Research Bulletin No. 29

Groundnut Value Chain Innovations to Enhance Farmer Profitability and Promote Oil, Food and Confectionery Industries in Telangana

Mapping Groundnut Technologies in Telangana (Baseline survey) Report

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY 2014

Citation: Kumara Charyulu D, Reddy DS, Reddy RV, Mamatha K, Govardhan M, Gajanan S, Kumar AA, Sudini HK, Bagudam R, Sravanthi K, Shankar M, Sujatha M, Vanisri S, Reddy MM and Pasupuleti J. (2023). Groundnut Value Chain Innovations to Enhance Farmer Profitability and Promote Oil, Food and Confectionery Industries in Telangana. ICRISAT Research Bulletin No. 29, Patancheru 502 324, Telangana, India: International Crops Research Institute for the Semi-Arid Tropics. 36 pp.

ISBN: 978-81-956619-8-5

Publisher: Self publish

Printed: ICRISAT, Patancheru 502 324, Telangana, India

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2023

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Contents

Executive summary

Groundnut is a major oilseed crop grown in Telangana state, India, mainly during the post-rainy season (rabi) and to a limited extent during the rainy season (kharif). The state's high quality and aflatoxin-free groundnut produce in the post-rainy season provides a unique opportunity to expand the groundnut value chain in the country. This study on "Mapping of groundnut technologies in Telangana" was carried out to achieve the outputs under Objective 1 of the four-year project on "Groundnut value chain innovations to enhance farmer profitability and promote oil, food and confectionery industries in Telangana". The project is supported by the Government of Telangana (2022-2025) and is being implemented jointly by Professor Jayashankar Telangana State Agricultural University (PJTSAU) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

This study aims to document existing practices in groundnut cultivation through a representative primary survey in the state and to identify key constraints and potential opportunities to expand the crop area. A state-level representative baseline survey was undertaken covering about 994 groundnut growers drawn from three major districts of Telangana state (Nagarkurnool, Wanaparthy and Mahabubnagar), 14 mandals, and 56 villages. The household data were complemented by Focus Group Discussions (FGDs) in the study villages. Tablet-assisted CS-Pro programming formats and highly trained field investigators were used to collect the data. Primary data was validated and analyzed to derive meaningful conclusions.

The study found that small and medium groundnut farmers comprised nearly 2/3rd of the total sample. The average age of the sample households was 45 years. More than half of the total sample had no formal education. Nearly 98% of the total sample was highly dependent on agriculture and allied activities for their livelihoods. The mean operational landholding of the baseline sample stood at 2.84 ha, of which 0.40 ha were dryland and 2.44 ha accounted for irrigated land. In the study areas, groundnut cultivation was highly preferred during the post-rainy season on red chalka/sandy soils, while the preferences were for paddy, maize and cotton in the rainy season under irrigation and for cotton in the drylands. Fallow followed by groundnut or maize-groundnut were the preferred cropping system choices practiced in the study districts. This pattern of cultivation was quite similar in all the sample villages. The mean groundnut area allocated for the entire sample was around 1.98 ha per household, a significant figure that reflects the importance farmers give to groundnut in the study region.

Kadiri 6 (K 6) is the single dominant cultivar (>90%) in the three targeted districts, followed by K 1812 or TAG 24, based on farmers' choices. Wide variations were observed in groundnut productivity levels under different climatic conditions (bad, good and best). Mean groundnut productivity stood at 1754 kgs/ha during the 2021-22 rabi season, remarkably lower than a good year's productivity level and much closer to that in a bad year. Mean haulm productivity too is low at 618 kgs/ha. These figures clearly reveal that the groundnut farmers are not happy with current productivity levels and are experiencing significant income losses in its cultivation, underlining the need to enhance mean productivity levels.

A majority of the farmers in the survey felt access to improved seed is their biggest challenge. Informal seed systems play a pivotal role in the state. Traders/dealers/millers play a crucial role in seed supply and distribution. The timely provision of quality seed in sufficient quantities is the entry point that the project should focus on for sustaining the groundnut area in the study districts. Promoting low-cost on-farm seed storage technologies such as Purdue Improved Crop Storage (PICS) bags is critical for improving seed access. Biotic stress (such as pod borer and late leaf spot) plays a major role in limiting productivity. The crop never gets exposed to moisture stress conditions; hence abiotic stress has a limited role in crop genetic improvement. Aflatoxin contamination is very limited in the study area and farmers have a reasonably good knowledge about it.

More than 90% of the groundnut produced goes to the market as kernel. There is no practice of preserving seed for the next season. Hence there is huge scope for promoting such interventions to reduce costs as well as introducing quality seed in the sample villages. The introduction of effective crop management strategies can reduce the high seed rate (90 kg kernel/acre) and excessive irrigation during the first 30 days of the crop. Immense scope also exists for promoting mechanization in different operations which will ultimately reduce the cost of cultivation and enhance profitability.

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1. Project background

Telangana state presents a unique opportunity in the groundnut value chain in the country to meet growing domestic demand and export markets for three reasons; i.e., (a) the crop is grown in *rabi* season under irrigation, (b) cultivation under irrigation results in good seed filling ensuring good size and shelling out-turn, and (c) the *rabi* crop in the dry months (mid-Feb to April) leads to safe drying of pods with minimum chances of *Aspergillus* infection at pre-harvest, harvest and drying, thereby ensuring low aflatoxin contamination. Despite vast opportunities, the groundnut value chain's potential in the state has not been harnessed. An efficient groundnut value chain can contribute to the recent Telangana State Food Processing policy's objective of setting up food processing units on 4,000 ha by 2024-25.

Project objectives

1. Map existing groundnut production practices in the state, from sowing to harvest, including biotic and abiotic stresses.
2. Accelerate the development of new groundnut varieties using genomic tools, rapid generation advancement, and testing of new cultivars with industry-preferred traits suitable for *Kharif, Rabi* and *summer* season cultivation.
3. Develop and promote improved production packages for groundnut, including mechanization for enhancing the benefit-cost ratio.
4. Promote seed systems to enhance access to quality seed and cultivation of improved varieties that meet the needs of the confectionary, snack food, export and oil industries, and new strategies for farmer-to-farmer seed distribution.
5. Establish market linkages to build groundnut value chains and promote local processing.
6. Capacity building of researchers, extension staff, seed agencies and farmers for their own production and other farmers.

Expected outcomes and impacts of the project

The key outcome of the project is to see Telangana emerge as a key producer of high-quality groundnut for exports and domestic food processing markets and as a major player in the seed supply chain in the country. Groundnut value chain actors, including farmers, can derive economic benefits through the cultivation of new cultivars with industry-preferred traits and the adoption of improved agronomic practices. Value chain interventions can pave the way to establishing secondary groundnut processing industries and export units in the state and create new employment opportunities through oil mills and value-added products, custom hiring centers for machinery and seed entrepreneurship. Through biological nitrogen fixation, groundnut contributes to environmental sustainability and thereby sustainable agricultural production systems.

2. Status of groundnut in Telangana

Groundnut is one of the major oilseed crops grown in Telangana. It is cultivated predominately during the post-rainy season while its spread is limited during the rainy season. The cropped area in the state has been fluctuating slightly in the last five years (2016-21). While the area covered during the rainy season has been much stable, that in the post-rainy season has declined slightly the recent period (2016-17 to 2020-21) from 140,000 ha to 112,000 ha, and production has hovered around 300,000 tons. In recent years, *rabi* productivity levels have been relatively higher than those in the *kharif* season (Table 1).

Table 1. Area, production and yield of groundnut in Telangana from 2016-17 to 2020-21.

Year	Kharif	Rabi	Total
Area ('000 ha)			
2016-17	26.0	140.0	166.0
2017-18	21.0	146.0	167.0
2018-19	13.0	113.0	126.0
2019-20	12.0	99.0	111.0
2020-21	15.0	112.0	127.0
Production ('000 tons)			
2016-17	52.0	290.0	342.0
2017-18	46.0	326.5	372.4
2018-19	32.6	281.3	313.8
2019-20	32.9	232.5	265.4
2020-21	23.7	266.6	290.3
Yield (kg/ha)			
2016-17	2,000	2,071	2,060
2017-18	2,188	2,236	2,230
2018-19	2,504	2,489	2,491
2019-20	2,743	2,348	2,391
2020-21	1,580	2,380	2,286

Source: State Statistics at a Glance, 2023.

The district-wise area under groundnut during the rainy season (2019-20) is summarized in Table 2. The presence of rainy season groundnut is significant (> 1000 ha) in only three districts out of the 33 in the state. Jogulamba Gadwal has the highest area (5,983 ha) followed by Warangal (2,560 ha) and Wanaparthy (1,385 ha) districts. The other districts have very negligible area during the rainy season. Mean productivity levels of the rainy season crop are around 2.75 tons/ha.

Table 2. District-wise area, production and productivity of rainy season groundnut, 2019-20.

District	Area (ha)	Production (tons)	Productivity (tons/ha)
Jogulamba Gadwal	5,983	14,887	2.49
Warangal	2,560	8,610	3.36
Wanaparthy	1,385	3,911	2.82
Suryapet	464	1,155	2.49
Nalgonda	436	1,197	2.75
Bhadradri Kothagudem	329	902	2.74
Nagarkurnool	229	572	2.50
Mahabubabad	168	461	2.74
Jangaon	156	427	2.74
Narayanapeta	117	320	2.74
Vikarabad	109	300	2.75
Yadadri Bhuvanagiri	92	252	2.74
Hanumakonda	84	229	2.73
Nizamabad	80	219	2.74
Khammam	50	137	2.74
Siddipet	43	118	2.74
Komaram Bheem Asifabad	23	62	2.70
Mahabubnagar	21	58	2.76
Mulugu	18	49	2.72
Jayashankar Bhupalpally	6	16	2.67
Karimnagar	5	13	2.6
Sangareddy	2	6	3
Medak	1	2	2
Peddpalli	1	2	2
Rangareddy	1	2	2

Source: Crop Production Statistics Information System, Govt of India.

District-wise groundnut area in the post-rainy season (Table 3) shows that many districts had significant area under the crop due to the predominant cultivation of groundnut during the season. Nagarkurnool leads in this with close to 50,000 ha under groundnut, followed by Wanaparthy district (approximately 18,000 ha). Jogulamba Gadwal, Nalgonda, Mahabubnagar, and Vikarabad districts also had a good chunk of area (>3000 ha) under the crop during 2019-20. Warangal and Wanaparthy districts showed the highest productivity levels (> 3.0 tons/ha) in the state.

Table 3: District-wise area, production and productivity of post-rainy season groundnut, 2019-20.

District	Area (ha)	Production (tons)	Productivity (tons/ha)
Nagarkurnool	49,722	107,137	2.15
Wanaparthy	17,556	53,489	3.05
Jogulamba Gadwal	5,008	13,439	2.68
Nalgonda	4,592	7,817	1.70
Mahabubnagar	3,900	8,192	2.10
Vikarabad	3,114	8,548	2.75
Narayanapeta	2,360	4,916	2.08
Karimnagar	1,839	3,072	1.67
Mahabubabad	1,758	3,079	1.75
Suryapet	1,485	4,200	2.83
Warangal	1,450	4,603	3.17
Bhadhradri Kothagudem	1,007	2,532	2.51
Hanumakonda	716	1,681	2.35
Jangaon	701	1,034	1.48
Siddipet	651	1,174	1.80
Rangareddy	624	2,495	4.0
Khammam	585	860	1.47
Adilabad	404	948	2.35
Mulugu	378	683	1.81
Jagityal	220	384	1.75
Nirmal	146	341	2.34
Mancherial	83	195	2.35
Jayashankar Bhupalpally	51	120	2.35
Yadadri Bhuvanagiri	47	111	2.36
Medak	36	83	2.31
Kamareddy	34	80	2.35
Rajanna Siricilla	32	74	2.31
Sangareddy	31	72	2.32
Komaram Bheem Asifabad	27	63	2.33
Nizamabad	16	37	2.31
Peddpalli	3	7	2.33

Source: Crop Production Statistics Information System, Govt of India.

3. Baseline survey approach

A mapping of existing groundnut production practices in the state was attempted by undertaking a representative baseline survey. Since post-rainy season groundnut is dominant, the baseline survey too was restricted to the post-rainy season crop. Based on the area under post-rainy season groundnut, the baseline survey purposively selected three major districts *i.e.,* Nagarkurnool, Wanaparthy, and Mahabubnagar. The mandal/tehsil was identified as the basic sampling unit to determine the representative sample. Given the limitations of economic resources and time for the survey, 14 mandals were identified for the baseline survey based on the probability proportion to groundnut cropped area (post-rainy season) in the three selected districts. Using this criterion, 8 mandals were identified from Nagarkurnool, 4 from Wanaparthy and 2 from Mahabubnagar districts. From each identified mandal, four villages were selected based on their highest concentration of groundnut area. From each selected village, 18 groundnut farmers were identified randomly for the primary household survey. Of the 18 farmers, 14 were small and marginal farmers (with operational landholdings of less than or equal to 2.02 ha), 2 medium category farmers (> 2.02 to <= 4.04 ha) and 2 large category farmers (> 4.04 ha). Thus, a total of 1008 households were targeted for the baseline survey from 3 districts, 14 mandals, and 56 villages.

Two survey instruments were developed for the primary household survey in addition to focus group discussions (FGDs), and shared with project stakeholders for their review and feedback. Based on the comments received from them, modifications were made. Both the instruments complement each other to validate various data points and finalize findings. Census and Survey Processing System[1] (CS-Pro) programming formats were developed and validated to collect tablet-based data for the survey. Ten field investigators (graduates and post-graduates in agriculture) were engaged for data collection. They underwent a three-day orientation training organized at RARS Palem during 13-15 September, 2022 to familiarize them with the survey instruments and to obtain hands-on experience in tablet-based data collection. Tablet-based pre-testing of survey instruments was done during the training program and necessary modifications were incorporated. Primary data collection was completed in about 22 days.

The data collected on tablets were exported to excel and validated critically. Outlier/missing data, if any, was identified and rectified in consultation with field investigators. The cleaned dataset was processed for tabular analysis. Preliminary findings from the survey were shared with stakeholders on 17th Feb 2023 and key comments were incorporated while preparing this report.

[1] https://www.census.gov/data/software/cspro.html

4. Baseline survey findings

The findings from the baseline survey are summarized below.

4.1 Sample coverage

Table 4. District-wise distribution of the sample for the baseline survey.

Mandal	Mahabubnagar	NagarKurnool	Wanaparthy	Total
Achampet		76		76
Balmoor		74		74
Gopalpet			62	62
Kalwakurthi		64		64
Lingal		76		76
Midjil	70			70
Mohammadabad	87			87
Pangal			71	71
Peddakothapalle		66		66
Telkapally		80		80
Uppununthala		73		73
Vangoor		61		61
Wanaparthy			75	75
Weepanagandla			59	59
Grand total	157	570	267	994

Even though the baseline survey aimed to cover 1008 households from 56 sample villages, it covered only 994 households from 14 mandals (Table 4). As envisaged in the survey approach, the field team faced difficulties in identifying a sufficient number of marginal and small groundnut farmers in the sample villages. Hence, their representation in the total sample declined marginally and the corresponding share of medium and large farmers was greater. Further, a few incomplete records in the dataset were discarded.

4.2 Socio-economic profile

The socio-economic profile of the sample farmers is summarized in Table 5. Small groundnut farmers (with operational landholding of > 1.01 to 2.02 ha) constituted the lion share (35.4%) of the total sample. This was followed by medium farmers (> 2.02 to 4.04 ha) with a share of 32.4% in the total sample. Marginal farmers (< 1.01 ha) had a share of 18.0% and large farmers (> 4.04 ha) represented 14.2% of the baseline sample. Thus, marginal and small groundnut farmers together represented only 53.4% of the total sample. This clearly indicates that the average landholdings allocated to groundnut cultivation is relatively higher when compared with other crops. Further, a major chunk (57.3%) of the total sample was from Nagarkurnool district, followed by Wanaparthy (26.9%) and Mahabubnagar (15.8%) districts. This trend clearly represents the post-rainy groundnut area in the state.

The average age (years) of the household heads in the total sample was around 45.3 years. It was the lowest in the Nagarkurnool (44.4 years) and highest in Wanaparthy (47.2 years). Mahabubnagar farmers had an average age of 45.4 years. More than 98% of the sample had male-headed households and the rest had female-headed households.

Table 5. Socio-economic profile of the sample.

District	Average age of household head (Years)	Marginal farmer	Small farmer	Medium farmer	Large farmer	Total
Mahabubnagar	45.4	31	67	42	17	157 (15.8%)
Nagarkurnool	44.4	92	175	198	105	570 (57.3%)
Wanaparthy	47.2	56	110	82	19	267 (26.9%)
Grand Total	45.3	179 (18.0%)	352 (35.4%)	321 (32.4%)	141 (14.2%)	994 (100.0%)

The farmer distribution by caste is shown in Figure 1. About 63.6% of the total farmers belonged to the Backward Class (BC), 15.8% to the Open Category (OC), 12.3% to the Scheduled Caste (SC) and 7.8% to the Scheduled Tribe (ST) categories. Minorities represented 0.5% of the total sample.

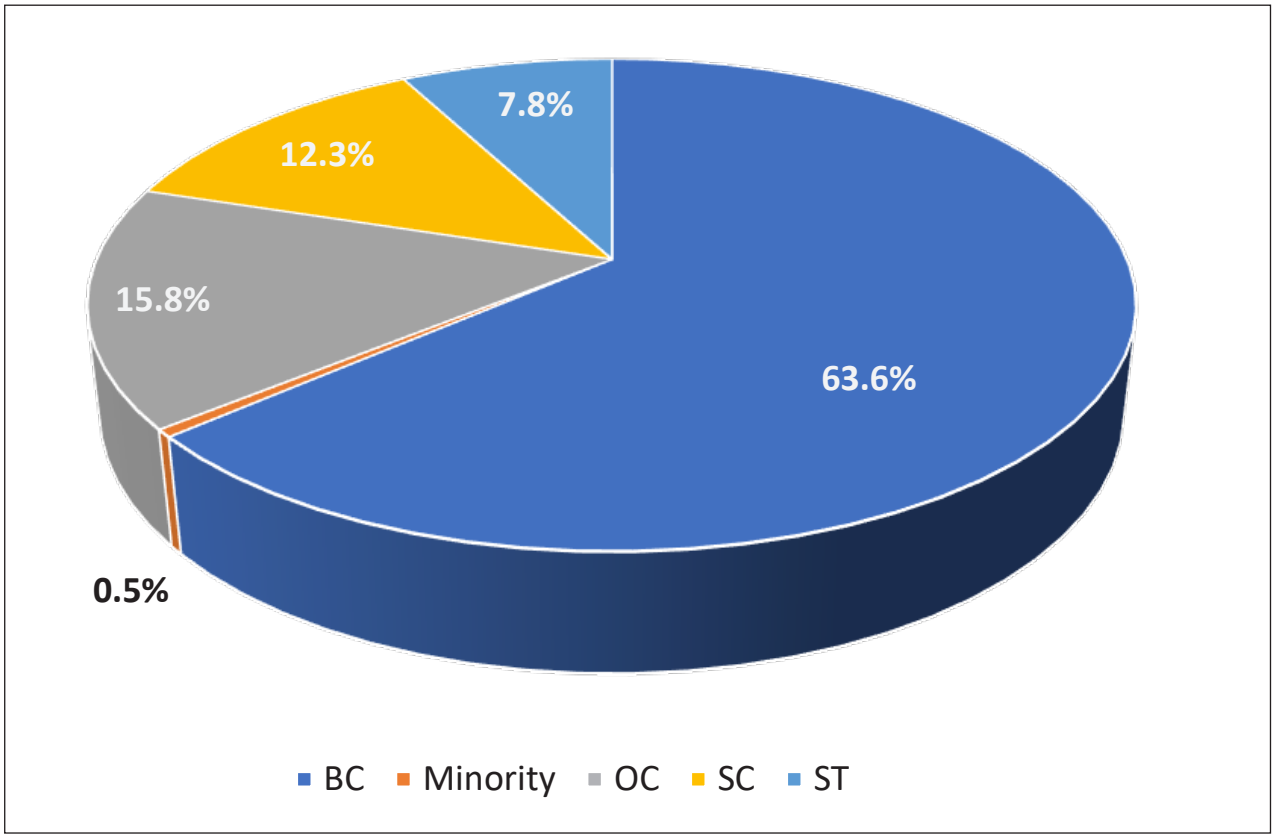

Figure 1. Caste groups covered in the baseline survey.

Table 6. Educational qualifications of the sample households.

District	Illiterate	Primary level	Secondary level	Upper Secondary level	Total
Mahabubnagar	93	12	30	22	157
Nagarkurnool	258	68	125	119	570
Wanaparthy	159	14	40	54	267
Grand Total	510 (51.3%)	94 (9.5%)	195 (19.6%)	195 (19.6%)	994 (100.0%)

Details on the educational qualifications of the sample farmers are presented in Table 6. More than 51% of the total sample had no formal education. Only 9.5% of the sample had primary level of education followed by 19.6% secondary level of education. Another 19.6% had Upper secondary level of education. This demonstrates their limited exposure to formal education compared to the state mean level (66.46% based on 2011 census).

4.3 Major sources of livelihood

Project interventions are more effective with a better understanding of the major sources of livelihood of farmers. Details on the major occupation, i.e, one from which at least 50% of the total household income was derived, was gathered from the survey (Table 7). More than 98% of total sample is dependent on agriculture/farming as the primary source of income. Their dependence on farm and non-farm labor occupancy was very limited. Only 3% of the total sample comprised members of elected bodies of the gram panchayat or other formal bodies in the village.

Table 7. Major occupation of sample households.

Source of income	Main occupation (N)
Business	3 (0.30%)*
Caste occupation	1 (0.10%)
Farm labour	1 (0.10%)
Farming	975 (98.09%)
Livestock	4 (0.40%)
Non-farm labour	2 (0.20%)
Salaried job	8 (0.80%)
Total	994 (100.0%)

**Figures in the parenthesis indicate % to total*

4.4 Average family size and literacy levels

Details about the average family size of the sample households and their participation in farm and non-farm operations are summarized in Table 8. The mean family size of the total sample was 5 members per household. It was slightly higher in the Wanaparthy sample (5.3 members per household), 4.9 members in the Nagarkurnool sample and 4.8 members in the Mahabubnagar sample. The mean literacy level among all the household members for the entire baseline sample was 58%. Not much difference was observed in literacy levels between the sample districts.

Nearly 56% of the family members participated in farm operations and 24% in non-farm operations in the entire sample. This clearly indicates the limited non-farm opportunities in the study villages. A majority of sample households depend on agriculture as their primary source of livelihood. There was no great difference in household members' participation in farm and non-farm operations between the study districts.

Table 8. Family size and extent of participation in farm activities.

District	Average family size	Average literacy	Average farm participation	Average non-farm participation
Mahabubnagar (n=157)	4.8	2.7	2.7	1.2
Nagarkurnool (n=570)	4.9	2.9	2.8	1.1
Wanaparthy (n=267)	5.3	3.0	3.0	1.4
Grand Total (n=994)	5.0	2.9 (58%)	2.8 (56%)	1.2 (24%)

4.5 Landholding

It is very important to understand the level of landholdings of sample farmers as well as the functioning of the land markets in the study villages to design appropriate project interventions. Details on the landholdings of the sample farmers are given in Table 9. The mean operational landholding of the entire sample of farmers is 2.84 ha, of which, 0.40 ha fall under drylands and 2.44 ha accounted for irrigated land. The average own land holding of the entire sample is 2.32 ha. Farmers were leasing-in on an average 0.54 ha of land from the open market to expand production. They were leasing-out a negligible 0.02 ha. Hence, the total operational land of about 2.84 ha per household is reasonably high compared to other studies (Telangana Agricultural Statistics, 2015-16) in the state.

Among the three study districts, Nagarkurnool led the sample of farmers with the highest mean operational landholding per household at 3.14 ha, with Mahabubnagar placed second at 2.54 ha and Wanaparthy at 2.35 ha. The average own landholding per household (2.57 ha) was the highest in Nagarkurnool district followed by Mahabubnagar (2.06 ha) and Wanaparthy (1.91 ha) districts. The three districts exhibited similar patterns in their mean leasing-in land per household between 0.44 and 0.60 ha.

Table 9. Operational landholdings of the sample farmers (ha).

District	Dryland (ha)	Irrigated land (ha)	Permanent fallow (ha)	Total operational land (ha)
Mahabubnagar (n=157)				
Own land	0.30	1.76	0.00	2.06
Leased-in land	0.11	0.38	0.00	0.49
Leased-out land	0.00	0.01	0.00	0.01
Total operated	0.41	2.13	0.00	2.54
Nagarkurnool (n=570)				
Own land	0.37	2.20	0.00	2.57
Leased-in land	0.06	0.54	0.00	0.60
Leased-out land	0.00	0.02	0.00	0.02
Total operated	0.43	2.72	0.00	3.14
Wanaparthy (n=267)				
Own land	0.30	1.61	0.00	1.91
Leased-in land	0.02	0.42	0.00	0.44
Leased-out land	0.00	0.00	0.00	0.00
Total operated	0.33	2.02	0.00	2.35
Grand Total (n=994)				
Own land	0.34	1.97	0.00	2.32
Leased-in land	0.06	0.48	0.00	0.54
Leased-out land	0.00	0.02	0.00	0.02
Total operated	0.40	2.44	0.00	2.84

4.6 Major cropping patterns

The major cropping patterns in the three study districts (Table 10) show that groundnut cultivation is highly preferred during the post-rainy season on red chalka/sandy soils. During the rainy season they prefer to grow paddy, maize and cotton under irrigation while cotton is preferred in the drylands. Fallow followed by groundnut or maize-groundnut is the preferred cropping system choice in the study districts. This pattern of cultivation was quite similar in all the sample villages.

In Nagarkurnool district, the dominant rainy-season crops are paddy, cotton, and maize. Black soils with access to irrigation were allocated to paddy, maize or cotton. Irrigated drylands and chalka/sandy soils have been allocated to groundnut in the post-rainy season. The average productivity levels are around 4446 kgs/ha for paddy, 2470 kgs/ha for maize, and 1700 kgs/ha for cotton and groundnut. Wanaparthy district exhibited similar trends in crop cultivation. However, paddy productivity was higher at 4940 kgs/

ha and groundnut yields were on par with Nagarkurnool. In Mahabubnagar district, productivity levels of both paddy (5187 kgs/ha) and groundnut (1950 kgs/ha) were higher than in the other two districts. Mean groundnut haulm productivity levels were 740-988 kgs/ha.

Table 10. Major cropping patterns in the study districts.

District	Area (ha)	Type	Season	Crop	Yield (kgs/ha)	Price (₹/kg)	By-product (kgs/ha)	Price (₹/kg)
Mahabubnagar	73.1	Irrigated	Kharif	Cotton	1803.1	65.9	-	-
	17.0	Irrigated	Kharif	Maize	2766.4	19.8	1729	3.6
	134.8	Irrigated	Kharif	Paddy	5236.4	19.4	1482	4.9
	261.5	**Irrigated**	**Rabi**	**Groundnut**	**1951.3**	**61.7**	**864.5**	**4.6**
Nagarkurnool	25.9	Rainfed	Kharif	Cotton	1383.2	64.1	-	-
	640.5	Irrigated	Kharif	Cotton	1654.9	66.5	-	-
	13.4	Irrigated	Kharif	Groundnut	1284.4	56.2	691.6	4.2
	100.8	Irrigated	Kharif	Maize	2470.0	16.1	666.9	2.5
	243.3	Irrigated	Kharif	Paddy	4446.0	19.3	1531.4	7.6
	6.3	Irrigated	Kharif	Sorghum	988.0	41.8	1309.1	2.0
	1250.2	**Irrigated**	**Rabi**	**Groundnut**	**1778.4**	**58.9**	**592.8**	**6.4**
	59.5	Irrigated	Rabi	Paddy	4050.8	19.5	1877.2	2.9
Wanaparthy	245.7	Irrigated	Kharif	Paddy	4989.4	19.5	1235	5.1
	16.2	Irrigated	Perennial	Mango	3211.0	19.3	-	-
	425.1	**Irrigated**	**Rabi**	**Groundnut**	**1778.4**	**59.1**	**716.3**	**4.2**
	36.0	Irrigated	Rabi	Paddy	4149.6	19.4	1753.7	3.9

4.7 Reasons for cultivating groundnut

The major reasons farmers in the sample districts cultivated groundnut are shown in Table 11. Responses from groundnut growers were analyzed and relative weightages were provided and arranged in descending order of priority. That the “soils are best suited for groundnut cultivation’’ was the major reason cited for growing groundnut, with the highest weighted score of 37%. This was followed by the reason of groundnut “fitting well in the cropping system’’ with a weighted score of 19.5%. Growing groundnut because it “fetches a higher income” and its “suitability to weather conditions” were other reasons with a weighted score of 18% each. Its convenience in terms of marketing and fodder for animals, etc., secured a low weighted score compared with other reasons.

Feedback on groundnut cultivation

Farmers in all the three study districts have been cultivating groundnut for more than 10 years, with those in Nagarkurnool having grown it the longest, followed by those in Wanaparthy and Mahabubnagar. More than 99% of the sample farmers preferred to cultivate groundnut on the same piece of land every year. While more than 90% of them said they have been allocating the same area of land towards groundnut cultivation, 10% said their allocation of land had been altered due to various reasons. Groundnut was not able to replace any existing crop in the three study districts but due to its low productivity and profitability, the area under it was replaced by competing crops such as black gram, vegetables, and mango.

Table 11. Reasons for cultivating groundnut, as stated by sample farmers.

Reason	% weightage
Best suited to the land	37.01
Fits well in the cropping system	19.50
Fetches a high income	17.87
Suited to weather conditions	17.68
Convenient marketing	5.14
Fodder/animal consumption	2.53
Food/home consumption	0.26
Self-consumption	0.01

4.8 Area under different groundnut cultivars

The distribution of groundnut area among different cultivars over three years in the study districts revealed the clear preferences of groundnut farmers (Table 12). The total groundnut area allocated by the total sample in the study did not change much over the study period. It goes to show that farmers have been allocating similar quantity of area to groundnut in 2019-20, 2020-21, and 2021-22. Kadiri 6 (K 6) is the single dominant variety occupying the three districts, followed by Kadiri Lepakshi 1812 (K 1812) and TAG 24 based on the farmer's choice.

Table 12. District-wise distribution of area under different groundnut cultivars, 2019-20 to 2021-22 (ha).

District/cultivars	2019-20 (ha)	2020-21 (ha)	2021-22 (ha)
Mahabubnagar			
K 1812	8.9	8.9	15.8
K 6	249.6	252.4	242.3
TAG 24	0.0	0.0	3.6
Total	258.5	261.3	261.7
Nagarkurnool			
Dharani	0.0	1.2	0.0
K 1812	12.6	19.0	28.3
K 6	1232.6	1226.7	1227.9
TAG 24	13.0	11.7	11.7
Total	1258.1	1258.7	1268.0
Wanaparthy			
K 1812	0.0	0.0	0.8
K 6	407.4	405.0	378.7
TAG 24	23.1	23.1	34.6
Total	430.5	428.0	414.2
Total cropped area	1947.0	1948.1	1943.9

Distribution of groundnut area by cultivar

The distribution of groundnut area by variety in the total sample is given in Figure 2. More than 92% of the total groundnut area was occupied by Kadiri 6; groundnut farmers in the study districts have great trust in the variety. This was followed by TAG 24 which occupied nearly 4.1% and K 1812 which accounted for 3.8% of the total area.

Distribution of groundnut sample by cultivar

Details about the distribution of groundnut by variety is depicted in Figure 3. It is very clear that K 6 has been cultivated by more than 94% of total sample farmers in the study districts. Even though Kadiri 6 was released more than 15 years ago, it is still highly preferred by farmers in Telangana state. This also shows that there have been no formal releases of groundnut cultivars suitable for Telangana (post-rainy season) region. TAG 24 is the next best bet for the sample farmers. A few farmers are also growing K 1812 in a few pockets in the villages in the study districts.

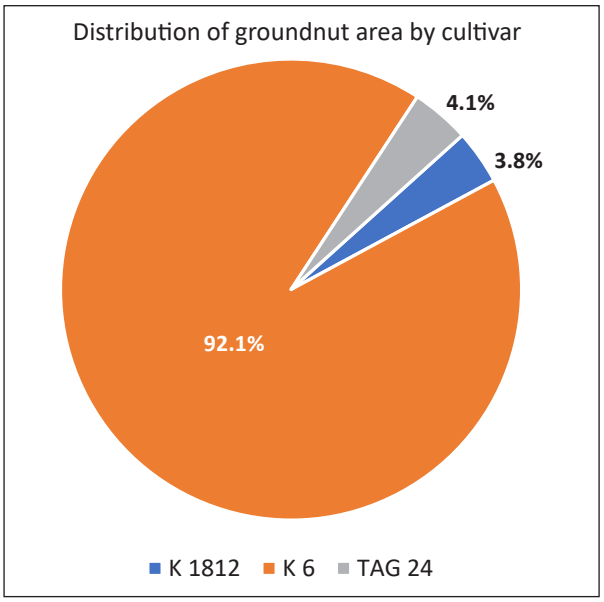

Figure 2. Distribution of groundnut area by cultivar.

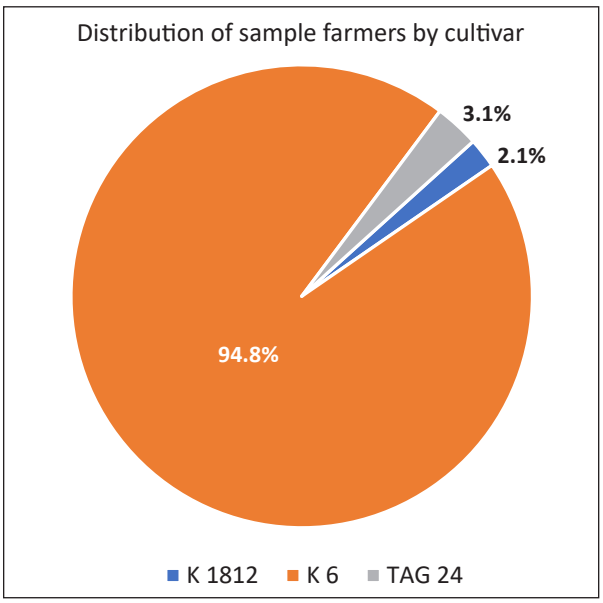

Figure 3. Distribution of groundnut by variety in the sample.

4.9 Mean groundnut productivity

Mean groundnut productivity in the study region depends on several factors such as climatic conditions, quality of seed, crop management practices, pest and disease attacks, and method of harvesting. Groundnut growers in the study region are experiencing wider variability in their productivity levels. To understand the extent of deviations in mean productivity under different climatic conditions, three types of responses were elicited from farmers. They were asked about productivity in (a) a bad year (the lowest yield in recent times), (b) best yield recorded so far (the highest yield in recent times), and (c) a good year (somewhere between a good and bad yield). These responses were critically analyzed and summarized (Table 13).

Not much difference was observed in mean productivity between the three study districts under the three climatic conditions. However, yield deviations between the three climatic conditions were significant. In a bad year, productivity was as low as about 1235 kgs/ha while in a best year it was close to 2964 kgs/ha. In a reasonably good year, productivity levels hovered around 2470 kgs/ha. The three climatic conditions clearly impact farmers' net profitability. Among the study districts, Nagarkurnool exhibited the highest productivity levels followed by Mahabubnagar and Wanaparthy districts.

Table 13. Mean groundnut productivity under different climatic conditions.

District	Mean groundnut productivity (Kgs/ha) (post-rainy and irrigated)
Mahabubnagar	
Bad year	1210
Best yield recorded so far	3013
Good year	2445
Nagarkurnool	
Bad year	1210
Best yield recorded so far	3063
Good year	2594
Wanaparthy	
Bad year	1186
Best yield recorded so far	2840
Good year	2371

Mean groundnut productivity in the study region

Details about mandal-wise mean groundnut area, mean kernel and haulm yields are presented in Table 14. Mean groundnut area in the entire sample was around 1.98 ha/household. This is quite significant and indicates the importance sample farmers give to groundnut. However, mean groundnut pod yield stood at only 1753.7 kgs/ha during the 2021-22 rabi season. This is remarkably lower than productivity

Table 14. Mean area grown to groundnut, pod yield and haulm yield in the sample mandals.

District	Mandal	Average area (ha)	Average pod yield* (kgs/ha)	Average haulm yield* (kgs/ha)
Mahabubnagar	Midjil	2.1	1877.2	666.9
	Mohammadabad	1.4	1976	913.9
Nagarkurnool	Achampet	2.0	1654.9	592.8
	Balmoor	2.0	1901.9	543.4
	Kalwakurthi	2.2	1753.7	395.2
	Lingal	2.3	1901.9	419.9
	Peddakothapalle	1.6	1630.2	518.7
	Telkapally	2.3	1654.9	419.9
	Uppununthala	2.8	1679.6	691.6
	Vangoor	2.5	1630.2	741
Wanaparthy	Gopalpet	1.7	1827.8	716.3
	Pangal	1.5	1654.9	642.2
	Wanaparthi	1.3	1803.1	691.6
	Weepanagandla	2.1	1654.9	716.3
Mean of the sample		1.98	1753.7	617.5

** The data pertains to the 2021-22 rabi season.*

during a good year and much closer to a bad year's productivity. Mean haulm productivity was also low at 617.5 kgs/ha. These figures reveal that the groundnut farmers are not happy with current groundnut productivity levels and are experiencing significant income losses in its cultivation.

This situation was similar in the 14 mandals in the three districts in the study with the exception of one or two mandals. Such productivity levels are not economically viable for farmers who may not even recover their variable costs fully. A majority of the sample farmers expressed dissatisfaction with groundnut cultivation due to its poor productivity coupled with stagnating market prices, probably major reasons for it not expanding in the study locations. The groundnut crop area is either stagnant in a few villages while it is also declining in other sample villages. Sample farmers were keen to replace the area grown to groundnut with black gram, vegetables, and mango crops.

4.10 Major sources of information

The primary household survey also sought responses from farmers on the major sources of information on different aspects of groundnut cultivation in the study area, as summarized in Table 15. The sample farmers are highly dependent (>60%) on input dealers for information on disease management, fertilizer management, new seed/cultivars, and pest management, etc. For information on water management in groundnut, only 40% of the total sample relied on input dealers. The next best major source of information among a majority (>20%) of the sample farmers was extension staff. Their reliance on research stations, newspapers, television, and fellow farmers was very low. Project interventions should ideally be linked to these actors for swift information dissemination to farmers in the study locations.

The survey found that fellow farmers have a small role to play in sharing information on water management in groundnut, after input dealers and extension staff.

Table 15. Farmers' major sources of information on different aspects of groundnut cultivation.

Source	Disease management	Fertilizer management	New seed/ cultivar	Pest management	Water management (micro-irrigation)
Input dealers	612 (62%)*	631 (63%)	644 (65%)	638 (64%)	393 (39%)
Research station	16	13	25	13	8
Extension staff	259 (26%)	233 (23%)	187 (19%)	238 (24%)	272 (27%)
TV/Radio	1	2	3	2	10
Magazines/newspapers	3	3	4	4	3
Fellow farmers	42	47	30	41	206 (21%)
Friends/relatives	56	54	51	54	87
NGOs	2	2	48	2	2
Others	3	9	2	2	13
Grand total	**994**	**994**	**994**	**994**	**994**

** Figures in parentheses indicate the percentage of the column total.*

Major sources of seed

An exclusive seed module was prepared to elicit responses from sample groundnut farmers for a deeper understanding of the constraints and challenges they face in accessing quality and sufficient seed. Groundnut is a highly sensitive crop because of the bulky nature of its seed and limited seed multiplication ratio (1:8) compared to other crops. Feedback from the sample farmers revealed that access to quality seeds was the biggest challenge in the study location. They purchase seed from traders/millers at high

market prices (₹12,000-13,000/100 kg kernel) without an idea about its quality. They use high seed rates of 85-90 kg/acre as they lack confidence in the quality of seeds and poor germination percentage. Traders/millers often sell groundnut seed only in the form of kernels and not pods. Kernel damage during storage and loading/unloading often leads to poor germination percentage. The role of the public seed sector (State Seed Corporation, Research Stations, etc.) in marketing quality groundnut seeds is almost negligible, increasing farmer reliance on traders/millers.

A majority of sample farmers (>90%) purchase groundnut seeds every year from the open market. In the absence of a functional seed system in the study location, this is causing a huge burden on them. In the event of being able to access good quality seeds, only 24% of the total sample farmers are willing to retain them for the next season while 76% of them would like to sell them in the open market as grain. There is a clear need for promoting formal and informal groundnut seed systems in the target area. Similarly, promoting cheap on-farm seed storage technologies (such as PICS bags) and creating awareness about their use are crucial. Only 56% of the sample farmers were willing to borrow good quality seeds from fellow farmers while the rest were willing to purchase it from the open market. Close to 60% of the total sample farmers showed interest in purchasing groundnut seeds from traders/millers/input dealers. Seed subsidies played a critical role and influenced farmer decision (>97%) to purchase certain varieties of groundnut seeds. Previously, the Government of Telangana used to provide a seed subsidy for purchasing seed from the open market. Currently, in the state Government's Rythu Bandu scheme, a farmer is eligible for cash to buy inputs; this is directly credited into the farmer's bank account.

None of the sample farmers had any knowledge about formal and informal groundnut seed systems. They have never been involved in seed production, specifically of groundnut. This underlines the need to expose them to capacity building and awareness programs in order to promote sustainable seed production systems in the target districts. The sample farmers have reasonably good trust in the government extension department followed by input dealers. The major constraints expressed by the sample farmers were the lack of awareness followed by non-availability of required quantity of seed, and pod borer and leaf spot infestations. The role of abiotic stresses (such as drought and moisture stress) in groundnut cultivation in the study area was almost negligible. Majority of sample farmers used sprinklers.

4.11 Mapping groundnut production technologies

Mapping existing groundnut production practices in the study area will enable the identification of opportunities for suitable interventions to enhance post-rainy groundnut productivity in the state. A module was designed for this purpose and information was elicited through Focus Group Discussions (FGDs) from all the sample villages. Not many differences were observed between the study districts and mandals in groundnut cultivation. The practices mapped ranged from land preparation to harvesting of groundnut (Table 16).

The sample farmers preferred to cultivate groundnut in red chalka/sandy soils and with sufficient irrigation facilities. A majority of them use sprinkler irrigation on groundnut. On an average, the farmers applied about 9-10 irrigations during the season. Given their heavy dependence for seed on traders/millers/input dealers, their high seed rates were in the region of about 85-90 kg/acre since they were unsure of the seed's germination and to be able to maintain optimum plant population in the field. This is leading to a huge economic burden on them. A majority of sample farmers were reasonably well aware about seed treatment and most of them are practicing it during sowing and had a good understanding about application of fertilizers and pre- and post-emergence herbicides. They are all using an optimum dosage of fertilizers. Most of the farmers were applying insufficient gypsum since it is not easily available.

The three major pests of groundnut are pod borer, leaf folder and thrips. Pod borer damage was severe in the sample villages. The major diseases are leaf spot and root rot, with the former being more prevalent. There is limited use of machinery in groundnut cultivation, except in land preparation. A few farmers use tractors for

sowing but a majority use bullocks for sowing and intercultural operations. Harvesting is done entirely using human labor. Currently, groundnut diggers are being tried out in harvesting in a few project villages. There is huge scope to promote mechanization in groundnut cultivation that can reduce costs per ha.

Even though the sample farmers are applying high seed rates, mean productivity has been below optimum levels. The presence of admixtures in seed, low genetic vigor and poor quality of germination etc., are the major reasons for the low productivity. There is huge scope for promoting sustainable seed systems as well as enhancing genetic vigor in promising cultivars in the study area.

Table 16. Groundnut production practices in Telangana.

Practice type	Description
Soils	Red, chalka and sandy types
Seed rate	85-90 kg/acre
Seed treatment	Majority of sample farmers are aware
Number of irrigations	9-10 times in a season using sprinklers
Fertilizer application	Urea – one bag/acre DAP/SSP – one bag/acre MOP – 30 kg/acre Gypsum – 50-60 kg/acre (only 60% of the sample followed this)
Major pests	Pod borer, leaf folder and thrips
Major diseases	Leaf spot and root rot
Harvesting	Manual process, huge scope for mechanization
Productivity	Good – 2050 kgs/ha Bad – 1087 kgs/ha Best – 2791 kgs/ha

4.12 Cost of cultivation

The profitability of a crop determines its scope for expansion in any ecology. Details about the cost of cultivation of groundnut (₹/ha.) elicited from FGDs in the sample villages is summarized in Table 17. The primary data collected was tabulated and analyzed for a deeper understanding of different input costs. Only variable costs were considered while analyzing the data while fixed costs such as rental value of own land, etc., were ignored. The mean cost of groundnut cultivation per ha. was estimated at ₹105,317. Among all the cost items, seed took up the highest share of 28.2% of the total cost per ha., followed by land preparation (12.3%), harvesting (10.1%) and weeding (10.0%). Expenditure on fertilizers and plant protection chemicals accounted for about 8% each in the total cost per ha. Two potential areas where the cost of cultivation per ha can be lowered are the cost of seed and by promoting mechanization in different crop operations.

Groundnut productivity ranged between 1729 kgs and 1976 kgs/ha. If we consider productivity levels at 2010 kgs/ha, estimated gross returns from groundnut cultivation would be ₹130,579 per ha.

(see Table 18). Since the price of groundnut has been stagnant over time, sample farmers could realize around ₹6000/100 kg. After deducting the total variable costs, the farmer could get a net return of ₹25,263/ha which is quite marginal, leading to a benefit-cost ratio of 1.23. This seems quite non-remunerative to groundnut growers in the state; hence farmers are looking for alternatives to switch over from groundnut.

Assuming very optimistic productivity levels (around 2258 kgs/ha) in the study location, the estimated gross returns will be slightly higher at ₹146,140/ha, translating to a BCR of 1.38. Even though farmers are providing sufficient irrigation to the crop, the net income margins looks quite narrow. If productivity crosses 2470 kgs/ha, the crop looks more promising to growers and there is huge potential for expansion in the study villages. Enhancing the productivity per ha is the major challenge with infusing quality seeds in the study location. Access to low-potential poor quality seeds is a major constraint limiting productivity. The impact of moisture stress on productivity is almost negligible in the sample villages. Hence, the entry point for interventions is infusing quality seeds to enhance mean productivity levels.

Table 17. Cost of cultivation of groundnut (₹ /ha).

Item	Cost/ha (₹)*
Land preparation	12,975 (12.3%)
Farmyard manure	1853 (1.8%)
Seed cost	29,647 (28.2%)
Sowing	3841 (3.6%)
Fertilizer	8887 (8.4%)
Microfertilizers	1319 (1.3%)
Weeding	10539 (10.0%)
Plant protection	8808 (8.4%)
Irrigation	3725 (3.5%)
Watching	3251 (3.1%)
Harvesting	10,656 (10.1%)
Threshing	4829 (4.6%)
Transport	2596 (2.5%)
Marketing	2391 (2.3%)
Grand total	105,317 (100%)

** Only variable costs were considered.*
** Figures in the parenthesis indicate % to the total costs.*
** Fixed costs (Depreciation and Rental value of owned land) were not added into total cost of cultivation.*

Table 18. Gross returns per ha from groundnut.

Item	Actual yield	Optimistic yield
Productivity (kernel) (kgs/ha)	2010	2258
Kernel price/kg	63	63
Productivity (haulm) (kgs/ha)	978	978
Haulm price/kg	4	4
Gross returns (₹/ha)	130,579	146,140
Net returns (₹/ha)	25,263	40,824
BCR (Benefit-Cost-Ratio)	1.23	1.38

4.13 Pattern of groundnut utilization

It is very important to understand the pattern of groundnut utilization in the study area so that preferred traits, if any, can be targeted in crop improvement efforts. The utilization of groundnut in the study area is summarized in Table 19. Over 98% of crop produce is going to the market in the form of kernels. Farmers are retaining close to 1% of the produce for domestic consumption but not retaining any as seed for the next season. This is happening due to three reasons: (1) Farmers are concerned about storage of pods for close to one year (rabi to rabi cycle); 2) they have no exposure to low-cost on-farm seed storage technologies; and 3) they have not been involved in groundnut seed production. So they never save produce for sale as seed. The proposed project interventions should target all these constraints with a focus on capacity building and training programs.

Table 19. Groundnut utilization in the study area.

District	Consumed (%)	Other uses (%)	Sold as seed (%)	Used as own seed (%)	Sold as kernel (%)
Mahabubnagar	1.0	0.4	0	0	98.6
Nagarkurnool	1.5	0.6	0	0.1	97.8
Wanaparthy	1.7	0.5	0.1	0.1	97.6

4.14 Mean household income

As indicated by the sample farmers, their livelihoods are highly dependent on farming and allied sectors. Their dependence on non-farm activities is quite limited. Details about the major sources of household income per annum are summarized in Table 20.

The findings clearly show that more than 50% of the total household income per annum is derived from agriculture alone. This is quite significant and confirms that their livelihoods are highly dependent on farming. State-run welfare programs/development programs are contributing a significant 22% to their total household income. The dependence on farm labor opportunities are also contributing to their household income. Rearing of livestock and small ruminants are contributing another 5% of their total household income. The contribution of other livelihood options is relatively limited.

Table 20. Major sources of household income (₹/annum).

Source of income	Amount (₹/annum)	Source-wise (%)
Income from crops (including orchards)	117,372	53.4
Government welfare/development programs	48,057	21.8
Farm work (labor earnings)	18,158	8.3
Regular salaried jobs (Government/private)	11,674	5.3
Livestock (sale of milk and milk products)	11,134	5.1
Business	5,151	2.3
Non-farm work (labor earnings)	3,571	1.6
Rent from land, building, machinery, etc.	1,853	0.8
Out-migration/remittances	1,509	0.7
Income from selling sheep, goat, chicken, meat, eggs, etc.	865	0.4
Caste occupations	604	0.3
Grand total	219,949	100.0

4.15 Conclusions and way forward

Groundnut is one of the major oilseeds crop highly preferred by farmers in Telangana during the post-rainy season. A total of 112,000 ha is being cultivated under groundnut in the state. More than 90% of the total area is under post-rainy season cultivation and the rest during the rainy season. The baseline survey made a systematic attempt to understand the major constraints and challenges in the post-rainy season groundnut-based cropping systems in the state. Since Nagarkurnool, Wanaparthy and Mahabubnagar districts together contribute more than 90% of the post-rainy groundnut area in the state, these districts were chosen for a primary household survey of farmers. The mandal/tehsil was identified as a basic sampling unit to determine the optimum sample for the study. Paucity of time and resources limited the study to 14 mandals. A total of 994 sample farmers growing groundnut were interviewed using a well-designed and pre-tested survey instrument. About 56 FGDs were organized in the sample villages (one in every village) to complement and validate household survey information. Tablet-based household surveys were conducted with well-trained field investigators. Following the validation and analysis of data, the following conclusions were arrived at:

1. Post-rainy season groundnut cultivation is highly preferred in red sandy chalka soils in the study location. Majority of the sample farmers prefer to grow it because it best suits their soil and fits well in their cropping systems.

2. All the sampled villages had good access to irrigation facilities (either through sprinklers or furrow irrigation). The crop never gets exposed to moisture stress conditions; hence abiotic stress has a limited role in crop genetic improvement.

3. The most preferred groundnut cultivars in the study districts are K 6 (90%) followed by TAG-24 (5%) and K 1812 (5%).

4. Access to improved seed was the biggest challenge faced by a majority of the farmers in the survey. Informal seed systems play a pivotal role in the state. Traders/dealers/millers play a crucial role in seed supply and distribution compared to other organizations/agencies.

5. Timely provision of quality seed in sufficient quantities is the entry point that the project should focus on for sustaining the groundnut area in the study districts.

6. The cost of groundnut seed is as high as ₹12,000-13,000/100 kg. Since the farmers don't know the name of the cultivar, its vigor and germination percentage, they apply high seed rates at 80-90 kg/acre to get optimum population, contributing significantly to the high cost of cultivation per acre.

7. Biotic stress plays a major role in limiting productivity. Pod borer followed by late leaf spot are serious problems.

8. Aflatoxin contamination is very limited in the study area and farmers have reasonably good knowledge about it. This is not a major strategic research issue in the state.

9. Farmers have a reasonably good awareness of Good Agricultural Practices (GAPs) in groundnut cultivation. However, they need to be made aware of on-farm seed storage technologies (such as PICS bags) and efficient water management.

10. Excessive irrigation during the first 30 days of the groundnut crop, high seed rate, lack of on-farm seed storage facilities, non-remunerative Minimum Support Price (MSP) of ₹5000-6000/100 kg and lack of exposure to groundnut seed production technologies are the biggest constraints to groundnut expansion in the state.

11. The average productivity of groundnut in the project villages is 1976-2223 kgs/ha. The best productivity levels so far are 2964 to 3458 kgs per ha and the lowest levels are 988 to 1235 kgs/ ha. The huge difference among different climatic situations (best, good and bad yield situations) are highly impacting the economics of groundnut cultivation.

12. Currently, groundnut is not able to replace any existing crop in the study area but is being replaced by black gram, green gram and mango in several villages due to its low profitability.

13. Traders/millers are significantly influencing the market price of groundnut in the study districts. Farmers were not able to get a remunerative price for their harvest, as it is always lower than the MSP). The Government of India announced an MSP that is not remunerative under existing costs of production in the state.

14. More than 90% of the groundnut produced is going to the markets as kernel. Preserving seed for the next season is not in practice. There is huge scope for promoting such interventions that will reduce costs and infuse quality seed in the sample villages.

15. There is also immense scope to introduce mechanization in different crop operations to minimize costs as well as improve efficiency.

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5. Appendix – household survey questionnaire

Targeting groundnut breeding, seed delivery and efforts to enhance the profitability of farmers in Telangana state, 2022

PJTSAU-ICRISAT collaborative project

Module 1: Socio-economic profile of households

1.1. Date of interview ---------- 1.2. Name of the investigator ----------

1.3. Village ---------- 1.4. Mandal/taluk ----------

1.5. District ----------

1.6. Name of household head (the one who takes major decisions) ----------

1.7. Son/daughter/wife of ----------

1.8. Mobile number of household head ----------

1.9. Farm size (marginal, small, medium and large)* ----------

1.10. Gender ----------

1.11. Age (completed years) ----------

1.12. Education (completed years of schooling) ----------

1.13. Member of any elected/nominated body Yes/No

1.14. If yes, names of the body/organization ----------

1.15. Caste category (BC, SC, ST, FC and minority) ----------

1.16. Main occupation (from which >50% of the income is derived) ----------

1.17. Secondary occupation (secondary source of income) ----------

1.18 Family details

Gender	Number of persons	Number of literates	Number working on own farm	Number working outside the farm
Male				
Female				
Others (Transgender)				
Children (<14 years)				

Module 2: Land holding as on June 2022 (ha)

Particulars	Dry	Irrigated	Permanent fallow	Total
Own land				
Leased/ shared-in land				
Leased/shared-out land				
Operated land (own land+leased/shared-in – leased/shared-out land)				

** Households operating (< 1.01 ha -marginal; 1.01 to 2.02 ha – Small; 2.02 to 4.04 ha – Medium; 4.04 and above ha – large)*

Module 3: Cropping pattern *(refer 2021-22 cropping year)*

Plot name	Area (ha)	Soil type[1]	Season[2]	Crop name	Sole/ inter-crop specify	Vareity name	Rainfed/ irrigated	If irrigated, what is the source[3]	Main production (kgs)	Harvest price/kg	By-product (kgs)[4]	Harvest price/kgs

[1] 1 = Black soil, 2 = Red soil, 3 = Saline and alkaline soil, 4 =Alluvial soil and 5.Others (specify)
[2] Season codes: K = kharif (rainy/vaanakalam), R = rabi (post-rainy / yasangi), S = summer, and P = perennial
[3] 1 =Open well, 2 = bore well, 3 = canal, 4 = tank, and 5 = others.
[4] If the farmer reported by-products in bundles or cart/truckloads, convert and record in kilograms by asking the approximate weight of each bundle.

Module 4: History of groundnut cultivation

1. How long have you been growing groundnut? ----------

2. Reasons for growing groundnut:

Purpose	Weightage (% of 100%)
Higher income	
2. Fits well into the cropping system	
3. Best suited to my land	
4. Fodder/animal consumption	
5. Food/home consumption	
6. Convenient marketing	
7. Suitable weather condition	
8. Others (specify ……)	

3. How often do you grow groundnut on the same land? ( )

(a) Every season (b) every year (c) once in two years (d) others

4. Area allocated to groundnut during the last three years - (increasing/decreasing/constant)

5. Area allocated to different groundnut cultivars in the last three years/seasons

Cultivar	Area sown (ha)		
	2019-20	2020-21	2021-2022
1.			
2.			
3.			
4.			
5.			

6. What are the crops replaced by groundnut, if their area is increasing?

(a) ---------- (b) ----------

7. What are the crops replaced groundnut, if the area is decreasing?

(a) ---------- (b) ----------

8. Average yield of groundnut by household (kgs/acre)

Year	Rainy season (*kharif/aanakalam*)		Post rainy season (*rabi/Yasangi)*	
	Irrigated	Rainfed (dry)	Irrigated	Rainfed (dry)
Good year				
Bad year				
Best yield recorded so far				

9. Major sources of information about various inputs (*Rank top three sources*)

Sources of information	New seed/cultivar	Fertilizer management	Pest management	Disease management	Water management (micro irrigation)
Input dealers					
Research station					
Extension staff					
T.V/Radio					
Magazines/newspaper					
Fellow farmers					
Friends/relatives					
NGOs					
Others					

10. Major sources of groundnut seed

a. How often do you purchase groundnut seed from the market? ---------- (Years)

b. If the last harvest was good, how long did you retain it and use the seed --------- (Years)

c. If a fellow farmer has good seed, would you like to borrow it from him? ----------(Yes/No)

d. What are your preferred networks to borrow new seed/cultivars? (*Rank top three*)

Sources	Fellow farmer	Friend/ relative	Research stations	Input dealers/ traders	Agriculture Department	Self-Help Groups	Others
Rank							

e. Is subsidy an influence in your decision to adopt new groundnut cultivars? ---------- (Yes/No)

f. Have you been involved in groundnut seed production? ---------- (Yes/No)

g. Which sources of seed do you have more trust in? *(Score 5–high, 1–low)*

Sources	Fellow farmer	Friend/ relative	Research stations	Input dealers/ traders	Agriculture Department	Self-Help Groups	Others
Score							

11. Major constraints to purchase of new seed *(Rank top three)*

Sl.no	Constraints	Rank
1.	Lack of information about recommended variety	
2.	Non-availability of required variety	
3.	Seed is not of good quality (not up to expectations)	
4.	High seed price	
5.	Need to travel long distances for it	
6.	Credit facility not available	
	Others (specify)	

12. What are the top three major biotic and abiotic constraints limiting yield?

Major constraint (biotic/abiotic)	Area damaged (%)	Yield loss (%)

13. Major constraints among preferred cultivars (*Rank top five in each variety*)

Constraints	Variety 1	Variety 2
Low yield		
High pest incidence		
High disease incidence		
Susceptible to drought		
Small kernel size		
Low oil content (%)		
Low shelling (%)		
Poor market demand		
Poor fodder quality		

Module 5: Utilization of crop produced

1. Utilization of produce (*2020-21*)

Variety	Grain output (kg)	Cosumed (kg)	Other uses* (kg)	Own seed (kg)	Sold as seed (kg)	Seed saleprice (₹/kg)	By-product (kg)	Own use (kg)	Sold (kg)	Sale price ₹/kg

** Includes in kind wages, gifts and feed for cattle, etc.*

Module 6: Major sources of household net income during the year.

Sources of income	Net income (₹)
1. From crops (including orchards)	
2. Farm work (labor earnings)	
3. Non-farm work (labor earnings)	
4. Livestock (sale of milk and milk products)	
5. Sale of sheep, goat, chicken, meat, eggs, etc.	
6. Rent from land, building and machinery, etc.	
7. Caste occupations (specify)	
8. Business (specify)	
9. Regular salaried jobs (Govt./private)	
10. Out migration/remittances	
11. Government welfare/development programs	
12. Others, if any	

Module 7: Training needs of farmers

List the top three areas where you need training/capacity building in groundnut cultivation?

Rank	Priority areas
1	
2	
3	

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ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

About

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a pioneering, international non-profit scientific research for development organization, specializing in improving dryland farming and agri-food systems. The Institute was established as an international organization in 1972, by a Memorandum of Agreement between the Consultative Group on International Agricultural Research and the Government of India. ICRISAT works with global partners to develop innovative science-backed solutions to overcoming hunger, malnutrition, poverty, and environmental degradation on behalf of the 2.1 billion people who reside in the drylands of Asia, sub-Saharan Africa, and beyond.

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