Adoption of chickpea cultivars in Andhra Pradesh: Pattern, trends and constraints

Suhasini P, Kiresur VR, Rao GDN and Bantilan MCS

Baseline research report for Tropical Legumes-II

DRAFT REPORT

2009

International Crops Research Institute for the Semi-Arid Tropics
(ICRISAT), Patancheru 502 324, Andhra Pradesh, India

(ICRISAT®)

Contents

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the largest produced food legume in South Asia and the third largest produced food legume globally. Chickpea is grown in more than 50 countries. Asia accounts 89.7% of the area in chickpea production, followed by 4.3% in Africa, 2.6% in Oceania, 2.9% in Americas and 0.4% in Europe (Gaur, MP. 2010). India ranked first in terms of chickpea production and consumption in the world. About 65% of global area with 68 % of global production of chickpea is contributed by India (Amarenderreddy and Devrajmishra, 2010). Chickpea production has grown from 3.65 to 5.63 million tonnes between 1950-51 and 2004-05, registering a growth of 0.58% annually. During the period, area has marginally declined from 7.57 to 6.67 million hectare and the productivity has steadily increased to 844 kg/ha from 482 kg/ha (IIPR, 20009). Six states *viz*., Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka and Andhra Pradesh together contribute 91% of the production and 90% of the area under chickpea.

Andhra Pradesh is categorized among the states which show high growth rate of chickpea production in India. Since 1971 the state experienced study growth rate in terms of production, area and yield. Chickpea is emerging as a cash crop in black cotton soils of Andhra Pradesh replacing different crops like cotton, sorghum, bajra, sugarcane, groundnut and tobacco. Having realised that crops like cotton are prone to pests and diseases and prices being subjected to high fluctuations, chickpea a low risk crop, is found to be a suitable alternate to varied dry land agro climatic conditions of the state. Low pest and disease attack compared to other crops, storability and less price fluctuations triggered the adoption of chickpea by farmers. Already certain varieties are adopted by the farmers, but those existing varieties are released long ago and virtually yielding like local varieties now. One of the reasons for the declined performance of those varieties was improper seed replacement. Strategic development of new varieties considering the preferences of the farmers and other players in the market is required to have effective crop improvement programmes. Hence it is justified to have a project targeting grain legumes crop breeding and seed delivery efforts to enhance live hoods.

The baseline survey of chickpea has been taken up in drought prone districts Kurnool and Prakasam of Andhra Pradesh which were the top producers of chickpea occupying an area of 1.38 lakh hectares and 1.1 lakh hectares during in 2005-06. These districts selected for the

purpose of survey in the State were most drought prone areas of the state. Kurnool district is representing an important region Rayalseema and Prakasam, the region of Coastal Andhra and have average rainfall of < 700mm and >750mm per anum respectively. Area irrigated under Kurnool and Prakasam is only 23 to 28% of the cropped area indicating that most of the crops are rain fed. The crop choice for the dryland farmer is limited and subjected to uncertainties of prolonged dry spells and moisture stress during critical stages of crop growth. Onset of monsoons is another crucial factor influencing selection of crop. When there is a delay in onset of monsoons farmer changes his crop options. This process of crop shifts lead to the selection of chickpea as a rabi crop in the study area. Other crops that were adopted include sunflower, chillies and groundnut. The present study explored the factors determining the selection of chickpea and the cultivars' subsequently.

Objective of the study

The baseline survey aimed at documenting the status of chickpea in terms of production and productivity, ruling varieties, preferences and constraints encountered by the farmers as well as functionaries along the value chain, economics of chickpea, marketing opportunities, marketable surplus, and to track the supply chain. The analysis of baseline information will serve as a feed back about existing status as prima facie of chickpea. This would redirect the research priorities to enhance breeding programme and make possible market interventions to enhance the remuneration to the farmers in order to improve livelihoods.

Expected outcome

The following are the expected outcomes of the present study:

1. Basic socioeconomic and resource endowments information of the study districts and sample respondent farmers generated
2. Better understanding on the status of chickpea production in Kurnool and Prakasam districts of Andhra Pradesh developed
3. The level of adoption of chickpea and the ruling varieties identified
4. The constraints and potential of chickpea production explored
5. Preference along the value chain, market and seed delivery mechanism of chickpea in the study districts better understood

6. The principal stakeholders and key players of chickpea identified and communicated about the potential and prospects of chickpea production

7. The gaps and bottlenecks of chickpea production and distribution identified

8. Appropriate chickpea breeding, seed delivery, marketing and utilization mechanism suggested and implemented

Overall hypotheses

The study is taken up with formulation of certain hypotheses (General and specific) as follows:

- There is significant change in the area, production and productivity of chickpea in target regions in the recent past.
- The sources of growth in chickpea have changed over time
- The newly introduced mother baby trials of a crop give higher yields compared to the ruling varieties.
- Ruling varieties dominate due to lack of better alternatives
- The newly introduced cultivars will be adopted in the targeted area and have economic impact on the livelihoods in long-run
- Yield gap II is very high (The difference between farmers yield and research satiation experimental field yield)
- Adoption of a variety is dependant on suitability, performance and seed delivery system
- Marketing of a crop directly influences the area expansion of a crop
- Price is one of major determinant of adoption of a new crop in any area

Drivers on Adoption Hypotheses

- Preferred traits in production, consumption and marketing will drive the adoption
- There are several constraints pertaining to seed availability(quality, quantity, time and price) which hinder the adoption of new varieties
- Existing seed delivery system is constraining the adoption of new varieties.
- Incorporation of preferred traits in the crop improvement programmes will foster the adoption
- The new improved technologies will affect the gender division of labour in the

communities (farm and labour groups), access and control over resources and benefits

- Increased income due to adoption of new technology improves households food security and nutritional security of men women and family in general
- Participation in PVS trials will improve the women's decision making capacity on varietal choice, leading to their empowerment
- Women significantly participate in production and marketing
- There is existence of gender based wage price differential in production
- Women play a significant role in on farm operations, in decision making , ownership and utilisation of resources

METHODOLOGY

The study to be carried out in Andhra Pradesh has been designed by harmonising conventional and participatory methodologies. The study aimed at generating data on drought conditions, coping up strategies, production technologies, consumption, marketing and value additions using different techniques. Purposive and proportionate stratified random sampling techniques were adopted for the study. Districts were purposively selected. Three villages were also purposively and exposed to participatory varietal selection (PVS) approach based on treatments of Mother Baby trials initiated and by ICRISAT, to create awareness to farmers on the performance of new in comparison with old varieties by organising demonstrations. Three villages nearer to the treatment mandals that were similar in their cropping pattern were selected as control mandals. Together six villages were surveyed. Farmers growing chickpea were identified in each village and 30 farmers in each treatment village and 15 in each control village were selected by proportionate stratified random sampling technique to cover marginal, small, medium and large farmers for the purpose of data collection. A semi structured pre-tested questionnaire is designed and used to elicit relevant information. Interview method is adopted for data collection. Other participatory rural appraisal techniques (PRA) like transect walk, one to one interactions with farmers, group meetings and focussed group meetings were used to collect utmost reliable data and to know detailed information about the crop, general particulars of the village and economics of chickpea growers. Hence in the present study two interrelated approach has been employed. While the baseline information was used to get a deeper insight about the chickpea production,

productivity, existing varieties, ruling varieties, adoption level, preferred traits and preference along the value chain, constraints and the like, the PVS has been employed to lay the foundation for participatory approach variety development, selection and popularization.

Nature and sources of data

Primary data were collected from farmers and the marketing particulars from various market functionaries like traders, brokers, commission agents, processors, retailers and consumers. Similarly secondary data pertaining to the area production, productivity and other parameters has been collected from State Directorate of Economics and Statistics and Chief Planning Officer of the districts. The reference period for baseline data is 2006-07. In Kurnool district Balapanur, Mitnala and Pulimaddi, are treatment while Munagala, Rasulpet and Brahmanapally are control villages. In Prakasam district Cherukurapadu, Chirvanauppalapadu, Kollavaripalem are treatment and, Paidipadu, Maddiralapadu and Bodavada are control villages selected for the study.

Table 1: The details of selected villages are as follows:

Name of the district	Treatment village	Control village
Kurnool	Pulimaddi (30)	Brahamanapalli (15)
	Mitnala (30)	Munagala (15)
	Balapanoor (30)	Rasulpet (15)
Prakasam	Chirakurapadu (30)	Payidipadu (15)
	Kollavaripalem (30)	Bodavada (15)
	Chirvanauppalapadu (30)	Maddirala (15)

Figures in parenthesis indicate no of farmers selected in that village

CHAPTER 1

ADOPTION AND CONSTRAINTS

Chickpea is grown as major crop during rabi season in Kurnool and Prakasam districts of Andhra Pradesh state. In Andhra Pradesh the districts with black cotton soils are trying with new crops, which have commercial value involving low risky production management techniques. Chickpea has emerged as a proving crop in these districts and hence a faster growth is recorded in area during the last five years. The research organisations like ICRISAT, ANGRAU with the help of Seed Corporation and Dept. of Agriculture are trying to supply seed of Bengal gram since there is a demand for seed in these districts (Kurnool and Prakasam). However, farmers are unable to get seed in demanded quantity and preferred quality/variety timely and in the right place. In this context, there is a need to go for evaluation of recent crop shifts; crops replaced the conventional crops, adoption process, adoption of different varieties with reasons for adoption, ruling varieties, constraints if any, farmers experience with the existing seed delivery system and the whole issue of non adoption of some promising varieties. This call for a complete understanding of the farmers' behaviour on adoption of improved varieties in diverse agro-ecological and socioeconomic environment is necessary to design appropriate strategies to harness their potential benefit in target domain (R.L. Shiyani, et al., 2000). By so doing breeders could get relevant feedback on the performance of varieties released, underlying reasons for choice and non-preference as well.

Acquaintance with the farmers' condition and the targeted biophysical environment would guide researchers to reorient their research strategies, approaches and the development of new varieties according to farmers' preference, market demand and agro-ecological potential. Many studies uncovered the potential benefit of participatory approaches such PVS and PPB in marginal and drought prone areas. For instance Witcombe et al., (1996) showed that PVS is more rapid and cost effective way of identifying farmers preferred cultivars. Hence, current research paradigm has emphasised the crucial role of farmers in the whole research process i.e. from preference setting to selecting suitable cultivars through active involvement. The potential benefit of such participatory approach is not limited to cultivar selection per se but also an empowering process which

ultimately enhance the farming community livelihoods. The approach also finds out and stabilise best method of popularisation of new technologies in cost effective manner.

Sampling technique:

The study has been conducted in two districts of Andhra Pradesh namely Kurnool and Prakasam districts in each mandal three adopted and three control villages with 30 farmers each from adopted and 15 farmers each from control villages were selected by stratified random sampling technique. The data was collected from 12 villages and 270 farmers were involved in personal interview which was conducted from January to March 2007.

Cropping pattern and shifts

Kurnool district

Major crops grown in Kurnool are paddy, jowar, bajra, korra, red gram, groundnut, and sunflower, cotton, tobacco, chillies and Bengal gram as per the secondary data during 1995 about decade ago. Later the crops, which picked up in terms of area were chickpea, paddy, sunflower, tobacco and chillies sacrificing the area under other crops predominantly grown. While growth in other crops like paddy, tobacco and chillies is ranging from 5 to 25 per cent, Chickpea growth happened is interesting, which is more than 150% compared to 1995 indicating clear-cut preference of the farmers to chickpea replacing other crops. Crops replaced were bajra, jowar, Korra, red gram, groundnut initially and cotton, tobacco, sunflower and chillies during the recent past.

The cropping pattern as presented in Table 38a indicate that chickpea is major crop grown as rabi crop followed by sunflower. Very small area under crops like tobacco, paddy and groundnut is being recorded. No area under pigeon pea, cotton, bajra and korra is reported indicating a total shift in the cropping pattern. Kurnool is one of the seed production centres in Andhra Pradesh for cotton and sunflower crops despite of this chickpea emerged as best suited crop to the farming situation. In 2007-08 production year chickpea is proved to be the priority crop in terms of area allocation. Adopted area sample farmers allocated 810.25 acres of land while control farmers are allocated 225.5 acres of land for chickpea. Following chickpea sunflower, jawar, tobacco, pady and groundnut share land allocation in that order. The crop production in Kurnool is mainly rain

fed and the only exception is paddy, which is grown under irrigation. Sole cropping is a common practice and no intercropping reported both from adopted and control sample farmers.

While in all other crop types the same cultivars are grown by adopted area and control sample farmers, which was not true in case of chickpea. Adopted area sample farmers are growing three varieties of chickpea while control area sample farmers are grown two varieties. The improved varieties of chickpea have shown better performance in term of productivity and return per acres.

Prakasam district

Crops grown in prakasam district a decade ago are paddy, red gram, jowar, bajra, chillies, groundnut, sunflower, cotton, tobacco and with a negligible area of less than 5000 ha, out of them today many of the crops like groundnut, cotton, jowar, bajra to a large extent are replaced by bengal gram (chickpea). In fact chickpea is competing with crops like tobacco, chillies, which is evident by the fluctuating area under these crops shown by secondary data at district level during the later part of the last decade.

The cropping pattern indicated by the present survey conducted in the sample villages of adopted and control Prakasam district is summarized as follows. About 90% of the area surveyed has been occupied by chick pea during rabi and followed by tobacco with traces of area under sunflower. Paddy remained as a main crop during kharif in the villages with irrigation water. Four types of crop varieties are grown by both adopted and controlled area sample farmers. However, area allocated for chickpea in adopted sample villages are more than twice of controlled villages. It has been noted from Table 38.b that there is a noticeable variation among chickpea varieties in productivity and return per acres.

Ruling Varieties in Chickpea

The varieties ruling in Kurnool and Prakasam districts are different which underscore the variation of adoption process from one district to the other. A farmer's decision to adopt or reject new technologies is influenced by the combined effect of a number of factors related to farmer's objectives and constraints such as: farmer's socioeconomic circumstances (age, and formal education, income, consumption preference etc); farmer's resource endowments as measured by size of family labour, farm size and oxen ownership, and institutional support systems available to farmers (credit, extension and availability of inputs) [CIMMYT,

1993]. Moreover factors like attitude, confidence on the information provider and the prevailing market price, price stability for output of the technology or innovation to be adopted also influence the adoption of different varieties. Ruling varieties in Kurnool are JG-11 and Annigeri and in Prakasam Kabuli, JG-11 followed by Annigeri, are the ruling varieties in terms of area share. Even though there is late entry of chickpea in Prakasam district, farmers were interested to try new varieties that's why they could almost abandon the old variety Annigeri, which is locally termed as Gulabi, where as Kurnool farmers are still continuing with Annigeri though JG-11 started taking over as a ruling variety. ICCV 2 is a short-duration variety which matures earlier than Annigeri and local varieties and escapes terminal drought (Kumar *et al.,* 1985). There are alternate suitable crops but still the ruling varieties dominated.

The areas under ruling varieties of chickpea are JG – 11 and Annigeri in Kurnool district occupying about 52 % and 46% of area respectively. On the other hand Kabuli, JG-11 and Annigeri in that order occupied 49%, 48% and 3% of the areas under in Pakasam.

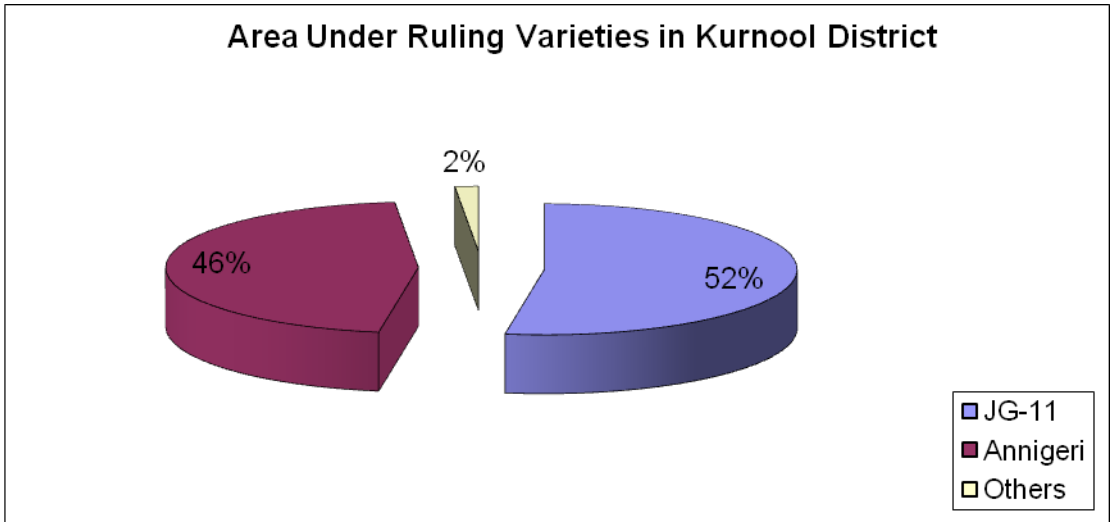


Fig-1: Area occupied by different varieties of chickpea in Kurnool district

Kabuli (Bold) varieties are picking up in Prakasam due to the market preference and JG-11 is picking up due to the in Kurnool district. But the varieties Annigeri and JG-11 and Kabuli are almost became equal to any other local varieties since seed replacement is not done properly by the existing seed distribution system. It is evident that all the varieties lose potential yield if the

seed is not replaced once in every three years. So the preferred traits in the varieties adopted have to be explored.

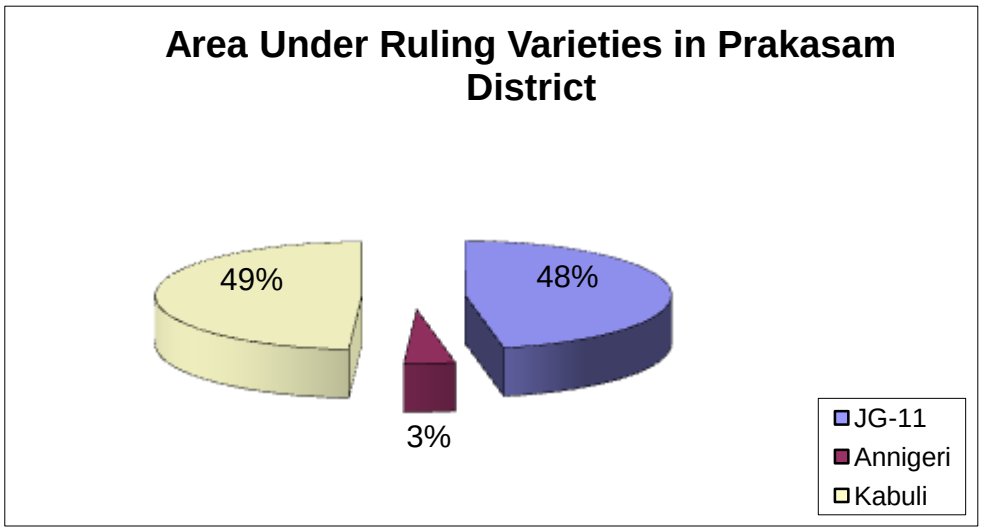


Fig-2: Area occupied by different varieties of chickpea in Prakasam district

Time of Adoption of chickpea

Many studies of adoption showed that not all farmers adopt a given technology or package of technologies at the same time. There are three important factors which influence the timing of adoption. The first one is the nature of the technology itself which includes its compatibility to the existing practices, visibility of the technology, profitability, complexity and tribally with the present knowledge and resources. Except complexity all these factors facilitate adoption process positively. The second one is the socioeconomic condition of the target household. Empirical studies showed that education status, resource endowment, farmer's perception of technology characteristics, cultural setting etc affect adoption of technology. The third important factor is the technology suitability to the physical environment. This includes soil type, temperature, precipitation and the like. Wendland and Sills (2008) classified factors influencing adoption as human capital (e.g. education, age), farm assets endowments and institutional and policy variables that are external to the household. Respondent farmers first adopt chickpea in 1966-67. Gradually chickpea adoption has risen and its reach its peak in 2002-03. Since then the adoption rate is declining. However, the cumulative distribution of adoption of chickpea indicated that although those who adopt chickpea for the first time is on decline, the total number of farmers adopting

chick in the study area is rising. Two periods has shown exceptionally low adoption rate namely 1999-00 and 2001-02. The overall pattern of adoption rate has fitted the bell shape while the cumulative adoption pattern fitted the inverted s-shape hypothesised in adoption literature.

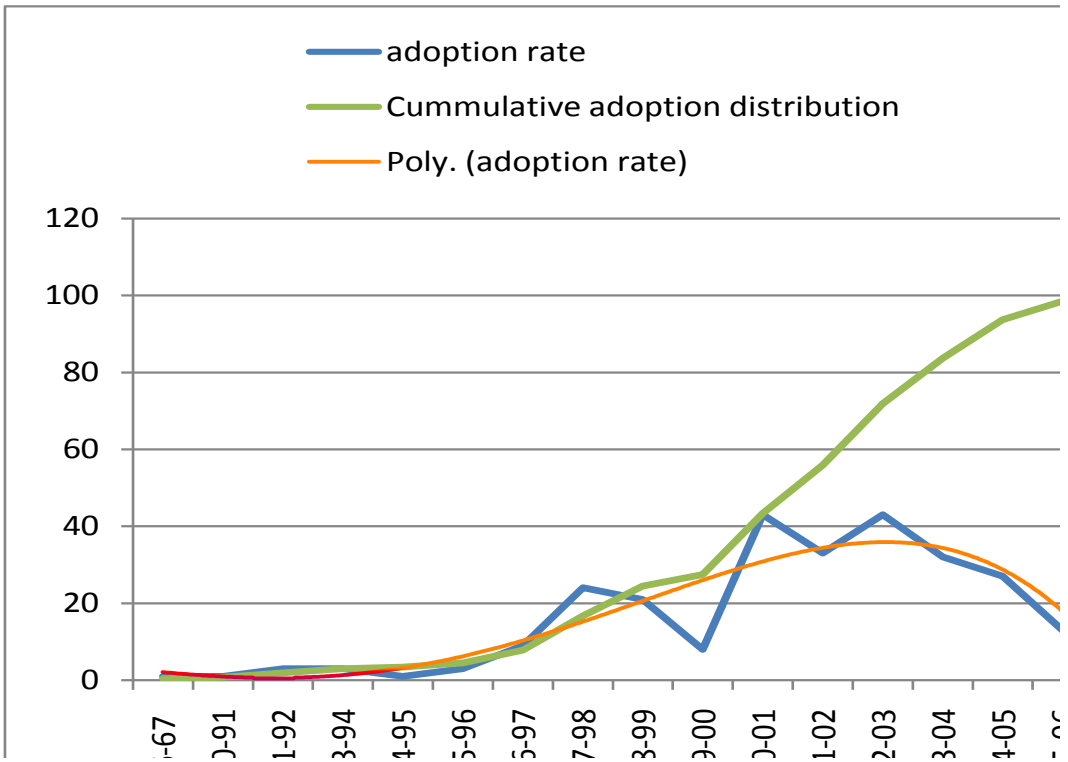


Figure 3: Adoption rate of chickpea in the study districts

Land allocation for chickpea

The allocation of land for chickpea and the number of farmers adopted chickpea production attained its maximum in 2006-07. The number of farmers growing chickpea has increased tremendously year after year. The land allocation for chickpea has shown fluctuation overtime. For instance the average acres of land allocated for chick pea 2 to 1.5 from 1997-98 to 1998-99. Similarly the average acres allocated for chickpea declined from 6.8 in 2002-03 to 4.7 in 2003-04. The number of farmers growing chickpea also flow the same trend with acres of land allocated for chickpea production.

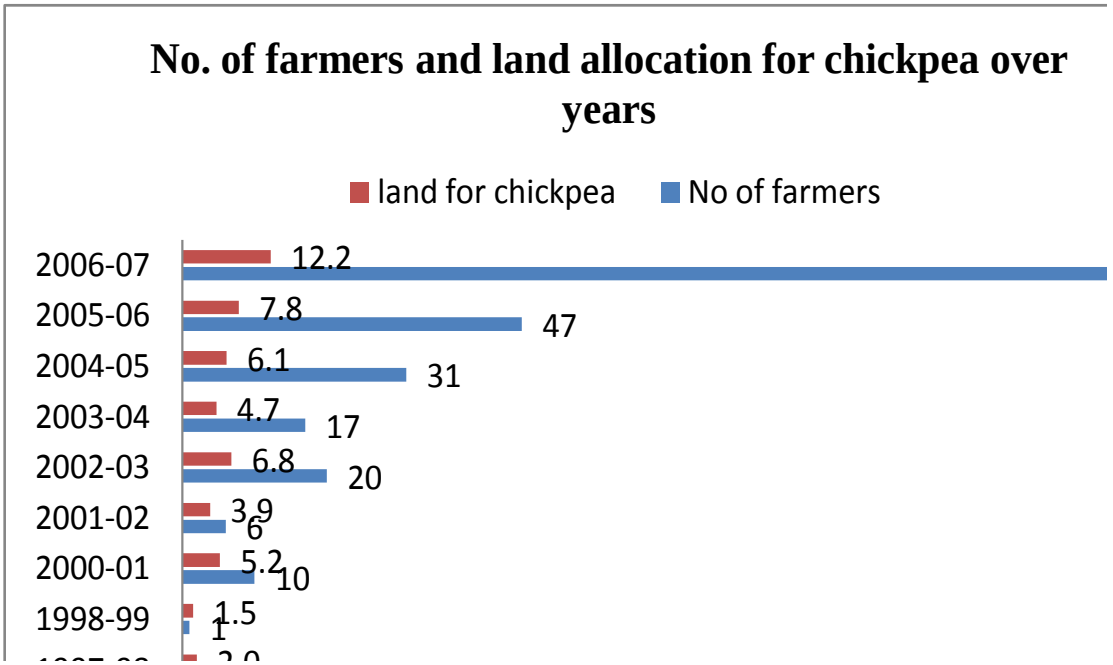


Figure 4: land allocation for chick pea

Why is chickpea preferred by farmers?

The responses of farmers were captured and Garrett scores were worked out and presented in Table 40. Chickpea is preferred by Kurnool adopted village farmers because of fodder availability for their livestock (76), higher income fetching (54.8), low risk and less labour requirement (52.11) for farm operations. Conversely the control villages' farmers attracted to chickpea production due to low risk and less labour intensive nature of the crop (54.38), higher income (52.17) and best suited to my land (51) is was the main reasons mentioned to develop preference for the shift towards chickpea.

Prakasam district farmers of adopted villages prompted for greater chickpea production because of its low risk and less labour requirement (57), higher income (56) and fit well for rotation system (45). The Garrett score obtained from control villages sample farmers also indicated more or less similar evidence. Accordingly, low risk and less labour requirements 60), higher income (55) and bets suited to my land (47) have motivated them to start and continue growing chickpea.

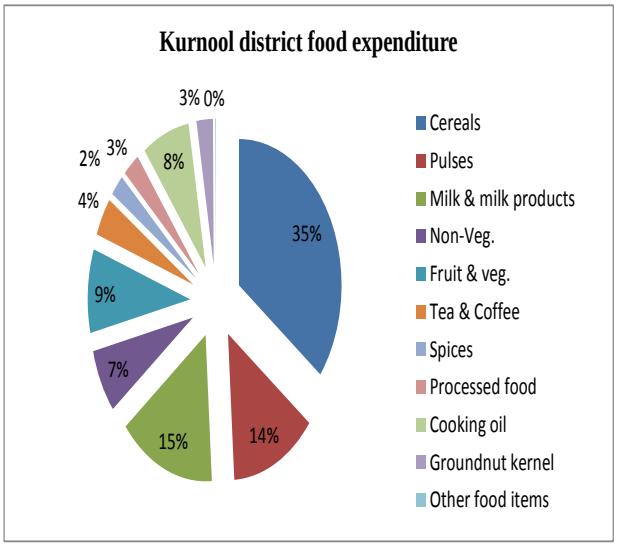
This findings underscore three factors has triggered farmers towards chickpea production both in Kurnool and Prakasam districts viz., higher income, low risk and labour requirement and suitability to the land type. Higher income itself has been influenced by a number of factors such as productivity (supply), demand, price of inputs and outputs (which is again determined by the

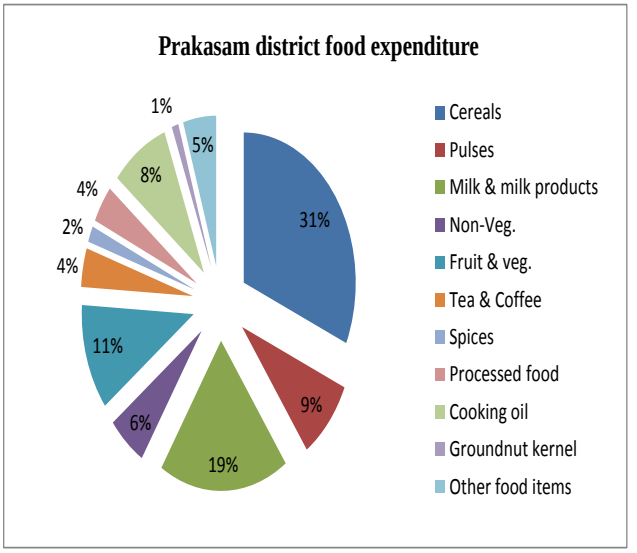
supply and demand), market facility and technical efficiency of the producer. This call for working both in the desirable attribute of chickpea varieties such as productivity, colour and test (food value) in the technology generation process itself as well as put in place appropriate institutions such as market and seed delivery system. The issue of risk in technological uptake has a paramount importance particularly when dealing with subsistence and small farmers. A balance should be kept in minimizing risk and maximizing income. Otherwise the risk aversion behaviour of farmers will affect the pace and level of technological uptake. Last but not least is the importance of considering the agro-ecological characteristics of the target areas. Soil type, amount and distribution of rainfall, pest and disease etc should be taken into account in technology generation.

Consumption

It is appropriate to note the consumption pattern of pulses in the study area. The farmers have regular habit of consuming pulses in different forms. They often use pulse crops like red gram, black gram chickpea and green gram, which is a positive indicator of their consciousness to consume plant proteins in regular diet. In the meantime income is ensured and in turn the food and nutritional security of farm family is attained.

Consumption pattern indicates that pulses are finding a place in the daily bowl of the rural people now which is supported by the NSS round data which indicates the diversion of food habits towards quality food and more nutritious food. So still efforts are needed to propagate the need for taking enough proteins in diet so as to enhance productivity and work efficiency per person. According to A. Amarender Reddy and Devraj Mishra, (2010) about one-third of India's chickpea production is actually marketed and the rest is consumed by farm households. Hence chickpea is main component of Indian diet and any efforts to increase the marketable surplus should rest on increasing the productivity of the crop.





The present study also indicated that the food consumption expenditure share of pulses (including the imputed value of own produced and consumed) in Kurnool and Prakasam was 14% and 9% respectively. It is the third major expenditure next to cereals and cooking oils in Kurnool while it is forth in Prakasam next to cereals, cooking oils and fruit and vegetables. On average the sample respondents sold 5 quintal of chickpea. Hence, chickpea apart from contributing to nutritional security, it also source of income to farm families.

Crop rotation

While examining the performance of any crop among the management practices followed and for sustainability of a new practice, crop rotation becomes a necessary technical component in order to retain the soil fertility status, avoid depletion of natural resources, development of pest and diseases complex due to repeated sowing on the same piece of land. Therefore, the crop rotation information furnished by the respondents in adopted and control villages of Kurnool and Prakasam districts were presented in Table 41. The farmers of Kurnool district in adopted and control villages followed poor crop rotation practices as 98% and 100% of them sow the crop once in every year. But some of them indicated that the land during kharif is kept vacant (fallow).In Prakasam district 9.33% of the farmers informed that they grow every season similar crops without bothering about rotation of crops. About 91% farmers grow chickpea every year, but in adopted villages about 2.96% of farmers grow chickpea in every two years.

It is further supported by information furnished in Table 42 where the crops grown before and after the chickpea are presented. Very few farmers in Kurnool ranging from 1.11 to 4.44 % of the total respondents only grow crops like cotton, jowar and tobacco during kharif and more than 100% of the farmers grow chickpea as a sole crop. Similarly in Prakasam district less than 2 % farmers grow other crops like tobacco black gram, chillies and paddy, but more than 50% of farmer's stick to either chickpea. So this indicates the attitude of the farmers that once they are convinced with the performance of a crop they want to continue the production of the same crop year after year aspiring continued, stable and higher income. But this may sometimes result in crop failures, high incidence of pests and diseases and added cost of cultivation. This finding emphasises the need for revitalization crop rotation. This is a technical gap identified between farmer' practice and recommended in the scientific management practices, which has to be focussed during the extension programmes to motivate the farmers to adopt crop rotation.

Productivity

Chickpea productivity has been affected seasonally based on weather condition. Average yield in a bad year was 393 Kg/ac in Kurnool and almost double ie, 579 Kg/ac in Prakasam. Similarly in a good year in Kurnool chickpea yielded 759 Kg/ac and in Prakasam about 985 Kg/ac. The best yield recorded in Kurnool was 764Kg/ac and 1045 Kg/ac in Prakasam. The yields recorded in Prakasam district are quite higher when compared to Kurnool due to fertile black cotton soils and better management practices adopted by farmers.

In both bad and good year Prakasam farmers enjoyed better yield as compared with Kurnool farmers. There is also a noticeable yield difference between irrigated and rain fed production. Irrigated production is less susceptible to yield reduction as compared with rain fed production.

Potential for area expansion

Chickpea area cultivated by the sample respondents in terms of area expansion for the past five years have been examined and presented in Table 43. Chickpea is on area expansion trend as indicated by 60% and 46.67% of the adopted and control villages farmers in Kurnool respectively. Among the total respondents, 31.11% and 48.89% farmers are constantly maintaining the area

under chickpea. Only 9% and 4% of adopted and controlled area farmers are responded that they are allocated less area of land for chickpea in Kurnool.

But in Prakasam district 34.44% and 35.56% of the farmer's from adopted and controlled area is increasing area under chickpea respectively. About 64.45% and 62.22% of farmers reported that they are maintaining the area under chickpea at constant level. It can be inferred that the scope for area expansion is more in Kurnool than in Prakasam. It seems the area has reached to a peak in Prakasam district. Never the less, the area under similar farming situations may soon be converted into chickpea in the surrounding area of the study area. To sustain the area already reached under the crop requires better yielding varieties, seed delivery system, extension, market facilities.

In both study districts crops such as cotton, sunflower, ground nut and Tobacco has been replaced by chickpea (see Table 44). The extent of replacement is rampant in case of cotton. About 75% and 55% of sample farmers in Kurnool and Prakasam replaced cotton with chickpea. Sunflower has also got replaced by 41% of sample farmers in Kurnool where as only 36% of farmers in Prakasam did so. The replacement of groundnut and tobacco was less than 25% in both districts. In both districts the controlled villages sample farmers has replaced these crops with chickpea more than the adopted villages sample farmers. A study by P.K. Joshi and R. Saxena, (2002) revealed that Andhra Pradesh is one of the non-traditional area where chickpea production enormously mounting both in terms of area and productivity. The some study shows that the annual compound growth rate of area in chickpea increases from 2.23 in 1980s to 11.16 in 1990s while production rise from 6.84 to 9.28. However, the increase in area and production is not accompanied by yield (productivity) as it decline form 4.51 in 1980s to -1.88 in 1990s.

As presented in Table 45 chickpea is grown as a sole/pure crop in both the districts Kurnool and Prakasam unlike other pulse crops such as pigeon pea. The adoption pattern indicates that 2006-07 is the peak year of adoption which is the reference year of the baseline, so the study area has implicated the existence of good potential of area expansion under this crop. Annigeri is a variety which occupied an area ranged from 3.21 to 7.56 acres in Kurnool, but has less average area from 2.2 to 4.25 acres per household in Prakasam. This substantiates the facts that Annigeri is not a variety preferred any more particularly in Prakasam. Kabuli variety is preferred in Prakasam and suitable to soil and market needs. The other variety JG-11 equally preferred in both districts, ranged from 5.17 and 7.51 acres in Kurnool and from 7.21 to 7.54 acres in Prakasam. This

necessitates a probe into the traits of JG -11 and keep them tracking in the new research programmes for releasing new varieties. The preference of JG-11 reveals interesting stories to the breeders to incorporate this variety in to their breeding programmes. This also insists on the need to design seed replacement programmes to protect the potential yielding of the variety as presented in Table 49.

The seed system

In India, 80 percent of the farmers rely on farm-saved seed (Gaur PM, et al., 2010). Exchange of seed through farmer-to- farmer net work, purchase from local shops and market is also occupying distinctive role. However, the informal seed system is characterized by lack of functional specialization and quality control. Farmers follow the following procedure to select seed from their own stock. First they separate the good quality seed at harvest and do threshing separately without mixing with the rest of the harvest. They dry and store it until it is sown. While the procedure is a stepwise one, when it comes to storage they practiced two types' viz., store in clean gunny bag and store in a separate room. It has been shown in Table 50 that former is the most commonly used practice both in Kurnool and Prakasam districts. Although their number is few some farmers stored seed in underground storage structure, storage room, warehouse, go-downs etc.

Purchasing seed

The criteria considered by farmers when they purchase seed from external source are explored. In Kurnool both adopted and controlled area villages the sample respondents have shared the same criteria in their decision making for purchasing external seeds. According to the survey finding the potential yield of the seed (91), price (73), certification (58) and brand name (49) were standout to be the most important criteria for seed purchase. Where as in Prakasam study villages price (75), certification (67), yield (58) and Brand name (53) were important criteria.

It can be inferred that there is awareness about certification and brand in both districts. An effective seed distribution net work to produce and supply certified seed and to ensure good quality seed through public research institutions and seed corporation is desired. To ensure reasonable seed prices allowing private players to play critical role in the seed delivery system is

essential. However, strong institution capacity in seed regulation with respect to quality control, price and branding may require for safeguarding the interest of farmers. Meanwhile enhancing the skills in seed production and building the capacity of the region in seed production and delivery may need the attention of the concerned decision makers.

It is well known fact that the performance of a crop variety adoption depends on seed availability, information flow, on potential yield and profitability. Knowing that the successful adoption and sustainability of a variety in long run is indispensable from seed delivery and augmenting the productivity of the crop in the long run, the study concentrated on eliciting information on the problems faced by the farmers with respect to seed from multiple angles and Garrett scores are worked out to identify the major constraints with respect to the purchase of seed and the finding are presented in Table 53. The result of Garrett score revealed that three major constraints pointed out by Kurnool farmers are lack of information about good seed (57.56%), need to travel long to get good seed (56.62%) and non availability of good seed (52.98%) in that order. In the district of Prakasam again the major constraints are the same with a slight change in order, long distances (57.98%), lack of information (55.81%) and non availability of quality seed (53.21%). This emphasises that farmer realises the need for quality seed and they do not have proper information and readily available local seed sources. In a study conducted in Gujarat points out that the demand for chickpea seed is limited in demand as the varieties adapted to a specific agro-climatic region and such a potentially low demand structure is not attractive for seed industry (Shiyani, et al., 2001). So the efforts needed to popularise a suitable variety not only depends on information provided to them through effective communication but also on making the good quality seed available at a distance which not far from their habitat. The established channels of communication by NGOs can be used as information dissemination centres. This requires a holistic multi-disciplinary approach in transferring the technology to the land and in obtaining the feed back from land to lab.

Constraints

Pest and Disease Management:

Pest and disease management becomes very crucial in chickpea as it is a host crop for boll worms which is capable of devastating the crop yields in crops like cotton and chillies etc. Boll worm (*helicoverpa*) is reported as a major pest by 87 and 64 farmers of Kurnool and Prakasam

farmers respectively. It is the most important pest of chickpea in all the chickpea growing areas. It damages almost all the pods in case of severe damage, but causes nearly 20-30% annual yield losses in India (Gaur PM, et al., 2010). Similarly root wilt is major disease as noticed by 133 and 66 farmers in Kurnool and Prakasam respectively. Root wilt seems to be persistent in Kurnool when compared to Prakasam district. These two are capable of reducing the yields considerably by establishing themselves either on alternate hosts or in soil, if proper crop rotation and management techniques are not followed. That is why recently the extension programme aimed at promoting integrated plant management (IPM) for controlling boll worm and root welt in order to sustaining chickpea production in the region. The breeding programme shall aim at developing cultivars that resist Boll worms and root wilt. At least the locally adopted varieties and landraces germ-plasm can be utilised for developing resistance chickpea varieties.

Frequency of occurrence for *helicoverpa* as well as wilt was high during the last five years. . The principal biotic constraints, which limit chickpea production in hot and dry environment are wilt and root rots among major diseases and pod borer and leaf minor among insects (Ali *et al.*, 1997). However, the damage caused by boll worm considerably high in terms of the percentage area affected ranging from 8.37 to 10.85 per cent in both districts. When it comes to economic damage in terms of yield lost wilt causes much harm to the farmer. According to Kurnool sample farmers they lost 15.64% of yield to wilt while Prakasam farmers accounted the yield loss to wilt to 5.34% only.

The majority of sample farmers in Kurnool (61%) and Prakasam (74%) perceived that the problem of pest and diseases in chickpea production are increasing (Table 56). The respondent farmers' response to the causes for increase in the pests and diseases are summarized using the Garrett scores and presented in Table 57. The result indicated that majority of farmers were with the opinion that they are not following integrated pest and disease management, the second being growing of alternate host crops only and thirdly unfavourable climatic conditions. This implies that farmers in this area already got some exposure to integrated pest management and they are not able to practice it properly. The reasons for not adopting IMP have to be explored further. IPM measures even though its importance is well established, unless its transfer mechanism well organised trough user friendly ways it poses a menace and the consequence is more than what we spelt out in these areas as they are a potential belt for chickpea crop expansion.

Measures adopted in controlling the pest as per the Garrett scores indicated in Table 58, show that majority rely on chemical control. Where as for controlling the diseases scientists suggest altering the sowing time is as the most effective strategy and then second option would be chemical control. There is clear gap in the scientific control recommended and farmers practice which re-emphasise the holistic approach in training the farmers from seed to seed

The various sources of information for the application of pesticides, time of application, and quantity of use and method of mixing are furnished in Table 59. The Garrett scores indicated that in Kurnool district adopted farmers expressed that Research Institute (60.67%) is the main source of information to them while the control villages farmers pointed out that fellow farmers (65.78%) as main source of information. Prakasam district for both adopted and control villages farmers input supplier is the main source of information. Regarding their decision on what type of pesticide to be used 59.83% in Kurnool and 59.35% in Prakasam districts relied on input suppliers. About how much quantity has to be used fellow farmers and research institute are the best sources of information in Kurnool and fellow farmers only are the main sources of information in Prakasam. Regarding the mixing of pesticide Research Institute is the most important sources for Kurnool farmers and neighbouring farmers are the best source of information to the farmers of Prakasam. In various aspects of usage of pesticides discussed it can be understood that Research Institute, input suppliers and fellow farmers are very important channels of dissemination of technology therefore, training can be imparted for them deliver the message in a proper way.

Constraints in cultivars

According to the computed Garrett score the first five constraints namely low yield (61.8), small grain size (55.6), poor test (55.3), long duration (53.6) and poor colour (52.6) are mainly reflecting the cultivars traits. These constraints could directly affect the marketability, price, profitability and income of the farmers. The long duration traits of the cultivars are a crucial impediment as the drought incident become frequent and sever. This feedback has a strategic importance for the on-going breeding programme and those initiated in the future in order to overcome the constraints voiced by farmers. Pest infestation (47.4) is a crucial problem in chickpea production. K.P. Joshi et al., (1999) ten years back documented that wilt and root rots are major diseases while pod borer and leaf minor are major insects that constrained chickpea

production in hot and dry climate region. Hence, to overcome the problem of pest and disease pest infestation extension and research institutions should design effective education and user friendly and cost effective protection methods. Strengthening the use of IPM and pest control mechanism is essential. Low market price (44.8) was also got mentioned as a constraint. This requires further prove in terms of precisely identifying the required traits in the market and if there is additional marketing malpractices which leads to low price that affect farmers wellbeing.

High disease infestation (43.4), low recovery or shelling (40.5), poor fodder quality (38.2), not fitting into the cropping system (31) and susceptibility to storage pests (30.8) are also the constraints prevailing in the study districts. It can be inferred from farmers' response that the constraints are holistic in nature it cuts across the cultivars traits, market condition, enterprises linkage (crop-livestock through fodder), technology generation and transfer capacity.

Seed delivery system

Good quality seed of high-yielding varieties is a critical input in crop production for obtaining high yields. Inadequate availability of seed of improved cultivars in chickpea has been a major bottleneck in adoption of improved cultivars by the farmers. The present study revealed that farmers are mostly using their own stored seed, which is often broken and has poor germination potential. Generally the seed replacement rate is very low and the cultivars grown are very old. Farmers mentioned travelling long distance to get quality seed is a constraint and this has witnessed the poor seed delivery system prevailing in the study area. The price of improved seed is high and it is forcing farmers to use their own seed. Farmers also lack adequate information about the seed delivery mechanism operational in their respective area. Despite the increasing trend in the expansion of area under chickpea, the potential of the study districts and the growing market demand; the rate of adoption of chickpea is far from desired level cumulative due to the constraints discussed above.

Preferences along the Value Chain:

Farmers' preference is the most crucial yet the least recognized factors in technology generation and transfer process. When we say preference, the natural question is whose preference? We argue that the preference of all key players in the value chain of chickpea production matter equally. Farmers would have a dual role in preference analysis as they are mostly producers and consumer. There is also a positive development as participatory approach

such as PVS and PPB are emerging as the recognition for the need to incorporate farmers' preference. For instance R.L. Shiyani et al (2000) pointed out that Krishak Bharati Cooperative Limited (KRIBHCO and ICRISAT) using farmers PVS, identification of improved varieties having farmers preferred traits and their procurement was effective. However, in today's free market economies where even the subsistence farmers are integrated with market our preference analysis should incorporate other actors in the value chain.

Preferable of cultivars for production

Ten traits were employed for the identification of appropriate chickpea cultivars for production purpose. The Garrett score reveals that high yield (66.2), short duration (55.6), drought resistance (52.8), Early Maturity (43. 4), pest resistance (41.56), fitting into the cropping system (36.83), disease resistance (35.1), improvement of soil fertility (33.7), more recovery or shelling (31.8) and FP (23.31) came to be important traits in that order. A number of issues are apparent form this findings. First productivity (high yield) is the most important traits valued by the sample framers and the breeding programme shall take this preferable trait into account in variety development. Second the varieties preferred for production should not only provide high yield but also drought tolerant, ripen with short duration and pest resistance. It is very clear that farmers are vigilant in terms incorporating risk into their preference setting. Hence, according to the Garrett score the preferable trait for production not only satisfies their interest in terms of yield but it should also incorporate risk reduction quality such as drought and pest resistance. According to IIPR, (2010) there has been shift in chickpea area from cooler long duration and highly productive environment to warm, short duration, rain-fed and less productive environment. Thus, the upcoming scenario indicate that there is should be a clear strategy in chickpea variety development to meet the growing demand of cultivars in drought prone and pest susceptible areas keeping the preferable production trait into consideration. In a par with this Joshi and Witcombe (1996) argued that early maturing varieties of chickpea are given high preference by the farmers because these escape drought due to receding soil moisture and escape in pod-borer infection traits. Shiyani, R.L, et al., (2001) also found out that chickpea producing farmers in Gujarat preferred early maturing chickpea cultivars as they escape drought, fetch good price in the early season before mass harvest reach to the market and earliness also help to escape pod borer infestation.

Among the varieties grown by farmers Annigeri is the most preferred one in terms of productivity. In all adopted and controlled villages of the study districts it has got the highest Garrett score. Following, Kabuli is the second productive variety and JG-11 is the least preferred one. However, when it comes to short duration, JG-11 is the most preferred variety and it ranked first in Garrett score. The drought resistant Garrett score favour Annigeri and Kabuli than JG-11. One can see that there is trade-off in terms of farmers preferred traits and *vis-a-vis* the existing chickpea varieties performance. Annigeri is productive, resist drought but it takes long duration for maturity. It means risky in drought prone area, where as JG-11 is less productive, mature early and hence escape drought situation. That's why wilt and rot tolerance also a preference, but farmers some times are mistaken in identifying wilt or terminal drought. ICCC 37 is a high-yielding variety, matures in 90-100 days and resistant to wilt and tolerant to dry root rot (Kumar *et al.*, 1985). It can be seen from farmers perspective that whenever the climatic factors is favourable Annigeri is the choice while in drought condition JG-11 is preferred. From this finding we suggest that researchers should incorporate the risk elements farmers facing in their variety development programme as it matters in farmers preference setting while they choose variety for production.

Preferred consumption traits of chickpea variety

It can be said that the benefit of incorporating women preference at the early stage of varietal development is not only help in developing the best variety preferred by the faming community as whole but also it saves the cost of rejection if women's preference is ignored in the process. From consumption point of view a variety which takes less cooking time is most preferable one. It is impressive that incorporating women preference in varietal development will enhance varietal adoption as well as marketability of the variety as they are the one who make choices in terms of which variety to be bought for consumption. Consumption preferred traits for Annigeri and JG-11 were similar less cooking time (69.79%, 75%) and high keeping quality (49.65% and 46.97%) in Kurnool. Similarly in Prakasam also the preferred traits for Annigeri were less cooking time (63.89%) and high keeping quality (42.71%) and for JG-11 less cooking time (57.86%) and better taste (50.86%).For Kabuli (KAK-2) also preferred traits were less cooking time and high keeping quality (Table 62).

The shelf life and taste also matters in the choice of variety for consumption. It can be learned from Table 62 that all the existing varieties of chickpea in the study districts satisfy the consumption traits.

Preferred traits for fodder in chickpea cultivars

The Garrett score depicts that fodder quantity (55.12) matters more than palatability of the fodder (50.46) and its durability (43.6). In crop-livestock farming system the variety selection is influenced by the by-products. In such farming system there is a flow of resources from one enterprise to another and decision making in this case is quite complex and it requires a close look at of farmers decision making process to come up with varieties which satisfy the multiple production objectives of farmers. According to the present study the quantity of fodder is an important trait in selection of chickpea varieties. Therefore, among the varieties grown in the adopted and controlled villages of the study districts KAK-2 AND JG-11 were the preferred for their higher quantity of fodder. Following, the fodder palatability is an important trait it be considered in variety selection. The finding confirms that Annigeri is the most palatable variety. Least but not last farmers consider the duration the fodder can stay without losing it quality. In terms of this trait JG-11 and KAK-2 are performing better than Annigeri variety. The preference to the fodder yield can be further examined by considering the relation between yield levels, the duration of the crop, which seem to be inversely related and given a choice whether the yield or fodder is preferred.

Preferred traits of marketing in chickpea cultivars

From marketing point of view high demand, lucrative output price and low price fluctuation is important traits of consideration in chickpea variety selection. According to the Garrett score convincingly Annigeri has enjoyed higher demand as per the adapted and controlled villages sample farmers response in both Kurnool and Prakasam districts. Likewise it command higher price compared to others. This is expected as higher demand triggered upward movement of price. Price fluctuation poses a significant risk in agricultural production. Studies have shown that farmers irrevocably learn to avoid those varieties which is characterised by high price fluctuation. The Garrett score indicated that all the varieties of chickpea currently grown by farmers are characterised by price fluctuation. The reason for price fluctuation could be either

demand or supply side factors or both. Addressing these problems is critical for enhancing adoption of suitable chickpea varieties and stabilizing the production overtime.

Desirable Traits in New Cultivars and Premium Prices of Selected Crop

Table 65 presented the desirable traits farmers are seeking in new cultivars and their willing to pay over the existing market price to acquire the variety which meet these traits. High yielding variety (HYV) is the most desirable traits for the majority of sample farmers (230) and they showed more than 18.8% willingness to pay over the ruling market price. A simple comparison between adopted and controlled villages in terms of percentage of farmers seeking this trait revealed that adopted area sample farmers (75.5%) are demanding HYV more than the controlled area farmers (39.4%). This might be due to the exposure of the former to HYV than the latter. Disease and pest resistant variety also draw sample farmers interest and they are willing to pay more than 20% of the existing price. Grain size matters in new cultivars selection. Farmers prefer big grain size and they are willing to pay 12% more of what is currently costing them. It has been learnt from the result that in both disease and pest resistant and big grain size traits adopted area sample farmers showed more interest than the controlled area sample farmers. Two interrelated traits viz., drought resistance and short duration flow as forth and fifth important traits. In line with the expansion of chickpea cultivation along with hot and dry climate regions, one can expect a rise in demand for drought resistance crop. This fact was well pointed out ten years back by P.K. Joshi, et al., (1999) found *rabi* fallow and marginal lands released substantial area for chickpea cultivation and enormous expansion in these areas. Learning where the area increase expected i.e. marginal, hot and dry climate for chickpea production would help to recognize what kind of varieties to develop. Short duration varieties which effectively utilized the available precipitation and reach for maturity in less than 90 days is the most preferred in this environment and should be the focus of breeding programme. In conformity with this the sample farmers confirmed that they are ready to pay 20% and 14% over the market price for drought resistance and short duration varieties respectively.

The whole more than the sum of its parts

The knowledge we get regarding individual components of a system is necessary but not sufficient condition to understand the whole, this is particularly true in agricultural research where we deal with human, institutional and biophysical components of a system. The understanding of

the need for holistic approach paves a way to an alternative thinking. Thereof a technology or innovation is no more considered as an object or simple idea generated by technocrats; instead it is viewed as an outcome of the serious deliberation and reflection of multiple actors embodied in it their preference and choice. Any deviation will result in a rejection of technology outright or in the process whatever attractive it is from a single actor perspective. If we take the crop production component in the prevailing farming system of the study districts (Kurnool and Prakasam) it interacts with the livestock component, market (consumers, retailers, wholesalers and processors), input delivery agents, research institutions (execute policy priority which reflect general public interest), the natural environment (soil fertility, pest and disease check), etc. Farmers as a producer prefer high yielding, drought and pest tolerant, short duration, better quantity and quality fodder; variety which maintain/enhance soil fertility, profitable chickpea cultivars. As consumer they prefer chickpea cultivar which is cooked with less fuel, testy and had prolonged shelf life. Where as the players in the various market chains prefer chickpea cultivars with specific colour, grain size, clean, disease and pests free and fetch premium price for maximizing their profit objective. The research institute design a chickpea breeding strategy to meet the general public interest and may strive to enhance production and productivity to secure per capita consumption of chickpea or specific foreign exchange target or resource use efficiency and price stabilization. Hence, the success of technology generation, dissemination and its uptake (adoption) depends on how much balance we kept to accommodate the preference and interest of various actors.

For the success of technology generation, dissemination and widespread adoption understanding the whole of the system is a key. In addition manipulation of incentive through policy instrument (market and non-market forces) can help to stabilize the preferences of various actors for successful technology transfer and agrarian transformation.

Gender difference

Any intervention in agriculture that deals with issues related to the production, protection and use of crops impact on gender in a number of ways. Firstly, whilst much of the work undertaken to enhance productivity (variety development) and protect crops is highly scientific the implication of this work is that crops will be more resistant to disease and pest and should thus provide better harvests. As with most agricultural activities there is a sharp gender division in the roles undertaken in the fields which leads to women and men are to be in charge of different

activities. Hence there is a strong need to examine the implication of the introduction new technology on the established gender role of the community under study.

A perusal of Table 73a shows men wand women have performed different task in chickpea production. It is also more apparent that the gender division of task is neither static nor uniform among communities. For instance in Prakasam women took part in non-conventional tasks for their sex such as land preparation, seed sawing, selection of crop, variety, watching etc. while in Kurnool women do not participate in such kind of activities. The common tasks performed by women in both districts are hand weeding, harvesting main crop, land clearing and fodder harvesting. Particularly hand weeding is mainly done by women.

Any research that reduces the need for weeding (by developing improved weed-resistance or developing inter-cropping patterns which reduce the quantity of weeds, for example) is likely to have a positive effect on the work load of women. Likewise improvements in pest management which lead to a reduction in the use of pesticides are likely to positively impact upon men (who spend time spraying crops) and upon the household budget as a whole. However, one should be extra conscious about the impact of technological intervention on gender. Padmaja and Bantilan, (2005) shows that the adoption of a package of groundnut technologies (including new land preparation and planting methods, seed treatment, fertilizer use and irrigation) recommended for farmers in Maharashtra has led to aggregate increases in female labor demands, but most of the gain is in hiring of female wage labor. A general outcome of the focused group meetings in the study area is that the wage discrimination is glaring for men and women though studies reveal that the contribution of labor component to the total cost of cultivation is increasing which is also confirmed by the results of the study, there a persistent wage discrimination found. In such case if the technology increases the physical work burden at a low wage rate may lead to disguised unemployment of women labour because the rate of shift of men labour to non farm sector is more compared to women. Hence, a technology may reduce work burden of women and increase their leisure time or time for other productive work, or it might increase their work burden which leads to more employment opportunity for poor women, it should keep the relative wage earning also in consideration so that their overall wellbeing is enhanced.

. **Gendered wise ownership of resources**

Resource ownership defines the power relation that exists between men and women. Men in many society enjoyed greater access to and control over resources than women. This skewed

ownership of resources has shrunk women's sphere of influence in many aspects of life and in day to day decision making. According to Bennett (2005) being able to secure and maintain ownership of assets (be they financial or physical) is an important factor in establishing some degree of financial security and in being able to exercise influence over how the resource is managed. Ownership is often dictated by legal frameworks (both formal and informal) which in many cases place ownership in the hands of (male) head of the household. Our understanding of the power dynamics at household and community level can better develop only when we see things from gender perspective. The gender disaggregated information on the ownership of resources presented in Table 74 give us which resources owned by whom. Most of the assets and resources such as credit, implement, investment, land livestock and machinery are owned by men. Land and livestock which have practical importance to the wellbeing of women are controlled by men. From chickpea production point of view women's perception of resources is negligible as most of the resources required for chickpea production are in the hands of men. In the absence of ownership to land, credit, livestock, machinery and implements one can not make effectively decision regarding chickpea production. However the poverty targeted programmes are aiming at creating the ownership attachment to women farmers and participation in PVS trials would enhance the decision making ability and participation in active decision making. The level of women's perception of ownership of inputs such as fertilizer, pesticide, seed, hired labour and even their own labour is extremely low. Women also have very little ownership feeling over output sale. Although their participation in chickpea production activities such as land clearing, hand weeding, fodder and crop harvesting insured as shown in Table 74, when it comes to benefit they do not have control over chickpea sale.

Decision making with respect to various resources

Decision making can not be seen in isolation with resource ownership and control. Those who are in charge of the resources make the final decision. From the basic decision of what crop(s) to produce to the marketing of outputs, most of the decisions are made by men. Hence, the perusal of Table 75 indicates that resource ownership and decision making with respect to resources are mirror image of each other. So the analysis of decision making with various resources uses shows that women do not have decision making authority over household assets, inputs and outputs. They have jointly decided on issues such as children marriage, education and house maintenance.

Women's sources of information about government programmes

Information is very vital in our day to day lives and decision making. The level of access we have to quality and reliable source of information could influence the outcome of our livelihood and wellbeing. Individuals who have assured access to reliable information could have a greater possibility for improving their living standard while who lack it would be affected negatively. Many studies indicated that access to information is influenced by gender. As a result men and women do not have the same sources of information. As presented in Table 77 women's sources of information about governments programmes are numerous and their importance varied spatially. According to the Garrett score in Kurnool adopted villages the three important sources of information are internet (64), community leader (49) and government agents (44) while in control villages' friends, relatives and neighbor (49), group/association (36) and community bulletin board are the prominent sources of information. The respondents in adopted villages of Prakasam mentioned that internet (58), group/association (40.5) and television (38.3) are the three most important sources of information in order of importance. Whereas in control villages of Prakasam, group/association (77), internet (57) and training melas are the most important sources of information in that order. Radio, community, local and national news paper, field days and Krishi are also used as sources of information at various extents in both districts.

This finding is useful in many ways. First it revealed that women are using both the traditional sources of information such as friends/relatives/neighbors, local leaders, group/association and modern one such as internet, television, radio and newspaper. Second, the importance of the different sources of information intra and inter district are varied. Both have significant implication for designing effective communication strategies to reach women. First we need to incorporate both traditional and modern sources of information to improve women's access to information. This will contribute much to bridge the gender gap in accessing information. Second, the strategies to be designed should be tailor-made to suit the need and importance of the different sources of information into consideration.

Markets and seed delivery as critical constraints

Two critical points that is seed delivery system and the markets emerge from a systematic study of adoption pattern and constraints and markets, which have to be addressed. The examination of existing seed delivery system revealed that there is no systematic seed distribution net work. The existing seed delivery system comprises of a regulated channel of seed distribution

system, where there is the state seed development corporation to multiply the foundation seed in farmers fields foundation seed from the public sector. The distribution network is through the district cooperative societies facilitated by the state department of Agriculture. Part of the seed production in other crops is done by private agencies. The role of private players is not noticed much in case of chickpea as it is self pollinated crop. Now the farmers are more depended on purchased seed from an external agency and do not produce own seed. This linkage can be developed by the state department of Agriculture by adopting seed village programmes and encourage them to produce seed. If the total seed demand has to be handled by the public sector it is highly impossible, and there fore this leads to the spurious seed and impure seed entering the distribution network.

In the usual course the farmers own seed can be produced and re-used by the farmers by maintaining simple procedure and following rouging for three years. Ideally a replacement ratio of at least 30% can be systematically done.

Even though regulated markets are existent again the market arrangements are not favouring the farmer, the flow market information is not proper. Never before the preference of the value chain agents considered even though they are responsible for total value addition.

Quality of the produce brought for sale is influenced by climatic conditions, proper time of harvesting and drying along with other post harvest management practices like cleaning and grading.

Lessons learned and feedback to breeders

Some feed back in terms of the emerging issues

Preferred traits by farmers for production

Over all short duration, high yielding, pest and disease resistant and drought resistant varieties are preferred by farmers.

Preferred traits by for marketing –farmers

No proper specification they relied on market agents preference their interest is to get high price.

Preferred traits by farmers for consumption

The traits preferred are less cooking time and high keeping quality fro consumption by men.

Preferred traits by women farmers

The range of preferences of women varied across for production, consumption and marketability. From the consumption point of view better taste and less cooking time are preferred by women.

For those preferred qualities such as better taste, bigger grain size, drought resistance, high yield and less cooking time etc women expressed their willingness to offer higher price ranged from Rs. 28/- per Kg to Rs. 32/- per Kg in Kurnool and Rs 27.50 to Rs 31.50 per Kg in Prakasam.For JG-11 cultivar bigger grain size is preferred in Kurnool and high demand from market fetches good price.

Preferred traits by Commission agents and traders

Traders considered bigger grain size as preferred trait in case of Annigeri, JG-11 and KAK-2 cultivars, second trait preferred was better taste for Kabuli type KAK-2 and pest disease free material for Annigeri and JG-11.

Preferred traits by processors

Processors of chickpea specified that grain should be of bigger size, colour and pest disease free grain are preferred traits. Bigger size is preferred as dal obtained will be bold. Later they preferred to have better taste and high recovery rate are traits that are preferred

Preferred traits by retailers

Retailers also preferred better taste, bigger grain size and less cooking time keeping their customer's interest in view

Preferred traits by rural and urban consumers

The top three traits preferred by the consumers are better taste, bigger grain size and keeping quality for KAK-2 whole grain. and for dal preferred qualities are better taste, big size , followed by colour and keeping quality.

Among all the stakeholders of value chain farmers and women expressed the if seed is available with the desired qualities in it they are ready to pay a premium of 25 to 30 % more than the existing seed price and the rest of the value chain agents were ready to offer a premium price to the clean and superior produce and for the desired qualities also promise to pay 30% more price than existing price. This indicates the quality consciousness of the produce along value chain specially in post globalisation era.

Viability of chickpea

Chickpea is a viable crop as the consistent yields and less price fluctuations and the farmers adoption even at a low yield performance to the potential yield indicate that it is economically viable. The benefit cost ratio is higher at Prakasam when compared to Kurnool

Critical gender issues

The lesson learnt from the gender analysis highlighted the need to involve men and women in technology generation and dissemination effectively. However, the current women position in terms of resource ownership and decision making is worrisome. Despite their clear role in both technology generation and adoption they are not involved in decision making and they have little control over resources and output produced through their labour input. This negatively affects not only women but also the wellbeing of the community. Many studies show that the participation of women technological intervention speedup adoption and benefit children and the family as whole in many ways. For example, a gender analysis of the impacts from the improved groundnut production technology introduced in Maharashtra, India during the late 1980's led to the conclusion that gender is a key variable in relation to labor activity pattern and time use, decision-making behavior concerning resource use and crop product utilization and perceptions of needs of new technology development (Kolli and Bantilan 1997).The empowerment of women will enhance the collective wellbeing and further speedup betterment of livelihood and living standard. They play a significant role in storing the produce and so the clean post harvest management and scientific storage can empower them to take care of the nutritional security of the household. In today's world, access to information will make a difference. Information distribution is skewed and favoured men than women. It is high time to design appropriate communication strategy to reach women effectively. To this effect identifying the sources of information is essential. This study indicated that women in the study area are got informed about government programmes from both traditional and modern sources of information. This study has pinpointed some of the hurdle in technology transfer and adoption from gender dimension. However, it overlooks the importance of disaggregating women and men preferred traits in chickpea varieties. The wage discrimination seeks attention if women have to continue with chick pea activities

Women preferred traits are crucial and they are representing consumer's preference and the market requirements. More over the activity profile shall be designed in terms of labour hour instead of mere involvement in a particular task.

Critical action points

- The PVS and adoption of varieties can be a holistic package to be pursued

- Display of comparative results at the village level at all important centres as permanent hoardings
- Seed distribution network use the existing network efficiently with slight intervention, coordination and feedback mechanism
- Estimation of seed demand by involving the local network of people in touch with farmers
- Seed village production – Community net works like self help groups for seed production and market integration by training them. For this the communication and strengths women farmers can be used
- Use of existing communication channels for the dissemination of market information
- Take care of gender issues so that adoption at a later stage will not be affected by technology spill over on any category
- Shortlist the varieties from PVS trials and examine for the preferred qualities.
- Involve the value chain agents and convince them by organising focussed meetings with them by taking the help of AMC officials.

References

Ali, Mosood; P.K. Joshi, S. Pande, M. Asokan, S.M. Virmani, Ravi Kumar and B.K. Kandpal (1997), "Legumes in Indo-Genetic Plain of India", Paper presented in the Workshop on Legumes in Rice-Wheat Cropping Systems of the Indo-Genetic Plain: Constraints and opportunities, 15-17 October, 1997, International Crops Research Institute for the Semi-Arid Tropics, Patancheru-502 324, Andhra Pradesh, India.

Amarender Reddy and Devraj Mishra, (2010). Growth and Instability in chickpea production in India.

Bennett.E (2005)."Gender and the DIFD RNRRS: A Synthesis' Final DRAFT December 2005, Prepared for the AFGRP, University of Stirling.

CIMMYT. (1993). The Adoption of Agricultural Technologies: A Guide to Survey Design. Mexico, D.F.: CIMMYT.

Gaur PM, Tripathi S, Gowda CLL, Ranga Rao GV, Sharma HC, Pande S and Sharma M.(2010). Chickpea Seed Production Manual. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.28 pp.

IIPR, (2009). All Indian Coordinated Research project on Chickpea: A profile. Kanpur 208 024.

Joshi P.K. and Witcombe. (1996). "Farmers Participatory Plant Improvement: II Participatory Varietal Selection: A case study in India", *Experimental Agriculture,* Vol.57 No.3 July – Sept.2002.

Joshi PK, M. Asokan and M.C.S. Bantilan (1999). "Silent Chickpea Revolution in Non-Traditional areas-Some experience from Andhra Pradesh", *Indian Journal of Agricultural Economics*, Vol.54 No.4 Oct-Dec. 1999.

Joshi P.K., and R.Saxena (2002). "A profile of chickpea production in India: Facts, Trends and Opportunities", *Indian Journal of Agricultural Economics*, Vol.54 No.4 Oct-Dec. 1999.

Kolli, R.D, and C. Bantilan. 1997. Gender-related impacts of improved agricultural technologies: identification of indicators from a case study. *Gender Technology and Development*. 1(3): 371-393.

Kumar, J.; M.P. Haware and J.B. Smithon (1985), "Registrations of Four Short Duration Fusarium Wilt-Resistant Kabuli *(Garbanzo)* Chickpea Germplasms", *Crop Science,* Vol. 25, pp. 576-577.

Padmaja .R and C. Bantilan, (2005). "Empowerment through Technology: Gender Dimensions of Social Capital Build-Up in Maharashtra, India. International Research Workshop on '*Gender and Collective Action*' October 17-21, 2005 • Chiang Mai, Thailand

Shiyani R.L., P.K. Joshi, M.Asokan and M.C.S. Bantilan. (2000).”Adoption of improved chickpea varieties: evidence from Tribal Region of Gujarat”, *Indian Journal of Agricultural Economics*, Vol.55 No.2 April-June. 2000.

Shiyani, R.L., Joshi, P.K., and Bantilan, M.C.S. (2001). Impact of chickpea research in Gujarat. (In En. Summaries in En, Fr.) Impact Series no. 9. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. ISBN 92-9066-442-8.

Wendland, K.J. and Sills, E.O. 2008. Dissemination of food crops with nutritional benefits: Adoption and disadoption of soybeans in Togo and Benin. *Natural Resources Forum*, 32, 39–52

Table-38a: Cropping pattern

CROP_NAME	Sole / Intercrop	VARIETY_NAME	R/I	Kurnool											
				Adopted				Control				Both			
				Cropped area ac	Production kg/ac	By-product q/ac	Gross returns Rs/ac	Cropped area ac	Production kg/ac	By-product q/ac	Gross returns Rs/ac	Cropped area ac	Production kg/ac	By-product q/ac	Gross returns Rs/ac
CHICKPEA	S	ANNIGERI	R	375.5	223.9	3.9	4281.63	45.0	141.00	5.6	3010.35	420.5	210.91	4.2	4106.01
	S	BOLTS	R				0.0				0.0				0.0
	S	KAK-2	R	15.5	200.0	5.0	6320.0				0.0	15.5	200.00	5.0	6320.0
	S	JG-11	R	419.25	271.02	4.5	5820.74	180.5	198.65	2.9	3967.35	599.8	248.88	4.0	5228.62
GROUNDNUT	S	TAG-24	R	5	100..0	0.0	2000.0	6.0	95.00	3.8	1330.00	11.0	98.33	3.0	1494.62
JOWAR	S	MAHENDRA	R	169.47	616.76	27.1	6207.56	90.5	418.24	20.1	3626.35	260.0	537.35	24.3	5108.65
PADDY	S	KURNOOL SONA	I	18.5	432.50	23.9	5487.34	53.0	648.28	11.9	6401.78	71.5	576.35	15.9	6231.83
SUNFLOWER	S	KARGIL-177	R	577	201.82	0.0	4467.52	91.5	157.14	0	3308.42	668.5	176.80	0	3806.50
TOBACCO	S	NATU	R	32.75	257.50	0.0	6759.38	3.0	110.00	0	2640.00	35.8	228.00	0	5882.40
	S	VERGINIA	R	0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0

Table-38b: Cropping pattern

CROP_NAME	VARIETY_NAME	Sole	R/I	Prakasam											
				Adopted				Control				Both			
				Cropped area ac	Production kg/ac	By-Product q/ac	Gross Returns Rs/ac	Cropped area ac	Production kg/ac	By-Product q/ac	Gross returns Rs/ac	Cropped area ac	Production kg/ac	By-product q/ac	Gross returns Rs/ac
CHICK PEA	ANNIGERI	S	R	29.9	153.22	1.7	3267.89	34.0	395.56	5.2	8372.5	63.9	234.00	2.9	4978.13
	ICCV-2	S	R	101.5	302.80	2.9	8793.31	26.5	302.86	5.4	9172.2	128.0	302.81	3.4	8876.19
	KAK-2	S	R	321.4	420.75	4.1	9756.05	97.5	474.72	5.6	11356.4	418.9	432.18	4.4	10090.79
	JG-11	S	R	424.6	351.89	4.2	7981.04	264.5	407.15	4.4	9018.4	689.2	374.01	4.2	8380.94
PADDY	KURNOOLSONA	S	I	9.0	312.50	20.0	2722.92	0.0	0.0	0.0	0.0	9.0	312.50	20.0	2722.92
TOBACCO	NATU	S	R	51.5	487.69	0	1699.42	10.0	335.00	0	15075.00	61.5	467.33	0	16917.47
	VERGINIA	S	R	33.0	321.25	0	12568.91	66.0	572.00	0	22308.00	99.0	460.56	0	17987.25

Table-40: Reasons for growing this crop (Garrett Scores)

Reasons	Kurnool			Prakasam			Over All		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
1. Food/home consumption	49.3 (4)	-	49.3 (4)	39.6 (5)	-	39.67 (5)	44.5 (5)	-	44.50 (5)
2. Fodder/animal consumption	**76.0 (1)**	-	76.0 (1)	44.0 (4)	24.0 (7)	34.00 (7)	**60.0 (1)**	24.00 (7)	**48.00 (3)**
3. Higher Income	**54.8 (2)**	**52.17 (2)**	53.9 (2)	55.8 **(2)**	**54.9 (2)**	**55.52 (2)**	**55.3 (2)**	53.58 (2)	**54.74 (2)**
4. Restore soil fertility	43.5 (7)	25.00 (6)	37.33 (8)	-	30.2 (6)	30.25 (8)	43.5 (6)	29.20 (6)	33.29 (8)
5. Fitted well into the present cropping system	47.4 (5)	50.31 (4)	48.6 (5)	38.9 (6)	38.6 (4)	38.76 (6)	45.0 (4)	46.00 (4)	**45.45 (4)**
6. Best suited to my land	42.6 (8)	**51.14 (3)**	46.0 (6)	37.55	**47.1 (3)**	41.02 (4)	39.46	48.80 (3)	42.96 (6)
7. Fits well into a rotation	44.3 (6)	38.71 (5)	41.9 (7)	**45.3 (3)**	38.5 (5)	**43.70 (3)**	44.91 (4)	38.64 (5)	42.82 (7)
8. Others (low risk & less labour requirement etc)	**52.1 (3)**	**54.38 (1)**	52.7 (3)	**57.1 (1)**	**60.4 (1)**	**58.17 (1)**	54.89 (3)	**57.87 (1)**	**55.79 (1)**

Note: Figures in parentheses indicate the order of preference in each category.

Table-41: Crop rotation (Once in how many years do you grow this crop on same land (crop rotation)?)

(Number and % of farmers)

Frequency	Kurnool			Prakasam			**Overall**		
	A	**C**	**Both**	**A**	**C**	**Both**	**A**	**C**	**Both**
a) Every season	-	-	-	11 (12.22)	2 (4.44)	13 (9.63)	11 (6.11)	2 (2.27)	13 (4.81)
b) Every year	89 (98.89)	45 (100)	134 (99.25)	75 (83.33)	43 (95.56)	118 (87.41)	164 (91.11)	88 (97.78)	252 (93.33)
c) Once in 2 years	1 (1.11)	-	1 (0.75)	4 (4.45)	-	4 (2.96)	5 (2.78)	-	5 (1.86)
d) Once in 3 years	-	-	-	-	-	-	-	-	-
e) Once in 4 years	-	-	-	-	-	-	-	-	-

Table-42: Crops planted before and after the selected crop in the same field

(Number and % of farmers)

CROPS_BEFORE/AFTER	SEASON	Kurnool			Prakasam			Over All		
		Adopted	Control	Both	Adopted	Control	Both	Adopted	Control	Grand Total
BEFORE										
COTTON	K	2 (2.22)	-	2 (1.48)	-	-	-	2 (1.11)	-	2 (0.74)
FALLOW	K	2 (2.22)	-	2 (1.48))	-	-	-	2 (1.11)	-	2 (0.74)
JOWAR	K	3 (3.33)	-	3 (2.22)	-	-	-	3 (1.66)	-	3(1.11)
PADDY	K	-	1 (2.22)	1(0.74)	-	-	-	-	1 (1.11)	1 (0.37)
TOBACCO	K	4 (4.44)	-	4 (2.69)	2 (2.22)	-	2 (1.48)	6 (3.33)	-	6 (2.22)
BLACKGRAM	R	-	-	-	1 (1.11)	-	1 (0.74)	1(0.55)	-	1 (0.37)
CHICKPEA	R	56 (62.22)	7 (15.56)	63 (46.67)	45 (50.00)	22 (48.89)	67 (49.62)	101(56.1)	29	130 (48.15)
CHICKPEA,JOWAR	R	8 (8.88)	10 (22.22)	18 (13.33)	-	-	-	8(4.44)	10	18 .67)
CHICKPEA,SUNFLOWER	R	-	2 (4.44)	2 (1.48)	-	-	-	-	2 (2.222)	2 (0.74)
CHICKPEA,TOBACCO	R	-	-	-	2 (2.22)	3 (6.67)	5 (3.7)	2 (1.11)	3 (3.33)	5 (1.86)
CHILLIES	R	-	1 (2.22)	1 (0.74)	-	-	-	-	1(1.11)	1 (0.37)
CHILLIES,PADDY	R	-	-	-	1 (1.11)	-	1(0.74)	1 (0.55)	-	1 (0.37)
COTTON,CHICKPEA	R	1 (1.11)	-	1 (0.74)	1 (1.11)	-	1 (0.74)	2 (1.11)	-	2 (0.74)
COTTON	R	-	-	-	3 (3.33)	1(2.22)	4(2.96)	3 (1.66)	1(1.11)	4 (1.48)
COTTON,JOWAR	R	3 (3.33)	-	3	-	-	-	3 (1.66)		3 (1.11)

				(2.22)						
COTTON,TOBACCO	R	-	-	-	2 (2.22)	1(2.22)	3 (2.22)	2 (1.11)	1 (1.11)	3 (1.11)
GROUNDNUT,SUNFLOWER	R	-	1 (2.22)	1 (0.74)	-	-	-	0	1 (1.11)	1 (0.37)
JOWAR	R	15 (16.67)	5 (11.11)	20 (14.81)	-	-	-	15 (8.33)	5 (5.55)	20 (74.0)
JOWAR, CHILLIES	R	-	1 (2.22)	1 (0.74)	-	-	-	-	1(1.11)	1 (0.37)
JOWAR,PIGEONPEA	R	1(1.11)	-	1 (0.74)	-	1(2.22)	1(0.74)	1(0.55)	1(1.11)	2 (0.74)
JOWAR,SUNFLOWER	R	6 .66)	3 (6.66)	9 (3.67)	-	-	-	6(3.33)	3 (3.33)	9 (3.33)
JOWAR,TOBACCO	R	-	1 (2.22)	1 (0.74)	-	-	-	-	1(1.11)	1 (0.37)
PADDY	R	-	1 (2.22)	1 (0.74)	-	-	-	-	1 (1.11)	1 (0.37)
SUNFLOWER	R	6 (6.66)	5 (11.11)	11 (8.14)	-	-	-	6 (3.33)	5 (5.55)	11 (4.07)
TOBACCO,CHILLIES	R	-	-	-	2 (2.22)	2 (4.44)	4 (2.96)	2 (1.11)	2 (2.22)	4 (1.48)
TOBACCO,COTTON	R	-	-	-	1(1.11)	-	1(0.74)	1(0.55)	0	1 (0.37)
TOBACCO,SUNFLOWER	R		2 (1.11)	2 (1.48)	-	-	-	-	2 (2.22)	2 (0.74)
AFTER										
TOBACCO	K	4 (4.44)		4 (2.96)	-	-	-	4(2.22)	-	4 (1.48)
CHICKPEA	R	85	26	111 (82.22)	85 (94.4)	43 (95.56)	128(94.81)	170 (94.44)	69 (76.67)	239 (88.51)
CHICKPEA,JOWAR	R	13	5 (11.11)	18 (13.33)	-	-	-	13(7.22)	5 (5.56)	18(6.66)
CHICKPEA,PADDY	R	1 (1.11)		1 (0.74)	-	-	-	1(0.55)	-	1 (0.37)

CHICKPEA,SUNFLOWER	R	3 (3.33)	4 (8.89)	7 (5.18)				3 (1.66)	4 94.44)	7 (2.59)
CHICKPEA,TOBACCO	R	-	-	-	2 (1.11)	1(2.22)	3 (2.22)	2 (1.11)	1 (1.11)	3 (1.11)
JOWAR	R	5 (5..56)	1 (2.22)	6 (4.44)				5(2.7)	1 (1.11)	6 (2.22)
JOWAR,CHICKPEA	R	3 (3.33)	2 (4.44)	5 (3.70)				3 (1.66)	2 (2.22)	5 (1.85)
TOBACCO	R	4 (4.44)	1(2.22)	5 (3.70)	3(3.33)	1 (2.22)	4 (2.96)	7 (3.88)	2 (2.22)	9 (3.33)

Table-43: Change in area of the selected crop in the last 5 years

(Number and % of farmers)

Change in area	**Kurnool**			**Prakasam**			**Overall**		
	A	**C**	**Both**	**A**	**C**	**Both**	**A**	**C**	**Both**
Increasing	54 (60.0)	21 (46.67)	75 (55.56)	31 (34.44)	16 (35.56)	47 (34.81)	85 (47.22)	37 (41.11)	122 (45.19)
Decreasing	8 (8.89)	2 (4.44)	10 (7.41)	1 (1.11)	1 (2.22)	2 (1.48)	9 (5.0)	3 (3.33)	12 (4.44)
Constant	28 (31.11)	22 (48.89)	50 (37.03)	58 (64.45)	28 (62.22)	86 (63.71)	86 (47.78)	50 (55.56)	136 (50.37)

Table-44: Crops replaced by or replacing the selected crop in the last 5 years

(Number and % of farmers)

Crops replaced by or replacing the selected crop	Kurnool			Prakasam			Overall		
	A	C	Both	A	C	Both	A	C	Both
Crops replaced by this crop:									
1.Cotton	55 (61.1)	42 (93.3)	97 (71.8)	43 (47.7)	31 (68.9)	74 (54.8)	98 (54.4)	73 (81.1)	171 (63.33)
2.Sunflower	25 (27.8)	30 (66.6)	55 (40.7)	24 (26.6)	25 (55.5)	49 (36.3)	49 (27.22)	55 (61.1)	104 (38.5)
3.Groundnut	15 (16.7)	12 (26.6)	27 (20)	22 (24.4)	12 (26.6)	34 (25.1)	37 (20.5)	24 (26.6)	61 (22.59)
4.Tobacco	12 (13.3)	10 (22.2)	22 (16.3)	20 (22.2)	15 (33.3)	35 (25.9)	32 (17.7)	25 (27.7)	57 (21.1)
Crops replacing this crop:									
1.	-	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-

Table-45: Is this crop grown as sole/inter crop/mixed crop?

(Number and % of farmers)

Change in area	District-1			District-2			Overall		
	A	C	Both	A	C	Both	A	C	Both
1. Sole	90 (100)	45 (100)	135 (100)	90 (100)	45 (100)	135 (100)	180 (100)	90 (100)	270 (100)
2. Inter crop	-	-	-	-	-	-	-	-	-
3. Mixed crop	-	-	-	-	-	-	-	-	-
4. If inter/mixed crop, crops grown:	-	-	-	-	-	-	-	-	-
a)	-	-	-	-	-	-	-	-	-
b)	-	-	-	-	-	-	-	-	-
c)	-	-	-	-	-	-	-	-	-

Table-46: In which year the area under this crops maximum?

		Kurnool			Prakasam			Over All		
Year	Particulars	Adopted	Control	Both	Adopted	Control	Both	Adopted	Control	Both
2002-03	No of Farmers	3	3	6	10	4	14	13	7	20
	% to Total	3.33	6.67	4.44	11.11	8.89	10.37	7.22	7.78	7.41
	Average Area	2.17	3.33	2.75	7.02	12.25	8.51	4.60	5.17	4.88
2003-04	No of Farmers	4	2	6	7	4	11	11	6	17
	% to Total	51.11	33.33	45.19	47.78	60.00	51.85	49.44	46.67	48.52
	Average Area	9.13	3.25	7.17	3.82	1.84	3.23	6.47	2.54	4.51
2004-05	No of Farmers	12	7	19	8	4	12	20	11	31
	% to Total	13.33	15.56	14.07	8.89	8.89	8.89	11.11	12.22	11.48
	Average Area	7.04	4.29	6.03	5.97	6.88	6.30			6.13
2005-06	No of Farmers	24	13	37	7	3	10	31	16	47
	% to Total	26.67	28.89	27.41	7.78	6.67	7.41	17.22	17.78	17.41
	Average Area	8.77	3.50	6.92	11.21	11.33	11.25			7.84
2006-07	No of Farmers	46	15	61	43	27	70	89	42	131
	% to Total	51.11	33.33	45.19	47.78	60.00	51.85	49.44	46.67	48.52
	Average Area	11.53	9.17	10.95	15.20	10.33	13.37			12.23
Grand Total	No of Farmers	90	45	135	90	45	135	180	90	270
	% to Total	100	100	100	100	100	100	100	100	100
	Average area	38.64	23.54	62.18	43.22	42.63	85.85	81.86	66.17	148.03

Table-47: Average yield of this crop harvested **(Kg/acre)**

	Rain fed	Bad/Best/Good	Kurnool			Prakasam			Over All		
Season	/Irrigated	year	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Total
		Bad year	393.14	363.14	385.64	579.66	606.82	588.71	478.19	498.8608	484.1912
		Best yield recorded so far	764.66	678.97	741.13	985.06	1045.12	1005.25	645.56	560	615
	Rain fed	Good year	759.46	677.38	737.08	970.68	1016.67	986.24	861.68	866.625	863.1818
		Bad year	626.25	500.00	584.17	800.00	800.00	800.00	872.73	888	877.5
		Best yield recorded so far	850.00	835.00	845.71	1100.00	1100.00	1100.00	852.40	852.8736	852.5436
Rabi	Irrigated	Good year	854.55	835.00	849.33	1100.00	1100.00	1100.00	875.00	888	878.8235

Table-48: Area under different varieties grown during the last 3 years

(Acres/Household)

Year	Season	Variety	Kurnool			Prakasam			Over All		
			Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
		ANNIGERI	7.56	3.21	6.67	2.20	4.25	2.91	6.39	3.59	5.72
		JG-11	7.51	5.17	6.60	7.21	7.54	7.33	7.36	6.36	6.97
2006-07		KABULI	2.50		2.50	7.62	6.50	7.34	7.36	6.50	7.15
		ANNIGERI	7.51	4.06	6.68	3.89	5.07	4.37	6.57	4.50	5.96
		JG-11	6.57	5.17	6.06	6.31	7.56	6.73	6.44	6.32	6.39
2005-06		KABULI	5.00		5.00	6.32	4.44	5.85	6.30	4.44	5.84
		ANNIGERI	6.92	3.70	6.24	4.48	5.00	4.66	5.99	4.41	5.57
		JG-11	6.64	5.18	6.13	6.81	7.37	7.01	6.72	6.20	6.54
2004-05	Rabi	KABULI	5.00		5.00	5.23	4.36	5.06	5.23	4.36	5.06

Table-49: First and peak year and area of adoption of cultivars of this crop

(Mean of years and area in Acres/Household)

Crop	FYA/PYA*	Particulars	District-1			District-2			Overall		
			A	C	Both	A	C	Both	A	C	Both
Chickpea	FYA	Year	1997-98	2001-02	1997-98	2000-01	1997-98	1997-98	2001-02	1991-92	1991-92
		Area(ac)	1.22	2	1.61	2.22	2	2.11	1.4	1.21	1.31
	PYA	Year	2006-07	2006-07	2006-07	2006-07	2006-07	2006-07	2006-07	2006-07	2006-07
		Area(ac)	11.52	9.17	10.94	15.2	10.3	13.36	13.30	9.90	12.23

***FYA=First Year of Adoption; PYA=Peak Year of Adoption.**

Table-51: Household storage of own seed

(Frequency & % of farmers)

Storage structure									
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Total
Gunny bags	37	13	50	45	21	66	82	34	116
Cane made bins	-	-	-	-	-	-	-	-	-
Mud pots	-	-	-	-	-	-	-	-	-
Underground storage	15	7	22	-	-	-	15	7	22
Storage rooms	18	2	20	18	8	26	36	10	46
Others(specify)	3	2	5	-	-	-	3	2	5
Others(WAREHOUSE)	2	-	2	-	-	-	2	-	2
Others(OPENSTORAGE)	1	-	1	-	-	-	1	-	1
Others(GODOWNS)	1	1	2	-	-	-	1	1	2

Table-52: Factors considered by the household when purchasing seed

(Frequency & % of farmers)

Steps	**District-1**			**District-2**			**Overall**		
	A	**C**	**Both**	**A**	**C**	**Both**	**A**	**C**	**Both**
1. Brand name	36	13	44	38	15	53	74	28	102
2. Price (Rs/Kg)	47	26	73	49	26	75	96	52	148
3. Certification	41	17	58	41	26	67	82	43	125
4. Good packing	14	5	19	4	3	7	18	8	26
5. Others (Quality)	2	-	2	1	4	5	3	4	7
6.Germination %	-	-	-	3	-	3	3	-	3
7. High yield	54	37	89	34	24	58	-	-	4
8.Clean seed	-	-	-	1	-	1	1	-	1

Table-53: Major constraints in purchasing seed **(Garrett Scores)**

Constraints	Kurnool			Prakasam			Over all		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
1. Lack of information about recommended variety	**55.632**	**61.911**	**57.561**	**55.422**	**56.572**	**55.812**	**55.521**	**59.042**	**56.662**
2. Non-availability of required variety	46.244	**47.142**	46.404	45.564	48.32	46.544	45.904	47.984	46.484
3. Seed is not of good quality (up to expectation level)	**53.363**	**47.003**	**52.983**	**53.213**	**53.223**	**53.213**	**53.293**	**52.543**	**53.123**
4. High seed price	42.65	43.604	43.065	42.106	37.72	40.425	42.38	40.936	41.796
5. Need to travel long distances	**56.621**		56.622	**56.401**	**60.441**	**57.981**	**56.511**	**60.441**	**57.451**
6. Credit facility not available	45.17	43.874	44.44	44.365	35.83	41.356	44.785	41.575	43.255
7. Others (specify)	47.45	47.50	47.46	46.50	45.60	46.20	47.00	46.14	46.79

Table-54: Major pests and diseases affecting this crop

(Give frequency with % of farmers under each frequency in parentheses)

Particulars	Kurnool			Prakasam			Over All		
	Adopted	Control		Adopted	Control		Adopted	Control	Grand Total
Pests									
Boll worm Helicoverpa	59 (65.5)	28 (62.2)	87 (64.4)	43 47.7)	20 (44.4)	64 (47.4)	103 (57.2)	48 (53.3)	151 (55.9)
Plume Moth				5 (5.55)	1 (2.2)	6 (4.44)	5 (2.7)	1 (1.1)	6 (2.2)
Spodoptera	8 (8.8)	1 (2.2)	9 (6.6)	1 (1.1)	1 (2.2)	2 1.4)	9 (5)	2 (2.2)	11 (4.0)
Diseases									
Complete drying	2	2	4	1		1	3	2	5

	(2.22)	(4.44)	(2.9)	(1.11)		0.07)	(1.6)	(2.2)	(1.8)
Mosaic	2 (2.22)	1 (2.2)	3 (2.2)				2 (1.1)	1 (1.11)	3 (1.1)
Redding	1 (1.11)	1 (2.2)	2 1.4)				1 (0.05)	1 (1.1)	2 (0.07)
Root wilt	88 (97.7)	41 (91.1)	133 (98.%)	45 (50)	21 (46.6)	66 (48.8)	137 (76.1)	62	199 (73.7)
Stunting	0	0	0	0	2 (4.4)	2 (1.4)	0	2 (2.2)	2 (0.07)
Yellowing	1 (1.11)	0	1 (0.07)	19 (21.1)	6 (13.3)	25 (18.5)	19 (10.5)	6 (6.6)	25 (9.25)
Zn deficiency	1 (1.11)	0	1 (0.07)	0	0	0	(0.5)	0	1 (0.03)

Table-55: Frequency of occurrence and yield loss estimated by the household in the last 5 years

Pest/Disease	Particulars	District-1			District-2			Overall		
		A	C	Both	A	C	Both	A	C	Both
1.Helicoverpa	Frequency*	248	121	369	172	74	246	420	195	615
	% area affected	8.37	10.38	9.63	10.85	10.79	10.83	9.37	10.53	9.74
	% yield loss	0.21	0.005	0.17	-	-	-	0.21	0.005	0.17
2.Plume moth	Frequency*	-	-	-	2	-	2	2	-	2
	% area affected	-	-	-	4	-	4	4	-	4
	% yield loss	-	-	-	-	-	-	-	-	-
3.Spodoptera	Frequency*	21	-	21	1	-	1	22	-	22
	% area affected	7.11	-	7.11	-	-	-	7.11	-	7.11
	% yield loss	-	-	-	-	-	-	-	-	-
4.Wilt	Frequency*	15	4	19	26	13	39	4	17	21
	% area affected	5.75	-	5.75	-	-	-	5.75	-	5.75
	% yield loss	16.01	14.25	15.64	5.8	4.42	5.34	4.54	6.73	8.71

***No of times in last 5 years?**

Table-56: Are the pest and disease problems increasing?

(Frequency & % of farmers)

Steps	District-1			District-2			Overall		
	A	C	Both	A	C	Both	A	C	Both
Yes	55 (61.1)	27 (60)	82 (60.7)	67 (74.4)	33 (73.3)	100 (74.1)	122 (67.7)	60 (66.7)	182 (67.4)
No	35 (38.9)	18 (40)	53 (39.2)	23 (25.6)	12 (26.7)	35 (25.9)	58 (32.3)	30 (33.3)	88 (32.6)

Table-57: Causes for increased incidence of pests/diseases (Garrett Scores)

Causes	Kurnool			Prakasam			Over All		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
1. Growing it every year without rotation	29.69	17.26	23.89	19.44	25.002	20.83	26.89	18.23	23.25
2. Growing other crops, which are alternative hosts	59.172	69.792	63.892	58.332	-	58.332	58.852	69.792	62.502
3. Weather related reasons	45.83	53.753	50.003	55.953	62.501	57.413	50.263	55.213	52.383
4. Growing susceptible varieties	50.003	50.00	50.003	-	-	-	50.004	50.004	50.004
5. Not adopting IPM/IDM technologies	81.251	72.921	77.081	75.001	-	75.001	80.361	72.921	76.921
6. Others (Specify)	38.89	25.00	35.42	-	-	-	38.89	25.00	35.42

Table-58: Measures of controlling pests and diseases (Garrett Scores)

Measures	Kurnool			Prakasam			Over All		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
A] Pests:									
1. Relying only on chemical insecticides	41.86 1	49.57 1	41.10 1	50.00 1	50.00 1	50.00 1	47.5 1	43.5 1	44.10 1
2. Adopting IPM technologies	38.00	30.50	38.63	34.00		34.00	40.88	39.57 2	40.48
3. Traditional control (farmers practices) measures (specify)	38.24 3	40.00 2	38.68 2	37.67	36.25	37.20	37.89	37.39	37.74
4. Altering sowing time	38.86 2	37.00 3	38.00	50.00 2	37.00 2	45.67 2	41.33 2	37.00	40.44 2
B] Diseases:									
1. Relying only on chemical fungicides	53.43 1	50.11 1	52.50 1	*63.5* *1*	47 1	41.33 1	52.64 1	58.80 1	51.54 1
2. Adopting IDM technologies	35.85	39.33	36.50	40	40	40	36.86	43.60	38.63
3. Traditional control (farmers practices) measures (specify)	40.44	33.00	39.38	38.31	36.25	37.63	39.08	35.74	38.16
4. Altering sowing time	45 2	41.71 2	43.72 2	47 2	45 2	42 2	44.33 2	49.71 2	43.37 2

Table-59: Sources of information about pest and disease control measures (Garrett Scores)

Source	Kurnool			Prakasam			Over All		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
A] When to apply:									
1. TV	31.11		31.11	36	45.6	42.86	32	45.6	36.25
2. Radio		28	28.00		40	40		34	34
3. News paper	28.00		28.00	28	28	28	28	28	28
4. Agriculture Magazine Diary/ news letter	45.60	48.33	46.23	**57**	42.67	46.25	46.64	45.50	46.24
5. Farmers	**60.10**	49.56	**56.83**	49.04	**59.8**	**52.30**	**54.19**	**54.95**	**54.42**
6. Friends/relatives	47.10	41.83	45.13	47.46	47.25	47.38	47.30	44.93	46.41
7. Input supplier	49.87	**65.29**	54.77	**64.77**	**65.75**	**65.00**	**56.79**	**65.45**	**59.23**
8. Research institute	**60.67**	**57.75**	**59.94**	44.00	25.00	37.67	**58.29**	**51.20**	**56.42**
9. NGO									
10. Others	44.60	39.00	42.11	43.78	70.00	46.40	44.07	45.20	44.37
B] Type of pesticide:									
1. TV	27.67	28.00	27.70	28.00	38.33	36.86	27.70	36.86	31.47
2. Radio		28.00	28.00		25.00	25.00		26.50	26.50
3. News paper	28.00		28.00		19.67	19.67	28.00	19.67	21.75
4. Agriculture Magazine Diary/ news letter	43.18	41.67	42.86	53.50	47.00	49.17	44.77	44.71	44.75
5. Farmers	**59.61**	**58.75**	**59.35**	**51.91**	**65.20**	**55.94**	**55.29**	**62.33**	**57.44**
6. Friends/relatives	47.08	51.80	48.47	43.50	57.17	47.60	45.15	54.73	48.00
7. Input supplier	**59.20**	**61.00**	**59.83**	**60.00**	**56.20**	**59.05**	**59.60**	**59.15**	**59.47**
8. Research institute	52.67	46.50	50.77	31.00	25.00	28.00	50.50	42.20	47.73
9. NGO									
10. Others	56.20	36.00	46.10	45.11	31.00	42.55	49.07	34.57	44.24
3. Quantity to use:									
1. TV	32.25	29.00	31.36	29.50	44.00	39.86	31.70	38.38	34.67
2. Radio	28.00	28.00	28.00		46.00	46.00	28.00	37.00	34.00
3. News paper	34.00		34		34.00	34	34	34	34
4. Agriculture Magazine Diary/ news letter	47.55	36	45.77	41.67	51.33	46.50	46.29	45.20	46.00
5. Farmers	**59.94**	**55.44**	**58.44**	**58.73**	**63.00**	**59.87**	**59.28**	**59.00**	**59.19**

6. Friends/relatives	45.00	47.00	45.75	45.44	55.71	48.57	45.27	51.69	47.41
7. Input supplier	47.83	55.00	50.70	40.92	42.00	41.30	44.24	48.93	46.00
8. Research institute	**58.00**	**62.33**	**58.87**	**73.00**	39.67	48.00	**59.15**	51.00	56.58
9. NGO		44.00	44.00					44.00	44.00
10. Others- agril. Department	58.29	55.60	57.17	59.57	**70.00**	**60.88**	58.93	**58.00**	**58.65**
4. Mixing chemical:									
1. TV	29.18	34.33	30.29	36.75	40.60	38.23	32.37	38.25	34.11
2. Radio	31.00	28.00	29.50		44.00	44.00	31.00	36.00	34.33
3. News paper	44.00		44.00	37.00	31.00	33.00	40.50	31.00	35.75
4. Agriculture Magazine Diary/ news letter	41.00	49.33	42.56	44.00	42.67	43.33	41.56	46.00	42.77
5. Farmers	**66.10**	61.33	**64.62**	**60.19**	**67.91**	**62.84**	**63.07**	**64.95**	**63.69**
6. Friends/relatives	45.87	33.71	42.00	41.86	46.75	43.64	43.93	40.67	42.82
7. Input supplier	42.89	40.00	42.00	39.50		39.50	41.29	40.00	41.05
8. Research institute	**60.58**	**67.25**	62.25	**73.00**	34.50	47.33	**61.54**	**56.33**	**59.89**
9. NGO									
10. Others	62.57	61.83	62.23	65.75	43.50	61.30	64.26667	57.25	61.82609

Table-60: Garrett Scores for Constraints in Cultivars of Selected Crop

Garrett scores

District	Kurnool												Prakasam												Over All	
A / C	A						C						A						C							
Variety	Annigeri		JG-11		KAK-2		Annigeri		JG-11		KAK-2		Annigeri		JG-11		KAK-2		Annigeri		JG-11		KAK-2			
Constraint *	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
LY	61.5	1	56.2	3	70	1	-	-	64.2	1	57.9	3	65.7	1	51.8	4	68.3	1	68	1	53.5	4	64.4	1	61.8	1
HPI	49.6	5	53.8	5	31	4	-	-	50	3	54.8	4	45.0	4	43.1	8	47.9	4	44.1	7	43.6	7	49.3	4	47.4	6
HDI	41.4	7	36.4	11	50	2	-	-	-		31	10	40.4	7	46.3	7	47.6	5	40	8	40.8	8	42.7	8	43.4	8
LD	43.5	6	47.6	7	-	-	61	2	37.3	6	-		61.1	2	51.0	5	55.6	2	56.8	2	54.1	3	53.4	3	53.6	4
SGS	52.2	2	49.2	6	-	-	42	5			-		58.1	3	60.7	2	55.3	3	56.5	3	60.8	1	43	7	55.6	2
PC	51	3	55.2	4	-	-	44	4	71.5	1	-		38	8	69.8	1	43.7	7	46	5	50.3	5	40.5	9	52.6	5
PT	50.2	4	57.0	1			-		60.6	2	-				58.	3	44.7	6	37	9	51	6	56	2	55.3	3
LRS	39.7	10	39.3	9	50	2	37	6	47	5	-		44	5	38.3	9	36.7	10	50	4					40.5	9
LMP	39.8	9	43	8	-	-	33	7	36.3	8	-		43.2	6	50.9	6	42.4	8	45.1	6	60.2	2	47.2	5	44.8	7
NFC					-	-					-						31	11							31	11
PFQ	36.8	11	37.5	10	-	-			35.5	9	-		31.5	9	37.6	10	42.1	9			40.7	9	46	6	38.2	10
SSP	40.5	8	57	2	-	-	25	8	37	7	-		24.3	10	28.8	11	30.7	12	27.6	10	29	10	40.5	10	30.8	12

*Note: GS=Garrett Score R=Rank
LY=Low Yield LD=Long Duration PT=Poor Taste NFC=Not Fit into Cropping System
HPI=High Pest Incidence SGS=Small Grain Size LRS=Low Recovery/Shelling % PFQ=Poor Fodder Quantity
HDI=High Disease Incidence PC=Poor Colour LMP=Low Market Price SSP=Susceptible to Storage Pest

Table-78: Garrett Scores for Constraints in Cultivars of Selected Crop

	Kurnool								Prakasam												Grand total	
	Adopted				Control				Adopted						Control							
Constraints	ANNIGERI GS	R	JG-11 GS	R	ANNIGERI GS	R	JG-11 GS	R	ANNIGERI GS	R	JG-11 GS	R	KAK-2 GS	R	ANNIGERI GS	R	JG-11 GS	R	KAK-2 GS	R	GS	R
LY	36.96	11	47.79	8	30.00	6	25.74	9	21.76	10	39.43	8	23.54	11	21.88	10	38.03	8	25.08	10	30.58	12
HPI	34.90	12	43.37	10	47.50	5	58.06	5	59.85	7	64.28	5	53.92	8	62.28	5	69.77	3	51.67	6	56.91	7
HDI	61.46	6	76.39	1	83.33	1	60.42	4	69.07	4	66.35	4	55.73	7	69.52	4	59.17	4	63.35	3	62.81	5
LD	75.00	2	57.87	5	83.33	1	77.50	1	27.12	9	49.61	6	38.43	10	32.50	9	48.33	6	48.75	8	46.27	9
SGS	51.11	8	53.33	7	62.50	4	-	-	35.99	8	31.88	9	41.77	9	38.24	7	33.24	10	62.42	4	40.99	11
PC	57.05	7	44.79	9	62.50	4	26.39	8	73.66	3	18.45	10	61.46	5	58.33	6	41.67	7	64.58	2	48.55	8
PT	44.79	10	32.92	11	-	-	41.07	7	-	-	35.42	8	61.46	5	75.00	3	48.75	5	40.28	9	41.39	10
LRS	70.83	4	58.33	4	79.17	2	56.25	6	64.29	6	87.50	1	66.96	2	62.50	5	-	-	16.67	11	63.63	4
LMP	65.39	5	54.17	6	68.75	3	68.75	2	64.88	5	46.88	7	62.63	3	56.78	7	36.17	9	57.90	5	57.83	6
NFC	83.33	1	-	-	-	-	-	-	-	-	-	-	62.50	4	-	-	-	-	-	-	72.92	2
PFQ	50.00	9	66.67	3	-	-	-	-	87.00	2	86.67	2	82.56	1	77.08	2	75.00	1	77.08	1	81.84	1
SSP	71.79	3	74.24	2	-	-	64.58	3	90.67	1	74.31	3	58.75	6	91.67	1	74.17	2	49.40	7	70.38	3

*Note: GS=Garrett Score R=Rank
LY=Low Yield LD=Long Duration PT=Poor Taste NFC=Not Fit into Cropping System
HPI=High Pest Incidence SGS=Small Grain Size LRS=Low Recovery/Shelling % PFQ=Poor Fodder Quality
HDI=High Disease Incidence PC=Poor Colour LMP=Low Market Price SSP=Susceptible to Storage Pest

Table-61: Garrett Scores for Preferred Traits (Production) in Cultivars of Selected Crop

District	Kurnool										Prakasam												Over All	
A / C	Adopted						Control				Adopted						Control							
Variety	ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		KAK-2			
Trait*	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
HY	63.44	1	61.5	2	70	1	63.32	1	50	3	68.71	1	67.5	1	66.97	1	69.41	1	60.47	2	66.7	1	66.17	1
SD	45.73	5	70.75	1			41	5	70	1	58.59	2	62.8	2	59.06	2	53.32	3	66.5	1	50.5	3	55.582	2
DRR	48.9	3	51.86	4			48.94	2	60	2	54.76	3	51.1	3	49.35	3	54	2	61.42	3	59.4	2	52.765	3
PR	41.32	7	44	5	31	3	41.64	4			40.89	4	39.2	4	43.23	5	43.51	4	41	4	40.4	4	41.563	5
DIR	38.27	8	37	6	50	2	38	7			33.22	5	32.2	7	35.14	7	37.35	5	33	5	33	5	35.088	7
FCS	41.77	6	34.25	7			40	6	40.5	4	32.71	7	33.4	6	47	4	32.45	6	31	6			36.838	6
ISF	50	2									33.13	6	34	5	41	6	25	7					33.75	8
MRP	37.29	9	28	8			31	8	31	5	32.40	8					0				31	6	31.81	9
FP											23.60	10	24	8	22.5	8	23	8	24	7			23.308	10
EM	46.18	4	57	3			43.67	3			28.67	9											43.444	4

*Note: GS=Garrett Score R=Rank
HY=High Yield PR=Pest Resistance ISF=Improvement Soil Fertility
SD=Short Duration DIR=Disease Resistance MRP=More Recovery/shelling Percent
DRR=Drought Resistance FCS=Fitness into Cropping System

Table-62: Garrett Scores for Preferred Traits (Consumption) in Chickpea Cultivars

District	Kurnool										Prakasam										Over All	
A / C	Adopted						Control				Adopted						Control					
Variety	ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		KAK-2			
Trait*	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
BT	41.87	3	46.25	3	50	1	39.29	2	40.79	3	30.8	3	50.86	2	38.54	3	34.62	3	44.79	3	28.4	3	40.39	4
LCT	69.79	1	75	1			75	1	62.5	1	63.89	1	57.26	1	62.3	1	75.93	1	63.16	1	72.2	1	64.12	1
HKQ	49.65	2	46.97	2	50	1	33.33	3	54.17	2	42.71	2	45.26	3	50.86	2	41.67	2	46.21	2	57.2	2	48	3
OTH													75		44.44								52.08	2

*Note: GS=Garrett Score R=Rank
BT=Better Taste LCT=Less Cooking Time HKQ=High Keeping Quality OTH=Others

Table-63: Garrett Scores for Preferred Traits (Fodder) in Chickpea Cultivars

District	Kurnool										Prakasam										Over All	
A / C	Adopted						Control				Adopted						Control					
Variety	ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		ANNIGERI		JG-11		KAK-2		ANNIGERI		JG-11		KAK-2			
Trait*	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
MFQ	50	2	50	1			50	2	50	1	51.44	1	44.39	3	58.67	1	68.8	1	56.78	1	66.75	1	55.12	1
PQT	51.82	1	46.88	2			55	1	50	1	50.41	2	54	1	48.33	2	48.14	2	50.89	2	49	2	50.46	2
MDF	40.5	3	50	1	50	1	31	3	50	1	48.83	3	46.75	2	43.96	3	34.8	3	40.43	3	31	3	43.61	3

*Note: GS=Garrett Score R=Rank
MFQ=More Fodder Quantity PQT=Palatability (Quality/Taste) MDF=More Durability of Fodder OTH=Others

Table-65: Desirable Traits in New Cultivars and Premium Prices of Selected Crop

TRAIT	Particulars	Kurnool			Prakasam			Over All		
		Adopted	Control	Both	Adopted	Control	Both	Adopted	Control	Both
BETTER QUALITY	EMP	27.54	26.67	27.26	22	28	25	27.143	26.86	27.05
	PWP	30.38	29.17	30	30	30	30	30.357	29.29	30
	PP%	110.3	109.4	110	136.36	107	120	111.84	109	110.9
	%F	14.44	6.667	21.11	1.1111	1.11	2.222	15.556	7.778	23.33
BETTER TASTE	EMP	23.13		23.13	28.5	24	27	24.917	24	24.79
	PWP	27		27	31	26	29.33	28.333	26	28
	PP%	116.8	0	116.8	108.77	108	108.6	113.71	108.3	113
	%F	4.444	0	4.444	2.2222	1.11	3.333	6.6667	1.111	7.778
BETTER YIELD	EMP	25		25	21.5	23	22.25	23.6	23	23.43
	PWP	29.33		29.33	27.5	28	27.75	28.6	28	28.43
	PP%	117.3	0	117.3	127.91	122	124.7	121.19	121.7	121.3
	%F	3.333	0	3.333	2.2222	2.22	4.444	5.5556	2.222	7.778
BIG GRAIN SIZE	EMP	27.38	26.42	27.02	27.36	25.6	26.72	27.37	26.13	26.91
	PWP	30.36	29.08	29.89	30.6	29.9	30.36	30.449	29.38	30.06
	PP%	110.9	110	110.6	111.84	117	113.6	111.25	112.4	111.7
	%F	48.89	28.89	77.78	27.778	15.6	43.33	76.667	44.44	121.1
DISEASE AND PEST RESISTANT	EMP	25.56	27.17	25.96	27.133	20.9	25.43	26.432	23.5	25.66
	PWP	32.42	32.92	32.54	31.333	25.1	29.61	31.815	28.31	30.89
	PP%	126.8	121.2	125.4	115.48	120	116.5	120.36	120.5	120.4
	%F	40	13.33	53.33	50	18.9	68.89	90	32.22	122.2
DROUGHT RESISTANCE	EMP	24.67	28.33	25.89	24.488	21.7	23.34	24.511	22.34	23.63
	PWP	29.83	33.33	31	29.122	26.6	28.09	29.213	27.25	28.42
	PP%	120.9	117.6	119.7	118.92	123	120.3	119.18	122	120.2
	%F	6.667	3.333	10	45.556	32.2	77.78	52.222	35.56	87.78
FODDER USAGE	EMP	27.5	35	30	25		25	26.667	35	28.75
	PWP	32	40	34.67	28		28	30.667	40	33
	PP%	116.4	114.3	115.6	112	0	112	115	114.3	114.8
	%F	2.222	1.111	3.333	1.1111	0	1.111	3.3333	1.111	4.444
GOOD COLOR	EMP	20		20				20		20
	PWP	21		21				21		21

	PP%	105	0	105	0	0	0	105	0	105
	%F	1.111	0	1.111	0	0	0	1.1111	0	1.111
GOOD GROWTH	EMP	28.75	30	29.29	26.75		26.75	27.75	30	28.36
	PWP	32.25	35	33.43	29.75		29.75	31	35	32.09
	PP%	112.2	116.7	114.1	111.21	0	111.2	111.71	116.7	113.1
	%F	4.444	3.333	7.778	4.4444	0	4.444	8.8889	3.333	12.22
HIGH MARKET PRICE	EMP	25	30.2	26.53	25	22	23.5	25	28.83	26.21
	PWP	36.33	34.4	35.76	29	23	26	35.769	32.5	34.74
	PP%	145.3	113.9	134.8	116	105	110.6	143.08	112.7	132.5
	%F	13.33	5.556	18.89	1.1111	1.11	2.222	14.444	6.667	21.11
HIGH YIELDING VARIETIES	EMP	25.19	27.07	25.84	25.963	22.8	24.9	25.643	24.61	25.29
	PWP	31.21	32.33	31.6	29.85	27.1	28.93	30.412	29.34	30.04
	PP%	123.9	119.5	122.3	114.97	119	116.2	118.59	119.2	118.8
	%F	62.22	33.33	95.56	88.889	45.6	134.4	151.11	78.89	230
MARKET DEMAND	EMP	27.5	27.5	27.5				27.5	27.5	27.5
	PWP	31	34	32.5				31	34	32.5
	PP%	112.7	123.6	118.2	0	0	0	112.73	123.6	118.2
	%F	2.222	2.222	4.444	0	0	0	2.2222	2.222	4.444
RESISTANT TO WATER LOGGING	EMP	25.2	25	25.14	27	22	24.5	25.714	23.5	24.91
	PWP	30.6	35	31.86	29.5	27.5	28.5	30.286	31.25	30.64
	PP%	121.4	140	126.7	109.26	125	116.3	117.78	133	123
	%F	5.556	2.222	7.778	2.2222	2.22	4.444	7.7778	4.444	12.22
SHORT DURATION THAN ANNIGERI	EMP	27.36	28.9	27.84	27.677	24	26.53	27.547	26.04	27.08
	PWP	31.82	32.4	32	31.516	27.4	30.22	31.642	29.46	30.96
	PP%	116.3	112.1	114.9	113.87	114	113.9	114.86	113.1	114.3
	%F	24.44	11.11	35.56	34.444	15.6	50	58.889	26.67	85.56
SUITABLE TO SOIL	EMP	17	30	23.5	33	30	31.5	25	30	27.5
	PWP	20	32	26	35	32	33.5	27.5	32	29.75
	PP%	117.6	106.7	110.6	106.06	107	106.3	110	106.7	108.2
	%F	1.111	1.111	2.222	1.1111	1.11	2.222	2.2222	2.222	4.444

Note: EMP=Existing Market Price; PWP=Price Willing to Pay; %PP=Percent Premium Price; %F=Percent of Farmers responded; n=Sample Size.

HYV=High Yielding Variety; PDR=Pest and Disease Resistance; BGS=Bigger Grain Size; DR=Drought Resistance; HSP=High Shelling Percentage; BT=Better Taste; SD=Short Duration; GC=Grain Colour; HDM=High Demand in Market.

Table-73a: Role of gender in chickpea cultivation – Activities performed by gender

(Per cent)

Performance By	Activity	Kurnool			Prakasam			Over All		
		Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Grand Total
Men	Chemical fertilizer application	51.11	51.11	38.33	54.44	53.33	40.56	52.78	52.22	52.59
	Field cleaning	33.33	35.56	25.56	50.00	62.22	40.56	41.67	48.89	44.07
	Fodder harvesting	24.44	26.67	18.89	27.78	40.00	23.89	26.11	33.33	28.52
	Hand weeding	5.56	4.44	3.89	8.89	6.67	6.11	7.22	5.56	6.67
	Harvesting main crop	23.33	28.89	18.89	4.44	11.11	5.00	13.89	20.00	15.93
	Interculture/mechanical weeding	61.11	62.22	46.11	46.67	53.33	36.67	53.89	57.78	55.19
	Irrigation	38.89	37.78	28.89	16.67	8.89	10.56	27.78	23.33	26.30
	Land preparation	93.33	97.78	71.11	86.67	84.44	64.44	90.00	91.11	90.37
	Plant protection measures	94.44	95.56	71.11	86.67	93.33	66.67	90.56	94.44	91.85
	Seed selection and storage	67.78	57.78	48.33	46.67	48.89	35.56	57.22	53.33	55.93
	Seed treatment	81.11	80.00	60.56	68.89	71.11	52.22	75.00	75.56	75.19
	Selection of crop	98.89	91.11	72.22	91.11	88.89	67.78	95.00	90.00	93.33
	Selection of variety	98.89	93.33	72.78	86.67	80.00	63.33	92.78	86.67	90.74
	Sowing seed	24.44	13.33	15.56	53.33	64.44	42.78	38.89	38.89	38.89
	Storage of produce	71.11	73.33	53.89	77.78	77.78	58.33	74.44	75.56	74.81
	Threshing	31.11	35.56	24.44	3.33	4.44	2.78	17.22	20.00	18.15
	Transport and stacking fodder	60.00	64.44	46.11	38.89	44.44	30.56	49.44	54.44	51.11
	Transport of grain	96.67	97.78	72.78	90.00	93.33	68.33	93.33	95.56	94.07

	Transport of manure and appli.	88.89	97.78	68.89	90.00	95.56	68.89	89.44	96.67	91.85
	Watching	41.11	42.22	31.11	43.33	42.22	32.22	42.22	42.22	42.22
Women	Selection of crop	0.00	0.00	0.00	2.22	2.22	1.67	1.11	1.11	1.11
	Selection of variety	0.00	0.00	0.00	4.44	2.22	2.78	2.22	1.11	1.85
	Seed treatment	0.00	0.00	0.00	3.33	2.22	2.22	1.67	1.11	1.48
	Sowing seed	0.00	0.00	0.00	13.33	17.78	11.11	6.67	8.89	7.41
	Land preparation	0.00	0.00	0.00	0.00	2.22	0.56	0.00	1.11	0.37
	Chemical fertilizer application	0.00	0.00	0.00	2.22	0.00	1.11	1.11	0.00	0.74
	Field cleaning	6.67	8.89	5.56	7.78	4.44	5.00	7.22	6.67	7.04
	Fodder harvesting	5.56	0.00	2.78	6.67	4.44	4.44	6.11	2.22	4.81
	Hand weeding	43.33	48.89	33.89	54.44	46.67	38.89	48.89	47.78	48.52
	Harvesting main crop	7.78	0.00	3.89	23.33	26.67	18.33	15.56	13.33	14.81
	Interculture/mechanical weeding	0.00	0.00	0.00	15.56	11.11	10.56	7.78	5.56	7.04
	Irrigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Seed selection and storage	0.00	0.00	0.00	1.11	0.00	0.56	0.56	0.00	0.37
	Storage of produce	1.11	0.00	0.56	0.00	2.22	0.56	0.56	1.11	0.74
	Threshing	2.22	0.00	1.11	0.00	0.00	0.00	1.11	0.00	0.74
	Transport of manure and appli.	0.00	0.00	0.00	0.00	2.22	0.56	0.00	1.11	0.37
	Watching	0.00	0.00	0.00	1.11	0.00	0.56	0.56	0.00	0.37
Jointly	Selection of crop	1.11	8.89	2.78	6.67	8.89	5.56	3.89	8.89	5.56
	Selection of variety	1.11	6.67	2.22	8.89	17.78	8.89	5.00	12.22	7.41
	Seed treatment	11.11	2.22	6.11	1.11	0.00	0.56	6.11	1.11	4.44
	Sowing seed	71.11	82.22	56.11	16.67	8.89	10.56	43.89	45.56	44.44
	Land preparation	5.56	2.22	3.33	10.00	8.89	7.22	7.78	5.56	7.04
	Chemical fertilizer application	50.00	48.89	37.22	34.44	42.22	27.78	42.22	45.56	43.33
	Field cleaning	45.56	37.78	32.22	31.11	28.89	22.78	38.33	33.33	36.67
	Fodder harvesting	55.56	53.33	41.11	26.67	26.67	20.00	41.11	40.00	40.74
	Hand weeding	51.11	46.67	37.22	36.67	46.67	30.00	43.89	46.67	44.81
	Harvesting main crop	67.78	71.11	51.67	68.89	57.78	48.89	68.33	64.44	67.04
	Interculture/mechanical weeding	14.44	8.89	9.44	12.22	13.33	9.44	13.33	11.11	12.59

	Irrigation	0.00	0.00	0.00	0.00	2.22	0.56	0.00	1.11	0.37
	Plant protection measures	2.22	0.00	1.11	3.33	0.00	1.67	2.78	0.00	1.85
	Seed selection and storage	3.33	0.00	1.67	1.11	0.00	0.56	2.22	0.00	1.48
	Storage of produce	5.56	0.00	2.78	2.22	0.00	1.11	3.89	0.00	2.59
	Threshing	66.67	64.44	49.44	90.00	88.89	67.22	78.33	76.67	77.78
	Transport and stacking fodder	5.56	2.22	3.33	0.00	0.00	0.00	2.78	1.11	2.22
	Transport of grain	0.00	0.00	0.00	2.22	0.00	1.11	1.11	0.00	0.74
	Transport of manure and appli.	6.67	2.22	3.89	0.00	0.00	0.00	3.33	1.11	2.59
	Bird watching	1.11	0.00	0.56	1.11	2.22	1.11	1.11	1.11	1.11

Table-74: Ownership of resources by gender

(Per cent)

			Kurnool			Prakasam			Over All		
Gender	Asset	RESOURCES	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Total
Men	1.Assets	Credit	85.56	82.22	84.44	71.11	68.89	70.37	78.33	75.56	77.41
		Implements	60.00	62.22	60.74	28.89	31.11	29.63	44.44	46.67	45.19
		Investment	48.89	51.11	49.63	61.11	64.44	62.22	55.00	57.78	55.93
		Land	92.22	95.56	93.33	92.22	95.56	93.33	92.22	95.56	93.33
		Livestock	86.67	91.11	88.15	51.11	66.67	56.30	68.89	78.89	72.22
		Machinery	55.56	60.00	57.04	24.44	22.22	23.70	40.00	41.11	40.37
		Others(Specify)	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
	2.Inputs	Fertilizers	100.00	100.00	100.00	96.67	97.78	97.04	98.33	98.89	98.52
		Hired labor	80.00	91.11	83.70	88.89	91.11	89.63	84.44	91.11	86.67
		Others(Specify)	2.22	0.00	1.48	0.00	0.00	0.00	1.11	0.00	0.74
		Own labor	87.78	97.78	91.11	81.11	82.22	81.48	84.44	90.00	86.30
		Pesticides	100.00	100.00	100.00	95.56	97.78	96.30	97.78	98.89	98.15
		Seeds	100.00	100.00	100.00	96.67	97.78	97.04	98.33	98.89	98.52
	3.Outputs	Crop production	97.78	100.00	98.52	95.56	97.78	96.30	96.67	98.89	97.41
		Fodder	64.44	73.33	67.41	64.44	73.33	67.41	64.44	73.33	67.41
		Sale quantity	86.67	97.78	90.37	91.11	97.78	93.33	88.89	97.78	91.85
	4.Others	Children marriage	30.00	37.78	32.59	65.56	51.11	60.74	47.78	44.44	46.67
		Education of	55.56	46.67	52.59	57.78	68.89	61.48	56.67	57.78	57.04

		children									
		Household maintenance	62.22	60.00	61.48	70.00	62.22	67.41	66.11	61.11	64.44
		Migration	3.33	2.22	2.96	11.11	4.44	8.89	7.22	3.33	5.93
Women	1.Assets	Credit	0.00	0.00	0.00	2.22	0.00	1.48	1.11	0.00	0.74
		Implements	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Investment	0.00	0.00	0.00	3.33	2.22	2.96	1.67	1.11	1.48
		Land	3.33	2.22	2.96	5.56	4.44	5.19	4.44	3.33	4.07
		Livestock	1.11	0.00	0.74	2.22	2.22	2.22	1.67	1.11	1.48
		Machinery	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
	2.Inputs	Fertilizers	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Hired labour	7.78	2.22	5.93	3.33	2.22	2.96	5.56	2.22	4.44
		Own labour	0.00	0.00	0.00	3.33	2.22	2.96	1.67	1.11	1.48
		Pesticides	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Seeds	0.00	0.00	0.00	2.22	2.22	2.22	1.11	1.11	1.11
	3.Outputs	Crop production	0.00	0.00	0.00	2.22	2.22	2.22	1.11	1.11	1.11
		Fodder	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Sale quantity	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
	4.Others	Children marriage	2.22	0.00	1.48	2.22	2.22	2.22	2.22	1.11	1.85
		Education of children	5.56	0.00	3.70	3.33	2.22	2.96	4.44	1.11	3.33
		Household maintenance	13.33	13.33	13.33	5.56	8.89	6.67	9.44	11.11	10.00
		Migration	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
Jointly	1.Assets	Credit	1.11	2.22	1.48	1.11	0.00	0.74	1.11	1.11	1.11
		Implements	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
		Investment	16.67	13.33	15.56	1.11	0.00	0.74	8.89	6.67	8.15
		Land	4.44	2.22	3.70	2.22	0.00	1.48	3.33	1.11	2.59
		Livestock	0.00	2.22	0.74	3.33	0.00	2.22	1.67	1.11	1.48
		Machinery	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
	2.Inputs	Fertilizers	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
		Hired labour	1.11	4.44	2.22	1.11	2.22	1.48	1.11	3.33	1.85
		Own labour	6.67	2.22	5.19	3.33	2.22	2.96	5.00	2.22	4.07
		Pesticides	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
		Seeds	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
	3.Outputs	Crop production	1.11	0.00	0.74	1.11	0.00	0.74	1.11	0.00	0.74

		Fodder	1.11	0.00	0.74	1.11	0.00	0.74	1.11	0.00	0.74
		Sale quantity	7.78	0.00	5.19	1.11	0.00	0.74	4.44	0.00	2.96
	4.Others	Children marriage	33.33	37.78	34.81	27.78	33.33	29.63	30.56	35.56	32.22
		Education of children	27.78	35.56	30.37	26.67	26.67	26.67	27.22	31.11	28.52
		Household maintenance	24.44	26.67	25.19	24.44	28.89	25.93	24.44	27.78	25.56
		Migration	1.11	0.00	0.74	2.22	2.22	2.22	1.67	1.11	1.48

Table-75: Decision making with respect to different resources by gender

(Per cent)

Gender	Assets	Resources	Kurnool			Prakasam			Over All		
			Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Total
Men	1.Assets	Credit	63.33	60.00	62.22	64.44	66.67	65.19	63.89	63.33	63.70
		Implements	52.22	55.56	53.33	24.44	28.89	25.93	38.33	42.22	39.63
		Investment	42.22	46.67	43.70	46.67	57.78	50.37	44.44	52.22	47.04
		Land	83.33	84.44	83.70	87.78	86.67	87.41	85.56	85.56	85.56
		Livestock	64.44	66.67	65.19	35.56	48.89	40.00	50.00	57.78	52.59
		Machinery	47.78	53.33	49.63	20.00	20.00	20.00	33.89	36.67	34.81
		Others(Specify)	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
	2.Inputs	Fertilizers	96.67	95.56	96.30	83.33	88.89	85.19	90.00	92.22	90.74
		Hired labor	72.22	84.44	76.30	62.22	71.11	65.19	67.22	77.78	70.74
		Others(Specify)	2.22	0.00	1.48	0.00	0.00	0.00	1.11	0.00	0.74
		Own labor	77.78	91.11	82.22	55.56	62.22	57.78	66.67	76.67	70.00
		Pesticides	95.56	93.33	94.81	84.44	91.11	86.67	90.00	92.22	90.74
		Seeds	95.56	93.33	94.81	78.89	82.22	80.00	87.22	87.78	87.41
	3.Outputs	Crop production	91.11	93.33	91.85	75.56	88.89	80.00	83.33	91.11	85.93
		Fodder	61.11	68.89	63.70	57.78	68.89	61.48	59.44	68.89	62.59
		Sale quantity	81.11	84.44	82.22	75.56	84.44	78.52	78.33	84.44	80.37
	4.Others	Children marriage	5.56	6.67	5.93	12.22	11.11	11.85	8.89	8.89	8.89
		Education of children	14.44	13.33	14.07	23.33	17.78	21.48	18.89	15.56	17.78
		Household maintenance	20.00	8.89	16.30	18.89	15.56	17.78	19.44	12.22	17.04
		Migration	2.22	2.22	2.22	3.33	2.22	2.96	2.78	2.22	2.59
Women	1.Assets	Credit	1.11	0.00	0.74	2.22	0.00	1.48	1.67	0.00	1.11

		Implements	1.11	0.00	0.74	1.11	0.00	0.74	1.11	0.00	0.74
		Investment	0.00	0.00	0.00	2.22	2.22	2.22	1.11	1.11	1.11
		Land	1.11	0.00	0.74	2.22	2.22	2.22	1.67	1.11	1.48
		Livestock	2.22	2.22	2.22	2.22	4.44	2.96	2.22	3.33	2.59
		Machinery	1.11	0.00	0.74	1.11	0.00	0.74	1.11	0.00	0.74
	2.Inputs	Fertilizers	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Hired labour	5.56	2.22	4.44	3.33	2.22	2.96	4.44	2.22	3.70
		Own labour	0.00	0.00	0.00	3.33	2.22	2.96	1.67	1.11	1.48
		Pesticides	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Seeds	0.00	0.00	0.00	2.22	2.22	2.22	1.11	1.11	1.11
	3.Outputs	Crop production	1.11	0.00	0.74	2.22	2.22	2.22	1.67	1.11	1.48
		Fodder	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
		Sale quantity	0.00	0.00	0.00	1.11	2.22	1.48	0.56	1.11	0.74
	4.Others	Children marriage	5.56	0.00	3.70	2.22	2.22	2.22	3.89	1.11	2.96
		Education of children	10.00	0.00	6.67	4.44	2.22	3.70	7.22	1.11	5.19
		Household maintenance	18.89	15.56	17.78	14.44	8.89	12.59	16.67	12.22	15.19
		Migration	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
Jointly	1.Assets	Credit	21.11	24.44	22.22	7.78	2.22	5.93	14.44	13.33	14.07
		Implements	6.67	6.67	6.67	5.56	2.22	4.44	6.11	4.44	5.56
		Investment	22.22	17.78	20.74	15.56	4.44	11.85	18.89	11.11	16.30
		Land	14.44	15.56	14.81	7.78	8.89	8.15	11.11	12.22	11.48
		Livestock	20.00	24.44	21.48	18.89	15.56	17.78	19.44	20.00	19.63
		Machinery	6.67	6.67	6.67	5.56	2.22	4.44	6.11	4.44	5.56
	2.Inputs	Fertilizers	2.22	4.44	2.96	12.22	8.89	11.11	7.22	6.67	7.04
		Hired labour	10.00	8.89	9.63	27.78	22.22	25.93	18.89	15.56	17.78
		Own labour	15.56	6.67	12.59	27.78	22.22	25.93	21.67	14.44	19.26
		Pesticides	2.22	4.44	2.96	11.11	6.67	9.63	6.67	5.56	6.30
		Seeds	3.33	6.67	4.44	17.78	15.56	17.04	10.56	11.11	10.74
	3.Outputs	Crop production	4.44	4.44	4.44	16.67	8.89	14.07	10.56	6.67	9.26
		Fodder	2.22	4.44	2.96	7.78	2.22	5.93	5.00	3.33	4.44
		Sale quantity	11.11	11.11	11.11	14.44	13.33	14.07	12.78	12.22	12.59
	4.Others	Children marriage	54.44	66.67	58.52	81.11	73.33	78.52	67.78	70.00	68.52
		Education of children	64.44	66.67	65.19	60.00	77.78	65.93	62.22	72.22	65.56
		Household maintenance	61.11	75.56	65.93	62.22	75.56	66.67	61.67	75.56	66.30

		Migration	2.22	0.00	1.48	10.00	4.44	8.15	6.11	2.22	4.81

Table-77: Sources of information to women about government programmes (on agricultural extension, welfare and new cultivars)

(Garrett Scores)

Source of Information	Kurnool			Prakasam			Over all		
	Adopted	Control	Total	Adopted	Control	Total	Adopted	Control	Total
Relatives, friends and neighbors	32.40	49.33	38.75				38.75		38.75
Community bulletin board	35.25	34.33	35.00	24.63	25.86	25.32	35.00	25.32	27.54
Community or local news papers	29.91	21.29	27.83	32.30	43.38	37.22	27.83	37.22	31.43
National news papers	26.92	28.00	27.00	23.15	45.00	31.34	27.00	31.34	30.02
Radio	29.66	21.06	27.26	37.16	24.65	32.35	27.26	32.35	30.47
Television	33.95	36.00	34.61	38.28	21.82	32.57	34.61	32.57	33.66
Group or association (specify)	26.93	24.22	25.92	40.50	77.00	62.40	25.92	62.40	32.21
Community leaders	48.69	29.50	42.29	36.50		36.50	42.29	36.50	40.84
Government agent	44.00		44.00	24.00		24.00	44.00	24.00	37.33
NGO									
Internet	64.00		64.00	57.92	56.64	57.51	64.00	57.51	57.69
Field days	12.33		12.33	32.86	35.00	33.33	12.33	33.33	31.23
Training melas	30.00		30.00	36.95	55.00	39.30	30.00	39.30	38.23
Krishi (farmers) mela	7.00		7.00				7.00		7.00