

# **A COMPARATIVE ANALYSIS ON DIVERSIFICATION OF AGRICULTURAL PRACTICES IN AGENCY AND NON- AGENCY AREAS OF COASTAL ANDHRA PRADESH**

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## **Abstract**

In recent years, changing climatic patterns and extreme weather events, such as cyclones and unseasonal rains, have posed significant challenges to agriculture in Coastal Andhra Pradesh. For instance. These challenges underline the importance of adaptive farming strategies, including crop diversification, to enhance resilience and ensure sustainable agricultural development in the region. The geographical and agro-climatic diversity of Coastal Andhra Pradesh serves as a critical backdrop for analyzing the dynamics of crop diversification and its implications for farmers' livelihoods. Socio-economic disparities also play a critical role in shaping cropping patterns. Non-tribal farmers, who generally have better education, access to credit, and exposure to markets, are more likely to diversify their crops and adopt modern farming techniques. By contrast, tribal farmers often lack access to these resources, which limits their ability to transition to high-value or commercial crops. Recent policy measures, such as providing subsidized seeds, improving irrigation facilities, and training programs tailored for tribal farmers, aim to reduce these disparities. The cropping pattern in non-tribal areas of Coastal Andhra Pradesh is characterized by greater market orientation and resource-intensive cultivation, tribal areas emphasize traditional and subsistence farming. Understanding these distinctions is crucial for formulating targeted policies to promote sustainable agricultural development across the region.

**Key words:** farming activities, crop diversification, farming techniques, cropping patterns, resource-intensive cultivation.

## 1. Introduction

Coastal Andhra Pradesh, situated along the eastern coastline of India, encompasses a rich tapestry of geographical and agro-climatic conditions that make it one of the most agriculturally significant regions in the country. This region stretches across 18 districts, including East Godavari, West Godavari, Krishna, and Guntur, covering vast plains, fertile deltas, and upland terrains. The Krishna and Godavari rivers play a pivotal role in shaping its geography, creating extensive deltas that are renowned for their high agricultural productivity. These deltas, combined with proximity to the Bay of Bengal, endow the region with fertile alluvial soils conducive to intensive farming practices.

The agro-climatic conditions in Coastal Andhra Pradesh vary across its subregions. The region experiences a tropical monsoon climate, with three distinct seasons: summer, monsoon, and winter. Annual rainfall ranges between 900 and 1,200 mm, with the majority received during the southwest monsoon season from June to September. The deltaic zones, benefiting from well-distributed rainfall and irrigation infrastructure, are primarily used for paddy cultivation. In contrast, the upland and dryland areas are more dependent on rain-fed agriculture and grow a variety of millets, pulses, and oilseeds. Temperature fluctuations also influence crop choices, with summer temperatures often exceeding 40°C and winter temperatures dropping to around 15°C. These conditions support a diverse range of crops, including cereals, pulses, oilseeds, sugarcane, and horticultural crops like mango, banana, and citrus. Coastal Andhra's varied agro-ecological zones enable farmers to diversify their crops, particularly in areas with better irrigation facilities. However, the agency areas, dominated by tribal populations and characterized by hilly terrain, often face challenges such as limited irrigation, soil erosion, and dependence on traditional subsistence farming. These areas predominantly grow rain-fed crops like maize, jowar, and small millets, reflecting their distinct agricultural profile.

The present paper aims to delve into the extent of crop diversification in Coastal Andhra Pradesh, focusing on the distinct characteristics of agency and non-agency areas. This comprehensive analysis will underline the role of crop diversification in improving livelihoods, enhancing food security, and fostering sustainable agriculture in the regions.

### 1.2 Objectives:

1. To examine the socio-economic diversification based on caste and occupation in both agency and non-agency regions.
2. To assess the variation in agricultural practices within agency and non-agency areas of Coastal Andhra Pradesh.
3. To evaluate the difficulties faced by the farmers in order to implement suitable measures for enhancing agricultural practices.

### 1.3 Research Methodology

The research methodology is designed to provide a systematic, objective, and comprehensive analysis of crop diversification and its impact on the income and expenditure of small farmers in Coastal Andhra Pradesh. A multi-stage random sampling technique is used to select study areas and participants, ensuring the process is both representative and

statistically valid. The methodology is structured as in step I, selection of state is Andhra Pradesh, Costal Andhra in particular stands out for its high agricultural productivity, cultivating a wide range of crops. Step II selection of district, in Andhra Pradesh consisting of 26 Districts among these two districts have been chosen in the Costal Andhra. These districts are Alluri Sitha Rama Raju districts in agency area, and East Godavari districts in non-agency area. In step III selection of mandals, in agency area out of 22 mandals in Alluri Sitha Rama Raju districts two mandals have been chosen which are Chintapalli mandal and Koyyuru mandal. In non-agency area two mandals have been chosen in East Godavari districts out of 64 mandals in the districts Kovvuru and Chagallu mandals have been chosen. Step IV selection of villages, for each selected mandal, specific villages are chosen based on the presence of smallholder farmers and the variety of crops cultivated. A stratified random sampling technique ensures the representation of both high and low-diversity crop areas.

#### **1.4 Sources of Data**

The data for this study is obtained from both primary and secondary sources to ensure comprehensive and reliable results.

##### **i) Secondary Data:**

Secondary data complements the primary data and is sourced from various government records and reports, including publications from Agricultural Development Agencies and reports from other relevant government departments. Additional secondary data is gathered from agricultural journals, research papers, and books on topics such as crop diversification, agricultural economics, and rural development.

##### **ii) Primary Data:**

Primary data has been collected through a farm-level survey conducted among farmers in the selected villages of the study area. In the agency area of Alluri Sitharama Raju district, due to challenges in gathering data from a sufficient number of farmers in each village, 8 villages from each mandal are selected, with 10 farmers chosen from each village. This ensures a total of 80 farmers per mandal are surveyed, representing the tribal areas adequately despite logistical difficulties. In the non-agency area of East Godavari district, 20 farmers are selected from each of the four villages in each mandal, leading to a total of 80 farmers per mandal. This ensures a diverse and representative sample of the farming community in non-agency areas. The sample size is 320 households in both agency and non-agency areas.

## **2. SOCIO-ECONOMIC DIVERSIFICATION BY CASTE AND OCCUPATION IN AGENCY AND NON-AGENCY AREAS**

Understanding the socio-economic characteristics of respondents is essential for assessing the developmental status and challenges faced by smallholder farmers in both agency and non-agency areas. This profile plays a crucial role in evaluating how socio-economic factors—such as education, occupation, income, and caste—affect the livelihoods

and opportunities available to individuals in the study areas. The stratified random sampling approach ensures that diverse agricultural practices are well represented, thus providing a comprehensive view of the socio-economic landscape in both tribal and non-tribal regions. In this study, the socio-economic profile is analyzed based on respondents from two distinct agricultural settings. agency areas (Chintapalli and Koyyuru mandals of Alluri Sitharamarajudistrict) non-agency areas (Kovvuru and Chagallu mandals of East Godavari). The non-agency areas represent regions with a mix of traditional and diversified cropping systems, while the agency areas focus on agricultural practices predominant in tribal communities, where crop diversification is either nascent or emerging.

### 2.1. Category-wise Distribution of the Respondents

The caste-based distribution shows a clear contrast between the agency and non-agency areas. In the agency areas, Scheduled Tribes (ST) overwhelmingly dominate the sample, making up 96.25%. This is consistent with the presence of tribal communities in the agency areas, where agricultural practices are often more traditional and based on subsistence farming. The high percentage of ST respondents in the agency areas reflects the strong influence of tribal customs and a predominantly agrarian lifestyle, where land ownership and farming practices have been passed down through generations. On the other hand, in the non-agency areas, the caste composition is more diverse. Open category (OC) represents the largest group with 46.88%, followed by Backward Castes (BC) at 36.25%. These figures suggest that the non-agency areas are predominantly inhabited by non-tribal communities, with a greater socio-economic diversification in terms of caste and occupation. Scheduled Castes (SC) make up 15.63%, which is a significant proportion but much smaller compared to the agency areas. The presence of Scheduled Tribes in the non-agency areas is minimal, with only 1.25%, reinforcing the idea that these areas have a less tribal, more agrarian-based community composition.

**Table-1**  
**Category-wise Distribution of the Respondents**

Sl.No	Category	Agency Area	Non-agency Area	Total
1	OC	1 (0.63%)	75 (46.88%)	76 (23.75%)
2	BC	3 (1.88%)	58 (36.25%)	61 (19.06%)
3	SC	2 (1.25%)	25 (15.63%)	27 (8.44%)
4	ST	154 (96.25%)	2 (1.25%)	156 (48.75%)
5	Others	0 (0%)	0 (0%)	0 (0%)
	Total	160 (100%)	160 (100%)	320 (100%)

Source: Primary Data

## 2.2. Educational Status of Respondents

Table-2 presents a comparative analysis of the educational status of respondents in agency and non-agency areas. It sheds light on the disparities in literacy levels and educational attainment between the two regions, providing insights into the socio-educational landscape of the study areas. The table summarizes the frequency and percentage of respondents across five educational categories: Illiterate, Primary, Secondary Education, Graduation, and Post-Graduation and above. It also aggregates the totals for a comprehensive overview. Illiteracy is notably prevalent in the agency area, where 98 respondents, constituting 61.25% of the sample, lack basic literacy skills. This highlights the limited access to education and the challenges faced in these areas. In contrast, the non-agency area exhibits a lower illiteracy rate, with 52 respondents, or 32.5%, falling into this category. Overall, illiterate respondents account for 41.67% of the total sample, emphasizing the need for targeted educational interventions.

The primary education category shows an opposite trend, with a higher percentage of respondents achieving this level in the non-agency area. Specifically, 38.13% of the non-agency sample have completed primary education, compared to 26.25% in the agency area. This suggests slightly better educational opportunities and outcomes in the non-agency area at the foundational level. Overall, primary education is attained by 28.61% of the total sample. In the SSC category, the disparity between the two regions is evident. Only 12.5% respondents of the agency sample have completed secondary education, compared to 29.38% in the non-agency area. This reflects a significant gap in progression beyond primary education in agency areas. Across both regions, 18.61% of the respondents have reached the SSC level, showcasing moderate attainment at the secondary stage. The absence of respondents with graduation or post-graduation qualifications is a striking feature of the data. Both the agency and non-agency areas report 0% representation in these higher education categories. This indicates that tertiary education remains inaccessible to the sampled population, underscoring a critical area for policy and development focus.

**Table-2**  
**Educational Status of Respondents**

Sl. No	Educational Status	Agency Area	Non-Agency Area	Total
1	Illiterate	98 (61.25%)	52 (32.5%)	150 (41.67%)
2	Primary	42 (26.25%)	61 (38.13%)	103 (28.61%)
3	SSC	20 (12.5%)	47 (29.38%)	67 (18.61%)
4	Graduation and above	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total		160 (100%)	160 (100%)	360 (100%)

Source: Primary Data

### 2.3. Main Occupation of the Respondents

The occupation distribution reflects distinct patterns between the agency and non-agency areas, highlighting differences in agricultural practices and Labour involvement. In the agency areas, 53.13% are engaged in cultivation, making it the most prevalent occupation. However, there is a significant reliance on agricultural Labour, with 23.75% in this category, which reflects the importance of Labour-based work in the agency areas. In the non-agency areas, cultivation remains the dominant occupation but at a higher proportion of 70% ,indicating a stronger reliance on direct farming activities in these areas. The agriculture Labour proportion is much lower at 8.13% , suggesting that Labour-based work may not be as common in these areas. Mixed occupations, such as combining farming with Labour or husbandry, are slightly more common in the non-agency areas. For example, 11.25% in the non-agency areas engage in a combination of farming and Labour, compared to 7.5% in the agency areas. Overall, cultivation remains the most common occupation across both areas, but there is a noticeable difference in how Labour and mixed occupations are distributed between agency and non-agency areas. The diversity in occupations may reflect variations in agricultural practices, land ownership, and economic strategies between the two areas.

**Table -3**  
**Main Occupation of the Respondents**

Sl.No	Occupation	Agency Area	Non-agency Area	Total
1	Cultivation	85 (53.13%)	112 (70.0%)	197 (54.72%)
2	Agriculture Labour	38 (23.75%)	13 (8.13%)	51 (14.17%)
3	Animal Husbandry	15 (9.38%)	10 (6.25%)	25 (6.94%)
4	Mixed (Farming + Labour)	12 (7.5%)	18 (11.25%)	30 (8.33%)
5	Mixed (Farming + Husbandry)	10 (6.25%)	9 (5.63%)	19 (5.28%)
6	Mixed (All Three)	10 (6.25%)	8 (5.0%)	18 (5.0%)
	Total	160 (100%)	160 (100%)	360 ( 100%)

Source: Primary Data

### 2.4. Sources of Income of the Household

Tables- 4 illustrate the primary sources of income for households in agency and non-agency areas, highlighting the distribution and reliance on various income-generating activities. The table outlines four main income sources: agriculture produce, minor forest produce, hiring of farm equipment, and income from wages, along with their respective frequencies and percentages in each area. Agriculture produce is the dominant source of

income for households in both regions, with notable differences in prevalence. In the agency area 70.63% households rely on agriculture. This figure is even higher in the non-agency area, where 85.63%, earn income from agriculture. Collectively, agriculture contributes to the income of 78.13% of the total sample, underscoring its significance as the primary livelihood source across both areas.

Minor forest produce is exclusively reported in the agency area, 4.38% rely on it as a supplementary income source. This reflects the unique availability of forest resources in agency areas and their role in the livelihoods of a small segment of the population. The absence of this income source in the non-agency area highlights the lack of dependency on forest produce in these regions. The hiring of farm equipment is another income source, albeit with a smaller contribution. In the agency area, 6.25% earn income through this activity, compared to 3.75% households in the non-agency area. Together, this accounts for 5% of the total sample, indicating that farm equipment rental is a relatively minor income source.

Income from wages is the second most significant income source but shows a stronger presence in the agency area. A total of 18.75% households in the agency area depend on wage Labour, compared to 10.63% households in the non-agency area. Across both regions, wage income supports 14.38% of the total sample, suggesting its role as a supplementary livelihood source, particularly for those with limited access to other income-generating activities. The data highlights the reliance on agriculture as the primary income source in both regions, with a higher dependence observed in non-agency areas. Meanwhile, minor forest produce and wage Labour contribute more significantly to household incomes in agency areas, reflecting their distinct socio-economic conditions and resource availability. These findings underscore the importance of diversifying income sources and strengthening support systems tailored to the unique needs of each region.

**Table -4**  
**Sources of Income of the Household**

Sl. No	Sources of Income	Agency Area	Non-Agency Area	Total
1	Agriculture produce	113 (70.63%)	137 (85.63%)	250 (78.13%)
2	Minor forest produce	7 (4.38%)	0 (0%)	7 (2.19%)
3	Hiring of farm equipment	10 (6.25%)	6 (3.75%)	16 (5.00%)
4	Income from wages	30 (18.75%)	17 (10.63%)	47 (14.38%)

Source: Primary Data

### **3. DIVERSIFICATION OF AGRICULTURAL PRACTICES IN AGENCY AND NON-AGENCY AREAS OF COSTAL ANDHRA PRADESH**

The stratified random sampling approach ensures that diverse agricultural practices are well represented, thus providing a comprehensive view of the socio-economic landscape in both tribal and non-tribal regions.

#### **3.1. Details of Land Holdings**

Table-5 provides an overview of landholding patterns among households in the agency and non-agency areas, categorized into five groups: below 1 acre, 2–4 acres, 5–7 acres, 8–10 acres, and above 10 acres. The table highlights notable differences in land distribution between the two regions, shedding light on the disparities in agricultural resource availability. Households with landholdings below 1 acre are more prevalent in the non-agency area. A total of 40% households in this region fall into this category, compared to only 18.13% households in the agency area. This group accounts for 29.06% of the total sample, indicating a higher concentration of small landholders in the non-agency area.

The 2–4-acre category represents the largest group of landholders across both regions. In the agency area, 28.13% households fall into this category, while in the non-agency area, it is slightly higher, with 36.25% households. Overall, this group constitutes 32.06% of the total sample, highlighting the dominance of medium-sized landholdings among the surveyed households. Landholdings of 5–7 acres are more common in the agency area. Here, 31.25% households report owning land in this range, compared to 15.63% households in the non-agency area. Together, this group represents 23.44% of the total sample, indicating a notable presence of larger landholdings in the agency area.

The category of 8–10 acres shows a similar trend, with more households in the agency area owning land in this range. A total of 13.13% households in the agency area report such landholdings, compared to only 5% households in the non-agency area. Collectively, this group accounts for 9.06% of the sample, reflecting limited ownership of land in this size range. Households with landholdings above 10 acres are relatively few but are more prevalent in the agency area. In this region, 9.38% households report owning large tracts of land, compared to 3.13% households in the non-agency area. This group makes up 6.38% of the total sample, highlighting the concentration of larger landholdings in the agency area. The data demonstrates a clear disparity in landholding patterns between agency and non-agency areas. Agency households tend to own larger landholdings, with significant representation in the 5–7 acre, 8–10 acre, and above 10-acre categories. In contrast, non-agency households are more concentrated in smaller landholding categories, particularly below 1 acre and 2–4 acres. These differences highlight the varying access to and distribution of agricultural resources in the two regions, with implications for productivity, income, and land management practices.



**Table-5**  
**Details of Land Holdings**

Sl.No	Land Holdings	Agency Area	Non-agency Area	Total
1	Below 1 acre	29 (18.13%)	64 (40.00%)	93 (29.06%)
2	2-4 acres	45 (28.13%)	58 (36.25%)	103 (32.06%)
3	5-7 acres	50 (31.25%)	25 (15.63%)	75 (23.44%)
4	8-10 acres	21 (13.13%)	8 (5.00%)	29 (9.06%)
5	Above 10 acres	15 (9.38%)	5 (3.13%)	20 (6.38%)

Source: Primary Data

### 3.2. Source of Irrigation

Table-6. presents the distribution of irrigation sources among households in the agency and non-agency areas, categorized into five main types: canals, tanks, groundwater (wells and tubewells), lift irrigation, and other sources such as hill streams. The table reveals significant regional differences in irrigation practices and dependency on specific water sources. Canals are an equally important source of irrigation in both regions, with 25% households in each area relying on them. Together, canals serve 25% of the total sample, indicating their widespread use as a reliable and organized irrigation method.

Tanks are a more prominent source of irrigation in the agency area than in the non-agency area. In the agency area, 20 households (12.50%) depend on tanks, compared to only 6.25% households in the non-agency area. Overall, tanks account for 9.38% of the total irrigation sources, highlighting their limited but significant role in traditional irrigation systems. Groundwater (wells and tubewells) is the dominant source of irrigation in the non-agency area, with 52.50% households relying on it. In contrast, only 18.13% households in the agency area use groundwater. This source represents the largest share of the total sample, accounting for 35.31%, underscoring its importance, particularly in non-agency areas with better access to groundwater infrastructure.

Lift irrigation, while less prevalent overall, shows a balanced distribution between the two areas. In the agency area, 9.38% households rely on this method, compared to 6.25% households (in the non-agency area. Collectively, lift irrigation accounts for 7.81% of the total sample, indicating its niche utility in specific regions with suitable topography. Other sources (hill streams) are significantly more common in the agency area, where 44.38% households depend on them. In contrast, only 10.00% households (in the non-agency area utilize such sources. Overall, this category constitutes 27.19% of the sample, reflecting the reliance on natural water flows in hilly and less developed areas like the agency region. The data highlights stark contrasts in irrigation practices between the two regions. While the non-agency area heavily relies on modern groundwater extraction methods, the agency area

exhibits a diverse mix, including substantial dependence on natural sources like hill streams. These differences underscore the variations in geographical conditions, infrastructure availability, and agricultural practices between the two areas.

**Table -6**  
**Source of Irrigation**

Sl.No	Source of Irrigation	Agency Area	Non-agency Area	Total
1	Canals	40 (25.00%)	40 (25.00%)	80 (25.00%)
2	Tanks	20 (12.50%)	10 (6.25%)	30 (9.38%)
3	Groundwater (Wells & Tubewells)	29 (18.13%)	84 (52.50%)	113 (35.31%)
4	Lift Irrigation	15 (9.38%)	10 (6.25%)	25 (7.81%)
5	Other Sources (Hill Streams)	71 (44.38%)	16 (10.00%)	87 (27.19%)

Source: Primary Data

### 3.3. Usage of Agricultural Machinery and Implements

Table-7 provides an overview of the use of agricultural machinery and implements across agency and non-agency areas. The data reveals notable differences in the adoption of modern and traditional tools, reflecting disparities in accessibility, infrastructure, and agricultural practices. Tractors are extensively used in the non-agency area, with 82.50% households (utilizing them, compared to only 16.25% households (in the agency area. Overall, tractors account for 49.38% of the sample, indicating their importance for mechanized farming, particularly in the non-agency area, which likely has better road connectivity and financial resources. Sprayers, used for pesticide and fertilizer application, are more common in the non-agency area, with 51.88% households using them. In contrast, 33.13% households in the agency area report their usage. Sprayers represent 42.50% of the total sample, reflecting a growing reliance on chemical inputs for crop protection in both areas. Ploughs, traditional farming tools, dominate in the agency area, where 71.25% households use them, compared to 28.75% households (in the non-agency area. This group makes up 50.00% of the total sample, indicating the continued importance of manual or animal-driven farming methods, especially in regions with limited mechanization.

Oil engines, commonly used for pumping water, are more prevalent in the non-agency area, with 45 households (28.13%) relying on them. In the agency area, 14.38% households use oil engines. Overall, they account for 21.25% of the sample, reflecting moderate dependence on this technology for irrigation. Electric motors, another source of power for irrigation, are significantly more common in the non-agency area, where 34.38% households use them, compared to only 6.25% households in the agency area. Electric motors make up 20.31% of the total sample, indicating their role in areas with better access to electricity infrastructure. The data highlights a clear divide in the adoption of agricultural machinery and

implements between the agency and non-agency areas. While the non-agency area shows a higher reliance on modern tools like tractors, sprayers, and electric motors, the agency area continues to depend heavily on traditional implements like ploughs.

**Table -7**  
**Usage of Agricultural Machinery and Implements**

Sl. No	Agricultural Machinery & Implements Used	Agency Area	Non-agency Area	Total
1	Tractors	26 (16.25%)	132 (82.50%)	158 (49.38%)
2	Sprayers	53 (33.13%)	83 (51.88%)	136 (42.50%)
3	Ploughs	114 (71.25%)	46 (28.75%)	160 (50.00%)
4	Oil Engines	23 (14.38%)	45 (28.13%)	68 (21.25%)
5	Electric Motors	10 (6.25%)	55 (34.38%)	65 (20.31%)

Source: Primary Data

### 3.4. Proportion of Land Owned Utilized for Cultivation

Table-8 illustrates how the land owned by farmers is utilized for cultivation, revealing important differences between the agency and non-agency areas. In the agency area, 31.25% of respondents use more than 75% of their land for cultivation, and 18.75% use all (100%) of their land, indicating a high level of land use efficiency. In contrast, only 18.75% of farmers in the non-agency area use more than 75% of their land, but a significant 50% of them utilize their entire land for farming, showing that land use practices in the non-agency area are more intensive. This suggests that non-agency area farmers may be more focused on maximizing crop production on the available land, perhaps due to limited land availability or economic pressures to optimize output. For farmers using less than 25% of their land for cultivation, the agency area has a higher proportion (9.38%) than the non-agency area (3.13%), which could reflect either underutilization of land or the use of land for non-agricultural purposes, such as residential or commercial development.

Similarly, 15.63% of farmers in the agency area use between 25% and 50% of their land for cultivation, while only 6.25% of farmers in the non-agency area report similar land usage, suggesting that agency area farmers may have more diverse land uses or engage in mixed farming systems. The overall data suggests that while a higher percentage of farmers in the non-agency area use all of their land for cultivation, land utilization patterns in the agency area show more varied practices, potentially due to differing economic, cultural, or infrastructural factors. This difference in land utilization could be crucial for policy recommendations regarding land management, crop diversification, and agricultural development.

**Table-8**  
**Proportion of Land Owned Utilized for Cultivation**

Sl. No	Proportion of Land Owned Utilized for Cultivation	Agency Area	Non-agency Area	Total
1	Less than 25%	15 (9.38%)	5 (3.13%)	20 (6.25%)
2	25% - 50%	25 (15.63%)	10 (6.25%)	35 (10.94%)
3	51% - 75%	40 (25.00%)	20 (12.50%)	60 (18.75%)
4	More than 75%	50 (31.25%)	30 (18.75%)	80 (25.00%)
5	Whole (100%)	30 (18.75%)	80 (50.00%)	110 (34.38%)

Source: Primary Data

### 3.5. Use of Fertilizer

Table-9 provides insights into the use of fertilizers across the agency and non-agency areas, categorizing the use into three main types: bio-fertilizer, chemical fertilizer, and a combination of both. The data reveals significant regional differences in fertilizer usage, indicating varying farming practices and access to agricultural inputs. Bio-fertilizer is more commonly used in the agency area, where 42.50% report using it. In contrast, only households 18.75% in the non-agency area use bio-fertilizers. Overall, 30.63% of the total sample utilizes bio-fertilizers, reflecting an eco-friendlier approach to farming, especially in the agency area. This may be indicative of a preference for sustainable farming practices or a limited access to chemical fertilizers in the agency area.

Chemical fertilizer is the most widely used type of fertilizer in the study, with households 75.00% in the non-agency area relying on it, compared to 32.50% in the agency area. Collectively, 53.75% of the total sample uses chemical fertilizers, signifying the dominance of chemical inputs in agricultural practices, especially in the non-agency area. This widespread use of chemical fertilizers could be linked to more intensive farming practices and better access to external agricultural inputs. Both bio-fertilizer and chemical fertilizer are used by a smaller proportion of households. In the agency area, 25.00% use a combination of both types of fertilizers, while only 6.25% in the non-agency area report using both. Overall, 15.63% of the sample uses both types of fertilizers, indicating some level of integration of organic and chemical inputs in farming practices.

**Table -9**  
**Use of Fertilizer**

Sl.No	Use of Fertilizer	Agency Area	Non-agency Area	Total
1	Bio-fertilizer	68 (42.50%)	30 (18.75%)	98 (30.63%)
2	Chemical Fertilizer	52 (32.50%)	120 (75.00%)	172 (53.75%)
3	Both Bio-fertilizer & Chemical Fertilizer	40 (25.00%)	10 (6.25%)	50 (15.63%)

### 3.6. Technological Training Status of Farmers

Table-10 provides information on the technological training status of farmers in the agency and non-agency areas, categorized into "Trained" and "Untrained" groups. This data highlights the extent to which farmers in both areas have received formal technological training, which is essential for adopting modern farming practices and improving productivity. In the agency area, a significant majority of farmers (81.25%) are untrained, with only 18.75% reporting that they are trained. This suggests that the agency area has a relatively low level of technological training, which could be attributed to limited access to formal agricultural education or training programs.

In contrast, the non-agency area has a higher proportion of trained farmers, with 37.50% being trained compared to 62.50% who are untrained. The higher percentage of trained farmers in the non-agency area may indicate better access to agricultural extension services, training programs, or greater investment in improving farming practices in this region. Overall, across both areas, 28.13% of the total sample is trained, while 71.88% are untrained. This shows that a majority of farmers in the study area lack formal technological training, which may hinder their ability to adopt modern farming practices, utilize advanced machinery, or manage inputs effectively.

**Table -10**  
**Technological Training Status of Farmers**

Sl.No	Technologically Trained/Untrained	Agency Area	Non-agency Area	Total
1	Trained	30 (18.75%)	60 (37.50%)	90 (28.13%)
2	Untrained	130 (81.25%)	100 (62.50%)	230 (71.88%)

### 3.7. Usage of HYV Seeds

Table-11 examines the use of High-Yielding Variety (HYV) seeds in both agency and non-agency areas. The data reveals that 62.50% of farmers in the agency area use HYV seeds, while a slightly higher percentage (75.00%) in the non-agency area also adopt these seeds. On the other hand, 25.00% of farmers in the agency area and 18.75% in the non-agency area do not use HYV seeds, and a small portion of both groups occasionally use them

(12.50% in the agency area and 6.25% in the non-agency area). The greater usage of HYV seeds in the non-agency area could be attributed to better access to seed distribution channels or more government initiatives promoting their use. However, a notable number of farmers in both regions do not use HYV seeds, which could affect their crop yields and overall farm productivity.

**Table-11**  
**Whether HYV Seeds Used**

Sl. No	Whether HYV Seeds Used	Agency Area	Non-agency Area	Total
1	Yes	100 (62.50%)	120 (75.00%)	220 (137.50%)
2	No	40 (25.00%)	30 (18.75%)	70 (43.75%)
3	Occasionally	20 (12.50%)	10 (6.25%)	30 (18.75%)

Source: Primary Data

#### **4. CHALLENGES FACED BY THE FARMERS**

The formers in the agency areas are facing many challenges compared to the farmers in non-agency areas such as unorganized markets, storage facilities, problems faced in selling agricultural produce, crop failure and sources of finance.

##### **4.1. Types of Market**

The types of markets i.e Local Market, Regular Weekly Hats, Monthly Market, Seasonal Fairs, Government-Organized Markets, Regional Market, Online Platforms are available to farmers in both agency and non-agency areas. A significant percentage of farmers (31.25%) in the agency area sell their produce in local markets, whereas a larger proportion of farmers (37.50%) in the non-agency area use regular weekly hats. Other types of markets include seasonal fairs, government-organized markets, and online platforms, but they constitute a smaller portion of the overall market options.

##### **4.2. Problems Faced in Selling Agricultural Produce**

The list of challenges i.e., Low Market Prices, Lack of Access to Markets, Transportation Issues, Storage Problems, Competition from Other Sellers, Regulatory/Legal Issues, Seasonal Variability are farmers face when selling their agricultural produce. The most common problem reported in both areas is low market prices, with 34.38% of farmers in the agency area and 37.50% in the non-agency area highlighting this issue. Other significant problems include lack of access to markets (25.00% in the agency area and 31.25% in the non-agency area), transportation issues (18.75% in the agency area and 21.88% in the non-agency area), and storage problems. These challenges point to a need for better market infrastructure, improved access to transportation, and price stabilization mechanisms to ensure that farmers receive fair compensation for their produce.

### **4.3. Sources of Finance for Cultivation**

The sources of finance for cultivation are Personal Savings, Bank Loans, Government Subsidies, Microfinance Institutions, Cooperative Societies, Credit from Family and Friends, in agency and non-agency areas. It highlights a significant difference in how farmers in these two areas access financial resources. Personal savings are the primary source of finance for cultivation, with 48.75% of non-agency area farmers relying on their savings, compared to 30.63% of those in the agency area. This indicates a stronger dependence on personal funds in non-agency areas, possibly due to limited access to formal financial institutions. Bank loans are more common in the agency area (20%) compared to the non-agency area (7.5%), suggesting that farmers in the agency area are better integrated into formal banking systems. Government subsidies are more accessible in the agency area (14.38%) than in the non-agency area (5%), further emphasizing the institutional support available in agency areas. Additionally, microfinance institutions are more utilized in the agency area (10.63%) compared to the non-agency area (1.88%). Credit from family and friends is a significant source of finance in both areas, with 50.63% of farmers in the agency area and 43.75% in the non-agency area relying on informal networks. This reflects the crucial role of social capital in agricultural financing in both regions.

## **5. CROP DIVERSIFICATION IN AGENCY AND NON-AGENCY AREAS**

Coastal Andhra Pradesh exhibits a diverse cropping pattern that reflects its geographical, agro-climatic, and socio-economic variability. The region's agricultural landscape is predominantly defined by rice cultivation, but the choice of crops varies significantly between tribal (agency) and non-tribal (non-agency) areas due to differences in irrigation availability, soil types, market access, and socio-economic conditions.

In non-tribal areas, particularly the fertile deltas of the Godavari and Krishna rivers, paddy is the primary crop, covering over 13.65 lakh hectares during the Kharif 2024 season, accounting for nearly 90% of its targeted area. These regions also grow commercial crops like sugarcane, cotton, and tobacco, benefiting from robust irrigation infrastructure and access to agricultural inputs. Pulses like black gram and green gram are increasingly cultivated in upland non-tribal areas, with pulses exceeding their normal sowing targets by 133% during the 2024 Kharif season, reaching 3.94 lakh hectares. Additionally, horticultural crops such as mango, banana, and guava are extensively cultivated in these regions, driven by market demand and government support for high-value crop production.

In contrast, tribal (agency) areas rely heavily on rain-fed agriculture due to limited access to irrigation and modern farming infrastructure. The cropping pattern in these areas is dominated by traditional food grains like millets (ragi, jowar, and bajra), maize, and pulses, which are cultivated on fragmented landholdings. Millets, for instance, are grown both for household consumption and as a climate-resilient crop, vital in ensuring food security in the face of erratic rainfall. According to recent reports, cereals and millets accounted for 15.82 lakh hectares across the state in 2024, a figure that includes substantial contributions from tribal farming systems. Shifting cultivation practices in hilly tribal regions also influence crop diversity, with farmers cultivating a mix of crops on small plots of land for subsistence purposes. Horticultural production in tribal areas is less intensive but includes crops like

jackfruit, tamarind, and wild honey, which are either consumed locally or sold in limited quantities in regional markets. Government initiatives, such as those under the Tribal Sub-Plan, have been promoting the cultivation of high-value horticultural crops and commercial forestry products, with the aim of increasing tribal farmers' incomes. Programs for promoting millet cultivation in tribal areas have gained momentum, emphasizing the nutritional and ecological benefits of these crops.

In the tribal areas face significant challenges due to limited irrigation facilities and a reliance on traditional farming techniques. Rain-fed agriculture is the norm, with farmers growing traditional food crops such as millets (ragi, jowar, and bajra), maize, and pulses. These crops serve both for household consumption and as a buffer against unpredictable rainfall patterns. The region's hilly terrain and fragmented landholdings also contribute to the persistence of subsistence farming. Furthermore, shifting cultivation practices in tribal regions promote crop diversity on small plots of land, while horticultural production, though less intensive, includes crops like jackfruit, tamarind, and wild honey.

In contrast, non-tribal areas, particularly those in the fertile deltas of the Godavari and Krishna rivers, rice is the dominant crop, with over 13.65 lakh hectares of land under paddy cultivation in the 2024 Kharif season, accounting for nearly 90% of the targeted area. These regions benefit from robust irrigation systems, making them conducive to intensive farming practices. In addition to paddy, commercial crops such as sugarcane, cotton, and tobacco are grown, and pulses like black gram and green gram are increasingly cultivated in upland non-tribal areas. Horticultural crops such as mango, banana, and guava are also widely grown in these areas, driven by strong market demand and government incentives for high-value crop production.

## 6. RESEARCH FINDINGS

1. The data demonstrates a clear disparity in landholding patterns between agency and non-agency areas. Agency households tend to own larger landholdings, with significant representation in the 5–7 acre, 8–10 acre, and above 10-acre categories. In contrast, non-agency households are more concentrated in smaller landholding categories, particularly below 1 acre and 2–4 acres. These differences highlight the varying access to and distribution of agricultural resources in the two regions, with implications for productivity, income, and land management practices.
2. The data underscores the predominance of irrigated landholdings in both agency and non-agency areas, reflecting a strong reliance on irrigation for agricultural activities. However, the presence of unirrigated land is exclusive to the agency area, highlighting a disparity in land types between the two regions. The small proportion of households owning both irrigated and unirrigated land suggests limited diversification in land resources, which could impact agricultural practices and productivity.
3. The data highlights stark contrasts in irrigation practices between the two regions. While the non-agency area heavily relies on modern groundwater extraction methods, the agency area exhibits a diverse mix, including substantial dependence on natural sources like hill streams. These differences underscore the variations in geographical conditions, infrastructure availability, and agricultural practices between the two areas.



4. The data highlights a clear divide in the adoption of agricultural machinery and implements between the agency and non-agency areas. While the non-agency area shows a higher reliance on modern tools like tractors, sprayers, and electric motors, the agency area continues to depend heavily on traditional implements like ploughs. This disparity underscores the differences in economic conditions, accessibility to resources, and levels of modernization between the two regions.
5. The overall data suggests that while a higher percentage of farmers in the non-agency area use all of their land for cultivation, land utilization patterns in the agency area show more varied practices, potentially due to differing economic, cultural, or infrastructural factors. This difference in land utilization could be crucial for policy recommendations regarding land management, crop diversification, and agricultural development.
6. majority of land is owned in the non-agency area, with 75% of respondents indicating they own land, compared to just 25% in the agency area. Conversely, the agency area has a notably higher proportion of leased-in land (31.25%) compared to the non-agency area (6.25%), indicating that many farmers in the agency area rely on leasing land rather than owning it. This difference could point to issues like land scarcity or a higher population density in the agency area, forcing farmers to lease land for cultivation. Additionally, both areas show relatively similar figures for leased-out land, with 12.5% in the agency area and 6.25% in the non-agency area.
7. The data highlights a clear contrast in fertilizer usage between the agency and non-agency areas. The agency area demonstrates a stronger preference for bio-fertilizers, possibly due to limited access to chemical fertilizers or a preference for sustainable agricultural practices. In contrast, the non-agency area shows a higher reliance on chemical fertilizers, indicating more intensive and modernized farming techniques. The use of both fertilizers in a smaller proportion of households suggests that some farmers in both areas are integrating organic and chemical inputs to optimize crop production.
8. A majority of farmers in the study area lack formal technological training, which may hinder their ability to adopt modern farming practices, utilize advanced machinery, or manage inputs effectively. The data highlights the need for increased efforts in providing agricultural training and education, particularly in the agency area, to improve productivity and encourage the adoption of modern farming techniques. Training programs could focus on introducing new technologies, efficient farm management practices, and sustainable farming methods to enhance the overall agricultural output in both areas.
9. The data reveals that 62.50% of farmers in the agency area use HYV seeds, while a slightly higher percentage (75.00%) in the non-agency area also adopt these seeds. The greater usage of HYV seeds in the non-agency area could be attributed to better access to seed distribution channels or more government initiatives promoting their use. However, a notable number of farmers in both regions do not use HYV seeds, which could affect their crop yields and overall farm productivity.

## 7. Conclusion

The farmers in the agency areas are facing many challenges compared to the farmers in non-agency areas such as unorganized markets, storage facilities, problems faced in selling agricultural produce, crop failure and sources of finance. This data suggests that farmers in both areas predominantly rely on physical, local markets for selling their produce, although there seems to be more reliance on weekly markets in the non-agency area. The availability and accessibility of different types of markets may impact farmers' ability to sell their produce at competitive prices. The data underscores the importance of storage infrastructure for enhancing farmers' ability to sell their produce when market conditions are more favorable. These challenges point to a need for better market infrastructure, improved access to transportation, and price stabilization mechanisms to ensure that farmers receive fair compensation for their produce. The higher incidence of crop failure in the agency area may reflect various factors such as climatic conditions, soil fertility issues, or more intensive cropping patterns that are vulnerable to pests and diseases. Credit from family and friends is a significant source of finance in both areas, relying on informal networks. This reflects the crucial role of social capital in agricultural financing in both regions. The tribal areas face significant challenges due to limited irrigation facilities and a reliance on traditional farming techniques.

## 8. POLICY SUGGESTIONS:

1. Develop farmer education programs focusing on modern farming techniques, pest management, and post-harvest handling to increase productivity. These programs should be tailored to both tribal and non-tribal communities with a focus on inclusivity. In tribal areas, where education levels are lower, focus on basic literacy and vocational skill training to improve income-generating opportunities for rural youth and women.
2. Strengthen market access for farmers, particularly in remote areas, by creating more farmer markets or mandis. Support the development of direct marketing channels where farmers can sell their products without intermediaries. Support the establishment of value-added processing units for agricultural products like fruits, vegetables, and grains. This could include processing facilities for making pickles, jams, or flour, which could increase farmers' incomes.
3. Promote sustainable farming practices such as agroecology and organic farming, which could provide higher returns and reduce dependency on chemical inputs. Provide financial incentives for adopting these practices. Implement soil testing and health monitoring programs, and encourage farmers to use organic fertilizers and crop rotation methods to restore soil fertility.
4. Improve rural transport infrastructure, including better roads and storage facilities, to reduce post-harvest losses and improve market access. Build cold storage facilities to reduce post-harvest losses, particularly for perishable crops like fruits and vegetables, which would help farmers maintain better price control.

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