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Rental Burden of Tenants under Conditions of Varied Risk
A Study in Andhra Pradesh and Telangana

Srinivasa Reddy Mandala
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CENTRE FOR ECONOMIC AND SOCIAL STUDIES
(Planning Dept, Govt. of Telangana & ICSSR-Ministry of Higher Education, Govt. of India)
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Foreword

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The present Monograph titled "Rental Burden of Tenants under Conditions of Varied Risk: A Study in Andhra Pradesh and Telangana" by Srinivasa Reddy Mandala and Samba Murty Chinta, is one of the outcomes of a larger study on "Climate Change and Contractual Terms of Tenancy: A Study in Andhra Pradesh and Telangana" supported by the ICSSR (under IMPRESS Scheme), Ministry of Education, Government of India.The study investigates how climate change impacts on cropped area and yields, on the terms of tenancy including on the choice of the rental form and on the relative efficiency with which tenants operate the tenanted land vis-à-vis their owned land. To accomplish the objectives, the study employs both the secondary data and the village survey data encompassing Andhra Pradesh and Telangana states.

Legislative curbs on tenancy impede the free play of market forces, which are now facilitating low rents in a risky environment. Curbs could incentivise landlords to raise the rental burden on tenants to cover the inherent risk in leasing out land. Therefore, it is necessary to liberalise the lease market. However, schemes such as Rythu Bandhu of Telangana (and Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) of the Centre), even though they do not directly benefit tenants, could do so indirectly by lowering their rental burden. They enable tenants to press their landlords for better terms. Next, any initiative that aids credit flow to tenants is welcome. Such initiatives bear fruit if they do not impinge upon the rights of landlords. Many small initiatives could combine to benefit tenants substantially. Viewed from this perspective, the issue of Loan Eligibility Cards and the YSR Rythu Bharosa Scheme of Andhra Pradesh could contribute immensely to the well-being of tenants. Tenant mobilisations that contribute to the credit flow of tenants are the need of the hour.

I hope this work is useful to the farming community, researchers, policy makers, development practitioners and all those interested in the resource use efficiency and rental burden of tenants under conditions of varied risk.

E. Revathi
Director, CESS

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Acronyms and Abbreviations used

AP	Andhra Pradesh
CV	Coefficient of Variation
CoC	Certificate of Cultivation
FC	Forward Caste
FCR	Fixed Cash Rent
FGDs	Focus Group Discussions
FISS	Farmers' Investment Support Scheme
FKR	Fixed Kind Rent
GoAP	Government of Andhra Pradesh
GP	Gram *Panchayat*
GoT	Government of Telangana
GCA	Gross Cropped Area
GIA	Gross Irrigated Area
ha.	Hectare (2.50 acres)
HHs	Households
IoC	Intensity of Cropping
IoI	Intensity of Irrigation
K	*Kharif*
LECs	Loan Eligibility Cards
LL	Landlord
MGNREGA	The Mahatma Gandhi National Rural Employment Guarantee Act
mm	millimeters
NA	Not Applicable
NAS	Net Area Sown
NCA	North Coastal Andhra
NIA	Net Irrigated Area
NSS	National Sample Survey
NSSO	National Sample Survey Office
NTS	North Telangana
OBC	Other Backward Castes
PM-*Kisan*	Pradhan Mantri Kisan Samman Nidhi Farmers' Investment Support Scheme is a welfare programme to support farmer's investment by the Government of India.
R	Rabi

RR	Rent Receiver
RS	Rayalaseema
Rythu Bandhu	*Farmers' Investment Support Scheme is a welfare programme to support farmer's investment for two crops a year by the Government of Telangana*
YSR Rythu Bharosa	*Farmers' Investment Support Scheme is a welfare programme to support farmer's investment for two crops a year by the Government of Andhra Pradesh*
SC	Scheduled Caste
SCA	South Coastal Andhra
SCG	Sharecropping
SD	Standard Deviation
ST	Scheduled Tribes
STS	South Telangana
TS	Telangana State

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Srinivasa Reddy Mandala & Samba Murty Chinta

Executive Summary

1. The present study sets off by first detailing the variations in rainfall in the last two decades in an attempt to gauge the severity or otherwise of climate change in the North Coastal Andhra (NCA), South Coastal Andhra (SCA) and Rayalaseema (RS) regions of Andhra Pradesh and North Telangana (NTS) and South Telangana (STS) regions of Telangana state. The means and coefficients of variation of average annual rainfall are examined to see if climate change is more of a worry in the more recent decade than in the decade before. A dearth of rainfall would be less of a worry if there is irrigation to compensate for it. This understanding made us analyse its trends too. This is followed by an examination of data on area and yields of the two decades to see if it exhibited any trend over the years.

2. It is worrisome that the means of actual rainfall in the second decade, besides being less than normal, were generally less than the means of the first decade of the century in all the regions of study. Also, the coefficients of variation of the second period were generally higher than in the first period. Of the five regions, RS and STS were placed very badly. These two regions received scanty rainfall. The measure which impacts the most on crop production is the irrigated area's proportion in Gross Cropped Area (GCA). Based on the proportion, the SCA was by far the best placed to contribute to the granary among the five regions. Not far behind was NTS. The worst equipped was RS.

3. Many crops lost their ground in the second decade as compared to the first, but generally by a small measure. Only the groundnut area declined significantly in RS, where both rainfall and irrigation were scanty. Climate change was a real threat to the RS region.

4. A large majority of crops studied recorded an increase in yields over time. The favourable effect of technological change and increased access to irrigation appears to have outweighed the unfavourable effect of climate change. The overall conclusion is that while SCA occupied the best position in respect of yields of principal crops, STS, RS and NCA vied for the worst position.

5. Survey data was collected from 10 village clusters of the five regions of AP and Telangana covering Kharif 2018, Rabi 2019 and Kharif 2019 to assess the impact

of climate change on the terms and conditions governing leases and on the efficiency of use of land.

6. The tenants and the owners covered in the study were, by and large, of low social and economic status. So whatever differences we may observe among them in the terms of tenancy and their land-use efficiency should be attributed only to the tenure category they belonged and not to their status.

7. All the three forms of tenancy, viz., fixed kind rent (FKR), fixed cash rent (FCR) and sharecropping (SCG), were represented in the primary study. But in the last two decades, there was a trend increase in the importance of fixed cash rents mainly at the cost of fixed kind rents. It is seen that landlords usually preferred fixed cash rents in the scenario marked by risk and uncertainty in agriculture. The landlords' choice of this rental form had to do with their urge to avoid cultivation risk and with their desire to free themselves of the market risk associated with selling the produce received as rent (under sharecropping or fixed kind rent). Fixed cash rent tenancy (CRT) seemed to particularly suit the interests of the small and the non-resident landlords (LL).

8. The observed co-existence of the three rental forms negates the conclusion reached in some of the earlier studies that sharecropping would be found in areas of relative uncertainty. It also runs counter to the finding that sharecropping would be found in areas of relative certainty. There was no pattern.

9. It was seen that the rental share of the landlord was less in regions where the tenant had to contend with more climate risk – as reflected by the source of irrigation; and more in regions characterised by less of the risk. We argued that this may have to do with the free play of market forces. To elaborate, the tenants of canal irrigated areas facing less of climate risk had to pay high rental shares whereas the tenants of tube- well irrigated areas experiencing more of climate risk ended up paying low rental shares. We argued that this may have to do with the free play of market forces.

10. The question of whether the landlord's share of the rent was related to climate risk as reflected by the form of tenure was also addressed. More specifically, an attempt was made to assess if the rental share of a landlord was the least where the tenant had to endure the most risk as under fixed cash rent and the highest where the

tenant faced the least risk as was the case with sharecropping. Did market forces aid in ensuring this pattern that is to the advantage of the tenant? Yes, the survey data provided consistent support to this proposition, within each of the irrigated and rain-fed zones. Where it was uppermost in the minds of landlords to receive rents with certainty, they opted for cash rents. But there was a cost associated with their choice, as they had to settle for relatively low rents in the bargain. Competitive forces seemed to aid the tenant from getting too much exposed to climate risk – they worked to the advantage of the tenant, separately under irrigated and rain-fed conditions.

11. A comparison of the rental burden on sharecropped land that was under irrigation and that under rain-fed conditions revealed that there was hardly any difference between the two. Also, the rental shares under cash rent tenancy were largely equal as between the irrigated and rain-fed lands. Thus, the rental burden was not related to risk. A comparison of irrigated and rain-fed lands invalidates our proposition that competitive forces help the tenant. This is possible because initial conditions differed as between the two regions. More than risk, historical factors, traditions and conventions may have played a part in shaping the rental burden under alternative forms of tenure.

12. It is observed that the government policy was also aiding to lessen the burden of tenants. While, *Rythu Bandhu* scheme inadvertently enabled tenants to successfully press for lower rents in Telangana, the Loan Eligibility Cards (LECs) and the provisions under *Rythu Bharosa* scheme came to the aid of tenants, though on a limited scale, by increasing their access to credit in AP.

13. In the era of climate change, when much more labour time than usual is needed to operate land, and at a time when wages in the labour market are boosted by the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), it is likely that there is undersupply of labour on sharecropped land as compared to that on owned land. With the result yields under the former tenure may be less than under the latter. The share tenant may also undersupply inputs, especially labour, because of incentive problems. While this is so, risk and uncertainty associated with cultivation is now much more than before consequent to climate change. Under the circumstances, the tenant may welcome leases under sharecropping, with a proviso to share costs, because it enables him to share risk

with the landlord. And, where he comes forward to do so, the share tenant may be enthused to work the land intensively (even where the landlord otherwise takes little interest in the tenanted land) and obtain yield on par with the owner cultivator.

14. We addressed to this issue of the relative efficiency of the sharecropped land and the owner-operated land and, more generally, to the question of the relative efficiency of alternative tenures. We looked at the patterns as they obtained separately on irrigated land and rain-fed land.

15. The survey data from the irrigated zone lends support to the propositions that (1) yield on the owned land cultivated by tenants was lower than that on the land operated by pure owners suggesting at a lack of enterprise among the tenants, (2) tenants use sharecropped land much less efficiently than their owned land alluding a lack of incentive, (3) the efficiency of the use of land under the kind and cash rents was greater than that of land under sharecropping again signifying the incentive problem and (4) the land cultivated under the kind and cash rents was used more efficiently than the owned land of the tenants exhibiting their urge to maximise the return net of rent through unsustainable use of land. These conclusions hold even when we control for cultivator-specific characteristics and also crop-specific characteristics. These patterns were specific to irrigated land and not so much to rain-fed land, however.

16. Legislative curbs on tenancy impede the free play of market forces which are now facilitating low rents in a risky environment. Curbs could make landlords to raise the rental burden on tenants, to cover the risk inherent in leasing-out land. Therefore, it is necessary to liberalise the lease market. However, schemes such as *Rythu Bandhu* of Telangana (and PM-*Kisan* of the Centre), even though they do not directly benefit tenants, could do so indirectly – they could dampen their rental burden. They enable them to press landlords for better terms. Next, any initiative that aids credit flow to tenants is welcome. Such initiatives bear fruit if they do not impinge upon the rights of landlords. Many small initiatives could combine to benefit tenants substantially. Viewed in this perspective, the issue of Loan Eligibility Cards, and *Rythu Bharosa* scheme of AP could contribute immensely to the well-being of tenants. Tenant mobilisations that contribute to credit flow to tenants are the need of the hour.

Section – I

Introduction

I.1. Statement of the Problem

Climate change hurts agriculture and those dependent on it.This can happen in a multiplicity of ways. The excesses of rain or dry weather it causes, upset agricultural operations, area put to agricultural use and agricultural yields. The concomitant impact is that the lives of those who make a living on agriculture are shattered. This is happening more and more frequently and with greater and greater severity. Adapting to the excesses is proving to be adaunting task.

Studies expounding the impact of climate change on area, production and productivity abound. Area put to agricultural uses is often seen as contracting following climate change. Productivity and therefore the production of a legion of crops are also observed to take a nose-dive. It is witnessed that there is a consequent fall in the incomes of farmers. The small and marginal farmers, who are constrained to adapt to climate change because of inadequate resources at their command, are noted to be the worst sufferers (Nelson, et al, 2009; Senapati and Goyari, 2020). It is common knowledge that there is a multitude of tenants among them. Their lives are made doubly difficult as they have to meet rental obligations towards their landlords from whatever little income they may make in farming. Where the tenant fails to pay up the rent either fully orpartly in a season, the obligations are carried forward as the landlord, as it often happens, reschedules payment of rental arrears to the next season. In this scheme of things, the tenant is always mired in debt.

Under the circumstances, one expects a demise of the institution of tenancy following climate change. But contrary to this conventional wisdom, the incidence of tenancy is on the rise. Three possible explanations can be offered fort his. First and foremost, lack of employment opportunities outside agriculture, given the residual nature of rural non-agricultural employment, may be forcing the landless and those endowed with little land into the lease market. Second, ownership of land may be passing increasingly into the hands of the urban dwellers lacking skills and interest in farming (Sreenivasulu, 2020) and this may be causing a surge in the supply of land for lease even as there is a fall in the

demand to lease-in land due to the perception of climate risk. The combined effect of the mismatch between the supply and demand forces may be triggering a steep fall in the rental charges prompting the young and the enterprising to enter the lease market in a big way. Three, government policies (such as *Rythu Bandhu* in Telangana (TS) and *YSR Rythu Bharosa* in Andhra Pradesh) may be inadvertently dampening rental charges and thus aiding the practice of leasing-in by tenants.

National Sample Surveys (NSS) show that the incidence of tenancy has been on the rise in the recent past. There have also been changes in the relative importance of alternative forms of tenancy. The significance of fixed cash rent tenancy has been increasing at the cost of, in particular, fixed kind rent (FKR) tenancy. Does this increase have anything to do with climate change? And in the new setting marked by excesses of rain and dry weather, how do tenants fare relative to owners. Is the productive efficiency of tenants on par with that of owners? There is mixed evidence in the literature on the efficiency of tenants *vis-a-vis* owners. The 'Marshallian School' of thought argues that the share tenant is relatively inefficient and the fixed rent tenant is equally efficient compared to the owner. On the contrary, the 'New School' led by Cheung contends that the share tenant can be as efficient as the owner or the fixed rent tenant. Which school of thought does the contemporary situation, impacted by climate change, support?

The present study carried out in the two Telugu speaking states of Andhra Pradesh and Telangana envelops the issues raised above. It probes into the impact of climate change: (1) on the cropped area and yield of principal crops, (2) on the contractual terms of tenancy that includes its influence on the choice of the form of tenancy by the landlord and his tenant, the rentpayable on the tenanted land, the duration of lease, etc., and (3) on the relative efficiency of tenants and owners. Primarily, the attempt is to see if the operation of market forces is vitiated by climate change, to the disadvantage of tenants.

I.2. Review of Literature

I.2.1. Climate Change and Agriculture:

Climate change is the biggest challenge facing agriculture. Prolonged dry spells, torrential and untimely rains are to be attributed to climate change and these have become so regular that reaping a reasonably good harvest is increasingly becoming rare for the farmer. It is common knowledge that the adverse affect of climate change falls disproportionately more on the poor peasant for, lacking in resources, he is slow to

adapt to the change (Porsche *et. al.*, 2011). With the result, he often defaults on the repayment of loans he borrows to finance agricultural operations. The failure to honour the loan repayment schedule shames the peasant and that alienates him from society. The situation ultimately drives him to suicide (*ala* Durkheim). Though it sounds a little mechanistic and over-simplifies reality (Ramprasad *et. al.*, 2017), in case of temperatures above 20° C, an 1° C increase in a single day's temperature is estimated to cause 70 suicides, on an average, in India's growing season, when heat also lowers crop yields and warming over the last 30 years is responsible for 59,300 suicides in the country (Carleton, 2017).

Thus, farmers in the country face severe weather risk. Besides, they are also subjected to market risk. Hardly do they profit from farming. In years when the crop is damaged because of bad weather, their farm business income is low and in years when weather is favourable, the income is again low because of low output prices. In Andhra Pradesh (united AP) an agriculturally better off state, paddy farmers suffered losses in 19 out of 36 years and these conditions culminated in the farmers declaring a 'crop holiday' in Kharif 2011 (Narayanamoorthy and Alli, 2017). The terms of trade for agriculture, contrary to expectations, did not markedly improve in the post-reform period and if any thing; they worsened in certain phases during the period (Roy, 2017).

Under the circumstances, the farmers are driven into the throes of debt and the concomitant suicides. Here we must not lose sight of the fact that the position of the tenant cultivator is particularly sad. Besides the financial obligations that impinge on any peasant in general, the tenant also has to contend with rental obligations. The rental obligations of the tenant may ease a little in a bad agricultural year if his landlord is benevolent, but there is no guarantee. It is known that landlords partly waive the rent due from their tenants or reschedule its payment when the crop fails. But such acts are ad hoc and arbitrary (Murty, 1998). The informal nature of tenurial contracts is responsible for this state of affairs. Also, because the lease deed between the landlord and the tenant is invariably not registered, the tenant is not eligible to cover his crop losses through insurance schemes. For the same reason, he also cannot benefit from loan waivers, input subsidies and other disaster relief measures of the government. This explains as to why tenants figure the most among the farmers committing suicide.

Climate change makes tenants particularly vulnerable to suicides. Therefore, one may surmise that the government should work for the demise of the very institution of tenancy.

The governments in the federal republic have indeed sought to end or at least regulate tenancy since the 1950s, but with little success. Tenancy persists that too largely in unregulated form. As an institutional arrangement, tenancy per se has a role to play, as it induces the more enterprising persons owning land to try and seek a livelihood in the often more remunerative non-agricultural sector. It is argued that an institution which facilitates the mobility of labour should not be curbed (Khusro, 1973). Further, a complete ban on future tenancies will have adverse effects on productive efficiency, for owners lacking skills and motivation forcibly remain in cultivation, or may even leave the land fallow, instead of leasing it to efficient tenants.

Thus, one may defend tenancy per se in a labour surplus country like India. Of the three mainforms of tenancy, viz., fixed kind rent (FKR), fixed cash rent and sharecropping; the last-named allows sharing of risk between the landlord and the tenant and therefore share tenants are relatively less hurt by climat echange. Conversely, tenants paying cash rentin advance of cultivation are the worst hit. They have to bear the production risk as also the market risk. So, for the tenant, share cropping is a means in the process of adaptation to climate change. Between 2002-03 and 2012-13, the share of sharecropped area in the total leased-in area declined sharplyat the all-India level according to the corrected estimates of NSSO (Vaishali Bansal *et. al.*, 2018). It is surprising as to why this decline has occurred, even as the incidence of tenancy has been on the increase. Climate change may explain, at least partly, for the increased extent of tenancy in general and within that for the growing popularity of cash rent tenancy in particular. These changes may have been accompanied by changes in the rental and extra-rental obligations of tenants.

1.2.2. Extent of Tenancy:

Even as tenancy reform barely succeeded, its ought to remove the discrepancy between ownership of land and its actual cultivation. In so doing it aimed at making a dent in the magnitude of tenancy. Of course, a waning institution of tenancy per se is to be welcomed and the underdeveloped agricultural sector of the country could do without it. There may be no substitute, from the stand point of sheer productivity, for an owner-operated system.

The National Sample Survey (NSS) estimates of different rounds suggest that there had been a secular decline in the magnitude of tenancy (inthe proportion of the cultivator households leasing-in and of the operated area leased-in) between1953-54 (8thround)

and 2002-03(59th round). But in the year 2002-03, the declining trend got reversed. Thus, between 2002-03 and 2012-13(70th round) there was anincrease in the magnitude oftenancy (Table I.1).

TableI.1:Percentage of Cultivator Households Leasing-in Land and the Area Leased- into Operated Area for Select Years:India, Andhra Pradesh, and Telangana:Rural

Year	NSS Round	Tenant Households	Leased-in Area
All-India:			
1953[1]	8	39.9	20.3
1960-61[1]	17	23.5	10.7
1970-71[1]	26	25.7	10.6
1982[2]	37	24.0	7.2
1991-92[2]	48	12.8	8.7
2002-03[2]	59	11.4	6.7
2012-13[2]	70	15.0	11.1
Andhra Pradesh			
1991-92[2]	48	21.2	14.2
2002-03[2]	59	20.8	16.9
2012-13[2]	70	42.8	41.5
Coastal AP			
1991-92[2]	48	24.9	17.8
2002-03[2]	59	23.9	20.0
2012-13[2]	70	46.0	54.7
Rayalaseema			
1991-92[2]	48	11.8	9.3
2002-03[2]	59	15.3	14.6
2012-13[2]	70	40.5	35.1
Telangana			
1991-92[2]	48	5.2	4.4
2002-03[2]	59	4.7	3.1
2012-13[2]	70	20.0	15.5

Cited from:

1. Murty.C.S.(1998);and 2.Vaishali Bansal *et.al.*(2018)

Note: The figures corresponding to 1991-92 (48th round), 2002-03 (59th round) and 2012-13bn (70th round) are arrived at by the authors after effecting corrections to the unit-level data of the NSSO's Surveys of Land and Livestock Holdings and therefore differ marginally from the data reported in the official documents of the NSSO.The corrections are mainly carried out (1) to set right the discrepancies in plot-wise data between the two visits that make up each round of the NSS and (2) to set aside homestead land from the purview of operational holding.

The secular decline noticed in the extent of tenancy till the turn of the century has triggered a spate of debate as to the genuineness of the NSS data, with Narain and Joshi (1969), Bardhan(1970) and Sanyal (1972, 1976, 1977) making significant contributions to the debate. And the general agreement is that there may have been some decline in the incidence of tenancy, but the decline is unlikely to have been as sharp as the data suggest. The legislation on tenancy reform has resulted in tenancy going under ground and there by getting under-reported.

There are at least two important factors which may have had a dampening effect on tenancy till the turn of the century. Land reform regulations, especially the legislation on tenancy reform or rather the rhetoric on it and demographic pressures on land have been responsible for the observed decline in the magnitude of tenancy (Bardhan, 1979; Vyas, 1979). Apart from these negative influences, technological progress in the agricultural sector may have had its influence on the incidence of tenancy, even though one is not sure of the direction of the influence.

First, the decline in the area tenanted can be directly traced not only to the positive impact of tenancy laws but more significantly to their negative effects. It is true that the decline has been caused by the shift of tenants to an ownership base, but treading on its heels is the decline caused by flawed policies and their irresolute implementation when tenants lost what little hold they had on land. The largest number of ejections of tenants in recent history had taken place between1951 and 1956 – at about the time when rent regulating and protective tenancy acts were first passed in different parts of the country (Vyas, 1966; Bardhan, 1970). Further, emphasis on an element of land reform, the consolidation of holdings curiously, has sometimes subverted the interests of tenants by ejecting them on a large scale (Appu,1974).

Second, given the fact that the growth rate of population has been alarming and that policy makers have not been able to create job opportunities outside agriculture, at least to match with the population growth, more and more owners have been found taking to self-cultivation of land. The process must have had the effect of bringing down the magnitude of tenancy.

It is plausible to expect that technological changes that have come about in agriculture have had their influence on the extent leased-in, or more generally on the structure of land-ownership and distribution, through their effect on returns from cultivation.

However, one cannot be certain about the possible direction of influence of the technology on the extent leased-in.

Bardhan(1979) outlines two competing forces involved here.'Land-augmenting technical progress' in the form of high yielding varieties of seeds has the tendency to lure some of the erstwhile rentiers to take to self-cultivation by enhancing 'profitability of agriculture', curtailing in the process the effective supply of land in the lease market. But the presumption of enhanced 'profitability of agriculture' rests on constancy of the harvesting wage rate. However, the harvesting wage rate may itself goup and the negative effect of such a rise on returns from cultivation may more than outweigh the positive effect of technological progress.In which case, self-cultivation becomes a less attractive proposition for the landlord. He may end up leasing-out more, following technological progress.

We have put together above the reasons advanced in the literature for the secular decline in the incidence of tenancy. But what explains the increase in the incidence of tenancy between 2002-03 and 2012-13? It is plausible that both demand-side and supply-side factors account for this.Thus, the grim job-less growth scenario may have occasioned an increase in the demand for tenanted land. Simultaneously, there may have also been an increase in the supply of land for lease. A decline in the profitability of agriculture, consequent to increase in the rural wage rate of both male and female labour, following The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), may have prompted medium and large owner cultivators who cultivate the land mainly with hired labour, to increasingly lease-out their land. Also, an increasingly large amount of un accounted money seems to be getting used to purchase agricultural land by the urban rich.Such of those land owners, for the reason of not being conversant with agricultural practices, may be increasingly opting to lease-out their land.

State-level trends for Andhra Pradesh (AP) and Telangana (TS) (the universe of the proposed study) may be provided here. In Coastal AP the proportion of cultivator households leasing-in land increased from 23.9 per cent to 46.0 per cent and that of operated area leased-in from 20.0 per cent to 54.7 per cent between 2002-03 and 2012-13. The incidence of tenancy shot up during the period even in arid Rayalaseema region of AP, from 15.3 per cent to 40.5 per cent in respectof the share of cultivator households leasing-in and from 14.6 per cent to 35.1 per cent in case of operated area leased-in. In the Telangana state too (despite the presence of relatively radical tenancy legislation) there was a sharp increase in the extent of tenancy between 2002-03 and 2012-13; from

4.7 per cent to 20.0 per cent in case of tenant households and 3.1 per cent to 15.5 per cent in respect of tenanted area (Vaishali Bansal *et.a*l.,2018).

1.2.3. Form of Tenancy:

We have seen above that there was a turnaround in the significance of tenancy after 2002-03. After the year there was also a marked change in the relative significance of different forms of tenancy (Table2). At the all-India level, the significance of share cropping declined from 40.7 per cent to 30.8 per cent and that of fixed cash rent tenancy increased from 28.9 per cent to 39.9 per cent between 2002-03 and 2012-2013. There was a period in the past during which the area under cash rent tenancy had declined. Thus, between 1953-54 and 1982, the proportion of area tenanted for fixed money declined from 32.9 per cent to10.9 per cent. Subsequently, its incidence rose sharply. And never before in the past was the proportion of area under share cropping as low as in 2012-13.

Table I.2: Percentage Distribution of Area under Different Forms of Tenancy: India, Andhra Pradesh and Telangana: Rural

Year	Fixed Money	Fixed Produce	Share Produce	Others
All-India				
1953[1]	32.9	7.8	36.6	22.7
1960-61[1]	25.6	12.9	38.2	23.3
1970-71[1]	15.4	11.6	47.9	25.1
1982[2]	10.9	6.3	44.7	38.2
1991-92[2]	19.0	14.5	34.4	32.1
2002-03[2]	28.9	18.6	40.7	11.8
2012-13[2]	39.9	15.2	30.8	14.1
AndhraPradesh				
2002-03[2]	28.9	32.5	34.1	4.5
2012-13[2]	55.2	23.0	15.9	5.9
CoastalAP				
2002-03[2]	29.1	50.0	14.9	6.0
2012-13[2]	64.7	30.6	2.5	2.2
Rayalaseema				
2002-03[2]	28.6	9.3	59.6	2.5
2012-13[2]	48.7	17.8	25.0	8.4
Telangana				
2002-03[2]	33.3	33.2	22.5	11.1
2012-13[2]	61.0	5.9	29.8	3.4

Cited from:

1. Murty. C. S.(1998); and 2.Vaishali Bansal *et. al.* (2018)

Divergent explanations have been provided in the literature for the coexistence of alternative forms of lease arrangements. Cheung (1969) argues that share cropping would be wide spread in areas characterised by a high degree of uncertainty because it permits risk-sharing between lessors and lessees. On the contrary, Hanumantha Rao (1971) shows that in the Indian context, share cropping arrangements are common in areas of relative economic certainty with very little scope for decision making, for example, for factor substitution, and where entrepreneurial profitis low. In areas where there is very little scope for share tenants to restrict the use of inputs, the cost of enforcing tenants' input would be lower and the incentive for share contracts would be greater. Fixed cash rents, on the other hand, would be found in situations of high uncertainty where the scope for decision making is significant or where crops are profitable.

The above observations made in the literature based on cross-section evidence provide us the basis for commenting on inter-temporal trends. If we are to go by Cheung's argument, there should have been an increase in share cropping in the present era of increasing uncertainty following climate change (assuming the influence of other factors impacting on the form of tenancy is but marginal). But the evidence is contradictory and there has indeed been a decline in sharecropping. It may be that tenants, though they wish to lease-in land on crop sharing basis as a safeguard against uncertainty, are in no position to get their wish fulfilled. Landlords may be dictating terms. Landlords may be in the lookout for secure rental receipts and this makes them opt for cash rents (usually in advance of cultivation). This may explain as to why cash rent tenancy has been on the increase. Hanumantha Rao's argument that cash rent tenancy will be found in situations of high uncertainty seems to be validated by contemporary data.

The trends in the form of tenancy observed at the national level are found obtaining in AP and to some extent in Telangana (Table I.2). Thus, in Coastal AP, between 2002-03 and 2012-13, the share of fixed cash rent tenancy in total area under tenancy increased from 29.1 per cent to 64.7 per cent and that of sharecropping tenancy decreased from 14.9 per cent to 2.5 per cent. In the Rayalaseema region of AP, the share of cash rent tenancy increased from 28.6 per cent to 48.7 per cent and the share of sharecropping decreased from 59.6 per cent to 25.0 per cent during the corresponding period. The figures for Telangana are as follows: the share of cash rent tenancy shot up from 33.3 per cent to 61.0 per cent and that of sharecropping too increased from 22.5 per cent to 29.8 per cent. These two forms of tenancy acquired increased significance at the expense of FKR tenancy.

I.2.4. Rental and Extra-rental Obligations of Tenants:

It is intriguing that the magnitude of tenancy and the significance of cash rent tenancy have increased at a time when risk and uncertainty in agriculture have been on the increase because of climate change. Are these observed trends (that downplay the risk and uncertainty in farming) because of an increase in the demand for tenanted land? Or is it that the increase in the supply of land for lease is accompanied by much less onerous terms of tenancy than are obtaining hitherto? Since the NSS data do not provide us with details on contractual terms of tenancy, we propose to explore them through a study based on primary data collected in AP and Telangana, the states where there has been a spurt in the incidence of tenancy since 2002-03.We primarily deal with exploitation in the lease market.

Exploitation in the lease market may be related to the tenant's economic status. If a tenant'seconomic status has no bearing on the terms and conditions of the lease contract, at least his status *vis-a-vis* the status of his landlord may become important (Bharadwaj and Das, 1975a,1975b; Murty, 1998). If the relative bargaining strength of the tenant is weak, then the landlord, should he be enjoying hegemonistic power in several inter-linked markets of the rural economy, can, if he so desires, exploit the weaker tenant and such exploitation could also impede innovation (Bhaduri,1973).

The exploitation here need not only be in the form of an exorbitant rent but may assume so many other price and non-price dimensions. For instance, if a landlord also retains part of his owned land under self-cultivation, he may force his tenant to contribute either unpaid or under paid labour on the self-cultivated farm – sometimes referred to as 'labour rent' or be may do so for his domestic chores.

Further, when the landlord combines the functions of a lessor and a merchant, he may decide what crops the tenant ought to grow, what varieties of fertilisers and pesticides in what quantities and at what time he ought to apply, to whom he ought to sell his 'residual produce' and so on. Similarly, if the land owner has control over the credit market, he may extract a very high rate of interest by providing consumption as also production loans and stipulating suitable conditions on the time and terms of repayment in kind (Bhaduri, 1973). Again, the weaker position of the tenant imposes limitations on the opportunities to phase his sales of output overtime.

Such inter-locking of markets 'increases the exploitative power of the stronger sections because, while there could be limits to exploitation in any one market due to traditions or conventions or due to economic factors, the interpenetration of markets allows them to disperse exploitation over different markets and to phase out exploitation over time as well' (Bharadwaj, 1974). If on the contrary, a tenant's economic position is superior to that of his landlord, then the terms and conditions governing the tenure may be unduly favourable to the tenant (or at least fair). All said and done, the fact that a landlord (or to be more precise, the one with greater bargaining strength)enjoys either monopolistic or oligopolistic power does not mean that he will exercise it to exploit his tenant (Newbery,1975).

Of the two parties involved in lease contracts, landlords and tenants, the former group presumably has a greater bargaining strength and therefore, it is this group which dictates the terms of tenancy including the tenurial form under which the land is rented. It is reasonable to expect that this group prefers fixed cash rent tenancy to FKR and share cropping because it bringsin assured rental receipts in a scenario marked by uncertain yields from land and uncertain prices for output.

We presume so because cash rent tenancy that is usually burdensome to tenants is gaining ground and share cropping that eases the burden to an extent, is on the decline. In the present-day lease market, fixed cash rents may be facilitating the exploitation of tenants by landlords the most. Sharecropping, which once greatly paved the way for exploitation in the semi-feudal setup through inter-linked markets may no longer be the preferred option of landlords. Most landlords are now largely small, they have no control over the credit market – as they are in no position to extend credit to tenants to extract usurious interest from them; the output market – asthey are no great traders of output to buy cheap and sell dear; and have no need or desire to extract 'labour rent' from tenants – as they stay in urban surroundings (Sreenivasulu, 2020) and have no land under personal cultivation. It is this setting which may explain the increased significance of fixed cash rent tenancy in agriculture.

What cannot be dismissed, however, is another possibility that the tenants, in the present setting, may be securing leases at rents (whether fixed in cash, kind or crop shares) lower than at any time in the past. Climate change may be one reason for this. Also, as the landownership passes on increasingly into the hands of the urban rich,into the hands of those disinclined to till it, rental charges may decline.

I.2.5. Efficiency of Tenants:

As we debate over the inputs used on the land leased-in by the share tenant *vis-à-vis* those employed by his landlord under personal cultivation of the land (briefly the landlord henceforth), first consider the view so stead fast in earlier works (see, for instance, Bardhan, 1979; Bardhan & Srinivasan, 1971; Bell, 1977; Bliss & Stern, 1982; Shaban, 1987; Ali *et al*, 2012; Akram *et al*, 2019) and which follows from the basic position taken by Marshall (1952). It is contended that the share crop per employs resources less intensively than the landlord.

The Marshallian logic suggests the share tenant is less efficient than the owner-operator because he lacks both the economic incentive and capability for productive investment. He does not have the incentive to apply sufficient working capital, including labour-power, to achieve maximum output because he receives only a fraction of the increment in output while he has to bear the full cost involved in attaining it. The tenant's equilibrium will be sub-optimal relative to that of the owner-operator as long as the landlord cannot stipulate input intensity.

To be more specific, if the output is shared between the tenant and his landlord in 50:50 ratio, marginalist theories argue that the tenant would undertake additional investment only if the marginal return from such investment is twice as high as the cost associated with the investment. Share cropping as long as the share is fixed by convention and the tiller is free to choose the quantum of investment he will supply will, in general, be less efficient than owner cultivation.

The tenant's inefficiency attributed to lack of proper incentives is compounded by his limited capacity to undertake short-term investment. Low productivity, high rental share and high costs associated with supporting facilities leave him with a very little surplus, forcing him to ration working capital employed in land operation (Herring, 1983; Senand Varghese,1966).

For the same reasons that make him curtail investment in operating capital, the share tenant putsin little or no investment in fixed capital. Durable investment or long-term investment which contributes to higher productivity on land for some years in future will not be to the advantage of the tenant. Insecure tenancies give rise to uncertainty and the tenant is not sure whether he will retain operational control over the leased parcel till such time that the durable investment exhausts (Jacoby,1953).

If the tenant is not a sharecropper but is operating the tenanted land on a fixed kind or fixed cash rent basis, he may use inputs (i.e., variable capital), as intensively as the owner. It does not pay him to under-supply variable inputs. But the possibility of the tenant neglecting investment in fixed or durable capital cannot be ruledout. Land improvement activities, such as the digging of a well, lowering or raising the level of the land, which increase output on a long-term basis will be neglected because the tenant's future control over the leased-in parcel is doubtful. The neglect of durable capital by the fixed tenant (and also by the share tenant) can also lead to a less incentive use of operating capital by him since the two are complementary (Schickele, 1941).While this is so, the fixed rent tenants may employ chemical fertilisers excessively so that they can maximise their returns while the land is under their control. Such an action can impair soil health and will influence the sustainable use of land (Goswami and Bezbaruah, 2013). Therefore, it appears that owner cultivation is by far the most efficient organisation of production.

The short-term ill-effects of tenancy are considered to be particularly serious in case of share tenant. Acting on this premise, alternative policy models have been suggested to come to terms with this problem and to make the share tenant produce at least as much output as the landowner can attain. To prevent the sub-optimal equilibrium from occurring, sharing of input costs between the tenantand his landlord in just the same ratio as the outputis shared is often considered necessary (Schickele, 1941: Heady, 1968). This prescription lowers the marginal cost of the tenant by an extent sufficient enough for him to deploy resources in just the way the owner-operator does.

There are reservations expressed over the credibility of the cost-sharing model. Even if the tenant and his landlord agree to share input costs in principle, the contract may at best be extended to cover the costs of purchased inputs only and such ones as the cost of family labour may not be shared. Supposing that the tenant cultivator works the leased parcel with family labour, he may restrict its use because he receives, as the cost-sharing arrangement does not cover this item, only portion of the marginal return from the labour input (Schickele,1941).

However, the Marshallian logic of marginal costs and returns on which the above conclusion is based, per se is challenged (Cheung,1969). Several people essayed to demonstrate that productive efficiency is invariant as between owner-operated and the share cropped farms (Johnson, 1950; Newbery, 1974, 1975; Stiglitz, 1974; Otsuka and Hayami, 1988). One of the arguments extended to show why tenancy may not adversely

influence resource use notes the generally high rates of return associated with modern inputs and contends that the tenant will be lured into expanding resource use beyond the level suggested by marginalist theories.

I.3. Objectives and Hypotheses

To begin with, we set ourselves the task of studying the impact of climate change on the cropped area and the yield of principal crops. It is hypothesised that climate change, other things remaining the same, dampens the area and yield and/or alters the cropping pattern, to the disadvantage of the cultivator.

Our foremost objective is to assess the impact of climate change on the terms and conditions governing leases. In the context, the study seeks to investigate the changes that have come aboutin the terms of tenancy in the last two decades. The question whether fixed cash rent tenancy most facilitates exploitation in current-day agriculture is sought to be answered. Arguably, tenants' bargaining position now is not all that weak for they deal with landlords who are small themselves and who are hardly motivated to till the land themselves (if rents offered by tenants are low). Even as cash rent tenancies are preferred, they may not be paving way for exploitation, and rents under this tenurial form may be tempered by competitive forces. We test the postulate that market forces operate freely to not put tenants to undue disadvantage.

Cultivation of land by owners themselves is by far the most efficient organisation of production. Does climate change make any difference to this adage? Is the tenanted land cultivated asefficietly as the owned land in the present set up? How do the yields of tenants compare asbetween the irrigated and the rain-fed zones and with those of owners within each zone? An attempt is made here to study the relative efficiency of alternative tenures.

I.4. Scope and Methodology

As a first step, the study explores the changes that have come about in the last 20 years in Gross Cropped Area (GCA), Gross Irrigated Area (GIA), the intensity of cropping and area and the yield of principal crops in the traditional regions of Andhra Pradesh and Telangana states based on secondary data. To elicit the changes, the data of a 20-year period on the variables under consideration is divided into two periods and the means and coefficient of variations of the periods are compared.

The impact studies such as this, follow either one of the two approaches (1) 'with and without'approach and (2) 'before and after' approach. If we propose to adopt the first method, we need to compare the terms and conditions governing the leases in an irrigated region (that is less subjected to climate change) with those in an arid region (that is highly exposed to the adverse affects of climate change). It is necessary here thatboth the regions have the same initial conditions except that one region has irrigation and the other no irrigation at the same point of time. In contrast, if we decide to opt for the second method, we need to compare the contractual terms of tenancy before the time when climate change is less of a problem with the terms of tenancy after the time when climate change has assumed serious proportions. The method to yield reliable results requires that the sample households chosen for the study are not subjected to any influence other than getting exposed to climate change between now and then. This method is based on a recall of the past events and requires that we collect data on terms and conditions of lease contracts as they prevailed in the past and now. The present study employs mainly the first approach in trying to understand the impact of climate change on contractual terms of tenancy. We collect data from sample households on terms of tenancy as they obtained in an arid zone and an irrigated zone.

Institutional mechanisms are also emerging to protect the tenants of the two states. The AP Land Licensed Cultivators Act, 2011 is one such (Murty and Srinivasa Reddy, 2017). Under the Act, tenants are being licensed and they are being given institutional loans, disaster relief, and input subsidies. They are also being covered under insurance schemes. The tenants are therefore better equipped to face cultivation risk now than in the past. We probe here as to the extent to which the Act is benefitting the tenant cultivator. There are some other policy measures with the potential to provide succour to tenants which are initiated in the two states. *Rythu Bandhu* of Telangana and *YSR Rythu Bharosa* of AP are two such schemes. The impact of these interventions is also studied below.

We undertook the study in two villages each of North Coastal Andhra (NCA), South Coastal Andhra (SCA), Rayalaseema (RS), North Telangana (NT) and South Telangana (ST) regions. While selecting the villages we purposively ensured representation of all tenurial forms. In each village, we administered a questionnaire among 25 tenants selected at random. If the number of tenants fall short of the required number in any of the chosen villages, we made good the number by drawing tenants from contiguous villages. Thus, we selected in all 250 (25*2*5) tenants. Besides, we also canvassed a schedule

among 10 randomly selected owner-cultivators in each of the chosen villages (10*2*5 = 100 in all) to get a comprehensive idea about the impact of climate change on farm yields.

Survey data from 250 tenants spread over the five regions are employed to study the influence of climate change on the terms of tenancy. In the process, details are elicited on the form of tenancy, rental charges, duration of the lease, sources of credit of tenants etc. The details on irrigated and rain-fed zones are compared and contrasted. Data on yields collected from the 250 tenants and also that gathered from the 100 owners are used to study the relative efficiency of alternative tenurial forms.

I.5. Plan of the Monograph

Section II that follows explores the impact of climate change on the cropped area, and yields in the five regions of the study employing the published data. Section III explains the setting in which the primary study is carried out. Some of the features of the study villages are presented here. Besides, we present characteristic features of the households among whom the questionnaires are administered in our survey. There are two groups of households, owners and tenants. In this Section, we provide also the details on the lands operated by them. Section IV delves with the terms of tenancy obtaining in the survey villages, their variations across villages. Here we test the hypothesis whether climate change impinges upon the operation of market forces to the disadvantage of tenants. Section V is devoted to an investigation of the efficiency with which the land is cultivated under alternative tenures. In the process, we compare the efficiency with which the owned land is cultivated on one hand and that with which lands under sharecropping, fixed kind tenancy and fixed cash rent tenancy are used on the other. The hypothesis that the productive efficiency of owned and tenanted lands is invariant is put to test in the Section. A summary and conclusions of the work make up Section VI.

Section – II

Regional Character of Changes in Area and Yields in the Era of Climate Change

II.1. Introduction

The impact of climate change on agriculture is primarily felt on the cropped area and yields. A simple measure such as the annual average rainfall may be taken to represent the nature of climate that obtained during a year. It is no doubt a crude measure, for it conceals the excesses of rain and heat waves (that cause floods and droughts) that are witnessed during the year. As noted, it is an average measure but is something about which we have region-specific data for a long period.

In this Section we give, to begin with, details on the average annual rainfall in our attempt to gauge the severity or otherwise of climate change. What we do is to arrive at the means and coefficients of variation of average annual rainfall (in mm) separately for two recent decades to first see if climate change is more of a worry in the more recent decade than in the decade before. Next, we examine if the means of alternative measures of area and yield for the two decades follow the trend exhibited by rainfall. The data employed here are sourced from Season and Crop Reports and Statistical Abstracts brought out annually by the Bureaus of Economics and Statistics of the governments of AP and Telangana. The data are grouped for five regions viz., North Coastal Andhra (NCA), South Coastal Andhra (SCA), and Rayalaseema (RS) of Andhra Pradesh and North Telangana (NTS) and South Telangana (STS) of Telangana State and each for two periods. The first period of AP corresponds to the decade from 1998-99 to 2007-08 and the second period of the state pertains to the decade from 2008-09 to 2017-18. In Telangana, the first decade is from 1996-97 to 2005-06 and the second from 2006-07 to 2015-16.

II.2. Variations in Rainfall across the Regions

Of the five regions of study, rainfall was generally scanty in RS and STS. The normal rainfall was 714 and 753 mm in the two regions respectively. The other three regions were better placed with the normal rainfall at 1165, 1035 and 1056 mm in NCA, SCA and NTS in that order. In the first decade, the means of actual rainfall were less than the

normal in all the regions, except in RS. The case of RS was not reassuring, however, because even with better than normal rainfall, the mean precipitation in the region was low at 732 mm with a very high coefficient of variation (Table II.1).

Table II.1. Variations in Annual Rainfall (mm) by Region

Region	Normal Rainfall	Rainfall in Period 1		Rainfall in Period 2	
		Mean	C. V.	Mean	C. V.
1. NCA	1165	1114	19.5	1104	21.8
2. SCA	1035	974	21.1	943	29.0
3. RS	714	732	26.5	676	18.3
4. NTS	1056	967	17.8	982	25.5
5. STS	753	726	24.0	684	27.2

Note: For regions of Andhra Pradesh (NCA, SCA, RS), Period 1 is from 1998-99 to 2007-08 and Period 2 if from 2008-09 to 2017-18. For regions of Telangana (NTS, STS), Period 1 is from 1996-97 to 2005-06 and Period 2 if from 2006-07 to 2015-16.

Source: Data compiled/analysed from:

AP:
1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS:
1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

It is worrisome that the means of actual rainfall in the second decade, besides being less than the normal, were less than the means of the rainfall in the first decade with one exception. Only in NTS, the mean of actual rainfall was marginally higher than in the first decade. The woes did not end there. The coefficients of variation of the second period were generally higher than in the first period. Only RS recorded a lower coefficient of variation, but with a far less mean than in the first period.

The inescapable conclusion is that rainfall is becoming less and less even as it is witnessing larger and larger variations. Climate change is more of a problem now than at the turn of the century. And of the five regions, NCA is favourably placed whereas RS and STS are unenviably placed.

II.3. Changes in Irrigated Area

A dearth of rainfall would be less of a worry if there is irrigation to compensate for it (Birthal, et al, 2014; Senapati and Goyari, 2020). One generally expects an increase in the area irrigated over time. This can happen with the commissioning of new irrigation projects as years roll by. We have arrived at the means of Net Irrigated Area (NIA) for the two periods for the regions under study. The mean of NIA was higher in period 2 than in period 1 in three of the five regions – in NCA, NTS and STS; and less in two regions – in SCA and RS. As we saw above, RS and STS receive scanty rainfall. It is heartening that the NIA increased significantly between the two periods in STS. On the other hand, NIA contracted over time in RS. Thus, agriculture in RS remains susceptible to the vagaries of the monsoon even to this day (Table II.2).

Table II.2: Changes in Net Irrigated Area (NIA) (ha) by Region

Region	NIA in Period 1		NIA in Period 2		% change in P2 over P1
	Mean	C. V.	Mean	C. V.	
1. NCA	411854	10.92	443162	7.27	7.60
2. SCA	1788490	13.67	1782510	6.75	-0.33
3. RS	745058	63.02	649979	4.43	-12.76
4. NTS	930933	11.97	1061128	12.75	13.99
5. STS	532419	14.03	668255	12.12	25.51

Source: Data compiled/analysed from:

AP:
1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS:
1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

For a better exposition on the availability of irrigation in the study regions, we have compiled data on GIA (Table II.3). The means of GIA were larger in period 2 than in period 1 in all the regions. It was larger even in RS, the region that seemed to be of perennial neglect. Overall, the in both periods. One bright spot in the otherwise gloomy picture of RS of AP was that the Intencity of Irrigation (IoI) recorded a sizeable increase in period 2 over period 1. The increase was of the order of 24.74 percentage points, the highest among the five regions.

Table II.3: Changes in Gross Irrigated Area (GIA) (ha) by Region

Region	GIA in Period 1		GIA in Period 2		% change in P2 over P1
	Mean	C. V.	Mean	C. V.	
1. NCA	483934	9.97	539584	6.50	11.50
2. SCA	2291828	10.04	2440407	7.84	6.48
3. RS	734345	9.90	801399	4.65	9.13
4. NTS	1232949	14.21	1537776	14.48	24.72
5. STS	729895	15.35	933774	14.62	27.93

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad. irrigation effort was more satisfactory in NTS and STS, the regions of Telangana; than in NCA, SCA and RS, the regions of AP. This view gathers further support when we look at the Intensity of Irrigation (IoI) (Table II.4). It is greater in the Telangana regions than in the regions of AP

Table II.4: Intensity of Irrigation (IIrri.) (%) by Region

Region	Intensity of Irrigation in		% change in P2 over P1
	Period 1	Period 2	
1. NCA	117.50	121.76	4.26
2. SCA	128.14	136.91	8.77
3. RS	98.56	123.30	24.74
4. NTS	132.44	144.92	12.48
5. STS	137.09	139.73	2.64

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

II.4. Changes in Cropped Area

Rainfall and access to irrigation would impact on the area sown in a region. Between periods 1 and 2, the Net Area Sown (NAS) recorded a fall in NCA and RS, while it showed an increase in SCA, NTS and STS; the increase in NTS being of a high order (8.79%) (Table II.5).

Table II.5: Changes in Net Area Sown (NAS) (ha) by Region

Region	NIA in Period 1		NIA in Period 2		% change in P2 over P1
	Mean	C. V.	Mean	C. V.	
1. NCA	931911	6.19	870890	4.08	-6.55
2. SCA	2817545	4.00	2870418	4.69	1.88
3. RS	2611620	11.38	2559691	6.17	-1.99
4. NTS	2083288	9.55	2266308	6.75	8.79
5. STS	1982296	7.25	2011381	7.43	1.47

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad. Considering Gross Cropped Area (GCA), we find it to record a large decline in SCA and the other two regions of AP – NCA and RS – it showed a marginal increase between the two periods. In Telangana regions of NTS and STS, there was a marked increase in GCA over time (Table II.6).

Let us now consider the Intensity of Cropping (IoC). It is found to have recorded a sizeable increase between the two periods in all regions, except SCA. In SCA, IoC fell by 19.21 percentage points over time. Not withstanding the fall, the mean of IoC in the second period was the highest in the region at 135.87% (Table II.7).

Table II.6: Changes in Gross Cropped Area (GCA) (ha) by Region

Region	GCA in Period 1		GCA in Period 2		% change in P2over P1
	Mean	C. V.	Mean	C. V.	
1. NCA	1106955	30.93	1156222	3.28	4.45
2. SCA	4369476	59.32	3899945	5.20	-10.75
3. RS	2674758	32.65	2840844	6.89	6.21
4. NTS	2310347	30.94	2878687	9.48	24.60
5. STS	2087508	31.98	2382970	6.27	14.15

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

Table II.7: Intensity of Cropping (IoC) (%) by Region

Region	Intensity of Cropping in		% change in P2 over P1
	Period 1	Period 2	
1. NCA	118.78	132.76	13.98
2. SCA	155.08	135.87	-19.21
3. RS	102.42	110.98	8.56
4. NTS	110.90	127.02	16.12
5. STS	105.31	118.47	13.16

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

The measure which impacts the most on crop production is GIA's percentage in GCA. Between period 1 and 2 the measure showed a rise in all the regions of the study. In the first period, the percentage was the highest in NTS at 53.37%. Close on its heels was SCA with 52.45%. The value was the least at 27.45% in RS. By the second period, SCA came to occupy the first position. The mean value of the region was 62.58% for the period. There was hardly any change in the position of RS over time. The mean was the least again in the second period in RS with a value of 28.21% (Table II.8).

Table II.8: Gross Irrigated Area as % of Gross Cropped Area by Region

Region	Gross Irrigated Area as % of Gross Cropped Area in		% change in P2 over P1
	Period 1	Period 2	
1. NCA	43.72	46.67	2.95
2. SCA	52.45	62.58	10.13
3. RS	27.45	28.21	0.76
4. NTS	53.37	53.42	0.05
5. STS	34.96	39.19	4.23

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

Based on a study of irrigated area's proportion in GCA, we can therefore say that SCA was by far the best equipped to contribute to the granary among the five regions. Not far behind was NTS. The worst equipped was RS. Since a considerable proportion of GCA was still without the benefit of irrigation, rainfall mattered for the cropped area. In fact, copious rainfall aids irrigation by raising the groundwater table and by increasing inflows to reservoirs. If we reflect upon rainfall, even the SCA region was experiencing a deficit compared to the normal and was also facing large variations.

II.5. Changes in Area under Principal Crops

Here we consider changes in the percentage of GCA devoted to individual crops between the two periods across the five regions under study. We have considered 19 crops in all in

our statistical exercises (Table II.9). We observe that in NCA the percentage witnessed a fall in respect of 13 crops, while it recorded an increase in case of 6 crops. In SCA, 12 crops lost area and 7 gained. In RS, 9 lost and 10 gained; in NTS 16 lost and 3 gained and in STS 13 lost and 6 gained. Barring a couple of exceptions, the recorded changes in percentages are small in all the regions. One exception is that groundnut crop lost a good deal of area in RS between the two periods. And cotton gained significantly in NTS and STS.

Table II.9: Number of Crops Recording Decrease/Increase in % of Gross Cropped Area Devoted to Them in Period 2 over Period 1 by Region

Region	Number of Crops Recording		Total Number of Crops
	Decrease	Increase	
1. NCA	13	6	19
2. SCA	12	7	19
3. RS	9	10	19
4. NTS	16	3	19
5. STS	13	6	19

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

We may note changes in the area devoted to 2 or 3 principal crops of each region (Table II.9). Rice accounted for 37.58% of GCA in NCA in the second period. Sugarcane and black gram follow next. They cover an area of merely 6.29% and 6.11% in the period. Over time area under rice gained 1.16 percentage points, sugarcane lost 3.18 points and black gram gained 1.16 points. In SCA, area under rice accounted for 43.32% of GCA, on an average in period 2. Cotton and black gram are the next two crops of some significance, but they are way behind rice. They cover a little over 7% of GCA. Rice area increased by 2.94 percentage points between the two periods. Cotton too gained by 2.51 percentage points. There was a fall of the order of 0.82 percentage points in case of

black gram. In the arid RS region, groundnut was the principal crop even though it was losing ground over time. In the second period, the crop accounted for 36.11% of GCA after a loss of 14.18 percentage points between periods 1 and 2. After groundnut, Bengal gram and rice are the important crops. Bengal gram covered 12.67% of GCA and gained 4.49 percentage points over the years. Rice was in third place with 9.06% of the area as of the second period. It lost ground marginally as between the first and the second periods.

Rice accounted for a large area in NTS and STS. In the former region, 31.91% of GCA was devoted to it on an average in the second period. Close on its heels was cotton which was sown in 30.40% of the area. Maize occupied third place with 11.15% area. Of the three crops, rice and maize were losing ground whereas cotton recorded a significant gain. In STS the first three crops of importance were again rice, cotton and maize. They were sown in 25.74%, 21.11% and 12.33% of the GCA as of the second period. All the three crops garnered more area in period 2 compared to period 1. The gain in cotton was of the order of 12.94 percentage points.

Thus, many crops lost their ground in the second period as compared to the first, but generally by a small measure. Only the groundnut area declined significantly in RS, where both rainfall and irrigation were scanty. Next, rice was the most preferred crop of the farmers in all the regions except in RS. But the area under rice seemed to have reached a plateau. Where it gained, the gain was marginal while it also lost its significance in a couple of regions. In sum, climate change appears to be threatening in the RS region.

II.6. Changes in Yields of Principal Crops

Unseasonal rains and heat waves caused by climate change can impact adversely on crop yields. To examine this, we have arrived at as a first step, the mean yields of principal crops of the two periods under study and then we have calculated the percentage increase in yields in period 2 over period 1 for the five regions of study separately. Our calculations show that a large majority of crops recorded an increase in yields over time. This finding does not negate our proposition, however, because the favourable effect of technological change and increased access to irrigation can outweigh the unfavourable effect of climate change. On closer scrutiny of the data, we have noted that while the increase in yields was common, the increase was more than the average increase in about half of the crops

and less than the average for the other half. This was true in all the regions of the study (Table II.10). We may therefore draw the inference that farmers were adapting to climate change. Technology and irrigation seem to be aiding them to nullify the negative effect of climate change.

Table II.10: Number of Crops Where Increase in Yield in Period 2 over Period 1 is More/Less than the Average Increase by Region

Region	Number of Crops Where Increase in Yield is		Total Number of Crops
	More than the Average	Less than the Average	
1. NCA	8	11	19
2. SCA	8	11	19
3. RS	9	10	19
4. NTS	11	8	19
5. STS	9	10	19

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;
2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and
2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

We have seen above that the RS and STS regions were badly placed based on mean annual rainfall in period 2. The two regions were also in an equally bad position in respect of mean of the proportion of Gross Irrigated Area in GCA in the second period. Did this setting culminate in relatively low yields of principal crops in the regions? We put together data on the mean yields of period 2 of nine main crops to examine this proposition. First, consider the case of rice, which was grown across all the regions. The mean yield of the crop was the lowest in NCA and not in RS or STS. The mean was reasonably high in RS. Another crop of importance was maize and as expected, STS fared badly. Again, RS did exceedingly well. In the case of redgram, RS did badly. The performance of STS was not all that good either. The worst performing region in the case of blackgram was NCA. The standing in respect of the other crops was: bengalgram-

RS; greengram-STS; groundnut-RS; sugarcane-NCA and cotton-STS (Table II.11). In sum, while SCA occupies the best position in respect of the yields of principal crops, STS, RS and NCA vie for the worst position.

Table II.11: Mean Yield (Kgs/Ha) in Period 2: Principal Crops

Region	Rice	Maize	Redgram	Black-gram	Bengal-gram	Green gram	Ground nut	Sugar cane (gur)	Cotton (Lint)
NCA	2559	4537	525	552	1698	491	1380	5142	358
SCA	4286	7938	695	804	1703	597	2771	7707	535
RS	3742	4857	287	854	917	546	639	7381	314
NTS	3200	4576	624	876	1511	557	1716	5706	296
STS	2960	2617	415	691	1217	454	1621	5583	225

Source: Data compiled/analysed from:

AP: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;

2. 2013-14 to 2015-16, GoAP, Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

3. 2015-16 to 2017-18, GoAP, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

TS: 1. 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts & Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. 2013-14 to 2015-16, GoT, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

While the rainfall received has been a source of worry in all the regions of study, it has been more so in RS and STS. Increased access to irrigation has done little to lessen the woes of the two regions. The yields of principal crops of the regions mirror this disturbing scenario.

Section – III

Features of Survey Villages and Respondents

III.1. Introduction

Survey data was collected from ten village clusters (contiguous villages were selected where the sufficient number of tenants could not be found in the main village), two each from the regions of NCA, SCA, and RS of AP state and NTS and STS of Telangana state. It was collected during December 2019 and February 2020. The reference period of the survey was extended to cover three agricultural seasons, Kharif 2018, Rabi 2019 and Kharif 2019. The main villages covered in the survey are listed in Tables III.1A and 1B. As noted earlier, the village selection was conditioned by the prevalence of tenancy. We ensured that tenants leasing-in land under all three forms of tenancy, viz., sharecropping, FKR and fixed cash rent, figured in the sample. Additionally, details on yields were also elicited from a limited number of owner cultivators to facilitate comparison of the efficiency with which lands were cultivated by tenants and owners.

III.2. Attributes of Survey Villages

The mainstay of the village inhabitants was agriculture – cultivation and agricultural labour. The population density varied between 1.43 persons per hectare (in Dinnapadu in the RS region) and 4.17 persons per hectare (in Cheedikada village in NCA). The predominantly agricultural castes of SCs and STs together accounted for between of 4.07% (in Rukminipuram village in NCA) and 52.72% (in Batlamaguturu village in SCA). Power for agricultural use was present in all the villages. This is important because in 7 of the 10 villages, wells and tube-wells that require electric power, supported irrigation.

Irrigated area formed a considerable proportion in the sown area of all the villages, although wide variations existed among them. Thus, while only 9.59% of the net area sown was irrigated in Chinna Cheppali village of RS, the entire 100% of the sown area was served by dependable canal irrigation in Batlamaguturu village of SCA. Paddy was the main crop in 5 of the 10 villages, although it was grown in all the villages except for Chinna Cheppali.

Table III.1A: Profiles of Selected Villages: Andhra Pradesh

Particulars	North Coastal Andhra (NCA)		South Coastal Andhra (SCA)		Rayalaseema (RS)	
District	Visakhapatnam	Visakhapatnam	West Godavari	Krishna	Kadapa	Kadapa
Mandal	Cheedikada	Yelamanchili	Penumantra	G. Konduru	Lakkireddipalle	Kamalapuram
Gram Panchayaat	Cheedikada	Krishnapuram & Rukminipuram	Batlamagututuru	Kavuluru	Dinnapadu	Chinna Cheppali
Village Name	Cheedikada	Rukminipuram	Batlamagututuru	Kavuluru	Dinnapadu	Chinna Cheppali
Geo. area (ha)	1177	699	618	2093	1870	1691
Households	1336	613	456	2327	713	1027
Population	4903	2186	1540	8067	2670	4046
Density of population	4.17	3.13	2.49	3.85	1.43	2.39
SCs	379	87	807	1950	333	641
STs	157	2	5	639	4	62
SCs & STs as % of total population	10.93	4.07	52.72	32.09	12.62	17.37
Prin. Crops grown	Paddy, Sugarcane	Paddy, Sugarcane	Paddy	Paddy, Cotton, Chillies	Groundnut, Paddy, Redgram	Groundnut, Sunflower, Bengalgram
Net Area Sown (ha)	434	587	530	1100	482	1480
Unirri. Land (ha)	340	244	0	965	1214	1339
Irrigated land (ha)	380	343	530	739	92	142
Irri. land as % of net area sown	87.56	58.43	100	67.18	19.09	9.59
Canal (ha)	0	321	530	251	0	0
Well/tubewell (ha)	0	0	0	488	72	142
Tank/lake (ha)	380	20	0	0	20	0
Predominant form of tenancy	Sharecropping	Sharecropping	Fixed Kind Rent	Fixed Cash Rent	Fixed Cash Rent	Fixed Cash Rent

Source: https://censusindia.gov.in/:District Primacy Census Hand Books: Visakhapatnam, West Godavari, Krishna, Kadapa, Directorate of Census Operations, Andhra Pradesh

Table III.1B. Profiles of Selected Villages: Telangana

Particulars	**North Telangana (NTS)**		**South Telangana (STS)**	
District	Warangal	Warangal	Mehaboobnagar	Mehaboobnagar
Mandal	Wardhannapet	Hanamkonda	Hanwada	Koilkonda
Gram Panchayaat	Inole & Ontimamidipalle	Kondaparthi	Gundiyal	Suraram
Village Name	Inole	Kondaparthi	Gundiyal	Suraram
Geo. area (ha.)	1840	2581	2343	838
Households	1840	1633	1224	395
Population	7441	6439	6126	2078
Density of population	4.04	2.49	2.61	2.48
SCs	1766	2050	213	447
STs	126	20	1376	18
SCs & STs as % of total population	25.43	32.15	25.94	22.38
Prin. Crops grown	Cotton, Paddy, Maize	Paddy, Cotton, Maize	Redgram, Jowar, Paddy	Jowar, Redgram, Paddy
Net Area Sown (ha.)	806	1780	705	492
Unirri. Land (ha.)	1170	1956	1130	542
Irrigated land (ha.)	555	211	416	218
Irri. land as % of net area sown	68.86	11.85	59.00	44.31
Canal (ha.)	0	0	0	0
Well/tubewell (ha.)	555	159	301	147
Tank/lake (ha.)	0	52	115	71
Predominant form of tenancy	Fixed Cash Rent	Sharecropping	Sharecropping	Fixed Cash Rent

*Source: https://censusindia.gov.in/:*District Primacy Census Hand Books: Warangal, Mehaboobnagar, Directorate of Census Operations, Andhra Pradesh

All forms of tenure could be witnessed in the study. Thus, in the two villages of NCA, sharecropping was present. In the Batlamaguturu village of SCA, fixed kind rent tenancy existed. In the other village Kavuluru of SCA, fixed cash rent tenancy was prevalent. Fixed cash rent tenancy was by far the most important form of tenancy in the survey villages. This observation coincides with that which follows from NSS data noted earlier. Rent fixed in kind was found in only one village, Batlamaguturu of SCA. Here, there was assured irrigation to the entire land of the village and if at all there was any risk in farming it was that occasioned by improper drainage. The conventional wisdom that fixed kind rental arrangements would be common in areas of relative certainty receives support from the setting in the village.

While this is so, FKR was replaced by sharecropping in the two villages of NCA region in the last 15 to 20 years following improved access to irrigation. To repeat, as the risk associated with farming decreased, fixed kind rental form gave way to sharecropping. This goes against the generally held notion that sharecropping would be found in areas characterised by high risk, but is in line with Hanumantha Rao's observation that it would be found 'in areas of relative certainty with very little scope for entrepreneurship.' But the conditions obtaining in the villages were not quite in line with Hanumantha Rao's conclusion, because there was scope for entrepreneurship in the villages. The more enterprising of the farmers in the villages grow sugarcane while paddy was preferred as a matter of routine by many small farmers. Also, in at least three other villages of Telangana the form of tenure witnessed a change from fixed kind rent (FKR) to fixed cash rent in the recent past. We attribute the preference of this tenurial form to the urge of the landlords to get assured rental returns from the tenanted land.

III.3. Characteristics of Respondents: Tenants

III.3.1. Social and Demographic Characteristics:

There were 250 tenants in our sample, drawn at the rate of 25 tenants from each of the chosen 10 village clusters. As many as 90.8% of them were Hindus. Christians constituted

Table III.1: Classification of Households by Religion and Region: Tenants

Region		Religion			Total
		Hindus	Christians	Muslims	
1. NCA	Absolutes	50	0	0	50
	Row %s	100.0	0.0	0.0	100
2. SCA	Absolutes	38	11	1	50
	Row %s	76.0	22.0	2.0	100
3. RS	Absolutes	43	3	4	50
	Row %s	86.0	6.0	8.0	100
4. NTS	Absolutes	49	1	0	50
	Row %s	98.0	2.0	0.0	100
5. STS	Absolutes	47	0	3	50
	Row %s	94.0	0.0	6.0	100
ALL	Absolutes	227	15	8	250
	Row %s	90.8	6.0	3.2	100

NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

6% and Muslims 3.2% of the sample (Table III.1). The caste-wise classification shows that 90% of the respondents were either OBCs, SCs or STs. Tenants, therefore, belonged to socially lowly placed castes (Table III.2). As we see below, almost all these tenants operated marginal and small holdings. There was a convergence of caste and class. There were a few female-headed households – 16.0% of them (Table III.3). They were working heads. The non-working heads were merely two in number. The average age of the heads of household was 48 years.

Table III.2: Classification of Households by Caste Category and Region: Tenants

Region		Caste Category				Total
		1. FC	2. OBC	3. SC	4. ST	
1. NCA	Absolutes	0	50	0	0	50
	Row %s	0.0	100.0	0.0	0.0	100.0
2. SCA	Absolutes	4	12	34	0	50
	Row %s	8.0	24.0	68.0	0.0	100.0
3. RS	Absolutes	17	23	7	3	50
	Row %s	34.0	46.0	14.0	6.0	100.0
4. NTS	Absolutes	3	22	25	0	50
	Row %s	6.0	44.0	50.0	0.0	100.0
5. STS	Absolutes	1	45	2	2	50
	Row %s	2.0	90.0	4.0	4.0	100.0
ALL	Absolutes	25	152	68	5	250
	Row %s	10.0	60.8	27.2	2.0	100.0

NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Education matters. It betters the way tenants approach farming. It places them on a sound footing while dealing with landlords, credit providers, traders and the government officials conferring benefits. Illiterate heads accounted for 36% of the total. Heads of households with the education of 5th standard or less formed 20%. Those with the education of 6th class to 10th class formed 26.4%. A considerable proportion of heads – 17.6% to be precise – had intermediate or technical education (Table III.4).

Table III.3: Details on Sex and Average Age of Heads of Households by Region: Tenants

Region		Sex		Total	Average age of head of HH (Years)
		1. Males	2. Females		
1. NCA	Absolutes	47	3	50	50
	Row %s	94.0	6.0	100	***
2. SCA	Absolutes	50	0	50	48
	Row %s	100.0	0.0	100	***
3. RS	Absolutes	49	1	50	50
	Row %s	98.0	2.0	100	***
4. NTS	Absolutes	47	3	50	45
	Row %s	94.0	6.0	100	***
5. STS	Absolutes	49	1	50	45
	Row %s	98.0	2.0	100	***
ALL	Absolutes	242	8	250	48
	Row %s	96.8	16.0	100	***

Note: ***: NA:Not Applicable (NA); NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.4: Classification of Heads of Households by Education Status and Region: Tenants

Region		Education Status					Total
		1). Illiterate	2). 5th or less	3). 6-10th Class	4). Inter	5). Others	
1. NCA	Absolutes	16	15	16	1	2	50
	Row %s	32.0	30.0	32.0	2.0	4.0	100.0
2. SCA	Absolutes	14	15	16	2	3	50
	Row %s	28.0	30.0	32.0	4.0	6.0	100.0
3. RS	Absolutes	21	8	7	9	5	50
	Row %s	42.0	16.0	14.0	18.0	10.0	100.0
4. NTS	Absolutes	19	4	16	7	4	50
	Row %s	38.0	8.0	32.0	14.0	8.0	100.0
5. STS	Absolutes	20	8	11	10	1	50
	Row %s	40.0	16.0	22.0	20.0	2.0	100.0
ALL	Absolutes	90	50	66	29	15	250
	Row %s	36.0	20.0	26.4	11.6	6.0	100.0

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Males among household members constituted 54.2% (Table III.5). The tenants had nuclear families, the average family size being 4.08. The members in the age-group 18-24 years formed 12.2% and those in the age-group 25-60 years 60.5%. Children less than 6 years and the elderly above 60 years formed 4.3% and 4.5% respectively. Those in the school-going age-group 6-17 years accounted for 18.5% (Table III.6). Household members with intermediate or technical education were 27.4%. The proportion of illiterate members (including those with age 6 years and below) formed 28.5% (Table III.7). Non-workers were 28.7% of all members (Table III.8).

Table III.5: Details on Sex of Household Members (including heads) by Region: Tenants

Region		Sex		Total	Average Family Size
		1. Males	2. Females		
1. NCA	Absolutes	101	80	181	3.62
	Row %s	55.8	44.2	100	***
2. SCA	Absolutes	105	84	189	3.78
	Row %s	55.6	44.4	100	***
3. RS	Absolutes	122	115	237	4.74
	Row %s	51.5	48.5	100	***
4. NTS	Absolutes	97	87	184	3.68
	Row %s	52.7	47.3	100	***
5. STS	Absolutes	128	101	229	4.58
	Row %s	55.9	44.1	100	***
ALL	Absolutes	553	467	1020	4.08
	Row %s	54.2	45.8	100	***

Note: ***: Not Applicable (NA); NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.6: Household Members (including heads) Classified by Age-group by Region: Tenants

Region		Age-group					All
		Less than 6 yrs	6-17 yrs	18-24 yrs	25-60 yrs	Above 60 yrs	
1. NCA	Absolutes	9	31	12	115	14	181
	Row %s	5.0	17.1	6.6	63.5	7.7	100.0
2. SCA	Absolutes	11	34	18	114	12	189
	Row %s	5.8	18.0	9.5	60.3	6.3	100.0
3. RS	Absolutes	10	41	37	136	13	237
	Row %s	4.2	17.3	15.6	57.4	5.5	100.0
4. NTS	Absolutes	7	30	31	113	3	184
	Row %s	3.8	16.3	16.8	61.4	1.6	100.0
5. STS	Absolutes	7	53	26	139	4	229
	Row %s	3.1	23.1	11.4	60.7	1.7	100.0
ALL	Absolutes	44	189	124	617	46	1020
	Row %s	4.3	18.5	12.2	60.5	4.5	100.0

NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Table III.7: Classification of Household Members (including heads) by Education Status and Region: Tenants

Region		Education Status of Members					Total
		1. Illiterate	2. 5th or Less	6-10th Class	Inter	Others	
1. NCA	Absolutes	52	31	55	24	19	181
	Row %s	28.7	17.1	30.4	13.3	10.5	100.0
2. SCA	Absolutes	51	38	57	23	20	189
	Row %s	27.0	20.1	30.2	12.2	10.6	100.0
3. RS	Absolutes	59	44	56	42	36	237
	Row %s	24.9	18.6	23.6	17.7	15.2	100.0
4. NTS	Absolutes	57	23	44	39	21	184
	Row %s	31.0	12.5	23.9	21.2	11.4	100.0
5. STS	Absolutes	72	47	55	38	17	229
	Row %s	31.4	20.5	24.0	16.6	7.4	100.0
ALL	Absolutes	291	183	267	166	113	1020
	Row %s	28.5	17.9	26.2	16.3	11.1	100.0

NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.8: Classification of Household Members (including heads) by Work Status and Region: Tenants

Region		Work Status of Members		Total
		1. Worker	2. Non-Worker	
1. NCA	Absolutes	123	58	181
	Row %s	68.0	32.0	100.0
2. SCA	Absolutes	144	45	189
	Row %s	76.2	23.8	100.0
3. RS	Absolutes	173	64	237
	Row %s	73.0	27.0	100.0
4. NTS	Absolutes	122	62	184
	Row %s	66.3	33.7	100.0
5. STS	Absolutes	165	64	229
	Row %s	72.1	27.9	100.0
ALL	Absolutes	727	293	1020
	Row %s	71.3	28.7	100.0

NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

III.3.2. Land Base of Tenants:

Sample tenants leasing-in land, fall in to either of four categories, viz., pure tenants, owner-cum- tenants, tenant-cum-rent receivers, and owner-cum-tenant-cum-rent receivers. Pure tenants are those who do not have any land of their own but operate the land leased-in from others. They may lease-in land to elevate themselves on the agrarian ladder or may be to guarantee themselves of employment at least for a minimum number of days. Owner-cum-tenants operate some of their own land and some of the land leased-in from others. They may do so to make farming a viable enterprise for them. Tenant-cum-rent receivers fully lease-out whatever land they own, but lease-in land from others. They both lease-out and lease-in land at the same time. On their part, leasing-out may become necessary for the reason that the land is located far away from the place of their residence. Like wise, owner-cum-tenant-cum-rent receivers may be necessitated to lease- out for the reason that the land in question is located far away.

Table III.9: Tenants Classified by Tenure Status and by Region: Tenants

Region		Number of Tenants Reporting as:				All
		1. Pure Tenant	2. Owner Cum Tenant	3. Tenant Cum Rent Receiver	4. Owner Cum Tenant Cum RR	
1. NCA	Absolutes	13	37	0	0	50
	Row %s	26.0	74.0	0.0	0.0	100.0
2. SCA	Absolutes	21	24	2	3	50
	Row %s	42.0	48.0	4.0	6.0	100.0
3. RS	Absolutes	14	33	0	3	50
	Row %s	28.0	66.0	0.0	6.0	100.0
4. NTS	Absolutes	16	33	1	0	50
	Row %s	32.0	66.0	2.0	0.0	100.0
5. STS	Absolutes	4	46	0	0	50
	Row %s	8.0	92.0	0.0	0.0	100.0
ALL	Absolutes	68	173	3	6	250
	Row %s	27.2	69.2	1.2	2.4	100.0

Note: RR: Rent Receiver NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

In our sample bulk of the respondents were owner-cum-tenants. They constituted 69.2% of the total of 250 tenants. The demand-side explanation is that it was necessary for the marginal owners to lease-in land to make their holdings viable. On the supply-side, landlords preferred to lease-out their land to those owning some land to assure themselves of receiving rent with certainty. Those owning some land satisfy this urge to a greater extent than those not owning any land. In the sample, Pure tenants formed 27.2%. Tenant-cum-rent receivers and owner-cum- tenant-cum-rent receivers were few (Table III.9).

The total land operated by tenants of all types together amounted to 1275 acres. Of this, 29.6% was owned land, 71.7% was leased-in land and the rest 1.3% was land leased-out (Table III.10). Leased-in land as a percentage of land operated was arrived at by size-class of the operated area to understand the significance of leasing-in for different classes of tenants (Table III.11). It may be noted that the percentage, at 86.5%, was the highest for the above 10 acres size-class. For the marginal cultivators, the leased-in land formed 71.2% of the operated land. The figure corresponding to the small cultivators was 65.9%.

These figures signify the importance of the lease market in the livelihoods of the respondents.

Table III.10: Shares of Owned Land, Leased-in Land and Leased-out Land in Operated Land by Region: Tenants

Region		Total Land (acres)			
		Owned	Leased-in	Leased-out	Operated
1. NCA	Absolutes	31	52		83
	Row %s	37.3	62.7	0.0	***
2. SCA	Absolutes	45	277	11	311
	Row %s	14.5	89.1	3.5	***
3. RS	Absolutes	111	314	6	419
	Row %s	26.5	74.9	1.4	***
4. NTS	Absolutes	85	128		213
	Row %s	39.9	60.1	0.0	***
5. STS	Absolutes	104	143		248
	Row %s	41.9	57.7	0.0	***
ALL	Absolutes	378	914	17	1275
	Row %s	29.6	71.7	1.3	***

Note: ***: Not Applicable; NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Source: Field Survey

We arrived at the distribution of tenants and area operated by them based on the size-class of land operated (Table III.12). The tenants operating land area above 10 acres formed 6% of the total. The land operated by them formed 25.5% of the total operated land. Marginal and small tenants comprised the bulk of the sample tenants. This is the general condition in the survey villages. Marginal tenants, operating land up to 2.50 acres accounted for 28.4% of all tenants and the land operated by them was 9.3% of the total land operated. And, small tenants, with an operated area of 2.51 to 5.00 formed 41.6% and the land operated by them, 32.4%. It is, however, wrong to equate the small tenant of NCA or SCA with the small tenant of RS or STS, because the tenants of the former regions had at their command land that is irrigated and of good quality, whereas the tenants of the latter regions operated land with irrigation facilities of little consequence.

Table III.11: Share of Leased-in land in Operated Land by Size-class of Operated Land: Tenants

Region	SIZE-CLASS OF OPERATED LAND														
	Up to 2.50			2.51-5.00			5.01-10.00			Above 10.00			All classes		
	Area leased-in	Area operated	Leased-in as of % operated	Area leased-in	Area operated	Leased-in as of % operated	Area leased-in	Area operated	Leased-in as of % operated	Area leased-in	Area operated	Leased-in as of % operated	Area leased-in	Area operated	Leased-in as of % operated
	1	*2*	*3= (1/2)* 100*	*4*	*5*	*6= (4/6)* 100*	*7*	*8*	*9= (7/8)*100*	*10*	*11*	*12= (10/11)* 100*	*13*	*14*	*15= (13/14)* 100*
1. NCA	47	76	61.8	5	7	71.4	0.0	0.0	0.0	0.0	0.0	0.0	52	83	62.7
2. SCA	10	12	83.3	83	92	90.2	86	101	85.1	98	106	92.5	277	311	89.1
3. RS	2	2	100.0	59	92	64.1	88	128	68.8	165	196	84.2	314	419	74.9
4. NTS	22	26	84.6	42	67	62.7	46	98	46.9	18	23	78.3	128	213	60.1
5. STS	2	2	100.0	83	155	53.5	58	91	63.7	0.0	0.0	0.0	143	248	57.7
ALL	84	118	71.2	272	413	65.9	278	419	66.3	281	325	86.5	914	1275	71.7

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.12: Distribution of Tenants and Area Operated by them by Size-class of Operated Area (acres): Tenants

Region		Number of Households in the Size-class of Operated Area					Area Operated (acres) in the Size-class				
		Up to 2.50	2.51-5.00	5.01-10.00	Above 10.00	All classes	Up to 2.50	2.51-5.00	5.01-10.00	Above 10.00	All Classes
1. NCA	Absolutes	48	2	0	0	50	76	7	0.0	0.0	83
	Row %s	96.0	4.0	0.0	0.0	100.0	91.6	8.4	0.0	0.0	100.0
2. SCA	Absolutes	6	24	14	6	50	12	92	101	106	311
	Row %s	12.0	48.0	28.0	12.0	100.0	3.9	29.6	32.5	34.1	100.0
3. RS	Absolutes	1	23	19	7	50	2	92	128	196	419
	Row %s	2.0	46.0	38.0	14.0	100.0	0.5	22.0	30.5	46.8	100.0
4. NTS	Absolutes	15	18	15	2	50	26	67	98	23	213
	Row %s	30.0	36.0	30.0	4.0	100.0	12.2	31.5	46.0	10.8	100.0
5. STS	Absolutes	1	37	12	0	50	2	155	91	0.0	248
	Row %s	2.0	74.0	24.0	0.0	100.0	0.8	62.5	36.7	0.0	100.0
ALL	Absolutes	71	104	60	15	250	118	413	419	325	1275
	Row %s	28.4	41.6	24.0	6.0	100.0	9.3	32.4	32.9	25.5	100.0

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana
Source: Field Survey

We have arrived at the average area owned, leased-in, leased-out and operated by the respondents (Table III.13). The average area owned by those owning land worked out to be 2.1 acres. It was the lowest at 0.9 acres in NCA and highest at 3.1 acres in RS. The average extent leased-in by those leasing-in was 3.7 acres. The average was the lowest in NCA and the highest in RS. In SCA also the average extent leased-in was quite high. Next, the average area operated worked out to be 5.1 acres. The average operated land was the lowest in NCA and the highest in RS.

Table III.13: Average Size of Land by Tenure and Region: Tenants

Region		Average size of Land			
		Owned	Leased-in	Leased-out	Operated
1. NCA	Absolutes	0.9	1.0	0.0	1.7
2. SCA	Absolutes	1.6	5.5	2.8	6.2
3. RS	Absolutes	3.1	6.3	2.0	8.4
4. NTS	Absolutes	2.5	2.6	0.0	4.3
5. STS	Absolutes	2.3	2.9	0.0	5.0
ALL	Absolutes	2.1	3.7	2.4	5.1

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.14: Classification of Land in to Irrigated and Rain-fed by Tenure and Region: Tenants

Region		Owned land			Leased-in land			Operated land		
		Irrigated	Rain- fed	Total	Irrigated	Rain- fed	Total	Irrigated	Rain- fed	Total
1. NCA	Absolutes	25	6	31	50	2	52	75	8	83
	Row %s	80.6	19.4	100.0	96.2	3.8	100.0	90.4	9.6	100.0
2. SCA	Absolutes	45	0	45	277	0	277	311	0	311
	Row %s	100.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	100.0
3. RS	Absolutes	55	56	111	247	67	314	302	117	419
	Row %s	49.5	50.5	100.0	78.7	21.3	100.0	72.1	27.9	100.0
4. NTS	Absolutes	62	23	85	101	28	128	163	51	213
	Row %s	72.9	27.1	100.0	78.9	21.9	100.0	76.5	23.9	100.0
5. STS	Absolutes	0	104	104	0	143	143	0	248	248
	Row %s	0.0	100.0	100.0	0.0	100.0	100.0	0.0	100.0	100.0
ALL	Absolutes	187	191	378	675	239	914	851	424	1275
	Row %s	49.5	50.5	100.0	73.9	26.1	100.0	66.7	33.3	100.0

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.15: Classification of Land (in Acres) of Households by Source of Irrigation, Tenure and Region: Tenants

Region		Owned Land Irrigated Under				Leased-in Land Irrigated Under				Operated Land Irrigated Under			
		1.Canal	2.Tank	3.Well	4.Total	1.Canal	2.Tank	3.Well	4.Total	1.Canal	2.Tank	3.Well	4.Total
1. NCA	Absolutes	14.40	7.20	3.25	24.85	23.10	27.30	0	50.40	37.50	34.50	3.25	75.25
	Row %s	57.95	28.97	13.08	100.00	45.83	54.17	0.00	100.00	49.83	45.85	4.32	100.00
2. SCA	Absolutes	42.80	2.66	0	45.46	276.70	0	0	276.70	310.10	1.16	0	311.26
	Row %s	94.15	5.85	0.00	100.00	100.00	0.00	0.00	100.00	99.63	0.37	0.00	100.00
3. RS	Absolutes	0	0	55.00	55.00	0	0	247.00	247.00	0	0	302.00	302.00
	Row %s	0.00	0.00	100.00	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00	100.00
4. NTS	Absolutes	0	3.65	58.41	62.06	0	13.00	87.50	100.50	0	16.65	145.91	162.56
	Row %s	0.00	5.88	94.12	100.00	0.00	12.94	87.06	100.00	0.00	10.24	89.76	100.00
5. STS	Absolutes	0	0	0	0	0	0	0	0	0	0	0	0
	Row %s	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALL	Absolutes	57.20	13.51	116.66	187.37	299.80	40.30	334.50	674.60	347.60	52.31	451.16	851.07
	Row %s	30.53	7.21	62.26	100.00	44.44	5.97	49.58	100.00	40.84	6.15	53.01	100.00

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

As remarked above, averages conceal the true nature of the land and, therefore, it is important to consider the quality of land by distinguishing it into irrigated and rain-fed. All regions together, the owned land was half irrigated and half rain-fed. When it comes to leased-in land, 73.9% of it was irrigated. If we ignore STS (where the entire tenanted land was rain-fed), there was a strong preference to lease in irrigated land. To put it differently, irrigation seemed to prop up the lease market. In the case of operated land, 66.7% was irrigated and the rest 33.3% was rain-fed (Table III.14).

The risk and uncertainty associated with cultivation vary depending on whether the land is located in a rain-fed or an irrigated zone and also, within the irrigated zone, whether the land is irrigated under the canal, tank, or well/tube-well. As we will later on see, rental charges were conditioned by the source of irrigation. We have classified irrigated land by source of irrigation (Table III.15). Considering owned land, we find that well-irrigated land constituted the largest proportion of irrigated land with 62.26%. This source of irrigation was predominant in RS and NTS. Next, canal irrigated land formed 30.53% of all irrigated land owned. This was almost the only source of irrigation in SCA. In respect of leased-in land, it was again well irrigation which was found to be widespread. 49.58% of the land was irrigated under this source. Close on its heels was canal irrigation. This source accounted for 44.44% of irrigated land. In SCA, leased-in land was irrigated exclusively by this source.

III.4. Characteristics of Respondents: Owners

III.4.1. Social and Demographic Characteristics:

To facilitate comparison with tenants, 100 owner cultivators were administered a small questionnaire. They were selected at the rate of 10 per village from the 10 village clusters. Barring 4% each of Christians and Muslims, all were Hindus (Table III.16). As many as 65% of them belonged to OBCs. FCs among them were 20% and SCs 14% (Table III.17). Female headed households formed 5% of all owners. The average age of owners was 51 years (Table III.18). Illiterates among them were 35% and those with education up to 5th standard were 28.0%. Thus, a large majority of the respondents had little or no education. Those having intermediate or technical qualifications were 14% (Table III.19). All household heads were workers with a lone exception.

Table III.16: Classification of Households by Religion and Region: Owners

Region		Religion			Total
		Hindus	Christians	Muslims	
1. NCA	Absolutes	20	0	0	20
	Row %s	100	0	0	100
2. SCA	Absolutes	17	3	0	20
	Row %s	85	15	0	100
3. RS	Absolutes	16	0	4	20
	Row %s	80	0	20	100
4. NTS	Absolutes	19	1	0	20
	Row %s	95	5	0	100
5. STS	Absolutes	20	0	0	20
	Row %s	100	0	0	100
ALL	Absolutes	92	4	4	100
	Row %s	92	4	4	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.17: Classification of Households by Caste Category and Region: Owners

Region		Caste Category				Total
		FC	OBC	SC	ST	
1. NCA	Absolutes	0	20	0	0	20
	Row %s	0	100	0	0	100
2. SCA	Absolutes	3	9	8	0	20
	Row %s	15	45	40	0	100
3. RS	Absolutes	12	7	0	1	20
	Row %s	60	35	0	5	100
4. NTS	Absolutes	2	13	5	0	20
	Row %s	10	65	25	0	100
5. STS	Absolutes	3	16	1	0	20
	Row %s	15	80	5	0	100
ALL	Absolutes	20	65	14	1	100
	Row %s	20	65	14	1	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.18: Details on Sex and Average Age of Heads of Households by Region: Owners

Region		Sex		Total	Average age of head of HH
		1. Males	2. Females		
1. NCA	Absolutes	17	3	20	54
	Row %s	85	15	100	***
2. SCA	Absolutes	19	1	20	51
	Row %s	95	5	100	***
3. RS	Absolutes	20	0	20	53
	Row %s	100	0	100	***
4. NTS	Absolutes	19	1	20	48
	Row %s	95	5	100	***
5. STS	Absolutes	20	0	20	51
	Row %s	100	0	100	***
ALL	Absolutes	95	5	100	51
	Row %s	95	5	100	***

*Note:****: Not Applicable; NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

TableIII.19: Classification of Heads of Households by Education Status and Region: Owners

Region		Education Status					Total
		1) Illiterate	2) 5th Or Less	3) 6-10th Class	4) Inter	5) Others	
1. NCA	Absolutes	12.0	7.0	1.0	0.0	0.0	20
	Row %s	60.0	35.0	5.0	0.0	0.0	100
2. SCA	Absolutes	6.0	9.0	4.0	1.0	0.0	20
	Row %s	30.0	45.0	20.0	5.0	0.0	100
3. RS	Absolutes	2.0	6.0	7.0	3.0	2.0	20
	Row %s	10.0	30.0	35.0	15.0	10.0	100
4. NTS	Absolutes	6.0	2.0	6.0	5.0	1.0	20
	Row %s	30.0	10.0	30.0	25.0	5.0	100
5. STS	Absolutes	9.0	4.0	5.0	2.0	0.0	20
	Row %s	45.0	20.0	25.0	10.0	0.0	100
ALL	Absolutes	35.0	28.0	23.0	11.0	3.0	100
	Row %s	35.0	28.0	23.0	11.0	3.0	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS; North Telangana; STS: South Telangana

Source: Field Survey

Among household members, 52.3% were males and the rest females. The average family size of owners was 4.07 (Table III.20). 59.2% of the members were in the age-group 25-60 years.

Those above 60 years of age formed 9.3%. Children, less than 6 years accounted for 4.4% (Table III.21). Illiterates among the members were 29%, and those with education up to 5th standard or less were a further 22.4%. Thus, those with little or no education accounted for a little over 50%. Those with education up to intermediate formed 11.3% and technical education 15.2% (Table III.22). Non-workers constituted 32.2% of all members (Table III.23). Inter-region differences in social and demographic characteristics were few. Owner households were no different from tenant households.

Table III.20: Details on Sex of Household Members (including heads) by Region: Owners

Region		Sex		Total	Average family size
		1. Males	2. Females		
1. NCA	Absolutes	36	35	71	3.55
	Row %s	50.7	49.3	100	
2. SCA	Absolutes	44	36	80	4.00
	Row %s	55	45	100	
3. RS	Absolutes	51	50	101	5.05
	Row %s	50.5	49.5	100	
4. NTS	Absolutes	37	38	75	3.75
	Row %s	49.3	50.7	100	
5. STS	Absolutes	45	35	80	4.00
	Row %s	56.2	43.8	100	
ALL	Absolutes	213	194	407	4.07
	Row %s	52.3	47.7	100	

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.21: Household Members (including heads) Classified by Age-group by Region: Owners

Region		Age-group					All
		Less than 6	6-17 yrs	18-24 yrs	25-60 yrs	Above 60 yrs	
1. NCA	Absolutes	3	16	4	38	10	71
	Row %s	4.2	22.5	5.6	53.5	14.1	100
2. SCA	Absolutes	3	17	5	45	10	80
	Row %s	3.8	21.2	6.2	56.2	12.5	100
3. RS	Absolutes	6	14	13	60	8	101
	Row %s	5.9	13.9	12.9	59.4	7.9	100
4. NTS	Absolutes	5	7	13	42	8	75
	Row %s	6.7	9.3	17.3	56	10.7	100
5. STS	Absolutes	1	12	9	56	2	80
	Row %s	1.2	15	11.2	70	2.5	100
ALL	Absolutes	18	66	44	241	38	407
	Row %s	4.4	16.2	10.8	59.2	9.3	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

OWNERS - Table III.22: Classification of Household Members (including heads) by Education Status and Region

Region		Education Status of Members					Total
		1) Illiterate	2) 5th Or Less	3) 6-10th Class	4) Inter	5) Others	
1. NCA	Absolutes	27	17	16	4	7	71
	Row %s	38	23.9	22.5	5.6	9.9	100
2. SCA	Absolutes	22	31	19	3	5	80
	Row %s	27.5	38.8	23.8	3.8	6.2	100
3. RS	Absolutes	18	19	23	16	25	101
	Row %s	17.8	18.8	22.8	15.8	24.8	100
4. NTS	Absolutes	25	10	11	16	13	75
	Row %s	33.3	13.3	14.7	21.3	17.3	100
5. STS	Absolutes	26	14	21	7	12	80
	Row %s	32.5	17.5	26.2	8.8	15	100
ALL	Absolutes	118	91	90	46	62	407
	Row %s	29	22.4	22.1	11.3	15.2	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana; *Source:* Field Survey

Table III.23: Classification of Household Members (including heads) by Work Status and Region: Owners

Region		Work Status of Members		Total
		1. Worker	2. Non-worker	
1. NCA	Absolutes	48	23	71
	Row %s	67.6	32.4	100
2. SCA	Absolutes	51	29	80
	Row %s	63.8	36.2	100
3. RS	Absolutes	65	36	101
	Row %s	64.4	35.6	100
4. NTS	Absolutes	50	25	75
	Row %s	66.7	33.3	100
5. STS	Absolutes	62	18	80
	Row %s	77.5	22.5	100
ALL	Absolutes	276	131	407
	Row %s	67.8	32.2	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana; *Source:* Field Survey

Table III. 24: Classification of owned land into irrigated and rain-fed by region: Owners

Region		Owned land		Total Owned Land	Average Size (acres)
		Irrigated *1*	Rain-fed *2*	*3=1+2*	
1. NCA	Absolutes	28	13	41	2.05
	Row %s	68.29	31.71	100.00	***
2. SCA	Absolutes	41	0	41	2.05
	Row %s	100.00	0.00	100.00	***
3. RS	Absolutes	72	36	107	5.35
	Row %s	67.29	33.64	100.00	***
4. NTS	Absolutes	65	22	87	4.35
	Row %s	74.71	25.29	100.00	***
5. STS	Absolutes	0	51	51	2.55
	Row %s	0.00	100.00	100.00	***
ALL	Absolutes	206	121	327	3.27
	Row %s	63.00	37.00	100.00	***

*Note:****: Not Applicable (NA); NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana;

Source: Field Survey

III.4.2. Land Base of Owners:

The average size of land owned by the households was 3.27 acres. Thus, owners, in general, were of small size. In RS the size was the highest at 5.35 acres and it was the lowest in NCA and SCA each at 2.05 acres. The irrigated component of the owned land formed 63.00% of the total. In SCA the land was fully irrigated and in STS it was fully rain-fed (Table III.24). The the major source of irrigation to the owned land was wells, they provide irrigation to 66.50% of the land. Canals account for 24.76% of the land. The entire land in SCA was irrigated under canals, while all the land in RS and NTS was under wells (Table III.25). The distribution of owners and the area owned by them by size-class of owned land showed that the marginal owners with land up to 2.5 acres formed 51.0% of all owners and the area owned by them constituted 24.2% of owned land. The small cultivators in the size-class of 2.51-5.00 too were many at 37.0% and the land owned by them amounted to 43.7%. There were only two owners with land over 10 acres.

Table III. 25: Classification of Irrigated Owned Land by Source of Irrigation and by Region
Owners

Region		Owned Land (acres) Irrigated Under			Total Land Irrigated (acres)
		1. Canal	2. Tank	3. Well	
		1	*2*	*3*	*4 = 1+2+3*
1. NCA	Absolutes	9	18	1	28
	Row %s	32.14	64.29	3.57	100.00
2. SCA	Absolutes	41	0	0	41
	Row %s	100.00	0.00	0.00	100.00
3. RS	Absolutes	0	0	72	72
	Row %s	0.00	0.00	100.00	100.00
4. NTS	Absolutes	0	0	65	65
	Row %s	0.00	0.00	100.00	100.00
5. STS	Absolutes	0	0	0	0
	Row %s	0.00	0.00	0.00	0.00
ALL	Absolutes	51	18	137	206
	Row %s	24.76	8.74	66.50	100.00

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table III.26: Number of Households and Area owned by Size-class of owned Area (acres): Owners

Region		Number of Households in the Size-class of owned area					Area owned (acres) in the Size-class				
		Up to 2.50	2.51-5.00	5.01-10.00	Above 10.00	All classes	Up to 2.50	2.51-5.00	5.01-10.00	Above 10.00	All Classes
1. NCA	Absolutes	15	4	1	0	20	21	14	6		41
	Row %s	75.0	20.0	5.0	0.0	100	51.2	34.1	14.6	0.0	100
2. SCA	Absolutes	15	4	1	0	20	18	17	6		41
	Row %s	75.0	20.0	5.0	0.0	100	43.9	41.5	14.6	0.0	100
3. RS	Absolutes	4	11	4	1	20	7	44	26	30	107
	Row %s	20.0	55.0	20.0	5.0	100	6.5	41.1	24.3	28.0	100
4. NTS	Absolutes	6	9	4	1	20	12	37	24	14	87
	Row %s	30.0	45.0	20.0	5.0	100	13.8	42.5	27.6	16.1	100
5. STS	Absolutes	11	9	0	0	20	20	31			51
	Row %s	55.0	45.0	0.0	0.0	100	39.2	60.8	0.0	0.0	100
ALL	Absolutes	51	37	10	2	100	79	143	62	44	327
	Row %s	51.0	37.0	10.0	2.0	100	24.2	43.7	19.0	13.5	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

The analysis above clearly brings out the fact that both tenants and owners that figured in the sample were, by and large, of the same social and economic status. So whatever differences that we may observe in the efficiency of use of the land operated by them should be attributed to tenure category they belonged.

Section – IV

Climate Change and Contractual Terms of Tenancy

IV.1. Introduction

A comparison of the conditions presently obtaining in irrigated areas of the study regions with those in rain-fed areas is attempted here to address the question of the impact of climate change on contractual terms of tenancy. How do the tenants of the two areas fare? What is the rental burden on the land leased-in by them – is it relatively higher in the irrigated zone than in rain-fed zone and how does it relate in each zone, across different sources of irrigation and alternative tenurial forms, viz., fixed kind rent (FKR), fixed cash rent and sharecropping? Is the fixed cash rent, which is now the most preferred form of tenancy, also the most exploitative? Or is it that landlords trade lower shares of rent for assured receipts of rent, as are possible under fixed cash rent? Here we test the hypothesis whether the risk associated with climate change impinges upon the operation of market forces to the disadvantage of tenants.

IV.2. Contractual Terms of Tenancy

These include terms mutually agreed upon by the landlord and the tenant before the land is contracted for lease. These may pertain to form of tenancy, rent payable both when the harvest is normal and when it is not, duration of the lease, mutual shares in cultivation costs, credit support (both formal and informal), labour rent, sale of produce, eviction clauses, etc. All these terms and conditions may find a place in a written lease contract or an oral agreement. While some of these terms may be given in the context of a village, others may be agreed upon mutually by the two parties of the lease contract. The relative bargaining strength of the landlord and his tenant may shape the onerous nature or otherwise of the contract.

Conditions peculiar to a village usually shape the form of tenancy. Unless there is a substantive change in these conditions, the form is unlikely to alter. We noticed that there had indeed been such a change in one of the villages of NCA that altered the form of tenancy in recent decades. Here, the onset of irrigation led to a change in the form from FKR to sharecropping. Contrary to received theory, reduced risk in cultivation

had caused this shift away from fixed rent. A movement away from FKR and sharecropping to fixed cash rent was noticed, in recent decades, in both the villages of NTS, not least because the ownership of land in the villages had passed on into the hands of non-residents. This is in line with what one observes from NSS data.

In united AP, the government took the initiative to confer credit and other benefits to tenants under the Land Licensed Cultivators Act 2011. It facilitated the flow of institutional credit to tenants with Loan Eligibility Cards (LECs). The initiative helped to register tenancies in a limited way, in the initial years but petered out later and to this day oral leases are the order of the day. With oral leases, it is next to impossible to devise institutional mechanisms to safeguard the interests of tenants. When crops fail, tenants are usually left to the mercy of landlords. However, informal pacts were slowly taking place between landlords and their beleaguered tenants, often with the intervention of village leaders, that reduced the rental burden at times when crops fail. Also, absentee landlords, either out of benevolence or out of helplessness were accepting rents that were less than those contracted when crop yields were less than normal. These instances were widely reported in our survey of RS and NTS regions.

Meanwhile, the Government of Telangana launched a scheme called *Rythu Bandhu* in 2018-19. Under the scheme, the government presently provides investment support of Rs. 10,000 per acre per year (only Rs.8,000 to begin with) to farmers in NTS and STS regions. The scheme reached 50.88 lakh farmers in Kharif 2018. In Rabi 2018-19 and Kharif 2019, it reached 49.03 lakh and 44.92 lakh farmers respectively. The scheme does not envisage to extend the benefit to the tenants covered under oral leases. Yet, the scheme was found in our field survey to be benefiting them inadvertently. The knowledge that landowners get investment support from the government was enabling the tenants to pressurise their landlords to accede to rents lower than before. These pressures were bearing fruit and the rental burden of tenants was now found to be less than before in Telangana. This has nothing to do with climate change, however. But we know of instances where tenant farmers of NTS, especially those belonging to SC community, successfully bargained for a reduction in their rents payable to non-resident landlords following crop failure.

The farmers of the AP state now have the benefit of YSR *Rythu Bharosa* scheme. The scheme was launched on 15th October 2019 and it envisages to provide financial assistance of Rs. 13,500 per year to landless tenants belonging to SC, ST, BC and minority categories

(in three instalments). The benefit of the scheme is yet to percolate downwards. Earlier on the state government passed 'The Andhra Pradesh Crop Cultivator Rights Act, 2019' to provide bank loans, insurance and other benefits to tenant farmers without affecting the rights of the owners of the land. Under the Act, Certificates of Cultivation (CoC) are issued with the mutual agreement of the landowner and his tenant. The CoC would be in force for 11 months, and they entitle tenant farmers to avail bank finance. The Act came in to force from 17th August 2019. Next, 'The Andhra Pradesh Land Licensed Cultivators Act, 2019' provides for the issue of Loan Eligibility Cards (LECs) to land licensed cultivators (tenant farmers). During 2019-20, an amount of Rs.548.70 crores was disbursed under crop loans to 1,33,414 LEC holders, and an amount of Rs.148.04 Crores was disbursed to 36,581 farmers with CoC. The policy interventions in AP have not reduced the contracted rents of the tenants of NCA, SCA and RS regions but have increased their access to institutional credit. Whether they have occasioned friction in landlord-tenant relations is not known. But as noted above we know of incidents where local leaders in the RS region successfully mediated to reduce the rental burden of tenants when crop yields were less than normal due to climate change.

Table IV.1: Household Heads Classified by the Number of Years they are Cultivating the Land of the Same Landlord: Only LL1

Region		Number of tenants cultivating the land of LL1 for a period of			All
		1-2 yrs	3-5 yrs	6 or more yrs	
1. NCA	Absolutes	1	28	21	50
	Row %s	2	56	42	100
2. SCA	Absolutes	3	22	25	50
	Row %s	6	44	50	100
3. RS	Absolutes	1	22	27	50
	Row %s	2	44	54	100
4. NTS	Absolutes	21	17	12	50
	Row %s	42	34	24	100
5. STS	Absolutes	0	20	30	50
	Row %s	0	40	60	100
ALL	Absolutes	26	109	115	250
	Row %s	10.4	43.6	46	100

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS:North Telangana; STS: South Telangana

Source: Field Survey

Should there be friction in landlord-tenant relations, the duration of leases would be short. Long duration leases would be a sign of cordial relations. Climate change should ideally occasion leases of long duration. If tenants are to recoup crop losses in one season with better than normal yields in others the duration of leases has to be long. Our village survey data is revealing. As many as 46.0% of the sample tenants were reportedly cultivating the land of the same landlord for 6 years or more. Those operating the land between 3 and 5 years formed 43.6%. Tenants who leased-in their tenanted land in the last 1 or 2 years accounted for only 10.4%. Long duration leases were common in all the regions of the study (Table IV.1). On average, the duration of lease worked to be 6.2 years. This was so notwithstanding the tenancy laws of Telangana and AP (The AP Tenancy Act of 1956 was annulled recently) which make it very difficult for a landlord to evict his tenant once the duration of lease extends beyond 5 years. We need however to add a rider here: the landlords and their tenants were not bound by written contracts but by oral leases and hence the latter could be evicted any time from the land.

Two factors contribute to a rise in the significance of fixed cash rent tenancy in the era of climate change. One of them is the size of the land owned by landlords and the other is the place of their residence. As the size of holding of landlord decreases, his urge to receive rent from the tenant without fail increases. A small landlord would be induced to opt for fixed cash rent tenancy. The landlord's choice of this rental form would, besides guaranteeing him the receipt of a fixed sum of money every year (which he cherishes because of his limited wealth), would also free him of the market risk associated with selling the produce received as rent under sharecropping or FKR. Next, the non-resident landlords too would welcome fixed cash rent tenancy for the same reasons. Moreover, the small and non-resident landlords would usually want to avoid the necessity of supervising their tenants, necessary under sharecropping, should they opt for it. They may not hesitate even to trade lower rents for secure receipt of rents.

For the tenant, crop sharing arrangement is ideal in the era of climate change. This is particularly so if he is of small size. He could share the risk of farming with the landlord. And, he would be assured of credit support from the landlord, as sharecropping usually involves sharing of production costs between the two parties of the lease contract. Presently, sharecropping is not seen as an institutional arrangement that paves way for exploitation of the tenant by his landlord. To repeat, a small tenant, if he has the option, would prefer sharecropping. But he may not have the option in the first place. It is the

landlord who chooses the rental form, and he usually prefers fixed cash rent in a scenario marked by risk and uncertainty.

We have seen earlier on that the tenants, barring a couple of exceptions in SCA and RS, are largely small cultivators across the regions of study. It is therefore likely that their bargaining strength is weak. But what about the capacity of landlords to enforce tenurial contracts. Our survey data reveals that landlords too were generally of small size in both the irrigated zone and the rain-fed zone (Table IV.2). On average, the land owned by them was 6.8 acres and 4.8 acres in the two zones respectively. Only in the irrigated tracts of RS, and to an extent in SCA their average landholding was large, because of the presence of a couple of large landlords. Their residence status shows that 24% of them were non-residents, living mostly in urban parts of the regions (Table IV.3). So, we may conclude that the landlords, though better placed relative to their tenants, were not exceptionally of high economic status to dictate terms in the lease market. They had lost control over the credit market, thanks to government policies. They were not big landholders wishing to gain control over the labour market and extract labour rent.

Table IV.2: Landlord's Owned Land

Region		Landlord's owned land (acres): Irrigated Zone			Landlord's (LL1) owned land (acres): Rain-fed Zone		
		Total land owned	No. of persons	Average per person	Total land owned	No. of persons	Average per person
		1	2	3 = 1/2	1	2	3 = 1/2
1. NCA	Absolutes	140	50	2.8	3	1	3.0
2. SCA	Absolutes	432	50	8.6	0	0	0.0
3. RS	Absolutes	395	25	15.8	66.5	25	2.7
4. NTS	Absolutes	186	45	4.1	45.5	8	5.7
5. STS	Absolutes	0	0	0.0	287.5	50	5.8
ALL	**Absolutes**	**1152**	**170**	**6.8**	**399.5**	**84**	**4.8**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table IV.3: Landlords Classified by Residence Status: Irrigated + Rain-fed

Region		Landlord's Residence		
		Resident	**Non-resident**	**Total**
1. NCA	Absolutes	45	5	50
	Row %s	90	10	100
2. SCA	Absolutes	35	15	50
	Row %s	70	30	100
3. RS	Absolutes	29	21	50
	Row %s	58	42	100
4. NTS	Absolutes	31	19	50
	Row %s	62	38	100
5. STS	Absolutes	50	0	50
	Row %s	100	0	100
ALL	**Absolutes**	**190**	**60**	**250**
	Row %s	**76**	**24**	**100**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Farming has never been an enterprise to be cherished and it is more so now. Not everybody would practice it. Leasing-in land in the era of climate change is risky and those without an option only would venture to do so. Such of those persons, as we have seen are economically as also socially weak. There are limits to exploiting them. On the other hand, some would like to lease-out, because, one, farming as said is not rewarding, two, have no option but to lease-out, as they are traditionally away from cultivation, have no inclination to operate land, or are distantly located from the land. But there are few takers. In this scenario, competitive forces may dictate that the landlords have to offer attractive terms to induce prospective tenants to lease-in land. The conditions necessitate that the landlords trade between guaranteed rental receipts and low rents. They have to strike a balance between the two. This necessitates that landlords settle for cash rents that are less burdensome to tenants.

IV.3. Climate Change and the Growing Significance of Cash Rents

The sample villages were so selected as to represent all forms of tenancy. The predominant tenurial forms of the villages as they appeared from the Focus Group Discussion (FGDs)

may be noted. Thus, the predominant form of tenancy in the two villages of the NCA region was sharecropping. The first of the two villages had canal irrigation, and the second had tank irrigation. While fixed kind rent prevailed in one of the two villages of SCA, fixed cash rent was prevalent in the other. Both villages in the zone had the benefit of canal irrigation. One of the two villages of RS was rain-fed and the other was serviced by wells/tube-wells. In both the villages of the region fixed cash rent governed the lease contracts. Wells/tube-wells constituted the source of irrigation in the two villages of NTS. The tenurial form differed as between the two villages; thus, in one village fixed cash rent was prominent and in the other sharecropping. Lastly, the villages of STS were both rain-fed but differed as to the tenurial form present. Leases in one village were exclusively governed by sharecropping, while in the other fixed cash rent was the principal form of tenancy. On scrutiny, we find that all three tenurial forms could be found in the irrigated zone and fixed cash rent and sharecropping could be noticed in the rain-fed zone. There was no pattern whatsoever. The broad conclusion is that all three tenurial forms could be found in irrigated areas as also in rain-fed areas (Table IV.4).

Table IV.4. Number of Tenants under Different Forms of Tenure by Region

Region	Villag ecode	Whether predominantly irrigated/rain-fed	If irrigated, source of irrigation	Fixed Kind Rent	Fixed Cash Rent	Share-cropping
1. NCA	1	Irrigated	Canal	0	0	25
	2	Irrigated	Tank	2	0	23
2. SCA	1	Irrigated	Canal	25	0	0
	2	Irrigated	Canal	0	25	0
3. RS	1	Rain-fed		0	25	0
	2	Irrigated	Well/tube well	0	25	0
4. NTS	1	Irrigated	Well/tube well	2	23	0
	2	Irrigated	Well/tube well	4	3	18
5. STS	1	Rain-fed		0	0	25
	2	Rain-fed		2	23	0
ALL				**35**	**124**	**91**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

The observed co-existence of the three forms of tenancy negates the conclusion reached in earlier studies that sharecropping would be found in areas of relative uncertainty. It also runs counter to the finding arrived at in some other studies that sharecropping would be found in areas of relative certainty. This observation goes to support the contention that traditions and conventions, more than economic factors, dictate the form of tenancy opted in a village. What must not go unsaid, however, is that FKR tenancy has been on the wane and fixed cash rent tenancy has been gaining ground in the circumstances characterised by climate change. As argued above, this must be attributed to the desire of landlords for the security of rental receipts. The observed shift in the ownership base of land from villagers to urban dwellers may also be a reason for the increased significance of cash rents.

IV.4. Rental Burden under Alternative Forms of Tenancy

The increased significance of cash rents may compound the difficulties of tenants for, under this tenurial form, rent sometimes has to be paid in advance, at the time of entering into the lease contract, and there is no way that the tenant could share the cultivation risk and the market risk with the landlord. There would be some solace to the cash rent tenant if this rental form proves, as is usually argued, more efficient than other forms of tenancy and, equally important if the rental burden under this rental form is less than under other forms. Ideally, cash rent tenants should be paid a premium for the extra risk they bear. But, do they get paid? We examine the validity of this proposition considering the irrigated land and the rain-fed land separately. If the cash rent tenants are found to be bearing less rental burden than the tenants under other forms, we may attribute it to climate change.

IV.4.1. Rents on Irrigated Land:

A methodological note is in order. As noted above, all three tenurial forms co-exist on irrigated land. To facilitate comparison of the rental burden on the tenants operating under the three principal forms of tenancy, we need to express the annual rent payable by them as a percentage of the output of the year. In a context where different crops are grown on the land under lease, and given the need to facilitate comparisons across alternative tenures, we need to convert the physical units in to value terms before arriving at the percentage. We have done so.

The farm harvest prices were employed to arrive at the value of annual rent payable and value of output on land under lease. Thus, for example, the value of the output of paddy of Kharif 2018/Rabi 2019 of a farmer was derived by multiplying his paddy output of the season with the farm harvest price of paddy of Kharif 2018/Rabi 2019. A similar exercise was carried out to arrive at the value of rent payable. To repeat, it is necessary to arrive at the total value of rent payable and the total value of the output of both seasons combined, for it is the annual rental burden of a tenant that is relevant. Since FKR and rent under sharecropping was payable twice a year, we arrived at the value of annual rent payable as a percentage of the value of the output of the year. We have not made any attempt to arrive at the costs of cultivation and the farm business income of the tenants.

Table IV.5: Fixed Kind Rent (FKR) Payable by Tenants: Irrigated Land

Region		Kharif				Rabi		Kharif + Rabi	
		Number reporting	Extent leased-in under FK	Total Rrent (in quintals)	Avg. rent per acre (in quintal)	Total rent (in quintals)	Avg. rent per acre (in quintal)	Total rent (in quintals)	Avg. rent per acre (in quintal)
		1	*2*	*3*	*4=3/2*	*5*	*6=5/2*	*7=3+5*	*8=7/2*
NCA	Absolutes								
SCA	Absolutes	25	164.7	1479.4	9.0	1502.5	9.1	2981.9	18.1
RS	Absolutes								
NTS	Absolutes	6	14.0	87.8	6.3	75.5	5.4	163.3	11.7
STS	Absolutes								
Total	**Absolutes**	**31**	**178.7**	**1567.1**	**8.8**	**1577.9**	**8.8**	**3145.0**	**17.6**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Kind rent governed the leases of all the 25 sample tenants of one of the villages of SCA and 6 sample tenants in the two villages of NTS. The entire land in SCA village was irrigated under the most dependable canals whereas the land of the 6 tenants of NTS was irrigated under a less reliable tube-well irrigation. So, the cultivation risk for the tenant was more in NTS than in SCA. Paddy was the crop grown in both regions. Kind rent was payable in both Kharif and Rabi seasons in both the settings and the rent per acre was more in NTS villages than in the village of SCA. The rent in Kharif and Rabi

together worked to 18.1 and 11.7 quintals of paddy respectively in the two village settings. We have arrived at the value of rent payable as a percentage of the value of output derived from the land and it was 34.3% in SCA and 28.0% in NTS (Tables IV.5 and 6). Thus, the rent was more in the region subjected to less climate risk and was less in the region facing relatively more of the risk. Competitive forces seemed to ensure that the rental burden was more/less in the region characterised by less/more climate risk.

Table IV.6: Value of Fixed Kind Rent (FKR) Payable by Tenants: Irrigated Land: Kharif + Rabi

Region		Extent leased-in in Kharif under FKR	Total value of rent payable to LL per year (K+R)	Avg. value of rent payable to LL per acre per year (K+R)	Total value of output per year (K+R) on land under FKR	Value of rent payable to LL as a% of value of output
		1	*2*	*3 = 2/1*	*4*	*5 = (2/4)*100*
1. NCA	Absolutes					
2. SCA	Absolutes	164.7	4968068	30164	14490973	34.3
3. RS	Absolutes					
4. NTS	Absolutes	14.0	272272	19448	973235	28.0
5. STS	Absolutes					
ALL	**Absolutes**	**178.7**	**5240340**	**29325**	**15464207**	**33.9**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Cash rent was prevalent one each in the villages of SCA, RS and NTS. Although there were a few cases where the rent was partly paid in advance of harvest, usually it was payable after harvest. On average, the rent in Kharif and Rabi together amounted to Rs. 16,511 in SCA with the more dependable canal irrigation and Rs. 19,374 and Rs. 8674 in RS and NTS, both with less dependable tube-well irrigation. The rental proportion in the total value of output was 27.3%, 20.5% and 14.2% respectively in SCA, RS and NTS. Rental share payable to the landlord was, therefore, the highest of the three regions in SCA, the region with the most dependable canal irrigation. The difference in the rental share between RS and NTS is difficult to explain (Table IV.7).

Sharecropping was found to be the rental form in both the villages of NCA and in one

of the two villages of NTS. Both the Kharif and Rabi crops combined, the rental shares of the tenant and the landlord were 55:45 and 49:51 in the two regions (Table IV.8). As is usually the case under sharecropping arrangements, some of the costs were also shared by the landlord. The costs associated with ploughing, fertiliser, pesticides, and transport (where sugarcane was grown) were generally found to be shared. We enquired with the tenants as to the amount contributed by landlords in the process of cost-sharing. We have accounted for this to facilitate comparison of rents across tenures.

Table IV.7: Value of Fixed Cash Rent (FCR) Payable by Tenants: Irrigated Land: Kharif + Rabi

Region		Number reporting	Extent leased-in under FCR	Total cash rent payable to LL by tenants K + R	Avg. rent payable per acre per year	Total value of output per year on land under FCR (K+R)	Cash rent payable to LL by tenants as a% of value of output	Value of output retained by tenants (after paying rent to LL) as a % of value of output
		1	*2*	*3*	*4 = 3/2*	*5*	*6 =(3/5)*100*	*7 =100 - 6*
1. NCA	Absolutes							
2. SCA	Absolutes	25	112	1849200	16511	6775946	27.3	72.7
3. RS	Absolutes	25	222	4301000	19374	20979541	20.5	79.5
4. NTS	Absolutes	19	47.5	412000	8674	2892117	14.2	85.8
5. STS	Absolutes							
ALL	**Absolutes**	**69**	**381.5**	**6562200**	**17201**	**30647604**	**21.4**	**78.6**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Before calculating the share of rent in the total value of output going to the landlord, we deducted this amount from the value of output going as his share of the rent (in other words, this amount was added on to the value of output retained by the tenant while sharing his output with the landlord). The rental shares of the tenant and the landlord, after accounting for the cost shares were 61.8:38.2 and 62.7:37.3 in NCA and NTS respectively (Table IV.9). The shares going to the tenant were about the same in the two

Table IV.8: Rent Payable under Sharecropping: Irrigated Land: Kharif, Rabi & Kharif + Rabi

Region	Number Reporting	Extent leased-in under sharecrop	Total value of output retained by tenant as part of his rental share			Total value of output on sharecropped land			Value of output retained by tenant as part of his rental share a % of total value ofoutput		
			Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R
1. NCA	48	49	811457	235184	1046641	1455465	442843	1898307	56	53	55
2. SCA											
3. RS											
4. NTS	17	38	575063	450323	1025386	1079667	821167	2077435	53	55	49
5. STS											
ALL	**65**	**87**	**1386519**	**685507**	**2072026**	**2535131**	**1264010**	**3975742**	**55**	**54**	**52**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table IV.9: Rent Payable under Sharecropping After Accounting for Cost Sharing By Landlords: Irrigated Land: Kharif, Rabi & Kharif + Rabi

Region	Total value of output retained by Tenant as part of his rental share + costs borne by LL			Total Value of Output on Sharecropped Land			Value of Output Retained by Tenant plus costs borne by LL as a % of Total Value of Output			Value of output accruing to LL (after deducting the costs borne by him) as a % of total value ofoutput		
	Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R
	1	*2*	*3*	*4*	*5*	*6*	*7 =(1/4)* 100*	*8 = (2/5)* 100*	*9 = (3/6)* 100*	*10 = 100 - 7*	*11 =100 - 8*	*12 =100 - 9*
1. NCA	937457	236355	1173812	1455465	442843	1898307	64.4	53.4	61.8	35.6	46.6	38.2
2. SCA												
3. RS												
4. NTS	765063	537323	1302386	1079667	821167	2077435	70.9	65.4	62.7	29.1	34.6	37.3
5. STS												
ALL	1702519	773678	2476197	2535131	1264010	3975742	67.2	61.2	62.3	32.8	38.8	37.7

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

settings, even though the risk associated with cultivation was more in the well-irrigated NTS compared to the canal (and partly tank) irrigated NCA. This is to be expected because the risk of cultivation was already shared by the landlord under the sharecropping arrangement.

We have seen above that the rental share accruing to the landlord was less in regions where the tenant had to contend with more climate risk – as reflected by the source of irrigation, and vice- versa under each of the three forms of tenure. We have argued that this may have to do with the free play of market forces.

We may now examine if a landlord's share of rent is related to climate risk as reflected by rental form. More specifically, we assessed whether the rental share of a landlord was the least where the tenant had to endure the most risk as under fixed cash rent and the highest where the tenant faced the least risk as was the case with sharecropping. Do market forces aid in ensuring this pattern that is to the advantage of the tenant? Our survey data provides consistent support to this proposition (Table IV.5). Thus, all regions combined, rental share in the value of output was the least at 21.4% under cash rent and the highest at 37.7% under sharecropping. The share was mid- way between these two extremes under kind rent at 33.9%.

Table IV.10: Average Rental Shares (%) of Landlords in Total Value of Output (Kharif 2018 + Rabi 2019) : Irrigated Land

Region	Fixed Kind Rent		Fixed Cash Rent		Sharecropping	
	No. of tenants	Rental share	No. of tenants	Rental share	No. of tenants	Rental share
1. NCA	0	0	0	0	48	38.2
2. SCA	25	34.3	25	27.3	0	0
3. RS	0	0	25	20.5	0	0
4. NTS	6	28.0	19	14.2	17	37.3
5. STS	0	0	0	0	0	0
ALL	**31**	**33.9**	**69**	**21.4**	**65**	**37.7**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana;

Source: Field Survey

Even the rental shares under different tenurial forms obtaining in individual regions were consistent enough to support the pattern observed at the level of 'all regions.' For example, in SCA, where both kind rent and cash rents prevailed, the rental share was lower under the latter form (at 27.3%) than under the former (at 34.3%). Next, in the NTS region, where all three tenures co-exist, the rental share was the lowest (at 14.2%) under cash rent, and the highest (at 37.3%) under sharecropping with the share under kind rent falling mid-way (at 28.0%) (Table IV.10). It seems that where it was uppermost in the minds of landlords to receive rents with certainty, they opted for cash rents. But there was a cost associated with their choice, as they had to settle for relatively low rents in the bargain. Competitive forces seemed to aid the tenant from getting too much exposed to climate risk – they worked to the advantage of the tenant.

Table IV.10A. Average Rental Payable to Landlords per Acre per Year (in Rs): Irrigated Land

Region	Fixed Kind Rent		Fixed Cash Rent		Sharecropping	
	No. of tenants	Rent payable	No. of tenants	Rental payable	No. of tenants	Rental payable
1. NCA	0	0	0	0	48	14,666
2. SCA	25	30,164	25	16,511	0	0
3. RS	0	0	25	19,374	0	0
4. NTS	6	19,448	19	8,674	17	20,396
5. STS	0	0	0	0	0	0
ALL	**31**	**29,325**	**69**	**17,201**	**65**	**17,157**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Source: Field Survey

In the above, we worked with the landlord's share of rent in the total value of output to assess the rental burden. It is also possible to reflect upon the burden by looking at the value of rent payable to the landlord per acre per year. To arrive at the value of the rent in rupees, we converted the rent payable in kind into value terms by using the farm harvest prices. In respect of cash rent, the rental values were readily available. Under sharecropping, the rental share payable to the landlord was converted into value terms considering the value of output derived on the sharecropped land. The necessary

deduction was made from the value of rent to account for the costs borne by the landlord as part of the sharecropping arrangement. All the regions combined the rent payable was found to be about the same under sharecropping (Rs. 17,157 per acre per year) and the fixed cash rent (Rs. 17,201). The value of rent under a fixed kind rental form was much higher (at Rs. 29,325) than under the other two tenures (Table IV. 10A). As per the view propounded above, the rental value under sharecropping should be the highest among the three tenures for the rent to be systematically related to risk. But it was not so. Note, however, that this is a less precise way of measuring the rental burden in comparisons across regions and across tenures.

IV.4.2. Rents on Rain-fed Land:

Fixed rent in kind had a negligible presence in respect of rain-fed land. So, we ignore it in the analysis here in this section. Fixed cash rent could be found in three regions, in RS, NTS and STS. Cash rent as a proportion of the total value of output payable to landlords formed 18.6%, 19.3% and 32.0% in the three regions respectively. All three regions combined, the proportion was 23.3% (Table IV.11). The rent prevailing in STS should be considered very high by any standard and it was higher than that dictated by tenancy law of Telangana area.

Sharecropping was found in a village of STS. A couple of instances of the presence of sharecropping could be found in other regions. The model rental share in the village of its significant presence was 50:50 with cost-sharing. After accounting for the costs borne by landlords the share in the village worked to 35.4:64.6 in favour of tenants (Tables IV.12 and 13).

A comparison of rental shares between cash rent tenancy and sharecropping is rewarding. As before, we tested the hypothesis that market forces worked to the advantage of the tenant. Did the landlord satisfy himself with a lower share of rent when he shifted the entire risk of cultivation and market risk to the tenant, as under cash rent tenancy than when he bore part of the risk, as under sharecropping? Did he trade a lower rental share for assured receipt of rent? Our data show that the landlord's rental share, all regions combined, was 36.4% under sharecropping and 23.3% under cash rent. If we separately consider the STS region, where both the rental forms were present, rent under sharecropping was higher (35.4%), though by a small margin, than under cash rent (32.0%) (Table IV.14). We thus accept the hypothesis that market forces worked to the advantage of the tenant.

Table IV.11: Value of Fixed Cash Rent (FCR) Payable by Tenants: Rain-Fed Land: Kharif + Rabi

Region		Number reporting	Extent leased- in under FCR	Total cash rent payable to LL by tenants K + R	Avg. rent payable per acre per year	Total value of output per year on land under FCR (K+R) to LL) as a %	Cash rent payable to LL by tenants as a% of value of output	Value of output retained by tenants (after paying rent of value of output
		1	*2*	*3*	*4 = 3/2*	*5*	*6 = (3/5)*100*	*7 = 100 - 6*
1. NCA	Absolutes							
2. SCA	Absolutes							
3. RS	Absolutes	25	68.5	177500	2591.2	956341.7	18.6	81.4
4. NTS	Absolutes	10	24.5	175000	7142.9	906477.4	19.3	80.7
5. STS	Absolutes	23	71.3	299200	4196.4	934202.0	32.0	68.0
ALL	**Absolutes**	**58**	**164.3**	**651700**	**3966.5**	**2797021.1**	**23.3**	**76.7**

Note:NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Source: Field Survey

Table IV.12: Rent Payable under Sharecropping: Rain-fed Land: Kharif, Rabi & Kharif + Rabi

Region	Number Reporting	Extent leased-in under sharecroping	Total value of output retained by tenant as part of his rental share			Total value of output on sharecropped land			Value of output retained by tenant as part of his rental share a % of total value ofoutput		
			Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9= (3/6)* 100*	*10= (4/7)* 100*	*11=(5/8)* 100*
1. NCA	1	1	26468	2844	29312	37811	4062	41874	70.0	70.0	70.0
2. SCA											
3. RS											
4. NTS	1	3	66390	71318	137707	132779	142635	275414	50.0	50.0	50.0
5. STS	25	66	1005783		1005783	2011566	.	2011566	50.0		50.0
ALL	**27**	**70**	**1098641**	**74161**	**1172802**	**2182157**	**146698**	**2328854**	**50.3**	**50.6**	**50.4**

Note:NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana

Source: Field Survey

Table IV.13: Rent Payable under Sharecropping after Accounting for Cost Sharing by Landlords: Rain-fed Land - Kharif, Rabi & Kharif + Rabi

Region	Total value of output retained by Tenant as part of his rental share + costs borne by LL			Total Value of Output on Sharecropped Land			Value of Output Retained by Tenant plus costs borne by LL as a % of Total Value of Output			Value of output accruing to LL (after deducting the costs borne by him) as a % of total value ofoutput		
	Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R	Kharif	Rabi	K + R
	1	*2*	*3*	*4*	*5*	*6*	*7 = (1/4)* 100*	*8 = (2/5)* 100*	*9 = (3/6)* 100*	*10 =100 - 7*	*11 =100 - 8*	*12 =100 - 9*
1. NCA	26468	2844	29312	37811	4062	41874	70.0	70.0	70.0	30.0	30.0	30.0
2. SCA												
3. RS												
4. NTS	81390	71318	152707	132779	142635	275414	61.3	50.0	55.4	38.7	50.0	44.6
5. STS	1299783		1299783	2011566		2011566	64.6		64.6	35.4		35.4
ALL	**1407641**	**74161**	**1481802**	**2182157**	**146698**	**2328854**	**64.5**	**50.6**	**63.6**	**35.5**	**49.4**	**36.4**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana; LL: Landlord; K: Kharif; R: Rabi

Source: Field Survey

Table IV.14: Average Rental Shares (%) of Landlords in Total Value of Output (Kharif 2018 + Rabi 2019): Rain-fed Land

Region	Fixed Kind Rent		Fixed Cash Rent		Sharecropping	
	No. of tenants	Rent payable	No. of tenants	Rental payable	No. of tenants	Rental payable
1. NCA	0	0	0	0	2	30.0
2. SCA	0	0	0	0	0	0
3. RS	0	0	25	18.6	0	0
4. NTS	0	0	10	19.3	1	44.6
5. STS	2	11.2	23	32.0	25	35.4
ALL	**2**	**11.2**	**58**	**23.3**	**28**	**36.4**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Source: Field Survey

Table IV.14A. Average Rental Payable to Landlords per Acre per Year (in Rs): Rain-fed Land

Region	Fixed Kind Rent		Fixed Cash Rent		Sharecropping	
	No. of tenants	Rent payable	No. of tenants	Rental payable	No. of tenants	Rental payable
1. NCA	0	0	0	0	2	12,562
2. SCA	0	0	0	0	0	0
3. RS	0	0	25	2,591	0	0
4. NTS	0	0	10	7,143	1	40,902
5. STS	2	1,625	23	4,196	25	10,785
ALL	**2**	**1,625**	**58**	**3,967**	**28**	**12,101**

Note: NCA: North Coastal Andhra; SCA: South Coastal Andhra; RS: Rayalaseema; NTS: North Telangana; STS: South Telangana.

Source: Field Survey

The value of rent payable to the landlord per are per year, in absolute terms, was arrived at for the rain-fed land too. As between the sharecropped land and the land under cash rent, it was much lower under the latter form (at Rs. 3,967) than for the former (12,101). This is along the expected lines (Table IV.14A).

IV.4.3. A Cross-sectional Analysis of Irrigated and Rain-fed Lands:

We may compare the data on rental shares obtaining in irrigated areas with those in rain-fed areas to see if they were lower across alternative tenures, in the latter areas than in the former. Since kind rent had no more than a token presence in the rain-fed areas such a comparison is not meaningful. But the prevalence of the other two forms of tenure, cash rent and sharecropping, was widespread. A comparison of the rental burden of the two areas is therefore possible. Since the cultivation risk is more for the tenant in the rain-fed areas his rental burden should be correspondingly lower, if market forces have any sway. In our analysis of the previous two sections, we have found a similar proposition to be validated by facts – that the most-risky conditions were associated with the least rental burden whereas the least-risky conditions carried the highest rental burden.

A comparison of the rental burden on sharecropped land that was under irrigation with that under rain-fed conditions revealed that there was hardly any difference between two. The rental shares as a proportion of the total value of output under sharecropping were 37.7% and 36.4% respectively for irrigated and rain-fed lands. Like-wise, the rental shares under cash rent were largely equal as between the irrigated and rain-fed lands at 21.4% and 23.3% respectively (Tables IV. 10 and 14). This invalidates our proposition and the rental burden is not related to cultivation risk. It is, however, useful to bear in mind that the initial conditions were different as between the two areas and this could vitiate the conclusions. More than the risk associated with cultivation, historical factors, traditions and conventions play a part in shaping tenurial forms and rental shares.

A comparison of the rental values across the rain-fed land and the irrigated land shows that the values were lower for the former land than for the latter under each form of tenure. Thus, the rental value under cash rent was lower (at Rs. 3,967) under the rain-fed conditions than the value under irrigated conditions (Rs. 17,201). Like wise, the rental value under sharecropping was lower (at Rs. 12,101) for the rain-fed land as compared to the value for irrigated land (Rs. 17,157) (Tables IV.10A and 14A). The risk associated with farming was thus found to have a bearing on the rental values.

Section – V

Productive Efficiency under Alternative Tenures in the Era of Climate Change

V.1. Introduction

The debate in the literature over the relative efficiency of sharecropped land vis-à-vis owned land is not conclusive. The followers of Marshall argue, based on both theory and evidence, that the land under sharecropping is used less intensively than that under owner cultivation. The share tenant does not have the incentive to apply sufficient working capital, including labour-power, on the sharecropped land because he receives only a fraction of any increment in output while he has to bear the full cost involved in attaining it. To prevent the share tenant from under- supplying inputs, sharing of input costs between him and his landlord in the same ratio as output is shared is considered necessary.

In the era of climate change, when much more labour time than usual is needed to operate land, and at a time when wages in the labour market, both male and female, are propped up by the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), it is likely that there is undersupply of labour on sharecropped land as compared to that on owned land. With the result yields under the former tenure may be less than under the latter.

While this is so, risk and uncertainty associated with cultivation are now much more than before consequent to climate change. Under the circumstances, the tenant may welcome leases under sharecropping, with a proviso to share costs, because it enables him to share risk with the landlord. And, where he comes forward to do so, the share tenant may be enthused to work the land intensively (even where the landlord otherwise takes little interest in the tenanted land) and obtain yield on par with the owner cultivator.

The literature on the relative efficiency of the fixed rent tenant (both cash and kind) and the owner cultivator is limited. However, it is conclusive and shows that the fixed rent tenant does not face any incentive problems, and he is as efficient as the owner cultivator, for whatever extra output that the tenant produces over and above the rent is entirely his. But, because leases (in the Indian setting) are mostly oral, the tenant is not

sure as to how long he will retain operational control over the leased parcel. Therefore, he may be hesitant to undertake investment that will have a positive effect on yields in the medium- to long-term. This is the reason why it is contended that owner cultivation is by far the best form of tenure.

In this Section, we address ourselves to the issue of the relative efficiency of alternative tenures. We present here the data on the yields (in rupees) derived on owned land on one hand and those from lands operated under fixed kind rent, fixed cash rent and sharecropping on the other. The yields are put together separately for three seasons, viz., Kharif 2018, Rabi 2019 and Kharif 2019 and for the irrigated and rain-fed lands. The best way to judge the efficiency of use of owned land and the tenanted land is to compare the yields from the both as derived by owner-cum- tenants. By doing so, we can control for the influence of the cultivator-specific characteristics on yields. It is possible to further improvise the comparison by working with crop-specific yields derived by owner-cum-tenants on their owned and tenanted lands. We also have data on yields obtained by pure owners. It is also presented in the tables for purposes of comparison.

V.2. Yields under Alternative Tenures

V.2.1. Irrigated Land:

As noted before, we have arrived at the total value of output per acre – the yields –by valuing the physical output using farm harvest prices of individual crops. For arriving at the yields of Kharif 2018, we have employed the prices of the season, and like-wise, for Rabi 2019. Because of the non-availability of the prices of Kharif 2019, we have used the mean of Kharif 2018 and Rabi 2019 prices in its place.

A comment in the passing is in order. Yields were higher in Kharif 2019 than in Kharif 2018 for all tenure groups. The whole of 2019 (that is Rabi 2019 Kharif 2019) was a favourable year for irrigated agriculture. This is true across the regions of study.

Is the owned land of tenants cultivated more efficiently than the land of pure owners? Such a postulate has meaning because only more enterprising among the cultivators may enter the lease market. And therefore, tenants may cultivate their owned land more efficiently than the efficiency with which pure owners do. This proposition was, however, found to be not validated by our data. In all the three seasons of study, the yields were no higher on the owned land of the tenants (pure tenants and owner-cum-tenants) than

on the land of pure owners; and if anything, they were marginally lower (Tables V.1: Panels 1 and 2). It thus seems that the tenants exhibited no great enterprise. The absence of difference between the yields of the two categories of cultivators might also mean that they had hit a plateau and it was no more possible to raise yield levels.

How efficiently do the tenants (pure tenants and owner-cum-tenants together) cultivate the sharecropped land relative to their owned land? In Kharif 2018, the yield on sharecropped land was Rs. 29,483 and this was much less than that on owned land, which was Rs. 37,124. The difference between the two yields was much more in Rabi 2019 – Rs. 23,641 on sharecropped land and Rs. 43,796 on owned land. In Kharif 2019 too, the same conditions persisted with yields of Rs. 36,305 on sharecropped land and Rs. 41,502 on owned land (Table V.1). Cost-sharing also did not help boost the output on sharecropped land, may be because only paid-out costs were shared and not the cost of labour input.

Table V.1: Yields under Alternative Tenures for All Crops Together: Irrigated Land: Tenants and Pure Owners

Tenure	Kharif 18			Rabi 19			Kharif 19		
	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
OWNED*	195.0	7822048	40113	163.0	7242056	44430	143.0	6244030	43665
OWNED**	160.2	5946183	37124	157.9	6915786	43796	139.7	5796551	41502
FKR	164.7	6213573	37727	164.7	8277399	50257	158.7	6854237	43190
FCR	379.5	14769012	38917	310.5	15878592	51139	263.0	11084574	42147
SCG	104.4	3078044	29483	81.7	1931482	23641	96.5	3502695	36305

Note: * Owned land of pure owners; ** Owned land of tenants; FKR: Fixed Kind Rent; FCR: Fixed Cash Rent: SCG: Sharecropping

Source: Field Survey

Are the lands under the kind and cash rents operated more efficiently than the land under sharecropping by tenants? The answer is in the affirmative. And, this is true for all the three seasons. Thus, in Kharif 2018, the yields under sharecropping, kind rent

and cash rent were 29,483; 37,124 and 37,727 rupees respectively. The respective figures for Rabi 2019 were 23,641; 50,257 and 51,139 rupees. And, in Kharif 2019, they were 36,305; 43,190 and 42,147 rupees. Note also that the productive efficiency of lands under kind rent and cash rent was superior to that of owned land (Table V.1). The inescapable conclusion is that the irrigated land under sharecropping is used less efficiently than the land under other tenures.

Since most costs are shared by the landlord, the tenant should not, as per theory, face incentive problems. But even in this setting, the productive efficiency of the sharecropped land is found to be less than that of the owned land. This points at the importance of sharing even the labour costs (both imputed and paid-out) by the landlord to overcome incentive problems of the tenant.

In the above, we reached the conclusions that (1) yield on the owned land cultivated by the tenants (owner-cum-tenants) was lower than that on the land operated by pure owners suggesting a lack of enterprise among the tenants, (2) the tenants use sharecropped land much less efficiently than their owned land alluding a lack of incentive, (3) the efficiency of the use of land under the kind and cash rents was greater than that of land under sharecropping and (4) the land cultivated under the kind and cash rents was used more efficiently than the owned land of the tenants.

We now raise the question whether these conclusions hold if we control for cultivator-specific characteristics by considering the owned and the tenanted parcels of owner-cum-tenants alone (excluding pure tenants)? And, we find that the above conclusions by and large hold even now (the only exception being that the efficiency of use of land under kind rent was less than that of owned land in Kharif 2018) in all the seasons under consideration (Table V.2). Note further that the conclusions generally hold when we control for both cultivator-specific and also crop- specific characteristics (Table V.3). This is when we undertake a comparison of owner-cum- tenants growing only the paddy crop.

Allow us to repeat the basic conclusion that the sharecropped land is used much less efficiently than the owned land by tenants under irrigated agriculture in a scenario characterised by climate change. This is so even though some of the costs of cultivation, other than labour cost, were shared by the landlord.

Table V.2: Yields under Alternative Tenure for All Crops Together: Irrigated Land: Owner cum Tenants and Pure Owners

Tenure	Kharif 18			Rabi 19			Kharif 19		
	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
OWNED*	195.0	7822048	40113	163.0	7242056	44430	143.0	6244030	43665
OWNED**	147.7	5528705	37440	145.4	6428238	44208	135.2	5590667	41360
FKR	56.0	1956539	34938	56.0	2662674	47548	50.0	2294470	45889
FCR	260.5	10146780	38951	217.5	11254257	51744	144.0	6369146	44230
SCG	71.1	2181222	30678	54.4	1308851	24060	66.2	2435369	36799

Note: * Owned land of pure owners; ** Owned land of owner-cum-tenants; FKR: Fixed Kind Rent; FCR: Fixed Cash Rent: SCG: Sharecropping

Source: Field Survey

Table V. 3: Yields under Alternative Tenure: Irrigated Land: Owner cum Tenants and Pure Owners: Paddy Crop Only

Tenure	Kharif 18			Rabi 19			Kharif 19		
	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
OWNED*	52.0	2509709	48264	52.0	2509709	48264	81.0	3137393	38733
OWNED**	41.0	1629011	39780	41.0	1629011	39780	85.3	3135212	36755
FKR	56.0	2662674	47548	56.0	2662674	47548	50.0	2294470	45889
FCR	6.5	255746	39345	6.5	255746	39345	55.0	1884224	34259
SCG	21.7	725744	33444	21.7	725744	33444	41.4	1425180	34441

Note: * Owned land of pure owners; ** Owned land of owner-cum-tenants, FKR: Fixed Kind Rent; FCR: Fixed Cash Rent: SCG: Sharecropping; *Source:* Field Survey

V.2.2. Rain-fed Land:

The patterns observed on irrigated land were found to be not systematic on rain-fed land. The proposition that owned land is used by tenants (pure tenants and owner-cum-tenants) much less efficiently than pure owners, was not found to be generally valid in rain-fed agriculture across seasons. The proposition had clear cut support only in Rabi 2019 and not in the other two seasons. Next, the sharecropped land was used more efficiently than the owned land by tenants in Kharif 2018 but not in Kharif 2019. And we found no systematic pattern in the performance of tenants on land governed by cash rents (Table.V.4). No patterns emerged even when we controlled the cultivator-specific characteristics by considering the owner-cum-tenants (Table V.5).

Table V.4: Yields under Alternative Tenure for All Crops Together: Rain-fed Land: Tenants and Pure Owners

Tenure	Kharif 18			Rabi 19			Kharif 19		
	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
OWNED*	108.0	2578707	23877	6.0	163505	27251	73.0	1632167	22358
OWNED**	186.0	4161824	22371	36.3	483996	13333	185.1	4442334	23994
FKR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCR	163.3	2191320	13419	32.0	503566	15736	159.5	2678596	16794
SCG	66.0	2011566	30478	0.0	0.0	0.0	66.0	886836	13437

Note: * Owned land of pure owners; ** Owned land of tenants; FKR: Fixed Kind Rent; FCR: Fixed Cash Rent; SCG: Share Cropping

Source: Field Survey

Table V.5: Yields under Alternative Tenure for All Crops Together: Rain-fed Land: Owner Cum Tenants and Pure Owners

Tenure	Kharif 18			Rabi 19			Kharif 19		
	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)	Extent cultivated (in acres)	Total value of output of all crops (in Rs.)	Yield per acre (in Rs.)
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
OWNED*	108.0	2578707	23877	6.0	163505	27251	73.0	1632167	22358
OWNED**	179.0	4096771	22882	34.3	466621	13604	178.1	4292172	24094
FKR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCR	124.3	1805065	14522	25.0	451357	18054	122.3	2025192	16559
SCG	63.0	1915445	30404	0.0	0.0	0.0	63.0	831815	13203

Note: * Owned land of pure owners; ** Owned land of owner-cum-tenants; FKR: Fixed Kind Rent; FCR: Fixed Cash Rent; SCG: Sharecropping

Source: Field Survey

Section – VI

Summary and Conclusions

VI.1. Objectives and Methodology

The present study investigates how climate change impacts on cropped area and yields, on the terms of tenancy including on the choice of rental form and on the relative efficiency with which tenants operate the tenanted land vis-à-vis their owned land. In the process, it tests the hypotheses that: (1) climate change dampens yields to the disadvantage of the cultivator, (2) market forces bring in a modicum of relief to tenants in the era of climate change and competition moderates the rental burden and (3) the yields on sharecropped land compare unfavourably with those on owned land and lands under other forms of tenure. To accomplish the objectives, the study employs both the secondary data and the village survey data encompassing the NCA, SCA, and RS regions of AP state and the NTS and the STS regions of Telangana state.

VI.2. Changes in Rainfall, Area and Yields in the Study Regions

As we try to gauge the severity or otherwise of climate change by analysing the average annual rainfall in the study regions we conclude that climate change is more of a worry in the more recent decade than in the decade before – rainfall is becoming less and less even as it is witnessing larger and larger variations and of the five regions, NCA is favourably placed whereas RS and STS are unenviably placed. While the rainfall received has been a source of worry in all the regions of study, it has been more so in RS and STS. Increased access to irrigation has done little to lessen the woes of the two regions. The yields of principal crops of the regions mirror this disturbing scenario.

VI.3. Features of Survey Villages and Respondents

The village survey data encompasses all three forms of tenure, viz., fixed kind rent, fixed cash rent and sharecropping. And among them, cash rents are the most common. There is clear cut evidence to suggest that this form of tenancy has been gaining ground in the survey villages at the cost of kind rents in the main. This is in line with the trends we observe in NSS data. We attribute the preference of this tenurial form to the urge of the landlords to get assured rental returns from the tenanted land.

Meanwhile, all three forms of tenure co-exist in the survey villages. But our village survey data does not lend support to the generally held notion that sharecropping would be found in the areas characterised by relative uncertainty and kind rents in areas of relative certainty.

A large majority of sample tenants are owner-cum-tenants and they seem to be preferred by landlords because their wealth position is superior to landless tenants (pure tenants) and therefore it is possible to receive rent from them with greater certainty. It is, however, necessary to note that tenants of the survey villages largely belong to marginal and small classes. The bulk of them also belongs to socially lowly placed caste categories. These two characteristics of tenants point at their low bargaining strength when it comes to dealing with landlords in the lease market.

VI.4. Climate Change and Contractual Terms of Tenancy

This essay essentially seeks to find if market forces bring in a modicum of relief to tenants in the era of climate change – if competition in the lease market moderates the rental burden of tenants.

Farming has not been rewarding. It is much more so in the era of climate change. Not everybody would like to practice it. Only those without an option would venture into it. Lack of employment opportunities outside agriculture, given the residual nature of rural non-agricultural employment, may force the landless and those endowed with little land into the lease market. Leasing-in would appeal to them if the rental burden on the tenanted land is low.

On the other hand, many would like to lease-out because, one, farming is not rewarding, two, they have no option but to lease-out as they are traditionally away from cultivation, or are distantly located from the land. Ownership of land has been passing increasingly into the hands of the urban dwellers lacking skills and motivation to farm. This has led to a surge in the land available for lease. Those wishing to lease-out would welcome receipt of high rents with certainty. Also, they would not want to bear the risk associated with farming. Landlords look for cash rents as they satisfy these conditions.

In this scenario, competitive forces are expected to balance the urge of landlords with the desire of their tenants. Conditions in the survey villages suggest that this expectation is being realised. Cash rent tenancies are growing in importance satisfying the demand

of the landlords. They are accompanied by rents lower than under other forms to placate the tenants. Long duration leases that facilitate recouping crop losses of a year with better yields in the successive years are the order of the day. This should also gratify the tenants. These emerging tendencies should be seen essentially as a reaction to the opposing demands of the two parties of the lease contracts. We have also seen that rental share of the landlord was less in regions where the tenant had to contend with more risk (as reflected by the source of irrigation) and vice-versa, under each of the three forms of tenure. This outcome should also be attributed to the free play of market forces. Informal pacts between landlords and their beleaguered tenants that facilitate part waiver of rents at times when crops fail are occasionally found in the survey villages. They should also be seen as balancing competing demands.

It is heartening that the government policy is also aiding to lessen the burden of tenants. While Rythu *Bandhu* scheme inadvertently enabled tenants to successfully press for lower rents in Telangana, the Loan Eligibility Cards and the provisions under *YSR Rythu Bharosa* scheme came to the aid of tenants, though on a limited scale, in raising credit in AP.

VI.5. Productive Efficiency under Alternative Tenures

The Marshallian logic suggests that the land under sharecropping is put to less intensive use than under owner-cultivation. The share tenant lacks both economic incentive and capability for productive investment. It is argued that he does not have the incentive to apply sufficient working capital, including labour-power. Under conditions of climate change, when more time than usual is needed to cultivate the land and at a time when wages in the labour market receive a thrust from the MGNREGS, labour will likely be undersupplied on sharecropped land relative to owned land. We tested this and related propositions employing the survey data.

The survey data from the irrigated zone lends support to the propositions that (1) yield on the owned land cultivated by owner-cum-tenants was lower than that on the land operated by pure owners suggesting at a lack of enterprise among the tenants, (2) the tenants use sharecropped land much less efficiently than their owned land alluding a lack of incentive, (3) the efficiency of the use of land under the kind and cash rents was greater than that of land under sharecropping again signifying the incentive problem and (4) the land cultivated under the kind and cash rents was used more efficiently than

the owned land of the tenants exhibiting their urge to maximise the return net of rent through unsustainable use of land. These conclusions hold even when we control for cultivator-specific characteristics and also crop-specific characteristics. These patterns were specific to irrigated land and not so much to rain-fed land, however.

VI.6. Perspectives on Policy

Legislative curbs on tenancy impede the free play of market forces which are now facilitating low rents in a risky environment. Curbs could make landlords raise the rental burden on tenants. Therefore, it is necessary to liberalize the lease market. However, schemes such as *Rythu Bandhu* of Telangana (and PM-*Kisan* of the Centre), even though they do not directly benefit tenants could do so indirectly – they could dampen their rental burden. They enable them to press landlords for better terms.

Next, any initiative that aids credit flow to tenants is welcome. Such initiatives bear fruit if they do not impinge upon the rights of landlords. Many small initiatives could combine to benefit tenants substantially. Viewed in this perspective, the issue of Loan Eligibility Cards (LECs), and *YSR Rythu Bharosa* of AP could contribute immensely to the well-being of tenants. Tenant mobilisations that contribute to credit flow to tenants are the need of the hour. If credit flow to tenants could be effected in a big way, it would be equally possible to reach them and ease their burden in times of crop failure.

In areas predominated by sharecropping, landlords should be motivated to share costs of production, including the imputed cost of family labour, with their tenants. This could help increase the efficiency with which the sharecropped land is cultivated.

APPENDIX

Tables in *Appendix*

Appendix Table II.1A: Normal and Actual Annual Average Rainfall of Andhra Pradesh: Period 1 (in mm.)

Sl.No.	Region	NRF	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	Mean	std dev (SD)	CV
I	NC	1165	1402	964	973	1002	749	1264	931	1282	1216	1353	1113.7	216.8	19.5
II	SC	1035	1253	836	963	958	626	972	784	1235	911	1206	974.3	205.7	21.1
III	CA	1078	1303	878	966	973	667	1069	833	1251	1013	1255	1020.7	204.4	20.0
IV	RS	714	889	563	777	820	458	747	545	956	546	1015	731.5	193.8	26.5
V	AP	966	1175	781	908	926	602	970	744	1160	869	1181	931.7	196.0	21.0

Note: NRF: Normal Rainfall; NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

Appendix Table II.1B: Normal and Actual Annual Average Rainfall of Andhra Pradesh: Period 2 (in mm.)

Sl.No.	Region	NRF	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Mean	std dev	CV
I	NC	1165	857	1039	1651	874	1261	1299	985	1053	950	1074	1104.3	240.6	21.8
II	SC	1035	995	835	1509	809	1232	1040	570	961	702	775	942.9	273.0	29.0
III	CA	1078	949	903	1556	831	1241	1127	708	992	785	875	996.7	251.9	25.3
IV	RS	714	699	686	880	653	645	691	467	771	496	772	675.9	124.0	18.3
V	AP	966	872	837	1348	776	1058	993	634	924	696	843	898.0	202.9	22.6

Note: NRF: Normal Rainfall; NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from 2008-09 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

2. Data compiled from 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3. Data compiled/analysed from 2015-16to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix Table II.1C: Normal and Actual Annual Average Rainfall of Telangana State: Period 1 (in mm.)

Sl.No.	Region	NRF	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	Mean	std dev (SD)	CV
II	ST	753	857	598	954	568	750	714	529	771	515	1001	725.7	174.1	24.0
III	NT	1056	1022	834	1170	946	1103	879	708	1009	767	1227	966.5	171.8	17.8
IV	TS	907	951	717	1065	758	949	808	627	899	652	1131	855.6	171.4	20.0
V	UAP	1664	1963	1442	1995	1364	1638	1547	1085	1661	1246	2030	1597.0	325.2	20.4

Note: NRF: Normal Rainfall; ST: South Telangana NT: North Telangana; TS: Telangana State; UAP: United AP SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed from: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

Appendix Table II.1D: Normal and Actual Annual Average Rainfall of Telangana State: Period 2 (in mm.)

Sl. No.	Region	NRF	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Mean	std dev (SD)	CV
I	ST	753	599	846	654	661	895	520	699	1012	399	557	684.3	185.9	27.2
II	NT	1056	1053	1029	974	708	1291	806	1118	1391	593	851	981.5	250.3	25.5
III	TS	907	841	948	846	687	1105	670	928	1205	494	722	844.5	213.0	25.2
IV	UAP	1664	1516	1910	1522	1365	2198	1291	1771	1919	1014	1479	1598.7	350.7	21.9

Note: NRF: Normal Rainfall; ST: South Telangana NT: North Telangana; TS: Telangana State; UAP: United AP. SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

Appendix Table II.2A: Net Irrigated Area (ha.) Andhra Pradesh: Period 1

YEAR	NC	SC	CA	RS	AP
1998-99	450100	1804616	2254716	664110	2918826
1999-00	437758	1763521	2201279	612531	2813810
2000-01	452587	1769257	2221844	623507	2845351
2001-02	373784	1703140	2076924	636813	2713737
2002-03	328489	1484978	1813467	532817	2346284
2003-04	385488	2428906	2814394	497855	3312249
2004-05	424624	1641226	2065850	2073455	4139305
2005-06	365412	1741793	2107205	617323	2724528
2006-07	444260	1734278	2178538	566299	2744837
2007-08	456034	1813180	2269214	625869	2895083
Mean	411854	1788490	2200343	745058	2945401
SD	44980	244542	253282	469501	482144
CV	10.92	13.67	11.51	63.02	16.37

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh; SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

Appendix Table II. 2B: Net Irrigated Area (ha.) Andhra Pradesh: Period 2

YEAR	NC	SC	CA	RS	AP
2008-09	443165	1857454	2300619	632742	2933361
2009-10	356327	1727072	2083399	638113	2721512
2010-11	451272	1895187	2346459	683266	3029725
2011-12	455795	1935736	2391531	713709	3105240
2012-13	446428	1731710	2178138	623083	2801221
2013-14	431751	1920871	2352622	661078	3013700
2014-15	455483	1831374	2286857	640135	2926992
2015-16	462544	1658030	2120574	622327	2742901
2016-17	465147	1606518	2071665	647177	2718842
2017-18	463711	1661152	2124863	638158	2763021
Mean	443162	1782510	2225673	649979	2875652
SD	32214	120265	122476	28797	143631
CV	7.27	6.75	5.50	4.43	4.99

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh; SD: Standard Deviation; CV: Coefficient of Variation

Source:
1. Data Compiled from 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.
2. Data compiled from 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad.
3. Data compiled/analysed from 2015-16to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix Table II. 2C: Net Irrigated Area (ha.) Telangana: Period 1

YEAR	South Telangana	North Telangana	Telangana
1996-97	538229	962439	1500668
1997-98	475245	739367	1214612
1998-99	617866	1001793	1619659
1999-00	583874	986268	1570142
2000-01	625624	1056624	1682248
2001-02	559779	964352	1524131
2002-03	441678	825702	1267380
2003-04	423775	882845	1306620
2004-05	468041	812244	1280285
2005-06	590083	1077692	1667775
Mean	532419	930933	1463352
SD	74680	111405	179190
CV	14.03	11.97	12.25

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

Appendix Table II. 2D: Net Irrigated Area (ha.) Telangana: Period 2

YEAR	South Telangana	North Telangana	Telangana
2006-07	583829	1124212	1708041
2007-08	672681	1076386	1749067
2008-09	688490	1193900	1882390
2009-10	669606	823220	1492826
2010-11	781367	1222620	2003987
2011-12	788491	1196127	1984618
2012-13	663448	1110669	1774117
2013-14	562317	923924	1486241
2014-15	710007	1016296	1726303
2015-16	562317	923924	1486241
Mean	668255	1061128	1729383
SD	80981	135343	194654
CV	12.12	12.75	11.26

Note:: Standard Deviation; CV: Coefficient of Variation

Source: 1.Data Compiled from 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2.Data compiled from 2013-14 to 2015-16, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

Appendix Table II.3A: Gross Irrigated Area (ha.) Andhra Pradesh: Period 1

YEAR	NC	SC	CA	RS	AP
1998-99	529814	2467729	2997543	848179	3845722
1999-00	504607	2394324	2898931	766952	3665883
2000-01	516836	2379367	2896203	778353	3674556
2001-02	447152	2283858	2731010	789135	3520145
2002-03	383681	1861908	2245589	658233	2903822
2003-04	462373	1943990	2406363	618009	3024372
2004-05	495138	2163884	2659022	666512	3325534
2005-06	445758	2438032	2883790	761876	3645666
2006-07	517801	2453868	2971669	684333	3656002
2007-08	536177	2531318	3067495	771864	3839359
Mean	483934	2291828	2775762	734345	3510106
SD	48239	230061	268161	72691	324842
CV	9.97	10.04	9.66	9.90	9.25

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

Appendix Table II.3B: Gross Irrigated Area (ha.) Andhra Pradesh: Period 2

YEAR	NC	SC	CA	RS	AP
2008-09	528413	2247819	2776232	778776	3555008
2009-10	447051	2371239	2818290	814385	3632675
2010-11	561328	2733287	3294615	859707	4154322
2011-12	545186	2515327	3060513	859957	3920470
2012-13	550582	2401639	2952221	758988	3711209
2013-14	538443	2743652	3282095	813361	4095456
2014-15	555772	2561719	3117491	768231	3885722
2015-16	547825	2240687	2788512	758129	3546641
2016-17	543932	2243744	2787676	794601	3582277
2017-18	577312	2344959	2922271	807858	3730129
Mean	539584	2440407	2979992	801399	3781391
SD	35096	191229	200295	37285	222015
CV	6.50	7.84	6.72	4.65	5.87

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh; SD: Standard Deviation; CV: Coefficient of Variation

Source: 1.Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

2.Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3.Data compiled/analysed from: 2015-16to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix Table II.3C: Gross Irrigated Area (ha.) Telangana: Period 1

YEAR	South Telangana	North Telangana	Telangana
1996-97	765167	1267267	2032434
1997-98	630073	969419	1599492
1998-99	884370	1361701	2246071
1999-00	768551	1311277	2079828
2000-01	842366	1399095	2241461
2001-02	755829	1272659	2028488
2002-03	583526	1048847	1632373
2003-04	594821	1161490	1756311
2004-05	629016	1032168	1661184
2005-06	845230	1505570	2350800
Mean	729895	1232949	1962844
SD	112069	175168	280096
CV	15.35	14.21	14.27

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

Appendix Table II.3D: Gross Irrigated Area (ha.) Telangana: Period 2

YEAR	South Telangana	North Telangana	Telangana
2006-07	813971	1599597	2413568
2007-08	927520	1517903	2445423
2008-09	998436	1722566	2721002
2009-10	922303	1208979	2131282
2010-11	1170959	1827839	2998798
2011-12	1077179	1786862	2864041
2012-13	903747	1653357	2557104
2013-14	754101	1273562	2027663
2014-15	1015425	1513531	2528956
2015-16	754101	1273562	2027663
Mean	933774	1537776	2471550
SD	136488	222665	336449
CV	14.62	14.48	13.61

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Year Book, Directorate of Economics and Statistics, Hyderabad.

***Appendix* Table II.4A: Net Area Sown (ha.) Andhra Pradesh: Period 1**

YEAR	NC	SC	CA	RS	AP
1998-99	1004478	2877607	3882085	2790811	6672896
1999-00	969561	2911141	3880702	2623036	6503738
2000-01	1004795	2891713	3896508	2786513	6683021
2001-02	911454	2746978	3658432	2668860	6327292
2002-03	837087	2593253	3430340	2525116	5955456
2003-04	899005	2699983	3598988	2562506	6161494
2004-05	940577	2822381	3762958	2767426	6530384
2005-06	852087	2872184	3724271	2810168	6534439
2006-07	937605	2789072	3726677	1816679	5543356
2007-08	962464	2971141	3933605	2765084	6698689
Mean	931911	2817545	3749457	2611620	6361077
SD	57640	112737	157920	297243	375367
CV	6.19	4.00	4.21	11.38	5.90

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad

***Appendix* Table II.4B: Net Area Sown (ha.) Andhra Pradesh: Period 2**

YEAR	NC	SC	CA	RS	AP
2008-09	931246	2935106	3866352	2769556	6635908
2009-10	815897	2792018	3607915	2424054	6031969
2010-11	917006	3007674	3924680	2773759	6698439
2011-12	905011	2916768	3821779	2631141	6452920
2012-13	868537	2837901	3706438	2647225	6353663
2013-14	851966	3030850	3882816	2678313	6561129
2014-15	851003	2935470	3786473	2449577	6236050
2015-16	854886	2939698	3794584	2414018	6208602
2016-17	854242	2616077	3470319	2467351	5937670
2017-18	859105	2692615	3551720	2341918	5893638
Mean	870890	2870418	3741308	2559691	6300999
SD	35574	134763	152399	157904	288045
CV	4.08	4.69	4.07	6.17	4.57

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP:Andhra Pradesh SD: Standard Deviation; CV: Coefficient of Variation

Source: 1.Data Compiled from: 2008-09 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

2.Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3.Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada

***Appendix* Table II.4C: Net Area Sown (ha.) Telangana: Period 1**

YEAR	South Telangana	North Telangana	Telangana
1996-97	1997709	2100353	4098062
1997-98	1783062	1838692	3621754
1998-99	2125118	2179917	4305035
1999-00	2059607	2140937	4200544
2000-01	2241824	2189667	4431491
2001-02	2043254	2039116	4082370
2002-03	1827242	1831841	3659083
2003-04	1921679	2035111	3956790
2004-05	1837848	1959238	3797086
2005-06	1985613	2518009	4503622
Mean	1982296	2083288	4065584
SD	143747	198876	307103
CV	7.25	9.55	7.55

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

***Appendix* Table II.4 D: Net Area Sown (ha.) Telangana: Period 2**

YEAR	South Telangana	North Telangana	Telangana
2006-07	1817981	2185433	4003414
2007-08	1757570	2352512	4110082
2008-09	1928275	2304160	4232435
2009-10	1900837	2058649	3959486
2010-11	2081021	2411456	4492477
2011-12	2152306	2447062	4599368
2012-13	2179999	2473915	4653914
2013-14	2072268	2102300	4174568
2014-15	2151284	2225292	4376576
2015-16	2072268	2102300	4174568
Mean	2011381	2266308	4277689
SD	149473	153060	242401
CV	7.43	6.75	5.67

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Year Books, Directorate of Economics and Statistics, Hyderabad.

***Appendix* Table II.5A: Gross Cropped Area (ha.) Andhra Pradesh: Period 1**

YEAR	NC	SC	CA	RS	AP
1998-99	1333220	4035689	5368909	3081650	8450559
1999-00	1300569	3944441	5245010	2850220	8095230
2000-01	1298028	4030725	5328753	3032860	8361613
2001-02	1221106	3836824	5057930	2897279	7955209
2002-03	238458	900765	1139223	227766	1366989
2003-04	792153	3708978	4501131	2782438	7283569
2004-05	1237352	3858829	5096181	3009347	8105528
2005-06	1134458	3993523	5127981	3116314	8244295
2006-07	1240034	11214991	12455025	2646406	15101431
2007-08	1274172	4169994	5444166	3103297	8547463
Mean	1106955	4369476	5476431	2674758	8151189
SD	342384	2591905	2768724	873361	3256229
CV	30.93	59.32	50.56	32.65	39.95

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP:Andhra Pradesh; SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

***Appendix* Table II.5B: Gross Cropped Area (ha.) Andhra Pradesh: Period 2**

YEAR	NC	SC	CA	RS	AP
2008-09	1217697	4134064	5351761	3083017	8434778
2009-10	1093496	3784547	4878043	2783523	7661566
2010-11	1213805	4257422	5471227	3173204	8644431
2011-12	1167969	3971949	5139918	2917591	8057509
2012-13	1155277	3896569	5051846	2908061	7959907
2013-14	1140802	4042941	5183743	2944005	8127748
2014-15	1154604	3861375	5015979	2673841	7689820
2015-16	1131761	3735292	4867053	2664534	7531587
2016-17	1125458	3618624	4744082	2673975	7418057
2017-18	1161351	3696662	4858013	2586690	7444703
Mean	1156222	3899945	5056167	2840844	7897011
SD	37976	202930	233030	195750	421197
CV	3.28	5.20	4.61	6.89	5.33

Note: NC: North Coastal; SC: South Coastal; CA: Coastal Andhra; RS: Rayalaseema; AP: Andhra Pradesh; SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from: 2008-09 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

2. Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3. Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix **Table II.5C: Gross Cropped Area (ha.) Telangana: Period 1**

Year	South Telangana	North Telangana	Telangana
1996-97	2307460	2575674	4883134
1997-98	2015850	2218330	4234180
1998-99	2475393	2698819	5174212
1999-00	2334771	2592865	4927636
2000-01	2541085	2642435	5183520
2001-02	2333191	2467959	4801150
2002-03	240451	336650	577101
2003-04	2203928	2462873	4666801
2004-05	2101711	2311309	4413020
2005-06	2321235	2796554	5117789
Mean	2087508	2310347	4397854
SD	667600	714909	1378994
CV	31.98	30.94	31.36

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: Data compiled/analysed: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad.

Appendix **Table II.5D: Gross Cropped Area (ha.) Telangana: Period 2**

Year	South Telangana	North Telangana	Telangana
2006-07	2130493	2810956	4941449
2007-08	2267791	2751744	5019535
2008-09	2308099	3087214	5395313
2009-10	2285082	2613818	4898900
2010-11	2584995	3282831	5867826
2011-12	2531414	3170451	5701865
2012-13	2536407	3153646	5690053
2013-14	2334642	2558506	4893148
2014-15	2516135	2799198	5315333
2015-16	2334642	2558506	4893148
Mean	2382970	2878687	5261657
SD	149442	272795	384395
CV	6.27	9.48	7.31

Note: SD: Standard Deviation; CV: Coefficient of Variation

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Year Books, Directorate of Economics and Statistics, Hyderabad.

***Appendix* Table II. 6A: Changes in Mean Area (ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	North Coastal Andhra TY: MEAN AREA		
	area under the crop as % of GCA		Difference in percentage points
	Period: 1	Period: 2	
Rice	36.41	37.58	1.16
Sugarcane	9.47	6.29	-3.18
Blackgram	4.95	6.11	1.16
Greengram	4.73	4.61	-0.12
Maize	1.47	3.98	2.51
Groundnut	9.08	3.10	-5.98
Gingeli	3.62	2.49	-1.13
Ragi	3.99	2.27	-1.71
Cotton	1.56	1.82	0.26
Horsegram	4.08	1.27	-2.81
Bajra	1.88	0.42	-1.45
Redgram	0.72	0.41	-0.30
Chilli	0.85	0.38	-0.47
Sunflower	0.13	0.18	0.05
Tobacco	0.30	0.13	-0.17
Onion	0.19	0.12	-0.07
Jowar	0.21	0.09	-0.12
Bengalgram	0.02	0.03	0.01
Caster	0.00	0.00	0.00

Source: 1.Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;

2.Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3.Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix **Table II. 6 B: Changes in Mean Area (ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	South Coastal Andhra TY: Mean AREA		
	area under the crop as % of GCA		Difference in percentage points
	Period: 1	Period: 2	
Rice	40.38	43.32	2.94
Cotton	5.37	7.88	2.51
Blackgram	8.15	7.33	-0.82
Maize	1.60	4.34	2.74
Tobacco	2.35	3.03	0.68
Bengalgram	1.68	2.91	1.23
Chilli	2.12	2.89	0.77
Redgram	2.58	2.38	-0.20
Greengram	3.11	2.08	-1.03
Sugarcane	3.14	1.93	-1.21
Groundnut	0.96	0.84	-0.11
Jowar	0.33	0.75	0.42
Gingeli	0.96	0.61	-0.35
Bajra	0.54	0.48	-0.06
Sunflower	0.74	0.46	-0.28
Caster	0.38	0.21	-0.17
Ragi	0.11	0.05	-0.05
Onion	0.05	0.04	0.00
Horsegram	0.09	0.03	-0.05

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;

2. Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3. Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

***Appendix* Table II. 6C: Changes in Mean Area (ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	RayalaseemaTY: MEAN AREA		
	area under the crop as % of GCA		Difference in percentage points
	Period: 1	Period: 2	
Groundnut	50.29	36.11	-14.18
Bengalgram	8.18	12.67	4.49
Rice	9.68	9.06	-0.62
Cotton	3.60	7.29	3.69
Redgram	3.19	4.38	1.19
Sunflower	10.46	3.72	-6.73
Jowar	4.91	3.63	-1.28
Maize	0.50	2.12	1.62
Caster	0.59	1.98	1.39
Sugarcane	2.20	1.30	-0.90
Onion	0.62	0.97	0.35
Blackgram	0.27	0.87	0.60
Chilli	0.87	0.78	-0.09
Horsegram	0.40	0.65	0.25
Bajra	0.85	0.61	-0.24
Greengram	0.34	0.37	0.04
Ragi	0.61	0.34	-0.27
Tobacco	0.48	0.33	-0.16
Gingeli	0.18	0.29	0.11

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;

2. Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3. Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix **Table II. 6D: Changes in Mean Area (ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	North Telangana TY: MEAN AREA		
	area under the crop as % of GCA		Difference in percentage points
	Period: 1	Period: 2	
Rice	32.25	31.91	-0.34
Cotton	20.49	30.40	9.92
Maize	12.07	11.15	-0.92
Redgram	4.25	2.67	-1.58
Greengram	5.82	2.65	-3.17
Chilli	3.21	2.25	-0.97
Jowar	7.77	1.92	-5.85
Groundnut	4.16	1.78	-2.38
Bengalgram	0.54	1.42	0.87
Blackgram	1.95	1.32	-0.63
Sugarcane	1.92	0.89	-1.03
Gingeli	2.28	0.81	-1.47
Sunflower	1.02	0.63	-0.39
Bajra	0.31	0.30	-0.01
Tobacco	0.43	0.20	-0.24
Onion	0.11	0.12	0.01
Caster	0.47	0.08	-0.39
Horsegram	0.26	0.04	-0.22
Ragi	0.00	0.00	0.00

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Abstracts and Season and Crop Reports, Hyderabad

Appendix **Table II. 6E: Changes in Mean Area (ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	South Telangana TY: MEAN AREA		
	area under the crop as % of GCA		Difference in percentage points
	Period: 1	Period: 2	
Rice	23.52	25.74	2.22
Cotton	8.28	21.22	12.94
Maize	7.89	12.33	4.44
Redgram	6.56	8.14	1.58
Groundnut	7.93	5.60	-2.34
Jowar	15.54	4.37	-11.18
Caster	11.06	4.32	-6.74
Greengram	7.33	3.95	-3.38
Bengalgram	1.82	2.52	0.70
Sugarcane	2.38	1.87	-0.51
Blackgram	2.11	1.55	-0.56
Sunflower	2.01	1.08	-0.93
Chilli	1.46	0.78	-0.69
Onion	0.39	0.43	0.05
Bajra	1.48	0.29	-1.19
Gingeli	0.66	0.18	-0.48
Horsegram	0.76	0.17	-0.58
Ragi	0.76	0.12	-0.65
Tobacco	0.19	0.11	-0.08

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Abstracts and Season and Crop Reports, Hyderabad

Appendix **Table II. 7 A: Changes in Mean Yield (kgs./ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	North Coastal Andhra: MEAN YIELD			
	Mean YIELD of		% of difference between P1 and P2	Increase more/ less than the percentage points
	Period: 1	Period:2		
Rice	1974	2559	29.61	1.82
Jowar	864	1737	101.13	73.34
Bajra	1015	1094	7.72	-20.07
Maize	3098	4537	46.44	18.65
Ragi	1100	985	-10.53	-38.32
Redgram	445	525	17.86	-9.93
Blackgram	434	552	27.29	-0.50
Bengalgram	1705	1698	-0.41	-28.20
Greengram	376	491	30.63	2.84
Horsegram	407	509	24.97	-2.82
Groundnut	970	1380	42.23	14.44
Gingeli	179	187	4.07	-23.72
Sunflower	1064	1012	-4.94	-32.73
Caster	394	741	87.88	60.09
Sugarcane	3477	5142	47.90	20.11
Cotton	365	358	-2.07	-29.86
Tobacco	2031	2500	23.07	-4.72
Chilli	2324	3193	37.39	9.60
Onion	16293	19177	17.70	-10.09
Mean of differences			**27.79**	

Source: 1.Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad;

2.Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3.Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

***Appendix* Table II. 7B: Changes in Mean Yield (kgs./ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	South Coastal Andhra: MEAN YIELD			
	Mean YIELD of		% of difference between P1 and P2	Increase more/ less than the percentage points
	Period: 1	Period:2		
Rice	3315	4286	29.29	-10.00
Jowar	1401	4094	192.16	152.87
Bajra	1319	1907	44.64	5.35
Maize	5574	7938	42.41	3.12
Ragi	1706	1448	-15.16	-54.45
Redgram	558	695	24.46	-14.83
Blackgram	669	804	20.25	-19.04
Bengalgram	1706	1703	-0.17	-39.46
Greengram	359	597	66.39	27.10
Horsegram	438	507	15.74	-23.55
Groundnut	1962	2771	41.22	1.93
Gingeli	239	266	11.67	-27.62
Sunflower	1025	1039	1.36	-37.93
Caster	347	677	95.18	55.89
Sugarcane	5139	7707	49.97	10.68
Cotton	453	535	18.04	-21.25
Tobacco	1386	2049	47.81	8.52
Chilli	3322	4584	37.97	-1.32
Onion	15160	18705	23.38	-15.91
Mean of differences			**39.29**	

Source: 1.Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2.Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3.Data compiled/analysed from 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix **Table II. 7C: Changes in Mean Yield (kgs./ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	Rayalaseema TY: MEAN YIELD			
	Mean YIELD of		% of difference between P1 and P2	Increase more/ less than the percentage points
	Period: 1	Period:2		
Rice	2729	3742	37.12	9.98
Jowar	1336	1618	21.07	-6.07
Bajra	1026	1558	51.88	24.74
Maize	3700	4857	31.26	4.12
Ragi	1309	1297	-0.87	-28.01
Redgram	349	287	-17.72	-44.86
Blackgram	681	854	25.49	-1.65
Bengalgram	967	917	-5.20	-32.34
Greengram	474	546	15.07	-12.07
Horsegram	437	523	19.85	-7.29
Groundnut	754	639	-15.35	-42.49
Gingeli	364	524	43.79	16.65
Sunflower	631	1056	67.32	40.18
Caster	425	527	23.79	-3.35
Sugarcane	5372	7381	37.39	10.25
Cotton	218	314	44.22	17.08
Tobacco	1070	1764	64.80	37.66
Chilli	2024	3208	58.52	31.38
Onion	15855	17960	13.28	-13.86
Mean of differences			**27.14**	

Source: 1. Data Compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16 (13 districts), Statistical Abstracts and Season and Crop Reports, Hyderabad; and

3. Data compiled/analysed from: 2015-16 to 2017-18, Statistical Abstracts and Season and Crop Reports, Amaravathi: Vijayawada.

Appendix **Table II. 7D: Changes in Mean Yield (kgs./ha.) Under Principal Crops between Periods 1 and 2**

Name of Crop	North Telangana TY: MEAN YIELD			
	Mean YIELD of		% of difference between P1 and P2	Increase more/ less than the percentage points
	Period: 1	Period:2		
Rice	2683	3200	19.28	-15.60
Jowar	859	1085	26.37	-8.51
Bajra	506	795	57.09	22.21
Maize	3456	4576	32.40	-2.48
Ragi	1250	924	-26.10	-60.98
Redgram	381	624	63.93	29.05
Blackgram	506	876	73.09	38.21
Bengalgram	795	1511	90.00	55.12
Greengram	404	557	37.88	3.00
Horsegram	277	386	39.10	4.22
Groundnut	1250	1716	37.32	2.44
Gingeli	217	321	47.80	12.92
Sunflower	834	1067	27.98	-6.90
Caster	401	492	22.60	-12.28
Sugarcane	4045	5706	41.09	6.21
Cotton	424	296	-30.10	-64.98
Tobacco	1894	2815	48.62	13.74
Chilli	2372	3355	41.42	6.54
Onion	22504	25431	13.00	-21.88
Mean of differences			**34.88**	

Source: 1. Data compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Abstracts and Season and Crop Reports, Hyderabad.

***Appendix* Table II. 7E: Changes in Mean Yield (kgs. /ha.) under Principal Crops between Periods 1 and 2**

Name of Crop	South Telangana TY: MEAN YIELD			
	Mean YIELD of		% of difference between P1 and P2	Increase more/ less than the percentage points
	Period: 1	Period:2		
Rice	2487	2960	19.04	-19.09
Jowar	741	991	33.80	-4.33
Bajra	508	717	41.16	3.03
Maize	2409	2617	8.64	-29.49
Ragi	1201	1289	7.36	-30.77
Redgram	381	415	8.91	-29.22
Blackgram	412	691	67.61	29.48
Bengalgram	807	1217	50.77	12.64
Greengram	369	454	22.96	-15.17
Horsegram	340	393	15.60	-22.53
Groundnut	834	1621	94.26	56.13
Gingeli	175	175	0.00	-38.13
Sunflower	610	1122	84.02	45.89
Caster	319	499	56.34	18.21
Sugarcane	3853	5583	44.90	6.77
Cotton	328	225	-31.51	-69.64
Tobacco	991	2092	110.96	72.83
Chilli	1751	2719	55.25	17.12
Onion	17115	22988	34.31	-3.82
Mean of differences			**38.13**	

Source: 1. Data compiled from: 2006-07 to 2012-13: GoAP (combined AP), Statistical Abstracts and Season and Crop Reports, Directorate of Economics and Statistics, Hyderabad; and

2. Data compiled from: 2013-14 to 2015-16, Statistical Abstracts and Season and Crop Reports, Hyderabad.

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