Value chain mapping and analysis of groundnut in Andhra Pradesh, India

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Executive Summary

- Groundnut is also known as peanut and a poor man's nut with around 25% protein and 40-50% oil content. Its both kernels and haulms are used for diversified purposes.
- Groundnut is the sixth most significant oilseed in the world with India being the 2nd largest contributor-contributing 10% into world's production.
- Within India, Gujarat, Rajasthan in west, Tamil Nadu, Andhra Pradesh and Karnataka account for more than 80% of both production and area under groundnut in the country.
- For this value chains study, we adopted a mixed method research. We used both secondary and primary methods of data collection.
- Andhra Pradesh (AP) is the eighth largest state in India divided into 13 districts. Out of these 13, Anantapur is the chosen district for study, where the two ALL sites- Tadipatri and Bathalapalli are located.
- Anantapur is the country's second-most drought-prone region, receiving an average annual rainfall of 560 mm, predominantly comprised of rocky red soils.
- In terms of area, the major crops grown in 2019-20 in the district are groundnut (51%), pulses (25.4%) such as red gram and horse gram, cotton (6.5%) and rice (4.1%).
- In Tadipatri, jowar and cotton in Kharif, and Bengal gram in rabi are the major crops. In comparison Bathalapalle with predominant red soils and rainfed geography has more of rainfed crops – with Horse gram and Groundnut as predominant crop systems.
- Groundnut is grown in both monsoon season (called *kharif*) and winter season (called *rabi*). The suitable time for kharif season sowing is from mid-May to end of July and for rabi starts from November to December. Sowing in kharif is dependent on rainfall condition.
- Anantapur traditionally used to have diversified crop systems in the rainfed areas before groundnut became the dominant monocrop for instance, *Navdhanya* which involved growing 5-10 crops with multiple harvests over the 2 seasons. But recently through natural farmers there is a revival of such farming methods.
- While conventional farmers use chemical inputs such as synthetic fertilizers, pesticides, fungicides etc., the natural farmers prepare such inputs themselves using natural elements such as cowdug, cow urine, and leftover plant leaves in various crop stages.
- The most common bio-stimulants include seed treatment through *Beejaamrutam*, *Ghanjeevaamrtuam* during sowing, *Jeevaamrutam* to enhance production, and the utilization of *Neemashastra* and *Bhramastra* for effective insect and pest control.
- Groundnut irrigation traditionally relies on the monsoon season and draws its primary moisture from rainfall.

- For harvesting, manual harvesting is employed, involving a team of 6 to 8 laborers per acre. The harvesting sequence encompasses several essential tasks: digging, lifting, windrowing, stocking, and ultimately, threshing.
- Post harvesting, farmers do basic sorting of the crop using traditional and manual methods, and then pack them into bags or temporarily store them.
- There is lack of proper storage facilities with the farmers, so they sell the produce as soon as possible, at the prevailing prices.
- Most common markets where the groundnut produce (directly from farm) is sold include consumers, Agriculture produce market committees (APMC), aggregators/ traders and primary processing centres. In addition, farmers save these seeds for next season as well.
- Rythu Sadhikar Samstha (RYSS) provides very limited market support to natural farmers such as procurement of output by Tirumala Tirupati Devasthanams (TTD) trust, supporting farmer enterprises, etc.
- RYSS doesn't have their own primary or secondary processing units. However, there are many primary units available in the district, such as in Narpala, 30 kilometres from Anantapur.
- Key steps conducted by primary processing units include cleaning and sorting the groundnut, shelling using machines. Once the shells are separated from kernels, kernels are subjected to roasting, cooling, blanching, grading, sizing, packaging. These processed kernels are then used by secondary processing units to make a host of items such as groundnut oil, peanut butter, snacks.
- Groundnut husks are used for mulching, making packaging material and for animal feed.
- We used the principal questions of B-ACT to understand link of the groundnut value chain with agroecology. We surveyed 14 farmers (8 natural farmers, 6 conventional farmers). The analysis shows that natural farmers achieve a 100% score on most principles such as animal health, biodiversity, economic diversification, etc. But the score of a few principles is nearly 80% such as recycling, input reduction and synergy. For chemical farmers on the other hand, the reverse is true- there are many principles whose score is 0, and a few principles only which achieve a positive score.
- There are many challenges in making the groundnut value chain for natural farmers more agroecological:
- One challenge is inadequate information about natural farming. Despite RYSS giving trainings through a network of SHGs (self-help groups) and CRPs (community resource persons), there is a need for more targeted steps to effectively demonstrate farmers about benefits of natural farming.
- There is a lack of markets for natural produce and farmers are paid same price as conventionally grown groundnut. No extra premium is paid to produce such high value crops.
- There is a shortage of bio-fertilizers for natural farming. Due to lack of adequate livestock, there is a shortage of raw materials- cow dung and cow urine.
- There are no storage facilities to store the groundnut post-harvest so that farmers are not able to take advantages of the market conditions.

- RYSS provides a PGS certification (Participatory Guarantee system) which is at local level- where farmers self-certify the members in a PGS group. But this does not as strong as the NPOP (National Programme for Organic Production) and NOP (National Organic Program) based certification which is a third-party certification.
- To combat the above challenges, there are a few solutions that exist:
- We need to strengthen out extension system for natural farming, spread awareness about its benefits, and use digital technologies for faster dissemination and adoption.
- We must leverage the strength of collective actions, as depicted by the women self help groups to generate market linkages for natural output. This includes organizing them into FPOs, providing linkage with local nearest primary processing units, providing storage facilities, giving them trainings to set up their own local shops that sell natural groundnut-based value added products.
- We also need to create local bio-input shops that sell pre-made bio-fertilizers such as ghanajeevamruth, jeevamruth, etc. Our analysis reveals that making such inputs at home costs only Rs 2/ litre for JV and Rs 7-8/kg for GJV. Some women SHG leaders are already selling these making local shops at price of Rs 8/litre of JV and Rs 25/kg of GJV which is very profitable. Such input model carries potential to meet demand for bio-inputs, generate employment for landless farmers, and boost entrepreneurship.
- We also need to strengthen supporting services such as testing of bio-inputs to establish credibility of these inputs.
- The groundnut value chain analysis serves as a valuable resource for stakeholders, policymakers, and farmers alike, offering insights into strategies that can unlock the full potential of groundnut cultivation while contributing to the economic growth of the district. By implementing these interventions, Anantapuram can pave the way for a vibrant and inclusive agricultural ecosystem that not only benefits farmers but also meets the evolving demands of consumers for sustainable and high-quality produce.

1. Introduction

1.1. Groundnut scenario- the world and India:

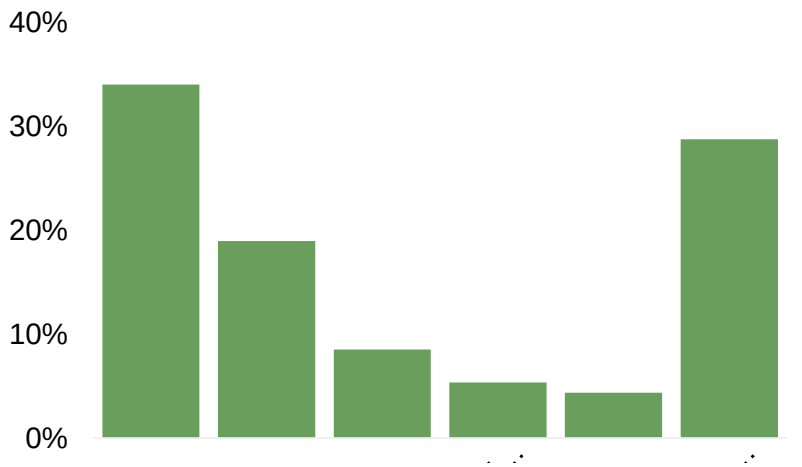
Groundnut is also known as peanut and a poor man's nut. Its botanical name, Arachis hypogaea L., reflects its geocarpic pod formation. With around 25% protein (Cobb & Jones, 1973; Arya et al, 2016), groundnut kernels surpass meat, eggs, and fruit serving as an important food crop (FAO, 2022). The 40-50% oil content is used for culinary purposes, vegetable oil, cosmetics, and industrial applications. The kernels are consumed raw, roasted, boiled, or as snacks.

Groundnut haulms (8-11% protein) are excellent cattle fodder, while the cake serves as livestock feed and organic manure. Groundnut shell is used for fuel, paper, and activated carbon due to its potassium and calcium content. These diverse applications make groundnut a valuable cash crop globally. Other advantages of groundnut cultivation include biological nitrogen fixation, minimal irrigation needs, lean-season employment, and extended storage.

Its origins lay in South America, particularly Argentina, Bolivia, Brazil, Paraguay, and Uruguay, with a primary center of diversity in North Argentina and Southern Bolivia. This region harbors progenitor species closely related to Arachis hypogaea. Secondary diversity centers include regions in Brazil, Bolivia, and Peru. Jesuit Fathers introduced groundnut to India, likely from South America, in the 16th century following Vasco De Gama's arrival. The indigenous variety in India probably had Brazilian roots.

Groundnut is the sixth most significant oilseed in the world. Major producers include China, India, Nigeria, USA, Indonesia, and Sudan, with Asia and Africa accounting for 90% of global cultivation (Figure 1). While India holds the top spot in acreage (16%), China leads in total production.

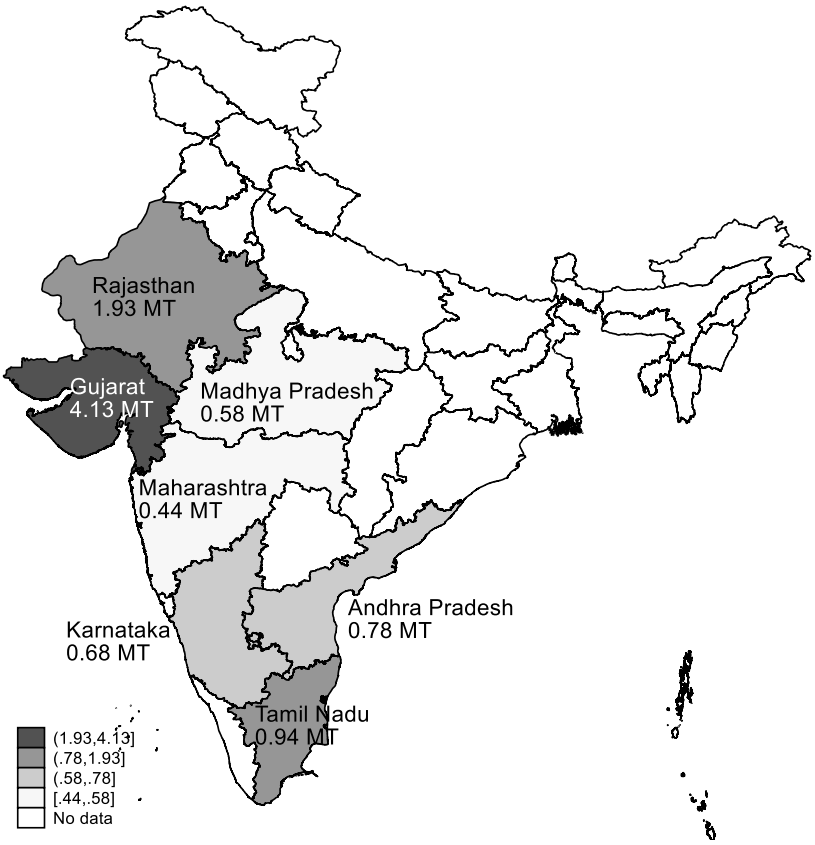
Figure 1: Share of various countries in groundnut production



Source: FAOSTAT database (2021) https://www.fao.org/faostat/en/#data/QCL

India holds the esteemed position of being the second-largest global contributor to groundnut production. This achievement can be attributed to its diverse range of soil types and demographics, which find a harmonious match in certain regions. As seen in Table 1, Gujarat, Rajasthan in west, Tamil Nadu, Andhra Pradesh and Karnataka account for more than 80% of both production and area under groundnut in the country.

Figure 2: Major states producing groundnut in India (in Million tons)



Source: Directorate of Economics and Statistics. 2021

Table 1: Share of major states in India in area and production under groundnut

	2020-21		2019-20	
	area %	prod %	area %	prod %
Gujarat	35.5	40.42	35	46.68
Rajasthan	14.04	18.91	15.32	16.27
Tamil Nadu	6.71	9.25	7.18	10.38
Andhra Pradesh	14.28	7.62	13.7	8.53
Karnataka	11.49	6.62	10.45	5.05
Madhya Pradesh	6.02	5.64	4.58	3.52
Maharashtra	5.57	4.3	6.03	3.1
Others	6.38	7.23	7.75	6.46
All India	100	100	100	100
All India (base)	6.09 million hectare	10.21 million tonnes	4.83 million hectares	9.95 million tonnes

Source: Agriculture statistics at a glance, 2021, Directorate of Economics and Statistics; https://eands.dacnet.nic.in/latest_2006.htm

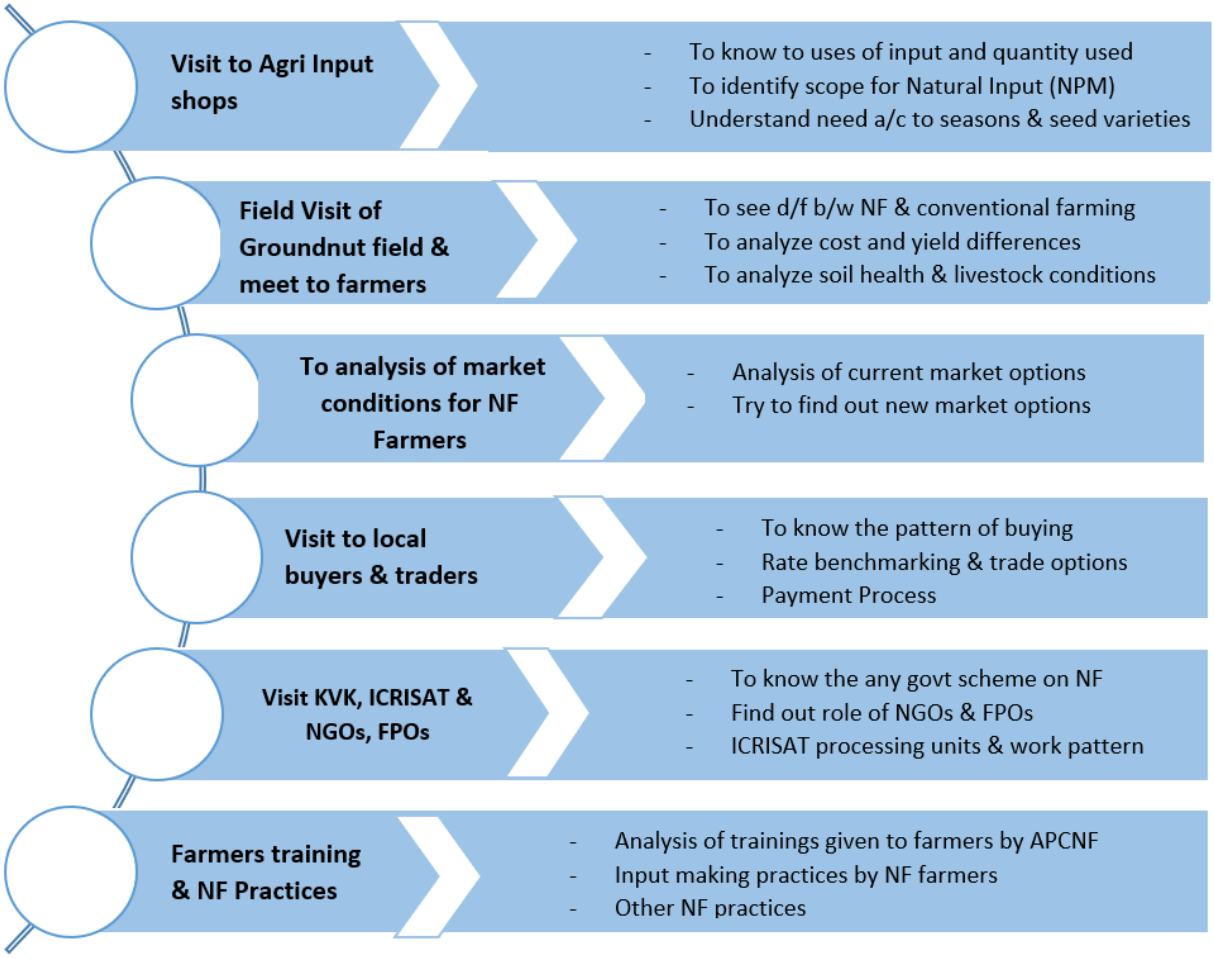
1.2. Methodology

For this value chains study, we adopted a mixed method research. We used both secondary and primary methods of data collection:

Step 1: Secondary Research: In the beginning of the study, we conducted in-depth secondary research about the choice of value chain and its relevance, importance and perception of groundnut cultivation in Andhra Pradesh and Anantapur district using various government documents from the agriculture department, pertinent online platforms, and agricultural universities.

Step 2 - Primary Research: Subsequently, we conducted primary research involving focus group discussions and semi-structured interviews of farmer growing groundnut using conventional and natural farming methods, women self-help groups, key informant interviews of RySS staff, agri-input shop owners, farmer science centres (KVK-*Krishi Vigyan Kendra*), ICRISAT staff (International Crop Research Institute for Semi-Arid Tropics), heads of Farmer Producer organizations, local groundnut buyers (who buy the produce from farmers locally and sell to wholesalers/retailers ahead), and field visits to achieve a holistic understanding of groundnut cultivation. We also administered the B-ACT tool to farmers to understand the degree of agroecology in farming systems practiced by them. Figure 3 shows the major stakeholders with whom we interacted as part of this research.

Figure 3: Major stakeholders interacted with and purpose of interaction



2. Pre-value chain analysis

2.1. Groundnut scenario in the ALL- Andhra Pradesh

Andhra Pradesh (AP) is the eighth largest state in India with a geographical area of 0.167 million sq.km. and is the 10th largest state accounting for over 4% of the population. The state has a predominantly rural population with only over 29.47% staying in the urban areas as per the 2011 census; this is expected to change substantially at present.

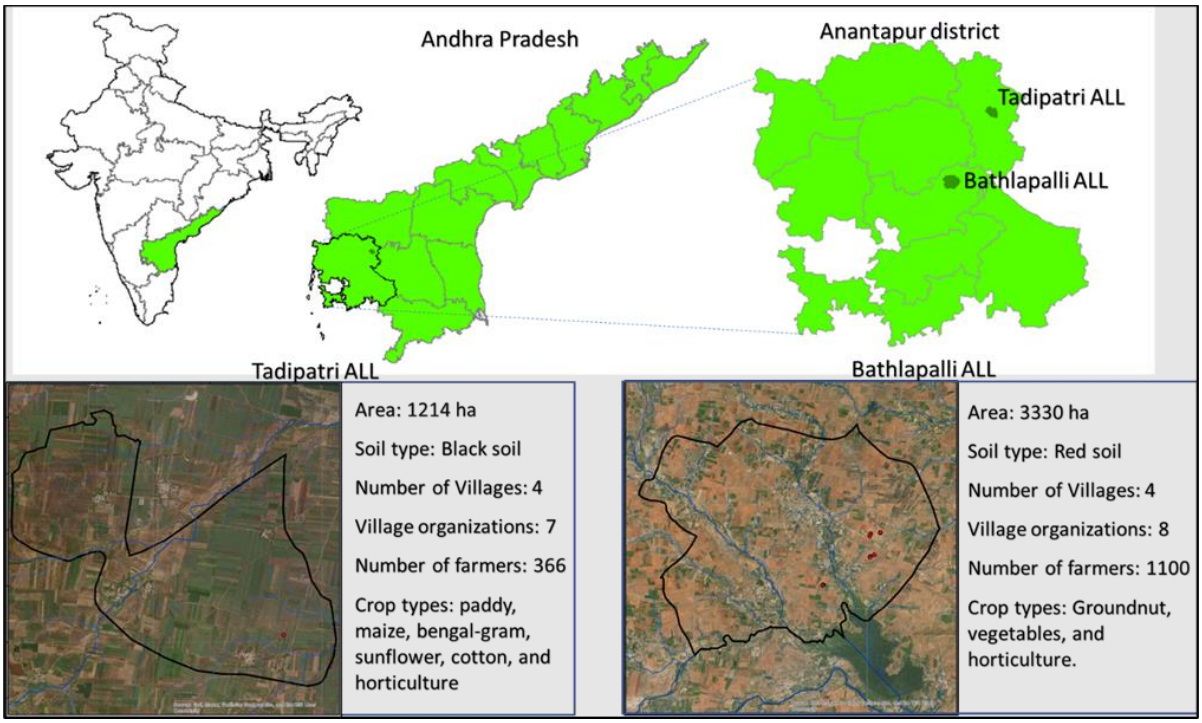
The combined state of Andhra Pradesh was divided in 2014 into Telangana and Andhra Pradesh states. The administrative divisions are State, Regions (3), Districts (26), Revenue divisions (77) and Mandals (679). The district of Ananthapur or Anantapuramu was divided into Ananthapuramu and Sri Satya Sai Districts. The reorganization of states and districts brings complexity in the presentation of data. For reasons of data availability, we consider the undivided Anantapur district for our presentation.

In Andhra Pradesh, we have partnered with Rythu Sadhikara Samstha (RySS)[1] (A farmers empowerment organization under Government of Andhra Pradesh). RySS is promoting the project Andhra Pradesh Community Natural Farming (APCNF[2]) in the region. Natural farming, as promoted by APCNF, is a word used synonymously for agroecological farming methods. It falls under climate resilient agroecology, more specifically under regenerative agriculture (Fukuoka, 1992).

Within Anantapur district, the mandals (sub-district units) of Tadipatri and Bathalpalli were chosen for establishing ALLs. Within these mandals, a contiguous area that encompasses a cluster of villages that is currently under the APCNF program was selected. Selection of the locations also considered the boundaries of the Village Organisations (federations of women Self-help groups).

[1] https://apcnf.in/ryss/
[2] https://apcnf.in/

Figure 4: Overview of ALL in Andhra Pradesh



Within the ALLs, 286 (78%) farmers out of 366 are practicing natural farming in Tadipatri and 500 (45%) farmers out of 1100 are practicing natural farming in Bathalpalli (Figure 4). These farmers are at various stages of transformation – some have fully adopted natural farming practices, while others are in different stages of transition.

Anantapuram, the largest district in Andhra Pradesh, unfolds its unique character through a blend of demography and soil. The district's climate is defined by a semi-arid nature, with a prevalent majority of high temperatures throughout the year. Notably, it holds the distinction of being the country's second-most drought-prone region, receiving an average annual rainfall of 560 mm.

The soil profile paints a desert-like picture, predominantly comprised of rocky red soils. These rocky terrains, adorned with a reddish hue, harbor a carbon content ranging from 0.2% to 0.4%, which results in a limited capacity to hold water. The land topography exhibits diversity, with approximately 47% of the landscape featuring slopes ranging from 1% to 3%, while the remaining 53% encompasses areas characterized by moderate to steep slopes.

In terms of area, Anantapur is one of the main districts where groundnut is grown both in terms of area and production (Table 2). The major crops grown in 2019-20 in the district are groundnut (61.8%), pulses (25.4%) such as red gram and horse gram, cotton (6.5%) and rice (4.1%). Season-wise, groundnut is the major kharif crop in red soil under rainfed conditions covering 60% of the area. Other kharif crops include

cotton, red gram, and horse gram. The major rabi crop is gram covering 56% area, followed by other crops such as groundnut (23%), rice (8.7%) and maize (5.4%). In Tadipatri, jowar and cotton in Kharif, and Bengal gram in rabi are the major crops as per the district statistics. The cropping intensity is low. In comparison Bathalapalle with predominant red soils and rainfed geography has more of rainfed crops – with Horse gram and Groundnut as predominant crop systems.

Table 2: Share of 13 districts of AP in total area and production under groundnut in 2019-20

District	Share in total area (%)	Share in total production (%)
Anantapur	61.80%	40.43%
Chittoor	16.37%	24.01%
East Godavari	0.02%	0.05%
Guntur	0.49%	1.37%
Kadapa	3.30%	6.22%
Krishna	0.23%	0.73%
Kurnool	14.38%	19.64%
Prakasam	0.46%	1.11%
Spsr Nellore	1.35%	4.29%
Srikakulam	0.74%	0.87%
Visakhapatanam	0.31%	0.37%
Vizianagaram	0.23%	0.29%
West Godavari	0.33%	0.62%

Source: Directorate of Economics and Statistics

We conducted semi-structured surveys of groundnut growing farmers, out of which 5 were doing it conventionally using chemicals and 10 were doing it through natural farming (Table 3). Out of the 15 farmers surveyed, 3 were females and remaining were male farmers. We will use the respective information from these surveys to describe the remainder of the report, supplementing the related sections with this information.

Table 3: Key differences between chemical and natural farmers from the surveys conducted

Characteristics	Natural farmers	Chemical farmers
Average total land size (acres)	3.6 (1.7)	5 (2)*
Area under natural farming	2.8 (1)	-
Seed application rate (kg/acre)	80-100	80-100
Type and source of nutrition given to crops	Mostly self-made bio fertilizers and bio-pesticides using cow-dung, urine, waste leaves etc.	Mainly chemicals purchased from the market like urea, dap, etc, and pesticides and insecticides.
Cropping method	Mixed cropping	Mono cropping
Yield rates (quintal/acre)	11-16 quintals	11-14 quintals
No of observations	10	5

*Excluding an outlier of 16 acres.

2.2. Cropping pattern and sowing methods:

Groundnut is grown in both monsoon season (called *kharif*) and winter season (called *rabi*). The suitable time for kharif season sowing is from mid-May to end of July and harvesting starts from mid-September to mid-October, immediately after which sowing for rabi starts from November to December and harvesting is done towards the end of rabi season from mid-February to mid-April. Sowing in kharif is dependent on rainfall condition. Sowing is done after 1 ploughing of field using local ploughs or through tractors.

Table 4: Cropping pattern of groundnut in Ananatapur

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kharif												
Rabi												

Key:

Sowing	
Harvesting	

Picture 1: A farmer doing sowing using a bullock cart in Anantapur district

The sowing process involves maintaining a spacing of approximately 3 to 4 inches between each plant (PP) and a broader spacing of 12 by 12 inches between rows (LL). This configuration optimizes plant growth and yield potential. Groundnut cultivation showcases a blend of traditional practices and modern adaptations to suit the local conditions.

The conventional farmers surveyed were doing monoculture farming with one-tow people growing coarse grains like Bajra as border crop. The natural farmers were following mixed cropping where groundnut is the main crop along with other crops like maize, leguminous crops like green gram, red gram, coarse grains like pearl millet, jowar, cowpea, oilseeds like castor and vegetables like field beans, cluster beans, and green leafy vegetables. This method is called *Navdhanya* method where 5-10 crops are growm allowing multiple harvests over the 2 seasons (monsoon and winter).

Anantapur traditionally used to have diversified crop systems in the rainfed areas before groundnut became the dominant monocrop for instance, *Navdhanya*. But by early 1980s, there was a shift to monocropping of groundnut to promote its high yielding varieties which led to an increase in its area from 18% in 1960 to 74% in 2005 and decreased dependency on millets and pulses for household consumption in addition to depriving soils of biomass. There is an increase in mixed farming methods in the region. For instance, use of groundnut haulms as fodder to promote ruminant economy, as compared to systems involving crop production alone, which helps provide income stability. Also, to protect from climate variations, the cultivation of millets and *Navdhanya* are also being promoted by various government initiatives.

2.3. Varieties of Groundnut:

In groundnut cultivation, the K-6 and TAG varieties have gained widespread popularity in various field areas. Additionally, there are specialized area-specific options like *Kadri Lepakshi* and *Kadri Chitrawati*, which cater to specific geographical nuances. To ensure successful growth, a recommended seed rate of

80 to 100 kg per acre is commonly employed. While farmers reported some key differences between the two major varieties of K6 and TAG, such as the plant height, expected yield (Table 5), the actual yields realized didn't differ much (Table). Moreover, both conventional and natural farmers were using either variety of groundnut. At the same time, there wasn't much difference in the yield rates (per acre) of groundnut between the two types of farmers.

Table 5: Differences in characteristics of TAG and K6 seed variety of groundnut

Characteristics	K6 variety	TAG variety
Maturity period (Days)	105 to 110	90 to 100
Plant height (CM)	35 to 40	20 to 25
Expected No of bunches (ideally)	15 to 18	10 to 15
Expected Yield per acre (Quintal)	20 to 25	14 to 16

Picture 2: TAG and K-6 varieties of groundnut

2.4. Input use

There is a major difference between natural and conventional farmers in terms of input use. Conventional farmers use chemical inputs such as seed treatment using chemicals before sowing, synthetic fertilizers such as urea, DAP and NPK at the time of sowing, 3-4 sprays of pesticides and insecticides at regular intervals (mostly first spray 1 month after sowing and subsequent sprays with a gap of 20-25 days).The natural farmers on the other hand, self-prepare bio-inputs themselves using natural elements such as cowdug, cow urine, and leftover plant leaves in various crop stages. These include the application of seed treatment through *Beejaamrutam*, *Ghanjeevaamrtuam* during sowing, *Jeevaamrutam* to enhance production, and the utilization of *Neemashastra* and *Bhramastra* for effective insect and pest control. This strategic integration of inputs exemplifies the comprehensive approach adopted by natural farmers to optimize their yields while adhering to sustainable and eco-friendly practices. See Box 1 for full details on how these inputs are prepared.

Picture 3: Input preparation by natural farmers

Box 1: Preparation of different natural inputs by natural farming practicing farmers in AP.

- **Beejamrit:**

Benefits and uses: This is used for seed treatment before sowing. Treating seeds with this mixture makes the seeds sprout faster and grow more in quantity. They also become resistant to diseases.

Ingredients assuming, we need to treat 100 kg seeds: Desi cow dung: 5 kg, Cow urine: 5 liters, Lime: 50 gm, Water: 20 liters, Quantity of soil on hand: 1 fistful, 100 kg seeds

Preparation: Put all these things together in water and keep for 24 hours. Stir twice a day with a wooden stick. Dry the seeds in shade after applying the solution**.**

- **Jeevaamrit:**

Benefits: It is a natural fertilizer that enhances soil vitality. It is a bio stimulant which promotes the activity of microorganisms in the soil and the activity of phyllo spheric microorganisms when spayed on foliage. It's like a primer for microbial activity and increases the population of native earthworms.

Ingredients: 10 kg of fresh cow dung, 5-10 litre cow urine, 50 gram lime, 2 kg jaggery, 2 kg pulses' flour 1 kg uncontaminated soil and 200 litres water

Preparation: The materials should be mixed and stirred well. The mixture should then be allowed to ferment for 48 hours in shade. It should be stirred by a wooden stick twice, once in the morning and once in the evening. This process is to be continued for 5-7 days. The ready solution should be applied on the crops

Application: This mixture should be applied every fortnight. It should be either sprayed directly on the crops or mixed with irrigation water. In the case of fruit plants, it should be applied on individual plants. The mixture can be stored for up to 15 days.

- **Ghanjeevaamrit:**

Benefits and uses: It works as a natural organic fertilizer and enhances soil microorganisms. It boosts the power of the soil and the fertility of the land.

Ingredients: Desi cow dung (aged) - 100 kg, Jaggery - 1 kg, Chickpea flour - 2 kg, Earthworm castings - 1 handful, Cow urine - 2 liters

Preparation: Mix all the ingredients together and gradually add cow urine. Then, cover the mixture with a cloth and keep it in shade for 2 days. After that, make small balls (laddus) from the moistened mixture.

Application: Place ghanjeevaamrut laddu (small ball) between two saplings during planting. If laddus are not prepared, then after drying ghamjeevaamrut for two days, grind and sprinkle it on the plants. Remember, when use it keep water in the field. This can be used for up to 6 months.

- **Neemastra:**

Benefits and uses: It is used to prevent or cure diseases, and kill insects or larvae that eat plant foliage and suck plant sap. This also helps in controlling the reproduction of harmful insects. It's also very easy to prepare and is an effective pest repellant and bioinsecticide for Natural Farming. All the sucking pests, jassids, aphids, white fly and small caterpillars are controlled by Neemastra.

Ingredients: 200 litre water, 2 kg cow dung, 10 litre cow urine, 10 kg fine paste of neem leaves.

Preparation:

Step 1: Take 200 litre of water into a drum and add 10 litre of cow urine. Then add 2 kg of local cow dung. Next, add 10 kg of fine paste of neem leaves or 10 kg neem seed pulp.

Step 2: Then stir it clockwise with a long stick and cover it with a gunny bag. Keep it in shade as it should not be exposed to either sunlight or rainfall. Stir the solution every morning and evening in clockwise direction.

Step 3: After 48 hours, it is ready for use. It may be stored for use up to 6 months. It should not be diluted with water.

Step 4: Filter the prepared solution with a muslin cloth and apply directly on the crop through foliar spray.

- **Brahmastra:**

Benefits and uses: This is a natural insecticide prepared from leaves which have specific alkaloids to repel pests. It controls all sucking pests and hidden caterpillars that are present in pods and fruits.

Ingredient: 20 liters cow urine, 2 kg neem leaves, 2 kg karanj leaves, 2 kg custard apple leaves and 2 kg datura leaves.

Preparation:

Step 1: Take 20 liter of cow urine in a vessel and add 2 kg of fine paste of neem leaves, 2 kg of paste prepared from leaves of karanj, 2 kg paste of custard apple leaves, 2 kgs paste of castor leaves, and 2 kg paste of datura leaves into it.

Step 2: Boil it on a small flame, till one or two foams (overflow level). Stir in clockwise direction, then cover the vessel with a lid and keep on boiling it.

Step 3: After formation of second foam, stop boiling and allow it to cool for 48 hours so that the alkaloids present in the leaves are released into the urine. After 48 hours, filter solution using a muslin cloth and store it. It is better to store in pots (earthen pots) or plastic drums under shade. The solution may be stored for use up to 6 months.

Application: 6-8 liter of Brahmastra diluted in 200 litre of water can be used as the foliar spray on the standing crop. This ratio may be changed depending upon the severity of pest attack as follows:

100 liters of water +3 liters of Brahmastra

15 liters of water +500 ml of Brahmastra

10 liters of water + 300 ml of Brahmastra

2.5. Weeding

The crop necessitates meticulous hand hoeing and weeding, a task carried out manually. Typically, 7 to 8 laborers are ample for tending to a one-acre area. The first weeding is performed after sowing 25 to 30 days after sowing. Subsequently, a second weeding is conducted around 45 days after sowing, tailored to the specific growth stage of the crop. This attentive approach to weed management ensures the unimpeded growth and productivity of the crop. Weeding is mostly done by women farmers at a wage rate of Rs 250-300 per day.

2.6. Irrigation

Groundnut irrigation traditionally relies on the monsoon season and draws its primary moisture from rainfall. Nonetheless, adopting a strategic approach to irrigation is advised, particularly during the critical pod development phase. By employing the highly effective sprinkler method, a well-planned schedule of 3 to 4 irrigations can be implemented. The initial irrigation should take place around 20 to 25 days after sowing, followed by subsequent irrigations spaced at similar intervals. This meticulous irrigation regimen plays a pivotal role in fostering robust groundnut growth and ensuring the attainment of optimal yield results. The predominant irrigation systems employed are sprinkler and drip irrigation, both of which contribute significantly to enhancing overall crop productivity.

Picture 4: Sprinkler irrigation

Picture 5: Drip irrigation

2.7. Harvesting

The harvest of groundnut is strategically timed when the plants exhibit a distinct yellowing, accompanied by the ripening of mature, hardened pods. A truly mature pod is characterized by its resistance to easy splitting under finger pressure. This stage coincides with the onset of yellowing vines and the shedding of leaves. The harvesting process is best initiated when a substantial portion of the nuts has reached full development and maintains its integrity.

Typically, manual harvesting is employed, involving a team of 6 to 8 laborers per acre. The harvesting sequence encompasses several essential tasks: digging, lifting, windrowing, stocking, and ultimately, threshing. This comprehensive approach ensures that the harvested groundnuts retain their desired quality, culminating in a successful harvest.

As described previously, in natural farming, farmers mix seeds of multiple crops while sowing (multicropping), so the harvesting time might be relatively more than conventional monoculture-based groundnut harvesting.

3. Rapid value chain analysis

This section provides details about the various processes involved in the groundnut value chain, namely- storing, sorting, grading, primary processing, secondary processing and various ways in which it is consumed. Instead of reporting consumption separately, we report consumption at various points of the value chain depending upon how many processes that product goes through. Moreover, we first explain the major steps involved in the VC, and then give the overall value chain map to summarize.

Post harvesting, farmers follow the following practices of sorting, grading, and storing the crop on field itself before it is sold anywhere:

3.1. Sorting and Grading

Farmers mostly sort groundnut using traditional manual methods and don't really do any grading of the crop beyond segregating produce according to quality and size. After sorting, the harvested crop is either packed into bags or temporarily stored in the fields under protective covers like tarps.

Picture 6: Woman doing sorting of groundnut

3.2. Storage

Farmers in Anantapur don't have lack dedicated facilities for storing their produce. The prevalent practice is to opt for immediate sale post-harvest posing challenges especially for smallholders. Due to lack of storage, farmers are not able to take advantage of favourable market prices and have to sell their produce at the prevailing rates which are sometimes lower than even Minimum support prices (MSP). Therefore, there is a pressing need for improved storage solutions to empower local farmers and enhance their prospects within the groundnut value chain.

3.3. Direct Markets for farmers

There are following key markets for groundnut crop:

1) Saved as seed for next year planting: Farmers either retain nearly 500,000 metric tons of kernels for re-sowing or vend them as seeds to other farmers with the same intention. The utilization of these kernels varies based on their variety, ensuring that the seed quality should be better.
2) Groundnut sold to consumers directly: Once the produce has been cleaned and its moisture content appropriately managed, it is made available for sale to local consumers. Notably, a significant gap exists in terms of a comprehensive, end-to-end natural produce market. This situation compels farmers to sell their yield at conventional market prices, devoid of any premium attached to natural groundnut.

   Although there are a few organizations engaged in procuring natural groundnut at a premium rate, such as Rural integrated development society (RIDS)- a local NGO, Farmer Producer Organizations (FPO), Tirumala Tirupati Devasthanams (TTD), and Jeevn Palli, who procure groundnut at 10% premium rates from farmers, yet their outreach remains limited to a relatively small area. Consequently, a considerable number of farmers are yet to reap the benefits of these premium rates for their natural produce.
3) GN sold to Agricultural Produce Market Committee (APMC): Within the vicinity, three APMC markets serve as potential avenues for farmers to engage with. These markets are situated in:
   a. Ballari - Karnataka
   b. Challakere - Karnataka
   c. Adoni - Andhra Pradesh

   However, it's observed that many farmers, especially small and marginal farmers, do not actively opt for APMC sales, due to various challenges faced by them:
   a. A lack of premium rates for natural produce within APMC markets.
   b. Limited access to logistical support for reaching APMC locations.
   c. Delays in payment receipt through APMC sales.
   d. The absence of collective sales due to the diverse harvesting periods of different farmers.

   Certain farmers maintain that they got the APMC rates on their own fields itself, which diminishes the appeal of APMC sales. These considerations underscore the multifaceted challenges and perspectives influencing farmers' engagement with APMC markets.
4) GN sold to aggregators and traders: there are many local buyers such as aggregators who buy the crop from the farmers and sell them to wholesalers or processors. The local buyers operate with a focus on maintaining a minimum margin rate, although the exact percentage remains unspecified. They have an extensive presence across the major groundnut production mandals in Ananthapurmu. Payment transactions are prompt, either hand to hand or on a weekly to 10 days' basis, ensuring smooth business operations. The buyers take full responsibility for the arrangements, including weighing machines, bags, and logistic vans. They adhere to the

government rate while determining their purchasing prices usually at the rate of Rs 5,500-7,700 per quintal. Last year, they procured an impressive 8,000 to 100,000 quintals of groundnut from various producing varieties like K6, TAG, and Kadiri Lepakshi. After procuring the groundnut, the buyer strategizes their selling approach. They sell the produce to the nearest APMC and other states' buyers, particularly Gujarat and Maharashtra, aiming to secure the best possible market rate. The Gujarat market is highly preferred by the buyer due to its favorable market rates and favorable business processes.

5) GN sold to primary processing units: Processing centres assume a pivotal role within the framework of value chain analysis. In Anantapuram district, a multitude of key stakeholders are intricately involved in direct and indirect collaborations with farmers. Notably, *Narpala* stands out as the nucleus of processing centres in this region, positioned at an approximate distance of 30 kilometres from Anantapuram. This locale hosts a diverse array of processing industries dedicated to various stages of refinement. Additionally, a limited number of non-governmental organizations (NGOs) and farmer producer organizations (FPOs) partake in processing endeavours. However, those are very limited.

   It is important to know that RYSS doesn't have their own primary or secondary processing centres as part of the APCNF program. In terms of marketing, the RYSS supports farmers by creating the following market linkages:

1. TTD agreement: Tirumala Tirupati Devasthanams is an indepemdent trust which manages temples in AP, including Tirumala Venkateswara Temple. The trust procures commodities from farmers working directly with RYSS at premium prices, to make prayer offerings at the temples. From conducting business in just 1 commodity across 96 villages and 608 farmers in 2022, now TTD is expanding its business with RYSS to 12 commodities, covering 1206 villages and 24800 farmers. It is offering 15% premium over the market price to such farmers. Like TTD, RYSS is also in process of tie ups with 11 more temples.
2. Farmer enterprises: RYSS supports a few enterprising farmers (mostly they are the educated farmers or who show entrepreneurial spirit). There are 2 stages of processing. The primary stage happens at the level of the farmer, but the secondary processing is conducted with the help of RYSS and machines at subsidized rates are provided to create value added products.
3. Farmer weekly markets
4. Mandal Samakhyas: RYSS helps in creation of Mahila marts (women marts) run by women federations, where the produce is collected from natural farmers, processed, and then sold at such marts. But such marts are limited in number.
5. Trade fairs: these are conducted every 2-3 months to take the marketing of the product further.

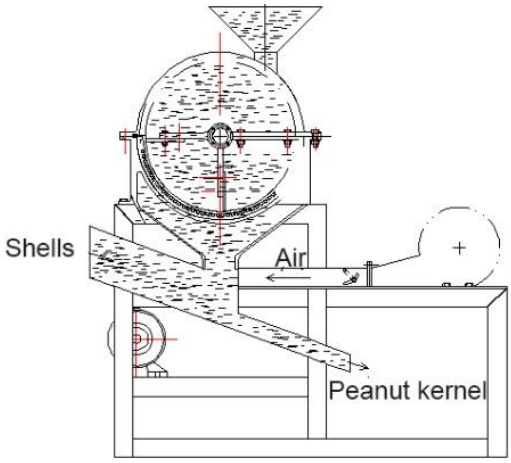
   The following section describes the steps involved in primary processing centres.

3.3a. Primary Processing centres

There are following steps involved in PPCs for groundnut:

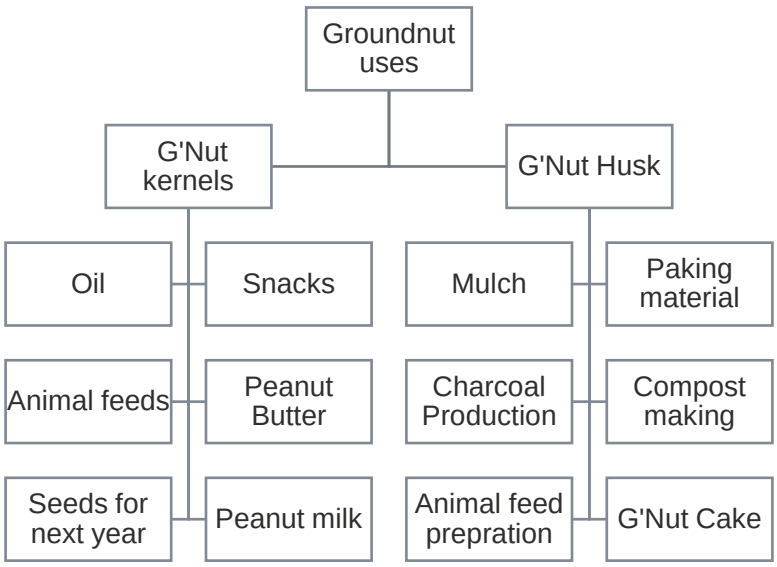
- **Cleaning and Sorting:** Freshly harvested groundnuts undergo a thorough cleaning process to eliminate any impurities such as dirt, rocks, and debris, along with any materials. In addition, a sorting procedure is carried out to identify and remove any compromised or discolored nuts, ensuring only the best quality nuts move forward in the process.
- **Shelling:** Next, the external shell of the groundnut is meticulously removed to unveil the coveted edible kernel within. This shelling stage can be executed using advanced mechanical methods, such as specialized shelling machines, which ensure precision and efficiency in the separation process.

Figure 5: Groundnut shelling machine



So, at this stage, there are two major outputs generated: the groundnut kernel, and its husk and both have multiple uses. The husk is used for mulching (helps in soil nutrition), packaging, charcoal crafting, briquette formation which serves as efficient fuel for industrial heating and other uses, composting, and also animal feed such as kitty litter (Figure 6).

Figure 6: Uses of groundnut



The kernel is used for making value added products besides being consumed as it is, such as in making of snacks, oil extraction, peanut butter and milk etc. These are mostly generated through the secondary processing units (described later). But before we reach the above value-added products and other final uses, the kernels are subjected to further steps as shown below.

- **Roasting:** To accentuate the delightful flavor and captivating aroma of the groundnuts, they are subjected to a carefully calibrated roasting procedure. This involves heating the nuts to a specific temperature, often within expansive rotating drums, to attain the desired roasted essence that enhances their taste.
- **Cooling:** Following the roasting phase, the groundnuts are gently cooled to room temperature, a crucial interlude before progressing to subsequent processing stages.
- **Blanching:** It is an optional process, blanching, takes the roasted nuts through a brief immersion in heated water followed by rapid cooling. This innovative technique expedites the removal of the outer skin, leading to blanched peanuts that are subsequently used in an assortment of products.

- **Grading and Sizing:** The groundnuts undergo meticulous grading, based on factors such as size and overall quality. This meticulous evaluation guarantees that the resulting products crafted from these nuts possess uniform dimensions and appearances.

- **Packaging**: It is the Culminating Stage. Upon the completion of all preceding processes, the final stage within the Groundnut Primary Processing Center (PPC) entails meticulous packaging. This pivotal step involves precisely filling the packages in accordance with the determined grading and size specifications. Quality and size-based packing is helpful for secondary processing.

Picture 7: Women farmers doing grading and sorting of groundnut at a PPC

Picture 8: Packaging of peanut at a PPC

3.4. Secondary processing centres

Secondary processing centres can vary based on the specific products being produced. They often involve specialized equipment and facilities dedicated to the transformation processes required for each product. These centres play a crucial role in adding value to the processed groundnuts and providing a diverse range of products to consumers, industries, and markets. As mentioned before, RYSS doesn't have any secondary processing centres. However, there are other such centres located in Anantapur.

These secondary processing centres take the prepared peanuts and convert them into common items like peanut oil, peanut butter, snacks, and more. We visited a secondary unit run by ICRISAT (International Crops Research Institute for Semi-Arid Tropics)- Walmart partnership in Muddalapuram village, Anantapur district. Here are some common secondary processing steps for groundnuts run in the centre:

1. **Oil Extraction**: Groundnut oil is extracted from the kernels through methods like cold pressing or solvent extraction. The oil can then be refined and packaged for consumption or industrial use. You can choose different grades of seeds based on the specific oil requirements.
   Commencing with the cleansing of procured groundnuts, this intricate procedure advances through the stages of dehulling, or decortication, to unveil the kernels within. Subsequently, the kernels are

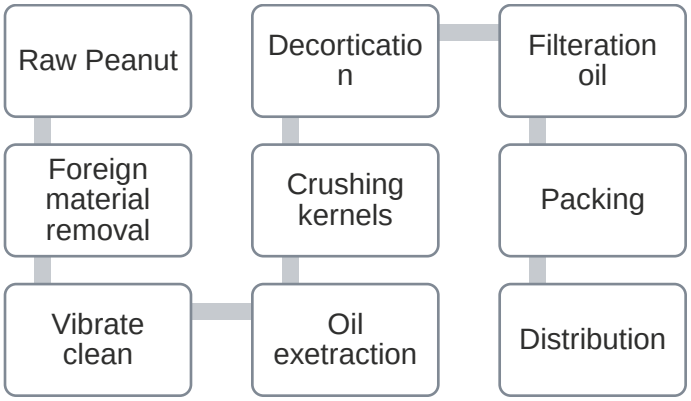
subjected to a process of crushing, achieved via grinding, or rolling. Following this, the crushed material is heated and pressed, facilitating the oil extraction.

India emerges as the world's second-largest producer of groundnut oil, contributing an impressive annual output of 12.8 lakh MT. This endeavor requires the utilization of nearly 32 lakh MT of kernels, thus reflecting the pivotal role of groundnuts in India's consumption landscape.

Picture 8: Oil extraction machine

Picture 9: Extracted cold pressed groundnut oil

Figure 7: Groundnut oil processing steps



2. **Peanut Butter Production:** The process of creating peanut butter involves roasting kernels and skillfully grinding them until a smooth paste is achieved, and adding ingredients like salt, sweeteners, and stabilizers, as desired. To craft 500g of peanut butter, nearly 565g of kernels are employed. The quantum of kernels allocated for peanut butter production in India corresponds to an estimated 25,000 metric tons. Peanut butter serves as a highly nutritious protein alternative favored by bodybuilders and

individuals seeking protein enrichment. Within India, approximately 75% of the produced peanut butter is designated for international trade, while the remaining portion caters to domestic consumption.

Figure 8: Peanut butter processing steps

3. **Snack Production:** Groundnuts can be transformed into a variety of snacks, such as roasted and flavored nuts, peanut bars, *Chikki* and coated candies.

Picture 10: Chikki making machine

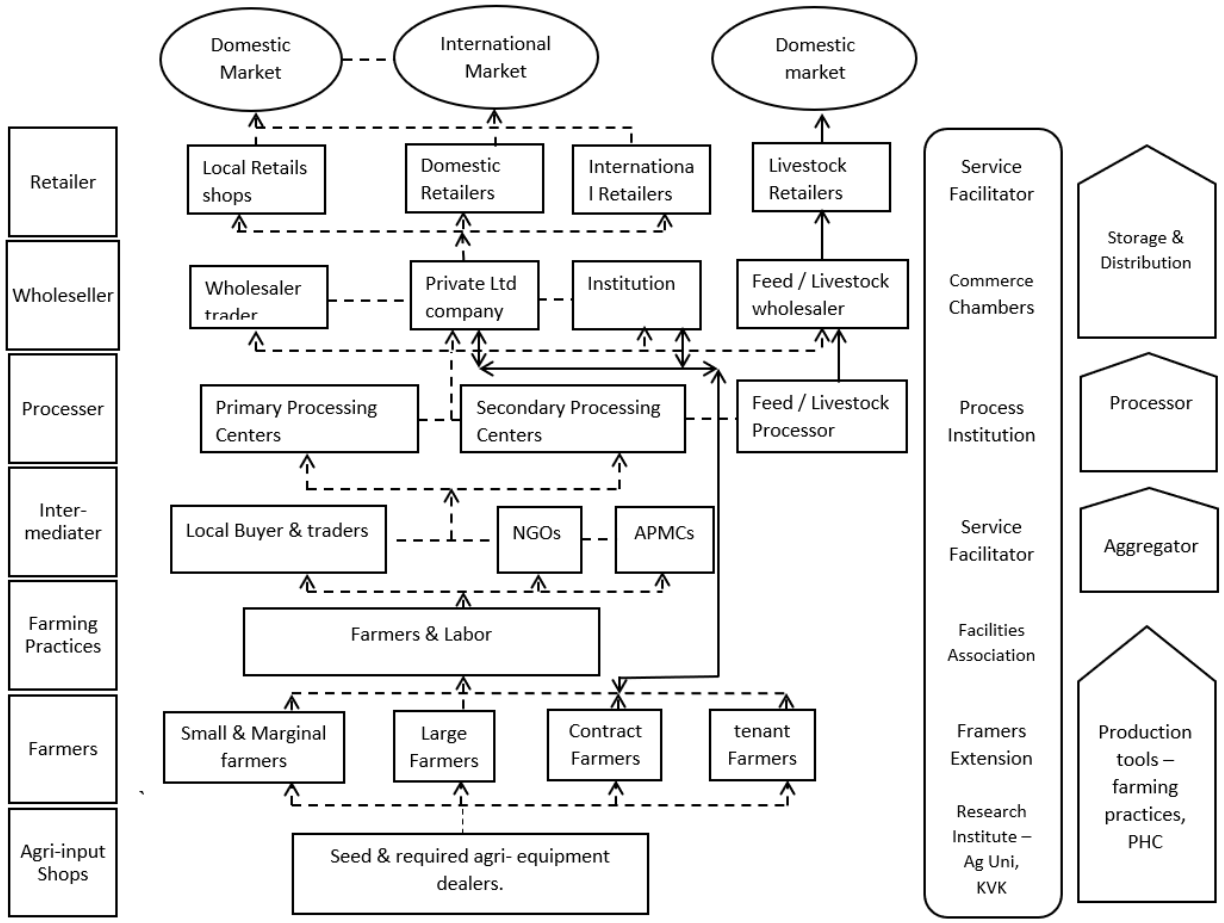
Figure 9: Chikki processing steps

4. Apart from this, the peanuts are used in groceries being added to making of chutneys, chiwda, poha; making snacks such as peanut singh bhuija and salted peanuts and making chocolates to name a few.

3.5. Value chain map of groundnut

The following figure gives a comprehensive value chain map showing the above-described steps in a compact manner.

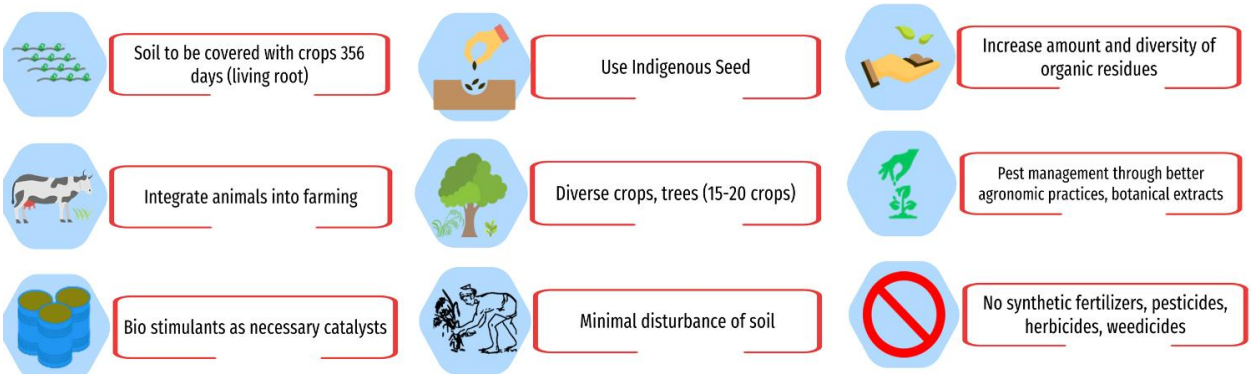
Figure 10: Pre-interventions Value Chain Mapping



4. Agroecological assessment of the current value chain

Based on an extension model centred on community organizations with practicing farmers serving as extension agents, and a wide network of women self-help groups (SHGs), APCNF is spearheading a major agroecological movement with about 6,30,000 farmers and farm workers in 2020-21 practicing natural farming practices, through community natural farming (CNF) in Andhra Pradesh.

Figure 11: Principles of natural farming



The APCNF project has strong interlinkages with the principles of agroecology.

1) **Recycling**: There is recycling of crop residues such as groundnut husk for mulching, using crop residues (sorghum, bajra, rice straw etc) underneath the cattle as bed material, making compost and manure using residues with dung and urine.
2) **Input reduction and soil health**: There is reduced (to negligible) dependence on external inputs and more reliance on in situ regeneration of soil health through by using bio-inoculants, Pre-Monsoon Dry Sowing (PMDS) and covering the soil for longer periods with live crops (called live mulch) to reduce exposure to the sun and applying ghana jeevamrutam. This has also reduced the input costs for instance, reduced use of water (by up to 10%) due to improved water holding capacity and lower costs for weeding due to decrease presence of weeds.
3) **Economic diversification**: It also led to a revival of the traditional cropping system of navadhanya. It includes a combination of millets, pulses, oilseeds, and vegetables sown together allowing for multiple harvesting of crops since each crop matures asynchronously, thereby providing some returns throughout the cropping season.
4) **Biodiversity**: It focuses on biodiversity and bringing indigenous varieties back into the system. Livestock is an important component of CNF since dung and urine are important inputs in CNF.
5) **Synergy**: Mixed farming methods with the integration of animals enhance complementarities and synergies.

6) **Social values and Dietary diversity**: The navdhanya method also helps in consumption of a diverse and healthy diet, indigenous to the community.
7) **Co-creation of knowledge**: It brings together farmers, self-help groups (SHGs) and government and private extension agents to add value to traditional and indigenous knowledge, and for participatory learning, in other words co-creation of knowledge.
8) **Fairness and Participation**: It enables participation of the relatively economically weaker sections of the society eventually allowing them to participate in decision-making processes at the household level, community level and beyond.
9) **Connectivity**: More recently, the project is moving to its 2nd phase from self-consumption to production for sale and has started developing some connectivity of farmers with private sector to strengthen the value chains, but it still needs work.
10) **Land and resource governance**: Farmers are managers and guardians of natural and genetic resources, and one needs to recognize and support ways to provide equitable access to natural resources while additionally facilitating the protection of soil, biodiversity, and ecosystem services in the long run through responsible land and resource governance mechanisms.

The agroecological assessment of the current groundnut value chain of natural farmers indicates that there is strong linkage with the 13 principles of agroecology. We referred to the Business-Agroecology Criteria Tool (B-ACT) for this purpose. The tool has questions pertaining to activities undertaken in each principle to understand how strongly that principle relates to current farming practices- a total of 77 questions across 13 principles. We didn't use the full tool since it is originally designed for an enterprise and not individual farmer. But the Principal questions serve as an important guide to understand overall agroecological linkage. Moreover, we only asked these questions to capture if the farmer directly practices them him/herself ignoring the indirect impacts.

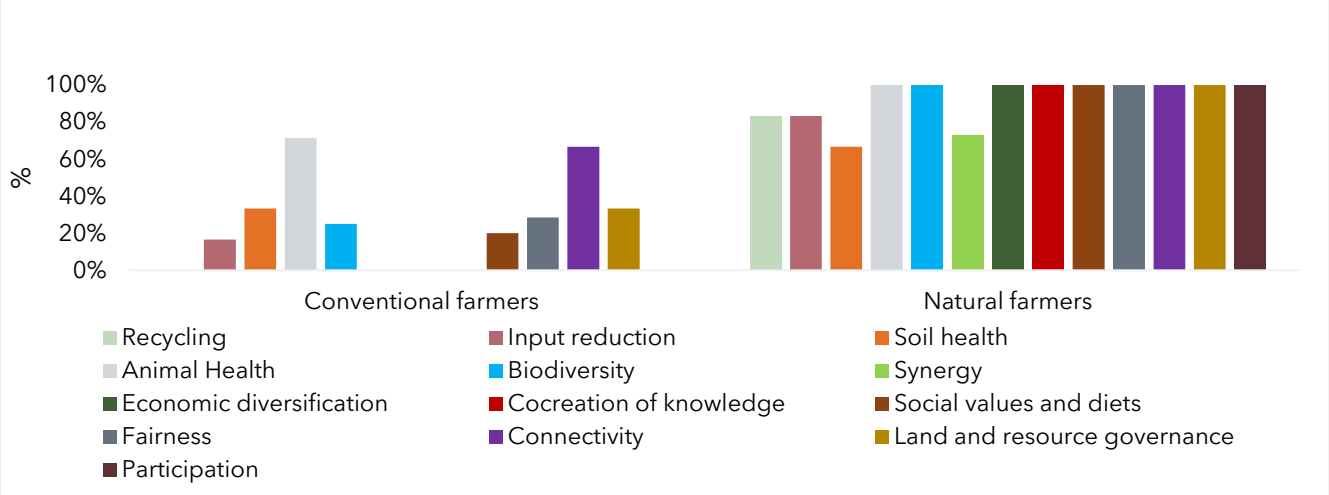
We administered the set of 77 principal questions to total 14 farmers out of which 43% were female. Of the total farmers, 8 were practicing natural farming of groundnut, cultivating on average 4 acres of land, and thus were working with the RySS's APCNF program. The remaining 6 farmers were farming groundnut conventionally (chemical-based farmers) cultivating 6 acres on average (Table 6). About 78% of the farmers were cow-owners owning 2 cows on average.

Table 6: Summary statistic of respondents who were surveyed using B-ACT

Characteristics	% / Mean (SD)	Number of observations that meet the condition
Gender= female (%)	43%	6
Farmer doing natural farming (%)	57.1%	8
Total land cultivated (acres)	5 (3.4)	14
Total land under natural farming (acres)	3.8 (1.3)	8
Total land under chemical farming	5.6 (2.4)	6
No of cows owned	1.8 (1.5)	14
Total no. of observations	-	14

One should note that for each principle, there is different number of questions asked (as per the B-ACT). So we report the % of questions to which the farmer replied `yes' for each principle (Figure 12). We see that natural farmers achieve a 100% score on most principles such as animal health, biodiversity, economic diversification, etc. But the score of a few principles is nearly 80% such as recycling, input reduction and synergy. For chemical farmers on the other hand, the reverse is true- there are many principles whose score is 0, and a few principles only which achieve a positive score.

Figure 12: Percentage score of each principle



5. Major challenges in the current groundnut value chain

Following are the major challenges identified in the groundnut value chain considering the natural farmers working with RYSS.

1) **Inadequate information about natural farming**: There is a need for more targeted extension and awareness to enhance adoption of natural farming. Currently, RYSS conducts its own trainings through a network of CRPs (Community Resource Persons) in the district who train farmers about the methods of natural farming and making bio-inputs in the meetings of women self-help groups and also in the villages separately. There is also presence of limited number of nutritional fellows who spread awareness about the health and nutritional benefits of doing NF and promote the adoption of nutri-gardens in homesteads by the community.

   Despite such initiatives, our interaction with farmers indicated the need for more targeted steps to effectively demonstrate farmers about benefits of natural farming. Some farmers reported that the trainings are conducted much later when the crops are already sown thereby slowing the adoption process. Women SHG members highlighted lack of adequate discussions on NF during their trainings. Moreover, the initial decline in yield due to the switch from conventional to natural farming makes it an unattractive avenue for many. Due to such reasons, many farmers feel under-confident to adopt the practice for long term benefits.

2) **Lack of markets for natural produce and premium prices**: In Anantapur, farmers practicing both conventional and natural farming methods share similar market avenues. Local buyers called *Adatiyas* or middlemen play a pivotal role in purchasing groundnut produce from these farmers. But both natural and conventional farmers receive the same price, and NF farmers don't get any additional premium for their produce. As described before, there are a few organizations and NGOs, such as TTD, RIDS, Jeevan Palli, and Timbaktu that have intervened to procure natural groundnut at premium rates, but their scope is limited to specific areas.

3) **Shortage of bio-fertilizers for Natural Farming**: The prevailing livestock conditions show that only 30 to 40 percent per village of farmers possess their own livestock, indicating a scarcity of essential resources like cow dung and cow urine. This scarcity poses a significant challenge to farmers aiming to prepare inputs for natural farming such as *ganjeevamrutham, jeevamrutham, beejamrutham, etc*., described previously. Adding to the complexity, a portion of farmers lack awareness to preparation practices of natural input, while others are constrained by time, impeding their ability to create natural inputs effectively. This challenge particularly affects tenant farmers, and small and marginal farmers who hold a genuine interest in natural farming.

4) **Inadequate Storage Facilities**: Most farmers have limited housing space, leaving them without the capacity to utilize any area as a dedicated warehouse for storing their crops. Consequently, farmers are compelled to promptly sell their harvests post-harvest. This prevents them to take advantage of the market conditions to sell when the prices are favourable since given the daily fluctuations in groundnut rates during the harvesting period, farmers are obligated to make sales based on the prevailing harvest conditions.

5) **Challenges in certification of natural produce**: In India, there are two ways of certifying a product. There is a NPOP (National Programme for Organic Production) and NOP (National Organic Program) where accredited certification agencies (third parties) certify the organic producers and the produce can also be exported afterwards. And then there is a PGS certification (Participatory Guarantee system) where people in similar situations (in this case smallholder producers) assess, inspect, and verify the production practices of each other and take decisions on organic certification. This system was launched by the Ministry of Agriculture and Farmers' Welfare, GoI, to make certification affordable and accessible for smallholders without the need for third party certifications. RYSS offers PGS certification to farmers doing natural farming.

   However, PGS is easier to give to farmers in a continuous territory since there is less chance of land getting contaminated by chemicals if we focus on a large chunk of land doing natural farming, thereby creating challenges to certify fragmented landholdings. Moreover, it is not as trustworthy among consumers unlike NPOP, since the produce is self-certified by farmers. And thus, to ensure that there is no chemical use, a stringent vigilance and supervision of field is required. RYSS offers a pesticide residue testing as well to enhance credibility of produce but again, there are concerns of sustainability of this support. Such issues create prevent farmers to take full advantage of the market.

6. Proposed solutions to combat the above challenges

There are several opportunities that exist which will improve the prospects for natural farmers. In light of the above challenges, following are the potential solutions identified:

1) **Strengthening the extension system for natural farming**: As argued before, there is a need for more systematic approach towards capacity building of extension officials and enable them to be the change makers. We must leverage innovative technology to bridge gaps in information exchange and last-mile connectivity as well as integrating practitioners in the community. For example, exposure visits on successful natural farming field, spreading information through mobile phones, channels, YouTube videos, etc.
2) **Sale of natural farming output through women collectives:**
   We must leverage the strength of collective actions, as depicted by the women self help groups to generate market linkages for natural output. This includes the following steps:

   a) **Need for aggregation and storage:** There is a significant need for aggregation of natural produce to realize better prices. Empowering the women collectives by organizing them into Farmer producer organizations, is an important step towards this direction. The FPOs helps its members realize fair prices for their product through dedicated understanding of conditions in local markets. Another option is to link natural farmers with preexisting FPOs. This could be done by aggregating output at local level (say a village) by establishing cluster collection centres which then gets supplied to the bigger FPOs. As discussed above, there are many primary and secondary processing centres in Anantapur which are out of reach of the natural farmers due to lack of aggregation and storage facilities.
   b) **Sale of value-added products locally through women collectives:** There is a potential to enhance sale of groundnut-based value-added products locally through the SHG platform. The government of Andhra Pradesh has initiated Cheyutha Mahila Mart- an initiative to provide a platform to women to sell their produce. This will also boost the spirit of entrepreneurship in the rural economy. There is one Mahila Mart in Bathalapalli where the natural produce from these NF farmers is sold, in small 1-2 kg packets at higher prices (about Rs 20 higher than usual). To run this each SHG member contributes a share capital of Rs 300 only once. Some farmers also sell to Bangalore and get a price premium of Rs 5/kg. We can thus enhance the linkage of women growers with local markets by providing them a formal training and information on how to join such marts. Many private retail organizations also buy products from such shops thereby strengthening linkage with other major urban markets.

3) **Local bio-input shops:** As argued before, there are several challenges in making the bio-fertilizers that are key in adoption of natural farming. A potential intervention here would be to construct local bio-input shops which sell these inputs at nominal rates to farmers who want to adopt NF. As mentioned previously, these inputs are purchased using all natural elements within the homestead. GJV is powdered and JV is liquid. We need 400 kg of GJV per acre and for JV, for 1 acre, mix the following amount of JV with 100 litre of water based on crop days:

Table 7: Application rate of JV

5 litre	5-20 days
10 litre	20-25 days
15 litre	30-35 days
25 litres	45-50 days

We tried to calculate the cost of making 2 such inputs – ghanajeevamrutham, jeevamrutham as shown below:

Figure 13: Cost to make 200 litres of jeevamrutham

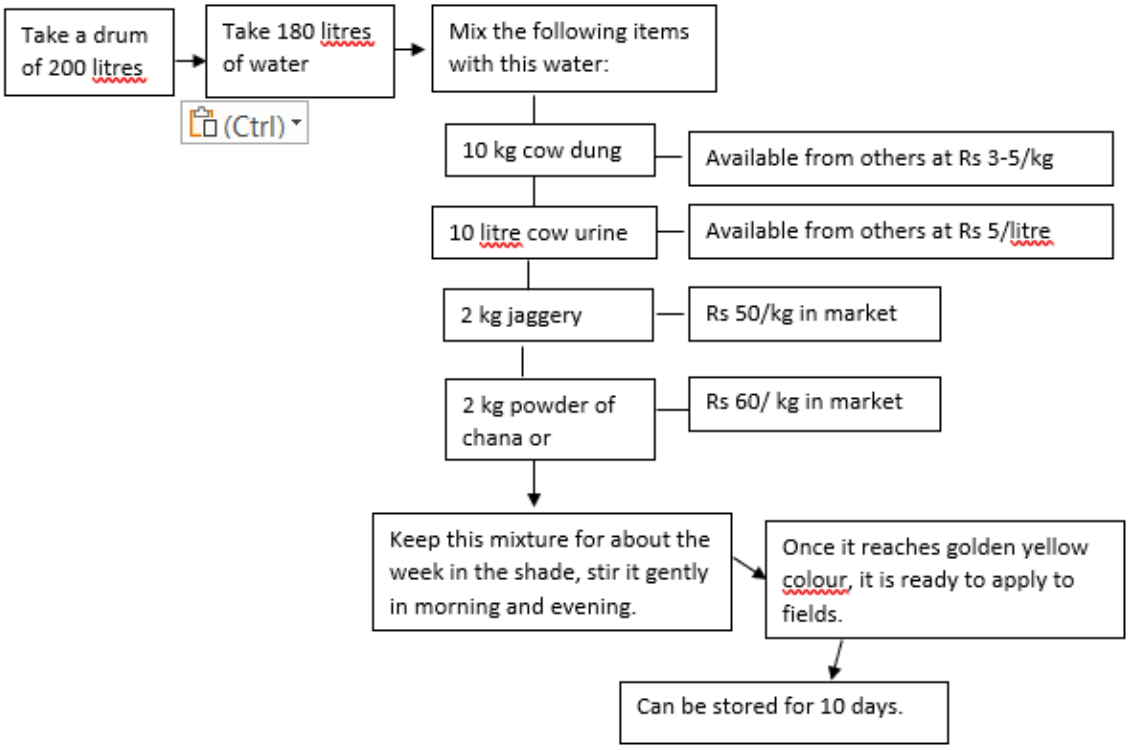
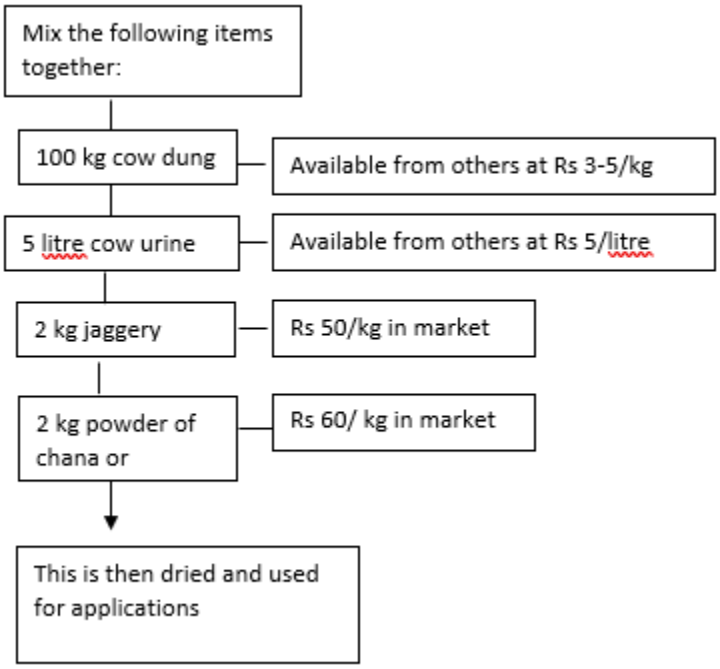


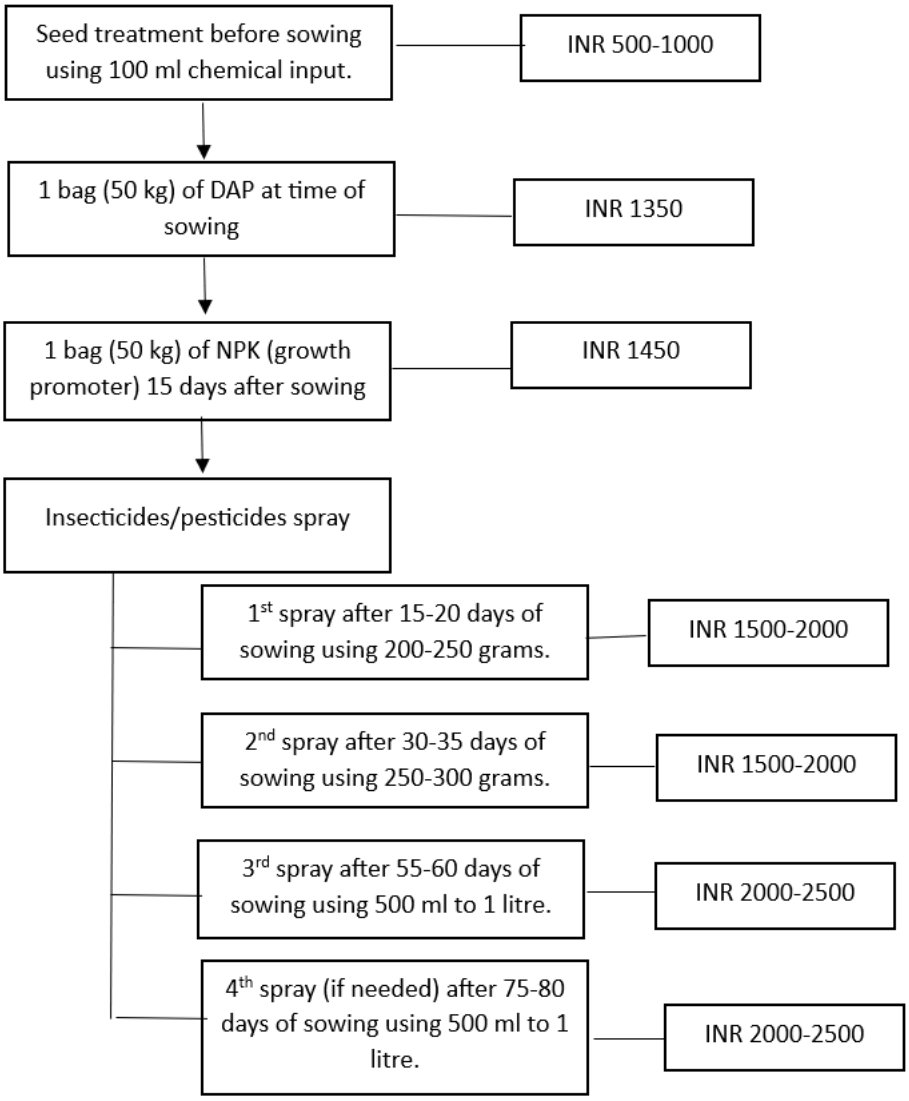
Figure 14: Cost to make 100 kg of Ghanajeevamruth



So overall, the cost of making JV is Rs 320 for 200 litres (or Rs 1.6=2/litre). In one acre, as per the dosage specified above, about 55 litre is used (=Rs 110 cost/ acre). And considering the shelf life of JV is just 10 days, JV needs to be made atleast 4-5 times a month. Likewise, for GJV, the cost of 100 kg is 500 + 25+ 100+ 120= Rs 745 (or Rs 7.5/kg). And for 1 acre we need 400 kg so cost is Rs 2980.

As compared to this, for chemical farming, following key chemicals are added at various stages:

Figure 15: Chemical inputs used and their cost per acre



And as we can see, the cost of application for 1 acre could be between Rs 10,300 to Rs 12,800 which is more than 3 times the cost of making GJV per acre.

Some SHG leaders are selling GJV and JV- they make them within their homes and sell to others on demand. The price charged is Rs 8/litre for JV and Rs 25/kg for GJV. These prices more than cover for the costs of making them- Rs 2/lit and Rs 7-8/kg.

The SHGs make agriculture action plans per season regarding what will be grown, what are the input needs and then only discuss who will need how much JV or GJV and the sellers produce them accordingly. They also discuss about what should be their price based on what others can pay.

In Gantapuram village (Bathalapalle block), there are from within their homes, prepared by the HH members together. The women themselves handle all management of the production along with bookkeeping. One of them said that they make monthly sales of about 50 liters of JV and 600 kg of GJV making about Rs 15000 monthly. These inputs are sold not just to member farmers but other non-members as well. About 50 non-member farmers come per season to buy this from them. There are a few issues faced by them such as shortage of cowdung sometimes (this also limits their ability to expand production and sell beyond own village).

Such a model of input shops carries a lot of potential to meet the demand for bio-inputs locally freeing others from this job, providing landless women an employment opportunity, boosting entrepreneurial spirit, and enhance the transition towards agroecology. Currently, women run these shops through own SHG savings. But to enhance the availability of such shops, we need institutional credit support for such groups. For instance, through convergence, we can link the National Rural Guarantee Act Programme (NREGA) and Indian Public Jobs Programme and use their funds to provide financial support to women to set up these shops. Moreover, women need trainings and technical expertise in maintaining and running these shops.

4) Testing of the quality of bio-fertilizers

Another important step to strengthen the bio-input shops is establishing the credibility of the inputs sold at such shops. There should be availability or development of methods to test their chemical compositions. This will also attract investments from private sector once the credibility of inputs (and hence output generated from such farming) is established and would make obtaining high level certifications easier.

7. SWOT analysis of proposed solutions:

- **Strengths:**

Increased Awareness by bringing technology, SHGs, extension system: Interventions focuses on enhancing awareness about NF practices among farmers using technology, SHG platform and public/private extension system. This can lead to improved adoption rates and better understanding of natural farming methods.

Certification: Some farmers are already engaged in Participatory Guarantee System (PGS) certification, which indicates a commitment to producing organic products.

Private Sector Collaboration: Collaborations with private organizations like Phalada Agro, Reliance, and others show potential for market linkages and enhanced market access.

Local Consumption: There is an opportunity to tap into the local consumption market by creating end-to-end natural products and collaborating with farmer producer organizations (FPOs) like Kamarupalli Village FPO.

- **Weaknesses:**

Training: The training activities for farmers have been limited to specific producing groups. This hampers the scalability of natural farming practices.

Raw materials for bio-Input Preparation: the input shop business might get affected by shortage of indigenous variety of cows hampering availability of cow dung and urine.

Storage and Logistics: Insufficient storage facilities and logistics make it challenging for farmers to manage their produce effectively and access markets. If market conditions are unfavorable, relying solely on storage facilities might lead to increased costs for maintaining the produce.

- **Opportunities:**

Training: Expanding and enhancing training activities through campaigns, banners, posters, audio, and video can raise awareness and increase farmer engagement.

Cluster Collection Centers: Establishing cluster collection centers can improve market access, reduce logistics issues, and create healthy market competition.

Market Diversification: Exploring both domestic and export markets for organic groundnut products can open up new revenue streams. Export and domestic market opportunities can lead to increased demand for NF groundnut and related produce.

Conventional Farmers: Engaging conventional farmers interested in natural farming practices can increase the adoption rate and create a larger community of natural farmers. Collaborating with conventional farmers for bulk NF production can promote knowledge sharing and potentially lead to wider adoption of NF practices.

- **Threats:**

Limited Market Access: Limited access to markets, especially for those without storage facilities and reliable transportation, can hinder market participation.

Lack of Awareness: Lack of awareness about natural farming practices among non-participating farmers can slow down the adoption process.

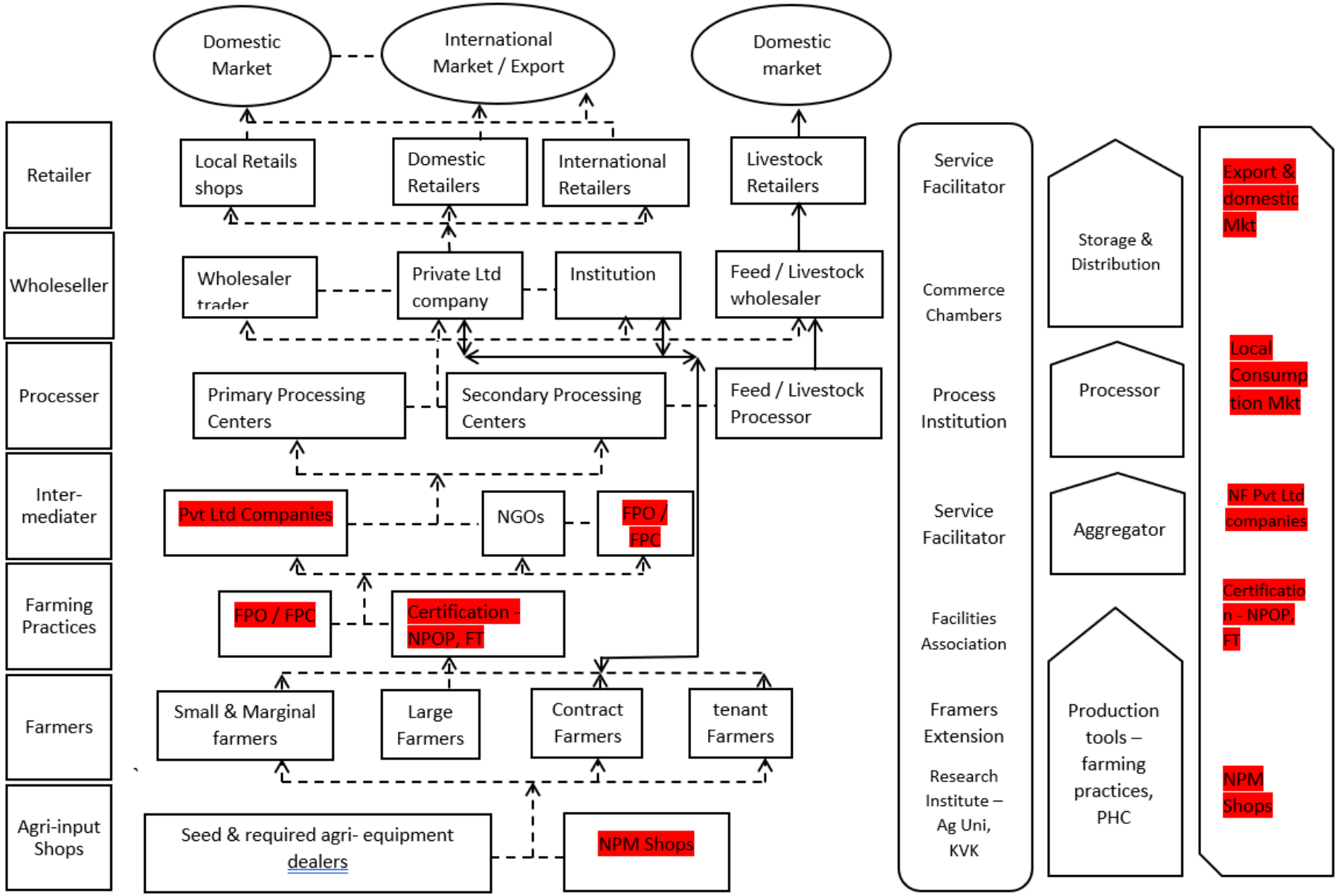
Resistance to Change: Convincing farmers to switch from conventional to NF practices might face resistance due to the unfamiliarity and perceived risks associated with the new approach.

Quality Control: Maintaining consistent quality of NF produce can be challenging, potentially affecting market reputation.

8. Updated potential value chains map after interventions

The following value chains map shows the changes that would arise in the VC map upon adoption of the above major interventions. We have highlighted the new additions in red.

Figure 16: Post intervention value chain mapping



9. Conclusion

The groundnut value chain analysis provides a comprehensive understanding of the intricate dynamics that govern the cultivation, processing, and consumption of groundnuts in the Anantapuram district. The journey from pre-value chain analysis, where the package of practices, demography, soil conditions, and sowing techniques were explored, to the post-value chain analysis, which delved into storage, processing, consumption, and market challenges, has highlighted both the strengths and vulnerabilities of the value chain.

The analysis underscores the commitment of farmers to natural farming practices and their active participation in enhancing productivity while adhering to sustainable principles. The demography and soil conditions of Anantapuram, while presenting challenges, have also shaped the uniqueness of groundnut cultivation in the region.

Through this value chain, it becomes evident that while there are notable strengths such as farmers' interest in natural farming, collaborations with private players, and the potential for local consumption, there are also areas requiring focused interventions. Challenges like limited market access, scarcity of natural inputs, inadequate storage facilities, organic certification and the absence of comprehensive end-to-end processing centers have been identified.

The recommended interventions presented in the analysis provide a roadmap for addressing these gaps, leveraging the strengths, and seizing opportunities. Enhancing training, creating cluster collection centers, diversifying markets, engaging conventional farmers, promoting organic certification, and empowering local markets are all critical steps toward building a more resilient and sustainable groundnut value chain.

The groundnut value chain analysis serves as a valuable resource for stakeholders, policymakers, and farmers alike, offering insights into strategies that can unlock the full potential of groundnut cultivation while contributing to the economic growth of the district. By implementing these interventions, Anantapuram can pave the way for a vibrant and inclusive agricultural ecosystem that not only benefits farmers but also meets the evolving demands of consumers for sustainable and high-quality produce.

10. References

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