

BYPASSED CROP: A STUDY OF COARSE CEREALS IN KARNATAKA

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Introduction:

At the turn of the millennium we are confronted with quite a delicate situation in the agricultural sector. Given the population pressure and the liberalisation scenario, the agricultural sector has presently a larger responsibility to shoulder. Gross capital formation in the agricultural sector has been showing a declining trend that has become a matter of wide concern. At the same time, superior cereals which were vanguards of the technological change during the mid-seventies, have been exhibiting signs of reaching a technological plateau in yield rates and hence hold a little promise for immediate growth push. On the resource front, in at least some regions of the country, irrigation development seems to have reached its optimum economic level of utilisation. Exploring for higher irrigation potential in these pockets is neither economically viable nor permissible from the environment point of view. In the process of irrigation development, the potential of the most promising regions of the country has been more or less reached to their economically feasible optimum output from the point of view of capital output ratios. In such a situation, only another technological breakthrough can help in effecting a shift in the growth curve. In the entire process, the bypassed regions and the bypassed crops have always remained neglected in terms of research inputs, investible resources, as well as technological breakthrough. These crops and regions do not necessarily suffer from the pessimism of impossibility in technological calculus but have received little attention on the policy front. A large potential exists for these crops and regions in terms of crop production, allied agricultural activities, as well as participation in the market. During the current decade and in the wake of the new development philosophy, stemming from the export-led growth, it becomes necessary that the bypassed regions and the crops participate in the mainstream process of development.

In the Indian context, the rainfed regions, coarse cereals, pulses and oilseeds did not receive many of the advantages of the seed-water-fertiliser technology during the mid-seventies and even beyond that. Sometimes the relative neglect of these crops is also interpreted as the negative externality of the 'green revolution'. Growth of these

crops suffered on account of area augmentation, comparable improvement in yield and the most needed factor namely, economic incentives. Similarly, the bypassed regions suffered mainly on account of the crop pattern-related decisions (predominated by low-value-low yield crops) as well as the resource availability. The rainfed farming technology could not achieve the comparable level of adoption like the superior cereals mainly because of the unattractive quantum of yield gap and incremental income attached with the recommended technology. Similarly, the coarse cereals, pulses and oilseeds as a group could not take advantage of the available technology because of the access and input requirements of the technology. Among the well-received programmes with wide coverage one can mention National Pulses Development Programme (NPDP), National Oilseeds Development Programme (NODP) and Oilseed Production Programme (OPP). These could achieve some breakthrough for the oilseed sector. However, such a breakthrough could not be obtained in the case of pulses. In the case of coarse cereals, no serious attempt was made.

Among these three crop groups, coarse cereals have been neglected on the policy front for a long time despite the intrinsic advantages that these crops have in the context of the Indian cropping system. At least five important aspects highlighting the role of coarse cereals in the aggregate cropping system need to be underscored here: (i) In the rainfed regions of the country coarse cereals form the staple diet of majority of the poor; Bajra, Jowar, Ragi, Sorghum, Harkra, etc. (the minor millets as a group) are largely consumed by the poor of Rajasthan, Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. (ii) Being an important diet component of the poor, these crops are the lowest priced cereals and thus are affordable for the poor (comparable to the cereals supplied through the Public Distribution System (PDS)). (iii) These crops have a proven record of drought resistance and are less amenable to common diseases and pests. Therefore, the risk factor being marginal, small and marginal farmers show preference towards these crops and cultivate them with traditional ease. (iv) The resource requirement of these crops has also been extremely frugal as they require minimum cash component in their total cost of cultivation. (v) It is well known that coarse cereals provide the richest source of calories among the cereals and hence can provide at the lowest cost, the same units of nutrients as rice or wheat. In addition to these factors, coarse cereals also form an important component of feed for livestock. Despite these factors and mainly due to the absence of economic incentives, coarse cereals have remained neglected crops in the country. In sum, coarse cereals have been traditionally

playing an important role in the farming calculus of the small and marginal farmers, in the consumption basket of the poor, as a livestock feed and sustaining the rainfed economy. This calls for an analysis leading to policy steps towards these crops.

1.2: Objectives

The present study investigates the economy of coarse cereals in the drought-prone region of Karnataka with the following objectives:

- i) to analyse the growth trends of coarse cereals in India and Karnataka and the prospects for these crops in a rainfed environment,
- ii) to locate the role of coarse cereals in the international trade as feed stock,
- iii) to analyse the price behaviour of coarse cereals in India and Karnataka,
- iv) to understand the decision-making behaviour of farmers regarding the coarse cereals.
- v) to study the consumption pattern and significance of coarse cereals in it checking the feasibility of incorporating coarse cereals in the local level PDS.

1.3: Methods and Materials

The study utilises both primary as well as secondary sources of data. At the country and state level we have utilised the secondary data on area, production and yield of principal coarse cereals. The crops included in our analysis are ragi jowar, bajara and maize, In addition to the analysis of these crops, with the help of secondary data, we have also included wheat, rice and other crops wherever a comparative perspective was needed . The analysis of the prices is based on the data of farm harvest prices and wholesale price indices. In order to smoothen the year to year fluctuations we have used five year moving averages and indexed these series This process has avoided any bias in the choice of year.

For the purpose of analysis at the primary level, two districts of Karnataka state growing coarse cereals were selected. The choice of the districts one from South Karnataka and another from North Karnataka region, was guided by the intensity of the cultivation of coarse cereals as well as the need for getting the perspective of two distinct cropping systems prevailing in two agro-climatological regions of Karnataka. It was noted that in South Karnataka, Chitradurga district has a large share of gross cropped area under coarse cereals. Whereas, in north Karnataka, Bijapur district

dominates in the coarse cereals led cropping system. One block (taluka) each from these two districts and two villages from each of the blocks were selected, guided by the concentration of coarse cereals in the cropping pattern. But below the block level the choice of villages was guided by two considerations. Firstly, village which faces difficulty to access market infrastructure was expected to have a self-sufficiency-dominated approach in its cropping as well as consumption decisions. The adoption of the latest technology will also be quite slow in such cases. The second type of village selected for the purpose of analysis was one well connected with the main town in the region. This helped to capture the influence of market-led decision parameters. Moreover, the consumption pattern and consequently the cropping pattern in such a village gets determined by the availability of foodgrains in the market. The access to technology-based information is also quite easy and thus technology adoption can be expected to be faster in such a situation. The following table gives the differential situation that is being analysed.

Sl. No.	Market Access Situation	Self Sufficient Village Situation
1	Production decisions guided by market forces	Production decision taken mainly to maintain self-sufficiency
2	Respond to price incentives	Slow response to price incentives
3	Technology adoption due to quick availability of information and inputs	Constraints on input availability
4	Consumption guided by the availability of grains in market	Consumption guided by local staples.
5	Monetisation of the wage market and hence reduced role of food in wage payments.	Prevalence of the role of food in wage payments.

This table presents a distinct picture of the two regions along with two different types of villages. Table 1.1 gives basic information about the selected blocks and villages. Even though we expected a-priori that the village with distant access to the town may have developed a process akin to self-sufficiency, observations do not fully support this view.

Chitradurga district comes under the rainfed region of Southern Karnataka. The average annual rainfall of the district is 566 mms and the cropping pattern is dominated by coarse cereals. Challakere taluka is a typical representation of the district of Chitradurga with low annual average rainfall, meagre irrigation facilities and a cropping

pattern dominated by low value crops. The average size of holding is 1.74 hectares. The proportion of area under coarse cereals is about 12 per cent but a large share of the area has been shifted to cultivation of rainfed groundnut due to the price factor. The villages selected for the purpose of micro-level analysis are Chikkammanhalli and

Table 1.1: Information on Selected Talukas and Villages at a Glance

Particulars	Challakere	Ckmnhalli	Bmnkunte	Bilgi	Korti	Ckogundi
Total Population (1991 Census) (in thousands)	279.3	1.4	1.0	119.0	1.8	3.6
Male (%)	51.5	52.1	53.1	50.0	44.1	44.7
Female (%)	48.6	47.9	46.5	50.0	46.2	45.5
SC/ST (%)	0.5	47.3	19.9	21.8	9.7	12.7
Density of Population (Sq.Kms)	135.0	112.7	108.6	152.0	51.3	131.8
Total Geographical Area (in thousand ha)	194.4	1.3	0.9	78.2	3.6	2.7
Cultivable Area (%)	77.5	80.5	86.8	55.3	82.4	93.5
Forest Area (%)	3.6	2.0	3.5	15.0	1.2	1.5
Irrigated Area (%)	8.7	25.0	16.0	30.1	41.0	34.5
Proportion of area under different crops in 1996-97 (% of total area)						
Jowar	3.5	13.7	10.5	35.2	43.1	39.1
Bajra	4.7	2.7	1.8	11.3	8.1	10.7
Maize	0.4	3.6	-	10.8	3.2	20.6
Ragi	2.8	6.8	6.5	-	-	-
Wheat	0.1	0.4	2.7	3.6	14.1	15.3
Paddy	4.5	3.0	18.6	0.0	-	-
Groundnut	74.6	68.7	58.4	5.5	25.5	10.4
Cotton	0.1	1.0	1.4	3.8	-	-
Gram	-	-	-	2.2	-	-
HYV Seeds	9.4	-	-	27.6	-	-
Total Area (in hect)	100	100	100	100	100	100
Public Distribution System (in 1999 September)						
No. of PDS shops	106	1	*	74	1	1
No. of Card holders	44725	315	101	31607	409	456
Allotment (in quintal Per month)	4818	93.46	47.1	2552.4	34	37.3

* This village attached to Korlakunte village.

Bommanakunte. Of these two villages, Chikkammanahalli falls in the category of having a good market access whereas Bommankunte is an interior village with a large share of tribal population. The PDS outlet for Bommankunte was about 2.5 kms. away in a neighbouring village but Chikkammanahalli has a PDS shop. Bommanakunte has a slightly larger share of agricultural labourers.

Bijapur is a well known traditional drought-prone district. Historically, drought has been quite frequent (once in every four years) in Bijapur district. Thanks to the various schemes presently undertaken by the Government of Karnataka the intensity of drought is not felt so severely in the district as that in the earlier years. Bilagi taluka also has its history of drought but in the recent past some protective irrigation has been provided. This has changed the crop economy of the taluka significantly. The selected villages in Bilagi taluka, viz., Chikkalgundi and Korti are mainly rainfed regions. Recently some protective irrigation is available to a few farmers in the villages. Korti falls on the main road with an access to market, whereas Chikkalgundi is an interior village. Both the villages have PDS outlets and the consumption pattern is dominated by jowar.

We selected 25 households from each of the village out of which 10 households were landless agricultural labourers. The remaining 15 households were spread over three landholding classes viz., below 2.5 ha., between 2.5 and 5.0 ha., and above 5 ha. This has given us a four dimensional view of consumption, utilisation and production of coarse cereals.

2.1 Background

Immediately after the initial euphoria of the Green Revolution settled down, two important issues emerged in the context of the new found path of growth. The possibility of deceleration in the growth performance of the crop productivity was voiced during the early eighties (Sawant 1983). Almost at the same time, the bypassed regions and crops which recorded lower rates of growth dominated the discussions in the context of slow growth crops (IJA, 1982). The performance of coarse cereals, pulses

and oilseeds came under scrutiny and policy steps were taken in terms of initiating the National Oilseeds Development Programme, Oilseeds Technological Mission, National Pulses Development Programme and Coarse Cereals Development Programme. But the results in the case of pulses and coarse cereals have not been encouraging as against those of oilseeds (AFC, 1998; Khare, 1995). While reviewing the performance of coarse cereals Jodha (1974) pointed towards the moisture stress where these crops are grown, their low unit value, the market demand and the resource poor cultivators as the permanent constraints. But the argument that these are permanent constraints blurs the technological feasibility and strengthens policy neglect that historically confronted these crops. Nadkarni (1986) pointed out at the institutional and technological constraints of slow growth crops and indicated the promise that these crops hold. In addition to this, it was pointed out that the demand factors have been mainly responsible for the slow growth of coarse cereals and therefore it was felt necessary to operate on price as well as on the demand front (Ray, 1984). In the present context, we are turning towards these issues in an economically charged agricultural sector with new vistas of growth and technology. Our attempt in this chapter is to review and analyse the aggregate growth performance of coarse cereals in the country as well as at the state level along with the prospects of growth.

2.2 Growth Performance: A Country Level Analysis

Coarse cereals occupied about 40 million hectares of area during the early fifties, which formed about 30 per cent of the gross cropped area. The decline in the actual area under coarse cereals as well as their share in the gross cropped area was more sharp during the late seventies to mid eighties. Table 2.1 shows the declining importance in the gross cropped area of coarse cereals. The proportion of area under paddy and wheat increased by 1.3 and 5.6 per cent points over the period. Share of area under jowar declined from 11.8 per cent to 6.2 per cent marking the highest decline. Area under bajra was about 8 per cent in the early fifties and this has come down to 5.2 per cent during the last quinquennium recording a decline of above 3 per cent. In terms of share, the decline in area under ragi seems to be miniscule but over the last 45 years, the area under ragi has come down by 318 thousand hectares. The overall trends in area allocation suggest a leaning away from foodgrain crops and area under non-foodgrains has increased by about 10 per cent points. Two points emerge very clearly out of this table that the proportion of area allocated to non-foodgrains has been increasing as well as the area allocated to superior cereals.

Table 2.1: Share of Major Crops in Gross Cropped Area: India

(Per cent to GCA)

Sl. No.	Crops	Five Years Moving Average Centred at				
		1955-56	1965-66	1975-76	1985-86	1995-96
1	Jowar	11.8	11.4	9.6	9.1	6.2
2	Bajra	7.9	7.6	6.9	6.0	5.2
3	Ragi	1.6	1.6	1.5	1.4	0.8
4	Maize	2.6	3.1	3.5	3.3	3.3
5	Coarse Cereals	29.8	9.5	25.7	22.3	17.0
6	Paddy	21.7	22.6	23.0	23.1	23.0
7	Wheat	8.2	6.6	11.8	13.3	13.8
8	Foodgrains	75.2	74.1	74.3	71.8	65.9
9	Non-Foodgrains	24.8	25.9	25.7	28.2	34.1
10	Gross Cropped Area	100.00	100.0	100.0	100.0	100.0

Source: GOI (1999): Agricultural Statistics at a Glance, Ministry of Agriculture, Govt of India, New Delhi, For Ragi – Estimates of Area, Production and Productivity of Principal Crops, Ministry of Agriculture, Govt. of India, New Delhi.

The area share of coarse cereals has been declining and the decline is quite sharp in jowar and bajra compared to ragi. Maize being a coarse millet, the promise of agro-processing has increased its area share.

The share of area indicates the allocation decisions, whereas the performance of the crop can be judged from the growth performance. The growth rates of major crops along with coarse cereals are given in Table 2.2. We have obtained growth rates for three sub-periods in order to locate the changes in the growth pattern during these phases. During 1949-50 to 1964-65 the growth rates in production of coarse cereals had kept pace with the growth rates of superior cereals. Growth rates in production of jowar, bajra, ragi and maize were 2.51, 2.34, 3.08 and 3.88 per cent per annum, respectively as against the growth rates in production of rice and wheat recorded at 3.50 and 3.98 per cent per annum, respectively. The growth rates in productivity of jowar, bajra, maize and ragi were 1.49, 1.24, 1.18 and 2.23 per cent per annum respectively, compared with the growth rates of paddy and wheat pegged at 2.25 and

1.27 per cent. This reveals that to begin with, till 1967-68, the coarse cereals were not lagging far behind rice and wheat in terms of productivity growth. However, the scene changed due to the technological breakthrough in the production of rice and wheat as well as due to the institutional support that these crops received. The result was quite obvious and growth rates during 1967-68 to 1980-81 reflected a substantial decline in the growth of production of these crops, even though there was a positive rate of change in the productivity of coarse cereals. The picture of coarse cereals across states differs widely. Only the Central Indian states having large rainfed area have higher concentration of the coarse cereals.

We have presented in Figure 2.1 the trends in area, production and yield of cereals from 1982-83 to 1995-96. These trends are based on indexes of five year moving averages and therefore avoid year to year fluctuations. A clear break can be seen around 1986-87 and 1987-88 in the trends in coarse cereals. The area has been either reduced or stagnated at the level of 1982-83, but the productivity has improved significantly during the eighties. This comes out from the aggregate area under coarse cereals as well as for jowar, bajra and ragi. Maize has a totally different kind of behaviour and its production growth matches more with growth in productivity. The growth in the superior cereals seems to be similar.

Table 2.2: All-India Compound Growth Rates of Area, Production and Yield of Principal Crops

(Base: T.E. 1981-82=100)

(% per annum)

Crop	1949-50 to 1964-65			1967-68 to 1980-81			1980-81 to 1996-97*		
	A	P	Y	A	P	Y	A	P	Y
Rice	1.21	3.50	2.25	0.77	2.22	1.46	0.52	3.16	2.63
Wheat	2.69	3.98	1.27	2.94	5.65	2.62	1.01	3.67	2.91
Total Cereals	1.25	3.21	1.77	0.37	2.61	1.70	-0.32	2.88	2.69
Jowar	0.99	2.51	1.49	-1.15	2.04	3.22	-2.52	-0.56	2.01
Bajra	1.08	2.34	1.24	-1.15	-0.38	0.77	-1.09	1.62	2.74
Maize	2.67	3.88	1.18	0.01	0.02	-	0.25	2.60	2.34
Ragi	0.84	3.08	2.22	0.91	3.38	2.45	-2.45	-0.29	2.22
Small Millets	-0.30	-0.20	0.09	-1.18	-0.81	0.38	-5.60	-4.51	1.16
Barly	-0.64	-0.28	0.36	-3.88	-2.72	1.21	-5.00	-2.06	3.09
Coarse Cereals	0.90	2.25	1.23	-1.03	0.67	1.64	-1.96	0.55	2.35
Total oilseeds	2.67	3.20	0.30	0.26	0.98	0.68	2.43	5.75	2.53
Total Foodgrains	1.35	2.82	1.36	0.38	2.15	1.33	-0.29	2.68	2.52
Non Foodgrains	2.44	3.74	0.89	0.94	2.26	1.19	2.02	4.46	2.25
All Crops	1.58	3.15	1.21	0.51	2.19	1.28	0.31	3.37	2.38

Notes: (*) - Provisional for non foodgrains and all crops.

\$ - Growth rates for the period from 1970-71

A - Growth rates in area under the crop

P - Growth rates in production of the crop

Y - Growth rates in yield of the crop

FIGURE 2.1

2.3 Analysis Across States

In order to understand the geographical distribution of the states growing coarse cereals, the five-year averages of area under these crops for the major states of the country was computed. Based on the share of area under these crops to the total gross cropped area of the state, the first six dominant states growing coarse cereals were chosen (See Table 2.3).

Table 2.3: Major Seven States Areawise under Coarse Cereals

Sl. No.	JOWAR	BAJRA	MAIZE	RAGI
I	Maharashtra	Rajasthan	Uttar Pradesh	Karnataka
II	Karnataka	Maharashtra	Rajasthan	Maharashtra
III	Madhya Pradesh	Gujarat	Madhya Pradesh	Tamil Nadu
IV	Andhra Pradesh	Uttar Pradesh	Bihar	Uttar Pradesh
V	Rajasthan	Haryana	Gujarat	Andhra Pradesh
VI	Tamil Nadu	Karnataka	Karnataka	Bihar
VII	Uttar Pradesh	Tamil Nadu	Andhra Pradesh	Orissa

Note: Computed from the data (CMIE, 1999) based on five years average area under the crop ending 1996-97

The analysis of growth trends across the states is attempted here in terms of crops. Jowar is prominently grown in Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, Rajasthan and Tamil Nadu. The production performances of Maharashtra and Karnataka have been better as compared to stagnation experienced in Rajasthan and Tamil Nadu. The production of jowar is significantly going down in case of Andhra Pradesh. In Andhra Pradesh, the area under sorghum might have declined due to the cheap availability of rice under Two-Rupee Rice Scheme. The stagnation as well as decline is contributed more by the area decline than by the performance of productivity

FIGURE 2.2 (A)

FIGURE 2.2 (B)

FIGURE 2.3 (A)

FIGURE 2.3 (B)

The productivity performance of jowar is relatively better in Andhra Pradesh, Maharashtra, Tamil Nadu and Madhya Pradesh. Therefore, the crop has larger scope to grow in Maharashtra, Karnataka, Madhya Pradesh and Rajasthan. It is necessary however to note the yield fluctuations in the state of Rajasthan.

Bajra is mainly consumed in Gujarat, Rajasthan and Maharashtra as well as in parts of Uttar Pradesh and Haryana. Naturally, these are the predominant states growing this crop. Area under bajra in Uttar Pradesh, Maharashtra and Rajasthan has more or less stagnated but it is fluctuating and reducing in Karnataka, Haryana and Guajrat. The production performance of bajra is satisfactory in the case of Uttar Pradesh, Rajasthan and Maharashtra. Gujarat has been picking up in the case of production. The recovery in bajra yield growth can be noted from mid-eighties onwards. The productivity has been growing at a significantly high rate in Uttar Pradesh, Mahararashtra, Rajasthan and Haryana, whereas it has stagnated in Karnataka and Gujarat. It is necessary to note here that bajra has better cultivars available as compared to the other coarse cereals.

Ragi is an important crop of South and Central India, with the hill regions of Central India, Uttar Pradesh and Bihar growing ragi significantly. Karnataka has the distinction of having the largest share of area under ragi. The area under ragi has been stagnating in Karnataka and Maharashtra whereas, it has clear declining trends in Bihar, Andhra Pradesh, Uttar Pradesh and Tamil Nadu. The production of the crop however, has grown significantly in Karnataka and Maharashtra; stagnated in Uttar Pradesh and Tamil Nadu but declined in Andhra Pradesh and Bihar. The productivity trends have been quite encouraging in most of the states except in Andhra Pradesh (Figures 2.4 (a) and (b)).

Maize has a totally different behaviour as well as purpose in the context of coarse cereals. Maize is mainly grown for the starch industry in many of the states. Therefore, the behaviour of maize as against other cereals has to be carefully looked into. There has been exemplary increase in the area of maize in Karnataka over the years. It is also increasing in the states of Gujarat, Madhya Pradesh and Rajasthan but the area under the crop has been declining in Bihar and Uttar Pradesh. In all the six states under consideration, production of maize has been increasing significantly. The

productivity of maize has also shown a positive rate of growth in most of the states except Karnataka.

This analysis clearly indicates that coarse cereals have shown a general trend of decline in area across all states. However, production has not declined due to increase in the productivity of these crops. The states indicated a mixed performance across coarse cereals but it is essential to note that the area under these cereals has been settling down to a level of equilibrium. The states in which this crop group gets support from the improvement in productivity have performed exceedingly well in terms of retaining production trends. Therefore, it is possible that this crop group has a potential to benefit from improvement in technology. Apart from the pure technological angle, the crops have also not gained from institutional support in terms of price behaviour. It is possible to

FIGURE 2.4 (A)

FIGURE 2.4 (B)

FIGURE 2.5 (A)

FIGURE 2.5 (B)

sustain the area of coarse cereals and improve their production with the given area by adopting better technologies and creating proper economic incentives.

2.4 Export of Coarse Cereals

Coarse cereals have been featuring as an important crop in international trade. These are exported either as animal feeds or for the purpose of processing. The average export of coarse cereals from India during the period 1980-81 to 1989-90 was only 6.79 thousand tonnes. It increased to 124 thousand tonnes during 1993-94 and in 1996-97 it came to 68.96 thousand tonnes (Table 2.4). Among the coarse cereals, jowar and maize are dominant crops which are exported. However, the exports form a miniscule percentage of the total share of exports of cereals in the country.

Table 2.4: Exports of Coarse Cereals from India

(Quantity: in `000 tonnes)

Sl.No.	Year	Jowar	Bajra	Maize	Ragi	Total
1	Avg. 1980-81 to 1989-90	1.66	4.21	3.45	-	6.79
2	1990-91	4.25	2.78	-	-	7.03
3	1991-92	7.48	5.83	-	0.47	13.78
4	1992-93	5.34	8.54	-	2.66	16.54
5	1993-94	71.93	25.41	26.67	0.52	124.53
6	1994-95	57.92	6.38	18.9	0.6	83.8
7	1995-96	3.16	5.13	18.75	0.77	27.81
8	1996-97	7.26	5.11	55.36	1.23	68.96

Source: FAO Stat.

Another important feature which can be noted from the Table 2.4 is that there is no definite trend in the export of coarse cereals and this has been violently fluctuating, probably responding to the demand pulls. This particular observation comes out very clearly from Figures 2.6 (a) and (b). Specifically, the peak in the exports of coarse cereals was obtained during the 1992-93 to 1995-96. Even though in the year 1995-96 the exports came down sharply, the trends picked up the following year. Figure 2.6 (b) shows the trends in cereals other than rice, wheat and maize compared to those for rice and wheat. A similar observation can be made from this figure also.

2.5 Emerging Issues

The important issues emerging in the context of coarse cereals involve mainly their future prospects as a crop commodity for domestic market, a consumption item and an export commodity. Speaking about the prospects of coarse cereals as a crop, it is clear from the literature as well as from data analysed that the area under coarse cereals has almost stagnated over the years. The revival of the area trends is a difficult question to answer. But even under the threat of stagnated area, the production of coarse cereals has continued with positive growth rates in quite a few districts of the country (Bhalla and Gurmail Singh, 2000). It has also been observed that coarse cereals have improved significantly in their performance of productivity trends beginning with the mid-eighties. In most of the coarse cereals growing states, productivity of these crops has increased in the post mid-eighties. More specifically, 1986-87 provides a clear indication of a structural break in the growth of coarse cereals.

As an item of consumption, there has been a significant decline in the share of coarse cereals within the total cereals consumption. However, at an aggregate level, the cereal consumption itself is coming down as well resulting in the aggregate trends of decline in the calorie intake through cereals. Therefore, it will not be correct to say that the consumption of coarse cereals has come down drastically. In the three lower decile groups, the consumption of coarse cereals has come down from about 60 per cent to about 50 per cent and has more or less stabilised at that level especially in the states where these form a major part of the consumption (Suryanarayana, 1995). In addition to this, it is essential to see if coarse cereals can be made as a component of the aggregate public distribution system. It is quite obvious that a large proportion of India's poor is located in the drought-prone areas of the country. The major consumption item of this group constitutes coarse cereals. The present Public Distribution System (PDS) provides rice and wheat through the PDS. The quantity as well as the quality of the PDS grains have been questioned quite often. In addition to this, PDS has come under severe criticism on account of the high public subsidy, inefficient operations, improper targeting, and high leakages, being employed to procure the surplus grains of the farmers from green revolution belt and thus providing protection to well-to-do farmers alone. The welfare implications of all these are quite intriguing. Therefore, it will not be out of place to argue in favour of incorporating coarse cereals as a commodity on PDS. One important problem of adding coarse cereals

FIGURE 2.6(A)

FIGURE 2.6 (B)

in the PDS arises out of the short shelf life of these commodities. In Maharashtra incorporation of jowar under PDS was tried during early eighties but could not succeed because of the pest infestation of jowar in the godown. Therefore, the mechanism of PDS needs to be carefully worked out.

On the policy front, certainly these crops have received a raw deal. What we can observe from the farm harvest prices at state level as well as from the minimum support prices declared by the central government, it is clear that the coarse cereals did not proceed with the same rate of change as that of paddy or wheat. During the nineties, the differences between the prices of coarse cereals, on one hand and wheat and paddy on the other, have widened. This is very clearly seen in Figure 2.7. In addition to this, as seen earlier, coarse cereals have been emerging as an important export commodity. Given that the world demand of livestock feed is increasing at a fast rate and if this demand exerts pressure on the domestic production of coarse cereals, probably we will be able to export a larger quantity of coarse cereals.

FIGURE 2.7

APPENDIX TABLE 2.1

Coarse Cereals form an important crop group in the crop economy of the State and cover about 30 per cent of the gross cropped area. The coarse grain economy of Karnataka depends mainly on the rainfed areas, consisting of Northern Karnataka and some of the districts of Southern Maidan. The districts of Bellary, Bijapur, Bidar, Gulbarga, Raichur, Chitradurga, Kolar, Tumkur and Mysore have a large part of their cultivated area under the broad drought zone, whereas Dharwad and Belgaum have parts of their areas coming under the drought-prone region. Therefore, on the production side we have Jowar, Bajra, Ragi and Maize as the dominant coarse cereals. Similarly, on the consumption side also the coarse cereals form a major component of the diet of the rural poor in Karnataka. In Northern Karnataka, jowar and bajra are the common staple food crops of the poor, whereas in Southern Karnataka, ragi forms an important part of the diet. Thus, on the production as well as on the consumption side, coarse cereals as a group constitute an important component of the economy. We shall attempt to look into the growth performance of coarse cereals at the state level followed by district level analysis, the analysis of Public Distribution System in Karnataka and the behaviour of prices forming the later part of the analysis of this chapter.

Table 3.2: Growth Rates of Area, Prod., Principle Crops in Karnataka. (1972-73 to 1994-95)

	<i>Area</i>	<i>Prod.</i>	<i>Yield</i>
Rice	0.78	1.95	1.17
Wheat	-2.73	-2.13	0.65
Jowar	0.93	0.31	0.19
Bajra	-2.86	-1.20	1.75
Ragi	-0.02	1.45	1.52
Maize	6.30	6.11	-0.24
Total Cereals	-0.31	1.37	1.70
Total Foodgrains	-0.11	1.28	1.40
Tur	2.10	-0.48	-2.43
Total Pulses	0.62	0.23	-0.36
Groundnut	1.73	3.26	1.53
Total Oilseeds	4.19	4.92	0.74

Note: Growth rates based on five years moving averages centered at 1972-73 through 1995-96.

3.3 District Level Analysis

In order to focus on the drought-prone regions as well as the area growing coarse cereals we looked into the averages of the last five years of area under these crops. Based on the share of area under coarse cereals we selected the top seven districts predominantly growing these crops in terms of the area share. Table 3.3, presents a list of such districts. It is obvious that there are two broad agro-ecological regions growing coarse cereals viz., North Karnataka Rainfed Region (Northern Maidan districts) and the Southern Karnataka Rainfed Region. Bijapur, Gulbarga, Raichur, Belgaum, Bellary, Dharwad and Bidar are the major districts growing coarse cereals in North Karnataka whereas, Chitradurga, Mysore, Shimoga, Kolar, Mandya and Tumkur are the districts predominantly growing coarse cereals in Southern Karnataka. These districts have low annual average rainfall and high variability. Figures 3.3 (a), (b), (c) and (d) indicate the trends of area, production and productivity of major coarse cereals producing

**Table 3.3: Major Seven Districts by Area of Major Crops in Karnataka
(Based on Averages of 1994-95 to 1996-97)**

Sl.No.	Jowar	Bajra	Maize	Ragi
I	Bijapur	Bijapur	Belgaum	Bangalore
II	Gulbarga	Raichur	Dharwad	Tumkur
III	Raichur	Gulbarga	Chitradurga	Hassan
IV	Dharwad	Belgaum	Bijapur	Mysore
V	Belgaum	Bellary	Bellary	Kolar
VI	Bellary	Bidar	Shimoga	Mandya
VII	Bidar	Chitradurga	Mysore	Chitradurga

districts of Karnataka for each of the crops for the period 1972-73 to 1994-95. The trends are based on the index numbers computed on the basis of five-year yield averages. Therefore, the year to year fluctuations have been eliminated and the

smoothened time series is obtained. The production growth rates of jowar range between less than 1 per cent to about 3 per cent in the state. The area under jowar has been more or less stagnant in most of the districts with a marked feature of recovery during the eighties. It is interesting to observe that the yield of jowar was almost at the same level till the late eighties and the yield rates have started improving during the last decade. Stagnation in production can be visualised in Belgaum, Dharwad and Raichur but Gulbarga and Bijapur districts show a significantly high growth in production through yield per hectare.

Ragi is mostly grown in Southern Karnataka. Bangalore, Tumkur, Hassan, Kolar and Mysore districts have this crop as a dominant crop in their cropping pattern. Typically, the area under ragi has stagnated to the levels of the early eighties (except for Tumkur) but the production trends show three distinct phases. In the first phase beginning 1974-75, there was a spurt in the growth in production of the crop supported by increase in productivity (excluding Kolar district). The production as well as productivity remained more or less at the same level till late eighties and picked up during the last ten years. A clear break is visible around 1986-87. The area under bajra in Raichur district increased during the late seventies and stayed more or less at the same level. Except for Bijapur and Gulbarga districts, the yield rates of bajra have stagnated to the level of the early seventies. Bajra is not among the staple grains in Northern Karnataka and therefore despite the availability of new cultivars, the crop seems to have stagnated and even shows declining trends in the districts. Performance of maize is quite distinct as compared to the other three coarse cereals. The production growth of this crop is mainly contributed by area under crop and the productivity has remained more or less in the same band as can be visualised during the early eighties. Belgaum and Dharwad districts have shown exemplary growth in the crop.

The above analysis helps to arrive at a few important observations: (i) Even now the coarse cereals dominate the cropping pattern of the drought-prone areas in Northern as well as Southern Karnataka especially the Maidan regions. Hence, these are closely associated with the agricultural economy of this region; (ii) Area under these crops has more or less stagnated to the level of the eighties but the production has been showing some signs of improvement. If the productivity growth during the last seven years is some indicator a good production of these crops in the coming decade can be easily foreseen; (iii) The crops have been showing a good production

performance in the districts where the resource constraints do not predominate. More than that, it becomes necessary to see if the crops have been supported by the price incentives.

3.5 Consumption and Public Distribution System

Coarse cereals still form a major part of the consumption of total cereals of households. According to the National Sample Survey (1972-73 Round) the share of coarse cereals in the consumption of total cereals was 64 per cent. This share declined to 60 per cent by 1983-84 and further to 52 per cent in 1993-94. But such a decline cannot be interpreted to mean that this important crop group will disappear from the diet of the poor. Probably the share may get stabilised at around 50 per cent of the total cereals, especially in the drought-prone districts of Karnataka. But this decline has to be viewed together with the declining calorie intake over these years.

Table 3.5: Changes in Consumption Pattern of Cereals in Rural Areas of Karnataka

Sl. No.	Cereals	1972-73		1983-84		1993-94	
		% of total Cereals	K. Calories	% of total Cereals	K. Calories	% of total Cereals	K. Calories
1	Rice	29.5	15.90	35.4	18.35	42.1	19.11
2	Wheat	4.5	2.39	8.5	1.81	6.5	2.90
3	Jowar	30.1	16.26	36.2	18.82	30.5	13.87
4	Bajra	0.9	0.51	1.3	0.72	0.8	0.40
5	Maize	3.2	1.74	0.4	0.21	1.5	0.70
6	Ragi	30.5	15.64	22.3	10.98	19.2	8.30
7	Other Millets	1.3	0.71	0.9	0.44	0.1	0.03
8	Total Cereals	100	53.15	100	51.33	100	45.31

Source: Computed on the basis of the data given in Bhende M J (1991), Demand and Supply Perspectives for Foodgrains in Karnataka, Journal of Social and Economic Development, Vol. 2, No. 2, July-Sept.

It can be seen from the Table 3.5 that the share of coarse cereals in the consumption of total cereals has generally gone down. But such a decline is steep in the case of ragi and jowar compared to maize. Bajra in any case forms a very

insignificant share of the total cereals at the state level but probably there are a few pockets in Northern Karnataka where it forms an important part of the diet.

The Public Distribution System in Karnataka serves all the districts and 11 million card holders through a chain of 20.2 thousand shops. This indicates that on an average each shop serves about 545 card holders. Out of the total number of cards provided in rural areas, 74.5 per cent are green card holders. Similarly, in urban areas, about 30.6 per cent are Green Card holders. The off-take of rice in March 1999 (during 1998-99) was 68.4 thousand tonnes and that of wheat was 25 thousand tonnes. The proportion of the off-take to allocation works out to 91 per cent and 71 per cent for rice and wheat, respectively. This works out to be about 6 kgs. of rice and 2.26 kgs. of wheat per card per month. It is quite clear that the provision through PDS forms an extremely low proportion of their total consumption of foodgrains in the household. This should be read with the allocation and off-take figures presented in Appendix Table 3.1 and Appendix Table 3.2. The proportion of the off-take to total allocation is fluctuating over the years. It has been reported to be as low as 32 per cent or 45 per cent in some of the districts. Interestingly, the drought-prone districts have lower off-take when compared to the non-drought-prone districts. The analysis above indicates that PDS does not meet the total requirement of the household and similarly the off-take as proportion of total allotment is quite low in drought-prone districts. The incorporation of ragi, jowar and bajra in PDS may have to be viewed from the point of view of the durability of these grains in stock

3.6 Summing Up

Karnataka is one of the states having a large share of drought-prone areas. The coarse cereals dominate the cropping pattern of the region both due to climatic compulsions and traditional food habits. The entry of commercial crops and horticulture have reduced the area under coarse cereals but the growth in productivity after 1986-87 not only retained the earlier positive rates of growth but increased it. There is a distinct shift in the growth behaviour of coarse cereals, specifically beginning 1986-87. The district level analysis indicated a mixed picture. However, it is clear that over the years the core drought-prone areas have gained on the productivity front. The productivity improved significantly in majority of the districts growing coarse cereals. Prices seem to have played a negligible role to boost the economy of coarse cereals at least till mid-eighties. But their role is emerging during the last decade. PDS meets only a small

share of the total cereal requirement of the household. Therefore, the dependence on market and growing for self-consumption cannot be ruled out in the near future. It is however, necessary to understand the phenomenon at the micro-level.

4.1 Introduction

The trends in the economy of coarse cereals observed at the country and state level indicate a continuous decline in the importance of this significant crop group. The picture is not very different even in the core drought-prone regions of the state. The revival in the interest about coarse cereals during the nineties comes both because of favourable price trends as well as some of the available technological options. As yet the technologies available for the coarse cereals have not been fully and widely adopted. A simple reason for this phenomenon is that the transfer of technology from lab to land requires an enhanced resource base as well as the cost incurred per quintal is much higher than the expected incremental benefits. Therefore, the cautious adoption of the new technology can be attributed to the content of the technology as well as the value added promised by these. It needs no emphasis that there is still large scope for technological improvement. It is essential therefore to look into five important aspects at the micro level. Firstly, the relative importance of coarse cereals in the cropping pattern at the farm households needs to be understood clearly. Incidentally, the decline or increase in the importance of coarse cereals becomes an integral part of this. The observations on this issue will offer material to comment on the prospects of coarse cereals. Secondly, we shall try to analyse the productivity obtained at the farm level as against the productivity promised by new technology. In other words, this exercise is undertaken to understand the yield gap between promised technology and the productivity prevailing in the field level. Thirdly, the price sensitivity and market access become important components in the cultivation of coarse cereals. We tried to get the farmers' expectations about prices as well as the market prices and prices received by them. Fourthly, decision-making in allocation of resources contributes to the relative importance of coarse cereals. Our attempt here is limited to locate the important parameters governing the farmers decisions in cultivation of coarse cereals. Lastly, the role of coarse cereals in the consumption pattern is a prominent factor to allocate the resources. We tried to locate here the relative importance of coarse cereals in the consumption pattern. This is viewed in the background of the Public Distribution System (PDS) and the availability of rice and wheat under PDS.

4.2 Importance of Coarse Cereals in the Crop Economy

In the drought-prone environment, the climatically sturdy crops dominate in the cropping pattern, as the cropping system gets evolved over the years. Jowar, bajra and maize are predominant among the coarse cereals in Northern Karnataka as against jowar, maize and ragi in Southern Karnataka. As indicated earlier, we selected four villages, two each from these two regions. The cropping pattern was ascertained at two points of time viz., before ten years and the present cropping pattern. This is done in order to understand the changes in the cropping pattern across the farm sizes. In Table 4.1 we have given the average size of a farm across the sample villages. The average farm size in Southern Karnataka is slightly less than that in Northern Karnataka. Even then, the average size of a farm in these villages is higher than the average farm size of the state. It has been observed that drought-prone areas have larger farm size compared to the areas with assured rainfall. Besides, for historical reasons the size of a holding in Northern Karnataka is higher compared to Southern Karnataka and the coastal regions.

Table 4.1: Distribution of Sample Households and Size of Holding

	Distribution of Households (%)				Average Size of Holding (Ha)*			
	CHK	BMK	CKG	KOR	CHK	BMK	CKG	KOR
Landless	40.0	40.0	40.0	40.0	-	-	-	-
Below 2.5 ha	16.0	16.0	16.0	24.0	1.8	1.5	1.7	1.4
2.5 to 5.0 ha	20.0	16.0	16.0	8.0	3.2	4.2	3.5	4.2
Above 5.0 ha	24.0	24.0	28.0	28.0	8.0	9.0	7.8	12.6
All	100.0	100.0	100.0	100.0	4.9	5.7	5.1	7.0

Note: 1. CHK – Chikkammanahalli, BMK – Bommanakunte
CKG – Chikkalgundi, KOR – Korti

2. * - Size of Operational holding

The cropping pattern across the villages is presented in Tables 4.2 (a) and (b). We also asked the farmers their cropping pattern a decade ago. It can be seen that the trends are mixed as far as coarse cereals are concerned. The preference for commercial crops and cash crops is quite visible in terms of the share of area allocated to these crops. In the sample villages from Southern Karnataka, the share of area under ragi and bajra have been declining but at the same time, the importance of jowar is

increasing. It is required to note here that jowar is not necessarily the staple food in Southern Karnataka and more often it is grown for the purpose of fodder. In spite of this, there has been some evidence of jowar being incorporated in the regular diet of rural households. In the sample

Table 4.2 (a): Cropping Pattern of the Sample Households

(Per cent to GCA)

CHK	Jowar	Bajra	Ragi	Maize	Paddy	Wheat	Groundnut	Sunflower
Small	21.1	-	10.5	-	15.8	-	52.6	-
Medium	9.4	-	6.3	6.3	3.1	23.4	51.6	-
Large	10.6	6.3	4.2	10.7	3.2	-	58.1	7.0
BMK	Jowar	Bajra	Ragi	Maize	Paddy	Sunflower	Groundnut	Mulberry
Small	22.1	5.8	3.5	-	11.6	14.3	38.4	4.4
Medium	-	-	12.9	-	19.8	-	67.3	-
Large	22.1	5.8	3.5	-	11.6	14.3	38.4	4.4
CKG	Jowar	Bajra	-	Maize	Cotton	Wheat	Groundnut	Sunflower
Small	29.0	16.1	-	38.8	-	16.1	-	-
Medium	26.4	17.0	-	20.8	-	9.4	26.4	-
Large	30.1	9.7	-	15.1	8.6	10.7	-	25.8
KOR	Jowar	Bajra	-	Maize	Onion	Wheat	Groundnut	Sunflower
Small	20.5	10.4	-	-	12.8	12.8	30.7	12.8
Medium	22.1	15.6	-	5.2	18.1	7.8	20.8	10.4
Large	28.3	8.7	-	7.6	9.2	7.6	20.7	17.9

Note: 1. CHK – Chikkammanahalli, BMK – Bommanakunte
CKG – Chikkalgundi, KOR – Korti

2. Small – Less than 2.5 ha, Medium – 2.5 to 5.0 ha., and Large – Above 5 ha.

Table 4.2 (b): Cropping Pattern of the Sample Households: A Decade Ago

(Per cent to GCA)

CHK	Jowar	Bajra	Ragi	Maize	Paddy	Wheat	Groundnut	Sunflower
Small	18.5	-	14.8	-	22.2	-	44.5	-
Medium	13.9	-	10.9	11.9	7.9	4.0	51.5	-
Large	7.7	9.1	12.5	13.9	13.9	-	41.8	1.11
BMK	Jowar	Bajra	Ragi	-	Paddy	-	Groundnut	Mulberry
Small	-	-	20.3	-	14.6	-	43.5	7.2
Medium	-	20.9	11.9	-	20.9	-	46.4	-
Large	19.4	16.6	6.7	-	29.0	-	43.1	-
CKG	Jowar	Bajra	-	Maize		Wheat	Sunflower	Cotton
Small	41.4	13.8	-	27.6	-	17.2	-	-
Medium	50.0	23.9	-	8.7	-	17.4	-	-
Large	38.0	15.3	-	19.7	-	19.7	4.4	2.9
KOR	Jowar	Bajra	-	Maize	Onion	Wheat	Groundnut	Sunflower
Small	26.2	9.5	-	-	19.1	16.7	19.0	9.5
Medium	40.6	25.0	-	-	-	21.9	12.5	-
Large	32.2	14.4	-	19.2	-	10.1	17.3	6.8

Note: As in the earlier tables.

villages of Northern Karnataka, the importance of jowar and bajra in the cropping pattern has been declining at the cost of the commercial crops. The share of jowar and bajra have gone down from an average of around 35 per cent to 27 per cent and at the same time the area under onion, sunflower and cotton has increased. It seems that the farmers prefer either to meet their consumption requirement from the market or the yield improvement is such that it more than compensates the area decline.

In Table 4.3, we have given village-wise size of holding-wise consumption of coarse cereals as per cent of total production, receipts from PDS as per cent of total consumption of foodgrains, marketable surplus and marketed surplus of coarse cereals as per cent of total production. It can be observed from the table that the consumption requirements are met from the total production of the household.

Table 4.3: Consumption and Marketing of Coarse Cereals

	Consumption* of Coarse Cereals as % of Production	Receipts from PDS as % of total Consumption	Marketable Surplus of Coarse Cereals as % of Production	Marketed Surplus as % of Production of Coarse Cereals
CKM				
Small	82.8	9.3	10.3	5.2
Medium	55.8	8.1	29.1	23.7
Large	40.1	5.7	38.2	36.8
BMK				
Small	54.3	9.1	28.8	20.8
Medium	53.6	9.9	27.9	22.6
Large	37.3	8.4	41.1	39.7
CKG				
Small	56.3	9.1	27.0	24.0
Medium	46.2	2.8	35.3	32.9
Large	57.9	2.4	25.3	20.0
KOR				
Small	72.6	9.3	16.8	10.0
Medium	25.3	6.5	52.4	47.0
Large	22.4	3.4	50.6	47.6

Note: * - Maize is excluded from the computations as it is mainly a crop going for processing and market.

There is some evidence that sample households have purchased some quantity of foodgrains from the market. Many times such purchases are resorted to obtain better quality of grains rather than meeting the shortage between actual consumption and the total household production. More often the coarse cereals are used to provide food to the wage labourer. The differences between the two agro-ecological regions come out specifically in these tables. The market dependence of the Southern Karnataka region is more clearly depicted. Similarly, the villages having a clear access to the market (in lieu of their location on the main road) also show larger dependence on the market and thus a possibility of decision behaviour being affected by the market trends.

5.1. : Introduction

The task of providing food security poses many hurdles in drought-prone areas. Backwardness and chronic poverty characterise most of these areas. Given the fragile base of agriculture, growth processes remain sluggish. Shifting to commercial crops

and, more recently, hi-tech agriculture are promising sources of growth but their impact on food security could be far from favourable. Commercial crops raise the incomes of farmers but also make them more vulnerable to vagaries of market and fluctuations in production. More important, commercial crops divert land from coarse cereals which are the local staple foodgrains in drought-prone areas. As regards hi-tech agriculture, it usually remains confined to small enclaves. While it would contribute handsomely to the value of agricultural output, it is far from certain that it would have a beneficial impact on the income and employment of the masses of poor. What the drought-prone areas desperately need is a comprehensive watershed development programme to conserve soil and water resources and improve the yield of dryland crops across the board. It would seem that in the absence of watershed development the new technologies and practices generated by research – of which there is an abundance – languish in laboratories. The question of providing food security in the drought-prone areas needs to be looked at keeping in mind the prospects for dryland agriculture in the coming years. Equally relevant to consider are the implications for food security of the reforms being contemplated to promote liberalisation and globalisation of Indian economy including agriculture.

5.2 Focus on Major Findings

The present study was undertaken with the main objective to understand the prospects of coarse cereals in the drought-prone areas of Karnataka. The importance of coarse cereals, especially in terms of the share of area allocated, has been going down but most often this is understood as getting reflected in the quantum of their production. In fact, the decline in area has been more than compensated by the increase in productivity and these crops have recorded positive rates of growth in their production especially in the period beyond mid- eighties. Our analysis here is spread over three components: Initially, we attempted to look into the trends in the area, production and productivity of coarse cereals at the country level. This was followed by the analysis at state and district level for Karnataka. Finally, in order to understand the intricacies in the cultivation and consumption of coarse cereals at the micro level, we selected two core drought-prone regions of Karnataka and carried out the field work in four villages. The choice of the villages was directed by cultivation of coarse cereals in production and their access to road or their access to the market.

At the country level we noted that there was a virtual stagnation in the growth of coarse cereals owing to the significant decline in area and almost negligible growth in productivity trends before the mid-eighties. But the performance revived beginning with the mid-eighties. Presently, though the area has stagnated, productivity growth will give a boost to the production trends. Among the coarse cereals, Maize and Bajra did exceedingly well closely followed by Jowar. The performance of Ragi follows. Maize cannot be really taken as belonging to the same group since the purpose of growing maize is quite different from that of growing jowar, bajra or ragi. Most of the production of maize is used for processing starch, flakes, breakfast cereals and animal feed.

The productivity rates of coarse cereals are lower mainly due to three reasons: (i) the innovations of Research and Development (R&D) in the new cultivars of coarse cereals do not cater to the needs of the sector. The indigenous innovations in the rainfed area are not incorporated in the R&D efforts. (ii) Periodic droughts leads to compulsory fallowing therefore, the nutrient balance gets automatically maintained. Non-occurrence of such fallowing has consequently affected lowering the yield rates. (iii) The adoption of the new varieties of coarse grains is slower mainly because of the low preference to these varieties in the diet of rural masses. Analysis of prices indicate that the coarse grains did not receive the required price support as reflected from the relative prices. It also comes out that the crops have not gained on the technology front and in fact the trends in production come as a result of both technology and prices. It was interesting to note that coarse grains are also emerging as a significant export commodity. In the early nineties the country exported coarse grains to a sizeable extent. Thus, it is essential to recognise the role of coarse cereals as an important animal feed for the purpose of export.

Karnataka is among the major states growing coarse cereals. The behaviour of trends in coarse cereals in Karnataka is similar to that at the country level. The production growth in Jowar, Bajra and Ragi was not very high over the entire period but there is a revival in the growth trends beginning with the mid- eighties. This revival cannot be totally attributed to technology alone but the relative prices also have played a significant role. The analysis also indicates an inadequate policy attention (or a relative neglect) on the price front. In terms of consumption behaviour, two specific

observations are quite important: (i) the share of coarse cereals in the consumption of total cereals has been declining but this decline is likely to stop at some bare minimum threshold level; (ii) as a general trend, the share of cereals has been declining in the total foodgrains. Therefore, one must view the decline in the consumption of coarse cereals based on these. Even in terms of total calorie consumption, there has been a reduction in the calorie intake from cereals as a group. The analysis of PDS at the state and district level indicates that there is a continuous problem about the off-take under PDS, apart from the other inadequacies. The proportion of the off-take has been fluctuating and this is more so in the core drought-prone areas.

Our micro level analysis indicated quite a few interesting aspects. Coarse cereals have been reducing in their importance in the cropping pattern of the households at the cost of cash crops but the area decline is more than compensated by improvement in yield per hectare. The achieved productivity levels at the farm level are comparable to those promised by the package of practices. This is no mean an achievement despite the neglect on the policy front. On the consumption side also these grains still muster the largest share with respect to the total cereal consumption even though there is a slight decline in their share. But in any case it will be completely erroneous to assume that these will disappear from the diet of the rural household of the drought-prone region. The availability of cereals (rice and wheat) through PDS does not cover even 10 per cent of the total consumption requirements and for the remaining 90 per cent of the household has to depend either on own farm produce or market. The production of coarse grains meet the consumption demand of the households and still leaves a comfortable surplus available for marketing. There does not appear to be widespread food distress and therefore the present PDS can easily be substituted by an efficiently managed local food security system covering the staple foodgrains grown locally. The analysis pertaining to expected prices and the prices received by the farmers indicated that there is little incentive available to the cultivators through this source. Thus the study indicates five important aspects: (i) it is true that the area under coarse cereals has come down over the last three decades but productivity is quite satisfactory and has retained the production level; (ii) the grains are grown mainly by the lower size classes of holding as the cultivators with better resource base move towards commercial crops; (iii) these grains still form a major part of the diet of rural households and most of their consumption requirement is satisfied by their own production; (iv) the present PDS provides less than 10 per cent of the total consumption needs and hence 90 per cent of

their cereal demand is met either through market or production on own farm; (v) coarse cereals can be brought under the PDS network which can be better managed locally as the Panchayats are mandated to undertake this. This alternative system will work better than the existing system.

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