

Adoption of Chickpea Cultivars in Karnataka: Pattern, Trends and Constraints

Kiresur VR, GN Kulkarni, MCS Bantilan and VS Kulkarni

INTRODUCTION

Chickpea is one of the most important pulse crops grown in India. It has been well recognized as a valuable source of protein particularly in India, where a majority of the population is vegetarian and depends on the low priced food for meeting its dietary requirements. It is consumed as a dry pulse, after cooking, germination, soaking or fermentation or as a green vegetable. It is also used for the preparation of various sweets and spicy dishes where the split grains or flour are used besides dhal.

India occupies the first position in the world in terms of chickpea area (6.93 m.ha.) and production (5.60 m.t.) during 2005-06 accounting for nearly 31 per cent and 40 per cent of total pulses area and production respectively, with a productivity of 808 kg/ha (Appendix-1). The largest chickpea producing state in the country is Madhya Pradesh followed by Uttar Pradesh, Rajasthan, Maharashtra, Andhra Pradesh and Karnataka (Appendix-2). Karnataka ranks fifth in the cultivation of chickpea with an area of 4.49 lakh ha, 2.08 lakh tonnes of production and 464 kg/ha of productivity (TE 2005-06).

In Karnataka, Gulbarga occupies the first position in chickpea area (1.24 lakh ha), production (8.63 lakh tonnes) and productivity (733 kg/ha) accounting for 30 per cent and 37 per cent of the total chickpea area and production in the State (Appendix-3), followed by Bijapur (11.88% and 11.02%, respectively), Belgaum (9.91% and 8.81%), Bidar(9.69% and 9.06%), Dharwad (9.35% and 7.55%) and Gadag (9.33% and 10.71%).

The Karnataka State has been divided into 10 agro-climatic zones. In each zone different chickpea based cropping systems exist which are listed below.

SN	Agro-climatic Zone	Cropping Systems
1	North Eastern Transitional Zone	Sorghum-Chickpea

		Greengram/Blackgram-Chickpea Sesamum-Chickpea
2	North Eastern Dry Zone	Bajra-Chickpea Sesamum-Chickpea Kharif Fallow-Chickpea Sunflower-Chickpea
3	Northern Dry Zone	Sunflower-Chickpea Bajra-Chickpea Kharif Fallow-Chickpea Maize-Chickpea
4	Central Dry Zone	Groundnut-Chickpea Ragi-Chickpea
5	South Eastern Dry Zone	Groundnut-Chickpea
6	Southern Dry Zone	Ragi-Chickpea
7	Southern Transitional Zone	Ragi-Chickpea Sunflower-Chickpea
8	Northern Transitional Zone	Maize-Chickpea Sorghum-Chickpea Soybean-Chickpea
9	Hilly Zone	Negligible area under paddy fallows
10	Coastal Zone	Negligible area under paddy fallows

Chickpea is the major pulse crop in Karnataka state. However its area and production are fluctuating year after year due to high incidence of pest and diseases, rainfed condition and fluctuating market prices. Farmers do not get remunerative price for their produce on the one hand and incur high cost of cultivation on the other. The farmers take their produce to the other states hoping for better prices and marketing facilities. The lower productivity of chickpea is due to non-availability of improved cultivars, non-adoption of proper production technologies, severe incidence of pests and diseases, non-remunerative market prices, lack of area under irrigation and its cultivation mainly as a mixed crop. Marketing facilities available to this crop are reportedly not efficient. Thus both production and marketing of chickpea are associated with the various technological and economic constraints, thus hindering the adoption of chickpea production technologies.

Hence the present study is taken up to understand the importance of chickpea in the cropping systems followed and various issues related to technology uptake by the farmers including constraints hindering adoption of improved chickpea cultivars.

METHODOLOGY

The study was conducted in the Karnataka state, which was one of the most important chickpea growing states in the country. Two of the six major chickpea growing districts (Appendix-3) and representing different agro-ecological situations, namely, Gulbarga and Dharwad districts, were selected for the study. These two districts account for 29.67 per cent and 9.35 per cent of the total area cropped to chickpea in the State. From either of the selected districts, two major chickpea growing talukas, namely, Navalgund and Dharwad talukas from Dharwad district and Chittapur and Gulbarga talukas from Gulbarga district were chosen (Appendix-4). Three villages were selected at random from each district as “treatment or adopted villages” by the ICRISAT under the project for transfer of technologies in the next 3-5 years. Further, one village neighbouring each adopted village and having similar agro-ecological conditions was chosen as “control village”. From adopted village 30 households were selected at random while from control village 15 households were randomly chosen. Thus, in all, 270 farmers spread across two districts, four talukas and 12 villages were chosen based on stratified random sampling technique. The district-wise, taluka-wise and village-wise size of sample is given in Appendix-5.

Nature and source of data

Primary data were collected through personal interview method using pre-tested and well designed comprehensive schedule prepared for the purpose. The period of reference for the flow variables was July 2006 to June 2007 and for the stock variables, it was as on 1st July 2007. Secondary data were collected from various sources in the State for the study on various parameters, namely, area, production, productivity and prices of chickpea in Karnataka state and in the selected districts. The major source of this secondary data was the Directorate of Economics and Statistics (DES), Bangalore.

RESULTS AND DISCUSSION

Cropping pattern

The cropping pattern followed by the sample respondents during the year 2006-07 agricultural year is presented in Table-38. Across the selected districts and area (adopted and control), the gross cropped area was to the tune of 2983 ac and the net sown area was 1988 ac. The cropping intensity was worked out to be 150 per cent. *Kharif* crops shared nearly 55 per cent of the gross cropped area while the remaining 45 per cent was planted to *rabi* crops. The major crops grown during *kharif* season were redgram, maize, greengram, sorghum, onion and sunflower, accounting for 13.61%, 11.12%, 10.46%, 6.08%, 5.91% and 2.58% of the gross cropped area. During *rabi*, since all the respondents were chickpea growers by choice, the area under chickpea was the highest (36.31%) followed by wheat (5.54%) and *rabi* sorghum (2.09%).

The cropping pattern was slightly different between districts. In Dharwad, *kharif* and *rabi* seasons shared 52% and 48% of the gross cropped area respectively. The major crops grown during *kharif* were maize (18.98%), greengram (12.86%), onion (9.97%), sorghum (5.49%), sunflower (2.10%) and cotton (2.06%), while in *rabi*, chickpea (34.93%), wheat (9.27%) and *rabi* sorghum (2.71%) were predominantly cultivated. This pattern was almost similar in adopted and control villages of Dharwad district, with a lone exception of greengram being less predominant than onion.

In Gulbarga district, 58% of the gross cropped area was occupied by *kharif* crops as against 42% in *rabi*. The major *kharif* crops were redgram (occupying 32.87% of the gross cropped area), greengram (7.05%), sorghum (6.90%), sunflower (3.26%) and blackgram (2.67%), whereas chickpea (38.27%) and *rabi* sorghum (1.21%) were the important *rabi* crops. Thus, Gulbarga district has been called as the "Pulse bowl of India".

Reasons for growing chickpea

The most important reasons for growing chickpea by the sample respondents were ascertained and analysed using Garrett Scores (Table-40). Across districts and areas, the most

important reason for growing chickpea was higher income as indicated by the highest Garrett Score (63.54), followed by restoration of soil fertility (32.12), food/home consumption (22.06) and fits well into the present cropping system (16.58). Similar pattern existed in adopted and control areas separately and also in Dharwad district individually. However, in Gulbarga district, while the first two reasons remained same, low cost of cultivation and food/home consumption assumed third and fourth positions. This reason of “higher income” attributed to the chickpea cultivation was reflected in the cropping pattern both in adopted and control areas.

Crop rotation

In general, a majority of the respondents (82.96%) were in the habit of cultivating chickpea every year, while nearly 15 per cent of them were planting chickpea once in two years (Table-41). Similar pattern was observed between districts and areas. However, this behaviour of the respondents was more religious in Dharwad district than in Gulbarga district as indicated by 98% and 68% of the respondents cultivating chickpea “every year” in Dharwad and Gulbarga districts, respectively.

Cropping sequence (crops planted before and after chickpea)

Chickpea was cultivated in *rabi* season and no crop followed chickpea during the same agricultural year. In other words, the land was left fallow during summer after the harvest of chickpea. However, several crops were grown during *kharif* season by the sample respondents preceding chickpea (Table-42), the most important one was greengram (33.70%), followed by maize (20.74%), sorghum (13.70%), pigeonpea (13.33%), onion (10.37%) and cotton (6.30%). Though these crops figured as the most important ones preceding chickpea both in Dharwad and Gulbarga districts separately, their order differed between districts. While in Dharwad district, maize, greengram, onion and hybrid sorghum were the most important crops preceding chickpea, it was greengram, pigeonpea, hybrid sorghum, bajra and blackgram in Gulbarga district. Similarly, In a study conducted by Shiyani *et al*, (2001) they found maize-chickpea, sorghum-chickpea, groundnut-chickpea rotations followed by farmers in different districts of Gujarat.

In Dharwad district, maize-chickpea cropping sequence was the most popular one. With the onset of monsoon, the farmers go for early sowing of maize so that they the crop is irrigated at later critical stages once the water is released in the irrigation canals. In the North-Eastern part of Gulbarga district, green gram-chickpea and short duration pigeon pea followed by chickpea are the popular cropping sequences followed.

Change in area of chickpea in last 5 years

The micro-level evidence suggests that the area under chickpea was constant according to nearly 62 per cent of the sample respondents (Table-43). On the other hand, about 30 per cent of the sample respondents opined that the chickpea area was increasing as against about 8 per cent of them feeling a decline. The situation was almost similar across selected districts and areas. This reveals an increasing interest among the farmers towards cultivation of chickpea crop as a commercial crop.

Cropping system followed by chickpea farmers

It is interesting to see that nearly 99% of the chickpea farmers cultivated chickpea as a sole crop (Table-45). Hardly 1.11% of them grew chickpea as inter crop with either sorghum or safflower. In earlier years, chickpea was cultivated mostly as an intercrop with *rabi* sorghum in 1:5 proportion. Over time, this practice is vanishing mainly due to relatively higher returns from chickpea crop and reduced demand for sorghum fodder. On the other hand, safflower as an intercrop with chickpea has become uncommon due to difficulties in harvesting of safflower.

Maximum area under chickpea cultivation

Across districts and areas, the area under chickpea per household was maximum (5.64 ac) in the year 2004, which fell to 5.02 ac in 2005, increased to 5.45 in 2006 and again fell to 5.28 in 2007 (Table-46). Thus, it ranged between 5-6 ac, with an average of 5.33 ac. This acreage is something like frontier area under chickpea per household. However, the proportion of respondents registering maximum area in different years (2004-07) followed a bell shaped curve, starting from 2.59% to 10% to 27.41% to 15.56%. Similar pattern was observed separately in selected districts

and areas. This analysis indicates that the maximum area allocation to chickpea by a farmer newly opting for chickpea cultivation would remain in the range of 5-6 ac. This also has some bearing on the saturation level of chickpea production technology uptake.

Yield of chickpea in best, good and bad years

The average of the best yields harvested by the sample respondents was 624 kg/ac in rainfed situation as against 788 kg/ac in irrigation condition (Table-47). It ranged from 607 to 650 kg/ac in rainfed condition as against 769 to 867 kg/ac in irrigation situation across districts and areas (adopted and control).

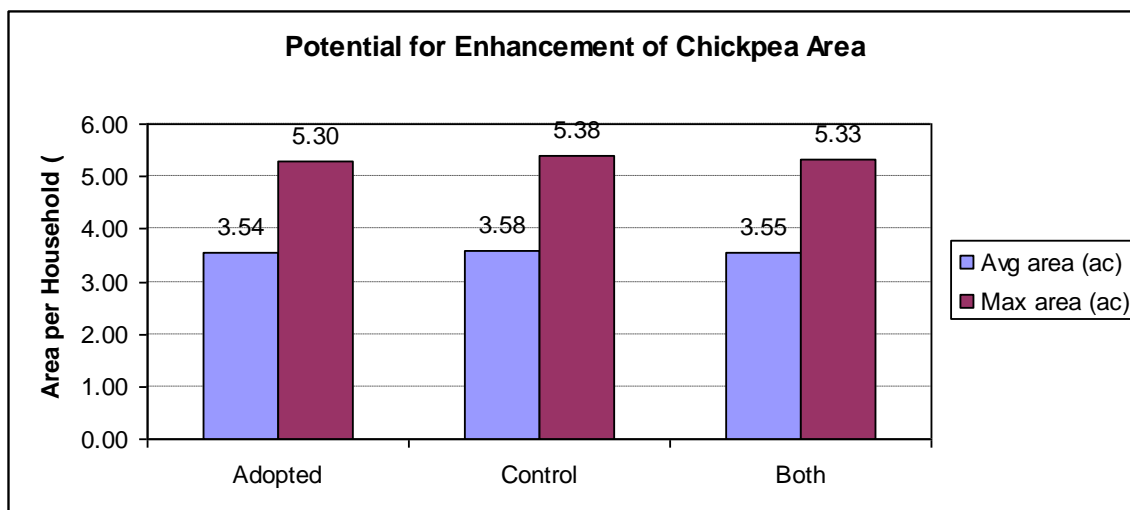
In good years, the average yield was to the tune of 525 kg/ac (range: 510-553) and 630 kg/ac (range: 609-767) in rainfed and irrigated conditions, respectively, whereas in bad years, the corresponding yield levels were 219 kg/ac (range: 174-254) and 265 kg/ac (range: 263-292). The percentage yield gains over the bad-year yields were also calculated and presented in Table-47. The good-year yields were 40 per cent and 37 per cent over the bad-year yields under rainfed and irrigated situations, respectively whereas the best-year yield increments were correspondingly 185 per cent and 137 per cent. Hence, other things being equal, the technology performance was better between bad to good years than between good to best years.

Chickpea cultivars grown in the last three years

The chickpea cultivars grown during the last three years (2004-05 to 2006-07 cropping seasons) in the select districts was analysed and the results are presented in Table-48. In all, four varieties were grown in the study area, namely, Annigeri, Kabuli, Bhima and local. However, Bhima was rarely cultivated in Gulbarga district. Annigeri was grown predominantly in the study area as revealed by more than 91 per cent of the farmer respondents cultivating chickpea (around 90% in Dharwad and 97% in Gulbarga).

In terms of average area under variety per household, Annigeri appropriated the highest area (nearly 4 acres), followed by Kabuli, Bhima and local, in general, with the exception of absence of Bhima in Gulbarga district.

It is very interesting to note that over the last three years, the area under chickpea seemed to increase, irrespective of the variety. It increased from 3.62 to 4.13 acres under Annigeri, 2.10 to 3.90 acres under Kabuli, 1.73 to 3.05 acres under Bhima and 1.81 to 2.71 acres under local varieties. This trend in area gives an indication that although the other varieties like Kabuli and Bhima are not popularly grown by the farmers however shows an inclination towards bringing more area under them.



CONSTRAINTS

Major pests and diseases affecting chickpea

It was heartening to see that all the farmers expressed that their chickpea crop was affected by pod borer, amongst all the insect pests, in both Dharwad and Gulbarga districts (Table-54). This is of serious concern in the study area hindering the adoption of chickpea varieties or even the cultivation chickpea crop. Thus, development of pod borer resistant chickpea cultivars or crop protection technology to effectively control pod borer is of paramount importance at present. Amongst diseases, wilt was the serious problem as expressed by more than half of the chickpea growing farmers. The problem was more severe in Dharwad district than in Gulbarga district.

Between districts, only pod borer and wilt were reported in Gulbarga district, whereas additionally leaf minor and moth amongst pests and benki roga and budi roga were reported in Dharwad district. However, the incidence of these pests and diseases was not very serious in the district.

Frequency of occurrence and yield loss estimated by household in the last five years

During the last five years, the incidence of pests and diseases on chickpea crop and its impact was analysed in terms of percentage households affected, percentage area affected and percentage yield loss and results are presented in Table-55. The responses of farmers are grouped into three: one, those affected by pod borer; second, those affected by wilt; and third, those affected by both pod borer and wilt.

In terms of percentage of respondents affected, nearly 84 per cent were affected by pod borer alone, while wilt was the problem with only 3 per cent of the respondents. Both pod borer and wilt were of serious concern for nearly 81 per cent of the respondents.

The area affected by pod borer, wilt and pod borer+wilt was to the tune of 47 per cent, 47 per cent and 28 per cent, respectively. Thus, in terms of area affected, both pod borer and wilt were of equally serious concern.

However, in terms of yield loss, pod borer topped the list reducing the yield to the extent of 42 per cent, whereas the yield loss due to wilt was to the tune of 35 per cent. Interestingly, the chickpea farms affected both by pod borer and wilt witnessed a yield loss of only about 14 per cent.

Occurrence of wilt along was not found in Gulbarga district; it was either pod borer or pod borer+wilt. Similar was the situation in control area of Dharwad district. Thus, it signal towards the need for protecting the crop against these pests and diseases by promoting extension services to the farmers so as to enhance crop growth performance and to minimise the yield losses.

Are the pest and disease problems increasing over time?

In general across districts and regions (adopted and control), nearly 80 per cent of the farmers felt that the pest and disease problems were increasing over time, whereas the remaining 20 per cent of them felt the other way (Table-56). One farmer opined neutral indicating that the problem remains constant. Such an increasing trend in pest and disease problems has an implication in the crop management and eventually on the profitability. The intervention through resistant cultivars addresses the issue of rising menace.

Between adopted and control areas, the problem was relatively less severe in adopted area compared to control area; nearly 82 per cent of farmers opined that there was an increase in pest and disease problem in adopted area as against 79 per cent in control area.

However, between districts, the situation was almost similar.

Causes for increased incidence of pests and diseases (Garrett Scores)

The ranks given by the respondents for various causes of increased pest and disease incidence were processed into Garrett Scores (Table-57). Generally, across districts and regions, “weather related reasons” topped the list (GS=38.93), followed by “growing every year without rotation” (GS=26.83), “growing susceptible varieties” (GS=21.34), “not adopting IPM/IDM technologies (GS=15.01) and “growing other alternative host crops” (GS=10.66).

The prioritisation of these causes was similar between adopted and control regions. However, it varied slightly in individual districts; “growing other alternative host crops” scoring over “not adopting IPM/IDM technologies” in Dharwad district while in Gulbarga district, “growing susceptible varieties” was more a severe cause than “growing every year without rotation”.

Measures of controlling pests and diseases (Garrett Scores)

Farmers were asked to rank the measures that adopted to control the pests and diseases on chickpea crop that they grew. These ranks were processed into Garrett Scores and presented in Table-58.

To control pests on chickpea, most of the farmers relied only on application of chemical pesticides as indicated by the Garrett Score (39.25). The other pest controlling measures adopted by farmers, in order of priority, were adopting IPM/IDM technologies (GS=18.48), altering sowing time (GS=10.39) and hand picking (GS=3.96). The situation was exactly similar in different districts and regions (adopted and control).

As regards control of diseases, again “relying only chemical pesticides” was predominantly adopted, followed by “adopting IPM/IDM technologies”, “altering sowing time” and “roguing”. Again, exactly same prioritisation was observed in selected districts and regions.

This analysis indicated a greater reliance on the use of chemical pesticides by farmers in the management of pests and diseases in chickpea. Therefore, there is a need for popularising the other methods of pest management such as through IPM/IDM technologies, by altering sowing time, hand picking and roughing.

Sources of information about pest and disease control measures (Garrett Scores)

The sources of information on various aspects of pest and disease control measures adopted, namely, when to apply, what to apply (type of pesticide), how to apply (mixing chemical) and how much to apply (quantity to use) were ascertained from the sample households. These ranks were again converted into Garrett Scores and presented in Table-59.

In general, across all these aspects, districts and regions, input suppliers were the most important source of information on pest and disease control to the farmers, followed by fellow farmers, friends and relatives, research institute, radio, NGOs, agricultural magazines, news papers, television and others, in that order.

The first five sources of information remained the same across districts and regions (adopted and control), with slightly varied order. Even they remained the same across various aspects of pest and disease control, namely, when to apply, what to apply, how to apply and how much to apply.

Amongst the mass media, radio was the most important source of information followed by news paper and television, in general. This could be probably because of the less accessibility/affordability of news paper and television.

These traditional sources of information are still considered important and often the farmers depend for information on pest and disease control measures. However, the institutional sources have a considerable role in promoting spread of technological know-how to the farmers and the results thus direct towards the need for increasing such efforts.

Constraints in chickpea cultivars

The constraints faced by the chickpea cultivars in terms of production, marketing and consumption are analysed using Garrett Ranking Method and the results are summarized in Table-60. These are based on the opinions expressed by the men in the selected households.

The Annigeri, Kabuli and local varieties were cultivated by the farmers in the study districts both in adopted and control areas, except that Bhima variety was also cultivated additionally in Dharwad-Adopted situation. However, Annigeri variety was popularly cultivated by a large proportion of farmers both in adopted and control areas of the study districts.

In general, across all cultivars, areas (adopted and control) and districts, low yield (Garrett Score, GS=20.93) was the major constraint confronted by the farmers in chickpea production. The major constraints in descending order of priority were high pest incidence (GS=16.24), small grain size (GS=14.01), low market price (GS=12.02), low recovery/shelling percentage (GS=11.42), high disease incidence (GS=10.73) and long crop duration (GS=9.83).

Coming to variety-wise constraints, in Dharwad district, cultivators of Annigeri variety faced the constraints of low yield, high pest incidence, low recovery/shelling percentage and high disease incidence, both in adopted and control areas, but with varying order. However, in Gulbarga, though low yield and high pest incidence topped the list in both adopted and control areas, the other constraints of severity were small grain size and low market price. One of the reasons for low market price was small grain size. Hence, Gulbarga being the major chickpea-producing district in the country, grain size needs enough attention in future chickpea crop breeding programmes.

In the case of Kabuli variety, while low yield, high pest incidence, high disease incidence and long duration were the major constraints in Dharwad-adopted area, Dharwad-control area was confronted with high pest incidence, high disease incidence, poor taste and low yield in that order. In Gulbarga, on the other hand, adopted area was confronted with the constraints of low yield, small grain size and high disease incidence whereas low yield, long duration, small grain size and poor taste were the major constraints faced by their counterparts in control area.

For Bhima, which was cultivated only in Dharwad-adopted area, the serious bottlenecks were high disease incidence, low recovery/shelling percentage, small grain size, low yield, high pest incidence and low market price. If nothing can be done by the researchers about low recovery/shelling percentage, grain size and low market price, at least pests and diseases could be controlled through improved agronomic practices which would probably enhance its yield and promote its adoption in Gulbarga district and other areas of Dharwad district.

The constraints faced by the farmers in cultivating local varieties of chickpea varied between districts and areas (adopted and control).

Thus, the crop improvement efforts should concentrate on at least two or three constraints faced by the farmers in the study area by prioritising these constraints, if the research budgets are limited.

Constraints in chickpea cultivars according to farm women

When we compare the constraints in chickpea cultivars expressed by women (Table-78) with those of men (Table-60) in the selected households, it could be observed that top four constraints remain same between men and women across districts and regions in general, namely, low yield, high pest incidence, small grain size and low market price.

For women, long duration is a more severe constraint than low recovery/shelling percentage and poor colour and susceptibility to storage pest were more important than poor fodder quality.

However, the responses of women were more heterogeneous across varieties, districts and regions when compared to those of men.

CONCLUSION

Across the selected districts and area (adopted and control), the major crops grown during *kharif* season were redgram, maize, greengram, sorghum, onion and sunflower. During *rabi*, since all the respondents were chickpea growers by choice, the area under chickpea was the highest followed by wheat and *rabi* sorghum. The cropping pattern followed in the adopted and control areas within each district were almost similar.

It was observed that higher income followed by its ability to restore soil fertility, food/home consumption, fits well into the present cropping system were the prime reasons both in adopted and control areas in Dharwad district. However, in Gulbarga district, apart from higher income and its ability to restore soil fertility, the low cost of cultivation was also considered as another important reason for growing chickpea crop. The prospectus of “higher income” as an important attribute to the chickpea cultivation was reflected in the allocation of large area in the cropping pattern both in adopted and control areas across districts.

In general, across districts and areas a majority of the respondents were cultivating chickpea every year, while only 15 per cent of them were planting chickpea once in two years.

Chickpea was cultivated in *rabi* season and no crop followed chickpea during the same agricultural year. However, several crops were grown during *kharif* season by the farmers preceding chickpea, the most important one was greengram, followed by maize, sorghum, pigeonpea, onion and cotton both in Dharwad and Gulbarga districts. However, their order differed between districts. In Dharwad district, maize-chickpea cropping sequence was the most popular one. In the North-Eastern part of Gulbarga district, green gram-chickpea and short duration pigeon pea followed by chickpea are the popular cropping sequences followed.

The majority of the (62 %) farmers across districts and areas felt that the area under chickpea remained constant while, 30 per cent opined that its area is increasing and the remaining 8 per cent of them feeling a decline. This depicts increasing farmers interests in the crop.

Majority of the farmers cultivated chickpea as a sole crop while, hardly 1.11% of them grew chickpea as inter crop with either sorghum or safflower. High return from chickpea is the main reason for growing it as sole crop against the traditional practice of growing as intercrop with sorghum or safflower.

Across districts and areas, the maximum/frontier area under chickpea per household ranged between 5-6 acres indicating that a farmer newly opting for chickpea cultivation would remain in that range. Thereby, also reveals the saturation level of chickpea production technology uptake.

The average of the best yields harvested by the sample respondents was 624 kg/ac in rainfed situation as against 788 kg/ac in irrigated condition across districts and areas. The yields in good years were 525 kg/ac and 630 kg/ac in rainfed and irrigated conditions, respectively, whereas in bad years, the corresponding yield levels were 219 kg/ac and 265 kg/ac. The good-year yields were 40 per cent and 37 per cent more over the bad-year yields under rainfed and irrigated situations, respectively whereas, the best-year yield increments were correspondingly 185 per cent and 137 per cent.

Among the four chickpea varieties grown in the last three years (2004-05 to 2006-07) namely, Annigeri, Kabuli, Bhima and local, Annigeri was grown predominantly and covered a highest area of nearly 4 acres per household in the study area followed by Kabuli, Bhima and local, in general, with the exception of absence of Bhima in Gulbarga district. Interestingly the area under chickpea seemed to increase irrespective of the variety in the study area.

Among the insect pests in chickpea crop, pod borer was the serious pest that affected the crop most in both the districts. Amongst diseases, wilt was the serious problem as expressed by more than half of the chickpea growing farmers. The problem was more severe in Dharwad district than in Gulbarga district.

In terms of percentage of pest and disease impact in the last five years, nearly 84 per cent of the farmers were affected by pod borer alone on an area of 47 per cent resulting in substantial yield reduction to the extent of 42 per cent. Both pod borer and wilt together were of serious concern for nearly 81 per cent of the respondents affecting 28 per cent area and a yield loss of about 14 per cent. While, wilt was the problem with only 3 per cent of the respondents affecting 47 per cent area

that resulted in yield reduction by 35 per cent. Thus, in terms of area affected, both pod borer and wilt were of equally serious concern. Occurrence of wilt alone was not found in Gulbarga district; it was either pod borer or pod borer+wilt. Similar was the situation in control area of Dharwad district.

In general across districts and regions, majority of the farmers (80 %) felt that the pest and disease problems were increasing over time, whereas the remaining felt the other way.

Generally, across districts and regions, “weather related reasons” topped the list, followed by “growing every year without rotation”, “growing susceptible varieties”, “not adopting IPM/IDM technologies and “growing other alternative host crops”.

The measures adopted by farmers to control pests and diseases across the districts and regions exactly had the same prioritisation. They indicated that most of the farmers relied only on application of chemical pesticides. The other measures adopted by farmers, in order of priority, were adopting IPM/IDM technologies, altering sowing time and hand picking of insects and roughing of disease infected plants.

In general, across all these aspects, districts and regions, input suppliers were the most important source of information on pest and disease control to the farmers, followed by fellow farmers, friends and relatives, research institute, radio, NGOs, agricultural magazines, news papers, television and others, in that order.

The opinions of farmers on the constraints faced w.r.t. chickpea cultivars in terms of production, marketing and consumption indicated that in general, across all cultivars, regions and districts, low yield was the major constraint confronted by the farmers in chickpea production. The major constraints in descending order of priority were high pest incidence, small grain size, low market price, low recovery/shelling percentage, high disease incidence and long crop duration.

Variety-wise constraints across both regions in Dharwad district showed that cultivators of Annigeri variety faced the constraints of low yield, high pest incidence, low recovery/shelling percentage and high disease incidence. However, in Gulbarga, though low yield and high pest incidence topped the list in both the regions, the other constraints of severity were small grain size and low market price.

In the case of Kabuli variety, while low yield, high pest incidence, high disease incidence and long duration were the major constraints in Dharwad-adopted area, Dharwad-control area was confronted with high pest incidence, high disease incidence, poor taste and low yield in that order. In Gulbarga, on the other hand, adopted area was confronted with the constraints of low yield, small grain size and high disease incidence whereas low yield, long duration, small grain size and poor taste were the major constraints faced by their counterparts in control area.

For Bhima, which was cultivated only in Dharwad-adopted area, the serious bottlenecks were high disease incidence, low recovery/shelling percentage, small grain size, low yield, high pest incidence and low market price.

When comparison was made on the constraints in chickpea cultivars expressed by women with those of men in the selected households, it could be observed that top four constraints namely, low yield, high pest incidence, small grain size and low market price remain the same between men and women across districts and regions. While, for women long duration is a more severe constraint than low recovery/shelling percentage and poor colour and susceptibility to storage pest were more important than poor fodder quality.

Table-2.1: Distribution of sample households in the study area

Farm size	Dharwad				Gulbarga				Overall			
	A	%	C	%	A	%	C	%	A	%	C	%
Marginal	15	16.67	6	13.33	25	27.78	10	22.22	40	22.22	16	17.78
Small	31	34.44	16	35.56	24	26.67	15	33.33	55	30.56	31	34.44
Medium	24	26.67	14	31.11	25	27.78	14	31.11	49	27.22	28	31.11
Large	20	22.22	9	20.00	16	17.78	6	13.33	36	20.00	15	16.67
Grand Total	90	100.00	45	100.00	90	100.00	45	100.00	180	100.00	90	100.00

Table-38: Cropping pattern, productivity and returns from crops in Dharwad district

Season	Crop	Sole/ inter crop	Dharwad															
			Adopted					Control					Both					
			Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)	
Kharif	Chilli	Sole	1.00	0.09	20000.00	0.00	120000.00		0.00				1.00	0.06	20000.00	0.00	120000.00	
	Greengram	Sole	179.34	15.60	255.02	0.01	5066.13	45.45	7.60	255.67	0.00	5225.08	224.79	12.86	255.15	0.01	5098.27	
	Sorghum	Sole	66.00	5.74	372.73	11.03	9535.30	30.00	5.02	397.00	8.67	43267.67	96.00	5.49	380.31	10.29	20076.67	
	Maize	Sole	180.84	15.73	1793.30	8.41	43881.97	150.83	25.22	1968.44	7.23	80249.55	331.67	18.98	1872.95	7.87	60420.46	
	Onion	Sole	119.04	10.36	3853.33	0.00	18017.89	55.22	9.23	1361.83	0.00	9884.10	174.26	9.97	3063.81	0.00	15440.43	
	Sunflower	Sole	27.50	2.39	258.18	0.00	7498.18	9.18	1.53	468.41	0.00	9204.79	36.68	2.10	310.80	0.00	7925.30	
	Blackgram	Sole	7.00	0.61	2285.71	0.00	13285.71		0.00				7.00	0.40	2285.71	0.00	13285.71	
	Groundnut	Sole	3.00	0.26					0.00				3.00	0.17				
	Cotton	Sole	25.00	2.17	428.00	0.00	9836.00	11.00	1.84	400.00	0.00	8800.00	36.00	2.06	419.44	0.00	9519.44	
	Total		608.72	52.95					50.44					52.09				
Rabi	Chickpea+ Sorghum	Inter	0.00	0.00				8.10	1.35	222.22	1.23	4123.46	8.10	0.46	222.22	1.23	4123.46	
	Greengram	Sole	4.00	0.35	250.00	0.00	5250.00		0.00				4.00	0.23	250.00	0.00	5250.00	
	Rabi sorghum	Sole	33.40	2.91	380.24	18.50	8491.02	14.00	2.34	528.57	1.79	6200.00	47.40	2.71	424.05	13.57	7814.35	
	Safflower	Sole	5.20	0.45	384.62	0.00	5269.23		0.00				5.20	0.30	384.62	0.00	5269.23	
	Wheat	Sole	109.68	9.54	410.36	0.26	4415.75	52.46	8.77	429.18	0.04	4516.01	162.08	9.27	416.60	0.19	4449.84	
	Chickpea	Sole	388.56	33.80	371.99	0.40	7886.57	221.91	37.10	421.89	0.08	8561.51	610.47	34.93	390.13	0.28	8131.91	
	Total		540.84	47.05			296.47	49.56				837.25	47.91					
GCA (ac)			1149.56	100.00			598.15	100.00				1747.65	100.00					
NSA (ac)			790.91				341.32					1132.23						
CI (%)			145.35				175.25					154.35						

Table-38 (Contd...): Cropping pattern, productivity and returns from crops in Gulbarga district

Season	Crop	Sole/ inter crop	Gulbarga														
			Adopted					Control					Both				
			Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs/ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs/ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs/ac)
Kharif	Greengram	Sole	64.10	7.28	294.85	0.00	6079.56	23.00	6.48	434.78	0.00	7652.17	87.10	7.05	331.80	0.00	6494.83
	Sorghum	Sole	58.20	6.61	536.94	19.81	13325.69	27.05	7.62	388.17	0.11	3547.87	85.25	6.90	489.74	13.56	10223.17
	Sorghum+Redgram	Inter	4.00	0.45	450.00	0.00	4050.00		0.00				4.00	0.32	450.00	0.00	4050.00
	Maize	Sole		0.00					0.00					0.00			
	Onion	Sole	2.00	0.23	5000.00	0.00	30000.00		0.00				2.00	0.16	5000.00	0.00	30000.00
	Redgram+Sesamum	Inter	1.20	0.14	416.67	0.00	8750.00		0.00				1.20	0.10	416.67	0.00	8750.00
	Sesamum	Sole	8.00	0.91	518.75	0.00	14150.00	11.00	3.10	145.45	0.00	3340.91	19.00	1.54	302.63	0.00	7892.11
	Sugercane	Sole		0.00				2.00	0.56	40000.00	0.00	280000.00	2.00	0.16	40000.00	0.00	280000.00
	Sunflower	Sole	40.25	4.57	496.89	0.00	9853.42		0.00				40.25	3.26	496.89	0.00	9853.42
	Sunflower+Redgram	Inter		0.00				3.00	0.85	500.00	0.00	7500.00	3.00	0.24	500.00	0.00	7500.00
	Turmeric	Sole	1.00	0.11	1000.00	0.00	32000.00		0.00				1.00	0.08	1000.00	0.00	32000.00
	Blackgram	Sole	14.00	1.59	485.71	0.00	12542.86	19.00	5.36	373.68	0.00	8371.05	33.00	2.67	421.21	0.00	10140.91
	Redgram	Sole	293.43	33.33	406.15	0.02	8193.48	112.62	31.75	488.81	0.00	10114.54	406.05	32.87	429.08	0.01	8726.30
	Bajra	Sole	4.18	0.47	478.47	0.00	2858.85	12.50	3.52	592.00	0.00	2960.00	16.68	1.35	563.55	0.00	2934.65
	Groundnut	Sole	11.00	1.25	609.09	0.00	13954.55		0.00				11.00	0.89	609.09	0.00	13954.55
	Redgram+Bajra	Inter	3.10	0.35	258.06	0.00	4887.10	2.00	0.56				5.10	0.41	274.51	0.00	5558.82
	Cotton	Sole		0.00					0.00					0.00			
	Total		504.46	57.29				212.17	59.81				716.63	58.01			
Rabi	Bajra+Redgram	Inter	2.00	0.23	400.00	0.00	2000.00		0.00				2.00	0.16	400.00	0.00	2000.00
	Carrot	Sole	0.50	0.06	4000.00	0.00	64000.00		0.00				0.50	0.04	4000.00	0.00	64000.00
	Chickpea+Safflower	Inter	10.25	1.16	292.68	1.56	5978.54		0.00				10.25	0.83	292.68	1.56	5978.54
	Greengram	Sole		0.00				2.00	0.56	400.00	0.00	9600.00	2.00	0.16	400.00	0.00	9600.00
	Rabi sorghum	Sole	10.00	1.14	460.00	0.00	4660.00	5.00	1.41	520.00	0.00	100500.00	15.00	1.21	480.00	0.00	36606.67
	Onion	Sole	1.00	0.11	2000.00	0.00	10000.00		0.00				1.00	0.08	2000.00	0.00	10000.00
	Safflower	Sole	6.00	0.68	383.33	0.00	5075.00	1.00	0.28	500.00	0.00	8500.00	7.00	0.57	400.00	0.00	5564.29
	Safflower+wheat	Inter	2.00	0.23	250.00	0.00	2375.00		0.00				2.00	0.16	250.00	0.00	2375.00
	Sunflower	Sole	3.12	0.35	833.33	0.00	13557.69		0.00				3.12	0.25	833.33	0.00	13557.69
	Wheat	Sole	2.00	0.23	800.00	0.00	9000.00	1.00	0.28	1000.00	0.00	12000.00	3.00	0.24	866.67	0.00	10000.00
	Chickpea	Sole	339.18	38.52	459.83	0.01	10209.98	133.59	37.66	518.00	0.00	10904.26	472.77	38.27	476.27	0.01	10406.16
	Total		376.05	42.71				142.59	40.19				518.64	41.99			
GCA (ac)			880.51	100.00				354.76	100.00				1235.27	100.00			
NSA (ac)			600.08					255.31					855.39				
CI (%)			146.73					138.95					144.41				

Table-38 (Contd...): Cropping pattern, productivity and returns from crops in Dharwad and Gulbarga districts

Season	Crop	Sole/ Inter crop	Overall														
			Adopted					Control					Both				
			Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)	Cropped area (acres)	% cropped area	Main product (Kg/ac)	By- product (q/ac)	Gross Return (Rs./ac)
Kharif	Chilli	Sole	1.00	0.05	20000.00	0.00	120000.00	0.00	0.00				1.00	0.03	20000.00	0.00	120000.00
	Greengram	Sole	243.44	11.99	265.51	0.01	5332.98	68.45	7.18	315.85	0.00	6040.61	311.89	10.46	276.56	0.01	5488.28
	Sorghum	Sole	124.20	6.12	449.68	15.14	11311.47	57.05	5.99	392.81	4.61	24434.71	181.25	6.08	431.78	11.83	15442.12
	Sorghum+ Redgram	Inter	4.00	0.20	450.00	0.00	4050.00	0.00	0.00				4.00	0.13	450.00	0.00	4050.00
	Maize	Sole	180.84	8.91	1793.30	8.41	43881.97	150.83	15.83	1968.44	7.23	80249.55	331.67	11.12	1872.95	7.87	60420.46
	Onion	Sole	121.04	5.96	3872.27	0.00	18215.88	55.22	5.79	1361.83	0.00	9884.10	176.26	5.91	3085.78	0.00	15605.64
	Redgram+Sesamum	Inter	1.20	0.06	416.67	0.00	8750.00	0.00	0.00				1.20	0.04	416.67	0.00	8750.00
	Sesamum	Sole	8.00	0.39	518.75	0.00	14150.00	11.00	1.15	145.45	0.00	3340.91	19.00	0.64	302.63	0.00	7892.11
	Sugercane	Sole	0.00	0.00				2.00	0.21	40000.00	0.00	280000.00	2.00	0.07	40000.00	0.00	280000.00
	Sunflower	Sole	67.75	3.34	400.00	0.00	8897.42	9.18	0.96	468.41	0.00	9204.79	76.93	2.58	408.16	0.00	8934.10
	Sunflower+Redgram	Inter	0.00	0.00				3.00	0.31	500.00	0.00	7500.00	3.00	0.10	500.00	0.00	7500.00
	Turmeric	Sole	1.00	0.05	1000.00	0.00	32000.00	0.00	0.00				1.00	0.03	1000.00	0.00	32000.00
	Blackgram	Sole	21.00	1.03	1085.71	0.00	12790.48	19.00	1.99	373.68	0.00	8371.05	40.00	1.34	747.50	0.00	10691.25
	Redgram	Sole	293.43	14.45	406.15	0.02	8193.48	112.62	11.82	488.81	0.00	10114.54	406.05	13.61	429.08	0.01	8726.30
	Bajra	Sole	4.18	0.21	478.47	0.00	2858.85	12.50	1.31	592.00	0.00	2960.00	16.68	0.56	563.55	0.00	2934.65
	Groundnut	Sole	14.00	0.69	607.14	0.00	13278.57	0.00	0.00				14.00	0.47	607.14	0.00	13278.57
	Redgram+Bajra	Inter	3.10	0.15	258.06	0.00	4887.10	2.00	0.21	300.00	0.00	6600.00	5.10	0.17	274.51	0.00	5558.82
	Cotton	Sole	25.00	1.23	428.00	0.00	9836.00	11.00	1.15	400.00	0.00	8800.00	36.00	1.21	419.44	0.00	9519.44
	Total		1113.18	54.83				513.85	53.92				1627.03	54.54			
Rabi	Bajra+Redgram	Inter	2.00	0.10	400.00	0.00	2000.00	0.00	0.00				2.00	0.07	400.00	0.00	2000.00
	Carrot	Sole	0.50	0.02	4000.00	0.00	64000.00	0.00	0.00				0.50	0.02	4000.00	0.00	64000.00
	Chickpea+Sorghum	Inter	0.00	0.00				8.10	0.85	222.22	1.23	4123.46	8.10	0.27	222.22	1.23	4123.46
	Chickpea+Safflower	Inter	10.25	0.50	292.68	1.56	5978.54	0.00	0.00				10.25	0.34	292.68	1.56	5978.54
	Greengram	Sole	4.00	0.20	250.00	0.00	5250.00	2.00	0.21	400.00	0.00	9600.00	6.00	0.20	300.00	0.00	6700.00
	Rabi sorghum	Sole	43.40	2.14	398.62	14.24	7608.29	19.00	1.99	526.32	1.32	31015.79	62.40	2.09	437.50	10.30	14735.58
	Onion	Sole	1.00	0.05	2000.00	0.00	10000.00	0.00	0.00				1.00	0.03	2000.00	0.00	10000.00
	Safflower	Sole	11.20	0.55	383.93	0.00	5165.18	1.00	0.10	500.00	0.00	8500.00	12.20	0.41	393.44	0.00	5438.52
	Safflower+wheat	Inter	2.00	0.10	250.00	0.00	2375.00	0.00	0.00				2.00	0.07	250.00	0.00	2375.00
	Sunflower	Sole	3.12	0.15	833.33	0.00	13557.69	0.00	0.00				3.12	0.10	833.33	0.00	13557.69
	Wheat	Sole	111.68	5.50	417.34	0.25	4497.85	53.46	5.61	439.86	0.04	4656.00	165.14	5.54	424.63	0.18	4549.05
	Chickpea	Sole	727.74	35.85	412.93	0.22	8969.45	355.50	37.31	458.01	0.05	9441.87	1083.24	36.31	427.72	0.16	9124.49
	Total		916.89	45.17				439.06	46.08				1355.95	45.46			
GCA (ac)			2030.07	100.00				952.91	100.00				2982.98	100.00			
NSA (ac)			1390.99					596.63					1987.62				
CI (%)			145.94					159.72					150.07				

Table-40: Reasons for growing chickpea crop

(% of households)

Reasons	Dharwad			Gulbarga			Overall		
	A	C	B	A	C	B	A	C	B
Higher Income	98.89	97.78	98.52	94.44	100.00	96.30	96.67	98.89	97.41
Restore soil fertility	66.67	66.67	66.67	76.67	62.22	71.85	71.67	64.44	69.26
Food/home consumption	60.00	53.33	57.78	42.22	46.67	43.70	51.11	50.00	50.74
Fitted well into the present cropping system	53.33	42.22	49.63	30.00	17.78	25.93	41.67	30.00	37.78
Fits well into a rotation	35.56	28.89	33.33	31.11	17.78	26.67	33.33	23.33	30.00
Fodder/animal consumption	41.11	40.00	40.74	22.22	8.89	17.78	31.67	24.44	29.26
Best suited to my land	37.78	26.67	34.07	18.89	20.00	19.26	28.33	23.33	26.67
Less cost of cultivation	12.22	6.67	10.37	23.33	15.56	20.74	17.78	11.11	15.56
Less labour requirement	1.11	0.00	0.74	0.00	0.00	0.00	0.56	0.00	0.37
Others	3.33	2.22	2.96	10.00	15.56	11.85	6.67	8.89	7.41

(Garrett Scores)

Reasons	Dharwad						Gulbarga						Overall					
	A		C		B		A		C		B		A		C		B	
	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
Higher Income	66.86	1	64.73	1	66.15	1	60.77	1	61.24	1	60.93	1	63.81	1	62.99	1	63.54	1
Restore soil fertility	30.60	2	31.96	2	31.05	2	36.38	2	26.82	2	33.19	2	33.49	2	29.39	2	32.12	2
Food/home consumption	28.70	3	22.69	3	26.70	3	18.02	3	16.22	4	17.42	4	23.36	3	19.46	3	22.06	3
Fitted well into the present cropping system	24.13	4	18.47	4	22.24	4	12.42	6	7.91	5	10.92	6	18.28	4	13.19	4	16.58	4
Fits well into a rotation	18.50	5	14.82	6	17.27	5	13.60	5	7.62	6	11.61	5	16.05	5	11.22	6	14.44	5
Fodder/animal consumption	16.01	7	15.04	5	15.69	6	10.82	7	4.36	8	8.67	7	13.42	6	9.70	7	12.18	6
Low cost of cultivation	5.34	8	1.31	8	4.00	8	16.68	4	21.16	3	18.17	3	11.01	8	11.23	5	11.09	7
Best suited to my land	16.53	6	11.58	7	14.88	7	7.19	8	7.36	7	7.24	8	11.86	7	9.47	8	11.06	8

Note: A=Adopted; C=Control; B=Both; GS=Garrett Score; R=Rank.

Table-41: Crop rotation on the same piece of land (Frequency of growing chickpea)

Crop rotation	No./ %*	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Every season	No.	0	0	0	1	0	1	1	0	1
	%	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
Every year	No.	88	44	132	62	30	92	150	74	224
	%	97.78	97.78	97.78	68.89	66.67	68.15	83.33	82.22	82.96
Once in two years	No.	2	1	3	24	14	38	26	15	41
	%	2.22	2.22	2.22	26.67	31.11	28.15	14.44	16.67	15.19
Once in three years	No.	0	0	0	2	1	3	2	1	3
	%	0.00	0.00	0.00	2.22	2.22	2.22	1.11	1.11	1.11
Once in four years	No.	0	0	0	1		1	1	0	1
	%	0.00	0.00	0.00	1.11	0.00	0.74	0.56	0.00	0.37
Total	No.	90	45	135	90	45	135	180	90	270
	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

* Number of households / Per cent of households.

Table-42: Crops planted before chickpea in the same field

Season/ Crop grown before Kharif	No./ %*	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Green gram	No.	35	13	48	28	15	43	63	28	91
	%	38.89	28.89	35.56	31.11	33.33	31.85	35.00	31.11	33.70
Maize	No.	31	25	56	0	0	0	31	25	56
	%	34.44	55.56	41.48	0.00	0.00	0.00	17.22	27.78	20.74
Sorghum	No.	14	10	24	11	2	13	25	12	37
	%	15.56	22.22	17.78	12.22	4.44	9.63	13.89	13.33	13.70
Pigeon pea	No.	0	0	0	23	13	36	23	13	36
	%	0.00	0.00	0.00	25.56	28.89	26.67	12.78	14.44	13.33
Onion	No.	20	8	28	0	0	0	20	8	28
	%	22.22	17.78	20.74	0.00	0.00	0.00	11.11	8.89	10.37
Cotton	No.	11	6	17	0	0	0	11	6	17
	%	12.22	13.33	12.59	0.00	0.00	0.00	6.11	6.67	6.30
Bajra	No.	0	0	0	4	5	9	4	5	9
	%	0.00	0.00	0.00	4.44	11.11	6.67	2.22	5.56	3.33
Sunflower	No.	0	1	1	6	0	6	6	1	7
	%	0.00	2.22	0.74	6.67	0.00	4.44	3.33	1.11	2.59
Black gram	No.	0	0	0	3	4	7	3	4	7
	%	0.00	0.00	0.00	3.33	8.89	5.19	1.67	4.44	2.59
Sesamum	No.	0	0	0	2	2	4	2	2	4
	%	0.00	0.00	0.00	2.22	4.44	2.96	1.11	2.22	1.48
Groundnut	No.	0	0	0	3	0	3	3	0	3
	%	0.00	0.00	0.00	3.33	0.00	2.22	1.67	0.00	1.11
Rabi										
Wheat	No.	3	0	3	0	0	0	3	0	3
	%	3.33	0.00	2.22	0.00	0.00	0.00	1.67	0.00	1.11

* Number of households / Per cent of households.

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

Change in area	No./ %*	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Constant	No.	52	26	78	60	30	90	112	56	168
	%	57.78	57.78	57.78	66.67	66.67	66.67	62.22	62.22	62.22
Increasing	No.	29	16	45	24	11	35	53	27	80
	%	32.22	35.56	33.33	26.67	24.44	25.93	29.44	30.00	29.63
Decreasing	No.	9	3	12	6	4	10	15	7	22
	%	10.00	6.67	8.89	6.67	8.89	7.41	8.33	7.78	8.15
Grand Total	No.	90	45	135	90	45	135	180	90	270
	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

* Number of households / Per cent of households.

Table-45: Pattern of chickpea cultivation as sole/inter/mixed crop

Type of cropping	No./ %*	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Inter crop	No.		1	1	2		2	2	1	3
	%	0.00	2.22	0.74	2.22	0.00	1.48	1.11	1.11	1.11
Sole	No.	90	44	134	88	45	133	178	89	267
	%	100.00	97.78	99.26	97.78	100.00	98.52	98.89	98.89	98.89
Total	No.	90	45	135	90	45	135	180	90	270
	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table-46: Maximum area under chickpea cultivation

Year	Particulars	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
2003-04	No. of households	3		3	2	2	4	5	2	7
	% of households	3.33	0.00	2.22	2.22	4.44	2.96	2.78	2.22	2.59
	Avg. area (ac)	6.67	0.00	6.67	3.50	6.25	4.88	5.40	6.25	5.64
2004-05	No. of households	7	4	11	10	6	16	17	10	27
	% of households	7.78	8.89	8.15	11.11	13.33	11.85	9.44	11.11	10.00
	Avg. area (ac)	3.03	11.80	6.22	4.22	4.17	4.20	3.73	7.22	5.02
2005-06	No. of households	25	16	41	22	11	33	47	27	74
	% of households	27.78	35.56	30.37	24.44	24.44	24.44	26.11	30.00	27.41
	Avg. area (ac)	5.10	6.20	5.53	6.17	3.68	5.34	5.60	5.17	5.45
2006-07	No. of households	21	9	30	8	4	12	29	13	42
	% of households	23.33	20.00	22.22	8.89	8.89	8.89	16.11	14.44	15.56
	Avg. area (ac)	6.40	4.39	5.80	3.97	4.01	3.98	5.73	4.28	5.28
Overall	No. of households	56	29	85	42	23	65	98	52	150
	% of households	62.22	64.44	62.96	46.67	51.11	48.15	54.44	57.78	55.56
	Avg. area (ac)	5.41	6.41	5.75	5.16	4.09	4.78	5.30	5.38	5.33

Table-47: Average yield of chickpea crop harvested

(Kg/acre)

Season	Rainfed/ irrigated	Good/ Bad/ Best yield	Dharwad			Gulbarga			Overall			
			A	C	B	A	C	B	A	C	B	% Gain
Rabi	Rainfed	Best	625.37	639.13	628.89	607.78	650.00	620.77	616.58	644.57	624.09	185.15
		Good	510.45	528.26	515.00	522.78	552.50	531.92	516.61	540.38	525.00	139.88
		Bad	192.39	174.35	187.78	234.44	253.75	240.38	213.42	214.05	218.86	100.00
	Irrigated	Best	795.65	769.05	782.95	0.00	866.67	866.67	795.65	817.86	788.30	196.99
		Good	608.70	633.33	620.45	0.00	766.67	766.67	608.70	700.00	629.79	137.27
		Bad	263.04	264.29	263.64	0.00	291.67	291.67	263.04	277.98	265.43	100.00

Table-48: Cultivation of different chickpea varieties during last three years

Year	Crop Varieties	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Number of households cultivating chickpea										
2006-07	Annigeri	80	42	122	88	43	131	168	85	253
	Bhima	4		4				4	0	4
	Kabuli	6	2	8	1	1	2	7	3	10
	Local	3	1	4	1	1	2	4	2	6
2005-06	Annigeri	78	42	120	62	28	90	140	70	210
	Bhima	4		4				4	0	4
	Kabuli	6	2	8	1	1	2	7	3	10
	Local	3	1	4	1	1	2	4	2	6
2004-05	Annigeri	79	42	121	86	42	128	165	84	249
	Bhima	3		3				3	0	3
	Kabuli	6	2	8	1	1	2	7	3	10
	Local	3	1	4	1	1	2	4	2	6
Percent of households cultivating chickpea										
2006-07	Annigeri	88.89	93.33	90.37	97.78	95.56	97.04	93.33	94.44	93.70
	Bhima	4.44	0.00	2.96	0.00	0.00	0.00	2.22	0.00	1.48
	Kabuli	6.67	4.44	5.93	1.11	2.22	1.48	3.89	3.33	3.70
	Local	3.33	2.22	2.96	1.11	2.22	1.48	2.22	2.22	2.22
2005-06	Annigeri	86.67	93.33	88.89	68.89	62.22	66.67	77.78	77.78	77.78
	Bhima	4.44	0.00	2.96	0.00	0.00	0.00	2.22	0.00	1.48
	Kabuli	6.67	4.44	5.93	1.11	2.22	1.48	3.89	3.33	3.70
	Local	3.33	2.22	2.96	1.11	2.22	1.48	2.22	2.22	2.22
2004-05	Annigeri	87.78	93.33	89.63	95.56	93.33	94.81	91.67	93.33	92.22
	Bhima	3.33	0.00	2.22	0.00	0.00	0.00	1.67	0.00	1.11
	Kabuli	6.67	4.44	5.93	1.11	2.22	1.48	3.89	3.33	3.70
	Local	3.33	2.22	2.96	1.11	2.22	1.48	2.22	2.22	2.22
Area cultivated with chickpea										
2006-07	Annigeri	3.78	4.92	4.16	3.92	2.92	3.59	3.85	3.92	3.87
	Bhima	0.14	0.00	0.09	0.00	0.00	0.00	0.07	0.00	0.05
	Kabuli	0.33	0.16	0.27	0.01	0.02	0.01	0.17	0.09	0.14
	Local	0.08	0.09	0.08	0.02	0.07	0.04	0.05	0.08	0.06
	Total	4.33	5.17	4.61	3.96	3.01	3.64	4.14	4.09	4.12
2005-06	Annigeri	3.28	4.12	3.56	2.43	1.77	2.21	2.85	2.95	2.88
	Bhima	0.09	0.00	0.06	0.00	0.00	0.00	0.05	0.00	0.03
	Kabuli	0.22	0.11	0.19	0.01	0.02	0.01	0.12	0.07	0.10
	Local	0.06	0.09	0.07	0.01	0.04	0.02	0.04	0.07	0.05
	Total	3.65	4.33	3.88	2.45	1.83	2.25	3.05	3.08	3.06
2004-05	Annigeri	3.20	4.11	3.50	3.36	2.80	3.17	3.28	3.45	3.34
	Bhima	0.06	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.02
	Kabuli	0.16	0.11	0.14	0.01	0.02	0.01	0.08	0.07	0.08
	Local	0.05	0.09	0.07	0.01	0.02	0.01	0.03	0.06	0.04
	Total	3.47	4.31	3.75	3.38	2.84	3.20	3.43	3.58	3.48

* Number of households / Per cent of households.

Table-49: First and peak year and area of adoption

(Mean of years and area in ac/household)

Cultivars	FYA/ PYA*	Parti- culars	Dharwad			Gulbarga			Overall		
			A	C	B	A	C	B	A	C	B
Annigeri	FYA	Year	2000.90	2001.57	2001.13	2000.28	2000.30	2000.29	2000.59	2000.94	2000.71
		Area	2.75	3.51	3.01	2.83	2.20	2.62	2.79	2.85	2.82
	PYA	Year	2005.77	2005.97	2005.83	2005.38	2005.07	2005.27	2005.58	2005.52	2005.55
		Area	5.51	6.76	5.91	5.65	4.51	5.25	5.58	5.64	5.58
Bhima	FYA	Year	2002.60		2002.60				1001.30	0.00	1001.30
		Area	2.64		2.64				1.32	0.00	1.32
	PYA	Year	2006.40		2006.40				1003.20	0.00	1003.20
		Area	4.20		4.20				2.10	0.00	2.10
Kabuli	FYA	Year	2003.00	2003.00	2003.00	2001.00	2002.00	2001.50	2002.00	2002.50	2002.25
		Area	2.83	1.50	2.50	1.00	1.00	1.00	1.92	1.25	1.75
	PYA	Year	2005.83	2006.00	2005.88	2005.00	2004.00	2004.50	2005.42	2005.00	2005.19
		Area	5.33	3.50	4.88	2.00	3.00	2.50	3.67	3.25	3.69
Local	FYA	Year	1995.88	1995.25	1995.67	1996.33	2004.50	1999.60	1996.10	1999.88	1997.63
		Area	2.65	3.18	2.82	1.67	2.50	2.00	2.16	2.84	2.41
	PYA	Year	2004.67	2001.25	2002.71	2006.00	2006.00	2006.00	2005.33	2003.63	2004.36
		Area	4.67	4.38	4.50	2.00	3.00	2.50	3.33	3.69	3.50
Overall	FYA	Year	2000.71	2001.10	2000.84	2000.16	2000.52	2000.28	2000.44	2000.81	2000.56
		Area	2.74	3.40	2.95	2.78	2.18	2.58	2.76	2.79	2.77
	PYA	Year	2005.77	2005.43	2005.66	2005.39	2005.06	2005.27	2005.58	2005.25	2005.47
		Area	5.37	6.30	5.67	5.52	4.42	5.13	5.45	5.36	5.40

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

Table-54: Major pests and diseases affecting the crop

Problem	Pest/disease	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
No. of households										
Major pests	Leaf miner	1		1				1	0	1
	Moth		1	1				0	1	1
	Pod Borer	90	45	135	90	45	135	180	90	270
	Red worm	1		1				1	0	1
Major diseases	Benki	1		1				1	0	1
	Budi roga	1		1				1	0	1
	Wilt	60	24	84	37	22	59	97	46	143
% of households										
Major pests	Leaf miner	1.11		0.74				0.56		0.37
	Moth		2.22	0.74					1.11	0.37
	Pod Borer	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Red worm	1.11		0.74				0.56		0.37
Major diseases	Benki	1.11		0.74				0.56		0.37
	Budi roga	1.11		0.74				0.56		0.37
	Wilt	66.67	53.33	62.22	41.11	48.89	43.70	53.89	51.11	52.96

Table-55: Impact of pests and diseases in the last five years

Pest/disease	Affected area/loss	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
Pod borer	Affected households (%)	88.89	77.78	85.19	81.11	88.89	83.70	85.00	83.33	84.44
	Area affected (%)	53.63	54.71	53.96	39.73	39.13	39.51	46.68	46.92	46.80
	Yield loss (%)	50.78	48.57	50.10	35.21	32.95	34.42	42.99	40.76	42.37
Pod borer and wilt	Affected households (%)	100.00	100.00	100.00	58.89	51.11	56.30	79.44	75.56	81.48
	Area affected (%)	28.21	31.42	29.39	25.57	24.57	25.26	26.89	27.99	27.96
	Yield loss (%)	15.66	14.04	15.06	13.19	11.96	12.82	14.42	13.00	14.29
Wilt	Affected households (%)	8.89		5.93				4.44		2.96
	Area affected (%)	46.88		46.88				46.88		46.88
	Yield loss (%)	35.00		35.00				35.00		35.00
Overall	Area affected (%)	40.40	40.68	40.49	33.77	33.81	33.78	37.09	37.25	37.71
	Yield loss (%)	32.22	27.77	30.75	25.94	25.16	25.69	29.08	26.47	28.66

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

Response	Dharwad			Gulbarga			Overall		
	A	C	B	A	C	B	A	C	B
No. of households									
No	19	6	25	19	9	28	38	15	53
Yes	71	38	109	71	36	107	142	74	216
Total	90	45	135	90	45	135	180	90	270
% of households									
No	21.11	13.33	18.52	21.11	20.00	20.74	21.11	16.67	19.63
Yes	78.89	84.44	80.74	78.89	80.00	79.26	78.89	82.22	80.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table-57: Causes of increased incidence of pests and diseases

(% of households)

Cause	Dharwad			Gulbarga			Overall		
	A	C	B	A	C	B	A	C	B
Weather related reasons	81.11	84.44	82.22	55.56	46.67	52.59	68.33	65.56	67.41
Growing every year without rotation	66.67	77.78	70.37	48.89	40.00	45.93	57.78	58.89	58.15
Growing susceptible varieties	44.44	33.33	40.74	36.67	46.67	40.00	40.56	40.00	40.37
Not adopting IPM/IDM technologies	35.56	31.11	34.07	31.11	31.11	31.11	33.33	31.11	32.59
Growing other alternative host crops	36.67	31.11	34.81	16.67	13.33	15.56	26.67	22.22	25.19

(Garrett Scores)

Causes	Dharwad						Gulbarga						Overall					
	A		C		B		A		C		B		A		C		B	
	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
Weather related reasons	48.09	1	50.64	1	48.94	1	31.18	1	24.42	2	28.93	1	39.63	1	37.53	1	38.93	1
Growing every year without rotation	32.10	2	35.82	2	33.34	2	22.07	2	16.80	3	20.31	3	27.08	2	26.31	2	26.83	2
Growing susceptible varieties	22.57	3	16.22	3	20.45	3	20.57	3	25.58	1	22.24	2	21.57	3	20.90	3	21.34	3
Not adopting IPM/IDM technologies	14.92	5	13.16	5	14.33	5	15.41	4	16.27	4	15.70	4	15.17	4	14.71	4	15.01	4
Growing other alternative host crops	15.40	4	14.07	4	14.96	4	6.27	5	6.58	5	6.37	5	10.83	5	10.32	5	10.66	5

Note: A=Adopted; C=Control; B=Both; GS=Garrett Score; R=Rank.

Table-58: Measures adopted by sample households to control pests and diseases

(% of households)

Measures	Dharwad			Gulbarga			Overall		
	A	C	B	A	C	B	A	C	B
A) Pests									
Rely only on chemical pesticides	75.56	73.33	74.81	70.00	82.22	74.07	72.78	77.78	74.44
Adopt IPM/IDM technologies	31.11	35.56	32.59	36.67	33.33	35.56	33.89	34.44	34.07
Alter sowing time	31.11	20.00	27.41	27.78	20.00	25.19	29.44	20.00	26.30
Hand picking (Traditional practice)	15.56	6.67	12.59	3.33	8.89	5.19	9.44	7.78	8.89
B) Diseases									
Relying only on chemical pesticides	78.89	73.33	77.04	62.22	57.78	60.74	70.56	65.56	68.89
Adopting IPM/IDM technologies	28.89	40.00	32.59	32.22	33.33	32.59	30.56	36.67	32.59
Altering sowing time	34.44	28.89	32.59	16.67	6.67	13.33	25.56	17.78	22.96
Roughing	6.67	0.00	4.44	4.44	4.44	4.44	5.56	2.22	4.44

(Garrett Scores)

Measures	Dharwad						Gulbarga						Overall					
	A		C		B		A		C		B		A		C		B	
	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
A) For controlling pests																		
Relying only on chemical pesticides	41.82	1	38.24	1	40.63	1	37.34	1	38.93	1	37.87	1	39.58	1	38.59	1	39.25	1
Adopting IPM/IDM technologies	16.96	2	19.24	2	17.72	2	19.28	2	19.16	2	19.24	2	18.12	2	19.20	2	18.48	2
Altering sowing time	11.57	3	6.44	3	9.86	3	11.48	3	9.80	3	10.92	3	11.52	3	8.12	3	10.39	3
Hand picking (Trad. Pra)	6.80	4	3.07	4	5.56	4	1.17	4	4.78	4	2.37	4	3.98	4	3.92	4	3.96	4
B) For controlling diseases																		
Relying only on chemical pesticides	43.73	1	40.00	1	42.49	1	32.26	1	27.36	1	30.62	1	37.99	1	33.68	1	36.56	1
Adopting IPM / IDM technologies	15.80	2	20.96	2	17.52	2	17.04	2	19.16	2	17.75	2	16.42	2	20.06	2	17.63	2
Altering sowing time	12.87	3	10.56	3	12.10	3	6.22	3	2.93	3	5.13	3	9.54	3	6.74	3	8.61	3
Roughing (Traditional control)	3.06	4	0.00	4	2.04	4	1.93	4	1.93	4	1.93	4	2.49	4	0.97	4	1.99	4

Table-59: Sources of information about pest and disease control measures

(% of households)

Decision	Source	Dharwad			Gulbarga			Overall		
		A	C	B	A	C	B	A	C	B
When to apply	Input suppliers	88.89	93.33	90.37	82.22	80.00	81.48	85.56	86.67	85.93
	Households	58.89	51.11	56.30	54.44	60.00	56.30	56.67	55.56	56.30
	Friends and relatives	31.11	33.33	31.85	4.44	8.89	5.93	17.78	21.11	18.89
	Radio	11.11	6.67	9.63	17.78	13.33	16.30	14.44	10.00	12.96
	Research institute	12.22	4.44	9.63	8.89	6.67	8.15	10.56	5.56	8.89
	News papers	3.33	0.00	2.22	0.00	0.00	0.00	1.67	0.00	1.11
	Agril. Magazines	3.33	0.00	2.22	0.00	0.00	0.00	1.67	0.00	1.11
	NGO	3.33	0.00	2.22	2.22	0.00	1.48	2.78	0.00	1.85
	Others	12.22	4.44	9.63	2.22	6.67	3.70	7.22	5.56	6.67
Type of pesticide	Input suppliers	88.89	84.44	87.41	77.78	82.22	79.26	83.33	83.33	83.33
	Households	47.78	33.33	42.96	44.44	62.22	50.37	46.11	47.78	46.67
	Friends and relatives	24.44	15.56	21.48	8.89	8.89	8.89	16.67	12.22	15.19
	Research institute	15.56	6.67	12.59	8.89	8.89	8.89	12.22	7.78	10.74
	Radio	3.33	0.00	2.22	4.44	6.67	5.19	3.89	3.33	3.70
	News papers	1.11	0.00	0.74	0.00	0.00	0.00	0.56	0.00	0.37
	Agril. Magazines	4.44	0.00	2.96	0.00	0.00	0.00	2.22	0.00	1.48
	NGO	3.33	0.00	2.22	2.22	0.00	1.48	2.78	0.00	1.85
	Others	3.33	2.22	2.96	2.22	6.67	3.70	2.78	4.44	3.33
Quantity to use	Input suppliers	96.67	86.67	93.33	77.78	80.00	78.52	87.22	83.33	85.93
	Households	48.89	42.22	46.67	53.33	64.44	57.04	51.11	53.33	51.85
	Friends and relatives	21.11	28.89	23.70	10.00	15.56	11.85	15.56	22.22	17.78
	Research institute	12.22	11.11	11.85	12.22	8.89	11.11	12.22	10.00	11.48
	Radio	0.00	8.89	2.96	0.00	6.67	2.22	0.00	7.78	2.59
	Agril. Magazines	0.00	6.67	2.22	0.00	0.00	0.00	0.00	3.33	1.11
	News papers	3.33	0.00	2.22	2.22	0.00	1.48	2.78	0.00	1.85
	NGO	0.00	0.00	0.00	2.22	0.00	1.48	1.11	0.00	0.74
	Others	3.33	2.22	2.96	2.22	6.67	3.70	2.78	4.44	3.33
Mixing chemical	Input suppliers	84.44	84.44	84.44	74.44	77.78	75.56	79.44	81.11	80.00
	Households	41.11	42.22	41.48	52.22	68.89	57.78	46.67	55.56	49.63
	Friends and relatives	21.11	22.22	21.48	10.00	8.89	9.63	15.56	15.56	15.56
	Research institute	7.78	2.22	5.93	6.67	11.11	8.15	7.22	6.67	7.04
	Radio	0.00	0.00	0.00	2.22	6.67	3.70	1.11	3.33	1.85
	News papers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Agril. Magazines	1.11	0.00	0.74	0.00	0.00	0.00	0.56	0.00	0.37
	NGO	7.78	0.00	5.19	2.22	0.00	1.48	5.00	0.00	3.33
	Others	5.56	2.22	4.44	2.22	6.67	3.70	3.89	4.44	4.07
Overall	Input suppliers	89.72	87.22	88.89	78.06	80.00	78.70	83.89	83.61	83.80
	Households	49.17	42.22	46.85	51.11	63.89	55.37	50.14	53.06	51.11
	Friends and relatives	24.45	25.00	24.63	8.33	10.56	9.08	16.39	17.78	16.85
	Research institute	11.95	6.11	10.00	9.17	8.89	9.08	10.56	7.50	9.54
	Radio	3.61	3.89	3.70	6.11	8.33	6.85	4.86	6.11	5.28
	Agril. Magazines	2.22	1.67	2.04	0.00	0.00	0.00	1.11	0.83	1.02
	News papers	1.95	0.00	1.30	0.56	0.00	0.37	1.25	0.00	0.83
	NGO	3.61	0.00	2.41	2.22	0.00	1.48	2.92	0.00	1.95
	Others	6.11	2.78	5.00	2.22	6.67	3.70	4.17	4.72	4.35

(Garrett Scores)

Decision	Dharwad						Gulbarga						Overall					
	A		C		B		A		C		B		A		C		B	
	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R
Mixing chemical																		
Input suppliers	42.59	1	45.29	1	43.49	1	40.51	1	41.67	1	40.90	1	41.55	1	43.48	1	42.19	1
Farmers	10.16	2	10.36	2	10.22	2	10.90	2	14.36	2	12.05	2	10.53	2	12.36	2	11.14	2
Friends and relatives	4.28	3	4.56	3	4.37	3	3.04	3	3.04	5	3.04	3	3.66	3	3.80	3	3.71	3
Research institute	2.64	4	1.11	4	2.13	4	1.46	4	3.64	4	2.19	4	2.05	4	2.38	5	2.16	4
Others	1.38	5	1.11	4	1.29	5	1.11	5	3.78	3	2.00	5	1.24	5	2.44	4	1.64	5
Radio	0.00	8	0.00	6	0.00	8	0.56	6	0.98	6	0.70	6	0.28	7	0.49	6	0.35	6
NGO	0.34	7	0.00	6	0.23	7	0.56	6	0.00	8	0.37	7	0.45	6	0.00	8	0.30	7
Agril. Magzines	0.56	6	0.00	6	0.37	6	0.00	8	0.00	8	0.00	9	0.28	7	0.00	8	0.19	8
Television	0.00	8	0.00	6	0.00	8	0.00	8	0.62	7	0.21	8	0.00	9	0.31	7	0.10	9
News papers	0.00	8	0.00	6	0.00	8	0.00	8	0.00	8	0.00	9	0.00	9	0.00	8	0.00	10
Quantity to use																		
Input suppliers	44.89	1	45.82	1	45.20	1	42.56	1	42.71	1	42.61	1	43.72	1	44.27	1	43.90	1
Farmers	11.64	2	10.53	2	11.27	2	12.56	2	15.04	2	13.39	2	12.10	2	12.79	2	12.33	2
Friends and relatives	5.29	3	7.09	3	5.89	3	2.36	3	3.73	4	2.81	3	3.82	3	5.41	3	4.35	3
Research institute	3.50	4	3.04	4	3.35	4	2.21	4	2.11	5	2.18	4	2.86	4	2.58	4	2.76	4
Others	0.97	5	1.11	5	1.01	5	1.11	5	3.78	3	2.00	5	1.04	5	2.44	5	1.51	5
News papers	0.34	6	0.00	8	0.23	7	0.56	6	0.00	7	0.37	6	0.45	6	0.00	8	0.30	6
Radio	0.00	8	0.62	7	0.21	9	0.00	8	0.69	6	0.23	8	0.00	9	0.66	6	0.22	7
NGO	0.00	8	0.00	8	0.00	10	0.56	6	0.00	7	0.37	6	0.28	7	0.00	8	0.19	8
Agril. Magzines	0.00	8	0.98	6	0.33	6	0.00	8	0.00	7	0.00	9	0.00	9	0.49	7	0.16	9
Television	0.34	6	0.00	8	0.23	7	0.00	8	0.00	7	0.00	9	0.17	8	0.00	8	0.11	10
Type of pesticide																		
Input suppliers	41.38	1	44.53	1	42.43	1	41.31	1	41.98	1	41.53	1	41.34	1	43.26	1	41.98	1
Farmers	10.81	2	8.42	2	10.01	2	11.54	2	15.36	2	12.81	2	11.18	2	11.89	2	11.41	2
Friends and relatives	7.12	3	4.18	3	6.14	3	3.04	3	3.04	4	3.04	3	5.08	3	3.61	3	4.59	3
Research institute	6.18	4	1.93	4	4.76	4	1.94	4	2.11	5	2.00	4	4.06	4	2.02	5	3.38	4
Others	0.97	5	1.11	5	1.01	5	1.11	5	3.78	3	2.00	4	1.04	5	2.44	4	1.51	5
Radio	0.34	8	0.00	6	0.23	8	0.31	7	0.69	6	0.44	6	0.33	6	0.34	6	0.33	6
Television	0.56	6	0.00	6	0.37	6	0.00	8	0.00	7	0.00	8	0.28	7	0.00	7	0.19	7
News papers	0.56	6	0.00	6	0.37	6	0.00	8	0.00	7	0.00	8	0.28	7	0.00	7	0.19	7
NGO	0.00	10	0.00	6	0.00	10	0.41	6	0.00	7	0.27	7	0.21	9	0.00	7	0.14	9
Agril. Magzines	0.31	9	0.00	6	0.21	9	0.00	8	0.00	7	0.00	8	0.16	10	0.00	7	0.10	10
When to apply																		
Input suppliers	39.38	1	44.56	1	41.10	1	41.78	1	42.44	1	42.00	1	40.58	1	43.50	1	41.55	1
Farmers	12.79	2	14.89	2	13.49	2	14.49	2	13.64	2	14.21	2	13.64	2	14.27	2	13.85	2
Friends and relatives	9.21	3	6.80	3	8.41	3	2.38	4	3.33	4	2.70	3	5.79	3	5.07	3	5.55	3
Others	4.79	4	2.22	4	3.93	4	1.11	6	3.78	3	2.00	6	2.95	5	3.00	4	2.97	4
Research institute	3.84	5	1.11	5	2.93	5	2.09	5	2.38	5	2.19	4	2.97	4	1.74	5	2.56	5
Radio	1.99	6	0.69	6	1.56	6	2.47	3	1.38	6	2.10	5	2.23	6	1.03	6	1.83	6
NGO	0.97	7	0.00	7	0.64	7	0.41	7	0.00	7	0.27	7	0.69	7	0.00	7	0.46	7
Agril. Magzines	0.49	8	0.00	7	0.33	8	0.00	8	0.00	7	0.00	8	0.24	8	0.00	7	0.16	8
News papers	0.34	9	0.00	7	0.23	9	0.00	8	0.00	7	0.00	8	0.17	9	0.00	7	0.11	9
Television	0.00	10	0.00	7	0.00	10	0.00	8	0.00	7	0.00	8	0.00	10	0.00	7	0.00	10
Overall																		
Input suppliers	42.06	1	45.05	1	43.06	1	41.54	1	42.20	1	41.76	1	41.80	1	43.63	1	42.41	1
Farmers	11.35	2	11.05	2	11.25	2	12.37	2	14.60	2	13.11	2	11.86	2	12.83	2	12.18	2
Friends and relatives	6.48	3	5.66	3	6.20	3	2.71	3	3.29	4	2.90	3	4.59	3	4.47	3	4.55	3
Research institute	4.04	4	1.80	4	3.29	4	1.93	4	2.56	5	2.14	4	2.98	4	2.18	5	2.72	4
Others	2.03	5	1.39	5	1.81	5	1.11	5	3.78	3	2.00	5	1.57	5	2.58	4	1.91	5
Radio	0.58	6	0.33	6	0.50	6	0.83	6	0.93	6	0.87	6	0.71	6	0.63	6	0.68	6
NGO	0.33	8	0.00	8	0.22	8	0.48	7	0.00	8	0.32	7	0.41	7	0.00	9	0.27	7
Agril. Magzines	0.34	7	0.24	7	0.31	7	0.00	9	0.00	8	0.00	10	0.17	9	0.12	7	0.15	8
News papers	0.31	9	0.00	8	0.21	9	0.14	8	0.00	8	0.09	8	0.23	8	0.00	9	0.15	9
Television	0.23	10	0.00	8	0.15	10	0.00	9	0.16	7	0.05	9	0.11	10	0.08	8	0.10	10

Table-60: Garrett Scores for Constraints in Chickpea Cultivars

Constraint*	Dharwad												Gulbarga												Overall			
	A						C						A						C									
	Annigeri		Bhima		Kabuli		Local		Annigeri		Kabuli		Local		Annigeri		Kabuli		Local		Annigeri		Kabuli				Local	
	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	40.42	1	28.00	4	76.20	1	1.71	1	32.95	2	38.50	4	1.69	1	42.24	1	70.00	1	0.81	4	43.05	1	73.00	1	1.42	2	20.93	1
HPI	39.23	2	27.00	5	59.60	2	1.42	2	41.52	1	71.50	1	0.00	1	21.62	4	0.00	5	0.78	5	25.28	3	0.00	1	1.71	1	16.24	2
HDI	27.11	4	37.50	1	51.80	3	0.61	5	30.55	3	60.50	2	1.36	2	10.86	8	31.00	3	0.63	7	12.56	7	0.00	3	1.22	3	10.73	6
LD	24.69	5	0.00		29.20	4	0.00		21.24	6	23.00	7	0.00		15.66	6	0.00		0.41	8	17.21	5	57.00	2	0.00		9.83	7
SGS	23.95	7	29.00	3	16.00	5	1.12	3	20.64	7	25.00	6	1.11	3	32.78	2	50.00	2	1.38	2	28.56	2	44.00	3	1.02	4	14.01	3
PC	11.46	11	0.00		13.40	7	0.00		10.48	10	28.50	5	0.00		8.20	9	0.00		1.02	3	6.37	9	0.00		0.82	5	4.85	10
PT	10.20	12	0.00		14.00	6	0.51	6	11.76	9	40.00	3	0.89	4	12.11	7	0.00		0.71	6	9.74	8	28.00	4	0.53	6	5.84	8
LRS	28.73	3	33.25	2	12.40	8	0.41	7	26.90	4	12.00	9	0.00		18.66	5	0.00		1.54	1	15.35	6	0.00		0.00		11.42	5
LMP	24.57	6	21.75	6	4.40	10	0.68	4	22.69	5	17.50	8	0.00		26.20	3	0.00		0.00		24.26	4	0.00		0.00		12.02	4
NFC	12.43	10	0.00		0.00		0.00		9.79	12	11.00	10	0.56	5	4.24	12	0.00		0.00		1.51	12	0.00		0.00		3.54	12
PFQ	17.27	8	0.00		0.00		0.00		14.62	8	0.00		0.00		8.12	10	0.00		0.00		5.84	10	0.00		0.00		5.53	9
SSP	13.89	9	0.00		5.00	9	0.27	8	10.33	11	0.00		0.00		4.68	11	0.00		0.00		2.60	11	0.00		0.00		3.97	11

*Note: GS=Garrett Score

R=Rank

LY=Low Yield

LD=Long Duration

PT=Poor Taste

NFC=Not Fit into

HPI=High Pest

SGS=Small Grain

LRS=Low

Cropping System

Incidence

Size

Recovery/Shelling %

PFQ=Poor Fodder

HDI=High Disease

PC=Poor Colour

LMP=Low Market Price

Quality

Incidence

SSP=Susceptible to

Storage Pest

Table-78: Constraints faced in the cultivation of chickpea varieties as perceived by farm women

(% of households)

Variety	Constraint	Dharwad			Gulbarga			Overall			
		A	C	B	A	C	B	A	C	B	
Annigeri	Low yield constraint	46.66	51.11	48.14	64.44	66.67	65.19	55.55	58.88	56.66	
	Small grain size	44.44	53.32	47.41	56.66	46.67	53.33	50.56	49.99	50.36	
	High pest incidence	58.88	62.21	59.98	37.77	40.01	38.51	48.33	51.1	49.25	
	Low market price	44.43	46.67	45.17	44.45	44.44	44.46	44.44	45.55	44.80	
	Long duration	43.33	46.65	44.44	31.11	28.89	30.37	37.23	37.77	37.41	
	High disease incidence	47.76	44.43	46.65	23.33	26.67	24.44	35.56	35.54	35.54	
	Poor taste	36.66	33.33	35.54	34.45	28.88	32.58	35.57	31.11	34.07	
	Low recovery/ shelling %	45.55	40	43.7	25.55	15.55	22.22	35.56	27.77	32.96	
	Poor colour	38.88	31.1	36.29	17.77	15.55	17.03	28.34	23.31	26.64	
	Susceptible to storage pest	27.77	26.67	27.4	16.66	11.11	14.81	22.25	18.89	21.11	
	Poor fodder quality	31.1	24.43	28.88	11.11	8.88	10.36	21.12	16.66	19.61	
	Not fit into present cropping system	25.53	24.44	25.18	6.66	2.22	5.18	16.13	13.32	15.17	
	Bhima	Small grain size	3.33	0	2.22	0	0	0	1.68	0	1.11
		Low yield	1.11	0	0.74	0	0	0	0.56	0	0.37
High pest incidence		1.11	0	0.74	0	0	0	0.56	0	0.37	
High disease incidence		1.11	0	0.74	0	0	0	0.56	0	0.37	
Poor taste		1.11	0	0.74	0	0	0	0.56	0	0.37	
Low recovery/ shelling %		1.11	0	0.74	0	0	0	0.56	0	0.37	
Susceptible to storage pest		1.11	0	0.74	0	0	0	0.56	0	0.37	
Kabuli	Low yield constraint	4.44	2.22	3.7	1.11	2.22	1.48	2.78	2.22	2.59	
	High pest incidence	5.55	4.44	5.18	0	0	0	2.78	2.22	2.59	
	High disease incidence	4.44	4.44	4.44	1.11	0	0.74	2.78	2.22	2.59	
	Small grain size	3.33	4.44	3.7	1.11	2.22	1.48	2.23	3.33	2.59	
	Low market price	1.11	4.44	2.22	1.11	2.22	1.48	1.12	3.33	1.85	
	Long duration	1.11	2.22	1.48	0	0	0	0.56	1.11	0.74	
	Not fit into present cropping system	2.22	0	1.48	0	0	0	1.12	0	0.74	
	Poor colour	1.11	0	0.74	0	0	0	0.56	0	0.37	
	Poor taste	0	2.22	0.74	0	0	0	0	1.11	0.37	
	Low recovery/ shelling %	1.11	0	0.74	0	0	0	0.56	0	0.37	
	Susceptible to storage pest	1.11	0	0.74	0	0	0	0.56	0	0.37	
	Poor fodder quality	1.11	0	0.74	0	0	0	0.56	0	0.37	
	Local	Small grain size	2.22	0	1.48	4.44	2.22	3.7	3.34	1.11	2.59
		Poor taste	2.22	2.22	2.22	1.11	2.22	1.48	1.68	2.22	1.85
Low yield constraint		2.22	0	1.48	1.11	2.22	1.48	1.67	1.11	1.48	
High disease incidence		2.22	2.22	2.22	1.11	0	0.74	1.67	1.11	1.48	
Long duration		2.22	0	1.48	0	2.22	0.74	1.12	1.11	1.11	
High pest incidence		1.11	2.22	1.48	0	0	0	0.56	1.11	0.74	
Low recovery/ shelling %		0	0	0	2.22	0	1.48	1.12	0	0.74	
Low market price		1.11	0	0.74	0	2.22	0.74	0.56	1.11	0.74	
Poor colour		1.11	0	0.74	0	0	0	0.56	0	0.37	
Poor fodder quality		1.11	0	0.74	0	0	0	0.56	0	0.37	

Constraint	(Garrett Scores)																		Overall								
	Dharwad									Gulbarga																	
	Adopted						Control			Adopted						Control											
	Annigeri		Bhima		Kabuli		Local		Annigeri	Kabuli	Local	Annigeri		Kabuli		Local		Annigeri	Kabuli	Local							
GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R	GS	R						
LY	37.60	2	12.50	5	59.80	2	1.74	1	40.71	2	38.50	4	0.00	44.89	1	73.00	1	0.78	3	46.28	1	70.00	1	1.69	1	21.37	1
HPI	39.73	1	15.25	4	62.00	1	0.76	6	41.05	1	70.00	1	1.56	1	21.05	4	0.00	0.00	22.81	4	0.00	0.00	0.00	0.00	15.63	2	
SGS	20.43	7	35.25	1	24.80	4	1.03	4	23.52	4	48.00	3	0.00	29.91	2	57.00	2	2.39	1	25.16	2	50.00	2	1.11	3	13.26	3
LMP	26.72	4	0.00		4.80	11	0.27	8	27.98	3	24.50	6	0.00	25.02	3	28.00	4	0.00	23.33	3	31.00	3	0.56	5	12.43	4	
LD	23.38	6	0.00		0.00		1.21	3	23.38	5	0.00	0.00	17.14	5	0.00	0.00	15.07	5	0.00	1.36	2	9.63	5				
HDI	25.32	5	19.00	2	42.60	3	1.38	2	23.14	6	58.00	2	1.11	2	11.35	8	44.00	3	0.41	4	11.56	6	0.00	0.00	9.62	6	
LRS	28.48	3	6.25	7	7.00	9	0.00		23.14	6	0.00	0.00	13.14	6	0.00	1.12	2	6.93	9	0.00	0.00	0.00	0.00	9.07	7		
PT	13.31	11	9.25	6	8.60	7	0.78	5	10.48	11	38.50	4	0.69	3	12.31	7	0.00	0.34	5	11.51	7	0.00	0.89	4	6.33	8	
PC	14.98	10	0.00		7.40	8	0.46	7	9.90	12	0.00	0.00	7.54	9	0.00	0.00	7.63	8	0.00	0.00	0.00	0.00	5.00	9			
SSP	15.75	9	16.00	3	8.80	6	0.00		14.29	8	0.00	0.00	6.19	10	0.00	0.00	3.60	10	0.00	0.00	0.00	0.00	4.98	10			
PFQ	16.96	8	0.00		5.60	10	0.23	9	13.02	9	0.00	0.00	5.31	11	0.00	0.00	2.63	11	0.00	0.00	0.00	0.00	4.74	11			
NFC	12.26	12	0.00		10.60	5	0.00		11.79	10	0.00	0.00	3.46	12	0.00	0.00	0.65	12	0.00	0.00	0.00	0.00	3.48	12			

*Note: GS=Garrett Score
 LY=Low Yield
 HPI=High Pest Incidence
 HDI=High Disease Incidence

R=Rank
 LD=Long Duration
 SGS=Small Grain Size
 PC=Poor Colour

PT=Poor Taste
 LRS=Low Recovery/Shelling %
 LMP=Low Market Price

NFC=Not Fit into Cropping System
 PFQ=Poor Fodder Quality
 SSP=Susceptible to Storage Pest

APPENDICES

App-1: Area, Production and Yield of Chickpea along with Percentage Coverage under Irrigation in India (1950-1951 to 2007-2008)

(Area in m.ha; Production in m.t.; Yield in Kg/ha)

Year	Area	Production	Yield	% Coverage under Irrigation
1950-51	7.57	3.65	482	12.5
1951-52	6.83	3.39	496	15.1
1952-53	7.26	4.21	580	14.6
1953-54	7.97	4.83	606	14
1954-55	9.25	5.62	608	12.8
1955-56	9.78	5.42	554	12.1
1956-57	9.67	6.23	644	10.8
1957-58	9.09	4.89	538	12.5
1958-59	10.08	7.02	697	12
1959-60	10.33	5.62	544	12.4
1960-61	9.28	6.25	674	11.9
1961-62	9.57	5.79	605	12.2
1962-63	9.19	5.36	583	13.7
1963-64	9.35	4.5	481	13.7
1964-65	8.87	5.78	651	15.8
1965-66	8.02	4.22	527	16.4
1966-67	8	3.62	453	18.8
1967-68	8.26	5.97	723	15.6
1968-69	7.11	4.31	607	18.8
1969-70	7.75	5.55	715	17.3
1970-71	7.84	5.2	663	15.6
1971-72	7.91	5.08	642	15
1972-73	6.97	4.54	651	15.6
1973-74	7.76	4.1	528	15.8
1974-75	7.04	4.02	570	17.8
1975-76	8.32	5.88	707	16.5
1976-77	7.97	5.42	680	15.2
1977-78	7.97	5.41	678	14.7
1978-79	7.71	5.74	745	15.6
1979-80	6.99	3.36	481	18.6
1980-81	6.58	4.33	657	20.6
1981-82	7.87	4.64	590	17.9
1982-83	7.4	5.29	715	15.6
1983-84	7.16	4.75	663	14.5
1984-85	6.91	4.56	661	14.8
1985-86	7.8	5.79	742	15.6
1986-87	6.98	4.53	649	19.4
1987-88	5.77	3.63	629	19.2
1988-89	6.81	5.13	753	18.3
1989-90	6.47	4.22	652	21
1990-91	7.52	5.36	712	20.5
1991-92	5.58	4.12	739	24.2
1992-93	6.45	4.42	684	22
1993-94	6.36	4.98	783	24

1994-95	7.54	6.44	853	25.3
1995-96	7.12	4.98	700	26
1996-97	6.85	5.57	813	25.1
1997-98	7.56	6.13	811	21.8
1998-99	8.47	6.80	803	21
1999-00	6.15	5.12	833	29.1
2000-01	5.19	3.86	744	30.9
2001-02	6.42	5.47	853	30.4
2002-03	5.91	4.24	717	32.1
2003-04	7.05	5.72	811	31
2004-05	6.71	5.47	815	NA
2005-06	6.93	5.60	808	NA
2006-07 (Targets)	7.63*	6.20	782*	NA
2006-07 @	-	6.34	-	NA
2007-08(Targets)	-	6.40	-	-

NA=Not available; P=Provisional

*Advance estimates as on 04.04.2007

@4th advance estimates as on 17.07.2007

The yield rates given above have been worked out on the basis of production and area figures.

Source: Ministry of Agriculture, Government of India.

App-2: State-wise Triennium Average (TE 2005-06) Area, Production and Yield of Chickpea

SN	States/UTs	Area		Prodn		Yield	
		'000 ha	% to Total	'000 t	% to Total	Kg/ha	% to Total
1	Andhra Pradesh	385.67	5.60	476.33	8.53	1235	152.22
2	Assam	2.17	0.03	1.03	0.02	477	58.78
3	Bihar	71.53	1.04	64.97	1.16	908	111.93
4	Gujarat	146.43	2.13	124.27	2.22	849	104.59
5	Haryana	120.00	1.74	87.67	1.57	731	90.04
6	Himachal Pradesh	1.77	0.03	1.90	0.03	1075	132.55
7	Jammu & Kashmir	0.23	0.00	0.13	0.00	571	70.43
8	Karnataka	448.50	6.51	208.03	3.72	464	57.17
9	Madhya Pradesh	2699.50	39.20	2501.67	44.77	927	114.21
10	Maharashtra	881.67	12.80	530.67	9.50	602	74.18
11	Meghalaya	0.50	0.01	0.30	0.01	600	73.95
12	Nagaland	0.97	0.01	1.13	0.02	1172	144.50
13	Orissa	32.13	0.47	20.13	0.36	627	77.22
14	Punjab	5.03	0.07	4.27	0.08	848	104.47
15	Rajasthan	1077.93	15.65	653.03	11.69	606	74.67
16	Tamil Nadu	6.40	0.09	4.23	0.08	661	81.52
17	Tripura	0.40	0.01	0.20	0.00	500	61.62
18	Uttar Pradesh	746.27	10.84	706.63	12.65	947	116.70
19	West Bengal	41.50	0.60	41.03	0.73	989	121.86
20	Chandigarh	215.57	3.13	158.27	2.83	734	90.49
21	Dadra & Nagar Haveli	0.20	0.00	0.10	0.00	500	61.62
22	Delhi	0.03	0.00	0.10	0.00	3000	369.74
	All India	6886.30	100.00	5587.43	100.00	811	100.00

Source: Ministry of Agriculture, Government of India.

App-3: District-wise Area, Production and Yield of Chickpea (2004-05)

(Area in ha; Production in tonnes; Yield in kg/ha)

District	Irrigated			Un-irrigated			Total				
	A	P	Y	A	P	Y	A	%	P	%	Y
Bagalkote	7488	5591	786	13472	4697	367	20960	5.01	10288	4.45	517
Bangalore - Urban	0	0	0	25	13	539	25	0.01	13	0.01	539
Bangalore - Rural	0	0	0	142	73	539	142	0.03	73	0.03	539
Belgaum	18961	10646	591	22460	9708	455	41421	9.91	20354	8.81	517
Bellary	2850	1857	686	7660	2591	356	10510	2.51	4448	1.93	445
Bidar	1269	1038	861	39227	19900	534	40496	9.69	20938	9.06	544
Bijapur	15308	10703	736	34350	14750	452	49658	11.88	25453	11.02	540
Chamarajanagar	76	57	789	2054	1971	1010	2130	0.51	2028	0.88	1002
Chikmagalur	0	0	0	3038	1319	457	3038	0.73	1319	0.57	457
Chitradurga	46	34	789	6641	1905	302	6687	1.60	1939	0.84	305
Dakshina Kannada	0	0	0	0	0	0	0	0.00	0	0.00	0
Davanagere	5	4	789	1710	395	243	1715	0.41	399	0.17	245
Dharwad	8826	7219	861	30285	10214	355	39111	9.35	17433	7.55	469
Gadag	9638	11994	1310	29350	12742	457	38988	9.33	24736	10.71	668
Gulbarga	3313	2710	861	120716	83602	729	124029	29.67	86312	37.37	733
Hassan	0	0	0	2864	1096	403	2864	0.69	1096	0.47	403
Haveri	88	66	789	1789	413	243	1877	0.45	479	0.21	269
Kodagu	0	0	0	25	13	539	25	0.01	13	0.01	539
Kolar	144	108	789	0	0	0	144	0.03	108	0.05	789
Koppal	698	523	789	13419	3200	251	14117	3.38	3723	1.61	278
Mandya	48	36	789	1	1	539	49	0.01	37	0.02	795
Mysore	0	0	0	991	379	403	991	0.24	379	0.16	403
Raichur	1892	359	200	16591	8464	537	18483	4.42	8823	3.82	502
Shimoga	0	0	0	39	20	539	39	0.01	20	0.01	539
Tumkur	0	0	0	588	564	1010	588	0.14	564	0.24	1010
Udupi	0	0	0	0	0	0	0	0.00	0	0.00	0
Uttara Kannada	0	0	0	7	4	539	7	0.00	4	0.00	539
Karnataka	70650	52945	789	347444	178034	539	418094	100.00	230979	100.00	582

Note: A=Area; P=Production and Y=Yield

App-4: Triennium Average Taluka-wise Area under Chickpea (TE 2005-06)

(Area in ha)

SN	Talukas	2003-04	2004-05	2005-06	TE 2005-06	% to Total
A	Dharwad District					
1	Dharwad	15831	14077	14326	14745	33.94
2	Hubli	6594	3970	4176	4913	11.31
3	Kalaghatgi	299	33	102	145	0.33
4	Kundagol	3973	2437	2338	2916	6.71
5	Navalgund	27951	18594	15626	20724	47.70
	Total	54648	39111	36568	43442	100.00
B	Gulbarga District					
1	Afzalpur	15585	12140	13804	13843	11.14
2	Aland	10254	8117	5568	7980	6.42
3	Chincholi	11568	12784	12168	12173	9.79
4	Chittapur	33525	32285	33030	32947	26.51
5	Gulbarga	11227	11624	9491	10781	8.67
6	Jewargi	17932	13642	11830	14468	11.64
7	Sedam	14831	15857	16890	15859	12.76
8	Shahpur	12415	9330	3332	8359	6.73
9	Surpur	6579	6050	5150	5926	4.77
10	Yadgir	2109	2200	1538	1949	1.57
	Total	136025	124029	112801	124285	100.00

App-5: Sample of Households by Districts, Talukas and Villages

SN	Districts	Taluks	Villages	A/C*	No. of Farmers					
					Total	Marginal	Small	Medium	Large	
1	Dharwad	1. Dharwad	1. Harobelwadi	A	30	3	13	7	7	
			2. Kabbenur	C	15	1	6	5	3	
		2. Navalgund	1. Shirkol	A	30	8	11	7	4	
			2. Hansi	C	15	2	5	5	3	
			3. Kumaragoppa	A	30	4	7	10	9	
			4. Yemnur	C	15	3	5	4	3	
			Adopted Total			90	15	31	24	20
			Control Total			45	6	16	14	9
			Both			135	21	47	38	29
		2	Gulbarga	1. Gulbarga	1. Kurikota	A	30	11	8	8
2. Bhushangi	C				15	2	8	4	1	
3. Farhatabad	A				30	6	7	8	9	
4. Honnakirangi	C				15	2	4	6	3	
2. Chittapur	1. Gotur			A	30	8	9	9	4	
	2. Bennur			C	15	6	3	4	2	
	Adopted Total					90	25	24	25	16
	Control Total					45	10	15	14	6
	Both					135	35	39	39	22
3	Overall			Adopted Total			180	40	55	49
		Control Total			90	16	31	28	15	
		Both			270	56	86	77	51	

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