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An Empirical Investigation into Agricultural Livelihoods of Scheduled Castes in Telangana

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(Planning Dept, Govt. of Telangana & ICSSR - Ministry of Education, Govt. of India)

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PREFACE

This publication is part of the Working Paper series in the CESS-DSSI Telangana Scheduled Castes Development Series. Over the past eight years, the Division for Studies in Social Inclusion (DSSI) of the Centre for Economic and Social Studies (CESS) has carried out a comprehensive range of studies focusing on the development of the Scheduled Castes in Telangana State, in addition to studies on other historically disadvantaged and marginalised social groups. Research aimed at identifying and quantifying the development disparities between the Scheduled Castes and other social groups is central to the DSSI's mandate. These empirical studies are designed to enable policymakers to formulate evidence-based and implementable policies so that new policies can be formulated or necessary course corrections can be made in the existing schemes and interventions. The research and academic activities undertaken by the DSSI team in the domains of social exclusion and inclusive development encompass the following:

- Baseline surveys and impact evaluation studies (concurrent, formative, and endline)
- Empirical studies on priority themes and domains to address development gaps
- Dissemination of findings through publications such as research reports, working papers, monographs, policy briefs, and journal articles
- Organising seminars, workshops, and special lectures on emerging themes related to inclusive development

This Working Paper presents the findings of an empirical study on a critical area of inclusive development, focusing on the agricultural livelihoods of Scheduled Castes in Telangana. It includes, *inter alia,* technology-related recommendations for enhancing their livelihoods. This publication is the fourth in the series of working papers that draw on survey data from over 10,000 SC households. The survey, conducted by DSSI, was commissioned by the TGCOST (Telangana Council of Science and Technology). I am deeply grateful to TGCOST for providing us with the opportunity to undertake the study titled, "Comprehensive Survey of SC Community in Telangana State: Mapping Data and Resources on a Spatial Domain". This publication provides a holistic perspective on the subject and offers implementable recommendations. I am confident that policymakers, practitioners, and other stakeholders find it useful and relevant in addressing development disparities in Telangana and beyond.

E. Revathi
Director, CESS

An Empirical Investigation into Agricultural Livelihoods of Scheduled Castes in Telangana

B. Suresh Reddy[1]

Abstract

Telangana's social stratification has undergone significant transformations since its formation in 2014, with the proportion of marginalised social groups exceeding 80% of the population. The Scheduled Castes represent 17.4% of the state's population. Given that they account for 20% of Telangana's rural population, agriculture is central to their livelihoods. While Telangana is known for its diverse agricultural practices, Scheduled Caste livelihoods are characterised by a high incidence of landlessness (61.22% of households in the state are landless). Over 80% of SC farmers are marginal holders, with the remainder being primarily small farmers. Despite the state's remarkable advances in agricultural productivity and irrigation infrastructure, SC farmers continue to confront various challenges, including uneconomical landholdings, limited access to surface irrigation and institutional credit, and a low rate of technology uptake. Paddy is the main crop grown by SC farmers, who rely on groundwater (mainly borewells and open wells), requiring substantial private investment, followed by cotton, maize, and redgram. Technology adoption is essential for enhancing agricultural productivity; however, crop cultivation practices are not uniformly adopted. High-yielding varieties should be introduced on SC farms, particularly for paddy, maize, redgram, and soyabean. SC farmers should receive targeted training in cultivating the latest varieties and associated package of practices through exclusive training programmes, leveraging existing institutional frameworks. Extension agencies, which can play a vital role in building the capacity of SC farmers by facilitating access to the latest agricultural technologies suitable for their specific conditions, currently underserve SC farmers. SC farmers should be targeted with comprehensive, innovative, and adaptive interventions to ensure sustainable livelihoods, including the establishment of exclusive Farmer Producer Organisations (FPOs) for SC farmers.

Key Words: Agriculture, Scheduled Castes, Technology Adoption, Productivity, Sustainable Livelihoods.

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1. Introduction

Telangana's rural economy remains closely anchored in agriculture and allied sectors, providing employment to a significant proportion of the state's population. These sectors employ 66.15% of the rural workforce and 46% of the state's workforce. According to the 11th Agriculture Census (2021-22), the total number of operational holdings in the State is 70.60 lakhs, covering an area of 63.12 lakh hectares. The social stratification of Telangana has undergone significant and visible shifts following its formation in 2014 out of the erstwhile Andhra Pradesh. The proportion of marginalised social segments has climbed to almost 85% of the population. The current Scheduled Caste population in Telangana is 54.09 lakhs, representing 15.45% of the state's population. Males constitute 26.93 lakhs and females 27.16 lakhs, respectively. While there are 59 sub-castes within the Scheduled Castes of Telangana, the *Madigas* represent the largest sub-caste, followed by the *Malas*, accounting for 60% and 28% of the state's SC population, respectively.

In Telangana, the SC population is predominantly rural, with 75.3% of them living in rural areas. The gross cropped area in Telangana was 232.58 lakh acres in 2022-23, of which 135 lakh acres were irrigated and the remaining 42% of the area was under dryland cultivation (DES, 2023). More than half (55.49%) of the state's population is dependent on agriculture for their livelihoods, either directly or indirectly. According to the Census of Landholdings (2015-16), there are 59.47 lakh holdings in Telangana covering a total area of 147.57 lakh acres. Scheduled Castes own 11.8% of landholdings, covering 8.9% of the operated area. Cereals, pulses, oilseeds, commercial crops, fruits, and vegetables account for over 80% of the total cultivated area in the state.

Agriculture is foundational to the livelihoods of the SC community in Telangana. The Scheduled Castes own 13.9% of the landholdings, accounting for 9.7% of the total area (DES, 2023). The Scheduled Tribes (STs) own 11.8% of agricultural landholdings, representing 11.9% of the total area, while 74.3% of the landholdings belong to the "others" category, accounting for 78.2% of the area operated. Between 2015-16 and 2021-22, the distribution of holdings among different social groups changed noticeably. The proportion of Scheduled Caste holdings increased from 11.8% to 13.9% of the total, while Scheduled Tribes' holdings decreased marginally from 12% to 11.8%. The share of holdings in the "others" category decreased from 76.2% in 2015-16 to 74.3% in 2021-22.

The southern state of Telangana is known for its diverse agricultural practices, ranging from rice cultivation in the fertile plains to horticulture and floriculture in the upland regions. The agricultural practices of the SC communities are often integrated with animal husbandry. Despite the state's advances in agricultural productivity and irrigation infrastructure, SC farmers are confronted with several challenges such as smallholdings and limited access to credit and new technologies.

Agriculture is currently undergoing a transformation due to a wave of changes in markets, institutions, the availability of technologies, and environmental conservation policies. Against this backdrop, and based on a large survey titled "Comprehensive Baseline Survey of SC Community in Telangana State: Mapping of Data and Resources on a Spatial Domain", this paper presents the agricultural scenario among SC farmers, focusing on their practices. Drawing on primary data collected from the sample households, an empirical analysis was carried out to assess the status of agriculture among SC farmers. Furthermore, a comparison across sub-castes was conducted, incorporating relevant variables.

2. Brief Literature Review

There is limited published research focusing solely on the SC community in Telangana and tracking their agricultural livelihoods over time. Many existing studies are village-level, covering all castes, or focus more on general agrarian change. Consequently, specific data on income levels, productivity, crop diversification, labour versus cultivation, and land tenure (owned versus leased versus tenancy) specifically for SC households remains sparse. Furthermore, studies rarely combine qualitative aspects (such as social discrimination and caste-based barriers to irrigation and credit) with quantitative data on landholdings and productivity specifically for SCs in Telangana. This section, therefore, presents the findings of various studies on this subject.

The study by Shukla et al. (2025), examined rural and agricultural households across India, analysing changing livelihood patterns, income diversification, and the influence of caste, land ownership, and regional disparities. It highlights that many agrarian households—especially those belonging to marginalised castes and smallholders—are increasingly dependent on non-farm income sources, signalling a structural transformation in rural livelihoods beyond traditional farming.

Kumar's study (2018) of Nalgonda district in Telangana found that the SCs and STs remained largely deprived of land ownership, with ownership becoming increasingly

concentrated among the Other Backward Classes (OBCs). Over the past 40 years, SC households experienced only a marginal increase in landholdings. The study highlights persistent caste-based discrimination in access to land. Furthermore, Srinivasulu (2020) found a decline in the share of landholdings by SCs in Telangana, from 17.06% (1975–76) to 13.39% (2010–11). Despite a marginal increase in the area operated by SC households (from 8.82% to 9.49%), the decline in the number of holdings indicates increasing fragmentation and potential landlessness.

Sudaiah's work (2020) focused particularly on SC women—a marginalised sub-group within the SC community—looking at the effectiveness of land-distribution policies targeted at landless SC women. The findings show persistent structural vulnerabilities: despite policy provisions, many SC women remain landless or hold negligible land due to gaps in implementation, social barriers, and systemic neglect. Bina and Mahesh (2023) observed that women landowners are less likely to self-cultivate compared to men; combined with caste disadvantage, the likelihood of marginalised caste (SC/ST) women to self-cultivate—and hence benefit from land ownership—is lower.

In 2020-21, Nirmala et al. (2023) carried out a study in Telangana and Andhra Pradesh under the Scheduled Castes Sub Plan (SCSP). They sampled 3,284 demonstration plots to examine "Good Agricultural Practices" (quality seed, herbicides, vermicomposting, and efficient water usage). The study revealed that rice productivity in the demonstration plots was significantly higher than in control plots. This suggests that targeted agronomic interventions and support can enhance productivity among SC farmers, providing empirical evidence that SC farmers benefit from structured agricultural support and technology adoption. The study recommends the expansion of such programmes to increase income and improve livelihoods among SC cultivators.

Zeeshan et al. (2025) examined caste-based differences in access to institutional credit among agricultural households in India, using national survey data and econometric analysis. The study reported that across rural India, caste-based disparities persist in access to institutional credit. Specifically, SC households were found to be significantly less likely to secure institutional credit compared to higher or other castes, even after controlling for standard socio-economic factors. These findings have direct implications for SC farmers' capacity to invest in land, inputs, and productivity enhancements, thereby perpetuating agrarian disadvantage. Complementing this, Karthick and Madheswaran (2020) found that caste identity significantly influences both the likelihood of obtaining credit and the amount borrowed, with upper-caste households receiving significantly

better access and larger credit amounts compared to those of SCs and Scheduled Tribes. They contend that caste remains a structural barrier in rural credit markets, especially evident in cooperative banks.

Based on focus group discussions (FGDs) conducted in 40 villages, representing both irrigated and rain-fed districts, Kumar et al. (2022) studied how farmers from diverse communities (not exclusively SCs) perceive changes in agriculture between 2014 and 2021. The findings reflect mixed results depending on region: improved support and some gains in irrigated areas, but continued vulnerability and limited transformation in rain-fed and relatively backward areas where smallholders and marginalised communities (including SCs) are typically over-represented. It is in this context that the present working paper, "An Empirical Investigation into Agricultural Livelihoods of Scheduled Castes in Telangana", assumes significance; it addresses research gaps identified in the literature review.

3. Methodology

A multi-stage stratified sampling design was adopted for the selection of sample households. As part of this process, a household listing protocol was carried out. This exercise involved listing all households within the sampling frame (SC locality in rural areas and urban slum/ward in urban locations) from which the sample households were randomly selected. The listing schedule also captured basic household characteristics, such as the name of the household head, sub-caste, landholding status, and the main source of household income. In instances where there was more than one SC locality, the village (or urban ward) was stratified into two hamlet groups, from which a representative hamlet was selected for household listing and subsequent sample selection. Based on this design, a total sample of 10,213 households was surveyed in Telangana using a GIS app.

The sample households represent all 33 districts of Telangana and are spread over rural and urban areas in the ratio of 3:1. The sample households were selected from a total of 400 locations, comprising 300 villages and 100 urban wards. The study employed a mixed-method approach consisting of quantitative and qualitative techniques to collect data at the household as well as community levels. In addition to the household survey, the study also used qualitative methods such as Participatory Rural Appraisals, focus group discussions with men, women, youth, self-help groups, as well as stakeholder interviews with district-level officials from the Scheduled Castes Development Department and related Government Departments.

4. Empirical Findings of the Study

4.1. Land Ownership

The Scheduled Castes, as historically marginalised communities, have faced several barriers to owning agricultural land, which is critical for sustaining livelihoods. In 2015-16, the number of operational holdings held by Scheduled Castes in the country was 17.34 million; of these Telangana Scheduled Castes accounted for 4% (Government of India, 2020). Telangana has a total of 59.47 lakh landholdings, representing 147.57 lakh acres; of these, Scheduled Castes own 11.8% of the holdings (Government of Telangana, 2020). Land is considered the most valuable asset in rural areas, as its ownership indicates a household's standard of living and socio-economic status. This paper assesses the livelihood dimensions of land, focusing on ownership status, tenancy, and access to common lands.

Table 1: Percentage Distribution of Land Ownership Status by SC Sub-Castes

Particulars	Madiga	Mala	Other sub-castes	All
Landless	61.25% (4,079)	55.76% (1,451)	75.92% (722)	61.22% (6,252)
Marginal farmers (0.1 - 2.5 acres)	32.22% (2,146)	35.13% (914)	14.93% (142)	31.35% (3,202)
Small farmers (2.51 - 5.0 acres)	5.65% (376)	7.42% (193)	6.62% (63)	6.19% (632)
Medium farmers (5.1 – 10.0 acres)	0.78% (52)	1.54% (40)	2.1% (20)	1.1% (112)
Large farmers (10.1 and above acres)	0.11% (7)	0.15% (4)	0.42% (4)	0.15% (15)
Total	100 (6,660)	100 (2,602)	100 (951)	100 (10,213)

Source: Primary survey
Note: Figures in the parenthesis indicate the actual number of households.

Agriculture and wage employment are the mainstay of Scheduled Caste livelihoods in Telangana. As the empirical evidence laid out in Table 1 shows, land-ownership-based disaggregation of the survey results indicates that 61.22% of SC households are landless (including urban households), followed by marginal farmers (31.35%), and small farmers (6.19%). Analysis of household listing data collected from 400 study sites also indicates that 62.5% of households are landless. It is important to note that landless households are the most vulnerable with regard to livelihoods, and they are

also deprived of the benefits of land-based government schemes such as Rythu Bharosa and Rythu Bhima. In 2018, the Government of Telangana launched the Rythu Bharosa (earlier called Rythu Bandhu) scheme, which provides investment support to farmers to mitigate the risks associated with agriculture and make it remunerative. However, the most vulnerable section of farmers—tenant farmers—have been excluded from both schemes (Danavath 2022).

Disaggregation of survey data by sub-castes within the SC community indicates that the share of landless households was highest among "other" sub-castes (75.92%), followed by the Madiga (61.25%), and Mala communities (55.76%). Jakkula Venkata Raju of Indira Nagar in Jagityal district said: *"Gollolaku gorrelu iyyavatte, bhoomunnoniki rythu bandhu, BC laku lakhsha isthundru, asalu yemi lenoniki yetla*" ("Shepherds are given sheep, farmers are given Rythu Bandhu support, and BCs are given Rs one lakh, but who cares about the landless?"). Katte Mohan from the same village stated that: "*Ye bhoomi jhaga lenoniki ye caste ayina sare yedho undali kadha*" ("The landless, irrespective of their caste, have to be provided some support by the government"). Rather than the facade of state welfare schemes for farmers by the state, there is an immediate need to initiate land redistribution, which the state government has not undertaken since the formation of Telangana in 2014 (Danavath, 2022).

Table 2: Distribution of SC Farmers by Landholding Size Categories

Farmer Category	Percentage
Marginal farmers (0.1 - 2.5 acres)	80.83% (3,202)
Small farmers (2.51 - 5.0 acres)	15.95 % (632)
Medium farmers (5.1 – 10.0 acres)	2.82% (112)
Large farmers (10.1 and above acres)	0.37% (15)
Total	100 (3,961)

Source: Primary survey.

Note: Figures in the parenthesis indicate the number of households.

Table 2 presents the distribution of land-owning households by landholding size. Landless households were excluded from the analysis, taking into account all 3,961 landed households. The vast majority (80.83%) of Scheduled Caste farmers are marginal farmers, followed by small farmers (15.95%), and medium farmers (2.82%). Large farmers, owning more than 10 acres, constitute only 0.37% of the sample. Furthermore, the analysis reveals that the proportion of Madigas is higher than other sub-castes across all farmer size-classes.

The baseline survey captured data from 25 non-Mala and non-Madiga SC sub-castes that were reported. The survey results related to land ownership status of these SC sub-groups are also presented here. A majority of farmers from these communities are marginal and small farmers. The empirical data also indicates that among SC sub-groups, landlessness is higher among *Bedajangam* (31.16%), followed by *Malasale or Netakani* (16.06%), and *Bindla* (9.55%). Relatively lower levels of landlessness were found among the following sub-castes: *Holeyadasari* (5.12%), *Gosangi* (4.89%), *Chamar* (5.95%), *Sindhollu* (5.67%), *Maladasari* (3.73%), and *Mahar* (3.32%). It is clear from the findings that landlessness is prevalent across all SC sub-castes. "*Prabhuthvam nunchi yedhi vacchina, mala madiga anubhavisthundru*", said Bairy Venkatesham of Siddipet district ("the benefits of government schemes are monopolised by the Malas and Madigas, depriving other SC sub-castes of these benefits").

Issues and legal disputes over land ownership or title are common in rural areas. These issues and disputes are more prevalent with respect to the lands owned by the Scheduled Castes. The present study collected data to assess the situation regarding land titles. Data related to the ownership status of land parcels owned by the surveyed households was captured; the total land owned by these households amounts to 10,766 acres, of which nearly 32% of the land owned by the SCs is without a formal title.

In addition to untitled lands, disputed lands are also found in rural areas. A small proportion (5.27%) of the land owned by the SC community falls into the "disputed" category. The findings also indicate that a higher share of lands (7.06%) owned by "other SC sub-castes" are disputed, followed by the numerically large sub-castes of Madiga (6.01%) and Mala (3.37%).

Farmers often lease out their lands due to their inability to cultivate them; the reasons include ill health, a lack of capital, and limited or no family support. Empirical data reveals that 16.89% of SC households leased out their land to others. Additionally, due to smallholdings, some farmers lease in land to cultivate a larger plot. Data indicates that 20.31% of SC households have leased in land to enhance their livelihoods. Rajanna of Guda village in Adilabad district said: "*Panta rani raka poni paisalu iyyalsindhe*" ("the tenant farmer has to pay the landowner irrespective of whether he gets any crop yield or not"). Therefore, tenant farmers should be covered under the Rythu Bharosa scheme and crop loan facility so that they will be able to cope with the vulnerabilities resulting from climate change and market price volatility for the crops they cultivate. To ensure the inclusion of genuinely indebted farmers, establishing a clear mechanism to identify tenant farmers and strengthening local government institutions is an urgent necessity (Danavath 2022).

Rythu Bharosa and PM-KISAN: In Telangana, farmers who own land are eligible to receive financial assistance under the agriculture investment support schemes, namely, Rythu Bharosa (previously known as Rythu Bandhu) and PM-KISAN. Each crop season, these schemes provide financial support to farmers for the purchase of inputs such as fertilisers, pesticides, seeds, and other investments in agriculture. The Rythu Bharosa scheme is a beneficial initiative that protects farmers from debt (Gulati and Hussian 2018). In Telangana, as per *vanakalam* (kharif) 2022 data, the scheme had 8.54 lakh beneficiaries among SCs, followed by 8.24 lakh among STs, 34.81 lakh among BCs, and 13.41 lakh among "Others" (GoT, 2023). This study collected data on the coverage of SC farmers under the Rythu Bharosa and PM-KISAN schemes in Telangana.

It was reported that 87.05% of farmers benefit from the Rythu Bharosa scheme. Similarly, 74.63% of farmers are in receipt of the PM-KISAN transfers from the Government of India. A study by Ramakrishna and Ravikumar (2021) with respect to the usage of Rythu Bandhu assistance revealed that it was spent on seeds (3.8%), fertilisers (20.7%), pesticides (14.0%), labour payments (11.9%), and non-agriculture expenditure (29.5%). Srinivas and Ram (2024) suggest that the Rythu Bandhu scheme should also be applicable to tenant farmers too. The main reasons reported by farmers for not receiving support under Rythu Bharosa and PM-KISAN include: (1) application submitted but assistance pending (45.73%); (2) application not submitted (18.31%); (3) no legal land title (17.76%); (4) no documentation for title ownership (11.76%); and (5) disputed land (3.0%).

4.2. Major Crops

Despite the constant encouragement of monocropping by agricultural extension agencies and private input companies (seeds, pesticides, and fertilisers) over the past three to four decades, farmers continue to prefer crop diversity, recognising its merits (Revathi et al., 2024). Data collected using a village schedule reveals that a majority (53.2%) of the surveyed SC farmers own shallow black soils, followed by red soils (50.6%), and sandy soils (20.2%). Some farmers own more than one type of soil. Only 1.7% of the surveyed farmers own fertile clayey soil.

The survey results presented in Table 3 reflect the agro-biodiversity hosted by the farms of the sampled households. They highlight the importance of millets within the food and farming systems of the SC community. Incentivising the conservation of agro-biodiversity, especially the on-farm diversity of underutilised crops such as minor millets, is essential to combat climate change (Arvindakshan and Sherief 2010). However, a

majority of SC households grow paddy (53.04%), enabled by access to irrigation. This is followed by the cultivation of cotton (27.67%), maize (4.94%), and redgram (4.62%). Millet crops, such as sorghum, are also cultivated by farmers. Crop genetic diversity is an essential dimension of agricultural production in low-input farming systems; a reduction in diversity often increases the vulnerability of small cultivators (Cleveland et al. 1994; Reddy 2009).

Only a negligible area was found under horticultural crops, such as vegetables and flowers. A majority of SC households are dependent on private bore wells for paddy cultivation, leading to the overexploitation of groundwater resources and an increased investment burden on these farming households. Therefore, the Agriculture Department should promote irrigated dry crops on these lands.

Table 3: Percentage distribution of area under different crops grown by SC farmers during kharif 2023 by sub-castes

Crop	Madiga	Mala	Other SC sub-castes	All
Paddy	53.81 (1,293)	53.00 (557)	45.75 (113)	53.04 (1,963)
Cotton	27.67 (665)	25.98 (273)	34.82 (86)	27.67 (1,024)
Maize	5.08 (122)	4.38 (46)	6.07 (15)	4.94 (183)
Redgram	4.33 (104)	5.14 (54)	5.26 (13)	4.62 (171)
Soyabean	1.71 (41)	2.28 (24)	0.81 (2)	1.81 (67)
Chillies	0.96 (23)	1.71 (18)	0.40 (1)	1.13 (42)
Jowar	0.92 (22)	1.24 (13)	1.21 (3)	1.03 (38)
Green gram	0.54 (13)	1.24 (13)	0.81 (2)	0.76 (28)
Ground nut	0.37 (9)	0.48 (5)	1.21 (3)	0.46 (17)
Black gram	0.46 (11)	0.10 (1)	0.40(1)	0.35 (13)
Turmeric	0.79 (19)	0.86 (9)	1.21 (3)	0.84 (31)
Vegetables	0.92 (22)	0.86 (9)	0.40 (1)	0.86 (32)
Carrot	0.21 (5)	0.19 (2)	0.00 (0)	0.19 (7)
Safflower	0.04 (1)	0.00 (0)	0.00 (0)	0.03 (1)
Bajra	0.08 (2)	0.10 (1)	0.00 (0)	0.08 (3)
Bengalgram	0.04 (1)	0.00 (0)	0.00 (0)	0.03 (1)
Castor	0.08 (2)	0.00 (0)	0.00 (0)	0.05 (2)
Coconuts	0.08 (2)	0.10 (1)	0.00 (0)	0.08 (3)
Flowers	0.25 (6)	0.10 (1)	0.40 (1)	0.22 (8)
Fruits	0.17 (4)	0.29 (3)	0.00 (0)	0.19 (7)
Horsegram	0.04 (1)	0.19 (2)	0.00 (0)	0.08 (3)
Niger	0.00 (0)	0.10 (1)	0.00 (0)	0.03 (1)

Crop	Madiga	Mala	Other SC sub-castes	All
Onion	0.12 (3)	0.10 (1)	0.00 (0)	0.11 (4)
Other	0.62 (15)	1.14 (12)	0.00 (0)	0.73 (27)
Pundi	0.08 (2)	0.00 (0)	0.00 (0)	0.05 (2)
Ragi	0.04 (1)	0.38 (4)	0.00 (0)	0.14 (5)
Safflower	0.04 (1)	0.00 (0)	0.00 (0)	0.03 (1)
Sesame	0.12 (3)	0.00 (0)	0.00 (0)	0.08 (3)
Sugarcane	0.29 (7)	0.10 (1)	0.00 (0)	0.22 (8)
Tobacco	0.12 (3)	0.00 (0)	0.00 (0)	0.08 (3)
Wheat	0.00 (0)	0.00 (0)	1.21 (3)	0.08 (3)
Total	100 (2,403)	100 (1,051)	100 (247)	100 (3,701)

Source: Primary survey
Note: Figures in parenthesis indicate the number of households

Analysis of cropping patterns across sub-castes reveals that, during kharif, 53.81% of Madiga households, 53% of Mala households, and 45.75% of other sub-caste households cultivated paddy. Although kharif is the main cropping season, 23% of farmers also cultivated crops in rabi. Of the total households growing crops in the rabi season, 86.04% of them cultivated paddy. Sub-caste analysis for rabi cultivation shows that 86.78% of Madiga households were cultivating paddy, followed by Mala (85.71%), and other SC sub-caste households (78.87%). Commercial crops such as chillies and turmeric were also cultivated by Scheduled Caste farmers. Regional transitions in farming systems have occurred in the recent past, and subsistence mixed farming systems have almost completely transformed into market-oriented specialised systems (Rao et al. 2021). Cropping patterns of the study villages where PRA exercises were conducted are presented in Box 1.

Box 1: Cropping Pattern

As part of the qualitative research methodology employed, four Participatory Rural Appraisals (PRAs) were conducted in the districts of Sanga Reddy, Nalgonda, Wanaparthy and Mancherial between August and October 2023. The findings emerging from these PRAs indicate that farming and agricultural wage labour constitute the predominant livelihood sources for the SC community, followed by employment through the MGNREGA. The major cropping system prevalent in *Kharif* season is as follows:

Sole cropping of paddy
1) Cotton + redgram + greengram + black gram + field beans
2) Green gram + redgram + black gram
3) Sole cropping of gingelly
4) Sole cropping of niger
5) Sole cropping of chillies

The major cropping system prevalent in *Rabi* is as follows:
1) Chick pea+ safflower + lathyrus + peas + linseed + saijonna + mustard + coriander.
2) Sole cropping of paddy

Cotton is the primary rainfed crop cultivated in the study villages. Cotton farmers encounter challenges from several risks, such as poor seed quality, elevated cultivation costs, pest and disease incidence, and market price volatility.

Source: Participatory Rural Appraisal

4.3. Access to Irrigation

Irrigation is the cornerstone of agriculture, playing a critical role in ensuring stable and enhanced crop production worldwide. By providing consistent moisture levels, irrigation supports crop growth throughout the year, enabling farmers to diversify crops, increase yields, and improve food security (Dayakar et al. 2024). Furthermore, by mitigating the impact of unpredictable weather patterns, irrigation facilitates crop cultivation in arid and semi-arid regions. Irrigation is not just a technological advancement but a fundamental tool for agricultural development, enabling farmers to harness their land's potential and serving as crucial prerequisite for optimising crop yields.

Empirical data (see Table 4) from the study indicates that 48.32% of the land owned by the sampled SC households is irrigated, with the remaining 51.68% comprise dry or rainfed land. Only 6.24% of the households own both irrigated and dry lands. There are no significant differences between the Mala and Madiga communities in this respect. However, the other SC sub-castes possess a greater share of dry land than the Madiga and Mala communities.

Table 4: Shares of irrigated and dry lands owned SC farmers by sub-caste

Particulars	Irrigated land	Dry land	Total
Madiga	49.63% (0.30)	50.37% (0.31)	100 (0.61)
Mala	50.23% (0.40)	49.77% (0.39)	100 (0.79)
Other SC sub-castes	33.69% (0.22)	66.31% (0.44)	100 (0.66)
All	48.32% (0.32)	51.68% (0.34)	100 (0.66)

Source: Primary survey

Note: Figures in the parenthesis indicate the average land per household in acres

As the findings presented in Table 5 demonstrate, the majority (54.97%) of SC households depend on borewells, indicating that it is the primary source of irrigation; the next important source is open wells, reported by 15.90%, followed by canals (11.39%). Therefore, there is a need to promote technological solutions that enable remote operation of borewell pumps through mobile devices. There is a significant difference in knowledge levels among farmers after their exposure to social media, compared to their pre-exposure status (Sandeep et al. 2023). This finding suggests that the extension system needs to consider social media platforms as a potential means of disseminating agricultural information. In addition to the sampled households, the study collected village-level data covering all SC households, using a village schedule; this data shows that 70.9% of SC households in rural Telangana depend on borewells for their irrigation needs, followed by canals (30.4%), open wells (27.7%), and tanks (19.6%). The SC farmers have minimal access to surface irrigation sources, such as canals, tanks, streams, and ponds, as their land parcels are usually located away from these water resources. Consequently, these farmers have no other option but to make significant investments in borewells and open wells.

Table 5: Irrigation Sources of SC Farmers by Sub-Caste (all figures are percentages)

Sub-Caste	Borewell	Canal	Open well	Ponds	River	Stream	Tanks	Other	Total
Madiga	56.61	11.29	17.41	3.34	0.54	1.39	2.58	6.83	100
Mala	53.91	12.21	15.79	4.34	1.03	1.48	1.60	9.65	100
Other SC sub-castes	47.41	8.92	5.60	8.01	3.69	6.70	3.87	15.80	100
Total	54.97	11.39	15.90	4.05	0.96	1.86	2.37	8.49	100

Source: Primary survey

Crop Insurance: Farmers cultivate crops in the face of a range of adverse climatic conditions spanning the entire cropping cycle, from sowing to harvesting. Such impacts at any stage could result in yield losses, impacting farmers' earnings and livelihoods. Therefore, farmers often seek to insure their crops against unpredictable natural events. However, empirical data from the present survey indicates that a negligible share of farmers (0.68%) have taken out crop insurance, and that exclusively with a private company. The main reason for this low adoption of crop insurance is that the Telangana Government opted out of implementing the Pradhan Mantri Fasal Bhima Yojana in the state until 2023. This absence of insurance cover has left farmers vulnerable to economic losses in the event of a natural disaster or pest infestation.

4.4. Average Crop Yields

Good and predictable harvests sustain farmers' livelihoods. Among other factors, crop yields are influenced by the level of technology adoption by farmers. This holds true for the sample farmers covered by the study. The average yields of major crops grown by SC farmers are presented in Table 6. Paddy is the leading crop, followed by cotton, maize, and red gram. The average yields were computed for these crops because they account for most of the area cultivated by SC farmers. The average yield of paddy per acre reported by the sample households is 27.88 quintals; the corresponding figures for cotton, maize, and red gram are 5.56 quintals, 21.59 quintals, and 6.70 quintals, respectively. The yields realised by other SC sub-castes are slightly lower in the case of crops such as paddy and cotton. The mean market prices obtained by Madiga, Mala, and other SC sub-castes do not show significant variation.

Table 6: Yields of Major Crops and Market Prices in Kharif (2023) Across SC Sub-Castes

Crop	Madiga		Mala		Other SC sub-castes		All	
	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl
Paddy	27.77	2060	28.77	2060	24.76	2060	27.88	2060
Cotton	6.34	6959	5.57	7010	4.77	7120	5.56	6986
Maize	20.90	1838	21.88	1814	22.00	1638	21.59	1816
Redgram	6.49	5312	6.32	5765	6.33	4031	6.70	5358

Source: Primary survey

The rabi pattern is comparable to that of kharif, with yields realised by other SC sub-castes lower than those reported by Madiga and Mala farmers (see Table 7). Focus group discussions indicate that the yields obtained by Scheduled Caste farmers in both kharif and rabi seasons are not substantially lower than those realised by non-SC farmers, especially in soils with good fertility levels.

Table 7: Yields of Major Crops and Market Prices in Rabi (2023) Across SC Sub-Castes

Crop	Madiga		Mala		Other SC Sub-Castes		All	
	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl	Average yield quintal/ acre	Average price Rs/qtl
Safflower	-	-	3.50	4000	-	-	3.50	4000
Bengal gram	11.77	4200	7.20	4735	3.00	5025	8.40	4560
Jowar	5.67	4054	5.60	3762	2.67	4000	4.64	3928
Paddy	26.58	2060	27.39	2060	24.49	2060	26.72	2060
sunflower	3.50	5000	-	-	-	-	3.50	5000

Source: Primary survey

In addition to crop yields obtained by SC farmers, data related to investments made by them was also captured by the survey. As the results detailed in Table 8 show, the average investments made by SC farmers in the cultivation of major crops are as follows: paddy (Rs 25,126), cotton (Rs 33,956), maize (Rs 20,454), and red gram (Rs 20,841). The sampled SC farmers also cultivate commercial crops, such as chillies and turmeric, with chilli cultivation costing Rs 1,04,667 per acre. Most small and marginal farmers belong to SCs and OBCs, and the lands cultivated by them are unproductive. Consequently, their farming is characterised by a growing cost of cultivation and dwindling productivity per acre, compared to medium and large farmers (Kumar 2015).

Table 8: Per-Acre Cost of Cultivation for Major Crops in 2023

Crop	Mean investment (in Rs)	Crop	Mean investment (in Rs)
Paddy	25126	Blackgram	16078
Cotton	33956	Chillies	104667
Maize	20454	Bengalgram	12173
Redgram	20841	Groundnut	30996
Sorghum (Jowar)	15406	Onion	18750

Source: Primary survey

The sampled farmers faced several constraints in crop cultivation. To improve understanding, these constraints were analysed by crop type so as to make policy recommendations accordingly. In the case of cotton, pests and diseases were reported as the major constraint by 37.63% of the farmers, followed by a lack of reliable irrigation (18.58%), and high input and labour costs (17.90%). With respect to jowar, too, pests and diseases (25.95%) and threats from wild animals (25.95%) were reported as the equally significant major constraints.

In other words, farmers identified a lack of reliable irrigation, pests and diseases, high input and labour costs, and wild animal attacks as the most prevalent constraints associated with crop cultivation. To address some of these challenges, the adoption of integrated pest management should be popularised through training and field demonstrations by the Agriculture Department. Similarly, to address labour shortages, agricultural implements and machinery should be provided through custom hiring centres. To address the constraint of high input costs, SC farmers should be organised into FPOs (Farmer Producer Organisations) as the collectivisation of small and marginal farmers will achieves economies of scale in accessing quality agricultural inputs at affordable prices. It is rare to find FPOs that have been formed exclusively for SC farmers. Therefore, there is a need to launch a campaign to facilitate the formation of FPOs consisting of both male and female farmers. This will establish an institutional platform to channel interventions and resources towards addressing the challenges confronted by SC farmers while partnering with government departments, marketing agencies, and other stakeholders**.**

Alongside documenting the constraints surrounding the cultivation of major crops, the study also elicited suggestions from farmers in terms of potential solutions to address the constraints. As for cotton, farmers conveyed the need for improved access to irrigation and the provision of inputs, such as seeds, fertilisers, and pesticides. Suggestions reported with respect to paddy cultivation include the supply of quality inputs (33%), soil quality management (26.55%), and support for land improvement (26.33%). Assured remunerative prices, improved access to marketing, flexible bank loans, and accurate and timely weather forecasts were key suggestions for both cotton and paddy cultivation.

The present study also sought to ascertain the propensity of farmers to cultivate high-value crops that would yield greater economic returns. Empirical evidence indicates that 19.64% of SC farmers expressed their willingness to cultivate high-value crops and expect the government to train and guide them, alongside providing the requisite technical and financial support.

5. Technology Adoption

Technology adoption is critical for improving crop yields and increasing farmers' income. As shown in Table 9, a plurality (38%) of SC farmers cultivate local crop varieties, followed by hybrid and high-yielding varieties. With respect to cotton production, almost all the farmers grow Bt cotton. In addition to cotton, a majority of farmers also cultivate paddy, maize, redgram, and soyabean. It is with respect to these crops that the Agriculture Department and agricultural universities should provide support for farmers to adopt high-yielding varieties by bringing the technology to their farms. This would ensure improved crop yields. Exclusive training programmes should be conducted for SC farmers in collaboration with Krishi Vigyan Kendras and Farmers' Training Centres at the district level, focusing on the cultivation of the latest varieties and their package of practices. However, traditional varieties with unique characteristics and good yields should be preserved across all crops.

Table 9: Adoption of Seed Type by SC Farmers by Sub-Caste

Sub-Caste	Local	High-Yielding Variety	Hybrid	BT	Don't Know
Madiga	37.7% (926)	8.59% (211)	34.93% (858)	17.43% (428)	1.34% (33)
Mala	37.79% (413)	8.51% (93)	37.15% (406)	15.46% (169)	1.1% (12)
Other SC sub-castes	37.5% (84)	10.27% (23)	26.34% (59)	23.66% (53)	2.23% (5)
All	37.72% (1423)	8.67% (327)	35.06% (1323)	17.23% (650)	1.33% (50)

Source: Primary survey
Note: Figures in the parenthesis indicate the number of households.

As the findings presented in Table 10 indicate, close to 95% of paddy transplantation is done manually by SC farmers. Self-help groups of SC women should be provided with subsidised mechanised paddy transplanters, particularly in areas experiencing labour shortages. The Government of India has also prioritised soil health, implementing several initiatives for its improvement. Therefore, paddy farmers should be educated about the advantages of growing green manure crops and incorporating them into their soils to maintain long-term soil health. Green manure is an efficient nitrogen (N) source when used as an alternative to chemical fertiliser. Partial substitution of chemical fertiliser with green manure is an effective method of promoting paddy growth by supplying N for paddy uptake and facilitating its more efficient use (Xiangtian et

al. 2019). Frontline demonstrations that introduced green manure crop *Dhaincha* (Sesbania Rostrata), conducted by Krishi Vigyan Kendras, have reported higher net returns (Borthakur 2018). Furthermore, studies indicate that the incorporation of green manure legumes can significantly increase the amount of N in the soil (Becker et al. 1995; Watanabe 2021).

Marginal farmers of the SC community must be discouraged from growing cotton as it may push them into a vulnerable situation due to uncongenial weather, high pest incidence and unstable market prices. Instead, special initiatives have to be implemented for these farmers for cultivating nutritionally rich millets, pulses and oilseed crops.

Table 10: Adoption of Mechanised Paddy Transplantation among SC Farmers by Sub-Caste

Category	Manual	Mechanised	Total
Madiga	94.9% (1582)	5.1% (85)	100 (1667)
Mala	94.48% (667)	5.52% (39)	100 (706)
Other SC sub-castes	90.78% (128)	9.22% (13)	100 (141)
All	94.55% (2377)	5.45% (137)	100 (2514)

Source: Primary survey

Note: Figures in the parenthesis indicate the number of households.

Empirical data indicates that the crop yields of SC farmers are generally lower than those of non-SC farmers for certain crops (this finding is corroborated by focus group discussions with farmers). Conversely, for certain other crops, the yields of SC farmers are higher than the state averages. For instance, the average yield of SC farmers for paddy is 27.88 quintals per acre, compared to the state average of 21.66 quintals per acre. The pattern regarding other crops is as follows (yields of SC farmers per acre vs. state-level yields per acre, respectively): cotton 5.56 quintals (7.18 quintals), maize 21.59 quintals (24.05 quintals), and redgram 6.70 quintals (3.28 quintals).

Lower yields for certain crops could be attributed to a lack of awareness and access to the latest technologies. Furthermore, most lands owned by SC farmers are marginal and of low soil quality, lacking access to the latest seed varieties. Even today, extension services do not reach most SC farmers. It is clear from the survey findings that only 11.34% of farmers receive extension services through mobile phones. Lack of information on appropriate adoption options was the most prioritised problem for farmers (Pankaj and Singh 2017). In addition to in-situ training in agricultural technologies, farmers should also be reached via social media, such as their community WhatsApp groups,

to keep them updated on farming practices. The existing *Rythu Vedikas* (one per 5,000 population in rural areas) can serve as multi-purpose platforms to support and handhold farmers.

The present study assessed the adoption of agricultural technology by Scheduled Caste farmers, covering the entire farming cycle, from seed varieties to post-harvest processing. The largest proportion (38%) of SC farmers cultivate local varieties of crops, followed by hybrids and high-yielding varieties. Furthermore, 95% of paddy transplantation was carried out manually by SC farmers. Empirical evidence presented in Table 11 indicates that soil testing had not been conducted for 92.88% of SC farmers. There is no variation across the Madiga, Mala, and other SC sub-castes in this respect. The SC farmers remain unreached despite several initiatives by the governments, including the soil health card scheme of the Government of India. Understanding the advantages of soil test-based applications and practices is crucial for overall farm management to produce optimum yields (Sandeep et al. 2023). Assessing soil health is essential for crop cultivation. Soil testing helps in identifying nutrient deficiencies. It is important to note that the Government of India implements several initiatives to maintain soil health. Therefore, paddy-growing farmers should be educated and incentivised to grow green manure crops and incorporate them into their soils to maintain long-term soil health.

Land preparation constitutes a crucial agricultural operation in which certain common implements and equipment are used, including tractors, rotavators, disc ploughs, wooden ploughs, and harrows. Even today, an overwhelming proportion of SC farmers (84.53%) use a wooden plough for land preparation, followed by disc ploughs (71.84%), tractors (67.73%), harrows (68.6%), and rotavators (57.35%).

Sowing is one of the skilled agricultural operations. It is evident from Table 11 that half of SC farmers practise hand dibbling. This could be due to a large area under cotton cultivation, where hand dibbling in lines is the most popular and efficient method. The study found that the adoption of the latest and most efficient sowing tool, the "ferti-cum-seed drill" is very low; thus, there is a need to promote its use among Scheduled Caste farmers by supplying it through Custom Hiring Centres (CHCs). Its usage will enable farmers to effectively place fertilisers near the seed, which the plant takes up after germination.

The study also collected data on the adoption of various soil fertility management practices among SC farmers. Some farmers adopted more than one practice. Responses were captured against a set of key fertility-enhancing practices. A majority of SC farmers

(51.17%) exclusively use chemical fertilisers in crop production, while 27.13% of them use a combination of chemical fertiliser and organic manure. The study identified the prevalence of certain traditional agricultural practices, such as sheep penning, tank silt application, and green manuring/green leaf manuring, reported by 26.41%, 10.16% and 9.41% of SC farmers, respectively. These practices not only enhance soil health but also generate employment opportunities.

Weeding is an important inter-cultivation operation. Manual weeding is predominant; however, 45.91% of farmers also use available weeding technologies, such as weedicides or herbicides. At the same time, these technologies may contribute to soil pollution and reduce soil microbial life, potentially impacting soil productivity. Therefore, it is important to sensitise farmers regarding these potential impacts.

Close to 50% of the land owned by SC farmers is wetland. Primary irrigation sources include borewells, canals, and open wells. However, the method of irrigation is predominantly traditional. Only 2.70% and 1.79% of SC farmers reported using drip and sprinkler irrigation systems, respectively. For farmers with borewells and open wells, adopting contemporary irrigation technologies, such as drip and sprinkler systems, would not only enhance water use efficiency but also improve crop yields, especially in the cultivation of irrigated dry crops. Therefore, there is a compelling case for expanding the coverage of SC farmers under the existing government subsidy schemes that provide drip and sprinkler irrigation technologies.

Table 11: Status of Adoption of Different Practices/Methods and Technologies in Agriculture by SC Farmers by Sub-Caste (all figures are percentages)

Practice or technology	Madiga		Mala		Other SC sub-castes		All	
	No	Yes	No	Yes	No	Yes	No	Yes
	Soil Testing							
Soil Testing	93.12	6.88	91.56	8.44	94.75	5.25	92.88	7.12
	Land Preparation							
Tractor	67.53	32.47	63.22	36.78	80.84	19.16	67.73	32.27
Rotavator	57.45	42.55	58.28	41.72	51.82	48.18	57.35	42.65
Disc plough	72.60	27.40	73.06	26.94	57.89	42.11	71.86	28.14
Wooden plough	85.21	14.79	85.14	14.86	74.09	25.91	84.53	15.47
Harrow	68.81	31.19	70.19	29.81	59.92	40.08	68.67	31.33

Practice or technology	Madiga		Mala		Other SC sub-castes		All	
	No	Yes	No	Yes	No	Yes	No	Yes
	Sowing							
Seed drill	83.04	16.96	82.35	17.65	77.73	22.27	82.52	17.48
Ferti-cum-seed drill	91.92	8.08	92.74	7.26	84.62	15.38	91.72	8.28
Hand dibbling	49.71	50.29	50.17	49.83	43.72	56.28	49.48	50.52
Broadcasting of seed	85.80	14.20	86.82	13.18	85.83	14.17	86.10	13.90
Tractor sowing	95.10	4.90	95.10	4.90	96.36	3.64	95.17	4.83
	Soil Fertility Enhancement							
Only Chemical Fertilisers	48.16	51.84	48.48	51.52	57.89	42.11	48.83	51.17
Only Organic manure	96.98	3.02	97.13	2.87	93.12	6.88	96.79	3.21
Chemical fertilisers plus organic manure	73.53	26.47	73.65	26.35	61.94	38.06	72.87	27.13
Tank silt application	89.20	10.80	90.54	9.46	93.52	6.48	89.84	10.16
Green manuring or green leaf manuring	90.82	9.18	90.46	9.54	88.66	11.34	90.59	9.41
Sheep/Animal penning	72.97	27.03	75.25	24.75	72.47	27.53	73.59	26.41
	Weeding							
Hand weeding	28.10	71.90	29.98	70.02	29.55	70.45	28.72	71.28
Dinde/Danthe	87.94	12.06	89.70	10.30	80.16	19.84	87.98	12.02
Herbicide/Weedicide	54.02	45.98	55.66	44.34	47.37	52.63	54.09	45.91
Weeding with Tractor	93.36	6.64	92.65	7.35	93.52	6.48	93.17	6.83
Weeding with hand hoeing	73.19	26.81	72.55	27.45	59.51	40.49	72.19	27.81
	Irrigation Methods							
Sprinkler	98.19	1.81	98.14	1.86	98.79	1.21	98.21	1.79
Drip	97.16	2.84	97.47	2.53	97.98	2.02	97.30	2.70
	Pest Management							
Traditional techniques	95.10	4.90	94.17	5.83	92.71	7.29	94.69	5.31
Bio-pesticides	94.21	5.79	92.74	7.26	91.09	8.91	93.60	6.40
Pesticides	32.45	67.55	32.77	67.23	33.20	66.80	32.59	67.41
Use of knapsack sprayer	65.30	34.70	67.23	32.77	59.11	40.89	65.48	34.52
Power sprayer	57.85	42.15	59.46	40.54	63.56	36.44	58.65	41.35
	Harvesting							
Manual harvesting	58.85	41.15	61.40	38.60	48.18	51.82	58.94	41.06
Bullock+ manual harvesting	95.84	67.02	99.24	0.76	98.79	1.21	99.18	0.82

Practice or technology	Madiga		Mala		Other SC sub-castes		All	
	No	Yes	No	Yes	No	Yes	No	Yes
Machine harvest	50.33	49.67	49.49	50.51	58.70	41.30	50.59	49.41
	Post-Harvest and Others							
Polyhouse	99.89	0.11	99.92	0.08	99.60	0.40	99.88	0.12
Mobile used to operate motors	98.75	1.25	98.73	1.27	99.60	0.40	98.79	1.21
Agri extension services through mobiles	88.68	11.32	87.75	12.25	92.71	7.29	88.66	11.34
Mobile used for labour hiring	81.34	18.66	81.25	18.75	80.16	19.84	81.25	18.75
Mobile use for wage payments	96.98	3.02	96.45	3.55	97.98	2.02	96.89	3.11
Marketing through e-NAM	96.09	3.91	94.85	5.15	97.98	2.02	95.85	4.15
Advice or support from Agri Dept and other agencies	66.81	33.19	67.48	32.52	73.28	26.72	67.39	32.61
Processing of produce or value addition	78.87	21.13	78.80	21.20	76.92	23.08	78.74	21.26

Source: Primary survey

Pest management constitutes a critical and recurring aspect of farming, requiring regular interventions. Globally, approximately 50% of all food and cash crops are lost to pests before and after harvest (DFID 2001). In India, despite the existing protection levels resulting from significant advances in crop protection research over the past 40 years, approximately 30% of the pre-harvest crop yield, valued at Rs 45,000 crore, is lost annually (Agriculture Today, 2012). The application of pesticides in modern farming to obtain increased yields is often viewed as a *sine qua non* for the success of agriculture. Empirical data presented in Table 11 shows that 67.41% of SC farmers spray pesticides; a disaggregation of data indicates that 41.35% use power sprayers and 34.52% use knapsack sprayers. Most farmers apply pesticides to protect their cotton and paddy crops. According to Mancini et al. (2005), nationally, 60% of all pesticides are applied to cotton crops, which accounts for only 4% of the total cropped area. Many pesticides can affect non-target organisms, contaminating soil and water (Chandrika, 2003). Indiscriminate pesticide use has led to environmental problems (Rajendran 2003; GoI 2008). Only 5.31% of farmers rely on traditional practices to manage pests.

Mechanised harvesting is fairly widespread among Scheduled Caste farmers, with close to 50% of them reporting its use. Paddy is the predominant crop cultivated by SC farmers, leading to widespread use of paddy harvesters across rural Telangana. Labour shortages have also contributed to the increased use of mechanised harvesting. A negligible proportion (0.12%) of farmers rely on polyhouse cultivation. Given the small landholdings of SC farmers, the adoption of polyhouses can be scaled up through capacity building and financial support so that they can improve the productivity of their small holdings. Value addition to farm produce was reported by 21.26% of farmers. Food processing and value addition have tremendous potential to substantially improve household incomes. Farmers need capacity building in this area in addition to a supportive environment in terms of infrastructure, financial support and market access.

Extension services serve as a bridge, making technologies accessible to the farming community. Empirical data demonstrates that only 11.34% of SC farmers receive extension services through mobile phones. Generally, extension officials from the Agriculture Department do not reach out to SC farmers as they are at the bottom of the socio-economic hierarchy with limited voice. In other words, there is a tendency not to treat them as part of mainstream farming. This is evidenced by the finding that only 32.61% of SC farmers avail themselves of services from the Agriculture Department and other agencies. There is vast scope for improvement in this area, given that almost every household (at least one member) owns a smartphone. By leveraging smartphones, extension agencies could now reach out virtually to every SC farmer, thereby universalising outreach. Technology adoption for wage payment is still low, with less than a fifth (18.75%) of farmers using smartphones to make payments via the UPI system. Furthermore, participation of SC farmers is significantly lower in the online marketing of their produce, with only 4.15% reporting access to the electronic National Agriculture Market (e-NAM) portal. These findings clearly reflect long-standing gaps in technology adoption by SC farmers and spotlight the imperative of reaching out and enabling them to leverage technologies towards more gainful farming and sustainable livelihoods.

The evidence indicates a low level of technology uptake across multiple domains, both in terms of scale and spread. Since agriculture represents a primary source of income for a significant proportion of rural households, the promotion and diffusion of agricultural technologies has the potential to positively impact the living standards of the SC communities. Alongside *in-situ* training in agricultural technologies, these communities should be engaged through social media platforms—WhatsApp groups in

particular—to keep them abreast of technological advances and information pertinent to agriculture and allied activities.

Technology adoption was also analysed across different land size-classes. As far as land preparation is concerned, marginal farmers from the SC community primarily rely on tractors due to their typical lack of bullock ownership. In contrast, medium and large farmers use advanced machinery such as rotavators and disc ploughs. Despite slightly higher rental charges, these machines till the land deeper. Overall, marginal farmers from the SC community reported lower levels of technology adoption compared to small, medium, and large farmers, particularly regarding technologies such as ferti-cum-seed drills and soil fertility management practices. However, marginal farmers use slightly higher quantities of pesticides than other farmer categories. More importantly, only 7% of the surveyed households engage in value addition for their produce.

6. Livestock among SC Households

Livestock is a critical component of agricultural households. The quantity and quality of livestock owned by farmers directly and indirectly influence soil fertility management and agricultural operations. The higher the number of livestock managed, the greater the access to organic manure, which, in turn, enhances soil health by improving plant resistance to pests and diseases. Within farming systems, livestock are crucial for maintaining soil fertility, providing draught power, and supplementing household food security (Reddy 2011). As Table 12 shows, most of the SC households (84.78%) do not own any livestock. This has a significant bearing on their agricultural practices and household income. According to Cheppala Pedda Yellaiah from Dharmaram village of Siddipet district, "*Pothana cheyyaleka, mepataniki jaga leka*" ("we are unable to raise livestock due to our inability to manage them and lack of grazing land"). Historically, livestock fulfilled multiple purposes, including the provision of food, manure, fuel, and draught power. However, the increased mechanisation of crop production and motorisation of transport has diminished the importance of bullocks. This has subsequently led to a reduction in the rearing of breeding cattle for bullock production (Rao et al. 2021).

Table 12: Percentage of SC Households Owning Livestock by Sub-Caste

Sub-caste	Yes	No
Madiga	13.84%	86.16%
Mala	15.73%	84.27%
Other SC sub-castes	25.12%	74.88%
All	15.22%	84.78%

Source: Primary survey

Table 13 presents the survey results regarding species-wise distribution of livestock ownership among SC sub-castes. Overall, 15.22% of SC households own livestock of various species. However, buffaloes account for almost half (49.52%) of the livestock-owning households. The distribution of other livestock-keeping households is as follows: cows (21.36%) and goats (20.02%). Poultry-owning households represent a further 7% of the SC community. SC households do not own sheep. Greater proportions of other SC sub-castes reported ownership of bullocks and goats. The average per-household ownership (across all sampled households) of buffaloes is 0.50, followed by cows (0.21) and goats (0.20).

Table 13: Ownership of Livestock across SC Sub-Castes by Type of Livestock (species-wise distribution of livestock-keeping households)

Livestock Type	Madiga	Mala	Other sub-castes	All
Buffaloes	51.03% (346)	55.74% (136)	28.69% (35)	49.52% (517)
Bullocks	1.03% (7)	0.82% (2)	4.1% (5)	1.34% (14)
Cows	22.42% (152)	20.08% (49)	18.03% (22)	21.36% (223)
Goats	17.55% (119)	16.39% (40)	40.98% (50)	20.02% (209)
Other	0.29% (2)	0.41% (1)	0.82% (1)	0.38% (4)
Poultry	7.67% (52)	6.56% (16)	7.38% (9)	7.38% (77)
Total	100% (678)	100% (244)	100% (122)	100% (1044)

Source: Primary survey (figures in parenthesis indicate the number of households)

Over the years, the population of cows and bullocks has decreased across the sample villages. However, focus group discussions indicate that bullocks continue to play a crucial role in agricultural operations. Despite this, tractor use has increased due to a steady decline in bullock ownership. Historically, each farming household typically owned at least one pair of bullocks. Mechanisation of farm activities, through the use of tractors and harvesters, was observed in many of the study villages.

The SC households predominantly keep local breeds of livestock. The proportion of households keeping local breeds within each category is as follows: bullocks (97%), cows (93%), goats (100%), he-buffaloes (98%), poultry (96%), she-buffaloes (88%), and sheep (100%). The remaining minuscule percentage of SC households reported non-local, but mostly native, breeds, such as: cows (Jersey and Punganur), she-buffaloes (Murrah), bullocks (Hallikar and Ongole), and poultry (Broiler, Giriraj/Vanaraj and Kadaknath). Ownership of improved cattle breeds is typically associated with households with greater access to resources, such as land, water, and finances (Rao et al. 2021). Over a quarter (27%) of livestock-keeping households reported constraints in livestock

management. However, only a third (34%) of livestock-owning households reported financial returns from livestock by selling animal products, animals, or the provision of animal-based services. Milch animals and small ruminants generate relatively higher and steadier incomes for these households.

The empirical evidence highlights the need to introduce improved and high-yielding livestock breeds to Scheduled Caste communities, as these can contribute to increased household incomes. A disaggregation of the constraints faced by livestock-owning households across the SC sub-castes is presented in Table 14. The primary constraint reported by livestock owners is the non-availability of fodder and feed (60.6%), followed by a lack of veterinary services (25.12%) and the high expenses associated with livestock management (16.82%). Consequently, it is imperative to make veterinary services accessible and affordable to the SC community, who remain largely unreached. In addition to prioritising the cultivation of fodder-yielding millet crops, dedicated fodder crops such as napier grass, para grass, and lucerne should be cultivated on irrigated farms.

Table 14: Constraints Faced in Livestock Management across SC Sub-Castes (percentage of livestock-keeping households)

Constraints	Madiga	Mala	Other SC sub-castes	All
Expensive to maintain	17.50 (49)	13.59 (14)	19.61 (10)	16.82 (73)
High household labour requirement	2.14 (6)	0.97 (1)	0 (0)	1.61 (7)
Constraints related to low price or demand for products/services	10 (28)	10.68 (11)	11.76 (6)	10.37 (45)
Lack of adequate space at home	13.57 (38)	12.62 (13)	13.73 (7)	13.36 (58)
Lack of open space for grazing	11.07 (31)	11.65 (12)	7.84 (4)	10.83 (47)
Lack of veterinary services	26.43 (74)	22.33 (23)	23.53 (12)	25.12 (109)
Low milk yield	5 (14)	7.77 (8)	5.88 (3)	5.76 (25)
Non-availability of fodder or feed	60.36 (169)	64.08 (66)	54.9 (28)	60.6 (263)
Water scarcity	2.5 (7)	5.83 (6)	0 (0)	3 (13)
Other constraints	10.71 (30)	9.71 (10)	11.76 (6)	10.6 (46)
Total	(446)	(164)	(76)	(686)

Source: Primary survey.

Note: Multiple responses were reported by the respondents; figures in the parenthesis indicate the number of households.

The study captured data to ascertain whether SC households are willing to take up livestock rearing as an income-generating activity. As illustrated in Table 15, over half (56.8%) of SC households conveyed their readiness to engage in livestock rearing for income-generation. This proportion does not vary significantly across SC sub-castes. Regarding livestock species preferences, nearly half (49.52%) of the households—the largest share—prefer buffaloes, followed by cows (21.36%), and small ruminants (20.02%). It is worth noting that the role of livestock in farming has evolved from a multipurpose function to an increasingly market-oriented food production role (Rao et al. 2021).

Table 15: Willingness to Take up Livestock Units as Income-Generating Activity and Choice of Livestock across SC Sub-Castes (% of households)

Sub-caste	Willingness to take up livestock units		Preferred livestock type					
	Yes	No	Cows	Buffaloes	Goat & Sheep	Bullocks	Poultry	Others
Madiga	56.97 (678)	43.03 (512)	22.42 (152)	51.03 (346)	17.55 (119)	1.03 (7)	7.67 (52)	0.29 (2)
Mala	55.45 (244)	44.55 (196)	20.08 (49)	55.74 (136)	16.39 (40)	0.82 (2)	6.56 (16)	0.41 (1)
Other SC sub-castes	58.65 (122)	41.35 (86)	18.03 (22)	28.69 (35)	40.98 (50)	4.1 (5)	7.38 (9)	0.82 (1)
All	56.8 (1044)	43.2 (794)	21.36 (223)	49.52 (517)	20.02 (209)	1.34 (1)	7.38 (77)	0.38 (4)

Source: Primary survey

Note: Figures in the parenthesis indicate the number of households.

7. Conclusion and Recommendations

The empirical evidence presented in this paper indicates that 61.22% of Scheduled Caste households across the state are landless. Furthermore, a higher incidence of landlessness was observed among "other SC sub-castes" (other than the *Madigas* and *Malas*). These findings provide a compelling rationale for implementing a comprehensive land distribution scheme, targeting Scheduled Castes, with the aim of fostering sustainable livelihoods through agriculture. In addition, providing institutional finance and other support mechanisms is crucial to enable landless SC households to establish micro and small enterprises. Among the landed SC households, over 80% are marginal farmers, predominantly followed by small farmers. A significant proportion of lands owned by

SC farmers lack formal legal titles, and a substantial area (5.27%) cultivated by SC farmers is subject to dispute. Despite the cultivation of diverse crops by SC farmers, which is indicative of agro-biodiversity, paddy dominates as the primary kharif crop, accounting for 53.04% of the cultivated area, which is predominantly irrigated through borewells and open wells, reflecting significant levels of private investment.

There is a need to accelerate the dissemination of high-yielding and stress-tolerant rice varieties among Scheduled Caste farmers. Furthermore, developing innovative practices to enhance the overall sustainability of rice production systems, such as reducing greenhouse gas emissions, is also important. In addition to paddy, other crops cultivated by SC farmers include cotton, maize, and redgram. Marginal farmers from the SC community should be encouraged to diversify away from cotton cultivation, as it can render them vulnerable due to unfavourable weather conditions, a high incidence of pests, and volatile market prices. Reliable and equitable marketing channels, remunerative prices, access to flexible institutional loans, extension services, and accurate and timely weather forecasts are critical requirements for cotton and paddy farmers. Therefore, it is important that related departments, agencies, and stakeholders address these priorities.

High-yielding varieties of crops, such as paddy, maize, redgram, and soyabean, should be introduced by the Agriculture Department and agricultural universities to the farms of SC farmers. Exclusive training programmes should be organised for SC farmers through Krishi Vigyan Kendras and Farmers' Training Centres at the district level and *Rythu Vedikas* at the cluster level, covering the cultivation of the latest varieties and their package of practices. Frontline demonstrations are an effective tool for the adoption and horizontal diffusion of scientific technologies, closing yield gaps that may arise from a lack of awareness within the farming community regarding improved cultivation management (Singha and Baruah et al. 2011; Singh et al. 2011).

The Government of India has prioritised soil health, implementing a range of initiatives to improve soil quality. Given the extensive scale of paddy cultivation in the state, it is imperative to enhance awareness among paddy farmers about cultivating green manure crops and incorporating them into the soil to ensure the long-term health and sustainability of their farming. Farmers should be provided with comprehensive information and guidance on sustainable agricultural practices to improve their incomes and reduce their reliance on chemical fertilisers and pesticides (Memdani 2024).

High-density planting systems and integrated pest management in cotton crops should be encouraged through training programmes and field demonstrations conducted by extension functionaries from the Agriculture Department. To address labour shortages—particularly during peak seasons— agricultural implements and machinery should be made available through custom hiring centres. Training farmers to use drone technologies for effective pest management should also be prioritised, which would simultaneously expand livelihood options for young people.

To address the constraint of high input costs for all major crops, governments, financial institutions, and relevant stakeholders should prioritise the formation of Farmer Producer Organisations (FPOs) for Scheduled Caste farmers. The collectivisation of small and marginal farmers into FPOs can yield a range of beneficial outcomes for farmers, including enhanced access to quality agricultural inputs and equipment at a significantly lower cost, improved access to remunerative markets, and opportunities for value addition. However, SC farmers are significantly underrepresented in existing FPOs. This institutional underrepresentation, coupled with the historical marginalisation of the SC community, underscores the need to establish FPOs exclusively for SC farmers. Institutions such as the NABARD (National Bank for Agriculture and Rural Development) and the SFAC (Small Farmers' Agri-Business Consortium) should assume a leading role on this front to facilitate the formation of FPOs comprising both male and female SC farmers.

The empirical data highlights the need for introducing native and high-yielding breeds of milch animals and small ruminants to the SC community, given their potential to improve household incomes. Dedicated fodder crops, such as napier grass, para grass, and lucerne, should be introduced to SC farmers with access to irrigation. This would address a major constraint: fodder shortages. Over 50% of SC households conveyed their willingness to take up livestock farming as an income-generating activity. The livestock species preferred by SC households, including buffaloes, cows, and small ruminants, should be provisioned through a targeted livestock development scheme. In conclusion, the findings underscore the importance of a holistic and targeted interventions to address the specific needs of the SC farming community and bridge the development divide between them and other social groups.

References

Agarwal, Bina and Malvika Mahesh (2023): "Does the Landowner's Gender Affect Self-cultivation and Farm Productivity? An Analysis for India," *Journal of Development Studies*, Vol 59, No 5, pp 758–77.

Agriculture Today (2012): "Crop Losses in India due to Pests and Diseases," *Agriculture Today*, Vol 15, No 4, pp 34–36.

Aravindakshan, S and A K Sherief (2010): "Connotation of Minor Millet Biodiversity and Indirect Payments in Tribal Homesteads in the Backdrop of Climate Change," MPRA Paper No 28136, Dresden University of Technology, Germany, and Kerala Agricultural University, India.

Bandumula, N, S Rathod, G Ondrasek, M P Pillai and R M Sundaram (2022): "An Economic Evaluation of Improved Rice Production Technology in Telangana State, India," *Agriculture*, Vol 12, Article 1387.

Becker, M, J K Ladha and M Ali (1995): "Green Manure Technology: Potential, Usage and Limitations—A Case Study for Lowland Rice," in J K Ladha and M B Peoples (eds), *Management of Biological Nitrogen Fixation for the Development of More Productive and Sustainable Agricultural Systems*, Vol 65, Dordrecht: Springer.

Bhalla, G S et al (1992): *Agricultural Growth and Structural Change in the Punjab Economy: An Input–Output Analysis*, Research Report 82, Washington, DC: International Food Policy Research Institute.

Borthakur, A K, M Pandey, K Singh and P P Tripathi (2018): "Effect of Green Manuring on Growth, Yield, Economics of Rice Production and Its Influence on Soil Fertility Status of East Kameng, Arunachal Pradesh," *Indian Journal of AgriSearch*, Vol 5, No 1, pp 34–36.

Chandrika, M (2003): "Pesticides Hardly Hit Pests, They Hit Us," *Times of India*, 15 April.

Cleveland, D A, D Soleri and S E Smith (1994): "Do Folk Varieties Have a Role in Sustainable Agriculture?," *BioScience*, Vol 44, pp 740–51.

Danavath, Ashok (2022): "Exploring Vulnerability of SC-ST Tenant Farmers in Telangana in the Context of Rythu Bandhu and Rythu Bima Schemes," MA thesis, International Institute of Social Studies, The Hague, Netherlands.

Department for International Development (2001): *Perspectives on Pests: Achievements of Research under the UK DFID's Crop Protection Programme, 1996–2000*, Department for International Development.

DES (2015): *Statistical Year Book 2015*, Directorate of Economics and Statistics, Government of Telangana, Hyderabad.

DES (2023): *Statistical Year Book 2023*, Directorate of Economics and Statistics, Government of Telangana, Hyderabad.

Gill, Anita and Lakhwinder Singh (2006): "Farmers' Suicides and Response of Public Policy: Evidence, Diagnosis and Alternatives from Punjab," *Economic and Political Weekly*, Vol 41, No 26, pp 2762–68.

Government of India (2008): APEDA, Ministry of Commerce and Industry, New Delhi.

Government of India (2016): *Economic Survey 2007–08*, Ministry of Finance, Economic Division, New Delhi.

Government of India (2020): *All India Report on Agriculture Census 2015–16*, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, New Delhi.

Government of Telangana (2023): *Socio-Economic Outlook 2023*, Government of Telangana, Hyderabad.

Gulati, Ashok and Siraj Hussain (2018): "Supporting Indian Farmers: Price Support or Direct Income/Investment Support?," Working Paper No 357, Indian Council for Research on International Economic Relations, New Delhi.

Karthick, V and R Madheswaran (2020): "Whether Caste Impedes Access to Formal Agricultural Credit? Evidence from Rural India," Working Paper No 478, Institute for Social and Economic Change, Bengaluru.

Kumar, K K (2015): "A Case Study of a Village in Telangana on Small Holding Farmers," *Agricultural Situation in India*, Controller of Publications, Ministry of Urban Development, Department of Publications, New Delhi.

Kumar, R (2018): "Caste-wise Disparities in Land Ownership: A Study of Nalgonda District, Telangana," unpublished research report.

Kumar, R et al (2022): "Perceptions of Agricultural Change among Farmers in Irrigated and Rain-fed Regions of India: Evidence from Focus Group Discussions, 2014–2021," unpublished report.

Memdani, M (2024): "Farmers' Suicides in India: A Qualitative Study of Andhra Pradesh and Telangana States of India," *Indian Journal of Community Medicine*, Vol 49, pp 629–32.

Nirmala, B. et al (2023): *Impact Assessment of Good Agricultural Practices under Scheduled Castes Sub-Plan (SCSP) in Telangana and Andhra Pradesh*, Hyderabad: Professor Jayashankar Telangana State Agricultural University.

Pankaj, K and R J Singh (2017): "Problems Faced by the Farmers in Adoption of Mitigation and Adaptation of Climate Change Practices in Agriculture," *International Journal of Agriculture Sciences*, Vol 8, No 56.

Peddi, Dayakar, B Suresh Reddy and E Revathi (2024): "Institutional Intervention and Farm Profits: Evidence from Rainfed Agriculture Systems in Telangana, India," Working Paper No 145, Centre for Economic and Social Studies (CESS), Hyderabad.

Rajendran, S (2003): "Environment and Health Aspects of Pesticides Use in Indian Agriculture," in Martin J Bunch, V Madha Suresh and T Vasantha Kumaran (eds), *Proceedings of the Third International Conference on Environment and Health*, Chennai, 15–17 December, pp 353–73.

Ramakrishna, B and J Ravikumar (2021): "Impact of 'Rythu Bandhu' Scheme on Farmers: An Evolutionary Study in Telangana State," *Journal of Decision Making and Leadership*, Vol 1, No 1.

Rao, K B, I J M de Boer, R Ripoll-Bosch and S J Oosting (2021): "Understanding Transitions in Farming Systems and Their Effects on Livestock Rearing and Smallholder Livelihoods in Telangana, India," *Ambio*.

Reddy, B Suresh (2009): "Sustenance and Enhancement of Agro-biodiversity: Voice of Stakeholders from Deccan Area of Southern India," *Journal of Social Action*, Vol 59, No 1, pp 19–30.

Reddy, B Suresh (2011): "Dynamics of Soil Fertility Management Practices in Semi-Arid Regions: A Case Study of AP," *Economic and Political Weekly*, Vol XLVI, No 3, pp 56–63.

Revathi, E, B Suresh Reddy and P Dayakar (2024): *An Assessment of Millet-Based Agro-Biodiversity Systems Enriched with a Mix of Modern and Traditional Ecological Packages*, CESS Monograph No 57, Centre for Economic and Social Studies, Hyderabad.

Sandeep, P G, P Prashant, M Srinivasulu and A Madavilata (2023): "Effectiveness of Social Media Agricultural Information on Farmers' Knowledge," *Environment Conservation Journal*, Vol 24, No 1, pp 123–29.

Shukla, R, A Banerjie and T Menaria (2025): "Reimagining Annadata Households and Their Livelihoods beyond the Farm," Working Paper, People Research on India's Consumer Economy Working Paper Series.

Singha, A K and M J Baruah (2011): "Farmers' Adoption Behaviour in Rice Technology," *Journal of Human Ecology*, Vol 35, No 3, pp 167–72.

Singh, R, E L Soni, V Singh and H L Bugalia (2011): "Dissemination of Improved Production Technologies of Solanaceous Vegetables in Banswara District of Rajasthan," *Rajasthan Journal of Extension Education*, Vol 19, pp 97–100.

Sreenivasulu, Y (2020): "Absentee Landowning Households in Agrarian Structure and Their Implications on Agrarian Economy," Working Paper No 144, Centre for Economic and Social Studies, Hyderabad.

Srinivas, K and B S Ram (2024): "Reevaluating the Rythu Bandhu Scheme: Towards Sustainable and Inclusive Agriculture in Telangana," *Bhartiya Krishi Anusandhan Patrika*, Vol 39, No 2, pp 125–30.

Sudaiah, A (2020): "Agriculture Land Distribution Policy and Programme: Landless SC Women in Telangana State," unpublished master's thesis, Kakatiya University, Telangana.

Watanabe, M, Y Sumita, I Azechi, K Ito and K Noda (2021): "Production Costs and Benefits of Japonica Rice in Mwea, Kenya," *Agriculture*, Vol 11, No 7, Article 629.

Xiangtian, M, L Yaying, Z Yang and Y Huaiying (2019): "Green Manure Application Improves Rice Growth and Urea Nitrogen Use Efficiency," *Soil Science and Plant Nutrition*, Vol 65, No 5, pp 511–18.

Zeeshan, M A Khan, T Shamim and N Khatoon (2025): "Caste Disparities in Institutional Credit Access," *Discover Sustainability*, Vol 6.

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Venkateswarlu, ***A. Economic theory: Crossing the barriers.*** Aakar Books. 2024

Venkateswarlu, A. ***Political economy of controversies over the origin of COVID-19 and its impact on the world and India.*** Aakar Books. 2023

Revathi, E and Reddy, Suresh B. ***Economics and Technology of Soybean Cultivation in Central India.*** New Delhi: Academic Foundation, 2022

Ch, Bala Ramulu. Marginalised ***Communities and Decentralized Institutions India: An Exclusion and Inclusion Perspective.*** U K: Routledge, 2021

Rao, Hanumantha CH. ***Rising Inequalities in Income in India: Key Role of Socio-Political Factors, Research Paper.*** Hyderabad: CESS, 2021

Indrakant, S. ***A Confused Professor and His Students.*** Paramount Publishing House, ISBN 978-93-88808-34-7, 2020

Reddy, Srinivasa M. ***Climate-Drought Resilience in Extreme Environments.*** Switzerland AG Basel: Springer Nature, 2020, (with V R Reddy and Y V M Reddy)

Saleth Maria, Galab.S, and Revathi, E.(Eds). ***Issues and Challenges of Inclusive Development: Essays in Honour of Prof. R. Radhakrishna.*** Springer, 2020

Korra, Vijay. ***Forgotten Communities of Telangana and Andhra Pradesh: A Story of De-notified Tribes.*** Singapore: Palgrave Macmillan, 2019

Radhakrishna R. ***Essays on Agriculture, Food Security and Nutrition, New Delhi,*** Academic Foundation, 2019

Radhakrishna R. ***Essays on Growth, Poverty and Wellbeing.*** New Delhi: Academic Foundation, 2019

Radhakrishna R. ***Essays on the Econometrics of Consumer Behaviour.*** New Delhi: Academic Foundation, 2019

Radhakrishna R. ***Essays on the Econometrics of Inflation, Consumption and Welfare.*** New Delhi: Academic Foundation., 2019

Radhakrishna R. ***Essays on Indian Economy,*** New Delhi: Academic Foundation, 2019

Reddy, Gopinath M and Walter Fernandes, NafisaGoga, D'Souza and Palla Thrinadha Rao. ***Displacement and Marginalisation in Andhra Pradesh and Telangana.*** *1951-2010.2019.* Vishakhapatnam: Social Research Centre, Guwahati & Laya Resource Centre, 2019

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