total production. More than 90 per cent of the land under groundnut production is dependent on rainwater. The groundnut crop sown in kharif season is normally sown in June-July and harvested in October-November. However, if irrigation is available, the groundnut crop is sown even in the rabi and summer seasons.

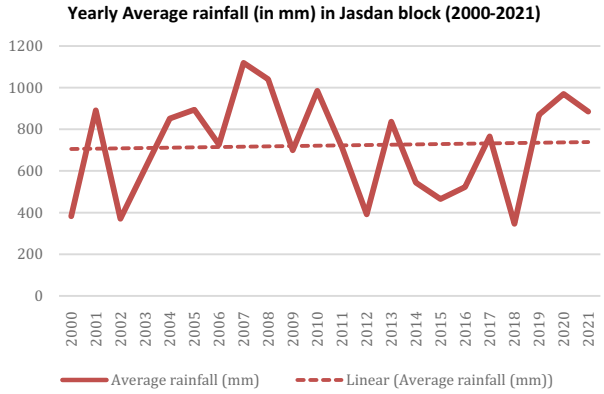


3. The varieties under cultivation fall into three groups according to the habit of growth, namely bunch (*Spanish*), semi-spreading (*Virginia bunch*), and spreading (*Virginia runner*). In the bunched group, the plants grow erect, possess light-green foliage, produce pods in clusters at the base of the plant, and have round, plump non-dormant seeds, with the light-rose test. In the cases of the semi-spreading and spreading varieties, the branches trail either partially or completely on the surface of the soil, produce pods all along them, possess dark-green foliage, and have oblong, dormant brownish seeds. The semi-spreading and spreading types are usually high yielding and late maturing than the bunch varieties (Talawar, 2004). Major commercial varieties being grown in Gujarat are G-20, G-10, G-2, G-3, G-5, G-7, G-39 and G-45. The local traditional varieties of groundnut in the cluster are as follows:

a) ***Sandhiya*:** It was being grown in this region and is popular mainly due to the very low input cost required. There are three seeds in one nutshell that look like a camel hump, therefore it is called *Sandhiya,* the local word for camel. It is drought resilient, disease resilient and its crop residue can be used as fodder. It requires less water and it is a short-duration crop. These characteristics make the *Sandhiya* variety attractive for farmers to cultivate. This variety is now improved as the *GJ-10* variety.

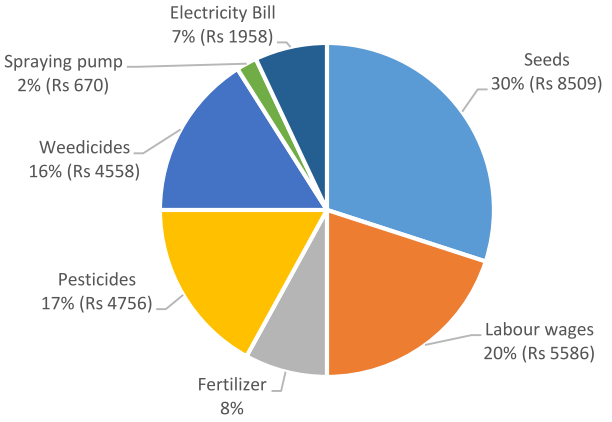
b) ***Mathdi*:** It is widely known as the *Ubhdi* (erect) variety. This variety is grown as a fodder crop as its vegetative growth is higher than its reproductive growth. It contains 49 to 50 per cent oil content. In recent years *HB-11* has been developed as an improved variety of *Mathdi*. *HB-11* variety is aflatoxin-resilient and contains 71 per cent oil.

c) ***Jini*:** It is a wild variety with a bitter taste and has the ability to survive in harsh conditions. Aflatoxin, naturally-occurring toxins produced by certain types of fungi associated with groundnut, maize and other crops has recently been found in this variety too. This variety requires less water to grow. Now many improved varieties have been developed from this variety to meet the market demand and with desirable characteristics such as low input cost, short maturity and climate resilience.



4. The average cost of groundnut production of the farmers in the Jasdan cluster was Rs. 28,335 per acre. Out of the total cost, major costs are the cost of seeds which accounts 30 per cent, labour wages accounting for 20 per cent, pesticides for 17 per cent and weedicides for 16 per cent.

Distribution of input cost per acre of groundnut farming



5. It is observed that soil tests are generally not being done by the farmers in the study area. Only one farmer from Ramaliya village had done soil testing and applied the fertilizers as per the recommendations of the experts.

6. The common diseases and pest attacks that occur on groundnut plants and pods are aphids, jassids, thrips, whiteflies, leaf miners, white grub and leaf spots. In the study cluster, farmers are experiencing climate change-related extreme events. The rainfall in the Jasdan block has been very erratic in recent years. In some years, there is above-normal rainfall, and in some the rainfall is deficient. The overall cloudy days have increased and there is the usual delay in the monsoon arrival. This has created favorable conditions for pests and diseases.

7. For pest management, the farmers usually use the following chemical fertilizers:

Pesticide	Active Ingredient (%)	Pest
Phosphamidon	0.03	Aphids, Jassid, Thrips, Whiteflies
Dimethoate	0.03	Aphids, Jassid, Thrips, Whiteflies
Methyl O'Demeton	0.025	Aphids, Jassid, Thrips, Whiteflies
Crebendazim+ Mancozeb and Leaf spots	0.05+0.2	White grub

8. The groundnut farmers spent an average of Rs. 9,019 on energy usage in the field and out of total expenses, major expenses are tractor fuel, fuel for spray pumps and paying the electricity bill of water pumps. The total seasonal emission from in-field energy use for groundnut farming in the selected sample is 874.7 MT CO_2e. None of the farmers have installed solar pumps for irrigation. Apart from these expenses, major expenses are renting a tractor which is Rs. 5,343 or a bullock cart which is Rs. 2,860 per season.

Energy consumption and expenses on energy in groundnut farming

	Avg. fuel consumption (lit.)	Avg. expenses (Rs.)	Percent of total energy expenses
Water pump	Not Applicable (Electricity)	1958	21.7
Tractor	29.1	2910	32.3
Four-wheeler	4.2	1723	19.1
Two-wheeler	8.6	428	4.7
Spray pump	20	2000	22.1
		9,019	100

9. As per collected data in the year 2021, a total of 6,627.5 quintals of groundnut was produced in the Jasdan study cluster in the year 2020-21 with an average productivity of 11.5 quintals/acre. The average harvesting loss is around 5-10 per cent as a few pods remain in the soil. Therefore, the total marketable groundnut produce is 10.93 quintals/acre. Considering the average market price of Rs. 5,000 per quintal, the average gross income per hectare of groundnut farming is Rs. 54,650.

Cultivation Area (In Acres)	Area
Total Cultivation Area (acre)	338
Groundnut Cultivation Area (acre)	239
Total Production of Groundnut in the cluster (quintals)	6,627.47
Productivity (quintal/acre)	11.5
Average Loss of Production (5%) (quintal/acre)	0.575
Total Marketable Produce (quintal/acre)	10.93
Average Rate of Groundnut per quintal	5,000
Average Gross Income from the Groundnut (Rs/acre)	54,650

10. Post-harvest losses occur at different stages of harvesting, threshing, cleaning, winnowing, packaging, transportation, storage, processing, and marketing. The losses during harvesting are due to unharvested pods in the soil. Groundnuts are stored both as pods and kernels and are vulnerable to insect and pest attacks even after the harvest. Therefore, farmers usually dry and cure produce at the farmgate for two to three days, and after that, the pods are detached from the plant. Untimely rain during the drying of pods causes heavy losses to farmers. Post-harvest losses in groundnuts range between 5 to 10 per cent during storage and it depends on maturity, moisture content and storage, sanitation of the storage area/space. Losses during transportation occur on account of pilferage, leakage of gunny bags, and rough handling.

11. It is observed that 78 per cent of the farmers marketed their produce at the APMC Jasdan Market and 18 per cent of farmers sold their produce to private traders, 2 per cent of farmers sold their produce in Ahmedabad and the remaining 2 per cent at Gondal Market. The price received per quintal in different markets is as follows:

Markets	Price Received (Rs/quintal)
APMC Jasdan	5000
Private Traders	6125
Gondal Market	6000
Ahmedabad	6250

12. The Jasdan and Gondal markets are at distances of 30 km and 50 km respectively from the study cluster, while Ahmedabad is at a distance of 200 km from the market. The middlemen of APMC and private traders buy produce directly from the farmgate. The cost of the transportation is borne by traders and charged to farmers while paying the price. The net income per hectare of groundnut farmers is as follows on the next page:

13. As per the price data received from farmers, the average price of groundnut across months and of different grades of groundnut in the year 2020-21 in the Gondal and Jasdan APMC markets was Rs. 5,000 for a quintal of groundnut. Therefore, overall farmers earned a net profit of Rs. 2,268 per quintal. The total profit in the Gondal and Jasdan APMC markets is 87.5 per cent over the cost of production (it does not include family labour and land rent cost).

Farmer's Net Income	Price received (Rs.)
The average cost of cultivation[1] (Rs/acre)	28,335
Average yield (q/acre)	11.5
Losses in quantity due to several reasons (q) Average 5%	0.575
Net quantity marketed	10.93
The total cost of production (Rs/q)	2592
Cost of the transportation-Gondal and Jasdan APMC markets (Rs/q)	130
APMC market expenses (Rs/q)	10
Total price received in Jasdan and Gondal APMC markets (Rs/q)	5000
Net profit (Rs/q)	**2,268**

14. The total emissions due to various activities at the pre-production, production, and post-production levels of groundnut farming in the Jasdan cluster in the form of carbon dioxide equivalent are given in the next table.
15. The marginal farmers who own land up to 3 acres produce less emission per acre and average emission per kilogram of groundnut produced. The average emission per acre and per kilogram of groundnut of big farmers who own more than 6 acre of land is highest.

Sr. No.	Landholding (acre)	Total Emission (MT CO_2e)	Emission per acre (kg CO_2e)	Average emission per kg of groundnut (kg CO_2e)
1	Up to 3	26.06	1449.10	1.59
2	3 – 6	131.80	1700.70	1.87
3	More than 6	391.90	4518.40	1.89

GHG Emissions from groundnut farming

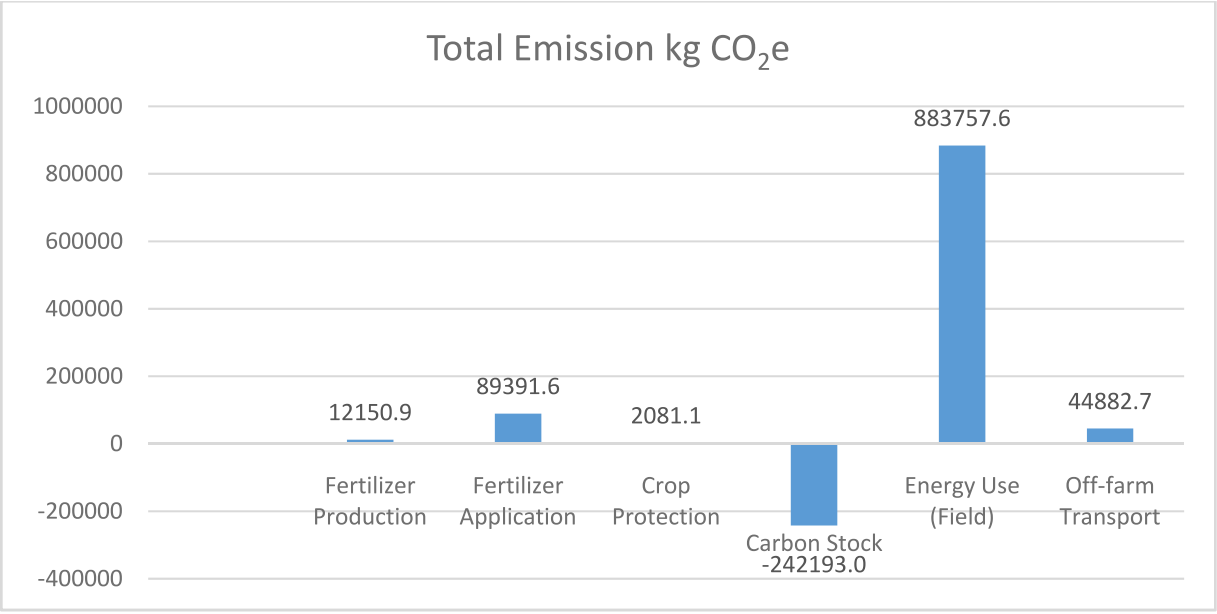
Total Emission	Emission per acre	Average emission per kg
790.17 MT CO_2e	2541.97 kg CO_2e	1.36 kg CO_2e

[1]This includes the cost of seeds, human labour, manure and fertilizers, pesticides, weedicides, water bill, drip irrigation, spray pump, supporting structures for plants, electricity bill. It does not include value of labour work of farmers and their family members and land rent cost.

GHG Emissions from various activities from groundnut farming

Sr. No.	Sources	Up to 3 acres		3 - 6 acres		More than 6 acres	
		Per acre of Groundnut	Per kg of Groundnut	Per acre of Groundnut	Per kg of Groundnut	Per acre of Groundnut	Per kg of Groundnut
1	Fertilizer production	46.35	0.051	49.70	0.055	53.80	0.038
2	Fertilizer application	344.27	0.379	353.20	0.389	391.40	0.379
3	Crop protection	7.169	0.008	8.10	0.009	9.30	0.008
4	Carbon stock	-1520	-1.66	-1423	-1.57	-710	-0.50
5	Energy use (field)	2422.5	2.67	2556.0	2.81	4561.61	2.50
6	Off-farm transport	138.79	0.152	156.70	0.173	212.30	0.172

16. If we analyze the data of greenhouse gas emissions from various activities related to groundnut farming, the energy use in the field such as electricity consumption for water pumps and use of tractors for ploughing produces the highest amount of greenhouse gases. The emissions from fertilizer application and off-farm transport are also significant.



VALUE CHAIN OF GROUNDNUT

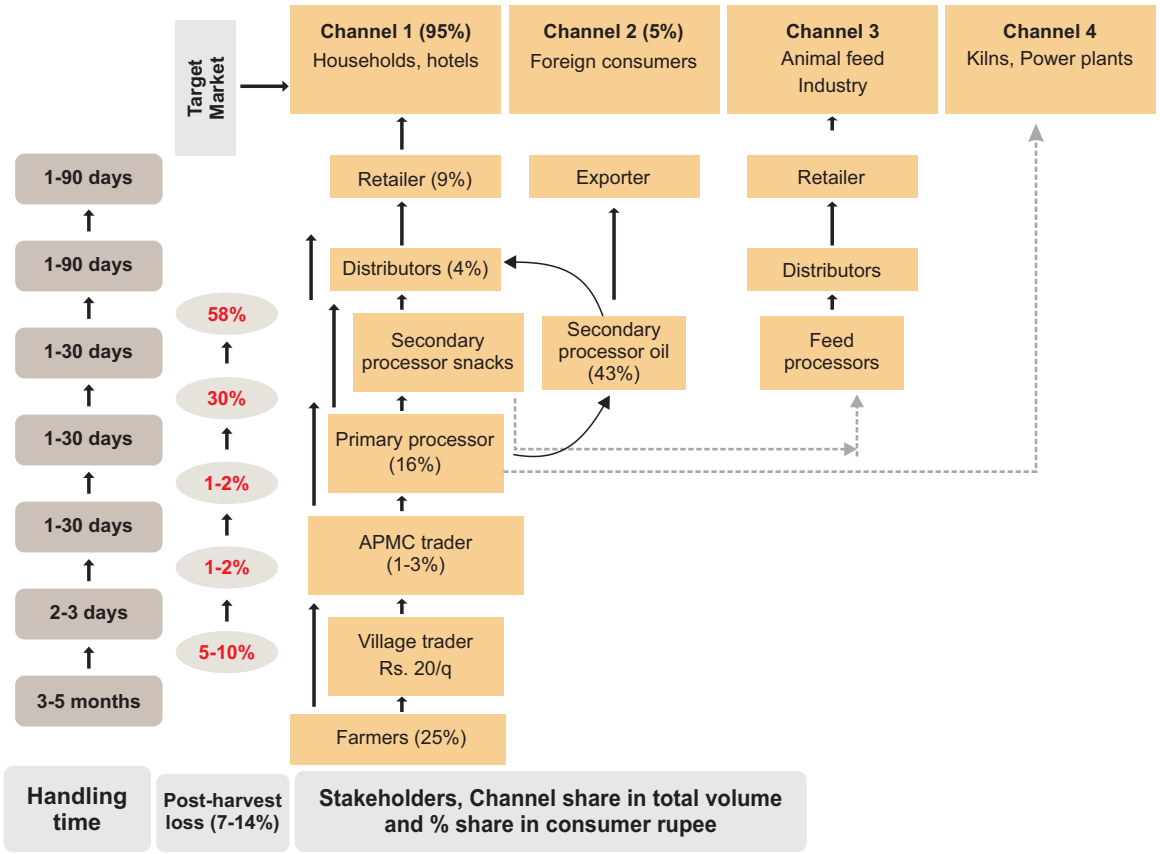
1. Marketing channels for oilseeds are different from those for food grains, mainly because the extraction of oil from oilseeds is an important marketing function of oilseeds. The present value chain for groundnut is highly complex in nature because of the multiple levels of value addition and multiple stakeholders present. The value chain has essentially four channels out of which Channels 1 and 2 are for human consumption and end users are households. Channel 3 is the by-product from secondary processing (oil industry) and end users are farmers/ animal breeders who use the by-product as animal feed. Channel 4 is the by-product chain of the primary processing (de-shelling) industry whose end users are brick kilns, husk power plants and steam generators.

2. The role of various warehouses is very important in the case of groundnut as the crop is mostly a kharif crop and has to be stored throughout the year for continuous production. Generally, post-harvest losses are 7-14 per cent during the primary processing level. During primary processing (de-shelling), losses are 30 per cent after de-shelling and the husk from de-shelling is sold at Rs. 300 per quintal to various brick kilns or steam power plants in the vicinity of the processor. The husk is also used as fuel in boilers of groundnut oil mills. Similarly, oil extracted during secondary processing of de-shelled groundnuts is around 35-48 per cent and it depends on the efficiency and type of oil extraction unit. The other by-products of groundnut oil processing units are sludge and de-oiled cake. After processing 1,000 kg of groundnut, 420 kg of oil is extracted, 420 kg of groundnut cake and 40 kg of sludge is formed. The de-oiled cake is usually sold at Rs. 2,000 per quintal.

3. The export channel consists of end users who are either households or institutional processors. The handling time is generally 3-5 months for farmers from farming to selling and storage. The holding time for village traders is a maximum of 2 to 3 days, 1 to 30 days for APMC traders, primary processors, and secondary processors and about 1 to 90 days for distributors and retailers who sell it to consumers.

4. Farmers' roles in the value chain are production, post-harvest handling, sorting, grading, and storage. Village traders aggregate the produce from farmers and sell them in nearby APMCs. The role of APMC traders is to facilitate the auction of the produce at the mandi premises and they charge a commission of around 2-3 per cent as *aadat*/ loading and weighing charges from the farmer. The role of the primary processor in the groundnut industry is to de-shell the product.

Value chain map of groundnut



RECOMMENDATIONS

1. Groundnut is a crop from a semi-arid zone. The ground water level in this zone is very deep and decreasing very rapidly. The ground water level in the Jasdan study cluster is at a minimum of 500 ft. Therefore, there is need to use water judiciously for irrigation. Mulching can significantly conserve soil moisture, reduce the overall water requirement and improve the well-being of plants. It is also required to promote the use of various micro irrigation methods such as drip and sprinkler irrigation in groundnut farming. The promotion of solar pumps and solar-based net metering systems for existing pumps can reduce the cost of electricity.
2. Presently, the losses during harvesting are quite high. For that purpose, mechanized harvesting using groundnut diggers can be promoted in the region.

Animal-drawn groundnut digger

Dimensions (l x w x h) (m)	1.75x0.30 x 0.57
Weight (kg)	10
Power source	A pair of bullocks/tractor
Width of cut (mm)	300
Operating speed (km/hr)	2.74
Field capacity (ha/hr)	0.16

3. There is great demand for value-added products of groundnut in the market. Peanut food items are among the most popular food items in the market. Peanut flour is used in confectionery products, seasoning blends, bakery mixes, and nutritional bars. Peanut butter and paste also have great export potential. Therefore, farmers or FPCs can be incentivized to set up processing units. It is also required to promote quick drying techniques and solar dryers in the cluster for the protection of groundnut against pest/disease attacks.
4. The transition to organic farming is challenging for the farmers. Therefore, monetary compensation for up to three years can be provided to farmers for the adoption of Farm Yard Manure (FYM)-based groundnut farming and reducing the use of inorganic/synthetic fertilizers.
5. As APMC market price-related information is not easily accessible to farmers, farmers tend to sell their produce to traders in contact with them. There is a need to create a robust APMC market price discovery mechanism for farmers. Further delay in payment by APMCs also forces the farmers to sell their produce to agents at a lower price as they need immediate cash for rabi sowing. Digital linking of groundnut FPCs with buyers, sellers, and transport agencies for real-time and online marketing of groundnut produce for better price realization may be encouraged. Storage facilities at reasonable cost in order to store the produce during glut periods maybe provided by the government.
6. To address a range of issues from productivity enhancement, reducing the spoilage, and better marketing and processing of the groundnut, it is imperative to have collectivization of the producers. The formation of a Farmer Producer Company (FPC) will enable farmers to procure agriculture input collectively at a cheaper price, aggregate the produce and bargain collectively in the market, and establish groundnut processing and storage units at the village level.

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