

# **LITERATURE REVIEW ON DECENTRALISED FOOD SECURITY & GRAIN STORAGE**

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## **FOOD SECURITY**

### **Concept, definitions of and indicators of food security (from literature)**

Hunger or lack of food is debilitating nearly one third of the world population even today. A substantial proportion of this hungry population lives in India even after the successful green revolution, which is said to have solved the food security problems facing India. This grave scenario is unacceptable. Voicing this unacceptability the Joint FAO/WHO Conference on Nutrition held in Rome in 1992 declared that “hunger and malnutrition are unacceptable in a world that has both knowledge and the resources to end this human catastrophe”, and recognised that “access to nutritionally adequate and safe food is a right of each individual”.

Food security means availability and accessibility of food to all. FAO (1983) formulated basic concept of food security implied that “all people at all times have both physical and economical access to basic food they need”. The World Bank (1986) has modified this formulation to indicate that food security is “access by all people at all times to enough food for an active, healthy life. Its essential elements are the availability of food and the ability to acquire it”. The World Bank has made distinction between chronic and transitory food insecurities. Chronic food insecurity reflects continuous “inadequate diet caused by the inability to acquire food. It affects households that persistently lack the ability to either buy food or to produce their own”. The transitory food insecurity is defined as “a temporary decline in the household’s access to enough food. It results from instability in food prices, food production and household income – and in its worst forms, it produces famine”.

It was implied that food security meant arrangements for providing physical supply of a minimum level of food grains at the national level, during all periods including those having harvest failures. It was subsequently recognised that physical availability alone would not ensure economic access to food for all population, especially the poor and vulnerable sections. It was emphasised that satisfactory production levels and stability of supplies should be matched by a reduction in poverty and increase in the effective demand to ensure economic and physical access for the poor (George 1999:466).

As food security is understood today while availability of food is a necessary condition for ending hunger, it is not a sufficient one. There is need to enable people to access food. This enabling route may consist of income generation opportunities like food for work programmes.

Food security problem is examined at various levels: global, regional, national, state, household and individual. Food security at the national or regional level does not necessarily indicate food security among regions, communities, households and individuals. Even while food security is claimed to have been achieved at the national level there are backward regions in the country like Koraput in Orissa, Telengana and Rayalaseema regions in Andhra Pradesh and tribal belt of Madhya Pradesh and Rajasthan from where one frequently hear about starvation deaths which is a sign of sever lack of food security. Even while food security is assured at the household level, within a household because of gender discrimination female members of the family tend to receive lesser quantity of food compared to male members. It is also recognised that to achieve food security at the household and individual levels it is important to realise the food security at national level. Increased availability of food is a necessary condition for achieving food security in food deficit countries. (George 1999. 467).

Recently the concept of food security is further expanded. A wider definition of food security incorporates quality of life indicators. According to this food security implies livelihood security at the level of each household and all members within, and involves ensuring both physical and economic access to balanced diet, safe drinking water, environmental sanitation, primary education and basic health care. (UN.1987)

Resources commanded by the households, levels of farm and non-form production, household income, household and individual consumption, and individual nutrition determine food security status of the households. Poverty is considered as the major determinant of food insecurity. Normally, the poor do not have adequate income to secure their access to food, even when food is available in local markets.

Braun *et al* suggested that while food security at national level can be monitored in terms of demand and supply indicators, food security at the household level can be measured by direct surveys of dietary intake and food security at the individual level can be gauged from anthropometric information (Braun *et al*.1992).

According to Chung *et al* ownership of poor quality of land or no land, distress sale of productive assets, livestock and valuable assets like jewelry, indebtedness, heavy dependence on wage employment, few income earners in family, accepting attached labour positions, migration in search of work, using inferior quality of food are some of the determinants for household level food insecurity (Chung *et al*.1997). From this it is clear that most of the indicators of food security at the household level are linked to poverty.

The policies and programmes for achieving household food security are based on the identification of the characteristics of food insecure households and individuals. As there is a close link between poverty and household food security, it is relevant for various macro economic policies to address poverty alleviation issues. Since the majority of the poor live in rural areas and since most of them are small farmers or agricultural labourers, the policies pursued in relation to agricultural development have a high significance.

Apart from macro economic policies in general and in particular the agricultural policies and poverty alleviation programmes, a number of direct interventions such as public distribution of food grains and feeding programmes are relevant in the context of achieving household food security.

**National level food security in SA India: Total amount produced vs per capita consumption; public distribution system, food for work programme and other national programmes, EGS: Shortcomings and inadequacies.**

At the national level production of food indicates the food security position. In India green revolution programme was initiated in 1969 to augment food production. Because of this programme rate of growth in food grain production increased during the 1970s and 1980s compared to the previous decades, but the 1990s has witnessed a sharp fall in the growth rate. Growth rate of food grain production was 1.96 and 2.70 percent during 1970s and 1980s respectively. The same declined to 1.84 percent during 1990s.

The substantially higher growth rate of above 4 percent experienced for rice during 1980s has declined to 1.68 percent during 1990s. Though wheat production growth rate had also declined during 1990s over the 1980s, the decline was not so pronounced as in the case of rice. During this period coarse cereal production also declined. Prior to the 1980s much of the increase in food grain production has been through the extension of area, but the 1980s witnessed the shift towards rise in productivity as the major factor contributing to the increased output. However, during 1990s there is stagnation on both these accounts. The declining trend in the growth rate of food production during 1990s has serious consequences for national food security. In fact the growth rate of food grain production during the 1990s has been close to the annual population growth rate, which implies a stagnant per capita production level. (George.1999:471-2)

Per capita supply of food grains can be considered as an indicator of food security at the household level. There had been a consistent upward trend in per capita production of cereals and a consistent downward trend in the per capita production of pulses. The average per capita daily production of cereals increased from 362.8 grams in 1960s to 449.3 grams in 1990s. In the case of pulses it declined from 54.6 grams to 36.5 grams.

The availability of food grains can be derived from the production levels, stock changes and trade balance. The average daily per capita availability during the 1970s remained at a slightly lower level than the 1960s, but the 1980s and 1990s witnessed moderate improvement in the availability level. The growth rate of per capita availability was a small negative value during the 1960s and it turned out to be positive during 1970s, 1980s and 1990s.

While availability of food increased the same cannot be said about accessibility to food by various sections of the population. At times the per capita availability of food may be misleading as it indicates only an aggregate picture and the nutritional status of substantial proportion of individuals and households may differ from the aggregate picture. This in facts seems to have happened in the case of India. 42 percent of the rural

consumers and 48 percent of the urban consumers had received less than 90 percent of the calorie norm during 1993-94. A comparison with the 1983 levels indicates that during the interval the proportion of rural consumers with less than 90 percent calorie norm has increased marginally, but in the urban areas there was a marginal reduction. Both the rural and urban areas indicate a sizable proportion of consumers with inadequate calorie intake. The deficiency is acute in the lowest income/expenditure groups. In rural areas 89 percent of those with less than 70 percent required calorie intake had monthly per capita expenditure levels below Rs. 265. (George.1999:479)

The Public Distribution System (PDS) through which subsidised food grains are supplied has become an important part of the scheme to address the food security problem in India. But it took considerable time before the PDS took the present shape. During the earlier plans PDS served the needs of the population of cities and towns. The real aim during this period was price stability for the urban consumers and contains speculation in food grains market through building food reserves.

The Sixth Five-Year Plan (1980-85) made a general reference to the need for the PDS to play a major role in ensuring supplies of essential commodities to consumers at reasonable prices. It promised that the PDS would be so developed that it would remain a stable and permanent feature of the strategy to control prices and to achieve equitable distribution. However, to the extent that most of the rural areas went without a credible PDS during the Sixth Plan, especially in the matter of food grains supply, the Plan's promise of equitable distribution of essential commodities remained a non-starter.

From Seventh Plan efforts were made to reorient PDS so that it could meet the needs of the rural poor. Though food grains were grown in rural areas, the rural poor were not getting enough to eat because of absence of purchasing power in their hands. Even afterwards urban areas have become main beneficiaries of PDS. During drought years also states dominated by the metropolitan urban areas were the main beneficiaries, though droughts are a rural phenomenon (Venugopal.1992: 100). The uncertainty of supplies induced by a total lack of relationship between people's actual needs and supplies, coupled with the lack of infrastructure facilities and unrealistic margins allowed for fair price shop dealers have rendered the public distribution system in the rural areas extremely ineffective. (Venugopal.1992:87).

Off-take in the PDS through fair price shops in rural areas, which should be a good indicator of whether or not the poor are eating better, is not registering a sustained rise. The cause for this lies in the very absence of a system where it has urgent reason to exist, namely, in the rural areas. The so-called food subsidies really go, in more than substantial measure, to support the surplus farmers and urban consumers rather than the poor. It is therefore crucial to reform PDS and shift focus from the undifferentiated to the targeted poor, from a predominantly urban to a predominantly rural target with the poor as the centre of the effort. (Venugopal.1992:214-215).

An important paradox of the present PDS is that there is mounting hunger even when food grain stocks held by the government are increasing. By middle of the year 2000 the

central government is saddled with 28 million tonnes of food grains as against the overall buffer stock norm of 15.8 million tonnes. It is said that resource constraint of the government and limited employment opportunities is coming in the way of using these mounting stocks.

An important limitation of the PDS is that it meets only 16 to 20 percent of the food requirement of the bottom 20% of the rural and urban population. For the rest of their requirement they are forced to depend on the open market irrespective of the high prices. Added to this PDS suffers from leakage. It was estimated that the PDS dealers divert more than one third of the food grains meant for PDS to the open market.

Another shortcoming of PDS is that while some non-poor have become beneficiaries of this scheme a large proportion of poor are excluded from the benefits of this scheme. Jha pointed out that about 40-50 percent of the population buys subsidised food grains and about half of them is non-poor. It means that a substantial part of the PDS benefits accrues to the non-poor. (Jha. 1991) Another study shows that in the case of rice, wheat and cereals, more than 75% of the poor are not covered under PDS network in West Bengal rural areas. This study also shows that PDS does not particularly favour the poor or there is no implicit targeting towards the poor. (Dev.1996).

Attempts were also made to examine alternatives to PDS in order to overcome its shortcomings. It was suggested that since labour house holds account for a large proportion of food insecure population, increased employment opportunities will make substantial contributions towards expanding the economic access to this group and improving its food security. Suggestions were also made to integrate the PDS with employment generation schemes as a self –screening method for the poor. It was felt that employment programmes and targeted food subsidies might yield substantial welfare gains. (Radhakrishna and Hanumanta Rao.1994:24)

Some estimates show that there is a positive relationship between poverty and personday unemployment. Its policy implication is that reducing under employment will increase the purchasing power of the poor population and increase their food security. The state of Maharastra has much lower personday unemployment as compared to West Bengal and this could be attributed to employment guarantee scheme (EGS) in Maharastra. (Dev 1996)

A study has shown that if a part of the subsidy were used for rural employment programmes and the remaining for augmenting investment, even after allowing for 50 percent leakage and 50 percent efficiency of assets created under rural employment programmes, both gross domestic product as well as the incomes of the poor would rise. (Radhakrishna and Hanumanta Rao.1994:30-1)

A comparative study on the effectiveness of PDS and EGS shows that PDS seems to be better off because of wider coverage in spite of severe leakage. It was also noted that secondary benefits of EGS are important. If they are taken into account EGS may equal or score over PDS in reaching the poor. However, it was felt that provision of

employment per se would not solve the problem of poverty. Though EGS has helped to increase the incomes of the rural poor in Maharashtra still poverty of casual labourers is quite high. At the existing wages even many poor households like agricultural labourers may not reach poverty line even if they work 300 days in a year. So, purchasing power of many poor has to be increased apart from increasing employment opportunities. (Dev 1996)

**Household level food security in SA India: entitlement and seasonality (access to land, employment opportunities/ cash, assets, other food sources such as hunting/ gathering/ fishing/ relying CPRs...)**

Mounting food grain stocks with the Food Corporation of India on the one hand and recurring starvation deaths in different part of India show that the food security policies being followed in this country are not bearing fruit. From this it is clear that though India has achieved food security at the national level, it has not achieved food security at the house hold level. The preoccupation with maintenance of price stability for the urban consumer and holding buffer stocks as an insurance against future fluctuation in food production is said to be coming in the way of realising household level food security. (Venugopal. 1992: 223) Instead, affordability for the poor and availability for the non-poor should govern Indian food management.

Increasing food availability at national level is a necessary condition for achieving household level food security, but it alone is not sufficient. Increased agricultural production alone do not necessarily translate into a more stable, sustainable, adequate food consumption at household level. It is the household's ability to obtain food when it needs it that is equally important. The food security concept is particularly concerned with people's immediate risks of not having adequate access to needed food. Household food security is the capacity of a household to access stable and sustainable basket of food. To make this real it is important to put in place necessary policies and actions to make adequate food available as well as accessible at the household level across seasons and transitory shortages. (IFAD.1996:3-4). Shortcomings of the present food security programmes point to addressing the household level food security effectively.

One of the important issues, while examining the household level food security, is seasonality. Poor families, particularly those living in the rural areas, face severe crisis of food availability/accessibility during some particular seasons. These which are usually named as lean seasons do not offer income generation or employment opportunities. Seasonal fluctuations in food availability are often seen to be most prevalent in drought prone semi-arid tracts. The poor families follow different strategies to cope with seasonality related food availability problems. Poor families having small pieces of land usually give priority to food crops like sorghum. The poor families also try to build up stores of assets, grain and livestock during good seasons to fall back on them during lean season. Familial and cultural relationships between families also come handy in difficult times to tide over the situation. Sale of farm land and other valuable assets like jewelry and migration in search of employment to urban areas are also important responses to seasonality related bad times.(Longhrust.1986)

The stressful, lean season may span from a few days in a month to a few months depending on the rainfall, agricultural activities and work availability. If there is a succession of lean seasons, it will have very adverse impact on the lives of the poor. It is during such seasons that we come across starvation deaths. During these adverse seasons while there is lack of availability of food grains, prices of these grains would also be very high. During such seasons women and children suffer more than male members of the family. At the same time studies also found that female-headed households are more resilient to seasonal stress and calamity and are far from being among the most vulnerable. (Jiggins.1986:16)

Food aid to vulnerable persons and food for work programmes will be some of the important elements of a relief programme to tackle adverse seasonal conditions. Women also would be important beneficiaries of such food for work programmes. According to Janice Jiggins studies of the Employment Guarantee Scheme in Maharashtra, India and the Food for Work programme in Bangladesh record unexpectedly high proportions of women turning for work.(Jiggins.1986:14). As the adverse season is characterised by low availability of food and high prices measures to stabilise prices of food grains at reasonable low levels so as to keep them accessible to poor households will also be important. Diversification and wider choice of crop, livestock and income earning activities are required in reducing the risk of adverse seasonal effects.

An important element in examining the food security issues is the entitlements of individuals in the society/economy. This issue is closely related to household level food security. Amartya Sen explained that people can starve in the midst of plenty of food owing to a collapse in their means of command over food. He pointed out that undue emphasis on aggregate food availability diverts attention from more fundamental issue of how particular individuals and groups of people gain access to and control over food.(Sen. 1981:1) A survey conducted by K.R.Venugopal in 13 villages spread over four states in 1985-86 corroborates this analysis. According to him, “ Admittedly, not every one in these villages goes hungry. But those who depend upon wage employment – agricultural labourers, artisans and even those with landholdings if they happen to live areas that have no assured irrigation facilities – do remain hungry, sometimes entire households, at other times the female children and, almost always, the women folk in these households. The number of days entire household or some of its members go hungry depends upon the number of days of employment available in the village or outside it, which, except in the canal irrigated villages, is always uncertain. It also depends upon the wage levels” (Venugopal. 1992. P. 27).

One of the solutions given to overcome the lack of entitlements is to restore past disappearing common property resources (CPR) with community based action. This is described as “a process by which local groups or communities organise themselves with varying degrees of outside support so as to apply their skills and knowledge to the care of natural resources and environment while satisfying livelihood needs” (Pretty and Guijt. 1992:22). While this community-based development is welcomed, some cautions that serious attention to social difference and its implications have been absent from this

debate. They argue for recognising that communities are not bounded homogeneous entities but socially differentiated and diverse. (Leach *et al.*1997: 5-6). To overcome this they suggest focusing on institutional arrangements that provide analytical tools for understanding the links between differentiated environments and differentiated communities.

**Alternatives to improve food security: Increase access to land, increase production, increase incomes → development of a decentralised food security approach → CEC approach of land lease / fallow land contribution ( any other example , if available?) (Use existing project documents from CEC)**

In India Public Distribution System run through ration shops is the main programme going on to tackle the food security problem. It is a totally centralised system. Because of its centralised nature it is facing innumerable problems. While many poor families are left out of this scheme, a good number of non-poor are included among the beneficiaries. Because of the centralised nature of this programme it has to bear costs on many overheads. The centralised procurement of food grains, movement over long distances, storage of food grains and buffer stocking has high administrative and handling costs. Inefficiency in FCI, which is involved in procurement, storage and distribution, only adds to the economic costs of the food grains operation. Such centralised anti-poverty programmes should give way to local initiative and local participation based on the principles of efficiency, equity and environmental conservation. (George.1999: 486-87)

The PDS largely depends on the food grain procured from green revolution areas. These areas encompass Punjab, Haryana, Western Uttar Pradesh, Coastal areas in AP and some districts in Tamil Nadu. Agriculture in all these areas is canal irrigated. In other words food insecurity alleviation programmes hitherto relied heavily on irrigated and input intensive agriculture. As a result of this rainfed dry land agriculture is severely neglected. Further a shift in cropping pattern in favour of commercial crops dealt a deathblow to agriculture in rainfed areas, as these are resource deficit both in natural resources and capital resources. More than this, it is the people in this areas who are severely food insecure. Deterioration in agriculture sector, which is their sole breadwinner, drastically affected their livelihoods. In the state of Andhra Pradesh more than 60 percent of the agricultural land is under rainfed cultivation. Traditionally these lands are used for cultivation of food crops like sorghum, bajra, and ragi. Rainfed agriculture in semi-arid is characterised by uncertainty, small profit margins and low productivity. Due to high subsidies prices of irrigated crops like rice remained relatively low. Additionally state government offered rice at Rs 2 per kilogram to poor people through the PDS. The availability of cheap rice led the poor in rainfed farming areas to shift from eating their traditional food grains to eating rice. Consequently prices of traditional food crops went down. Farmers reacted to shrinking profit margins by leaving land fallow and getting increasingly involved in labour migration. But employment opportunities are unsure and wages low, keeping these people food insecure and dependent.

Even where food security related programmes like Grain Banks were taken up there also irrigated food grain like rice was given preference rather than coarse food grains to which

the targeted populations are accustomed to. For example in IFAD financed Andhra Pradesh Participatory Tribal Development Project under the Grain Banks scheme rice was stored but not the crops raised in the targeted areas. The Grain Banks have the potential to really contribute to food security if the design is changed to provide incentives for dry food crop production. At present these Banks are almost non-functional in most of the villages. In the field of agriculture the project has concentrated on the introduction of cash crops and irrigated paddy. The emphasis on creating more access to cash income reduces the importance of self-sufficiency in food production and leads tribal away from their subsistence economy. (K.Lalita *et al.*1995:51)

In spite of the dismal picture the extent of dry land and the crucial role it plays makes one sit up and pay serious attention to it. In India rainfed agriculture sustains 40 percent of the human population and 60 percent of the cattle and contributes 44 percent of food production. Environmental constraints like spreading salinity and alkalinity of irrigated lands and vast financial resources needed to take up irrigation projects limits further recourse to irrigated agriculture. Crosson and Anderson argue that it is unlikely that irrigation within the existing knowledge regime can expand enough to accommodate more than a small part of the increased demand for food represented in their demand scenario by the year 2030. Stewart *et al* pointed that the rate of growth of irrigated land in the developing world was 4.5 percent in the period 1950-60, it declined to 3.5 percent in the next decade and to 2.1 percent per annum during 1970-85. Currently irrigated land is growing by less than one percent. They conclude by saying, “rainfed agriculture will have to provide an increasing share of the expanding demand for food in the developing world” (Crosson and Anderson.1992). In other words there is no other way than looking up to the rainfed agriculture for deliverance.

An examination of alternatives to the present food security systems will not be complete without looking at the role played by women in household level food security. IFAD rightly describes women as the gatekeepers between households and individual members in decisions regarding food production, health and nutrition, and provide the main entry point for addressing household level food security and nutritional objectives at household level. Women account for as much as 70 to 80 percent of household food production in Sub-Saharan Africa, 60 percent in Asia, and 45 percent in Latin America. They also perform significant work in food processing and storage. Further, Women’s incomes are more strongly associated with improvements in children’s health and nutritional status than those of men as women tend to spend their income disproportionately on food for the family. Given equal access to resources and human capital, women farmers can achieve yields equal to or even higher than those of men. Women’s capability could be increased by enhancing their access to resources, technology, and information through innovative credit programmes using non-traditional forms of collateral such as women’s groups, or through effective agricultural extension services to women. (IFAD.1996:9)

A decentralised, rainfed dry land agriculture based and women centred food security programme is pioneered by the Centre for Environment Concerns (CEC) an NGO from India. It is working among women farmers from Medak district of Andhra Pradesh, which forms part of the Deccan plateau. In this area more than two thirds of the cropped

area has a single rainfed crop and a third has a second crop from residual moisture. While nearly 15 percent of the households are landless more than 50 percent of the households belong to small and marginal farmer households. While small and marginal farmers own about 30 percent of the agricultural land large farmers who form 11 percent of the total households own more than 35 percent of the agricultural land. Farmers depend solely on the monsoons for getting a good crop and only during good crop years farmers are assured of some food availability through out the year. Sorghum forms the staple food for the people in this area.

Government policies towards food security instead of solving their food problems further accentuated it. The introduction of two rupees per kg rice as a part of the PDS scheme in early 1980s saw many poor families shifting towards this cheap rice. As a result of it demand for sorghum a coarse cereal declined. This led to change in the cropping pattern. Cash crops like groundnut, cotton and sunflower replaced coarse cereals like sorghum. Lands especially those that are suitable for growing rainfed crops like sorghum but not commercial crops like cotton have been kept fallow. Further, cheap rice supplied under PDS is sufficient only to meet about 20 percent of the food needs. For the remaining they have to depend on the open market where prices are high. On the one hand because of spreading fallow lands and declining agricultural income and on the other hand high cost of food grain made the food security position of the poor households miserable.

It is in this circumstance that CEC placed before the women's sanghams in several villages the option of taking up the cultivation of the fallow lands to grow coarse cereals like sorghum. In the initial stages the members of the women's sangham opted for a strategy of extensive cultivation and phased reduction of fallow lands under their ownership. Apart from this, the women sanghams also began to take fallow lands owned by larger farmers on lease and began cultivating sorghum and other crops that form the basket of essential food crops. As a part of this food security programme they also took up grain bank programme to insulate themselves from the market fluctuations. (Gopal and Sashikumar.1997:219-229)

The objective of the programme is to recognise the importance of women in sustainable land management and food security and promote policies for women's access to productive resources. CEC field projects have borne out the scope and opportunities for women's groups in land lease in terms of access to food, employment and sustainable agricultural practices. It further found that in these lands women work as a unit, strengthening co-operation. They meet, discuss and take decisions regarding the land. This has evolved them into decision-makers, not mere decision receivers and enhanced confidence in their ability to manage their affairs.

This programme facilitates the adoption of cropping patterns and agricultural practices suited to sustainable land use. This helps to arrest the growth of high-risk commercial crops and promote food crops. More than this it helps regain women's control in dry land agricultural management, and enhance wage and income opportunities for women.

Gopal and Sashikumar who at CEC pioneered this decentralised, rainfed agriculture based and women centred food security programme note that while the government promoted schemes involve expensive resources, large dams that have limited span and lead to irrevocable loss of productive lands through salinity and water logging, increasing subsidies, operates through a centralised mechanism beneficial only to rich farmers, the alternative system undertaken by women's sanghams use local resources, follow ecologically sound methods, promote watershed approach within the reach of the poor farmers and enables women to have a say in agriculture. Moreover, it operates on a decentralised and transparent basis with community stake for making it sustainable, releasing the latent energies of the people and reducing dependence on the government.

Elaborating the validity of such an approach Gopal and Sashikumar explain that fallow lands in Medak district were 5,83,085 acres while the net sown area was 10,38,009 acres in 1990-91. Thus fallow lands account for over 50 percent of the net sown area. To meet the needs of the 2,56,158 families covered under the PDS in the district, the requirement is about one hundred thousand tonnes. A procurement of 300 kgs per acre of sorghum coupled with annual crop rotation of sorghum with pulses or oil seeds, the fallow lands in Medak district are sufficient to meet the food security needs of the district. The investment needed for this programme which enables long-term food security is less than three years subsidy of the rice scheme. (CEC.1997: 17-18)

### **Janaseva Mandal**

Another important attempt at an alternative food security programme is being implemented by the Janaseva Mandal in the state of Maharashtra. It is a grain bank programme. AFARM of Pune provides guidance and support for the concept and practice of the programme. At present this programme is being carried out by 11 groups in different tribal/Adivasi villages.

The agricultural practices of the Adivasies are controlled by the behaviour of the monsoons. Both failure or excess rains impacts them adversely. Often these uncertain adverse conditions approximate to famine conditions. Almost all sections of the Adivasi community face deficiency in availability of food grains. Grain Banks programme of the community is designed to cope with the nutritional needs of the disadvantaged sections who lack food grains until such time they can repay from their own resources.

The lack of entitlements of the Adivasies are known to force them into debt traps in lean season prior to the first monsoon harvest. Money lenders either lend cash or grain at prohibitive rates of interest. These community grain banks make available grains to the Adivasies in lean season through lending at affordable interest rates thus eliminating the strangle hold of profiteering of money lenders. These alternative channels of grain availability go along way in increasing bargaining power of the tribal farmers. Adivasies can use the grain banks to get affordable rates for their produce.

Besides this the surpluses available with grain banks can also be used for providing additional work opportunities. Grain banks can offer surpluses for community development works as well as individual's requirement so that labour migration need not take place at the present scale.

Under this programme in the beginning each member contributes 35 kgs as their initial contribution. During time of difficulty or rather in monsoon they take loan from the grain bank and return it after the harvest season with 25% interest. Every year they also increase their shares and so gradually the amount increases. The loan is given in proportion of their shares. If some one is in dire need of more grain the group considers his or her request. Though at the moment the amount looks small but it will increase gradually. The year they do not get enough grain is also the time they have to find a creative solution to their problems.

The grain collected under the grain banks is being stored in the village type of wattle and cow dung plastered bin. These are inadequate for the expanding membership and volume of grain being stored in the grain bank. The Janaseva Mandal in association with the IGSMRI of Jabalpur is trying to design and construct more adequate and efficient the storage bins.

## **GRAIN STORAGE AND MANAGEMENT**

In achieving food security besides producing enough food grain proper and adequate storage and maintenance of the produced grain is equally important. Issues of grain storage acquire added importance in the background of mounting population pressure on the one hand and environmental constraints to increased intensive agriculture on the other. It is very important to find ways and means of reducing the present heavy losses of food grains at the post harvest stage due to poor processing techniques and inadequate storage facilities. Food grain wastage costs are estimated at Rs 230 billion (US\$ 5.75 billion) per year according to a joint study by the internationally renowned consultants McKinsey & Co and Confederation of Indian Industry. Their report entitled "Food and Agriculture: Integrated Development Action" indicates that the high wastage and value loss are due to the lack of infrastructure like storage and harvesting at the farm level. Transportation losses are also significant due to improper technology. (Ramesh. 1999.p.37)

In developing countries processing and storage are often overlooked. Compared to the developed countries losses at the time of harvesting are low as harvesting is done mostly by hand picking. In the developed countries harvesting is mechanised and leads to some losses at the harvesting stage. But in the case of storage and processing developing countries face substantial losses as they still follow rudimentary methods. This also points to urgent necessity of improving storage and processing methods in countries like India. Another fact that farmers in India tend to retain a substantial proportion of their food crop output with them, either for self consumption, or for seed purposes or for feed or for payment of wages in kind which is still prevalent in certain parts of the country, also calls for improving storage facilities at the family/farm level. Further, farmers have

inadequate storage facilities and usually compelled to sell their grain soon after harvest, when prices are low for fear of it spoiling later.

As pointed out by O'Kelly in most of the developing countries it is the women who are largely responsible for drying and storing of food grain. In addition most of the threshing winnowing husking, shelling and milling, necessary before the grain is fit for consumption also done by them and these arduous and time consuming tasks leave many of them prematurely aged. At a time when gender issues are taking centre stage the need for improving food grain storage and processing so as to lessen the burden on women is even more. But the question is whether these improvements will really benefit women. There is a possibility that these improvements may harm the interests of women. In this regard O'Kelly writes, "Surprisingly this might seem a way of lighting the woman's very considerable work load, but in practice it will be very much to their disadvantage because they will lose their status they enjoy now by virtue of the important part they play in feeding the family. The poor of then will also lose the income they receive for processing the crops of the larger farmers" (O'Kelly.1979:6) At the same time this need not be taken as the last word.

Storage losses can be divided into several categories: Quantitative loss is physical loss of substance (shown by a reduction in weight or volume) and so can easily be ascertained. Qualitative loss however is a more difficult to assess but can often be determined by comparison with locally acceptable standards. Nutritional loss may be a combination of both. There can also be wholesomeness or hygienic loss due to contamination of the grain, in the store, whether of microbial, insect or small animal origin. Aside from consideration of good health such contamination in turn can lead to economic loss because less money will be received for grain of poor quality. ( O'Kelly.1979:86)

## **Traditional grain storage in India – advantages and disadvantages, related problems.**

### **1. Straw Storage Structures**

The straw storage structures are known as 'Puri' in Andhra Pradesh. Similar structures can also be found in other parts of India, particularly in South India and are referred to as Seru, Kottai, Pura, Oliya and Murai in various regions. These are mostly outdoors and in some areas indoor structures are also found. The construction of these structures is made of straw ropes and varies from area to area depending upon the local economic and social conditions. They have a capacity ranging from 3-20 tons and have a life of 5-6 months (1-2 years where rainfall is low).

An important advantage of this kind of structure is that its cost of construction is very low and the materials are abundantly available in the local area. Because of cross ventilation provided by the structure the grain is well aerated retaining its original luster and fetch a good price. This structure also provides good thermal insulation. But in spite of these advantages this structure is not insect proof and moisture proof. These structures are also

susceptible to rodent attack. They are not free from fire hazards and provide poor protection against theft and animals (Ramam.1989:4)

## **2. Bamboo/Reed Storage Structures**

Bamboo/Reed storage structures are known as 'Gade', 'Gummi' and 'Borra' in Andhra Pradesh. These are also known as Kommu, Kudir, Bhukhari, Ponaka, Thombai and Vallam in other parts of the country. This structure is basically a basket type of store, made of split bamboo or reeds plaited together and plastered with mud. The construction of these structures, though uniform in most of the areas, depends on the locally available reeds, in case bamboo is expensive. The floor will also be of split bamboo/reed. It may be kept in the house or out doors. Its capacity can be from one to 25 tonnes in the case of outdoor structure and 0.75-1 ton in the case of indoor structure. Under normal conditions with proper maintenance the life of the structure varies from 10-15 years, but it may last 4-5 years in case not maintained properly.

The structure can be made locally with locally available materials. Because of the circular shape it occupies less space. The luster of the rain stored in these structures is maintained even up to a year. Important shortcoming of this type of structure is that it is very susceptible to rodent attacks. When these stores are not raised off the ground, however, even if a layer of paddy straw is placed under the grain the damp is still liable to migrate upwards and damage the contents. This structure is also not amenable to disinfestation measures.

## **3. Masonry Storage Structures**

The Construction of these structures is mostly using bricks or stones. But in some places the usage of wood or bamboo was also found. When bricks or stones are used for the construction of these structures, different materials such as mud mortar, lime mortar or cement mortar is used. Mostly the structure is rectangular type and it is constructed as a part of the house. Some times this structures are raised off ground on small pillars. These come in various sizes depending on capacity, which ranges from 7.5 – 30 MT and has life of over 20 years. These are known as Kotlu in Andhra Pradesh and as Kalangiam, Manaja, Amberkani, Vadevu, and Kothi in other parts of the country.

Because of its sturdy build it is long lasting. These structures are amenable to disinfestation. But these structures do not give adequate protection against rodent menace and moisture. In these structures infestation is a common feature due to resident infestation in cracks and crevices.

## **4. Earthen Structures**

Earthen storage structures in Andhra Pradesh are usually called as 'Kunda', 'Golem' and 'Jadi'. These are indoor structures made up of clay. These are made by the local potter using locally available clay. The structure is of cylindrical type but the diameter in the middle is more than top and bottom. For higher capacity structures, mud rings are used

which are fabricated with either burnt or unburnt clay. Its capacity ranged from 1-2 Qt., and has a life span of 10-15 years.

These earthen structures can be made locally with locally available materials, hence of low cost. Being lightweight they can be moved from place to place. The structures can be made functionally gas tight if the top is sealed. This is more suited for storing seed grain. But being lightweight they are also very fragile.

## **5. Underground Storage Structures**

The underground structure is known as 'Pathara' in Andhra Pradesh. This type of storage structure is in use for hundreds of years. It is mostly a dugout pit with a lining of loose straw/straw ropes and/or palmyra leaves. The floor of the structure is covered with loose straw and paddy husk. The structure is closed with loose straw and mud. These structures are common where water table is low. Sometimes the structures are also constructed as a part of the house with brick or stone lining. Its capacity range from of 1-2 MT. These are not permanent and must be renewed every year.

In the underground storage insect attack is reduced because of the reduced oxygen levels, but moisture can move into the grain from the surrounding soil and facilitate mould growth and spoilage. In cases where theft is to be feared pit storage has the advantage of being difficult to locate and open. There is also no risk of fire. They are also of use where there is shortage of wood and grass for buildings. They are however difficult to empty and to clear out and can be dangerous because of accumulation of carbon dioxide if the pits are not completely full. (O'Kelly.1979:142)

## **6. Bag Storage**

The bags are made of jute or hessian or Mesta fibers. The jute bags are normally B-twill but some farmers use handknitted Mesta bags. These bags are known as Basta, Sanchi, Koni, Bhaku, Conocheela etc. have a capacity of 75 kg paddy per bag and could last 2-3 years depending on the storage conditions.

Bags are the versatile containers, which can be used for storing any type of commodities. They have low tare weight ratio and easy for handling. The grain kept in bags is well aerated. But bags do not give adequate protection against rats, cross infestation and ingress of water vapour. Since they are liable to be damaged by rats or while handling with hooks, frequent replacement is needed. (Ramam.1989:11)

Most of the traditional storage structures except masonry storage structure are cheap and economical. The construction techniques of almost all traditional storage structures are well known to farmers/village artisans. Some of the traditional storage structures provide protection against infestation either through aeration or airtight sealing. At the same time most of the traditional structures are not rat-proof, insect proof and moisture proof. Straw roped structures and bamboo/reed storage structures are not fire proof.

Farmers are following traditional practices in tackling insect infestation in grain also. In order to save the grain from pests they used to keep neem leaves and ash in the grain. While in some villages this method is followed both for food grain and seed grain, in some villages this method is followed only in storing seed grain only. They do not use the same treatment for grain meant for immediate consumption, as this will alter the taste of the grain. If the same treatment is used for the grain meant for consumption, the grain would turn bitter.

Whenever grain is attacked by pests or it is facing moisture problems farmers usually dry grain in sun. Whenever they faced the problem of pests while using the above storage practices for grain meant for consumption, usually grain would be dried in sun. In case of dampness precaution is to be taken to dry the grain and see that storage areas in the dwellings are free from dampness.

The other problem that farmers faced in storing is with rodents. To a great extent they are helpless in this regard. Though they prepared bait it is effective to some extent in the case of smaller ones, but they are of no use against bigger rodents. In cases where bamboo or reed storage structures are used for storage farmers used to keep thorns in the bottom to deter rodent attack.

The Indian Grain Storage Management and Research Institute (IGSMRI) which has done extensive work on grain storage problems in India has come out with suggestions to improve the traditional methods. Some of these are as follows:

#### **For rat-proofing**

1. For straw roped structures: A concrete floor or reinforced brick floor is used to prevent rat entry from bottom. To avoid rat crawling or jumping into the structure a smooth obstruction of 600 mm is provided, the obstruction might be the metallic sheet, RCC rings or reinforced brick wall.
2. For Bamboo/reed storage structures:
  - a) For indoor structures a wooden platform with metallic cones or metal base with wooden platform is used.
  - b) For outdoor structures a masonry platform with stone slabs on the top are used, the slabs are arranged such that there is over hang of 300 mm all around to prevent rat entry. For the structures that are very old, simple cement plaster with outlet and GP sheet roof is recommended.
3. For masonry storage structures, preventing rat entry by ferrocement technique is adopted (plastering 1:2 cement, sand mortar on wire mesh).
4. For underground storage structures, a simple brick wall of 115 mm can be adopted
5. For earthen structures, either ferrocement technique or provision of skirting with cement mortar and baby chips can be adopted
6. For bag storage, the bags are to be kept at a place where they are inaccessible to rats

**For moisture proofing** either a waterproofing compound or 700 G or 1000 G polythene sheet can be used.

**For insect proofing** the structure should be plastered with mud and cow dung mixture. For bag storage structures the insect infestation especially cross infestation can be controlled by chemical spraying.(GoI.1996:105)

**Alternative storage methods ( technical side: different storage structures, fumigation methods,...)**

One of the important alternative storage methods developed by IGSMRI is referred to as 'Pusa' bin. For one type of the bin the floor and lower part of the walls are of burnt bricks, the rest of mud bricks are used. The walls and flat roof are double layered with a layer of plastic sheeting inserted between the two bricklayers. This protects the grain from moisture and prevents air from entering. A separate tached roof around on top is provided to protect it from sun and rain. Under another design of Pusa bin there are double walls of masonry each 4.5 inch thick with polythene sheeting in between. The outer layer has steel reinforcement and the sides are plastered with cement.

The Institute has also come up with metallic bins. These metallic and non-metallic bins are designed both for indoor and outdoor purposes.

The distinct advantages of using these modern storage structures are:

1. Large quantity can be stored safely
2. Storage losses can be substantially minimised
3. Quality degradation can be controlled
4. Can be stored for longer duration,
5. Better storage of seed grains
6. Better returns (GoI.1996.p.109)

In order to minimise use of pesticides hermetic storage methods are recommended, particularly when large quantities of grain are handled. It was contended that hermetic storage offers the most viable non-pesticidal alternative for insect control (Caliboso and Sabio.1999:61). There were also suggestions to use biological control methods to combat insect infestation in place of chemical pesticides. It was pointed out that several reports suggest that there is a large number of natural enemies in the Asian region and that they can be used for biological control. More efficient control of insect pests could be achieved by 'augmentative release of selected mass cultured natural enemies. At the same time for the use of natural enemies for biological control, extensive studies to identify species and the hosts was emphasised ( Nakakita.1999:73).

Integrated storage past management was also recommended as a strategy to solve problems of maintenance of grain during storage. This requires a multi-disciplinary approach. The basic framework is to adhere to quality standards during procurement to ensure sound initial grain quality, provide a good physical storage structure, maintain maximum levels of storage hygiene and sanitation, applying pesticides in a most cost effective and efficient manner, promote the application of non-chemical measures and generate strong commitment on the part of the management for integration of all measures (Sadik.1999:103).

**Alternative grain management: Management side (community organisation, grain transactions, grain management) ... base on CEC experience.**

Decentralised food security also calls for decentralised food storage management. The present food security scheme as implemented by the governments in India depends on enormous food grain storage systems managed by the Food Corporation of India (FCI). In spite of the modern methods used FCI is incurring huge losses because of grain loss during storage. The same is being successfully addressed by the women's sanghas promoted by CEC in its operational villages.

Under the food security scheme pioneered by CEC women farmers who participated in the programme contribute sorghum to be stored. The same will be used to distribute among the needy during lean season. This setting up buffer stock of food grains is also an important activity envisaged under this programme. This is meant to meet the food needs of the member families in lean seasons during which employment is not available and also during which period prices of food grains shoot up. This programme is managed by the Food Security Committee (FSC) consisting of five members, which is elected by the participating women farmers from that particular village. The FSC decides the quantum of grain to be contributed by each member, methods to be followed for storing this grain and when and how to distribute the collected grain.

The problems regarding sorghum storage are addressed by the FSC. Initially the collected grain was stored in the house of one of the members. Because of the inadequacies in the storage of food grain a good proportion of food grain is lost due to dampness as well as due to rodent menace. As the methods that they are aware of in tackling these problems are not successful they searched for alternatives. They planned to construct some sturdy structure that will withstand the menace of dampness as well as rodents. They surveyed various structures and finally selected reinforced concrete structures in some cases and metal structures in other cases. As the structures are small and they lend for easy management by these FSCs. As the FSCs have direct stake in it as well as the storage is done before their eyes they could immediately attend to any problems, which is not the case with huge, centralised structures. Because of these methods storage losses were brought down, and the grain could be stored for longer period with out affecting its quality.

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