

Ragi Value Chain and Sub-sector Analysis Report

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1. Executive Summary

This study tries to analyze the Ragi value chain and sub-sector to gain understanding of its production processes, market (from local to international) for commodity as well as its products and policy framework, so that relevant interventions in Ragi value chain can be suggested for tribal areas of coastal Andhra Pradesh with suitable institutional model to implement the recommended interventions. The study has covered 5 districts of Andhra Pradesh – Srikakulam, Vizianagaram, Visakhapatnam, East Godavary and Chittoor. In addition to this, Koraput district in Orissa is also covered as a part of extended tribal area. The analysis and recommendations are based on primary data collected from these districts through field visit, focused group discussions and interviews along with the secondary data, collected through library search and Internet browsing.

Ragi is an important staple food grain crop in Andhra Pradesh along with Rice, Bajra and Jowar. It is also an important staple food in other parts of India as well as in other countries of Asia and Africa, particularly in Eastern Africa. Its small seeds can be stored safely for many years without insect damage for as long as 50 years, which makes it a traditional component of farmers' risk avoidance strategies in drought-prone regions.

Ragi grain is an excellent dietary source of methionine and calcium. It is also higher in several other nutrients as compare to the raw milled rice, which is replacing Ragi in tribal areas. As per an estimate, 80 percent of the world's Ragi production is used as food, the remainder being divided between feed (7 percent), other uses (seed, beer, etc.,) and waste. Ragi is also used as folk medicine. The major Ragi products are Ragi Flour, Ragi Malt, Ragi Malt weaning food, Ragi Weaning food and Ragi based energetic foods.

It can be grown in a wide range of environment and growing conditions from southern Karnataka state in India to the foothills of the Himalayas in Nepal, and throughout the middle-elevation areas of Eastern and Southern Africa. Across the world, Ragi along with other millets is cultivated on around 38 million hectares. Current global production of Ragi and other millets is about 28 million tons, where Asia and Africa are the main producers. India, Nepal and Srilanka are main Ragi producing countries in Asia. The major Ragi producing states are Karnataka, Orissa, Uttar Pradesh and Tamil Nadu in India. The total area under Ragi cultivation was around 16.41 lakh hectares in India in 1999 –2000 and its production was around 24.8 lakh tones in 2001 –02, which accounts for 1% of total food grain production in India. Both area and production keep fluctuation from year to year and slowly coming down. In Andhra Pradesh, the total area under Ragi has come down from 2.26 lakh hectares in 1984-85 to .99 lakh hectares in 2000-01,

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similarly total production has slide down to 1.2 lakh tones in 2000-01 from 2.45 lakh tones in 1980-81. Other crops are replacing Ragi, as more farmers are opting for rice, wherever irrigation facilities are available or groundnut, cotton and sugarcane. Field visits indicate that the number of farmers growing the crop is also coming down slowly. At present, around 50% of total households are growing Ragi in Tribal areas as against 100% few years back.

At present, Ragi is mainly grown in coastal Andhra, which accounts for 58% of total Ragi growing area of Andhra Pradesh and produces 54% of total Ragi production of Andhra Pradesh. However, 85 % of the total area under this crop is grown in Srikakulam, Vizianagaram, Visakhapatnam, Anantapur, Chittoor and Mahabubnagar districts.

The analysis of Ragi value chain from studied districts shows that Ragi is grown on dry, peripheral and marginal land with no irrigation facilities. This type of land cannot be used to grow any other crop with small scale of financial investments. It was observed that wherever farmers have irrigation facilities, they have shifted to Paddy. Ragi cultivation is still done in traditional way, evolved over generations. It is not at all technology intensive and tune to modern cultural practices. Farmers are using own local variety seeds in all the districts. Use of improved or hybrid varieties, inorganic fertilizers and pesticides are negligible. It is sown through transplanting or broadcasting, however transplanting is more common, in the month of June and July. Ragi cultivation is also observed to have minimum cultural practices. Except for plough and manure application before sowing Ragi, no other cultural practices are followed but for one weeding in case of broadcasting. Family members, particularly female members, contribute most of the labour, required for crop. On an average women work for 30 to 39 person days, whereas men work for 11 person days for cultivation of Ragi in a season. In addition to this, grinding of Ragi to make flour require 2hrs for 1 Kg, which has been expressed as major concern by women.

The Ragi yield ranges from 3 to 12 quintals for transplanting and 3 to 8 quintals for broadcasting. The average cost of cultivation of Ragi through transplanting in one acre is around Rs. 700 to Rs. 800 and Rs. 1400 to Rs. 1500, if opportunity cost of family labour is considered. However, the benefit from Ragi crop is around Rs. 900 to 1300 from one acre. The cost benefit analysis for transplanting method does not show the positive value addition, if opportunity cost is considered. Otherwise also, net profit margins are very low. Due to this, farmers are not investing more in the crops.

There are international, national, state level and regional level institutes; universities, research station and organizations are working on Ragi and

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other millets. Despite this, very little has been achieved in terms of increasing the yield and production of Ragi so far. Whereas, the production of Bajra has been doubled in last two decades due to release of improved varieties and extension work. The few reasons for this are difficulty in crop improvement in Ragi as compare to other crop, lower budgets for research in Ragi, lack of coordination between research work and farmers requirement.

Only 15-20% of Ragi food surplus enters into the commercial marketing system, remaining is kept for own consumption for a year. The surplus Ragi is exchanged for other items of household consumption through barter system. Most of this exchange takes place in the villages between either villagers for other agriculture produces or petty traders for household consumption items. The petty traders exchange 3 Kgs of Ragi with items worth Rs. 8 to 10 and sells to local trader at the rate of Rs. 3.50 to 4.50 per kg. These local traders, in turn sell, Ragi at the rate of Rs 5 per Kg to other wholesale traders, who sell Ragi in state level markets. The major state level markets are in Srikakulam, Parvatipuram, Ankapalli, Vijayawada, Madanpalli and Kurnool. Here, Ragi is sold at Rs 7 or 8 per Kg.

The national market for Ragi is in Yashwantpur, Kolar, Banglore and Hassan in Karnataka. These centers supply Ragi to Rajsthan, Delhi, Uttar Pradesh, Maharastra, Chattisghad, West Bengal and Madhaya Pradesh, mainly. The peak season for Ragi trade is from February to June and it is available in 4 grades in the market - Poultry feed, Local, Graded and Medium. The current price of Ragi in Bangalore is Rs. 6 per kg. Ragi prices, on an average, are lower in Karnataka and higher in Andhra Pradesh, Tamilnadu and Maharastra. The prices are, further, high in Delhi, Rajsthan, Uttar Pradesh and Madhya Pradesh as demand for Ragi and Ragi based products (Ragi malt and Ragi based weaning foods) is comparatively high.

Global trade in millet is estimated to range between 200,000 and 300,000 tons, representing roughly 0.1 percent of world trade in cereals or 1.0 percent of world millet production. Proso millet and Bajra together add to about two-third of recorded millet exports. Ragi with other millets accounts for remaining recorded export. The major importers of Ragi along with other millets are developed countries - European countries, Japan, Switzerland and Canada. The primary use of imported Ragi is in preparing Ragi based products, mainly malts - either Mixed malts, blended with other commodities or Ragi malt. International trade in millet is controlled by a few specialized trading companies and generally conducted on a sample basis. The high degree of price variability among suppliers, even in the same year, is due to the "thin" market, with small trade volumes and very few buyers and sellers. The current average price of Ragi is Rs 18 to 20 per Kg in international market.

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Ragi marketing channels are not well developed. The main reasons for this are limited demand in urban areas, lower prices of Ragi, lower margins in Ragi trade, scattered and irregular supplies on account of only food surplus being sold and large distances between producing areas and the main urban centers. However, Value chain, from local market to final consumer, clearly shows that there is significant value addition in terms of place and form within Andhra Pradesh itself. Selling of Ragi as raw commodity after grading and flour at super market offers huge margins, which are kept by supermarkets and middlemen. For example, around 50% of total margin from consumers' money goes to supermarket and only 22% comes in the hands of producer, when graded Ragi is sold by supermarket.

Analysis of focused group discussions and interview during field visits indicates that although Ragi is still an important staple food for tribal, Rice is slowly replacing it. Ragi is believed to be essential for their survival as it makes them stronger and energetic, as well as reduces the expenditure on food because it is cheaper than rice. However, per capita consumption of Ragi is coming down due to various factors, but niche market for Ragi malt and other products in urban area is increasing. It is difficult to project the size of niche market, but it is expected to grow in near future as health consciousness among average Indian, particularly working middle class, is increasing. This coupled with their increased disposable income and willingness to pay for healthy food ensures high demand for Ragi based food in future. To indicate the size of market, the total Ragi trade is around 2.7 lakh quintals per year in Andhra Pradesh and around 48 lakh quintals per year in India.

In the given situation and based on above analysis, it is recommended that intervention should not focus on promotion of Ragi consumption or production. The constraints within tribal micro economy have built such mechanisms, by which Ragi's consumption and production have been sustaining for long and would continue to do so for some more years to come.

The analysis suggests that interventions should focus on value addition first and, than, on enhancement of production. Better returns from value addition would encourage farmers to take more interest in Ragi crop. To do so, proper resource survey for Ragi, feasibility study of setting up grading or Flourmill unit and designing of appropriate community owned institutional model should be undertaken before hand. The appropriate model could be a producers company or cooperative.

The policy framework analysis reveals that there is no direct policy on Ragi except for announcing minimum support price for Ragi. Since the concerned department gives emphasis to regulate the Paddy market, the minimum

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support price for Ragi is also not effective. The other policies, related to food grains, particularly Rice, have affected the consumption of Ragi, but none has supported or facilitated the production or consumption of Ragi in the villages. However, the policies of Government of Karnataka have supported the production and marketing of Ragi to a large extent. These facilitative policies include subsidy on hybrid seed and effective agricultural marketing committees, which regulate the marketing of Ragi in marketing yards and lower sales tax on trade of Ragi. In order to promote the production of Ragi, policy advocacy should be undertaken to increase the research budget for Ragi to develop new improved varieties and hybrid seeds, and provide the subsidy for buying these seeds.

2. Objective of study

The prime objective of the study is to analyze the Ragi value chain and sub-sector to gain understanding of its production processes, marketing and policy framework, so that relevant interventions in Ragi value chain can be suggested for tribal areas of coastal Andhra Pradesh with suitable institutional model to implement the recommended interventions.

3. Methodology of study

The focus of Ragi value chain and sub-sector study was to analyze production processes, market (from local to international) for commodity and its products, and policy framework for Ragi. To understand the entire Ragi value chain in integration, a framework was developed in the beginning. (Refer annexure –1:a). Based on this and secondary data, the whole gambit of sub-sector is critically analyzed. During the study, it was released that production practices, market and uses for Ragi and other millets are same. In addition to this, at international level, figure for Ragi was difficult to find as data for all the millets are clubbed. Therefore entire millet sub-sector is studied.

To begin with the study, secondary data from government departments, Agriculture University and ICRISAT was collected. During this, visit to technical institutes like ICRISAT, CRIDA and universities were also made.

Having done this, to understand the production process, marketing by Ragi farmers and local markets, 9 villages in five districts – Srikakulam, Vizianagaram, Visakhapatnam, East Godavari and Chittoor were visited. Although the study entails finding out interventions in Ragi for Coastal Andhra, Koraput district in Orissa, adjoining to tribal area of Coastal Andhra Pradesh, was also covered, This is done to capture all the elements in Ragi production and marketing, which can influence the tribal meso economy in extended coastal tribal area. While conducting the study, one village from Karnataka, highest Ragi producing state, is also covered. All put together, 13 villages were covered during the study. (For village profile, refer annexure – 5). Selection of villages based on secondary data (Mandals, where production of Ragi is high) and expert opinion by local NGOs.

All the main local markets around the villages studied were covered. State level markets in Srikakulam, Vizianagaram, Visakhapatnam, Vijayawada and Chittoor were covered. In addition to this, national market at Bangalore was also studied.

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For comprehending the dynamic influence of various policies on the Ragi production, marketing and consumption, real life policy related experiences of villagers were gathered. Subsequently, the related information from concerned department was collected and discussed with several opinion leaders.

For all the above, different methodologies were used to collect the data and analyze the information. Following table presents the methodologies used for various components.

S.n.	Component	Methodology
1	Production processes	Field visit in villages, Interviews with farmers and focused group discussion.
2	Market – local to national	Visit to market and interview of key traders
3	International market	Secondary data from Internet
4	Ragi products	Visit to processing units at Vijayawada and Hyderabad and secondary data
5	Policy Framework	Secondary data, visit in villages and visit to government office.
6	Technical institute	Secondary data and visit to international, national and regional level centers
7	Other material data	Secondary data from university, statistical department and internet

4. District profile

The demographic mapping of the covered districts is given below in Table -1.

Table – 1- Demographic mapping of covered districts

S.n.	District	Mandals	Population ('000) (2001 CENSUS)	
			Total	Rural
1	Vizianagaram			1,833.01
2	Srikakulam			2,250.28
3	Visakhapatanam	43	3,285.09	2,277.98
4	East Godavari	59	4,541.22	3,735.90
5	Chittoor	65	3,250.0	2,925.18
6	Koraput	14 blocks	1030.0	858.00

The main livelihoods of rural people in these districts are agriculture, agriculture labour, non-farm labour, livestock, petty business and leased agriculture. Incidences of bonded labour are also noticed here. The details of work force and land are given below in table –2 and 3.

Table-2- Socio-economic mapping of covered districts

S.n.	District	Workers		
		Cultivators	Agri. Labourers	Total
1	Vizianagaram	368,490	328,330	696,820
2	Srikakulam	333,823	423,258	757,081
3	Visakhapatnam	477,449	310,353	787,802
4	East Godavari	249,094	842,372	1,091,466
5	Chittoor	528,514	490,360	1,018,874
6	Koraput	204,000	132,000	514,000

Table –3- Details of Area under various uses (Area in ha)

S.n	District	Area	Net area sown	Forest	Cultural waste	Current fallows
1	Srikakulam	584,200	312,580	70,840	496	51,374
2	Vizianagaram	630,000	333,559	111,969	3,271	10,005
3	Visakhapatnam	1,116,100	323,422	477,791	12,735	44,380
4	East Godavari	1,080,700	436,171	323,107	17,580	50,756
5	Chittoor	1,498,700	422,492	451,341	42,049	117,680
6	Koraput	575,881	216,665	55,176	14,122	68,394

Data – A.P. for 1999-00, Orissa – 98-99

5. Ragi: as crop, commodity and product

5.1. Introduction

Ragi is an important staple food grain crops in Andhra Pradesh along with Rice and Jowar. It is also an important staple food in other parts of India as well as in other countries of Asia and Africa, particularly in Eastern Africa. Ragi has outstanding properties as a subsistence food crop. Its small seeds can be stored safely for many years without insect damage for as long as 50 years, which makes it a traditional component of farmers' risk avoidance strategies in drought-prone regions. They are highly valued as a reserve food in times of famine.

Ragi, known as Finger millet (*Eleusine coracana*) world wide, is also known as Chodi (Sollu) in Coastal region of Andhra Pradesh and Mandia in Orissa.

Table- 4- District wise type of Ragi available

S.n.	State	District	Name and type of Ragi
1	Andhra Pradesh	Vizianagaram	Punasa chodi for Kharif and Vesavi chodi for Rabi crop
2		Srikakulam	Punasa chodi for Kharif and Vesavi chodi for Rabi crop
3		Visakhapatnam	Jonna Chodi/ Chinna sodi - Short duration type for 3 months (White colour grains), Pedda sodi - High yielding & Long duration for 6 months, Military sodi
4		East Godavari	Gaddi sodi / Budatha sodi - Short duration type for 3 months (White colour grains), Pedda sodi / Muta ennu/ Muddha sodi - High yielding & Long duration for 6months.
5	Orissa	Koraput	Bada Mandia - long duration for 4 months, Chhota mandia - short duration for 3 months

Ragi is an annual crop plant with 60-120 cm long stem. Its root system is fibrous and remarkably strong, permeating soil thoroughly. It bears slightly curved spikes of 12.5-15 cm long with around 70 spikelets. It can be grown in varied climate ranging from cool temperate moist to wet through tropical very dry to wet forest life zones. Ragi is reported to tolerate annual precipitation of 29 to 429 cm and annual temperature of 11.1 to 27.4°C.

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Typically a tropical crop, one of the best suited for dry farming, generally grown rain fed. Thrives under a medium rainfall, on porous soils that do not get waterlogged. Ragi is very adaptable and thrives at higher elevations than most other tropical cereals. Cultivated on soils ranging from rich loams to poor shallow upland soils. In India, grown on black cotton soils, but thrives on red lateritic loams. Ragi stands salinity better than most cereals.

Ragi may be grown as a hot weather crop, from May to September, using long duration varieties and as a cold season crop, from November and December to Feb, using early types. In India, two crops are sown: the early crop is grown from May to August, and the main crop, from July to November or early December. It is also grown year-round under irrigation wherever water is available. Inorganic nitrogen depresses crop yields on poor land, but enhances yields on fertile land. Phosphate acts as a limiting factor controlling response to nitrogen. Minute amounts of zinc sulfate increase yields of both grain and straw.

Ragi is subject to relatively few serious diseases or pests. In storage, a beetle may cause some damage.

5.2. Production

The major Ragi producing states are Karnataka, Orissa, Uttar Pradesh and Tamil Nadu. The total Ragi cultivated area was 16.41 lakh hectares in India in 1999 –2000, but this keep fluctuation from year to year.

Table -5-Area under Ragi (in lakh hectares) in India

Crop	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Ragi	15.52	15.60	15.69	14.57	15.46	16.41	17.14

Source – Agricultural Statistics at a glance 2001, DES,

Similarly, significantly high fluctuations in production of Ragi were also observed during the same period. The total production of Ragi in India was 24.8 lakh tones in 2001 –02, which accounts for 1% of total food grain production.

Table –6- Ragi production in India (in million tons)

Crop	1991-92	1993-94	1995-96	1997-98	1999-00	2001-02
Ragi	2.58	2.6	2.5	2.09	2.29	2.48
Total Food grains	168.38	184.26	180.42	192.26	209.8	212.02
Ragi (% of total)	2%	1%	1%	1%	1%	1%

Source - Directorate of Economics & Statistics, India

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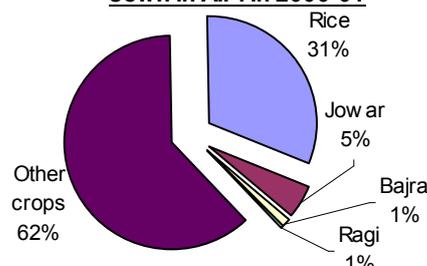
In Andhra Pradesh, Ragi producing area is reducing. It has come down from 2.26 lakh hectares in 1984-85 to .99 lakh hectares in 2000-01, accounting to 1% of total area sown in the same year.

Table-7- Ragi area (in lakh hectare) in A.P.

S.n.	year	Area
1	1984-85	2.26
2	1988-89	1.68
3	1992-93	1.44
4	1996-97	1.2
5	2000-01	0.99

Source - Directorate of Economics & Statistics, AP

% of area under crops to total area sown in A.P. in 2000-01



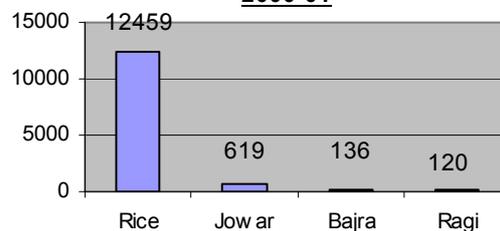
Along with the area, the total production of Ragi and other millets is also coming down over decades. It has reduced to 1.2 lakh tones in 2000-01 as against of 2.45 lakh tones in 1980-81. However, the production of rice has increased to 124.5 lakh tones in 2000-01 from 70.11 lakh tones in 1980-81. table - 8.

Table -8-Ragi Production (in lakh tons) in AP

s.n.	Year	Production
1	1980-81	2.45
2	1984-85	2.16
3	1988-89	1.71
4	1992-93	1.6
5	1996-97	1.48
6	2000-01	1.2

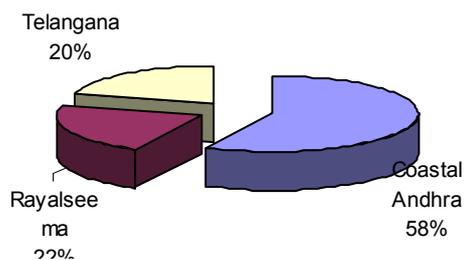
Source - Directorate of Economics and Statistics, A.P.

Production ('000 tonnes) of crops in A.P. in 2000-01

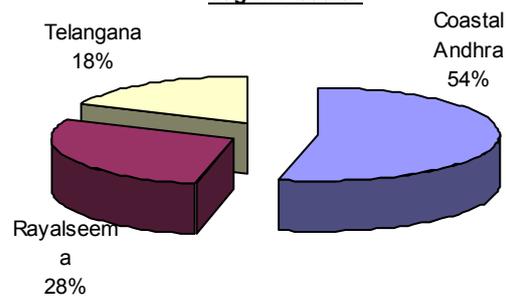


In Andhra Pradesh, 58% of total Ragi growing area of A.P. falls in Coastal Andhra, which produces 54% of total production of Ragi in Andhra Pradesh.

Region wise status of area under Ragi for 2000 -01



Region wise production ('000 tonnes) of Ragi in 2000-01



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However, 85 per cent of the total area under this crop is grown in Srikakulam, Vizianagaram, Visakhapatnam, Anantapur, Chittoor and Mahabubnagar districts. The details of total area under Ragi and its production in the sample districts for study are given below in tabular form. The field visit reflects that the Ragi producing area keep changing from year to year, based on the time of rainfall received. Ragi being a rain fed crop, its nursery raising and transplanting depends on rain. If rain is late, farmers would forgo the crop. Other inputs being same, the crop production is primarily the function of quantity and timings of rain, therefore the production as well varies with rainfall from year to year.

Table – 9- Details of Area under Ragi and Production of Ragi in study area in 2000-01 and 1999-2000

District	Area				Production			
	2000-2001		1999-2000		2000-2002		1999-2001	
	In ha	% of total	In ha	% of total	Ton.	% of total	Ton.	% of total
Srikakulam	4208	4.24	4876	5.04	4056	3.38	6085	5.50
Vizianagaram	10005	10.08	10704	11.06	10898	9.08	13471	12.18
Visakhapatnam	35648	35.92	35438	36.63	34778	28.96	38014	34.38
East Godavari	465	0.47	533	0.55	463	0.39	628	0.57
Chittoor	13017	13.12	9553	9.87	14538	12.11	7553	6.83
Total A.P	99252	100	96752	100	120079	100	110585	100

Source - Directorate of Economics and Statistics, Andhra Pradesh

Ha- hectare and ton - tones

The Ragi producing area constitutes to a very small fraction of total area sown in these districts, ranging from 0.4 % to 8% of total area sown as compare to Rice, which ranges from 15.6 % to 54.5 %. (Table -10)

Table -10- % of area under principal crops to total area sown in Study area in 2000-2001

District	Rice	Jowar	Bajra	Ragi	Other crops
Srikakulam	49.7	0.1	0.1	1	49.1
Vizianagaram	30.3	0.1	0.8	2.3	66.5
Visakhapatnam	26.8	0.4	4	8.1	60.7
East Godavari	54.5	0.2	0.4	0.1	44.8
Chittoor	15.6	0.7	0.9	0.3	82.5
Total Andhra Pradesh	31.3	5	1.1	0.7	61.9

Source - Directorate of Economics and Statistics, Andhra Pradesh

In Andhra Pradesh, both area and production of Ragi is coming down. The Ragi producing area is replaced by other crop, as more farmers are opting

for rice, wherever irrigation facilities are available or groundnut, cotton and sugarcane.

5.3. Varieties

Main Varieties of Ragi in Andhra Pradesh

Ragi growing farmers use only local varieties in Andhra Pradesh. The most common varieties are Giddu Regulu (matures in 120 days), Pedda Regulu (matures in 125 days), Naturegulu (matures in 120 days), Salupu Regulu (matures in 120 days), Nalla Regulu (matures in 90 days), Tellagidda Regulu (matures in 120 days).

Main Varieties of Ragi in Koraput in Orissa

Here also, only local varieties of Ragi are used. The most common long duration (4 months) varieties are Kaja mandia and lamba kehla mandia, whereas the short duration common ones are Kadiahandi mandia, Kori mandia, Vela mandia, Marda roda, Jambu mandia, Gomda doda and Songa rai. The seeds of longer duration Ragi are bigger than that of short duration varieties.

Commonly used Hybrid varieties in Karnataka

Unlike Orissa and Andhra Pradesh, farmers use hybrid varieties also. The most commonly used ones are Ind of - 8 (matures in 120 - 125 days), Indof -5 (matures in 120 - 125 days), HR 911 - (matures in 115 - 120 days) and GPV - 28 (matures in 110 - 115 days). Several other important varieties are released by Karnataka Universities in last 2-3 decades. (Refer annexure -3)

Use of improved varieties or hybrid varieties of Ragi is negligible in the covered districts under study. Improved varieties introduced by Agriculture department have generally failed to show any superiority over local varieties, therefore farmers are not interested in buying or using these improved varieties.

Secondary data indicates that the same prevail in other districts of Andhra Pradesh, Orissa as well as other parts of India, but for Karnataka. Lack of access to the improved varieties, non availability of suitable improved varieties, marginal increase of crop yield from improved varieties over the local varieties, more susceptibility of improved variety to pest attack and drought and lack of interest to invest of inputs on account of poor benefit cost ratio of Ragi are the few reasons for using the local varieties by Ragi farmers.

It is widely accepted fact that the research institutes also find difficult to release successful improved varieties, as adaptation is a more serious problem in Ragi, than in many other crops. Local varieties developed

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through natural and human selection gave poor yields, but showed reasonable tolerance to drought, pest and disease attack.

Whatever few varieties are developed by research stations, those are also not reaching to the field. For example, KVK in Kuntubai is engaged in extension work, but lacks in coordination between farmer's requirement and their assistance. There are credibility issues as well. KVK provided Ragi seed to farmers to promote intercropping with Red gram, but it was provided in July, which is late by one month. This made the crop prone to pest and disease attack. Henceforth, farmers are not interested in their recommendation.

In addition to this, private seed companies believe this area is not profitable, and public sector investments in seed production of Ragi are limited. The costs of distributing seed of improved varieties and hybrid varieties are also higher as farmers are located in remote area, mostly inaccessible by roads.

However, national and international research programmes have, earlier, made significant advances in case of other crops similar to Ragi. For example- Improvements in Bajra yields in India, have occurred largely due to the development, release and widespread multiplication of improved open-pollinated and hybrid cultivars. Similarly, several varieties of Ragi have been released by Karnataka Agriculture University. Government of Karnataka also provides subsidy on hybrid and other improved seeds. These have helped in improving the productivity of Ragi In Karnataka.

Therefore, there is a need to develop improved varieties, which adapt to local environment well and provided to farmers on time at cheaper rate.

5.4. Nutritive value

Ragi grain tastes very good and is an excellent dietary source of methionine -- an amino acid lacking in the diets of hundred of millions of the poor who live on starchy foods such as polished rice and maize meal. Ragi is also a good source of calcium, which is required in higher quantity to aging women. Ragi is a high-energy, nutritious food, especially recommended for children, convalescents and the elderly. Ragi is considered an especially wholesome food for diabetics. The flour of the malted grain is considered as a nourishing food for infants and invalids.

It is also higher in several other nutrients as compare to the raw milled rice, which is replacing Ragi in tribal areas. (Table -11 on next page)

Table-11– Comparison of nutritive value of Ragi and Rice

S.n.	Contents	Quantity of nutrients for 100 gms	
		Ragi	Rice, raw, milled
1	Moisture	13.1 gms	13.7 gms
2	Protein	7.3 gms	6.8gms
3	Fat	1.3 gms	0.5 gms
4	Minerals	2.7 gms	0.6 gms
5	Crude fiber	3.6 gms	0.2 gms
6	Carbohydrate	72.0 gms	78.2 gms
7	Energy	328 Kcal	345 Kcal
8	Calcium	344 mgs	10 mgs
9	Phosphorus	283 mgs	160 mgs
10	Iron	3.9 mgs	0.7 mgs

Source – Nutritive value of Indian Foods, NIN, Hyderabad.

5.5. Uses

Ragi grain is the basic diet and important staple food for poor households, particularly tribal in Andhra Pradesh and Orissa. When consumed as food it provides a sustaining diet, especially for people doing hard work. Its use is confined to food consumption directly in these areas, whereas only Ragi food surplus, around 20% of total production, enters into commercial market.

Ragi intake varies from month to month. Within 3-4 months after the Ragi harvest, Tribal takes Ragi in two meals. During this, it could be taken as *Porridge*, baked pancake and cooked whole grains. As long as Ragi taste sweet, they continue taking it twice a day, after that, Ragi is taken as porridge in remaining months of the year, particularly in summer. Its use as feed or any other has not been observed in these districts.

In other dry areas of India, like Karnataka, Ragi is one of the main food grains for many peoples. It is usually converted into flour and made into cakes, Puddings, or porridge.

In India as well as in other developing countries (Nepal, Srilanka and east African countries), it is estimated that about 80 percent of the world's Ragi (and over 95 percent in Asia and Africa) is used as food, the remainder being divided between feed (7 percent), other uses (seed, beer, etc.,) and waste. A fermented drink or beer is made from the grain. Ragi and other millet straw are a valuable livestock feed, building material, and fuel in those farming systems.

Ragi is also used as folk medicine. The leaf juice has been given to women in childbirth, and the plant is reported to be diaphoretic, diuretic, and vermifuge. Ragi is a folk remedy for leprosy, liver disease, measles, pleurisy, pneumonia, and small pox.

5.6. Ragi based products

The major Ragi products are Ragi Flour, Ragi Malt, Ragi Malt weaning food, Ragi Weaning food and Ragi based energetic foods. While making these products, no other byproduct is received.

5.6.1. Products from Raw Ragi

Raw Ragi can be cooked like Rice. Tribal eats this within 3-4 months of harvest, when it taste sweet.

5.6.2. Products from Ragi Flour

Ragi can be grind to make Ragi flour through ordinary local flourmills. Ragi Flour is commonly used for making Ragi ball, Roti, Chapati, Dosa and Biscuits. In addition to this, following can also be made.

Ragi flour, Grated coconut- 1 cup, Coriander- 1 bunch, Onions (finely chopped)- 4 , Curry leaves and green chilies- finely chopped (to your taste), Sugar little , Salt to taste, water to make dough Mix coconut, onions, curry leaves, green chilies, coriander leaves, and salt properly with little water. Add the Ragi flour with some more water and mix properly so that it mixes with other ingredients (This dough should be like chapati dough). Set aside for some time. Put some oil on tava (cooled tava). Roll small portions of dough to form medium sized roti. Apply oil around the roti and bake at low flame till it is done with the lid closed. Eat the Ragi roti with delicious pudina chatney.

5.6.3. Products from Ragi malt

Ragi Infant Food – 45 gms Ragi, 20gms roasted green gram dal, 10 gms Roasted ground nut, 5 gms roasted decorticated gingili seed and 30 gms of sugar. Ragi is soak in water over night. In the morning water is drained and grains are spread on a plate and allowed to germinate by covering with a damp cloth for one day. These germinated Ragi are dried in sun and roasted till it develops a malted flavor. Ragi and other roasted ingredients are powdered individually and mixed in the proportions as suggested and stored in air- tight tin. Whenever required, suitable quantity of food is added in small amount of hot water and sugar is add, if required, before feeding. It is made in the house.

Ragi malted weaning food - Malted weaning food is entirely a new product in weaning food formulation. This product is a mix of malted cereal and pulse with an entirely new and natural profile of flavor compared to the bland flavor of milk cereal weaning foods widely marketed so far. The low but not paste viscosity of the product increases the intake for food for the baby and hence be more appealing to the mother. It is made from Ragi, Green Gram, Milk powder, Vitamins and minerals. It is commercially available in brands.

Malted Ragi Porridge – 30 gm malted Ragi, 15 gm Roasted groundnut & 20 gm Jaggery. These three are powdered and added in sufficient water to cook. It is a good weaning food. It can be made in the house.

Ragi Weaning Food - A brief account of the process, developed for the preparation of a food formulation suitable for feeding weaned infants and young children, is as follows;

- ✓ Pre cleaning and powdering of raw materials
- ✓ Blending of flours
- ✓ Dispersing and pre cooking the blend in water
- ✓ Roller drying
- ✓ Packing

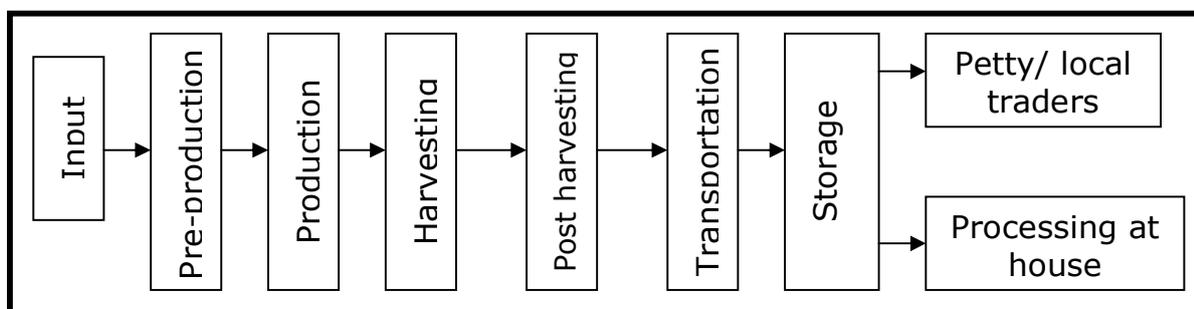
This is available in the market as brand.

5.6.4. Other blend Products from Ragi

Ragi mixing energetic food, which is manufactured by sante food products (pvt) Ltd., Bangalore, is also available in market.

6. Value Chain of Ragi

6.1. Production



Stage – 1: Inputs

S.n.	District	List of inputs
1	Vizianagaram & Srikakulam	Seed, manure, wooden plough, Sickles, Bullock pair, Gunny bags, labour and land
	Visakhapatnam	Seed, Manure, Fertilizers, Bullock Cart, Plough, Spade, Sickles, labour and land
	East Godavari	Seed, Manure, Fertilizers, Bullock Cart, Plough Spade, Sickles, Rope, labour and land
	Chittoor	Seed, Manure, Fertilizers, Bullock Cart, Plough Spade, Sickles, labour and land
	Koraput	Seed, Manure, Bullock pair, Plough, Sickles, labour, bamboo baskets, land and wooden plank.

1.1.Seed

Often, Ragi Farmers grow local varieties; use of hybrid was not observed in any of the villages in Andhra Pradesh and Orissa. However, hybrid varieties are widely used in Karnataka. The sources of seed are limited to own seed or neighbors' seed in Orissa. Agriculture department in Orissa introduced seed of improved variety in Koraput a few years back, the crop failed. Eventually, farmer's response to any seed from outside is not encouraging. However, farmers have better access and openness to use seeds introduced by KVK in Srikakulam and Vizianagaram. Farmers, here, develop seeds from KVK introduced varieties on their own and use it for next years and generally do not go outside for buying the seed. The cost of local variety seed ranges from Rs. 24-25/- in Andhra Pradesh. In Visakhapatnam and East Godavari, farmers develop their own seeds. In Chittoor, farmers buy seeds from Karnataka farmers, who get better quality seed from the government. The

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opportunity cost of own seed is around Rs. 4-5/- per Kg in Orissa as well as in Andhra Pradesh.

Generally, Ragi is stored as seed for next year in the Bamboo baskets and gunny bags in the house in Andhra Pradesh and Orissa. Properly dried panicles of Ragi are trashed and again dried properly before storing. No Technology, in particular, is used. Ragi is amazing crop as it can be stored for 50 years also without any damage. These stored seed germinate 70-100% based on the water availability and manuring in the field.

The quantity of seed used per acre varies from farmer to farmer, based on soil type of district, the methods of planting and spacing adopted.

S.n.	District	Method of sowing	Seed quantity (Kg/acre)
1	Vizianagaram & Srikakulam	Transplanting	3-5 Kgs of seeds
	Visakhapatnam	Transplanting and board casting	4kg for transplanting and 8kg for broadcasting. Generally broadcasting method of sowing is adopted. Also growing Ragi as a mixed crop with other millets like Jowar, Korra, Sama and Grams like Black gram, Redgram, and Beans Aleselu. In case of mixed cropping, often, 4 Kgs of Ragi seed is used, but it may vary based on the need of the farmers.
	East Godavari	Transplanting and board casting	6kg for transplanting and 9kg for broadcasting.
	Chittoor	Transplanting and board casting	3 kgs per acre for transplanting and 5 kgs per acre for broadcasting.
	Koraput	Transplanting	9-12 Kg of seed. Generally 12 Kg.

District specific

KVK, Kuntubai supplied seeds of Godavari variety, which yield well with fertilizer application. However, another variety Gouthami did not performed well.

1.2. Manure and Fertilizer

Use of inorganic fertilizer was not observed anywhere in Orissa as well as Andhra Pradesh. Ragi farmers use only organic manure. Strong believe is chemical fertilizers are not required, if cattle manure is used. Most of them do not use chemical fertilizers, even if cattle manure is not used, except for East Godavari and Chittoor. Here, farmers use chemical fertilizer, if cattle manure is not available. However, the quantities used are the methods of its use differ from place to place.

Application of manure in transplanting

In Vizianagaram and Srikakulam, 2-3 cartloads of organic manure are used for nursery preparation only. The source of organic manure may be own cattle, near by villages or any village in the mandal. One cartload cost around Rupees 60-70.

In Visakhapatnam and East Godavari, farmers use only manure, developed from their own cattle. In Visakhapatnam, 4-5 quintals of manure is applied for nursery bed for one acre of land. This cost Rs.200-300. If chemical fertilizers are used, 2-5 kg of urea is used for nursery bed for one acre, which cost around Rs.25. In East Godavari, often, cattle manure is kept for other crops and not for Ragi. If used for Ragi, they apply 3-4 quintals of manure for one acre. Generally, 1kg of Urea is used for nursery sufficient for one acre.

Whereas, in Orissa, cattle (bullock, cow, sheep and goat) are taken to the field, selected for Ragi cultivation. This is to collect its dung as well as urine and not to waste the urine. This is done 2 months prior to the land preparation for Ragi to ensure the proper mixing of manure in the soil. The manure is collected in the entire area of Ragi cultivation, however extra doses of manure are collected in the nursery land. This method does not cost any thing to the farmer as 25-30 cows from the village are pooled and kept on 1 acre for 2 days. This herd moves from land of one farmer to other, till it covers every bodies land.

Observation

Inorganic nitrogen depresses crop yields on poor land, but enhances yields on fertile land. Majority of Ragi farmers' landfall into the category of poor land, therefore use of inorganic fertilizer would lead to reduction in crop yield. Therefore, it is a best practice, which farmers are practicing. Phosphate acts as a limiting factor controlling response to nitrogen. Minute amounts of zinc sulfate increase yields of both grain and straw.

1.3.Pesticides

No chemical pesticides are used for Ragi. Ragi has been observed as a very hardy crop, worldwide. Pest or disease attack is not very common anywhere in the world. Ragi farmers also articulated the same. They have not faced any serious pest and disease attack on Ragi in Orissa and Andhra Pradesh. However, seldom, leaf spot are observed on the seedlings in the nursery bed. For this, farmer sprinkle raw Ragi solution on the bed in Andhra Pradesh and jackfruit solution or smoke in Orissa.

1.4. Implements

It was observed in Orissa and Andhra Pradesh that farmer himself from the locally available trees makes the plough; generally acacia is used in Andhra Pradesh. Local savaras also make the ploughs, costing Rs. 60/, in Srikakulam and Vizianagaram. These plough last for 6 months only as soil is hard.

In Visakhapatnam and East Godavari, Local carpenters also make the plough, which costs around Rs.100-120/- and last for 5-10 years.

The costs of other implements like sickle, spade, baskets etc. are nominal. They last for 6 months to one year as all the implements are used for other crops as well.

The major cost to implements is added by bullock pair, which cost around Rs 5,000 to 10,000 per pair. These bullocks have to be purchased from bigger town.

1.5.Gunny bags or bamboo baskets

To keep seed and store Ragi grain, gunny bags or bamboo baskets are required. The bamboo baskets are made by them only, whereas gunny bags are purchased for Rs 5 per bag from local markets. These bags go for 3-4 years and used for other crops as well.

1.6. Labour

Family members contribute to most of the labour. Only during transplanting and harvesting, huge number of labour is required. At that time, generally, villagers help each other in growing Ragi. Women from village go to help other in transplanting and harvesting. For transplanting, they are paid Rs. 10-15 per day and meals for one or two time depending upon the place. For harvesting, they get share from the crop.

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If labour from outside village is engaged, it is paid as per the prevailing wage rate there.

For ploughing, often 5-6 farmers have understanding and help each other during the ploughing. In this system also, they are given food and small amount of money. In case of absence of understanding, they get paid as per the prevailing rates.

1.7. Land

Ragi is grown on dry, peripheral and marginal land with no irrigation facilities. This type of land cannot be used to grow any other crop with small scale of financial investments. It was observed that wherever farmers have irrigation facilities, they have shifted to Paddy.

1.8. Credit

The farmers are not taking credit for Ragi crop as they do not require large scale of investment. In addition to this, they are also not willing to make large investment on Ragi. The total investment on one acre in a year is around Rs. 700-800. (Table – 12, calculation are based on data from Srikakulam and Vizianagaram.)

Table –12 – Estimation of cost for Ragi cultivation through transplanting in a acre (in Rs)

S.n.	Activity	Unit cost	Units	Expenditure
1	Seed	3-4/kg	6	24.00
2	1 st Ploughing	50/manday	1	50
3	Application of manure	60/load	2	120/-
4	Transplanting	30/womanday	6-10	180-300
5	For ploughing at the time of transplanting	50/manday	1	50
6	Uprooting the seedlings	50/manday	1	50
7	For harvesting	*30/womanday	10-15	300-450
	Total			774-894

****Generally they do not charge for harvesting but take half of the amount they harvested.***

Stage – 2: Pre-production

2.1. Land preparation

Farmer, with the help of plough and one pair of bullock prepare the land. It takes 2-3 ploughing to prepare land for nursery in Srikakulam and

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Vizianagaram. Whereas it takes 3-4 ploughing to prepare land for transplanting of Ragi in Visakhapatnam and East Godavari. For broadcasting of Ragi, land is ploughed only 2-3 times.

Farmers plough land for 3 times normally in Koraput, but the number of ploughing increases with the frequency of rain. Basically, land is ploughed till weeds are dead. Sometime, it may take as high as 10 ploughing to kill the weeds.

This is done in the month of May and June. Always, male member of the family or male labour ploughs land. Often, land is ploughed in the early hours in the morning and takes 1-2 days to completely plough one acre of land. The charges of male labour vary from place to place; normally, they charge Rs. 50 per day in Andhra Pradesh. Farmer himself ploughs land in Orissa.

Bunding around land is done with the help of spade before transplanting. It takes one day for an acre of land. This is also done by men, who charge the same as that for ploughing

2.2. Application of manure

Manures are applied to land before the ploughing of land and sowing the crop. Once the crop is sown, no manure is applied.

As mentioned earlier, Farmer gets manure from outside or prepares organic manure in the village in Andhra Pradesh, it is spread manually by a male labour, which takes one day for an acre. The charges of a labour, if hired from outside, is Rs 30 for a day.

In case of mixed cropping, farmers do not apply any manure to avoid competition among the crops in Visakhapatnam. They believe Ragi is very efficient to extract the nutrients from the soil compared to other crops. Similarly, Ragi is not followed by any other crops in East Godavari.

Already mentioned earlier, in Orissa, cattle (bullock, cow, sheep and goat) are taken to the field, selected for Ragi cultivation. This is to collect its dung as well as urine and not to waste the urine. This is done 2 months prior to the land preparation for Ragi to ensure the proper mixing of manure in the soil. The manure is collected in the entire area of Ragi cultivation, however extra doses of manure are collected in the nursery land. This method does not cost anything to the farmer as 25-30 cows from the village are pooled and kept on 1 acre for 2 days. This herd moves from land of one farmer to other, till it covers every body's land.

In case of Transplanting

2.3. Sowing time

Generally, nursery is raised in the month of June and July, but it differs from district to district; sowing time presented in tabular form below.

S.n.	District	Sowing time
1	Vizianagaram & Srikakulam	June end-July 1st week
2	Visakhapatnam	Varies from June 2 nd week to July 1st week.
3	East Godavari	July 1st week- August last week for Rabi crop.
4	Chittoor	June
5	Koraput	Mid June to end of June.

The above sowing time may change with the onset of monsoon. If there are early showers they go for early sowing, even in May last week also. If it does not rain after sowing, germinated seedlings die.

2.4. Nursery

Once the preparations are over, seeds are spread in the nursery after the shower. If rain is good and enough manure is applied, nursery will be ready in 20-21 days. The land for nursery is being changed every year. While nursery is being raised, farmers prepare land for transplanting the land.

Stage – 3: Production

There are two methods of production – transplanting and broadcasting. Transplanting is common in Koraput, Srikakulam, Vizianagaram, whereas broadcasting is also used along with transplanting in Visakhapatnam and East Godavari. In other parts of Andhra Pradesh and Orissa, both methods are used. However, transplanting is more common.

3.1. Method of Transplanting

3.1.1 Uprooting of seedlings

In other places, except for East Godavari, women uproot seedling on the same day of transplanting. In fact, a few women would be uprooting, while other would be transplanting the seedlings. Whereas, in East Godavari, Seedlings are uprooted one day before and left overnight in heaps in such a

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way that all the leaves are out side and the roots are inside. This is done to separate the healthy seedlings for transplanting from the decaying ones, which would rot and turn brownish yellow in a day. The good ones would be separated from rotten ones and would be used for transplanting next day.

3.1.2. Transplanting

Transplanting is done in July last week-August 1st week. This also depends on the rains. If there is no rain/moisture in the soil they do not transplant and leave the bed. Generally, Seedlings of 21 to 30days are ready for transplanting. Transplanting is done with the help of country Plough or spade.

Men plough the land after the rain and women follow the plough to transplant the seedlings, which are already uprooted from nursery by them. Both final ploughing and transplanting is done simultaneously. In East Godavari, rope is also used for making lines for transplanting. Generally, transplanting is finished in 1-2 days, depending upon the number of labour employed.

Farmers who possess own bullocks use the Plough for transplanting. Farmers who do not possess the bullocks use spade for transplanting in Visakhapatnam and East Godavari. This requires high labour. One man for one woman (who is transplanting) is required. Therefore, they employ 10-20 women and men to complete transplanting in one day.

Generally they do not take any wage for working in the field as they mutually help each other. Within the village they share work mutually or one-time meals and Rs.10-15/- are paid in Andhra Pradesh. However, labours from outside village are paid differently in different districts.

District	Mode of payment to labours used for production
Vizianagaram & Srikakulam	For outside labours, they pay Rs. 30/ day to woman and Rs. 50/day to man.
Visakhapatnam	They employ 2-3 men for uprooting the seedlings and ploughing, and 10 women for transplanting. For outside labours, they pay Rs.20/ day to woman and Rs.25/day to man.
East Godavari	They employ 2-3 men for uprooting the seedlings and ploughing, and 4-5 women for transplanting. If labours are from outside, women labour are paid Rs.20/ day and male labour are paid Rs.25/ day.
Chittoor	They employ 8 men and 7 women for ploughing, uprooting the seedlings and transplanting. If labours are from outside, both men and women labour are paid

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	Rs.30/ day.
Koraput	They employ 6 plough and 20 women for uprooting and transplanting. If nursery is at far place, 10 more women to uproot nursery. Only people from village are employed. Women are paid Rs. 15 and two meals per day. Plough is also generally exchanged and given 3 kgs of rice and vegetable for entire family. If not exchanged within families, they are paid Rs 30 per day.

3.2. Method of broadcasting

Around 4-5 ploughings are required for broadcasting method. Here also, manure is applied in the field before ploughing. After the rain, sowing start, unlike transplanting, seeds are spread in the field and plough follows it. Once it is over, around after 2-3 hrs, 25-30 goats are left in the field to cover the seeds with the mud.

3.3. Weeding

Weeding is done only in the case of broadcasting after 30 days of sowing, when the plant are of 1 feet height. For this, women are used. Around 10 women can clear one acre Ragi field in 15 days. In East Godavari, 10-12 Kgs of Urea is spread after the weeding. Barring this in broadcasting, not other cultural practice is carried out till harvesting.

Risk in production

There should not be any rain after flower initiation i.e. before panicle initiation. Rain at this stage reduces the yield by 50% or can lead to no yield.

3.4 Boundary and Hut

In Koraput, boundary of locally available wood is made to save crop from livestock. This takes 3 days to 4 persons to cover an acre. This is done by men only. Usually, 2 labour from outside are engaged.

If the field is far away from village, a hut is made in the field to stay overnight and keep a watch on the field. This is also made by 2 men in 2 days.

Stage – 4: Harvesting

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Only Ragi panicles are harvested with the help of sickles. Generally, women harvest it and given 50% of the Ragi harvested by individual as wages in Andhra Pradesh, whereas it is limited to 25% in Koraput.

District	Timing of harvest
Vizianagaram & Srikakulam	Harvesting is done in the month of October and November.
Visakhapatnam	Harvesting is done in the month of December- January for peddachodi and china chodi is harvested late September or early October.
East Godavari	Harvesting is done in the month of January for peddachodi.
Chittoor	Harvesting is done in the month of November.
Koraput	Puja is performed before harvesting. The elder women of family will cut the Ragi first, followed by other women from the village. Small Ragi is harvested in October and big Ragi is in November.

Stage – 5: Post – Harvesting

5.1. Heaping and drying

After the harvest, Ragi crop is kept in heap for 1-2 days so that raw grains also get ripened. Followed by this, it will be dried in sun for 2-4 days depending upon the sunshine. For this it will be spread in the morning and collected in the evening. This is done by women.

5.2. Threshing

Once it is completely dried, it will be beaten with wooden stick or plank to separate grains from the panicles. Both men and women perform this activity. Around 8 people can thresh the production from 1 acre in 3 days. For this, 18 kg of Ragi is given to one person for 3 days. At times, bullocks are also used for threshing.

5.3. Winnowing and cleaning

Threshed grains are winnowed to remove waste and clean properly. This takes 1 – 2 days for 2 women. The clean seed are again dried properly before taking back to home.

Yield

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District	Yield
Vizianagaram & Srikakulam	3-4 quintal per acre
Visakhapatnam	If grown alone, 10-12qt/acre. If grown in mixed cropping, 4-5 bags/acre
East Godavari	10-12qt/acre of Pedda chodi 4-5 qt/acre of china chodi
Chittoor	Transplanting 15qt/acre Broadcasting 8qt/acre
Koraput	Transplanting 10-12qt/acre, if it rain well 3 -4 qt/ acre, if does not rain Broadcasting 3-3.6 qt/acre under normal conditions

By products

Although stem of Ragi is used as livestock feed in other part of India and world, the same was not observed in these districts.

Risk during post harvest

While heaping if the weather is humid or it is raining, the grains would start germinating. The colour of grains would also turn black. Some times fungal growth is also observed.

Stage – 6: Transportation

Ragi is carried to home from field manually in baskets or gunny bags. Both men and women carry it back to home.

Majority of Ragi trade takes place in the village either in between villagers, where they exchange other crops and Ragi or in between petty traders and Ragi farmers. Hardily, farmer takes Ragi to shandy or local markets. In required, they carry only very small amount, ranging from 3-5 Kgs, to buy the items of other household in barter system. In such a case, Ragi is carried manually again.

Stage – 7: Storage for consumption

Generally, Ragi is stored in the special big baskets made of Bamboo or other straw in Orissa. Same basket may also be used to store other grains. These are stored in baskets or gunny bags Andhra Pradesh.

Stage – 8: Processing at household

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Ragi grains are grinded to flour by women with the help of stone grinder or at local flour or rice mill. No specific technology is used.

Although Ragi grain can be stored for longer period, the Ragi flour cannot be kept for long, not even for days. Its taste changes very fast. Therefore, it has to be grinded very frequently. It takes around 2 hours to grind one kg of flour, which is consumed in a day by a family of four members.

Women have expressed this as a major concern. One of the reasons for its declining use is this also. Women find it convenient to use Rice in place of Ragi.

Gender in value chain

Most of the work from Ragi cultivation to its consumption at household level is done by women. The major activities, which are commonly undertaken by men are ploughing and threshing, remaining works are performed by women.

Table – 13- Gendered value chain of Ragi from input to processing at household level

S.n.	Stage	Activity	Men	Women
1	Input		Yes	Yes
2	Pre-production	Ploughing	Yes, 2 pd	
		Application of manure		Yes, 1 pd
		Nursery	Yes, 1 pd	
3	Production	Uprooting of seedlings	Yes, 1 pd	
		Transplanting		Yes, 10 pd
		Broad casting		Yes, 4 pd
		Weeding		Yes, 15 pd
		Boundary and Hut	Yes, 6 pd	
4	Harvesting		Yes, 15 pd	
5	Post Harvest	Heaping and drying	Help	Yes, 1 pd
		Threshing	Yes, 1 pd	Yes, 1 pd
		Winnowing & cleaning	Help	Yes, 1 pd
6	Transportation		Help	Yes, .5 pd
7	Storage for consumption			Yes, .1 pd
8	Processing at household			Yes, 2 hrs for 3 kgs

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	Total	11 pd	30pd or 39pd
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Analysis of benefit to cost for Ragi crop in a acre (for transplanting)

The calculations for benefit to cost, without and with opportunity cost of families' labour, are given in tabular form. These calculations are based on data from Srikakulam and Vizianagaram.

S.n.	Head	Total
1	Benefit (3-4 quintal of yield @ 330 per quintal)	990-1320
2	Cost of production (details in table -13)	774-894
Profit		96-546

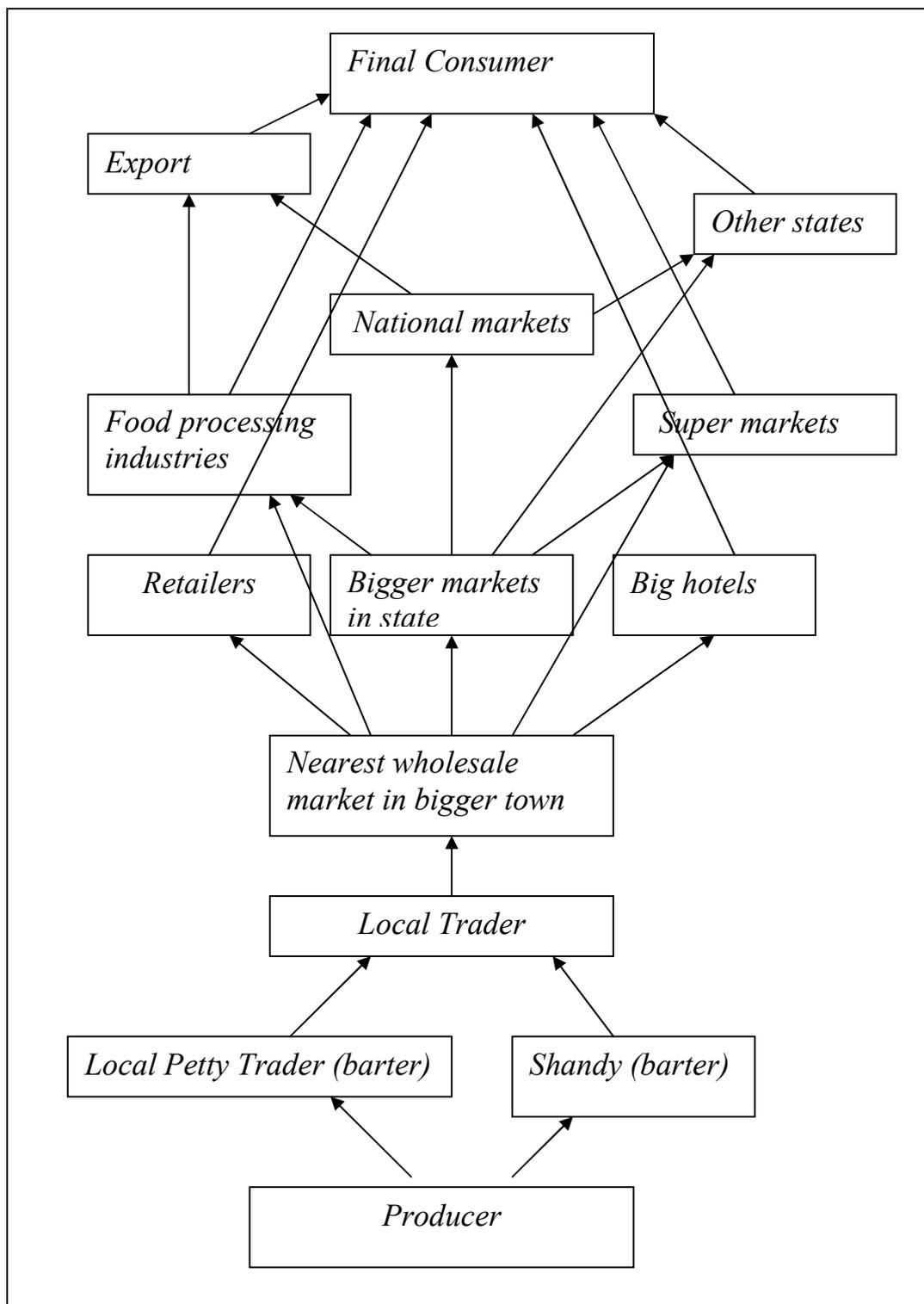
Family, normally, spends 21 days on the crop. If consider the opportunity cost of farmer (generally) women, the cost benefit in that case would be as follows.

S.n.	Head	Total
1	Benefit (3-4 quintal of yield @ 330 per quintal)	990-1320
2	Cost of production (details in table -13)	774-894
3	Opportunity cost of their time	630
4	Total cost	1404-1524
Profit		-534 to -84

These calculation shows that if the opportunity cost of families labour is consider, Ragi production is not at all profitable. The same has been expressed by Ragi farmers in all the villages, where study was conducted.

6.2. Market

Figure- 2- Market value chain and Channel for Ragi in India



6.2.1. Description of market channels

Ragi marketing channels are not well developed. The main reasons for this are limited demand in urban areas, lower prices of Ragi, lower margins in Ragi trade, scattered and irregular supplies on account of only food surplus being sold and large distances between producing areas and the main urban centers. Only 15-20 percent of the Ragi produced in these tribal areas of the covered districts enters the commercial marketing system. Moreover, there is no effective market intervention/ regulation by government, state as well as central, to regulate the domestic Ragi prices. Although unlike Rice, cotton, groundnut, wheat etc., these market channels are not well developed; Ragi follows the similar market channels like any other agricultural commodity. The description of these channels is given below in detail.

6.2.2. Local market (village and wholesale at division level)

As mentioned earlier, only 15-20% of Ragi food surplus enters into the commercial marketing system. Ragi growing farmers keeps the Ragi, required for annual consumption, from the total produce and only surplus Ragi is used for exchange of other items of household consumption through barter system. Most of this exchange takes place in their own villages, where either another villager exchanges his agriculture produce or petty traders from nearby bigger village or small town, ferry into 2-3 adjacent villages with small quantities of household consumption items. These petty traders also collect any other seasonal agricultural commodity through barter and sell it, in turn, to local traders at bigger village or smaller town.

In few cases, family carries Ragi to the local shandy or weekly haat and buys items of other household consumptions from local traders through barter system. These local traders, in turn, sell the Ragi in local wholesale market at mandal/ division/ district level. These traders also deal with other Agricultural commodities. (Table -14 - presents the local wholesale markets in the six districts)

It was observed that Ragi is rarely sold for cash and often, exchanged for other item. Most of this, takes place within 2-3 months of harvest of Ragi.

Table - 14 - Local wholesale market in the covered districts

S.n.	District	Name of the Market
1	Srikakulam	Srikakulam, Palakunda, Kotturu, Seetampeta, Tekkali, Anerdaladesh
2	Vizianagaram	Parvatipuram, Vizianagaram, G.C. Puram, N.K. Puram, Kurupam

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3	Visakhapatnam	Goligunda, Visakhapatnam, Ankapalli
4	Chittoor	Chittoor, V. Koli, Kuppam, Gudipalli, Satipuram, Madanpalli, Bangarupeta, Chintamani, Betumangalam
5	Koraput	Parvatipuram

On an average, petty traders exchange 3 Kgs of Ragi with items worth Rs. 8 to 10. The same is the case in shandy as well. These petty traders sell Ragi to local trader at the rate of Rs. 3.50 to 4.50 per kg. These local traders, in turn sell, Ragi at the rate of Rs 5 per Kg to other wholesale traders. The wholesale trader will supply gunny bags and pay transportation charges as well. The payments are made either on the spot or within 3-4 days.

6.2.3. State level markets

The major state level markets are in Srikakulam, Parvatipuram, Ankapalli, Vijayawada, Madanpalli and Kurnool. Ragi from wholesale markets and directly from small places come to these bigger markets. From here, it goes either to other states as well as to national level market. Here, Ragi is sold at Rs 7 or 8 per Kg (generally at Rs 7 per Kg).

Traders are not dealing, exclusively, in Ragi; they also deal in other agricultural commodities in Andhra Pradesh as well as in other parts of India.

Table –15 - Major state level markets

S.n.	Major market	Mainly collects from	Mainly supply to
1	Srikakulam	Seethampet, Kothur & Palakonda	Raipur, Bilaspur, Calcutta & Vijayawada
2	Parvathipuram	G.L.Puram, Koraput, Kurupam, Rayagada & other tribal areas.	Vizianagaram, Vijayawada, Raipur and Maharastra
3	Anakapalli	Buligonda, from Plain areas & agency area of Paderu & Gmadugula	Vijayawada & Hyderabad
5	Vijayawada	Srikakulam, Visakhapatnam & Vizianagaram	Hyderabad, other states & processing plants
6	Chittoor	V.Kota and Kuppam	Chintamani & Bangarupeta (in Kar.)
7	Kurnool	Mahabubnagar and Kurnool	Hyderabad, Maharastra & Karnataka

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To supply outside state, traders have to pay 4% sales tax and 1% market CESS. In addition to this, they have to pay Rs 4 to 6 per quintal to the agents, helping in finalizing the deal, from other states. They also have to bear the transportation cost, ranging as per distance. Therefore, to reduce the transportation cost they supply huge quantities (i.e. more than 8 to 10 tons).

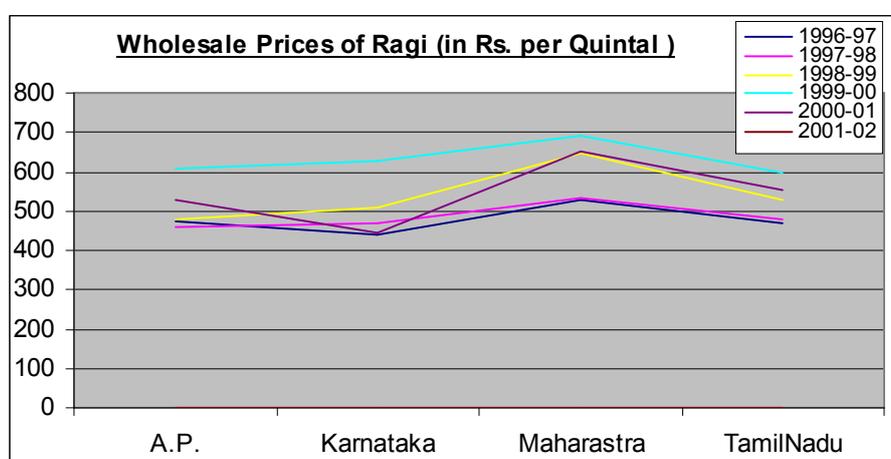
6.2.4. National markets

Ragi production is highest in Karnataka and the quantum of Ragi transaction is also very high in Karnataka, as recorded by Agricultural Market committees, as compare to other states. Therefore, it is considered as major marketing point as well as national market for Ragi in India. The main markets of Ragi in Karnataka are Yashwantpur, Kolar, Banglore and Hassan. These centers collect Ragi from Karnataka and some areas of Tamilnadu and Andhra Pradesh and supply to Rajsthan, Delhi, Uttar Pradesh, Maharastra, Chattisghad, West Bengal and Madhaya Pradesh.

The peak season for Ragi trade is from February to June only. Ragi is available in 4 grades in the market - Poultry feed, Local, Graded and Medium. The current price of Ragi in Bangalore is Rs. 6 per kg and in Andhra Pradesh is Rs. 7-8 per Kg.

Ragi prices, on an average are lowest in Karnataka and higher in Andhra Pradesh, Tamilnadu and Maharastra. (Figure -3, table -16) The prices are, further, high in Delhi, Rajsthan, Uttar Pradesh and Madhya Pradesh as demand for Ragi and Ragi based products (Ragi malt and Ragi based weaning foods) is comparatively high. The demand for Ragi based products is increasing there.

Figure - 3 – Wholesale prices of Ragi in selected markets in India



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Table-16-Wholesale Prices of Ragi in selected National Markets (in Rs. per Quintal)

YEAR	Madanpally in A.P.		Bangalore in Kar.		Nasik in Maharashtra		Salem in T.N.	
	M.S.P	Average	M.S.P	Average	M.S.P	Average	M.S.P	Average
1996-97	310	472	310	439	310	527	310	467
1997-98	360	459	360	468	360	531	360	477
1998-99	390	480	390	508	390	645	390	526
1999-00	415	609	415	627	415	692	415	599
2000-01	445	528	445	444	445	653	445	554
2001-02	485	487	485	465	485	615	485	536

(For month end price for above markets refer annexure -4.)

6.2.5. International markets

The major producer of Ragi are Burundi, Kenya, Malawi, Rwanda, Uganda, Zambia in Eastern Africa and Afganisthan, Iran, Iraq, Jordan, Srilanka, Nepal in Asia. Like India, Ragi is produced mainly for consumption in these countries also. Only 20% of total produce enters into the commercial market and less than half of it enters into the international market. Selected markets of Ragi are given below in tabular form.

S.n.	Region	Cities and countries as selected market for Ragi
1	Africa	Mombasa, Nairobi, Nakuru, Kisumu, Bungoma, Eldoret, Kitui, Karatina, Bondo, Taveta, Meru, Busia, Bondo, Migori
2	Asia	Bangalore in India, Srilanka and Nepal

Global trade in millet is estimated to range between 200,000 and 300,000 tons, representing roughly 0.1 percent of world trade in cereals or 1.0 percent of world millet production. Since the market channels are not strong, it is difficult figure out the accurate data for Ragi and other millets separately. However, as per FAO and ICRISAT estimates, Proso millet and Bajra together add to about two-third of recorded millet exports. Ragi with other millets accounts for remaining recorded export. Since Ragi and other millets amounts to less than 1,00,000 tons. The entire Ragi export market is not very big.

Along with Bajra, India also exports Ragi as commodity as well as Ragi products. However, it is difficult to estimate the total quantity of Ragi exported from India every year. An indication of Ragi export and its quantity can be drawn from the export list of ITC (source – The great Indian Bazaar) shows that 927 tones of Ragi, which is 0.1% of total Basmati Rice exported and 14% of other millets exported, was exported. (Table- 17, next page)

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Table -17- Export of Ragi by ITC In 2002-2003

ITC 10 - Cereals				
Article Code	Description	Unit	Total Quantity	Total Value (Rs.)
1006	Rice	Kg	-	62,807,544,896.00
10063002	Basmati Rice	Kg	597,756,430.0	18,769,092,230.00
100820	Millet	Kg	6,200,109.00	52,848,975.00
10082001	Jawar	Kg	1,258,374.00	11,592,883.00
10082003	Bajra	Kg	4,014,720.00	34,774,919.00
10082004	Ragi	Kg	927,015.00	6,481,173.00
10089000	Other Cereals	Kg	1,140,950.00	12,126,368.00

Source – website of the great Indian Bazaar

The major importers of Ragi along with other millets are developed countries – European countries, Japan, Switzerland and Canada. During the 1992-94 period, the EC purchased an average of 145,000 tons of millet per year, which accounts for more than 50 percent of global imports. The primary use of imported Ragi is in preparing Ragi based products, mainly malts – either Mixed malts, blended with other commodities or Ragi malt. Malt products are not mass consumer product, but it has only a niche market.

International trade in millet is controlled by a few specialized trading companies and generally conducted on a sample basis. Only Argentina is reported to have established official export quality standards. International prices are highly volatile, determined largely by supply volumes, and are usually unrelated to those of other major coarse grains such as maize, sorghum or barley. Quotations are not regularly published or recorded according to official statistics. The high degree of price variability among suppliers, even in the same year, is due to the "thin" market, with small trade volumes and very few buyers and sellers. (Table – 18)

Table -18- Average Wholesale Price for Ragi in International Markets

Week Ending 16th July, 2004, C		
S.n.	Selected Markets	Price (in US\$/ tons)
1	Nairobi	312.67
2	Mombasa	437.67
3	Nakuru	277.89
4	Kisumu	361.22

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5	Bungoma	277.89
6	Eldoret	268.56
7	Kitui	375.22
8	Karatina	389.11
9	Bondo	500.22
10	Taveta	375.22
11	Meru	555.78
12	Busia	187.56
13	Bondo	437.67
14	Migori	361.22
	Min	187.56
	Average	365.56
	Average price (in Rs/kg)	Rs. 18 (if 1US\$=rs.50)

Besides this official trade, a substantial unrecorded quantity of millet is traded within sub regions in Africa, with grain moving from surplus to deficit areas.

6.2.5. Government support for marketing

There are 293 Agricultural Marketing Committees (AMCs) and 848 Notified markets in the state, established with a view to ensure remunerative prices to the farmers for their agricultural produce. Most of these market committees are not functional. In the recent past, these AMCs have become the focal points for operating various government schemes to serve the farming community in a better way.

Discussion with farmers, traders as well as AMCs members revealed that no transactions related to Ragi takes place in these district market yards. The function of marketing committees is limited to announcing the daily prices of Ragi.

Though government has been fixing minimum support prices for Ragi, its benefits are not reaching to Ragi growing farmer as most of the Ragi trade takes place in remote hilly tribal villages, far from the Agricultural yards. In all the six districts, the Ragi was sold by poor tribal farmer for Rs. 3/ Kg as against its support price of (around) Rs. 5 per Kg.

It is surprising to know that minimum support price for common variety of rice and Ragi are almost same. However, the farmers are successful in getting the benefits from minimum support price of Rice on account of government's emphasis on Paddy procurement, their better access to agricultural yard and its commercial nature. (Table- 19, next page)

**Table -19- Minimum Support Prices fixed by the government
(Rs. per quintal)**

Crop	1990-91	1992-93	1994-95	1996-97	1998-99	2000-01
Paddy	205	270	340	380	440	510
Ragi	180	240	280	310	390	445

6.3. Value Addition

Value addition can be done through grading, making Ragi flour and other Ragi based products.

1. Grading

In Andhra Pradesh, 3 types of Ragi are common Red, Black and sunlight white. Producers sell it to petty traders and local traders the mixed one, however the graded one fetches more prices.

Generally, it is done at wholesale and retailer level. Grading increases the price of Ragi from Rs 5 to Rs. 5.50 per Kg with an investment of Rs. 0.2 per Kg. The percentage of loss is around 5% during the cleaning. However, this byproduct is also be sold as poultry feed for Rs 3- 4 per kg by wholesalers.

Table -20- Estimation for value addition through grading

S.n.	Head	Quantity	Rate	Total
1	Cost of Ragi at local trader	100 Kgs	Rs 5/ kg	500
2	Cleaning charges	1 qt	Rs 20/qt	20
	Total cost			520
3	Grade - 1 as Raw Ragi	95 kg	Rs 5.50/Kg	522.50
4	Grade -2 as poultry feed	5 Kg	Rs 4.00/Kg	20.00
	Total value			542.50
	Total Benefit			22.50

2. Ragi Flour

Generally, ordinary flourmills are being used to grind Ragi into Ragi Flour. The cost of grinding is around Rs. 35-60 per quintals. The Ragi flour is sold for Rs 7.00 per Kg in local area, for Rs. 8 to 10 per Kg in retail shops of big cities, whereas it is sold for Rs 12 per Kg in retail shops and Rs 20 per Kg in supermarkets (Giant, Food world, Trinethra etc.) in Hyderabad. (Table -21, next page)

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Table –21- Estimation for value addition in flour making in local area

S.n.	Head	Quantity	Rate	Total
1	Cost of Ragi at local trader	100 Kgs	Rs 5/ kg	500
2	Transportation till unit	1 qt	Rs. 10/qt	10
3	Cleaning charges	1 qt	Rs 20/qt	20
	Processing cost	1 qt	Rs 40/qt	40
	Total cost			570
4	Ragi Flour	90 kg	Rs 7.00/Kg	630.00
5	Grade -2 as poultry feed	5 Kg	Rs 4.00/Kg	20.00
	Processing loss	5 kg	0	0
	Total value			650.00
	Total Benefit			80.00

Total loss for flour making is 10%

If the flour were sold in supermarket at Hyderabad, the additional cost on transportation and packaging would be around Rs. 3 per kg. In that the net profit would be Rs 980 per quintal.

Table –22- Estimation for value addition in Ragi flour at Hyderabad

S.n.	Head	Quantity	Rate	Total
1	Processing cost of Ragi flour	1 qt		570.00
2	Additional cost (for 90 Kgs)	90 kgs	Rs 3/kg	270.00
	Total cost			840.00
3	Ragi Flour sold in super market	90 kg	Rs 20.0/Kg	1800.00
4	Grade -2 as poultry feed	5 Kg	Rs 4.00/Kg	20.00
	Total value			1820.00
	Total Benefit			980.00

Total loss for flour making is 10%

However, the processor supplying to these supermarkets are earning profit of Rs 780 per quintal as they are buying Ragi from state level markets at Rs 7 per Kg instead of Rs 5 per Kg.

The above can be set up with small capacity of 15 quintals per day with 2 persons to maintain the plant and 2 labours to carry out the physical work of carrying the bags etc. In addition to flourmill, it also requires thick Polithin bags to store processed stock. The processing loss may vary from 10 to 15%.

3. Ragi Malt

Although it requires specific technology to produce better quality product, some processing units are using indigenous technology to produce Ragi malt. The method is simple, clean Ragi, soak it in water over night and dry it next day. Once, it is dried properly, fries it and powdered it, when it is cool. The cost of making Ragi malt is low, but it is of medium brown colour.

4. Ragi Malt weaning food

It is made from Ragi, Green Gram, Milk powder, Vitamins and minerals. Preparation of Ragi Malt weaning food is technology intensive. It requires Destoner, steeping tanks, cross flow truck drier, roaster electrically operated, huller (Rice polished) plate mill sifter and ribbon mixer. The total investment for a unit with capacity of 500Kg /day/ shift is around Rs 26 lakh. This gives a turn over of Rs 8 lakh per annum. (Table -23) Setting up of Ragi Malt weaning food unit needs National Institute of Nutrition (NIN) certificate, high technology lab and lab chemist.

Table -23-Estimation of investment for Malt weaning food unit

S.n.	Cost head	Amount
1	Land	1,00,000
2	Buildings	6,25,000
3	Plant and Machinery	12,00,000
4	Misc. fixed assets	3,00,000
5	Pre operative expanses	1,75,000
	Total fixed capital	24,00,000
6	Working capital margin	2,00,000
	Total project cost	26,00,000

The unit production cost for Ragi malt weaning food is less than the commercially available weaning foods and can be marketed at a lower cost per unit enabling the lower income people to afford the product. This is sold for Rs. 20 for 200 Gms in the market.

At present, two companies Surya foods products ltd (Hyderabad) and Ragi Malt (Uppal, Hyderabad) are making Ragi malt and supply it to super markets in Hyderabad. Both the companies are selling their products at Rs 20 per 200 gms (Rs 100 per Kg). Agri Gold Ltd also initiated the same in Vijayawada, but had to stop due to objection from NIN.

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5. Ragi Weaning Food

To make this, Pre cleaner, balance, flourmill, sifter, silos, mixer, SS Kettles, sifter and grinder for finished products. Ss mixers, filling and packing equipment twin roller drier and boiler, which are available indigenously, are required.

The total capacity of plant and machinery should be 3 Tones of food/day (8 Hrs). This machinery costs around Rs. 45 lakh and is set up in a building of 1000 sqm on a piece of land of 42dqm.

6.4. Producer's share in consumer's money

The following table presents the producers and other middlemen's margin in the money paid by final consumers. For this assumption is wholesaler supplies Ragi to Retailers and supermarkets in Hyderabad and other places. The additional expenses by these three are on transportation, grading and packaging.

Table –24-Estimation of margin for raw Ragi

S.n.	Place	Price	Cost		Margin
			Additional	Total	
1	Super market at Hyderabad	15.00	1.00#	8.00	7.00
2	Retailer at Hyderabad	10.00	0.30@	7.30	2.70
3	Retailer at big cities	8.00	0.10\$	7.10	0.90
4	Whole sell	7.00	0.20	5.20	1.80
5	Local Trader	5.00	0.00	4.00	1.00
6	Petty trader	4.00	0.00	3.00	1.00
7	Producer	3.00	0.00	0.00	3.00

- transportation, grading and packaging, @ -transportation and grading & \$-transportation

When Raw Ragi is sold at super market, around 50% of total margin from consumers' money goes to supermarket, where as only 22% comes in the hands of producer. The share of producer in consumer money increases in case of retailer in Hyderabad and other cities in Andhra Pradesh.

Table –25-Share in % for raw Ragi

s.n.	Entity	Middlemen (4-6 in table-24)	Producer	
1	Super market	51%	28%	22%
2	Retailer at Hyderabad	28%	40%	32%
3	Retailer at big cities	12%	49%	39%

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In case of flour also, assumption is wholesaler will supply the Ragi to processor to make Ragi flour. Processor, in turn will supply the Ragi to the retailers and super markets. The additional cost for them includes the processing cost, transportation cost, packaging and other overheads (in case of super markets).

Table –26-Estimation of margin for Ragi flour

S.n.	Place	Price	Cost		Margin
			Additional	Total	
1	Super market at Hyderabad	20.00	3.00	10.00	10.00
2	Retailer at Hyderabad	12.00	1.50	8.50	3.50
3	Retailer at big cities	10.00	1.00	8.00	2.00
4	Whole sell	7.00	0.20	5.20	1.80
5	Local Trader	5.00	0.00	4.00	1.00
6	Petty trader	4.00	0.00	3.00	1.00
7	Producer	3.00	0.00	0.00	3.00

The producers' share in consumers' money goes as low as 17% in case of Ragi flour sold by super market, whereas it is 34% in case of sell by retailer at other big cities in Andhra Pradesh.

Table –27-Share in % for Ragi Flour

s.n.		Entity	Middlemen (4-6 in table-26)	Producer
1	Super market	60%	23%	17%
2	Retailer at Hyderabad	34%	37%	29%
3	Retailer at big cities	23%	43%	34%

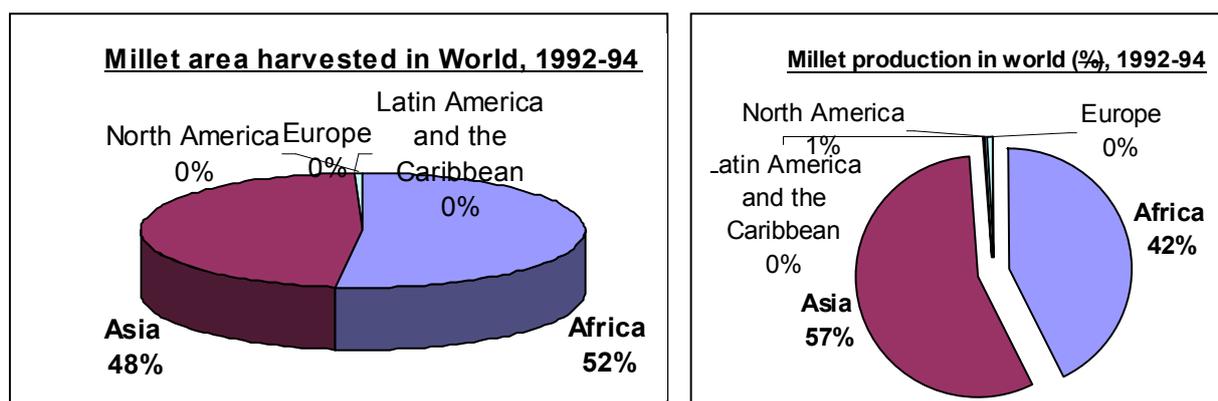
The producer's share in consumers' money for Ragi malt and other Ragi malt based product could not be calculated as processing units did not provide the details related to expenditure. However, it can be assumed that it would be very high as Ragi malt is sold for Rs 100 per Kg (Rs. 20 per 200 gms packet). The cost for making it would not be higher than Rs 20 – 30 per Kg. In this case, as low as, 3% of total margin from consumers' money is transferred to producer.

7. Sub sector analysis

7.1. Production and trends

Ragi is productive in a wide range of environments and growing conditions, from southern Karnataka state in India to the foothills of the Himalayas in Nepal, and throughout the middle-elevation areas of Eastern and Southern Africa. It can also be grown in both the seasons – Rabi and Kharif, however the yield in Kharif is higher as compare to Rabi season.

Across the world, Ragi along with other millets is cultivated on around 38 million hectares. Current global production of Ragi and other millets is about 28 million tons, and average yields are 0.75 t/ha. Asia and Africa are the main producers. During 1992-94, the average area from which millet grain was harvested was 19 million hectares in Africa and 17 million in Asia.



Out of annual global production of 28 million tones for this period, 22 million tones were used for direct human consumption.

Production statistics for the various millets are often lumped together (sometimes with sorghum) so it is difficult to obtain reliable estimates of the areas sown to individual species of millets, but the most recent estimate suggests that about 3 million tons of Ragi was produced annually in 1992-94.

The total world's production of millets and area under millets have increased marginally, however the per capita production has come down. In Asia, millet area declined by 2.4 percent per annum between 1979 and 1994, falling from 23 million to 17 million hectares. However, part of this decline was compensated by yield increases (1.5 percent per annum). During the past three decades, yields have roughly doubled in China - where they are

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now among the highest in the world - and increased by more than half in India.

Africa is the only region where millet production is growing, having risen from 8 million to over 11 million tons between 1979-81 and 1992-94. For many African countries, millet yields have remained stagnant or fallen, partly because much of the expansion has been into areas with poor soils and low, erratic rainfall.

Overall, millet production has grown slightly faster than population with 'per capita production increasing by 0.6 percent per annum between 1979 and 1994. However, this situation is likely to be reversed in the near future.

Table -28- Millet annual growth rates (%/yr) , 1979-94.

S.n.	Region	Area	Yield	Production	Per capita production
1	India	-1.8	2.7	0.9	-1.2
2	Asia	-2.4	1.5	-0.9	-2.8
3	Africa	4.1	-0.6	3.4	0.6
4	Developing countries	0.3	0.4	0.6	-1.4
5	Developed countries	-0.3	0.4	0.1	-0.9
6	World	0.3	0.4	0.7	-1.1

Source: FAO

In India, millet area has also declined by 1.8 percent per annum between 1979 and 1994. (Table -24) The area under Ragi has been fluctuating from year to year. Similar to this, fluctuations in area under other millets – Jowar and Bajra were also observed from 1994-2001. Contrary to this, rice cultivated area was more or less stable for the same period. (Table – 29)

Table -29-Area growth rate (%) for crops in India

Crop	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Rice	0.67	0.06	1.33	0.06	3.1	0.4	-0.41
Jowar	-11.25	-1.65	0.93	-5.52	-9.3	6.2	-4.07
Bajra	7.06	-8.86	7.13	-16	-3.8	-4.8	8.84
Ragi	-6.33	0.55	0.55	-7.13	6.1	-5.4	4.47

Source – Agricultural Statistics at a glance 2001, DES, Ministry of Agri. & cooperation, GOI

Similarly, significantly high fluctuations in production of Ragi and other millets (Jowar & Bajra) were observed during the same period, whereas the production of Rice has been fluctuating within a small range.

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Table –30- Production Growth rates (%) of crops in India

Crop	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Rice	1.85	-0.591	6.16	1.02	4.3	3.9	-3.55
Jowar	-22.75	4.04	17.26	-31.18	11.8	5.3	-16.31
Bajra	43.92	-24.83	46.1	-2.83	-9	-18.7	12.95
Ragi	-9.81	6.81	-6.17	-11.07	25	-8.6	3.54

Source – Agricultural Statistics at a glance 2001, DES, Ministry of Agri. & cooperation, GOI

The absolute quantities of Ragi are more or less same over a period of time, whereas the same has been increasing for rice.

Table –31- Ragi and Rice production in India

Crop	1991-92	1993-94	1995-96	1997-98	1999-00	2001-02
Rice	74.68	80.3	76.98	82.54	89.68	93.08
Ragi	2.58	2.6	2.5	2.09	2.29	2.48

Source - Directorate of Economics & Statistics, India

In Andhra Pradesh, Ragi producing area is reducing. It has come down from 2.26 lakh hectares in 1984-85 to .99 lakh hectares in 2000-01, accounting to 1% of total area sown in the same year. Another major millet, Jowar, producing area has reduced to 6.77 lakh hectare in 2000-01 from 18.62 lakh hectare in 1984-85. However, area under rice has increased considerably from 34.98 lakh hectare in 1984-85 to 42.43 lakh hectares in 2000-01.

Along with the area, the total production of Ragi and other millets is also coming down over decades. It has reduced to 1.2 lakh tones in 2000-01 as against of 2.45 lakh tones in 1980-81. However, the production of rice has increased to 124.5 lakh tones in 2000-01 from 70.11 lakh tones in 1980-81.

Worldwide, total area under millet and production of millet are more or less stable. Although, similar is the case with India also, total area under Ragi and production of Ragi is coming down. The reason for this is increase in production and area under Bajra, which amounts to significant portion of total world export of millet from India.

In Andhra Pradesh, both area and production of Ragi is coming down. The Ragi producing area is replaced by other crop, as more farmers are opting for rice, wherever irrigation facilities are available or ground nut, cotton and sugarcane.

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Figure-4-Area under different crops in A.P. from 1992-2001

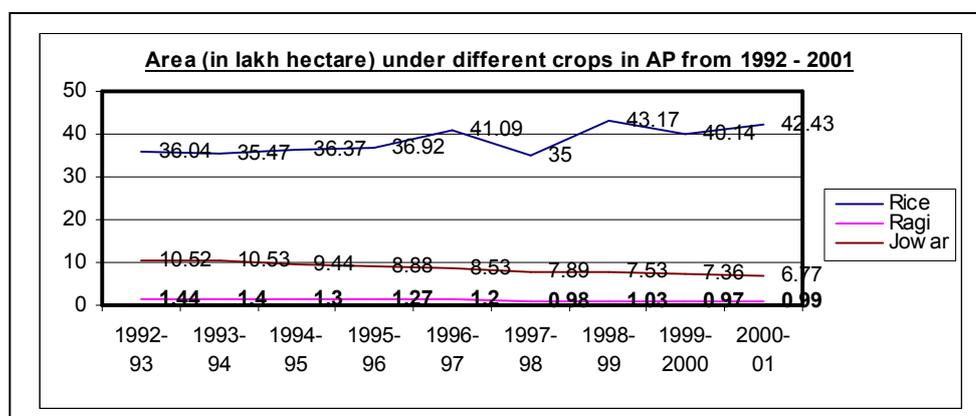
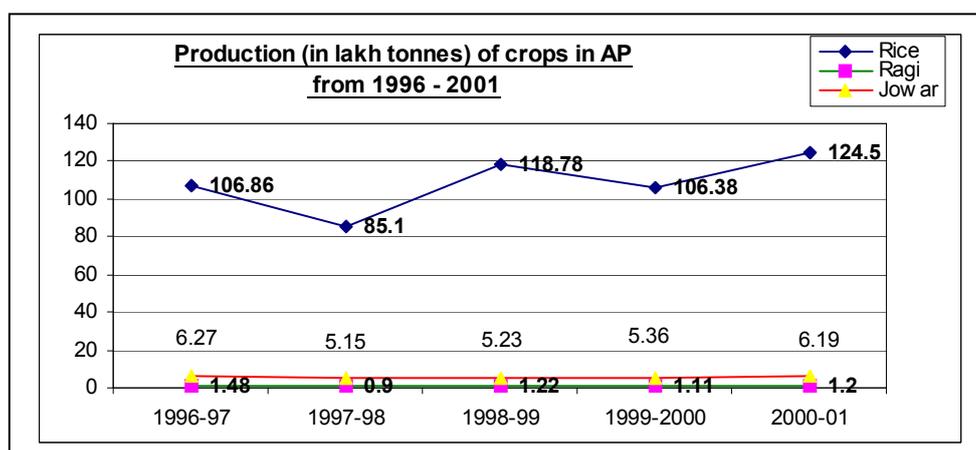


Figure- 5- Production of different crops in A.P. from 1996-2001



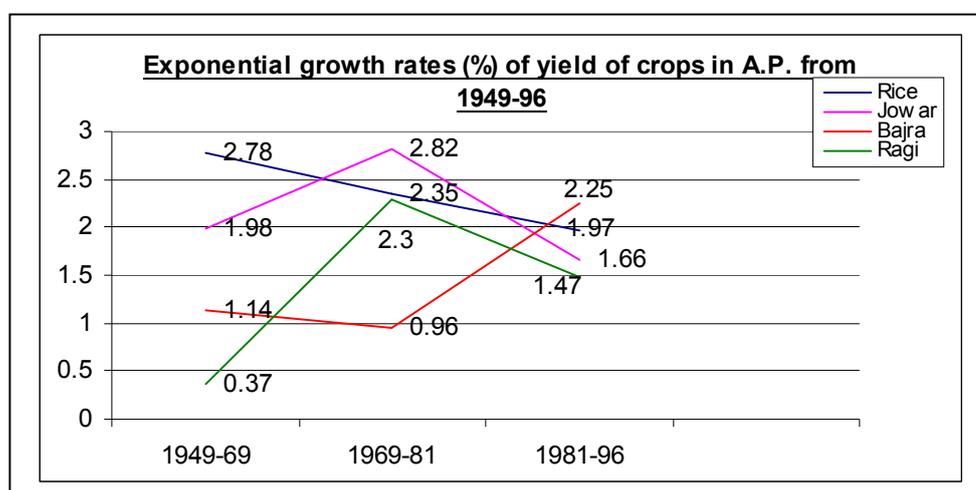
From last decade or so, the focus of farmers in Srikakulam and Vizianagaram has shifted to cash crop like cashew and coffee, promoted by ITDA, where as farmers in Visakhapatnam are more interested in coffee, again ITDA promoted crop. In all the cases, ITDA extend monetary as well as technical support for the cultivation of crop. These crops provided the farmers with liquid cash. Therefore, they have been diverting to these cash crops as well as rice.

In case of East Godavari, Jowar, not Ragi has been the important stable food crop. However, the area under Ragi has come down drastically in last two decades. The farmers, here, have given their land on lease for ten years and more to the farmers from out side on a meager amount of Rs. 3,000 per acre. These farmers are growing cotton on these lands, where the owner farmers are working as wage labour.

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Apart from the replacement of Ragi by other crops, the yield of Ragi has also been coming down. (Figure-6)

Figure –6- Growth rate of yield of different crops in A.P.



During the field visit, it was noticed that dry and marginalized lands are being used for Ragi cultivation, where organic manure is applied for the crop. These lands have been repeatedly used without putting the organic manure in required quantity based on scientific calculation. In addition to this, farmers have expressed that Ragi is more efficient in extracting the nutrients from the soil. Therefore, repeated cultivation of Ragi on the same land without replenishing it with scientifically suggested quantity of organic manure.

Production constraints in Ragi, as observed during field visits

- ✓ Ragi is cultivated on small and fragmented production units.
- ✓ Unreliable rainfall tends to keep the investment by farmers lower, thus influencing the production of Ragi.
- ✓ Lack of improved high yielding varieties.
- ✓ The return from investing labour and capital in Ragi production is lower than the gains derivable from such investments in other farm and non-farm enterprises. Limited commercial demand depresses the incentive to use purchased inputs.

7.2. Consumption of Ragi -demand, consumer preference and trend

Although Ragi is still an important staple food for tribal, Rice is slowly replacing it. Ragi consumption was twice or thrice in a day, which has come down to once in a day. The other meal is of rice. Although Ragi is taken

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twice a day for few months immediately after the harvest (as taste sweet) or during the days of hard work, it is taken once in remaining months.

Tribal are still using Ragi for following factors –

- ✓ Ragi porridge keeps the stomach cool during summer
- ✓ Ragi uppama gives more energy during the hard work
- ✓ Ragi intake is lesser than rice. A 4 members family will take 1 kg of Ragi flour in Ragi porridge, where as it required 1.5 kgs of rice in a day. When converted into Rupee value it is Rs 3 for Ragi and Rs 21 for Rice, other cost remain same.

Therefore, from economic as well as health point of view, it becomes important for them to eat Ragi. They also expressed that Ragi is an essential for them.

At the same time, preference for rice is increasing. The reasons for this are –

- ✓ At one point of time rice was cheaper than Ragi (Rs 2 per kg rice policy of NTR), tribal shifted to rice.
- ✓ Tribal perceive rice is tastier than Ragi
- ✓ Rice does not stick to mouth while eating, whereas Ragi does
- ✓ Eating rice is a status symbol
- ✓ Women find cooking milled rice is easier than Ragi. Ragi flour can not be kept for longer and they have to grind it frequently. This has been expressed as major concern by women.

The demand for Ragi malt and Ragi based weaning foods has been increasing at national level, particularly in northern India as doctors are prescribing it and health consciousness among people is also increasing. Consumers are inclined to take Ragi as a daily liquid dose in north India.

The similar trends are emerging in the urban area of Andhra Pradesh as well. The big departmental stores have started keeping Ragi flour, Ragi malt and other Ragi based weaning foods.

It is expected in the weaning and baby food product industry that possibility of baby food export, particularly Ragi and other millet based weaning products may emerge in near future.

World wide, although millet represents less than 2 percent of world cereal utilization, it is an important staple in a large number of countries in the semi-arid tropics, where low precipitation and poor soils limit the cultivation of other major food crops. Millet utilization is mostly confined to the developing countries.

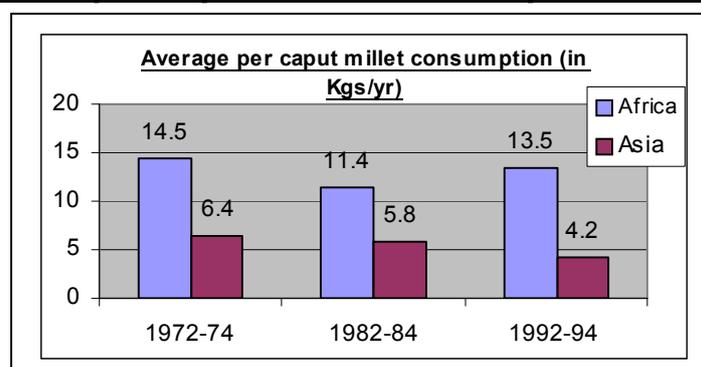
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Details of countries with Ragi as important consumption food crop

Continent	High Relative importance of Ragi	Low Relative importance of Ragi
Africa	Eastern Africa (50%)	Northern and central Africa
	Burundi, Kenya, Malawi, Rwanda, Uganda, Zambia	Sudan, Central African Republic, Zaire, Eritrea, Ethiopia, Mozambique, Tanzania, Zimbabwe, Angola
Asia	Near East	Far East
	Afganisthan, Iran, Iraq, Jordan, Srilanka, Nepal (100%)	Bangladesh, China, Myanmar, India (10-30%)

Millet consumption is coming down in these two regions as well. Average per capita consumption has come down from 6.4 kg /yr in 1972-74 to 4.2kg/yr in 1992-94. The same has been true for Africa as well, where it has come down from 14.5kg/ yr in 1972-74 to 13.5 kg/yr in 1992-94. (Figure- 7) Since, millet consumption is higher in these regions and Bajra and Ragi are the important millets. Therefore, it can also be inferred for Ragi as well.

Figure -7-Trend in per capita millet consumption in Africa and Asia



Worldwide, total millet food consumption has grown only marginally over the past 30 years, while total food use of all cereals has almost doubled. However, consumer demand has fallen because of a number of factors, including changing preferences in favor of wheat and rice (cheap imports are available in several countries), irregular supplies of millet, rising incomes and rapid urbanization. Particularly in urban environments, the opportunity cost of women's time has encouraged the shift from millet to readily

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available processed foods (milled rice, wheat flour, etc.,) that are far quicker and more convenient to prepare.

7.3. Technology and Research

There are international, national, state level and regional level institutes, universities, research station and organizations are working on Ragi and other millets. Important Ragi related research institutes are given below

S.n.	Type of Institute	List of Institutes
1	International level	ICRISAT
2	National Level	CRIDA, Hyderabad and NBPGR, Hyderabad
3	State level	Agricultural University, Rajendranagar, Hyd.
4	Regional level	KVK in Tirupati, Vizianagaram, Mahabubnagar and Srikakulam

In addition to this, CFTRI, Mysore has also included Ragi related products in its area of work. They have developed several products and providing the technologies and other support to interested entrepreneurs for its commercial production. Some of the products developed by CFTRI are Ragi malt weaning food and Ragi weaning food.

Despite this, very little has been achieved in terms of increasing the yield and production of Ragi so far. Whereas, the production of Bajra has been doubled in last two decades due to release of improved varieties and extension work. This has been the reason that India is the biggest exporter of Bajra in the world. It exports around 40,000 tons in a year.

There are certain technical constraints as well, which are responsible for this.

- ✓ Crop improvement is generally more difficult in Ragi than in Bajra and most other crops, largely because of the nature of the environment in which they are grown.
- ✓ Budgets for Ragi and other millet breeding research are low in India. Moreover, almost insignificant work is happening on Ragi as compare to other crop like Rice, Cotton, Sugarcane ext.
- ✓ No experience has been acquired on Ragi breeding in developed countries that could be transferred to India, as has been done for wheat and maize.
- ✓ However as compare to other types of millets only Bajra, and to a small extent Ragi, has so far been researched at the international level. Ragi is also one of the six mandate crops of ICRISAT. Despite this, very few varieties have been released by ICRISAT as compare to other 5 mandate crops.

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- ✓ Although new technologies and varieties for crop and resource management have been developed, adoption has been poor, partly because of inadequate extension, but, equally, because farmers in harsh environments are generally more risk-averse than their counterparts in more favorable environments. For example, KVK, Kuntubai has been doing research on Ragi in Srikakulam and Vizianagaram area. They tried to promote intercropping of Ragi with Red gram, but provided the seed late to the farmers. This made the crop susceptible to pest and entire crop failed. As a result of this, farmers are no more interested in their recommendations.
- ✓ Further, many new technologies are not be properly tailored to farmers' severely resource-constrained circumstances.

7.4. Government Policies

7.4.1 Minimum support prices

The Food, Civil Supplies & Consumer Affairs Department is engaged in the activities of procurement, distribution, market intervention and price and quality control of essential commodities.

Objectives of the departments are

- ✓ To ensure the availability of essential commodities, including petroleum products, in the market, at affordable prices.
- ✓ To ensure Minimum Support Price (MSP) for paddy/maize produced by farmers.
- ✓ To procure paddy under MSP operations.
- ✓ To procure rice for running the state programmes and for the central pool.
- ✓ To lift and distribute essential commodities like rice, sugar, wheat and kerosene, in a timely manner, under Public Distribution System (PDS) and other schemes like Annapurna, Anthyodaya, Annayojana and NPNSPE.
- ✓ To provide gas connections under the Deepam scheme to women below the poverty line.

The department focuses on procurement of Paddy under MSP operations. The main objective is to ensure remunerative price for the paddy produced by the farmers of Andhra Pradesh through the instrumentality of MSP. There are number of Paddy purchase centers, which are supervised by special teams in each district. They also have operational guidelines for procurement of paddy at MSP.

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Although minimum support prices for other crops and Ragi are also announced, the entire scheme for minimum support price focuses only on procurement and controlling the prices of Paddy.

Table -32- Minimum Support Prices by the GOI (Rs. per quintal)

Crop	1990-91	1992-93	1994-95	1996-97	1998-99	2000-01
Paddy	205	270	340	380	440	510
Ragi	180	240	280	310	390	445
Jowar	180	240	280	310	390	445
Bajra	180	240	280	310	390	445

The lack of access and inability of poor Ragi growing farmers reach to agriculture market yards, coupled with marginalizing other commodities from MSP by government of Andhra Pradesh, have reduced the bargaining power of poor Ragi farmers in Ragi trade.

7.4.2. Public Distribution System

The Food, Civil Supplies & Consumer Affairs Department is engaged in the activities of distribution of essential commodities. As per this, Public Distribution Systems (PDS) provides essential commodities - Rice, Wheat, Sugar and Kerosene to around 1.59 crore households through white, pink, A.A.Y. and Annapurana cards.

Table -33- Price list of various commodity

S.n.	Commodity	Price
1	Rice	Rs. 5.25 White Cards (BPL)
		Rs. 9.00 Pink Cards (APL)
2	Wheat	Rs. 7
3	Sugar	Rs. 13.50
4	Kerosene	Rs. 9.50

Table -34- Status of Card holders

S.n.	Head	Amount
Households		
1	Population (Census 2001)	7.57 Crores
2	No. Of Households	1.68 Crores
Ration Cards		
1	White	98,82,053
2	A.A.Y.	6,22,800

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3	Annapurna	93,200
4	Pink	53,97,160
Total		1,59,95,213

PDS, which is reaching to 98.83 lakh households, also theoretically covers the poor Ragi consumer's families, whose basic staple food Ragi is much cheaper than the Rice provided by PDS. The price difference is around Rs 2 per Kg and it becomes significant, if the quantity consumed for Ragi and Rice and their daily wages are compared. The calculation is for 4 members family for one day.

Table -35- comparison of expenses on Rice and Ragi

S.n.	Food item	Quantity	Amount	Total
1	Ragi	1 kg	3.30	3.3
2	Rice	1.5 kgs	5.25	7.87
Difference				-4.57

This becomes for significant, when their daily wages are Rs. 10-15 per day within the village and Rs 20-50 per day outside the village. In case of Rs. 50 per day rate of wages, the differential expenditure on Rice is 9% of total wages.

7.4.3. Promotion of cash crop in ITDA areas

In the pursuit to improve the livelihoods of tribal in ITDA areas, department of tribal development and welfare has started several schemes. One of those schemes is – cashew plantation in Vizianagaram and Srikakulam and coffee plantation in Visakhapatnam.

ITDA provides financial assistance, technical and resource assistance to these farmers to grow cashew and coffee on their land. In Vizianagaram and Srikakulam, farmers have 1-2 acres of cashew land, which provides them with cash income of 5000 to 10,000 in a year, without any financial and physical investment. Similarly, farmers are earning from coffee as well or getting wage labour of Rs. 60 per day in coffee plantation.

As compare to Ragi, where perceived returns are lower, these crops – cashew and coffee provide better option. As a result, farmers are, slowly, focusing on these crop and Paddy and forgoing the production of Ragi.

In other places also, when asked, farmers would like to take up cash crops like cotton or paddy, if they have access to water and finances required for

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the crops. Only, in Visakhapatnam, farmers were assertive in their preference for Ragi and its importance in their household economy.

7.4.4. Rice at Residential schools

ITDA schools and hostels provide Rice in the meals to tribal children and, eventually, they have become Rice eaters. While going back to their homes in summer holidays, these children ask for rice at their homes. When offered Ragi in food, they dislike the taste and do not accept it as their major food item.

Thus, ITDA schools and hostels are inculcating a new food habit among the new generation of tribal. This is also important as most of the children, even girls, are coming to these schools for higher education on account of growing awareness among tribal for importance of education.

7.4.5. GCC

The Girijan Cooperative Corporation Ltd. (GCC) was established during 1956 with headquarters at Visakhapatnam. It has monopoly right over procurement of Minor Forest Produce (MFP) in tribal areas. The major activities of GCC include.

- ✓ Procurement of Minor Forest Produce and other agricultural produce like cotton, red gram, Niger, turmeric, ginger, soybeans, chilies, cashew and piper langum from tribal.
- ✓ Supply of domestic requirements at reasonable prices through Daily Requirement Depots (DR) in tribal areas, and
- ✓ Provision of agricultural and consumption loans to the tribal.

Like PDS, Girijan Cooperative Corporation Ltd provides items of household consumptions through its Daily Requirement Depots (DR). It started the function as government runs PDS did not have adequate network in tribal area.

The fair price depots of GCC provide Rice and other essential commodities to tribal. This has also encouraged and contributed in the habit of eating rice among tribal.

7.4.6. Two rupee rice scheme

The populist schemes of politicians like two rupee rice by N.T.R., Ex-CM of Andhra Pradesh, have also facilitated the consumption of Rice. This made the rice cheaper, whereby Ragi consumer shifted to Rice. Eventually, the

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prices went back to pre scheme level. But these Ragi consumers got used to of rice.

7.4.7. Karnataka vs Andhra Pradesh policies related to Ragi

S.n.	Area	Andhra Pradesh	Karnataka
1	Subsidy on Seed	No subsidy	25% subsidy on seeds price
2	Hybrid seed	No provision	Supply of hybrid seeds
3	Tax on transaction at yards	4% sales tax and 1% market CESS.	2% commission on the quantity sold and 1.5% market CESS
4	Minimum support price	Not effective	Effective, as trading takes place at marketing yard
5	Trading	Most of Ragi trading takes place in villages. Most of 293 Agricultural Marketing Committees and 848 Notified markets are not functional	Trading through 245 market committees in marketing yards

7.5. Opportunities Market – in State, National and International Markets

The average production of Ragi in Andhra Pradesh state is around 13.7 lakh quintals per year. Of this, around 20% (i.e. 2.7 lakh quintals of Ragi) is traded at state level every year. Similarly, around 48 lakh quintals of Ragi, which is 20% of total average production 242 lakh quintals per annum, is traded in India every year.

As evident from tables of Ragi prices in different markets and Minimum support prices, demand for Ragi is increasing in the urban area. However, it is in the form of Ragi products – Ragi flour, Ragi malt, Ragi based weaning foods. Although it is a niche market, the size of this market is expected to grow in near future as health consciousness among average Indian, particularly working middle class, is increasing. This coupled with their increased disposable income and willingness to pay for healthy food ensures high demand for Ragi based food in future.

Global trade in Ragi and other millet is estimated to range between 200,000 and 300,000 tons. It is estimated that Proso millet and Bajra together add to about two-third of recorded millet exports. Ragi with other millets accounts

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for remaining recorded export. The total size of international market is not bigger than 1,00,000 tons as of now. Total size of export market is also remaining same, however export from India is increasing. (Table -36) Although, the Bajra is the primary millet to be export from India, export of Ragi is also sizable. Therefore, this increase also indicates the increase in export of Ragi also.

Table -36-Millet recorded export in international trade (in `000 tons)

S.n.	Exports	1979-81	1989-91	1992-94
1	India	0.0	7.0	58.5
2	Asia	12.0	16.8	84.6
3	Africa	57.9	26.4	20.2
4	America & the Caribbean	145.9	119.1	90.3
5	Europe	20.5	33.0	43.7
7	World	250.9	208.7	255.0
8	Developing countries	181.9	84.0	147.4
9	Developed countries	69.0	124.7	107.6

Source FAO

The magnitude of officially recorded trade in Ragi and other millets has marginally declined over the past 20-30 years, and there has been a slight change in direction. Imports by developed countries have tended to decrease over the past two decades, while those by the developing countries remained steady through the 1960s, rose during the 1970s, but fell thereafter, having been replaced by rising imports of wheat and rice. In last decade, import by developed countries has increased. Developed countries now account for an estimated 70 percent of recorded world imports, compared with about 50 percent during the early 1960s. Therefore, demand for Ragi by developed countries as well as developing countries has been fluctuating. But overall, it has been decreasing.

Table -37- Recorded import of Millet in international trade (in ` 000 tons)

S.n.	Imports	1979-81	1989-91	1992-94
1	Asia	58.9	40.3	44.3
2	Africa	82.0	7.9	40.9
3	America & the Caribbean	4.0	26.2	18.1
4	Europe	145.7	145.5	155.4
5	World	291.4	220.8	264.3
6	Developing countries	90.5	43.8	75.4
7	Developed countries	201.0	177.0	188.8

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Source - FAO

Along with the volatile demand, international prices are also highly volatile, determined largely by supply volumes. The comparison of export prices for millet in Argentina, Australia and the United States are given in Table-34. The high degree of price variability among suppliers, even in the same year, is due to the "thin" market, with small trade volumes and very few buyers and sellers.

**Table - 38- Average annual export prices for Ragi other millet
(in US\$/tons).**

Year	Argentina	United States	Australia
1987	108	154	162
1988	123	173	110
1989	190	177	249
1990	143	188	318
1991	107	156	249
1992	114	170	249
1993	156	223	245
1994	228	254	325

Since, developed countries produce less than 10 % of total Ragi and other millets production, their demand is fulfilled by import only. The major market for imported Ragi is also in developed countries, where the imports are coming down. Therefore, it can be inferred that consumers demand for Ragi and other millet is coming down in international market.

However, it is difficult to estimate the size of international markets of malt products. With increased awareness and willingness to pay for highly nutritive food items, the niche market for malt products is growing.

The demand for Ragi as raw agricultural commodity is coming down in national and international market, whereas the demand for malt products is increasing.

8. Gap and Opportunity analysis

8.1. Analysis of value chain -production

The cost benefit analysis does not shows the positive value addition, if opportunity cost of families is considered. Otherwise also, net profit margins are very low. Due to this, farmers are not investing more in the crops. If high yielding varieties with adaptation to local environment are made easily available to farmers at cheaper rate, better results can be expected.

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Apart from this, manure should also be applied in right quantities. In addition to these two, no other inputs are required as Ragi can be grown in any condition on any type of land with less water.

8.2. Analysis of value chain - Market

Value chain, from local market to final consumer, clearly shows that there is significant value addition in terms of place and form within Andhra Pradesh itself. Selling of Ragi as raw commodity after grading and flour at super market offers huge margins, which are kept by supermarkets and middlemen. Although margins for Ragi malt and Ragi malt weaning products could not be calculated, there is a tremendous opportunity of value addition and huge margins in these products. However, these products are technology intensive and requires certificate from NIN.

8.3. Analysis of Millet Sub-sector reflects the following

- ✓ Area and production of Ragi is coming down not only in Andhra Pradesh, but also world over.
- ✓ Per capita consumption of Ragi is coming down due to various factors, but niche market for Ragi malt and other products in urban area is increasing
- ✓ Research and other extension works are not very significant for Ragi in Andhra Pradesh as well as in India, however some work has been done in Karnataka.
- ✓ There is no direct policy on Ragi except for announcing minimum support price for Ragi. Other policy related to food grains, particularly Rice has affected the consumption of Ragi.
- ✓ There is market for Ragi (national and international), but not significant and prices are also highly volatile.

8.4. Analysis of Ragi production unit

Ragi, mainly, is cultivated on very small units of dry land, where no other crop can be grown with small scale of investment. These production units, further, are concentrated in tribal areas. The average land holding size of Ragi farmer is 1.4 acres, whereas average land holding in tribal areas is 1.6 acre. (These are the average figure for the villages studied. For village profile, refer annexure - 5). Wherever, farmers got access to irrigation or financial assistance or their economic conditions improved, they have shifted to other crops like paddy, cotton, cashew, coffee, gingili etc.

Table – 39- Status of Ragi growing farmers in the villages, studies

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S.n.	District	Village	Village		Ragi farmers	
			Total HHs	Average land size	Number	Average land size
1	Vizianagaram	Thenna Karja	30	5.0	10	1
2		L. laxmipuram	45	1.1	35	2.3
3		Duddu kallu	70	0.4	15	1
4		Rajjali	53	1.1	6	2
5	Visakhapatnam	Adagulaput	65	1.7	50	0.6
6		Koda Put	35	1.4	10	1
7	East Godavari	Barimamidi	110	1.8	2	0.5
8	Srikakulam	Gumada	25	6.0	15	1.7
9		Jakkaravalasa	32	1.6	20	2
10	Koraput	Baunspat	53	1.1	41	2
11		Mardijhola	28	1.2	4	1.2
12		Ranjiput	331	1.3	263	1
Total			887	1.55	471	1.4

Land holding in acres

During discussion, existing Ragi farmers have also expressed their interest to shift to Paddy or cash crop like cotton in all the districts covered, except for Visakhapatnam. Therefore, the decision for Ragi production is more out of production constraints than of choice.

8.5. Analysis of Ragi consumers

Ragi is mainly a subsistence crop and more than 80% of total production of Ragi is consumed by the Ragi farmers only. This figure is valid not only for farmers in Andhra Pradesh, but also for farmers worldwide.

8.5.1 Subsistence

Ragi farmers consume Ragi as it keeps the stomach cool in summer as well as the less quantities of Ragi is required for family consumption as compare to Rice. There is also the factor of price difference on per unit as well as on the entire consumption of a day. Although people have expressed that Ragi is essential for them to survive, it is more in terms of financial than consumption habit or preference for taste.

This is also reflected from the growing consumption of rice by these families. In addition to the preference of taste, there are various factors like consumption of rice perceived as status symbol; induction of rice in residential school has converted children into complete rice eaters.

Therefore, it has been observed that Ragi is, no doubt, an important staple food at present, but it is more of coping mechanism, as people are preferring Rice and given a chance would eat rice. At the same time, given a household economy of Ragi grower, Ragi will continue to play an important role.

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8.5.2 Consumer in open market

As only 20% of total Ragi production enters into the market. This Ragi also consumed as Ragi flour, Ragi Malt and Mixed malt, blend with other commodities by urban consumer. However, the use of these products is very limited and Malt products have niche market. This niche market is growing on account of health consciousness among middle and upper class of urban population.

8.6 Importance of Ragi in tribal economy in the study area

The discussions with villagers indicate that Ragi used to grown by the entire village for their consumption few decades back. However, the number of farmers growing the crop and area under cultivation are coming down slowly. At present, around 50% of total households are growing Ragi in Tribal areas. (Table -40)

Table – 40- Status of Ragi growing farmers in the villages, studies

S.n.	District	Village	Total HHS	No. of Ragi farmers	% of total HHS
1	Vizianagaram	Thenna Karja	30	10	33%
2		L. laxmipuram	45	35	78%
3		Duddu kallu	70	15	21%
4		Rajjali	53	6	11%
5	Visakhapatnam	Adagulaput	65	50	77%
6		Koda Put	35	10	29%
7	East Godavari	Barimamidi	110	2	2%
8	Srikakulam	Gumada	25	15	60%
9		Jakkaravalasa	32	20	63%
10	Koraput	Baunspat	53	41	77%
11		Mardijhola	28	4	14%
12		Ranjiput	331	263	79%
Total			887	471	54%

Land holding in acres

Still, Ragi continues to play important role in tribal economy and in their food along with other millet. Villagers, who do not grow it, also exchange Ragi from others and take in their food. Ragi ambali (porridge) is extensively used in their daily meal.

They believe that Ragi is essential for their survival as it makes them stronger and energetic, as well as reduces the expenditure on food as cheaper than rice. During the field visit, tribal expressed that Ragi is

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consumed once or twice a day to reduce the expenditure on food, now a days.

In addition to this, Ragi is also important for them for its medicinal values. Ragi malt is good cure for fever. Ragi with gingili and jaggery has been given to pregnant women.

While discussion, tribal accepted that Ragi is no longer as important food crop as it was earlier. Cultivation of other cash crop and paddy is increasing and Rice is taking important place in the preference of tribal. The relative importance of Ragi in tribal economy has been decreasing due to following reasons.

- ✓ Low returns for high investment in Ragi
- ✓ Other dry land crops like Gingili and jute (plains) require low investment as Ragi but fetch good price.
- ✓ Making Ragi flour at home is time consuming
- ✓ Increasing preference for Rice in the food

9. Institutional Models

9.1. Rice credit line

Rice Credit Line, an innovative project, is implemented by APRPRP (Velugu) in Guntur district. The central objective of Rice credit line (RCL) is to promote the food security of the poor during all seasons. The public distribution system (PDS) does not meet the entire consumption requirement of the poor. Sometimes, even the PDS entitlement of rice is not purchased by the poor of for want of money. As the market price of rice is substantially higher than the PDS price of rice, the poor purchase the additional quantities of rice from the open market, often with the borrowed money.

An innovative approach was adopted to the implementation of the RCL. The requirement of rice for each member household was first obtained and consolidated at the SHG level. Then, the requirement of each SHG was aggregated at the VO level and later at the MMS level. The proposal for financial support is sent to Velugu. Velugu advanced an amount of Rs.70.80 Lakhs to the Village Organizations/ Mahila Mandal Samakhaya (MMS) to implement the RCL activity till January 2004, only after ensuring that the beneficiary contribution is credited to the bank account of the MMS. A total of 24,081 members belonging to 2,775 SHGs in 22 mandals were admitted to the RCL. About 700 tons of rice was procured from private millers by the VO/MMS for distribution among the SHG members on the basis of the

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estimated requirement. The beneficiaries have to repay the loan regularly in weekly installments.

MMS appointed a coordinator with administrative experience to support the implementation of the RCL activity. In addition, the MMS constituted different committees (estimates committee, purchase committee, distribution committee and repayment committee) to implement the activity successfully.

The purchase committee negotiates with the rice millers directly and arranges for the purchase of the required quantity at a price lower than the market price. The weighing and packing are done in the presence of MS/VO members to ensure that right quality and quantity of rice supplied.

For the purpose of distribution, the mandal is divided into 2-3 convenient routes covering all the VOs. The rice is then transported and supplied to different VOs by the distribution committee. The VOs in turn distribute the rice among the SHG members directly. The transport charges are collected at a flat rate of Rs. 5/- for every 25 Kgs from the beneficiaries.

The price charged however, varied from mandal to mandal. The price depends on the quality of rice and the bargaining skills of the MS purchase committee. MMS/VO keeps a 10% profit margin (around Rs.1/-) on the entire transaction. The costs of unloading and the travel of purchase committee members were met from the surplus.

The beneficiaries are required to repay the total amount in 4 installments to the VO. The purchase committees are responsible for ensuring the recovery of the credit. The VO in turn repays it to the MS. For the services rendered by the VO the MS shares 50% of the total profit with the VOs, while the balance is appropriated to the MS corpus.

The RCL certainly contributed to the food security of the poor and the poorest of the poor households. Second, to the extent that the rice is supplied on credit basis, at a price slightly lower than the open market price, appears to have reduced the dependence of the poor households on traditional sources of credit purchase.

9.2. Grain Bank

Grain bank in village Adugulaput in Paderu was promoted to ensure food security and meet the food requirement in off-season. It was started 10 years back by the villagers by forming a group. This group worked in the fields of farmers and demanded their wages in the form of paddy instead of money. Thereby, they collected 5 quintals of paddy.

All the tribals were allowed to join by giving 2-4 kunchams of Paddy/Ragi/Sama to the bank. Villagers from near by villages are also members in the bank. The operation of grain bank is limited to provide grain on loan. This is subjected to availability of grain with the bank. The grain bank charges one kuncham (4kgs) as interest on two kunchams (8Kg) and this would be paid after the cropping season. If they failed to repay loan on time, the interest is added up further. So far, people have not failed to repay the loan. The loan can be repaid in the form of any crop, not necessarily in the form of paddy only.

The book is maintained properly to keep the details of loans and repayments. This would be written by the educated youth in the village.

The villages feel that the bank has enhanced their food security and met the food requirement, when they do not have money to buy food.

9.3.

10. Recommendation

10.1. At Ragi Farmers level

In the given situation and based on above analysis, it is recommended that intervention should not focus on promotion of Ragi consumption or production. The constraints within tribal micro economy have build such mechanisms, by which Ragi's consumption and production have been sustained since long and would continue to do so for some more year to come.

The analysis suggests that interventions should focus on value addition first and, than, on enhancement of production. Better returns from value addition would encourage farmers to take more interest in Ragi crop. This would build the foundation for further work on for enhancement of production, whereby farmers would take more interest to increase the production. Increased production will, further, enhance the incomes of Ragi farmers. This will encourage existing farmers to produce more Ragi and new farmers to grow Ragi. Since Ragi will continue to be cheaper than Rice, consumption of Ragi would continue, without any threat of complete Ragi drain from tribal area to urban areas. To achieve above, strategies are described below.

Strategy – 1:

Value addition in Ragi by appropriate community owned institutional model

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- a. Grading and supply to super market, or/and
- b. Grinding into Ragi Flour, packaging and supply to supermarket and retailers

Strategy –2:

Increase in production through application of manure in scientific quantities and methods, and introduction of improved varieties

Possibility for value addition in project area

The total production of four districts – Visakhapatnam, Vizianagaram, Srikakulam and East Godavari is around 5,00,000 quintals. Of which, 20% (i.e. 1,00,000 quintals) enters into market every year. (Table-41)

Table – 41- District wise production & estimation of market surplus

S.n.	District	Production (in qtl)	Marketable surplus
1	Visakhapatnam	347780	69560
2	Vizianagaram	108980	21800
3	Srikakulam	40560	8110
4	East Godavari	4630	930
Total		501950	100390

If 50% of this is from tribal areas, 50,000 quintals of Ragi have been marketed by tribal farmers at the rate of Rs. 2.70 to 3.50 per Kgs.

If Ragi is graded and supplied to super market, directly, at the cost of Rs 7 per Kg, equal to wholesale market, farmers will get better prices. In this case, farmers would have to incur cost of pooling, grading, interest on working capital, packaging, transportation and other overheads. If all this is within Rs 2 per Kg, farmers would get Rs 5 per Kg.

Table – 42- Comparison of existing and new offers

S.n.	Head	Existing	New
1	Cost to Supermarket	Rs 8/ kg	Rs 7/kg
2	Prices realized by Farmer	Rs. 2.70 to 3.50 /kg	Rs. 5/kg

If Ragi flour is made and sold to supermarkets, directly, at the cost lower than Rs. 10 per Kg, both farmers as well as supermarket would be in win – win situation. In this case, farmers would have to incur cost on pooling of Ragi, grinding it to Ragi flour, interest on credit (working as well as machinery), packaging, transportation and other overheads. If all these cost are within Rs 3 Per Kgs (which supermarkets are incurring right now), it can

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provide farmers with Rs. 6 per Kg, 100% more than the existing price realized by him.

Table – 43- Comparison of existing and new offers

S.n.	Head	Existing	New
1	Cost to Supermarket	Rs 10/ kg	Rs 9/kg
2	Prices realized by Farmer	Rs. 2.70 to 3.50 /kg	Rs. 6/kg

This should be done after proper resource survey for Ragi, feasibility study of setting up grading or Flourmill unit and designing of appropriate community owned institutional model. The appropriate model could be a producers company or cooperative.

Once farmer start realizing the benefits of value addition, efforts to increase production should be initiated. For this, knowledge for applying manure in scientific quantity and method should be improved through various methods and channels.

To introduce better quality improved varieties seeds convergence and linkages with research institutes, universities and organizations should be established. Banks or any other agency should be looped in to acquire necessary credit for seeds. In addition to this, during the cultivation of new varieties, technical support should be made available to entertain farmer's requirements and withstand any adaptation shocks of crop.

10.2. At Policy level

The policy framework analysis reveals that there is no direct policy on Ragi except for announcing minimum support price for Ragi. Since the concerned department gives emphasis to regulate the Paddy market, the minimum support price for Ragi is also not effective. The other policies, related to food grains, particularly Rice, have affected the consumption of Ragi, but none has supported or facilitated the production or consumption of Ragi in the villages. However, the policies of Government of Karnataka have supported the production and marketing of Ragi to a large extent. These facilitative policies includes subsidy on hybrid seed and effective agricultural marketing committees, which regulate the marketing of Ragi in marketing yards and lower sales tax on trade of Ragi. In order to promote the production of Ragi, policy advocacy should be undertaken to increase the research budget for Ragi to develop new improved varieties and hybrid seeds, and provide the subsidy for buying these seeds.

Annexure –1: A

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Source - Secondary data

1. Commodity Profile

General description of commodity

- Different names
- About crop
- Suitable climate and season
- Productive lifecycle
- Uses and useful parts
- Common threats to productivity

Production Area

- India's production relative to worldwide production
- Major states in India and major districts in Andhra Pradesh
- Acreage for India and Andhra Pradesh
- Production and productivity for India and Andhra for last 5 years

Usages of commodity (this will be studied in detail also)

- Uses of raw commodity – % of total production use for consumption and for making various products.
- List/type of products
- Details these products and its uses
- Details of major processors, players and consumers of these products
- List of places, where processing units are located, product wise
- Trends in Demand and supply of raw as well as products present and potential)

Market

- Major wholesale markets - districts (studies), in A.P. and Orissa, India and international level
- Prices for commodity, products and by-products (local, wholesale, retail domestic, and international) for last 5 years

Organizations/research institutes involved in developing product uses

- Description of their initiatives (past and current)
- Studies conducts on Ragi

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- Identify potential resource persons

Risks

- Price variability
- Competing products
- Dependence on weather and other factors influencing demand and supply

2. International market

- Major Ragi producing nations wide production, Total production of world and acreage under Ragi production (trend of last 5 years for last two)
- Uses of raw commodity – % of total production use for consumption and for making various products.
- List of major products, its uses, producing nations and major players
- Major nations – consuming Ragi as commodity and its products
- Major markets and major players
- Trends in Demand and supply of raw as well as major products
- Prices for commodity, products and by-products for last 5 years

Source – Fieldwork

3. Value chain analysis

List of stages in the value chain of Ragi

S.n.	Stage
1	Inputs
2	Pre production
3	Production
4	Post production at village level
5	Commodity
5.a.	Storage and transportation
5.b.	Marketing of raw commodity Shandy Local market, District level market, State level market, National level market, International market

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6	Value addition
6.a.	Local Value Addition
6.b.	Storage and transportation
6.c.	Marketing of local value added product
6.d.	Processing for intermediate product
6.e.	Marketing of intermediate product
6.f.	Processing for Final product
6.g.	Marketing of final product

2.2. Elements to be explored under each stage of Ragi value chain

1. Inputs

- a. List of inputs (equipments, seed, land, labour, other material, credits etc.)
- b. Sources or place to purchase/get of inputs
- c. Cost of inputs
- d. Mode/process/terms of conditions to purchase inputs (cash or credits)
- e. Terms and conditions and source of credit, if required
- f. Norms to use, if it is common property resource (Distribution of ownership over land, details of eligibility criteria for ownership right, method to gain ownership – formal and informal)
- g. Transaction cost involved in availing credit or purchasing inputs
- h. Maintenance cost and longevity of inputs
- i. Government schemes to provide inputs and it's terms and conditions
- j. Permit or permission required from forest dept and it's terms and conditions

2. Pre production

- a. Land preparation – time and methods
- b. Seed preparation - time and methods
- c. Arrangement of labour - time and methods

3. Production

- a. Seed sowing – time/month, method, water and other cultural practices, labour required, cost incurred
- b. Details of other major cultural practices (irrigation, weeding, thinning, fertilizer, manure, other chemical use) – stage of crop, labour required, other input used,

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time etc. Are there important practices, is it followed or not and if not, why.

- c. Harvest – stage of crop, time/month, method, , labour required, cost incurred
- d. Government laws or policies, related to production
- e. Social norms/ understanding for production
- f. Risks in productions

4. Post – production at village level

- a. Once harvested, how it is trashed, packed, stored in the field and carried back to village – time, method, labour and cost
- b. Process to store in house – equipment required
- c. If significant, cost, place/ source of purchase, mode of purchase etc.
- d. Process for drying – sun or shade
- e. Equipments used in drying, time required and labour required for one unit
- f. Loss in drying
- g. Quality parameters

5. Commodity

5.a. Storage and transportation

- a. Process to store dried commodity
- b. Equipment/infrastructure required for storage – description, cost, maintenance, longevity and source of purchase
- c. Accessibility to infrastructure – terms and condition
- d. Mode of transportation to the market, commonly approached to sale the product
- e. Frequency of facilities and Time required
- f. Cost of transportation
- g. Government rules, norms or facilities to transport and storage

5.b. Marketing of raw commodity

This is for Shandy, Local market and District level market. For state, and national level market separate questionnaire on similar dimensions is prepared.

- a. Access to alternatives/ channels for marketing (Kirana shop at village, middlemen at village, shandy, local market, wholesale market at district level)
- b. Offers made by each of the channels – price, mode of payment, provision of other facilities

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- c. Reasons to prefer the particular channel/ criteria to decide about the channel
- d. Trend of demand and supply scenario for each of the channel in last 5 years
- e. Margin at each layer for different channel
- f. Risk taken or assumed by each channel and facilities provided to the lower level
- g. Government facilities available for marketing – scheme, institution, price for last 5 years, terms and conditions, eligibility criteria

Specific to shandy, local and wholesale district level market

- h. Conditions to operate in these markets
- i. Prices offered in last 5 years
- j. About main buyers in these markets – who are they, place and purpose to buy it

6. Value addition

6.a. Local Value addition

- h. Details of local value addition – types, methods for each one, time required, labour required cost involved
- i. Quality parameters for local value addition
- j. Increase in prices due to value addition
- k. Credit required for processing – source, interest etc.
- l. Input or material used for processing – cost, qty, source etc.

6.b. Storage and transportation

- h. Process to store value added product
- i. Equipment/infrastructure required for storage – description, cost, maintenance, longevity and source of purchase
- j. Accessibility to infrastructure – terms and condition
- k. Mode of transportation to the market, commonly approached to sale the product
- l. Frequency of facilities and Time required
- m. Cost of transportation
- n. Government rules, norms or facilities to transport and storage

6.c. Marketing of local value added product

- a. Access to alternatives/ channels for marketing (Kirana shop at village, middlemen at village, shandy, local market, wholesale market at district level)
- b. Offers made by each of the channels – price, mode of payment, provision of other facilities

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- c. Reasons to prefer the particular channel/ criteria to decide about the channel
- d. Trend of demand and supply scenario for each of the channel in last 5 years
- e. Margin at each layer for different channel
- f. Risk taken or assumed by each channel and facilities provided to the lower level
- g. Government facilities available for marketing – scheme, institution, price for last 5 years, terms and conditions, eligibility criteria

Specific to shandy, local and wholesale district level market

- h. Conditions to operate in these markets
- i. Prices offered in last 5 years
- j. About main buyers in these markets – who are they, place and purpose to buy it

6.d. Processing for intermediate product

- a. List of processed products and by products
- b. List of major processing unit, product wise
- c. List of places, where processing units are located, product wise

For each product – calculate the following of a unit of processed product.

- d. Product and byproduct and it's use
- e. Cost and qty of raw product – qty of process product and by-product from it and it's price
- f. Other inputs required for processing – cost, source etc.
- g. Cost of infrastructure and other related details
- h. Brief description of method and Source of technology
- i. Cost of processing – labour, material and other variable costs
- j. Storage requirement – cost, specification, and facilities available
- k. Packing – material, cost, specification, technology, source, labour and advantage
- l. Commercial or sales taxes
- m. Government norms and policies to establish units
- n. Government schemes etc.
- o. Mode/method of transportation, facilities and charges
- p. Risk involved
- q. Credit requirement and sources of credit

6.e. Marketing of each intermediate product

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- a. Major players - Classification based on it's use

For each product used by final consumer

- b. Demand and supply scenario for last 5 years
c. Prices offered by final consumer in last 5 years
d. List of places, where final consumer belong to

For each product further processed for final consumption

- e. List of stockiest or distributors – their margins, method of operation etc.
f. List of corporate houses and list of final products
g. Demand and supply for last 5 years
k. Prices offered in last 5 years
l. Specification for each product
m. Mode/ process of purchase – cash and credit
n. Terms and conditions for purchase or sale
o. Transaction cost of marketing
p. Government norms
q. Market rules
r. Entry barriers – in terms of players
s. Final products and it's uses
t. Risk involved

6.f. Processing for final product

- a. List of processed products and by products
b. List of major processing unit, product wise
c. List of places, where processing units are located, product wise

For each product – calculate the following of a unit of processed product.

Product and byproduct and it's use

- d. Cost and qty of raw product – qty of process product and by-product from it and it's price
e. Other inputs required for processing – cost, source etc.
f. Cost of infrastructure and other related details
g. Brief description of method and Source of technology
h. Cost of processing – labour, material and other variable costs
i. Storage requirement – cost, specification, and facilities available
j. Packing – material, cost, specification, technology, source, labour and advantage
k. Commercial or sales taxes
l. Government norms and policies to establish units
m. Government schemes etc.

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- n. Mode/method of transportation, facilities and charges
- o. Risk involved
- p. Credit requirement and sources of credit

6.g. Marketing of final product

- a. Major buyers and their location (state or nation)
- b. Channel used to reach final buyer – depending on that ask other questions
- c. Major distributors
- d. Cost incurred on distributors
- e. Margins of distributors
- f. Product movement in the market and Profile of other competitors
- g. Barrier for market entry
- h. Margin to retailers
- i. Price, and demand and supply in last 5 years.
- j. Cost incurred by company on product promotion
- k. Credit requirement and sources of credit

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Annexure – 1: B

Activity Schedule for Ragi Sub-sector Analysis

Sno	Activities	Total Days	Level1 RP	Level2 RP
1	Secondary Data			
	Related to the crop	2		2
	Related to the earlier studies	2		2
	Technical Institutes visits	3	1	2
2	Study Design			
	Preparation at the production level	3	1	2
	Preparation for the market survey	3	1	2
3	Field Visit			
	18 Village level visits @ 3 per 6 districts	12	3	9
	Best practices studies - plain area comparison	5	1	4
	Shandy studies	2.5	0.5	2
	Local market study	2.5	0.5	2
	Industry study - Value addition	6	2	4
	National level important markets	8	2	6
	Major products study	2		2
	Study international market	2	2	
4	Policy Analysis			
	Study the policies	5	4	1
	Visit to the Government Departments	3	1	2
5	Institutional Design			
	Study food commodity based institutions	8	5	3
6	Documentation	6	4	2
7	Contingency	5	2	3
		80	30	50

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Annexure – 2

Classification of districts, based on Ragi grown area (Area and production for 2000-01)

S.n.	District	Area		Production	
		(In Hectares)	% of total	(In Tones)	% of total
Districts with significant area under Ragi					
1	Visakhapatnam	35648	36%	34778	29%
2	Mahabubnagar	14604	15%	16180	13%
3	Chittoor	13017	13%	14538	12%
4	Vizianagaram	10005	10%	10898	9%
Districts with less than 10% of total Ragi area in state					
5	Ananthapur	7522	8%	18235	15%
6	Rangareddy	5670	6%	5789	5%
7	Prakasam	6101	6%	12383	10%
8	Srikakulam	4208	4%	4056	3%
9	Nellore	839	1%	1063	1%
10	Kudapa	1002	1%	1462	1%
Districts with insignificant area under Ragi					
11	East Godavari	465	0%	463	0%
12	Medak	74	0%	76	0%
13	Kurnool	43	0%	70	0%
14	Guntur	23	0%	42	0%
15	Khammam	19	0%	22	0%
16	Nalgonda	8	0%	14	0%
17	Nizamabad	4	0%	4	0%
Total		99252	100%	120073	100%

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Annexure –3- Important Varieties released by Karnataka University

Crop	Important features	Year of Release
1. Purna	Short duration, high yielding variety, can be grown throughout the year, except during winter months and suitable for both rainfed and irrigated conditions.	1966
2. Hamsa	It matures in 110-112 days and can be grown in summer as well as kharif season. It has creamy white grain type unlike other Ragi varieties.	1967
3. Shakti (ROH-2)	Suitable for both rainfed and irrigated conditions and high yielding. Can be grown between May and August.	1972
4. Indaf-1	High yielding variety and suited to rainfed conditions.	1976
5. Indaf-3	High yielding variety and suited to rainfed conditions.	1976
6. Indaf-5	High yielding variety and suited to irrigated conditions. Can be grown throughout the year except during winter months.	1977
7. Indaf-7	Moderate tillering (3-4) non-pigmented, cox-combing varieties depending upon the environments. Need good cultivation, with high fertility, there will be prolific combing. The thumb itself becomes so conspicuous that it looks like a separate earhead. It takes 115-120 days from seed to seed. It has good cooking quality. Average yield is 45-50 q/ha.	1981
8. Indaf-8 (Chetana)	This variety is resistant to drought and blast disease. Its yield potentiality is	1982

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	upto 50 q/ha under rainfed conditions and 60 q/ha under irrigated conditions.	
9. Indaf-9	This variety is suited for premonsoon, late kharif, rabi and summer irrigated areas except for June and July sowing. It has high initial vigour and resistant to cold conditions. It matures by about 100-110 days and is found to be tolerant to water logging and salinity conditions. It is tolerant to pests and diseases. It has got the dormancy for two months after maturity. It has uniform grains, brown in colour and uniform in size. It has an yield potential of 35 q/ha.	1985
10. HR-911 (KBR-1)	This variety has been released for kharif and summer irrigated conditions in regions II, III and IV as an additional variety. It matures in about 115-120 days. It has recorded 20 per cent more grain yield over Indaf-8 during kharif season. Further, it has recorded 24 per cent and 18 per cent more fodder yield over Indaf-5 and Indaf-8. During summer season, it has recorded 16 percent more grain yield over Indaf-5. It is suited for sowing between July and August in kharif Season and between January and February in summer Season. It is moderately resistant to diseases. It has an yield Potential of 39 q/ha and its fodder yields are up to 85 a/ha.	1985
11. MR-1	Suitable for pre-monsoon and kharif Ragi areas of Region-III tolerant to drought and matures in 120-123 days, with an yield potential of 40 q/ha under rainfed conditions.	1990
12. Indaf-15	Grain yield 34.5 q/ha, straw yield 101 q/ha. Recommended for Rabi season	1993

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	under irrigated conditions of Region-III. Fairly tolerant to neck and finger blast with good cooking quality.	
13. MR-2	Grain yields 40 q/ha (12% grain & 18% in straw more than indaf-8). Recommended for rainfed areas of zone-7 of Karnataka. Matures in 125-130 days.	1994
14. GPU -28	Grain yields 52 q/ha. Blast tolerant. Matures in 125-130 days.	1996
15. GPU -26	Grain yield 3 to 4 t/ha and fodder yield 6 to 7 t/ha. Duration 95 - 100 days. Suitable for Kharif season and recommended for zone 4, 5 and 6.	1997
16. L - 5	Grain yields 49 q/ha (15% higher than Indaf-8). Recommended for Zone-4,5 &6 as a supplement to Indaf-8. Matures in 115-120 days.	1998

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Annexure -4

MONTH END WHOLESALE PRICES OF RAGI															
											(RS. PER QUINTAL)				
STATE/CENTRE	YEAR	M.S.P	OCT.	NOV.	DEC.	JAN	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	Average
VARIETY															
ANDHRA PRADESH	1996-97	310	475	455	475	480	490	450	540	500	455	420	475	450	472
MADANAPALLE	1997-98	360	440	460	440	445	450	450	475	480	455	490	450	470	459
(FINE)	1998-99	390	450	425	450	440	460	450	525	490	475	500	525	570	480
	1999-2000	415	540	418	625	620	650	640	640	640	600	625	650	660	609
	2000-2001	445	540	550	550	-	520	480	525	525	540	550	525	500	528
	2001-2002	485	480	470	415	450	500	-	-	470	-	550	550	500	487
	2002-2003	485	500	500	520	-									
KARNATAKA	1996-97	310	440	420	420	400	470	460	410	500	390	450	460	450	439
BANGALORE	1997-98	360	450	410	440	380	440	450	440	510	530	520	520	520	468
(LOCAL)	1998-99	390	520	510	550	540	510	480	460	490	460	480	500	600	508
	1999-2000	415	700	700	670	670	600	590	620	600	650	600	600	520	627
	2000-2001	445	500	-	-	400	425	440	430	405	435	435	500	465	444
	2001-2002	485	440	455	430	400	400	455	495	485	500	485	490	550	465
	2002-2003	485	550	560	570	650									
MAHARASHTRA	1996-97	310	600	500	500	500	500	550	525	550	550	500	500	550	527
GHOTI (NASIK)	1997-98	360	500	500	550	525	500	500	550	500	467	600	600	575	531
(RED)	1998-99	390	600	600	630	600	630	600	635	700	700	715	690	640	645
	1999-	415	600	600	550	600	660	690	700	725	775	810	790	800	692

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	2000														
	2000-2001	445	750	700	690	640	620	640	650	625	NR	650	620	600	653
	2001-2002	485	620	610	615	600	596	620	-	620	620	620	620	620	615
	2002-2003	485	620	650	650	645									
TAMIL NADU	1996-97	310	480	480	480	480	500	500	475	475	420	390	450	475	467
SALEM	1997-98	360	475	500	460	450	430	420	480	489	475	510	520	520	477
(LOCAL) (THUL)	1998-99	390	520	500	520	450	440	520	540	550	520	550	600	600	526
	1999-2000	415	575	550	550	550	560	650	700	675	525	600	650	600	599
	2000-2001	445	500	600	575	600	525	525	575	500	525	600	550	575	554
	2001-2002	485	575	575	525	500	500	540	540	540	540	515	540	540	536
	2002-2003	485	540	540	540	641									

Annexure -5

Village Profile

1. District - Vizianagaram

1.1. Name of the village - Thenna Karja

Name of the Mandal	Kurupam
Division	Parvathipuram
District	Vizianagaram
Soil type	Sandy soils
Total area	150 acres
Total number of families	30
No. of Ragi growing farmers	10
Season	Kharif
Sample size	5 farmers
Area of sample farmers	5 acres

Location - It is located 6 Kames away from the Mandal Head Quarter. Since, it is a roadside village, it has access to all kinds of transport facilities.

Major livelihoods in the village - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, Horticulture and labour. 7-10 Acres of land is under cashew cultivation.

Irrigation - No irrigation facilities are available for agriculture, it is totally dependent on rains.

Institutions working in the Village:

ARTS - creating awareness on land rights and women empowerment.

Velugu (APDPIP) - working on income generating activities.

1.2. Name of the village - Lova laxmipuram

Name of the Mandal	Kurupam
Division	Parvathipuram
District	Vizianagaram
Soil type	Sandy soils
Total area	50 acres
Total number of families	45
No. of Ragi growing farmers	35
Season	Kharif

Ragi Value Chain and Sub-sector Analysis Report

Sample size	15
Area of sample farmers	35acres

Location of the village - It is located 26Km away from the Mandal Head Quarter. It is also a roadside village and has access to various transport facilities.

Major livelihoods of the village - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, and labour.

Irrigation - Totally un-irrigated.

Institutions working in the Village-

Velugu (APDPIP) - working on income generating activities.

1.3. Name of the village - Duddu kallu

Name of the Mandal	Kurupam
Division	Parvathipuram
District	Vizianagaram
Soil type	Sandy soils
Total area	25 acres
Total number of families	70
No. of Ragi growing farmers	15
Season	Kharif
Sample size	15
Area of sample farmers	15 acres

Location of the village - It is located 25Km away from the Mandal Head Quarter. It is a roadside village and has access to various transport facilities.

Major livelihoods of the village - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, Horticulture and labour.

Irrigation - Totally rain fed.

Institutions working in the Village:

Velugu (APDPIP) - working on income generating activities.

1.4. Name of the village - Rajjali

Name of the Mandal	Kurupam
Division	Parvathipuram
District	Vizianagaram
Soil type	Sandy soils, Red

Ragi Value Chain and Sub-sector Analysis Report

	soil
Total area	56 acres
Total number of families	53
No. of Ragi growing farmers	6
Season	Kharif
Sample size	6
Area of sample farmers	11 acres

Location of the village - It is located 11Km away from the Mandal Head Quarter. It is a roadside village and has access to various transport facilities.

Major livelihoods of the village: Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, Horticulture and labour. 7-10 Acres of land is under cashew cultivation.

Irrigation: Totally rain fed.

Institutions working in the Village:

Velugu (APDPIP) - working on income generating activities.

2. District - Visakhapatnam

2.1. Name of the village – Adagulaput

Name of the Mandal	Peddabailu
Division	Paderu
District	Visakhapatnam
Soil type	Blacksoil with no water facility & Podu
Total area	110 acres
Total number of families	65
No. of Ragi growing farmers	50
Season	Kharif
Sample size	5
Area of sample farmers	3 acres

Location of the village - It is located 5Km away from the Mandal Head Quarter. It is a roadside village and has all kinds of transport facilities.

Major livelihoods of the village - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda, Grams etc.), Livestock, Horticulture (Coffee, Cashew) NTFP and labour.

Irrigation: Totally dependant on Rain fall

Institutions working in the Village:

Ragi Value Chain and Sub-sector Analysis Report

Velugu (APDPIP) - working on income generating activities.
LAYA an NGO to create awareness on women rights, health, NRM etc.,
Grain bank is working to ensure Food security.

2.2. Name of the village – Koda Put

Name of the Mandal	Peddabailu
Division	Paderu
District	Visakhapatnam
Soil type	Black soil with no water facility & Podu
Total area	50 acres
Total number of families	35
No. of Ragi growing farmers	10
Season	Kharif
Sample size	3
Area of sample farmers	3 acres

Location of the village: It is located 5Km away from the Mandal Head Quarter. It is a roadside village and has all kinds of transport facilities.

Major livelihoods of the village: Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda, Grams etc.), Livestock, Horticulture (Coffee, Cashew) NTFP and labour.

Irrigation: Totally dependant on Rain fall

Institutions working in the Village:

Velugu (APDPIP) - working on income generating activities.
LAYA an NGO to create awareness on women rights, health, NRM etc.,

3. District – East Godavari

3.1. Name of the village – Barimamidi

Name of the Mandal	Gangavaram
Division	Rampachodavaram
District	East godavari
Soil type	Blacksoil with no water facility
Total area	200 acres
Total number of families	110
No. of Ragi growing farmers	2
Season	Rabi
Sample size	2

Ragi Value Chain and Sub-sector Analysis Report

Area of sample farmers	1 acres
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Location of the village - It is located 20Km away from the Mandal Head Quarter. It is an interior village with kutchra road. Every Tuesday (Shandy day) bus comes to the village and no other facilities are available.

Major livelihoods of the village - Agriculture (Paddy, Cotton, and other millets like Ganti, Sama, Grams etc.), Livestock, Horticulture (Tapioca, Cashew) NTFP and labour.

Irrigation - Totally dependant on Rain fall

Institutions working in the Village:

Velugu (APDPIP) - working on income generating activities.

LAYA an NGO to create awareness on women rights, health, NRM etc.,

Tri MACS a farmer society to market the locally available produce.

4. Srikakulam

4.1. Name of the village - Gumada

Name of the Mandal	Seethampet
Division	Palakonda
District	Srikakulam
Soil type	Sandy soils, chowdu
Total area	150 acres
Total number of families	25
No. of Ragi growing farmers	15
Season	Kharif
Sample size	4 farmers
Area of sample farmers	7 acres

Location - It is located 5Km away from the Mandal Head Quarter. It is a roadside village and has all kinds of transport facilities.

Major livelihoods of the village - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, Horticulture and labour NTFP.

Irrigation – Rain fed, No irrigation facilities are available for agriculture.

Institutions working in the Village –

Velugu (working on income generating activities.)

4.2. Name of the village - Jakkaravalasa

Ragi Value Chain and Sub-sector Analysis Report

Name of the Mandal	Seethampet
Division	Palakonda
District	Srikakulam
Soil type	Sandy soils, black soil
Total area of village	50 acres
Total number of families	32
No. of Ragi growing farmers	20
Season	Kharif
Sample size	7 farmers
Area of sample farmers	15 acres

Location - It is located 4Km away from the Mandal Head Quarter. It is a roadside village and has all kinds of transport facilities.

Major livelihoods - Agriculture (Paddy, Ragi, Jowar, and other millets like Bajra, Ganti, Sama, Ooda etc.), Livestock, Horticulture and labour. 7-10 Acres of land is under cashew cultivation.

Irrigation - Totally irrigated.

Institutions working in the Village -
Velugu (working on income generating activities.)

5. District – Chittoor

Name of the villages – Gestampalli and Papelli

Mandal	Venkatagiri
District	Chittoor
Sample size	65 farmers

2. Orissa State

1. District – Koraput

1.1. Name of the village – Baunspat

Gram Panchayat	Bandhugaon
Block	Bandhugaon
District	Koraput
Total cultivated area	57 acres

Ragi Value Chain and Sub-sector Analysis Report

Total number of families	53
No. of Ragi growing farmers	41
Ragi growing area	57 acres
Season	Kharif
Sample size	6 farmers

Location - It is located 5.5 Kms away from the Block Head Quarter and 100 meter away from main road, going to Parvatipuram from Koraput district head quarter. Approach road to village is kutcha and does not have many transport facilities.

Major livelihoods in the village – Agriculture, wage labour, collection of NTFP. Few are engaged in carpentry work and liquor trade.

Irrigation - No irrigation facilities are available for agriculture, it is totally dependent on rains.

1.2. Name of the village – Mardijhola

Gram Panchayat	Bandhugaon
Block	Bandhugaon
District	Koraput
Total cultivated area	33 acres
Total number of families	28
No. of Ragi growing farmers	4
Ragi growing area	5 acres
Season	Kharif
Sample size	4 farmers

Location - It is located 4.5 Kms away from the Block Head Quarter and 2 Kms away from main road, going to Parvatipuram from Koraput district head quarter. Approach road to village is kutcha and does not have any transport facilities.

Major livelihoods in the village – Wage labour, agriculture, collection of NTFP. One family is mason.

Irrigation - No irrigation facilities are available for agriculture, it is totally dependent on rains.

1.3. Name of the village – Ranjiput

Gram Panchayat	Bandhugaon
Block	Bandhugaon
District	Koraput

Ragi Value Chain and Sub-sector Analysis Report

Total cultivated area	437 acres
Total number of families	331
No. of Ragi growing farmers	263
Ragi growing area	77 acres
Season	Kharif
Sample size	10 farmers

Location - It is located 11 Kms away from the Block Head Quarter and 8 Kms away from main road, going to Parvatipuram from Koraput district head quarter. Approach road to village is pucca till 3 kms remaining 5 Kms are kutcha and does not have any transport facilities.

Major livelihoods in the village – Agriculture, wage labour, collection of NTFP, fire wood, livestock. Few families are engaged in tailoring job, masonry and liquor trade.

Irrigation - Irrigation facilities are available for agriculture, but predominantly it is rainfed agriculture.

3. Karnataka State

1. District – Kolar

1.1. Name of the village – Budamahanahalli

Taluk	Bangarupeta
District	Kolar
Total cultivated area	3000 acres
Season	Kharif
Sample size	42 farmers
Soil type	Red 90%