

SAL SEED PROCUREMENT AND TRADE OPERATIONS

Issues & Challenges



Regional Centre for Development Cooperation
Bhubaneswar - 751007

April 2004

List of selected Publications of RCDC

- ◆ *Ama Jangala Amara* (Our forest is ours) – an Oriya newsletter on community based forest management in Orissa.
- ◆ *Jangala Khabar* (Forest News) – an Oriya update on forest law, rules and policy of Government of Orissa.
- ◆ *Community Forestry*, an English quarterly journal on community based forest management practices.
- ◆ *Ketoti Jangala Nitiniyama* (Some Forest Rules and regulations), March 2003, Rs. 10.00
- ◆ *Jugma Jangla Parichalana Sankalpanama O' Margadarshika* (O), an Oriya booklet on Joint Forest Management-2003, Rs. 20.00
- ◆ *Jatiya Banikarana Jojana O' Bana Unnayana Sansta* (O), an Oriya booklet on Forest Development Agency – 2003, Rs. 20.00
- ◆ *Ketoti Jangala Aain* (Some forest laws) - for Samanwaya, Koraput
- ◆ *Banajata Samparkita Ketaka Niti Niyama* (O) (Some laws on Non Timber Forest Produces) 2003), Rs. 20.00
- ◆ *Jhar Darab*, a news letter in Oriya on NTFP procurement and trade in Western Orissa
- ◆ *Laghu Banajata Drabya Karabarare Gram Panchayatara Bhumika* (The role of Panchayats in NTFP trading) – an Oriya leaflet on NTFP trading, September 2000.
- ◆ *Loka Kathare Marudi Suchana O' Marudi* (O) by Mishra Artabandhu, an Oriya Booklet on drought in folklore, Sept. 2003, Rs. 20.00
- ◆ *Chashi Bhai Jogauchhi Duniaku Ahara* (the Farmer feeds the world) – an Oriya booklet on sustainable agriculture.
- ◆ *Kalaku Akala Gorunku Khadya Chuliku Jala* – an Oriya booklet on fuelwood crisis.
- ◆ *Chashi Pain Chetabani* (Warnings for the Farmer) – an Oriya booklet on sustainable agriculture.
- ◆ *Phasalare Rogapoka Niyantрана Pain Nimba Gachhara Ansabishesha Byabahara Karantu* (Parts of Neem tree are good Pesticides) – an Oriya leaflet on sustainable agriculture.
- ◆ *Aame Chalaiba Desa Amari* (We will rule our Country) – an Oriya booklet on Panchayatiraj
- ◆ *Ame 'O' ama Kshyamata* (O), May, 2003 - an Oriya booklet of Panchayatiraj
- ◆ *Amar Jojana Amar Bikash* (O), 2003 - an Oriya Manual on Panchayatiraj
- ◆ *Pradushana Nirakarana O' Niyantранare Janasadharananka Bhumika* (Role of communities in environment protection) – an Oriya booklet on environment protection

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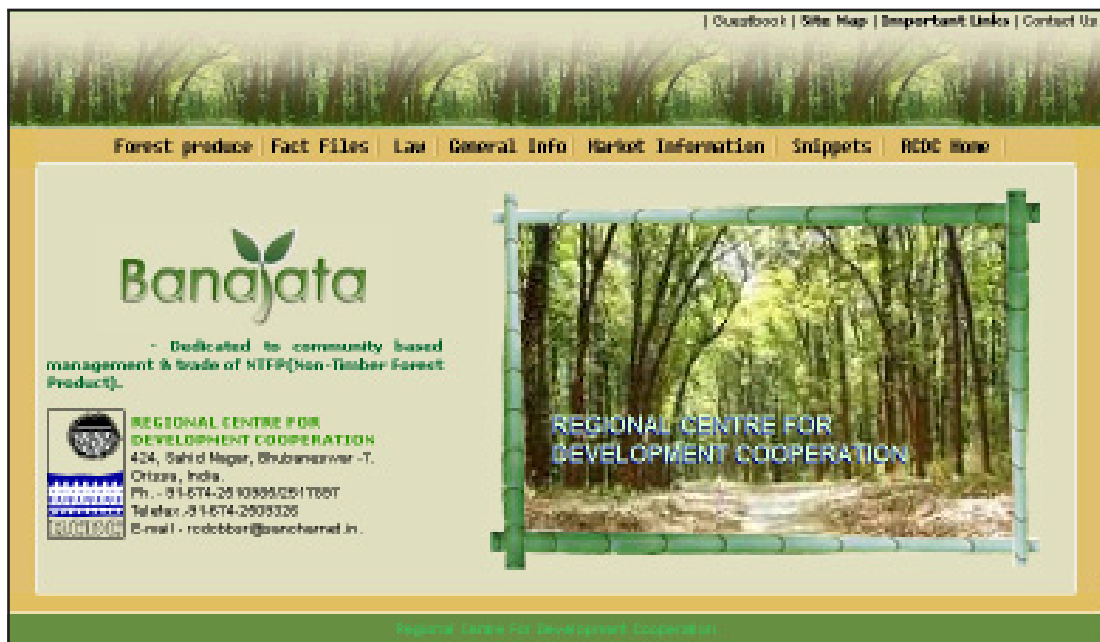


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Preface

Whether it is Kendu leaves or Sal seeds, monopoly or free trade, forest dependent communities have always got a raw deal. There has been no change in their penury irrespective of changes in policy and parties in power. Non-Timber Forest Produces means survival for the primary collectors and a lot of money for the State Government and other players. If NTFP indeed means a lot of money for the State, then where has it all gone? It has certainly not gone to the State exchequer or to the people who need it most- the forest dependent people. Given the nature of the resource and its management, the trade, for ages, has been in the stranglehold of a few invisible beneficiaries, prominent among them being politicians cutting across party lines and a fewbureaucrats in league with them. The political economy of forests, among other things, reflects, an unholy nexus between political executives and private traders where donation to political parties determines the resource management objectives. This has resulted in colossal loss of the State's legitimate revenue and has robbed the poor forest dwellers of a dependable source of sustenance. But for this deprivation, the poor forest dwellers would have been able to more or less sustain themselves without much of external support. Forest alone can sustain millions, if untampered. There is no point in allowing the invisible beneficiaries to usurp the resources and then look up to international donors for help in eradication of poverty.

The publication of this document on sal seeds is the first of a series that we aim to bring out.

Compilation and analysis of information on sal seeds and making it public has basically three specific objectives: prepare a consolidated account of sal seed operations in Orissa that can be used as base material for future research, initiate discussion on the grey areas in sal seed management policies, and try and influence the policy makers to start a process of rethinking on sal seed procurement and trade policies with a view to maximising returns to the primary collectors. Besides, the exercise also aims at encouraging State and non-state efforts for product development and research that could create favourable conditions for market promotion and technological development. We expect this document would lead to further inquiry and thought on the issue.

We take this opportunity to thank our friends and well wishers who thought production of such a document would help all those associated with sal seed procurement and trade. Our special thanks to Mr.B.K.Swain, IFS, Mr.Amiya Kumar Mohapatra, IFS, Mr.G.P.Mohanty, IFS (Retired), Ofiice of the Principal Chief Conservator of Forests, Orissa Forest Development Corporation, Tribal Development Cooperative Corporation, solvent extraction plants including Preeti Oil Mills, MP Oils and Fats and Markfed, and several others who have directly or indirectly contributed to the production of this document.

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Contents

Sl. No.	Subject	Page
1.	Preface	
2.	Introduction	1
3.	Sal Forests: Availability and Spread in Orissa and India	2
4.	Phenology	3
5.	Potential and production in Orissa	5
6.	Collection, Processing & Storage	8
7.	Management Policies and Operations over the years	12
8.	Sal seed Utilisation and Technological Developments	17
9.	Major issues in procurement and trade	23
10.	Suggested recommendations	27
11.	References	30



I ntroduction

S*horea robusta*, commonly known as Sal, is one of the important commercial and multipurpose tree species of the country. Sal is a tall, handsome tree of the family Dipterocarpaceae, widely found in central and northern India. In local languages, it is called Sal in Orissa and Bengal, Sargi in MP, Gugal in Telgu, Sakwa in Nepal. The tree is an object of worship among the Tribals, the Buddhists and the Hindus in India and adjoining countries. Legend has it that the famous Lumbini tract where Lord Buddha meditated and attained salvation was a thick forest of Sal trees.

Sal is the most important timber tree of India, used largely for construction works, railway sleepers and in mining operations. The timber is also used for making beams, columns, bridges, piles, roofing door, window frames, rafters, decking railing etc, agricultural implements (ploughs, yokes, harrows), boat building (dug outs), carts, marine piles, motor lorry and bus bodies. Not just its timber, virtually every part of the tree is useful for domestic as well as commercial purpose. Its leaves are used as service plates for food and packing. Lops and tops are very good as fuelwood. Sal tree also exudes an oleoresin, or

ral that is used as incense in religious ceremonies. The resin or "*Jhuna*", as it is known in Oriya is used to fumigate dwelling places and religious places to purify air and rid it of virus, foul smell and neutralise its toxicity. It is also used in making paints and varnishes.

The calorific value of completely dried heartwood is 5433 calories. The presence of resin in the heartwood is responsible for its higher calorific value. The flowers, wheatish in colour and sweet smelling, are a hot favourite with tribal women who use it for their hair makeup. They rejoice and dance during the flowering of sal trees.

Sal seed is an important non-timber forest produce (NTFP) having tremendous economic effect on tribals and poor people living in forest fringe areas. As per a rough estimate, more than two million people in the forest areas of Orissa are dependent on sal tree for a livelihood. The decorticated seeds (kernels) are used in solvent extraction plants for manufacture of fat and de-oiled cakes. Sal seed contains 12-19 per-cent fat. The fat is also used in soap making, chocolate industries and confectionaries as cocoa butter equivalent (CBE) and Vanaspati preparation.



Sal Forests: Availability and Spread in Orissa and India

Sal trees are found in a huge area stretching from Burma in the East- to Assam, Bengal, Nepal, the Deccan Plateau, going up to the

Similipal Tiger Reserve. The share of Orissa in the total sal seed production in the country is about 25%.

States	Forest area* (in Sq. Kms)	Sal forest area (in Sq. Kms)**	% of Sal forest to total forest area of the State
MP	131830	27800	21.1
Bihar	26474	21410	80.9
Orissa	47033	38300	81.4
Uttar Pradesh	34016	5710	16.8
West Bengal	8362	5700	68.2
Assam	23688	5310	22.4
Total	251403	104230	41.4

* State of forest Report 2001, Forest Survey of India

** Sustainable Forestry, May- Dec 2002

foothills of the Shivaliks on the left bank of the Yamuna. Sal grows well in low height plains to foothills, viz. Shivaliks from 200 to 1200 meters above mean sea level. Though a gregarious species, Sal forests, along with their understorey and ground flora associates, constitute a rich bio-diversity. Sal is, therefore, important both ecologically and economically.

Orissa is rich in Sal forests and Sal trees are seen in almost all parts of the state. The state of Orissa is unique in having 'coastal sal forests'- for example, Barbara forests of Khurda district- as a mixture in the coastal moist peninsular forests. The total Sal forest area of the state, as per working plan data, is 26,189.15 sq.km, out of which good Sal forests are found over 19,268.79 sq.km, i.e. almost 33% of the total forest area of the state. The divisions rich in Sal forests are - Keonjhar, Karanjia, Baliguda, Baripada, Nabarangpur, Deogarh, Bamra and



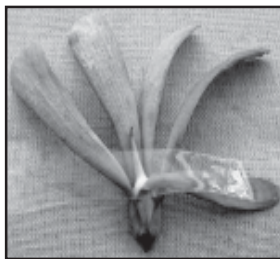
Phenology

Sal is a gregarious species and dominates forests where it occurs. It grows well in a well-drained, moist, sandy loam soil. It is a moderate to slow growing species and can attain a height of 30 to 35 m and a girth of 2 to 2.5 m in 100 years under favourable conditions. The pole of Sal tree is erect and cylindrical. The crown tends to be linear and sharp-topped in young trees and round to flat in older ones. The bark of the young tree is smooth with a few long, deep and vertical furrows. Its thickness is 2 to 5 cm and colour dark brown. Its texture is rough with peculiar longitudinal furrows in mature trees.

The sapwood in Sal is of small thickness. It is wheatish in colour and less durable. The heartwood is pale when freshly cut and tends to grow dark brown on exposure. It is coarse grained, hard and of fibrous structure. Annual rings are visible in young trees or on freshly cut wood. Its pores are of moderate size, filled with a kind of resin which makes the wood naturally durable.

Sal Flower

The Sal flowers, wheatish in colour, appear in early summer, usually in the month of March. By the end of the month, the trees are in full bloom. High temperature results in early flowering and fruiting. The flowers come out in auxiliary racemos panicles covered with white pubescence. At this time, the trees are partially leafless. The



trees look very beautiful with tender reddish and shining leaves with pale yellow bunches of flowers. From a distance, the tree looks yellowish white.

Sal Leaves

Sal tree is seldom completely leafless. In dry regions, however, it tends to shed practically all its leaves from February to April. Fresh leaves appear during April to May depending upon the local climate. These are ovate-oblong in shape and 10 to 25 cm x 5 to 15 cm in size. The texture is tough and coriaceous with a typical shine on upper surface when fully mature.



Sal Fruits

The fruits develop and start ripening in mid May. In dry and warm localities, the fruits ripen and fall earlier. The fruits are of 0.4 to 0.5 inch diameter with 3 to 5 segments inside with the fruiting calyx covering it forming 3 wings extending up to 2-3 inches. The wings become brown when dry and the ripe fruit falls with the wings. About 850 fruits weigh one Kg. The fruits lose their viability rapidly. Under ordinary conditions, they cannot remain viable after a fortnight. Dry weather conditions, non-availability of soil moisture to fallen fruit, fire



and other biotic effects are the major reasons for the mortality of seeds on the forest floor. Fruits falling before the start of the monsoon do not help regeneration and should not be allowed to rot on the forest floor. They should be collected for other uses.

Sal seed, being an oilseed, needs favourable germination conditions within a fortnight from the seed fall. If there is moisture in the soil at the time of seed fall and if the fruit is fertile and matured, then the seed germinates for natural regeneration in forest. In some cases, the fruit germinates even on the tree and falls after pre-monsoon showers. In Orissa and Singhbhum area of Jharkhand, which are the natural habitat of sal forests, seeds regenerate on their own. In less favourable areas, they need management intervention for regeneration. Issues concerning Sal regeneration are an important subject of research at the National Institute of Forestry and Environment, Dehradun, particularly for the sal forests of the Sivaliks where the water table is low and dye back phenomena is high. The institute is also conducting studies into the insects and bacteria afflicting the healthy growth of Sal trees in certain unfavourable locations.

Sal fruit production varies from year to year. Occasionally, fruiting is remarkably gregarious and profuse. During the ripening of the fruit in the month of April and May, strong dry wind, hail storms and extreme dry weather affect the fruiting. Immature fruits are blown off or knocked down. At times, insects also damage fruits on the tree or fallen ones on the ground. Sometimes, fruiting is so profuse in grown up trees during May/June that the surface below the tree gives the impression of a carpet of seeds.

Composition of Sal seed

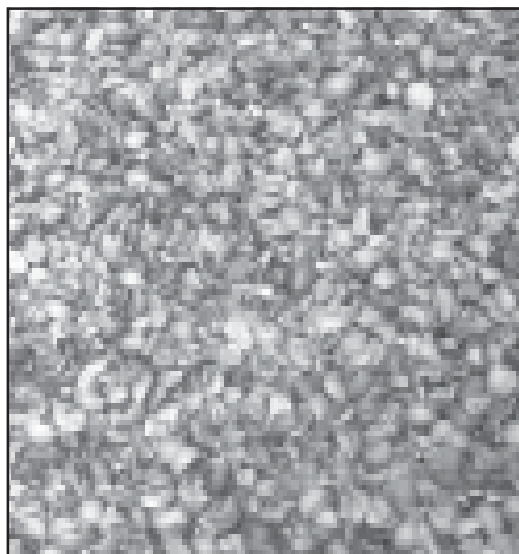
66.4 percent of Sal fruit is kernels and pod and

33.6 percent shell and calyx or wings. The brittle, dried wings are pulled off or burnt with mild fire. Dewinged seeds contain a thin, brittle seedpod. When threshed on hard ground, the outer shells split and the kernels come out. The whole kernels have 5 segments covering the embryo. In germinated seeds, the kernel is the cotyledons or the first leaves of an embryo. These decorticated kernels are commercially known as SAL SEED. The composition of Sal seed is given as follows -

	Seed Collected in early season	Seed Collected in later part of the season
Wings	38%	32%
Pods	27%	23%
Kernels	35%	45%

Source: Sri H.K. Patnaik I.F.S., GM, OFDC

Humidity plays a role in the rise of the percentage of kernel and dry decorticated seed kernels absorb atmospheric moisture, adding 1-1.5% to their weight. About 1800 full kernels make a kg in weight.



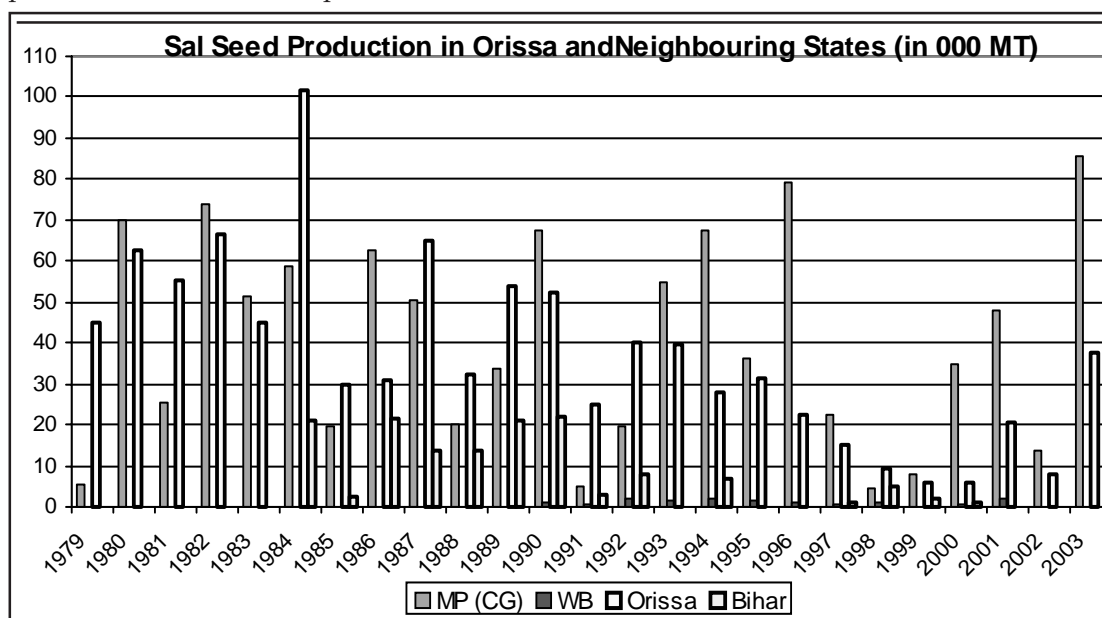
Potential and production in Orissa

The total potential for Sal seed in Orissa is assessed at 1.5 lakh MT per annum. However, production of Sal seed has hardly been related to the potential. The figure shows the actual Sal seed procurement in the state along with that of the other neighbouring states – Madhya Pradesh, Bihar and West Bengal. It is to be noted here that the production figures give only the quantity that is procured by the state agencies, as the produce is nationalised in all the states where it is present. Though the produce is still consumed at the domestic level in the tribal areas, the requirement seems to have reduced over the years. As such, there is no data available of the quantity that is consumed at the household level or smuggled as propelled cakes.

The figure shows a continuous decline in procurement in Orissa except for 1984 & 2003.

The decline has been particularly steep during post - 1994, except 2003. In 1984, procurement of Sal seed was a hefty 1,01,924 MT. But it has mostly remained below 50% of this figure in other years. The under-procurement is put in perspective when one considers that even the 1984 figure is well below the potential. During 1984, 9,155,219 persondays worth of employment was generated that resulted in payment of Rs. 91,552,194 as wages to the persons employed. Incidentally, this was the 1st year of procurement after Sal seed nationalisation.

Procurement fell sharply after a new system of procurement was introduced – that of making Sal seed processors the Raw Material Procurers in 1994. Collection showed an upward trend after the system was done away with in 1999.



Essentially, the figure suggests that there have been two distinct phases in the collection of Sal seed in Orissa – the non-RMP phase and the RMP phase - and that production was notably lower when the RMP system was in vogue. It is interesting to note that during 1995 - 1999, RMPs procured only 44% (approx.) of their target, whereas during the pre-RMP phase, OFDC and TDCC procured 62.5% (1984-1994) of the target set for them. In recent years, however, the targets themselves have been reduced drastically.

Production of Sal seed- State-wise comparison

The figure also shows the production figures of other Sal seed producing states, notably undivided MP. Bihar and West Bengal have marginal production figures of Sal seed, though, interestingly, Bihar (now Jharkhand, where most of the forests lie, after the division) has more areas under Sal, even more than Orissa. MP was also divided into two states. However, most of the Sal producing areas fall in the state of Chattisgarh.

The trend of production in Orissa and Chattisgarh is similar except for the period from 1994 - 1999 (!). This, in a way, reflects the production cycle of Sal seed that varies from year to year abnormally, depending upon weather and other natural factors known and unknown. There may be abundant crop, good crop, moderate crop, or poor crop. Almost every 4th year has been observed to be a poor seed-bearing year.¹

Production of Sal seed is not entirely dependent on the potential in the states. Last year's production figures can be taken as an illustration of this. Both Chattisgarh and Orissa reported very high procurement figures for 2003 - an all-time high for the former and the highest for the latter in the last 15 years.

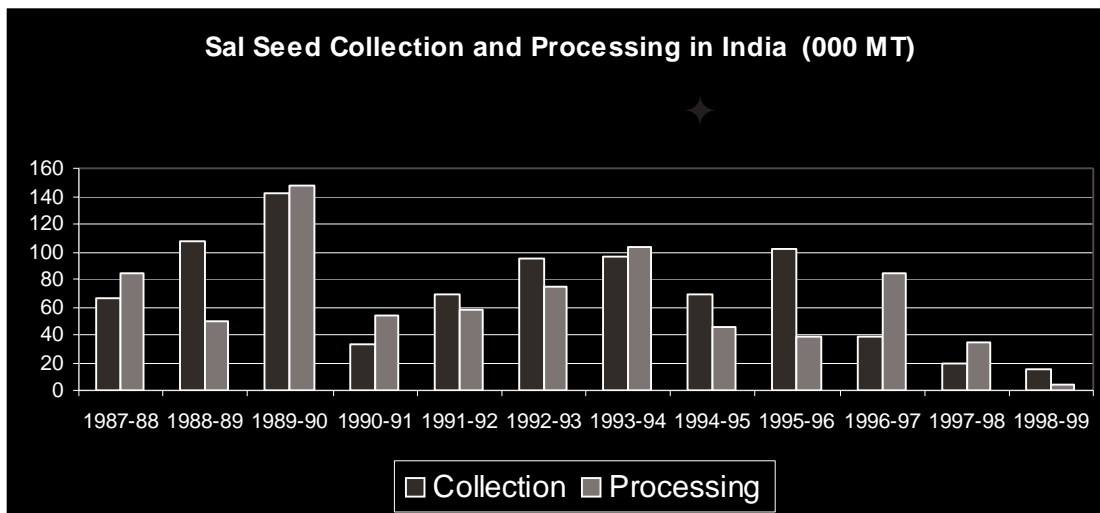
Even accepting that 2003 must have been a bumper crop year, this alone does not adequately explain the high procurement figures. The state of Chattisgarh fixed Sal seed procurement rates at Rs. 5 - 50% higher than its previous rate and the rate fixed in the neighbouring state of Orissa. It was election time in Chattisgarh and the political bosses ensured that all the sal seed is procured to provide some incentive to the primary collectors. The state also put barriers (in the form of tax), so that sal oil processors are unable to procure seed from Orissa. Notwithstanding such restrictions, however, sal seed from Orissa did find its way to Chhatisgarh through the porous border between the two states as a result of the price difference.

This price differential and massive procurement in Chattisgarh affected procurement in Orissa as political leaders and primary collectors put pressure on state agencies here to procure more than their respective target.



The following figure shows sal seed collection and processing by the sal oil manufacturers from 1987-88 to 1998-99. Collection and processing, as per the figure, appear to be similar most of the years. However, they show

a declining trend overall. So, it is difficult to ascertain from the figure alone whether sal oil demand drives supply of sal seed or whether it is the other way round.



Notes : ¹ Minutes of meeting held on 26/6/79 to discuss the problems relating to selection, storage and disposal of Sal seed, Ministry of Agriculture and Irrigation.

Collection, Processing & Storage

Collection

Sal fruits start falling on ground by mid of May. Strong wind or storm helps in bumper fall towards the end of May. As Mahua and Kendu Leaf collection is usually over by this time, forest dwellers get the opportunity and the time to collect sal fruits. The fruit collection goes on till the onset of monsoon after which it becomes difficult to dry the fruits. They either deteriorate or start germinating. Thus the collection period lasts 4-6 weeks only.

It is mostly children, men and women from poor or marginal farming households who collect Sal fruits. In case of a bumper harvest, they sweep the ground and keep the fruits in a heap. The fruits picked up from the ground are carried in baskets or bags to a safer plain ground and spread on the floor. Generally, collection is done in forenoon because during these days, there is an apprehension of a casual storm or rainfall in the afternoon. After collection, the seeds are dried. Normally, drying takes two days. Then, seeds are crushed and the wings and the seed coat are removed manually. These decorticated seeds are then sold to the agents at their counters. Kernel production out of the seeds is at the ratio of 2:1, i.e., one kg of kernel is fetched from 2 kg of seeds. For collection of kernels, the primary collectors sometimes burn the seeds, which is harmful. It raises the FFA (free fatty acid) level, affects the fat content and the wings become brown, reducing the quality of kernel drastically.

Processing

The sal fruit having wings falls to the ground from the tree. It is then taken to a godown, prior to the arrival of the monsoon, where it is spread on the ground to dry. Following drying, the seed is burned or scorched to remove the wings and the resulting seed is then winnowed to remove the shell. The kernel is then stored in dry conditions at the government godown, awaiting transport to buyers. The buyers/extractors process the seed into oil (13%) and livestock meal (87%).

Primary processing

Processing of Sal seeds at the primary level is difficult because of its physical constitution. Value addition is limited to decortications only. From the winged fruit, the seed is extracted in two gradual stages. Firstly, de-winging is done in two different ways. When the weather is very dry and fruits completely dry, they are beaten with a wooden stick to break the brittle wings on plain hard ground. Once the wings break, round seedpods with shell and cover get separated. This is the best recommended process for manual collection since the quality and the nature of kernels remain unchanged.

The second process is by spreading fruits on plain, dry, hard ground and burning them with a light fire. With controlled fire, the wings are burnt and the round seedpods with shell and cover remain unhurt. This is a risky process, though easier for de-winging. Sometimes, fire affects the seed, and the oil content is reduced. However, in case of cloudy weather or pre-monsoon showers, this is the

only manual process practicable for de-winging fruits. This process is easy and hence widely used.

Whatever be the method of de-winging, the round seed covered with shells is collected by picking up or by winnowing. These seeds are spread on hard ground and pressed by a wooden or stone roller. In the process of rolling under pressure, the shell and pods break and the kernels come out. The kernels heavier than the broken shells, just like rice and husk, are separated by winnowing as is done in case of paddy or pulses. Kernels, the final processed Sal seed, are kept in a dry place or under sun for a few hours. After drying, they are ready for sale.

Mechanical Decortications - Mechanical decortications have been designed at different research institutions.² Such machines have not been introduced in Orissa so far. The primary collectors do the de-winging and decortications manually that requires hard labour and is time intensive. Industrialists /Traders/ Agents have not invested in providing such machinery at collection points. They have insisted on purchase of only decorticated seed from the primary collectors.

The agents set up purchase centres at important villages, market places, and Panchayat headquarters to purchase seeds from the primary collectors. They declare the purchase price fixed by the Govt. every year. The seeds brought for sale are checked for their moisture content. Burnt seeds are rejected. Seeds, if mixed with sand or stone, are also not accepted. If the seed is purchased at market places, it is brought to the collection centres. Where the seeds are stored temporarily, bagged, weighed and then dispatched to central godown/factory godown by road transport- generally by truck.

In places where agents do not open purchase centres or when the agents are late in starting procurement, local petty traders take advantage of the situation by buying the seeds at half the notified prices and then selling it to the designated agents. It is also noticed that the Traders/Industrialists directly purchase seed through commission agents, though this is illegal.

Secondary Processing – Technology

In the traditional way, the kernels obtained after primary processing were boiled in the water and the fats resulting were skimmed off the surface of the water. On cooling, the fat sets hard like ghee. This, however, gives a low fat yield. Expellers are also not useful in this case. As the seed contains a high percentage of starch, unlike other oil seeds, the oil extraction process is a little difficult. Only the solvent extraction process with organic solvents serves the purpose of Sal oil (Fat) extraction. Processing is done in two sections in the solvent extraction process- Conditioning/Preparatory Section & Extraction Section.



Conditioning/ Preparatory Section Unit

Feeding Platform - Raw material is kept for feeding the plant.



Shaker Separator - Raw materials are shaken well in order to separate foreign materials like Stone, Sand, Stick and other oil seeds. Different sizes of Sal seed are also separated here.



Breaker - Sal seeds are broken into pieces. One piece of seed is broken into 3 pieces.



Cooking Section - In order to make the Sal seed soft, it is cooked here by steam. Two types of cooking is done here-steam cooking and jacket steam cooking.



Flecking - Broken, soft Sal seeds are flecked like thin corn fleck.



Expander - Now, a modern method has been introduced where Pallet is made after the flecking. Pallet is just like broken chalk pieces. This process can be avoided, if needed.



Pallet - Pallets are brought into normal temperature. Moisture contents - 10 % to 12 %. Cooler after these, pallets can be stored for a week or can be processed immediately.

Extraction - It is a compact machine with belt and chains. The inner side of the machine looks like wheels of a war tank. When the Pallets or Flecks pass through it, solvent (chemical name of solvent is N. Haxen) is sprayed over it. Solvent, mixed with oil (called Missela), is collected in 7 to 8 pots kept under the extraction bed. Collected Missela (Solvent mixed with oil) is taken to the distillery plant for distillation. In the distillation plant, N. Haxen is separated from oil by distillery method. N. Haxen is a hazardous and highly inflammable chemical. The by-product de-

oiled cakes- also contain some solvent which is separated by dryer. Some times, the de-oiled cakes are toasted in the de-hexinising plant for good fragrance (to be used as cattle and poultry feed). After production degumming, neutralisation and bleaching refine the fat.

1% of the raw material is lost during separation (stone, stick, sand & other seeds). Though the raw material contains 14% oil, oil recovery is only 12 to 12.5%. The rest is de-oiled cakes.

The grading operation is carried out through two tests. They are; the MIV test – moisture and volatile and insulation impurities test, and the Free Fatty Acid FFA test. This is important as it is done during selection of raw material. A good quality raw martial contains a little less than 4% of FFA.

Storage

Storage is the most important aspect in the Sal seed procurement process as the moisture contents of the seeds play a crucial role in production of oil and determining fruit quality. Various researchers opine that moisture contents should be kept low after collection and during storage so as to keep the FFA low. In general, the seeds should be absolutely dry.

Regional Research Laboratory, Bhubaneswar has conducted research on storage of Sal seed under different conditions and its protection against fungal and insect attacks. It has been found that with increasing duration of storage, yield of oil and its iodine value do not change much, but the acid value increases. Seed can be kept free from mould growth in storage, if its moisture content is kept below 11.26%. The mould growth can be checked by application of 1 - 1.5 cc of Eucalyptus hybrid oil per 354 cc of space. The seed collected from forest showed heavy insect infection. That, however, gets-killed during drying of seed over mild fire for reduction of moisture content. Department of

Oil Seeds Development, GoI, Hyderabad has produced a research note on storage of Sal kernels. As per the report, the moisture content of kernels has a profound effect on storage and maintaining quality. Kernels with high moisture contents are prone to rapid insect and fungal infection and the free fatty acid contents of the oil contained in the kernels also rise rapidly, thereby adversely affecting the quantity of Sal oil.

Sal fruit, when collected from forest floor, contains moisture up to 56.6% in case of immature fruit and fruits collected in wet weather. In a study conducted in the University of Bombay, the moisture contents of Sal seed was found to fluctuate with humidity and ranged between 8.3 to 10.1%. The study conducted by the University College of Science and Technology Calcutta, observed that when moisture content is reduced by about 50% of the original moisture, kernels remain in better condition.

For proper storage of Sal seed, the godown should be free from dampness and should have proper ventilation arrangements. Empty godown should be cleaned and sterilized properly prior to stacking of sal seed bags. Bags used should be dry before filling them with Sal Seed. Adequate gap should be left around the stacks for air circulation inside. Only dry seed should be kept in bags. Some agencies have tried storage of sal seed in loose inside the godown and found seeds in good condition. This requires a much larger storage space. In this case, the filled bags should be stacked inside the godown, keeping space from the walls to form a well-like structure inside the hall, to accommodate loose seed inside. Care should be taken to see that bags forming the wall of well like structure remain stable and

do not fall by the pressure of dumped loose Seed during storage. The store should be water and air tight and the door shouldn't be opened frequently.

The following are the important suggested precautions for storage of sal kernel.

- The kernels should be completely dry and free from insects, moulds and moisture. Moisture creates fungal infection. It also turns the kernel black instead of usual indigo.
- The kernels should be kept loose and not in packets. It should only be packed during transport.
- Sieving method should properly screen the kernels and all debris and insect should be burnt.
- Fumigation should be made with Aluminium phosphide tablets and the fumigation process should last 12 to 24 hours. In case of heap, fumigation should be done after covering the seed with tarpaulin or hatch cover.

The Central Food Technological Research Institute, Mysore, has developed the process, equipment and chemicals for pest proofing of bags to protect food grains and oil seeds from pest. They have also developed fumigant (*Durofune*, a formulation containing active ingredients methyl bromide and ethylene dibromide, in varying proportions) and fumigation equipments for treatment of food grains and oils seeds in the storage for protection from insect pests. The efficacy of the fumigant in storage of Sal seeds is under test at the Institute. Since potentiality varies from crop year to crop year, it is most profitable to hoard the surplus stock of a good fruiting year to run the industries in a bad seed year.

Notes : ²Oil Technological Research Institute, Anantapur and Harcourt Butler Technological Research Institute, Kanpur have designed modern devices for the same. OTRI, Anantapur has devised both manual operating machines and power processing machine. This can process up to 1,050 kg of seed per hour. HBTRI, Kanpur has designed machines convenient to operate, but with lower capacity.

Management Policies and Operations over the years

Sal seed leasing history

Any discussion on the history of Sal seed procurement in Orissa would be incomplete without making a reference to Mr. Bishweswar Das, IFS (Retired) and Mr. Jagdish Prasad Lath. Mr. B. Das, then the Conservator of Forests, Sambalpur Circle, while travelling in the tribal areas, noticed the extraction of sal seed fat by the tribals using a crude method. He requested Mr. Lath for support for a study on the extraction and utility of this fat. Though only a trader, Mr. Lath initiated research on Sal seed by supporting research scholars and forest officers for product development. In the early sixties, his associate company M/S Utkal Contracts and Joinery Private Ltd., Sambalpur started large scale collection of this abundantly available but grossly neglected forest produce. The Govt. of Orissa gave him a long-term lease at a nominal royalty of Rs 250 per metric tonne in 1967. This company set up a processing plant at Orissa Oil Mills, Rairangpur in the district of Mayurbhanj for extracting oils. Up to 1973, collection was on a small-scale and monopolized by the Lath group.

The importance of Sal seed and its impact on the economy of villages collecting it and government finances were not known to the state. It was only in 1974-75, when Orissa Forest Corporation (that later became OFDC) and the Tribal Development Cooperative Corporation were entrusted with the responsibility to collect the produce in divisions like Jeypore and Nabarangpur that the state realised the potential of the produce. This allotment was on a trial basis upto 1975-

76. In 1976, the state gave leases to OFC and TDCC with an annual allotment. From 1979-80, the state allowed leases to some other organisations too, both government and private.

In 1979, when the State leased out substantive forest divisions to private parties like Orissa Minor Oils Ltd. on a long-term basis, the amount of royalty was strangely reduced to Rs.60/- from the existing Rs.300/- per MT. The royalty rates for the state agencies, however, remained unchanged. Probably, this has got to do with the bargaining power of the private agencies, who either owned the processing plants or had contacts with industrialists outside the state. In most of the cases, sal seed collected by the agency was sold to industries outside the state. While the trade gained importance, there were complaints from the field of irregular payments to primary collectors as well as erratic procurement, which prompted the State to nationalise sal seed in 1983.

Nationalisation

The state issued a notification in 1983 nationalising sal seed, cancelling all of leases and allotments and appointing Govt. agencies as agents to collect sal seed. The agent system was introduced under the provision of the Orissa Forest Produce, (Control of Trade Act), 1981. Sal seed available in all 27 forest divisions were allotted to Govt. agencies. A collection price as well as a target for collection was fixed during the crop year for each forest division. The Govt. also authorized Asst. Conservator of Forests of Kendu Leaf division to collect Sal seed from the Keonjhar Forest

Division. This way, Govt Departments and undertakings, and Co-operative Societies took over the procurement and trade of Sal seed in the best interests of the state and the primary collectors. The solvent extraction plants (SEP) purchased the produce from the state agents.

The state fixed the purchase rate at Rs.0.90 per Kg of Sal seed with a total collection target of 1,06,300 MT, which was unthinkable earlier. The royalty rate was fixed at Rs. 0.4 per Kg. With nationalisation, the state reviewed the progress of the state agents in smooth collection with help from the district administrations. The state instructed the CCF and heads of collecting organisations to open more purchase centres, widely publicise information on the selling rate and location of purchase centres to maximise collection and to safeguard the interests of primary collectors. The operation was successful with appreciation from all levels and led to a visible increase in awareness amongst traditional Sal seed collectors in the rural areas. Collection during the 1st year after nationalisation exceeded the target. However, the success of the first year was never to be repeated. Procurement for the next year dipped to 25,000 MT, less than a quarter of the figure for the previous year.

This system continued up to 1994 with minimal modifications in allotment of divisions to different state agencies. In 1991, after merger of Similipal Forest Development Corpn. (SFDC) with OFC, OFDC was appointed as agent to collect Sal seed in all the divisions in Orissa. From 1992 to 1994, both OFDC and TDCC took up the collection. In practice, however, the bulk of the seeds were collected by oil extraction plants that used the godowns of OFDC.

Raw Material Procurer System

In May 1995, the State government changed the policy of direct procurement from primary

collectors by OFDC/ TDCC to a system where the processing industries directly purchased the produce from primary collectors as Raw Material Procurers (RMPs) under the banner of OFDC and TDCC.³ Under this system, the state agencies received a commission of Rs. 150 per MT to give a cover under the Acts and Rule to RMPs. This system was ostensibly adopted with the objective of reviving the sick solvent extraction plants of the state. The collection price of Rs. 2-50 per Kg was reduced to Rs 1.75 per Kg. The average royalty of Rs. 445 per MT paid to the Govt. from 1983 to 1994 (Rs. 44.83 crores for 3,17,206 M.T. sal seed collected) was reduced to Rs. 100 per MT. This was a mere 23% of the average annual royalty received in the previous 12 years. It was also enjoined upon them to process all the sal seeds they collected in the SEPs within the state, so that the loss making and sick SEPs could be rehabilitated.

For 4 crop years from 1995 to 1998, the RMP system continued. Production figures reached all-time low levels making life difficult for the primary collectors. In some places like Nabarangpur, traditional sal seed collectors stopped collection and looked for other avenues of employment like wage work. OFDC and TDCC, during their direct purchase from 1983 to 1994, had achieved 62.5% of the target, whereas during the phase of the RMP system, the target achieved was approximately 44%. The royalty realised from RMPs fell way short of expectations.

There were a number of complaints against the RMPs. A representation was given to the State government to cancel the RMP system and restore the old system followed from 1983 to 1994 and let the solvent extraction plants purchase their requirement from the state agencies. The RMPs, it charged, were quite unprofessional in maintaining the required

registers/records and showing payment particulars to primary collectors as well as day-to-day collection. They also did not pay the declared prices to the primary collectors. Field units revealed that due to inadequate supply of funds within the short period of collection by the RMPs, collection of sal seed was seriously hampered. They refused to furnish the required information wanted by field offices to meet the state agencies' queries.

Part RMP Part Agency

The government appeared to have realised its mistakes.⁴ It introduced a part agency and part RMP system for the 1999 crop year when the purchase price was raised to Rs. 3/- from Rs. 1.75 per Kg. OFDC, TDCC and Markfed were appointed agents for 11, 11 and 5 forest divisions respectively. Markfed appointed M/S Hanuman Vitamin Foods Ltd as its RMP and leased its solvent extraction unit at Bargarh. M/S Priti Oils Ltd., Rengali, Sambalpur was appointed as RMP to work under OFDC and TDCC.

The royalty payable to the state was fixed at Rs. 250 per MT, subject to a minimum royalty of 75% of the estimated target of collection of Sal seed for the crop year 2000 that had to be paid in advance by close of the collection season in one instalment. Any royalty that is due over and above the minimum royalty already paid shall be paid before lifting of Sal seed from collection centres.

The RMPs were allowed to transfer collected Sal seed directly from purchase centres to their factory under permits issued by the forest department. OFDC and TDCC were allowed to dispose of their stock through open tender. Disposal of Sal seed was subject to the condition that the seeds would be processed in the factories established inside the state of Orissa. Only two industries-Hanuman

Vitamins and Food and Priti Oils-had the facilities to procure raw materials directly from forest areas under this system. The other industries in Orissa were either sick or were not interested in milling Sal seed.

This system came in for criticism also because the best Sal seed growing forest divisions were given to the RMPs. The infrastructure developed by OFDC and TDCC had been damaged in the previous regime and they had to make fresh investment or arrangements. The performance was much below satisfaction as the trade had earned a bad name. The provision of limiting disposal within the state neither revived the sick oil extraction units nor augmented the revenues of the state. There were also the persistently ignored complaints of low payment to the primary collectors. Uncertainty prevailed in the minds of the tribals about getting the right price for Seeds they collect with hard labour.

Agent System

After persistent clamour against it, the RMP system was abolished in 2001. The pre-1995 agent system was restored once again, which is continuing till now. OFDC and TDCC were appointed as the only agents for procurement of Sal seed, dividing between themselves all the divisions where the produce was available with targets fixed before the season. Both the corporations were given the freedom to dispose of Sal seed in any market inside or outside the state to obtain the best price. The Purchase rate has been fixed at Rs. 3/- Kg. The rate of royalty has been pegged at Rs. 250 per MT that will be paid to the state for Sal seeds collected by them. For the year 2002, the state issued a notification allotting all the divisions to OFDC and TDCC. However the targets fixed - 10, 150 MT for TDCC and 8,855 MT for OFDC-were a miniscule percentage of the potential.

The State Government took 7 years to find out a feasible system of sal seed procurement incurring, in the process, colossal loss to the primary collectors and to its own exchequer. A careful analysis of sal seed policy over the last decade very clearly exposes the missionary zeal of the policy makers to promote rich business houses at the cost of the poor tribals. The apparently indecisive and erratic way in which the policy evolved over the years was, in fact, a well thought out design to maximise selfish gains with the willing connivance of the political class.

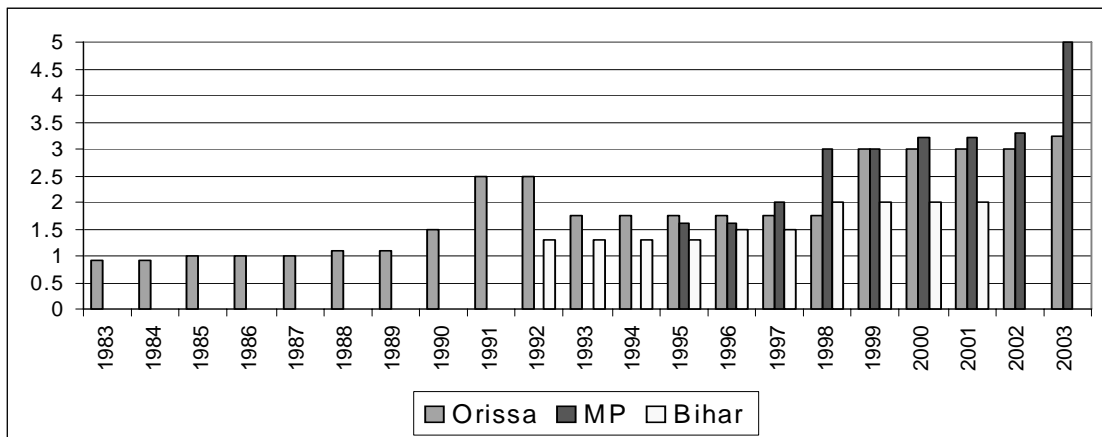
Price Fixation/ Control

After the state nationalised the produce, it formed an empowered committee to decide the purchase rate, rate of royalty and other principles. It has the following members - Additional Chief Secretary as Chairman, with the Finance Secretary, Industries Secretary, Forest Secretary, PCCF, MD of OFDC and TDCC as members. The rate is decided considering factors like the anticipated value of seed during the coming year, quality of Sal Seed estimated, cost of collection in the field, transportation, storage etc., analysing the rate of neighbouring Sal Seed producing states: like M.P., Bihar, and West Bengal and other related Govt. policies.

With nationalisation, the price of Sal seed was fixed at Rs. 0.90 per Kg which, over a period, rose to Rs. 2.5 per Kg. But it was reduced to Rs. 1.75 per Kg with the RMP system. Then in 1999, it was raised to Rs. 3 per Kg and has since remained at that level. The rates fixed by the two neighbouring states are given in the figure.

The collection price of Sal seeds in Orissa has risen by 3 times in 20 years. This is negligible when compared to the hike in the minimum wages and the price of other NTFPs. Because of the cumbersome process involved in its collection, one person, working 8 hours a day, can collect an average of around 6-8 kg of Sal seeds. This amounts to an income of between Rs.10/- to Rs.12/- per day, which is much less than the minimum wages.

To make matters worse, the actual price offered at the grassroots level is much less than what is officially declared. Unlike other produces, Sal seeds are not merely collected from the forest and sold to the agent. They undergo a preliminary round of processing at the primary collector’s level that also requires labour and employs the whole family instead of a single individual. Though the collection price was



finally raised to Rs. 3 per Kg in 1999, no condition were imposed on the RMPs and other agents to raise production.

Trade operations

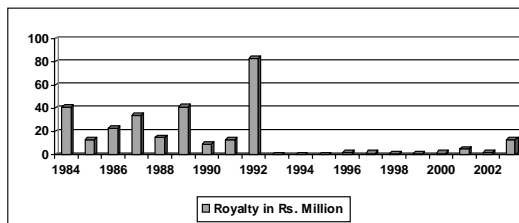
The transport of Sal Seed takes place in 3 phases. The first phase consists of transport from purchase centres/sub centres/ weekly market place to the central godown within the forest division. According to the provision of Rule (1), Permit in Form P1 is to be issued by the DFO or an officer authorized by him in writing. The nominee recommended by the agent for the purpose and duly authorized by the DFO in writing may issue Permit in Form P1 for transportation from collection center to storage godown.

For transportation of Sal Seed to outside the state, the DFO issues permit in form P2. There is no provision in the rules for delegation of the power to issue P2. For transportation of Sal Seed to places other than those stated above, i.e. for transport from one Division to a place outside that Division (but within the state), permit in Form P3 will be issued by the DFO or any officer duly authorized by him. DFO may authorize in writing the recommended nominee of the agent to issue P3 for timely transport of Sal Seed to different places within the state.

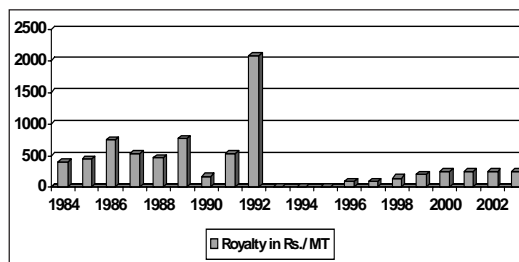
Royalty Collection

The royalty rates have varied from year to year prior to the RMP phase. Interestingly, it has decreased in certain years then the previous

ones. The royalty was not fixed for 3 years from 1993 – 1995 in consideration of high royalty fixed in the previous year i.e. 1992. So accordingly, as shown in the figure, royalty to



the government have varied, reaching its peak in 1992. Though, there has been certain stability in the royalty rates, post 1995, the royalty figures are quite minimal due to both



drastic reduction in procurement as well as the lesser royalty rates.



Notes : ³ Industries like Orissa Oil Industries – Sason, Sambalpur, Orissa Oil Industries – Rairangpur, Mayurbhanj, Priti Oils Ltd. –Rengali, Utkal Oils Ltd. – Ambaguda, Koraput, and Orissa Vegetable Oil Complex – Kesinga were appointed as RMPs for 1995.

⁴ It would be very difficult to say whether it was the realisation of mistake or the change of leadership in the ruling Congress Party that prompted a change in sal seed procurement arrangement in 1999.

Sal seed Utilisation and Technological Developments

Sal seed collection is done in approximately 20-25% of the Sal forest area in Orissa. It provides livelihood mainly to the poor, marginal farmers and landless labourers who collect seeds in the limited time of 30 - 45 days and sell them to the agent in their forest division. In case of a early break of monsoon, the collection time is reduced to even a fortnight. There is no definite periodicity in fruiting behaviour of Sal to fix up a target for constant yield.

The time for Sal seed collection is uniquely positioned between the end of Kendu leaf and mahua collection and the start of *Kharif* operations. During this one and a half months, people normally do not have any other forestry operations. Therefore, sal seed collection provides a good employment for forest dependent people in Orissa and its neighbouring states. As per a calculation, one person can collect up to 10 Kg of Sal seed in a day. In good crop years, the employment generation level goes much beyond 10 million person days. For example, 1978 and 83 were good crop years in Orissa, which generated 16 and 9 million person days of employment respectively.⁵

For long, people have been extracting sal oil using indigenous methods. The most prevalent among them is the boiling process, in which sal seed is boiled in big earthen pots and the floating oil layer is skimmed off. The skimmed off oil layer is then put in a separate pot and used mostly for burning lamp. People also use the oil for cooking after further processing. In some cases, it was used in adulteration of auto

oil and Ghee.⁶ Occasionally, seeds, after boiling and drying, are ground to prepare sal flour, which is consumed by the poor in the interior forest areas during a food crisis. Tribals, since time immemorial, used to extract oil from Sal kernels and Mahua seed/kernels by indigenous compression techniques using split log of Sal or Kusum and keeping the kernels in between. The kernels are then squeezed by tying with Siali fibre rope slings. The expelled oil is then used for cooking. Kernel powder is prepared by pounding in wooden pots. It is normally kept by tribals for use as gruel to serve as a poor man's food.

Commercial usages of sal seed

The financial importance of Sal seed is based on its tremendous and uncharted export potentiality. Before 1967, nothing was known about large-scale commercial use of Sal seed. It was rarely collected and was left uncared for in the forest beneath the canopy of Sal tree and allowed to rot. In the mid sixties, there was scientific research on Sal Seed and its use as raw material for oil and cattle feed was analysed and Orissa became the pioneer in this regard.

Sal fat is greenish brown and has a typical odour. It is largely free from oxidised fatty acid glycerides and contains about 69 per cent symmetrical triglycerides.

Its natural characteristic of remaining hard under room temperature and melting at 35°C body temperature and being edible, makes it particularly useful in the food sector. The fat forms the primary ingredient for a number of

products such as oil, soap, coco-butter that forms a very efficient substitute for manufacturing chocolates, rocket fuel and tanning purposes etc. The Central Committee of Food Standard has also cleared Sal oil (Fat) for confectionery use. Sal fat in Vanaspati ghee is preferred as there is no fear of this fat settling as cholestrol in blood vessels to cause blockage in the heart. Sal fat, being greenish in colour, gives a natural green colour to soap and is hence used widely for making soaps and tanning.

Till recently, most of the best quality Sal oil used to be exported to developed countries where it is used as a substitute for cocoa butter. Mostly, it was exported to Canada, France, Italy, Japan, Malaysia, UK etc. The use of Sal fat is the maximum in Japan. In Japan, the substitute for cocoa butter is made through the Inter Esterification Process; the technology is not available in India. If quality is maintained and free fatty acid (FFA) is below 5% and hydroxglycerides content is less, Sal oil has a tremendous export market. Sal fat is competitive in the export market due to its low price. What also works in its favour is the fact that it is an organic product without pollutants and fertilisers.

The quality of sal oil is dependent on the availability of FFA. The best quality oil, with an FFA of below 3-5%, is used in the chocolate industry and is exported to Japan and the EU (European Union) countries. The best quality oil that cannot be exported has an FFA of 5-7% finds use in the Vanaspati sector. In the

Market prospect of sal fat	%
CBE (cocoa butter equivalent)	50
Vanaspati (Edible Ghee)	10
Soap making	10
Paints and pigments	05
Lubricants, auto oil etc.	03

domestic market, the maximum use of Sal oil is for soap making, if the oil is of inferior quality (FFA of above 7%). Paint/pigment and lubricant manufacturing industries also need Sal oil as raw materials, if the FFA content is above 10%.

The oilcake, though rich in tannins, has been used in proportions of up to 20% in concentrates for cattle without detrimental effects and also as fuel for boiling plants. As the protein remains completely undigested, the oilcake yields only energy. Its high tannin content makes food astringent and causes growth reduction. This can be avoided by the process of solubilisation of tannins or by bleaching it with Ammonia, thereby making tannin ineffective and harmless. Under this process of eliminating tannin, the de-oiled cake

Constitution of DoC	%
Starch	40-50
Protein	10-14
Fibre	04-08
Tanin	06-12
Ash	03-04
Moisture	10-12

loses astringency and becomes palatable. Its nutritional value too increases on Ammonia treatment. This has a good export market as demand for cattle feed is rising. Sal seed cake can constitute up to 10% of poultry and pig rations without changes in performance. It is also used in Textile industries as a sizing material. Last but not the least, it is also a better substitute for wheat and tamarind flour.

A rough estimate of the uses of de-oiled cake shows that 80% of the produce is used as fuel in solvent extraction plant, 3% to 5% is used to make coal briquettes and the rest is used as cattle, poultry and fish feed. However, it is recommended that for the present, the proportion of sal seed meal in the feeds should

not exceed 5 percent by mass in case of poultry and 10 percent by mass in other classes of livestock meal. At present, very large quantities of solvent extracted sal seed meal is being produced in the country.

Export potential of Sal fat

Till nationalisation of sal seed in 1983, the sal oil export figures were fairly low. It suddenly increased as production went up after 1983. But in the last five years, export has suffered again. Though international trade and development indicators suggest that fluctuations in sal oil export is due to availability of substitutes at a cheaper rate, there are feelings within trade circles that the reduced exports is due to the increasing role of government agencies in sal business. In the face of decreasing sal seed procurement for the last five years, the following reasons have been widely attributed for fluctuations in sal oil exports.

1. Organisations responsible for procurement of sal kernel, producers and exporters of Sal oil failed to maintain quality specifications given by the importers. The reason for not being able to keep the specified free fatty acids and hydroxyglycerides in control was the gap between collection of seed and crushing of kernel to oil in the factory - the more the gap, the more is the FFA content and less is the quality of fat.
2. Sal oil is mostly imported by countries for use as a substitute for cocoa butter, known as cocoa butter equivalent (CBE). The rise and fall in prices, quality and quantity of sal oil is also linked to the production and use of cocoa butter (CB) itself in the chocolate and confectionary industries.

3. CBE has been specially designed to replace CB or to be mixed with CB without causing any significant changes to the final quality of chocolate for which it is used. The advantage that CBE has over CB is that it can reduce the high cost of chocolate making, as CBE is cheaper than, CB increasing the export figures of CBE. On the other hand, in the event of a low international CB price and substitutes like milk fat replacers (MFR), which could be used in chocolate making, the export of CBE suffers.
4. Sal oil as a CBE is considered to be of inferior quality in Europe, especially in UK. Therefore, it is considered to be of poor chocolate quality to be included as a CBE.
5. Consistent low price of cocoa beans has led to greater quantity of cocoa being used in chocolate making, increasing the demand further.
6. The control mechanisms introduced by the Indian Government in the form of export floor price has made sal oil price un-competitive in the international market.

EXPORT OF SAL OILS AND FAT		
Year	Qty in MT	Value in Million Rs.
1996-97	1911.00	82.87
1997-98	62.00	3.02
1998-99	87.50	4.49
1999-00	145.00	10.06
2000-01	294.65	22.12
2001-02	1266.50	75.32
2002-03	586.00	40.15

Quality issues and specifications

During the late seventies and early eighties, the two main international buyers of sal oil

were Mitsui (for Asahi Denka) and ISD (Unilever). Both initially purchased crude sal oil but quickly moved on to the refined version as the refining process in India had evolved to handle high FFA material with minimal losses. Sal stearin, which is used to address the high FFA issue, however, came later. Both buyers then used their sophisticated fractionation facilities to produce stearin for inclusion in CBEs. Oil for Japan was purchased directly from Indian extractors, but ISD, capitalising on the multinational benefits offered by Unilever, made a decision to buy through their sister company, Hindustan Lever. Having no extraction facilities, they were forced to buy crude oil from the open market. Though they had refining facilities, the quality of oil still remained an issue both at the domestic and international market level.

Such problems were not unique to Unilever. Quality of sal was, and still is, an issue. Increasing epoxy- and hydroxy-stearic acid levels were identified with poor quality and associated with long storage of seed and oil along with varying - and sometimes high-pesticide levels. These problems stemmed directly from the treatment of the seed during collection and storage, where the harvest was held for long periods of time with inadequate storage facilities awaiting sale and transport to the extractors. The extractors or the solvent extraction plants had to adjust to the quality realities of the CBE market with limited technological capacity as most of them were producing purely commodity oil. Since collection and storage methods decided the FFA content and the FFA content decided the demand for various uses, a trading system evolved whereby oil was shipped against contract only on the approval of the buyer's analysis and acceptance of pre-shipment samples.

Two examples relating to quality issues need a special mention here. The Cadbury industry in UK tried to incorporate sal oil directly into chocolate recipes but found that the Sal oil supplied by its Indian associate was of inferior quality. This resulted in a virtual veto against the use of sal in the UK CBE market. Hindustan Lever, with a view to solving all quality related problems, built an extremely expensive silica refining plant. Though well intentioned, it made sal oil so expensive that it became completely uncompetitive in the international market.

Trade legislations, Technology and uncertain CBE market

Evolution of export control mechanisms

During the early years, the Indian government could not resist the temptation of imposing some control over the trade, supposedly to protect domestic oil markets. This control took the form of an "export floor price", which artificially inflated prices related to competing shea and illipe.⁷ It became more and more difficult to justify the purchase of sal oil under these circumstances, and sal became a marginal purchase in comparison to shea or illipe.

The fortunes of sal were influenced by two factors; the removal of the export floor price and the application of dry fractionation.

The floor price had smothered the potential for Sal relative to shea and illipe. During the late eighties, the Indian government relaxed their protectionist trade policies and sal oil prices dropped to competitive levels. However, misfortune intervened in the form of the lowest shea prices in history, coinciding with the dramatic plunge in cocoa prices. Hence, the benefits of lower pricing were lost.

Growth and evolution of CBE legislation in Europe (largest consumer of cocoa beans) was influenced by a few factors. Some of them are; the main cocoa producers Ivory Coast, Ghana and Nigeria- also export shea; and Burkina Paso and Mali export shea but no cocoa, and form a club of the poorest countries in the world. These West African countries rely heavily on their cocoa exports to Europe. A legislation allowing CBEs in chocolate would only decimate their exports.

To tide over this new problem, a middle path was created. The new EU chocolate legislation of 2000 allowed 5 per cent of cocoa butter in chocolate to be replaced by vegetable fats. Cost was the key factor behind this EU directive. Vegetable fat is much cheaper than cocoa butter providing the manufacturers with a less costly allocation for chocolate formulation. Moreover, vegetable fat could also increase its product range and by extension, the size of the market

Technological development

The dry fractionation of sal for production of sal stearin was a most important innovation from a number of viewpoints. It breached the solvent fractionation barrier. Until this point, the major CBE producers had been secure in the knowledge that their expensive and sophisticated solvent fractionation process was required to produce a stearin suitable for inclusion in CBE recipes. Now, an inexpensive dry fractionation process, available "off the shelf", could produce an acceptable CBE component, which, moreover, was readily available in the open market. This had tremendous impact on the market for illipe butter. Moreover, the importers realized that Illipe crops were variable and unreliable, and availability and price levels of the butter were volatile. They thought it could be risky to develop a CBE business on the basis of such

an unreliable single SOS component. The way was now open to develop a CBE business with relatively low capital cost based on readily available CBE components available in the open market.

Dry fractionated stearin yields were almost twice those of shea stearin, although it must be admitted that inclusion levels in CBE were somewhat higher. Secondary fractions or olein values were much higher in a protected Indian market than in a free-trading Europe, thus boosting process returns. Finally, important for the extractors in India, it increased the value of exports.

Uncertain CBE market

Continued low cocoa butter prices and Eastern Bloc monetary problems had plunged the CBE market into the doldrums in the early 90s. Whereas the previous entry barrier had been the prohibitive cost of solvent fractionation, the modern equivalent was the sheer unprofitable nature of the CBE market. The fat margins had disappeared. Chocolate producers were quite content to remain with cheap cocoa butter and the main markets declined or at best were static. The only possible expansion opportunity would be if the EU speedily harmonised the inclusion of vegetable fats in chocolate.

By the mid' 90s, the CBE industry faced several challenges. A low cocoa butter price scenario with a consequent squeeze on margins, depressed global CBE market with the retraction in Eastern Bloc markets and the replacement of CBEs by MFRs (Milk Fat Replacers) in the UK. It was during this time that the expansion of CBE market got delayed by the inability of the EU to agree on CBE or vegetable fat inclusion in chocolate. On the other hand, although times were difficult, there were some opportunities:

- The acceptance by the chocolate industry of sal stearin as a CBE component, with consequently reduced capital and operating costs to the CBE producer;
- The historically wide availability and low prices for shea and sal resulting from the global SOS material surplus;
- The continued support by the chocolate manufacturers to the CBE producers, and their willingness to explore alternative SOS based products for varying chocolate applications.
- The chocolate producer benefits from lower raw material prices;
- The end consumer benefits from lower chocolate prices.
- Poor exporting countries face lower export revenues;
- CBE producers barely cover processing costs to remain competitive and employees lose their jobs as facilities are closed down to cut costs.

Impact on Sal seed collection

Now the biggest and probably the most crucial question is how does domestic or international trade of sal fat influence sal seed collection or *vice versa*? A good sal fat market is dependent upon uncompetitive cocoa butter prices as well as low price and non-availability of CBE products. The trade of sal oil/fat is dependent on cocoa butter and other CBE produces and also dependent on its cost-effective and inexpensive production process. Besides, since quality of Sal fat has been dependent on collection, primary processing, storage and transport practices, the extent Sal fat's acceptance as a CBE in the international market depends on how good and effective has been these practices.

The losers in the process are;

- Collectors get much lower prices for the nuts or butter;
- Middlemen have their margins squeezed as quantities and prices are reduced by buyers;



Notes : ⁵ Patri is a small village in Umerkote range, which is the major sal seed growing area of Nabrangpur forest division in Nabrangpur district. To the family of Suna Gouda with 7 members, sal seed provides supplementary income. His main occupation is cultivation and daily wage labour. The family depends on Sal seeds for about months when there is no wage/employment in the area. Mostly, it is the husband and the wife who collect the seeds. But sometimes, their 2 children also accompany them. The forest from where they collect the seeds is at a distance of 2 kms from their village. It takes them half an hour for the to and fro journey to the forest and they collect Sal seeds for 8 hours. The family collects up to 60 kgs of seeds per day. After decortications and drying for 2 days, it is sold at the rate of Rs.3.25/ per kg.-. Thus, the family of Suna Gouda involved 30 days in seed collection for about 3 months, earns about Rs. 2000/- to Rs. 2200 in one season.

⁶ During the course of the study, some business houses associated with sal oil extraction admitted that it is now used to adulterate automobile engine oil, especially in western Orissa.

⁷ Shea and Illipe seeds are found mostly in West African countries like Burkina Faso and Mali. These fats are also used in chocolate confectionary industries as CBE.

Major issues in procurement and trade

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A discussion on procurement and trade of Sal seed would have to focus on issues like ambiguous procurement policy framework, ever diminishing production figures, perennially low collection price, lack of processing facilities and-most importantly-lack of involvement of the State Government in promoting sal seed trade within and outside the state. What needs to be debated is the issue of reviewing the policy framework, monitoring production, negotiation with traders, importers and neighbouring states, etc. Unfortunately, our policy makers have failed miserably in addressing these issues. The indifference and lack of foresight on the part of our policy makers is an eye opener for all those who thought that the RMP system was a step towards promoting industrial bases within the state using sal seed as a raw material. Far from giving a boost to industry, this was the period (1995-98) which marked an all time low production, low and erratic payment to primary collector. More importantly, there was no initiative by the state to actually monitor industrial development through growth indicators like oil production, turn over etc which was one of the major objectives of the RMP policy. This goes to prove that the introduction of the RMP system was prompted by considerations other than promotion of the trade and better payment to the collectors.

Procurement policy

Next to Kendu leaf, Sal leaf and Bamboo, Sal seed contributes the most to the income of forest dwellers. But the state of Orissa is yet to devise a stable arrangement for Sal seed collection. The policies have been mostly ad-hoc in nature, to be changed and modified frequently

to suit the interests of the powerful stakeholders. Besides, sal seed does not have an independent guiding legislation like other nationalised produces. Though it has been

Period	Average Production in MT	Leasing System
1983-94	32, 219.774	Agent system
1995-98	14027.92	RMP System
1999-00	6126	RMP/ Agency
2000-03	21997	Agent system

Source: PCCF Office, Bhubaneswar.

officially declared as a nationalized produce, its trade follows the pattern of the specified produce where the primary collectors come in direct contact with the procuring agent.

The Sal seed season starts in mid May and continues till end June. The flowering starts in early March each year and the assessment of the potential is done by end March. This means that a rough estimate is sent to the Government by early April. But the sal seed policy invariably comes in the third week of May. By the time the tender and trade negotiations are over with the agents, it is almost June and half the season is over by then. By the time actual procurement operation starts, it is early June and the advent of pre-monsoon rains results in low procurement in terms of both quantity and quality. Besides, sal seeds are collected only from the operationally profitable areas. In the absence of assured procurement at fair price, the primary collectors have stopped collecting the seed. All these factors put together have resulted in substantial reduction of Sal seed procurement.

Diminishing production and procurement

The continuing lack of a consistent and proper procurement policy has seriously affected production. The accompanying table is a comparison of average procurement figures since nationalisation. It shows in no uncertain terms that procurement during the RMP phase went down to an all time low. There is no denying the fact that the potential of sal seed to enhance the income of primary collectors remains grossly underutilised. Collection is done in only 20-25 % of sal forest in the entire State. As discussed earlier, the reasons for low production is low payment and erratic procurement. As TDCC or OFDC collect through NGOs and self-help groups (SHG), procurement is dependent and limited to the reach and presence of these groups. Remote areas remain untouched and do not have any procurement arrangements. Moreover, uncertainty over procurement often continues well into the middle of the season. This drives primary collectors to other wage earning options. Besides, constant and consistent loss of sal forest, especially the trees with bigger girth, further accelerates the process of diminishing production.

Low collection price

The collection price of sal seeds stagnated at Rs. 1.75/- per kg for almost a decade whereas the minimum wages and the price of other NTFP witnessed normal growth. From nationalisation till 2003, the average collection price has remained at an atrociously low level of Rs. 1.84/- per kg. There has been no effort by the policy makers to review the price structure in a way that would suit the primary collectors.

Due to the cumbersome process⁸ involved in its collection, working 8 hours a day, a person, can collect an average of around 8-10 kg of sal seeds. This amounts to an income of between Rs.15/- to Rs.18/- a day, even on the basis of

the declared price. This is nowhere near a survival wage for the collector's family and is much less than the minimum wage. But this blatant denial of the survival rights of millions is persistently ignored by the authorities, who fix the collection price for sal seeds.⁹

The stakes in sal seed trade are higher for the primary collectors because of the extra labour that they put in. It won't be an exaggeration to say that over the years, Sal seeds collection and trade have become a liability for the tribals rather than a boon. In 1995, the price paid to the primary collectors was reduced from Rs 2.5 per Kg to Rs 1.75 per Kg on the plea of reviving solvent extraction plants and saving the employees of these plants from perury. It is worth mentioning here that during that period, the concerned plants provided employment to only 300 people in total. The state claimed that this initiative would provide revenue to the tune of Rs. 1.05 crores. But the loss to the primary collectors was to the tune of Rs. 2.1 crores, considering that the combined capacity of all the solvent extraction plants was 42,000 tons.¹⁰

Processing and quality control

It is interesting to note that till date, none of the Sal seed policy updates has been remotely mentioned about processing, the most important aspect of the trade.

At one time, policies restricted the flow of unprocessed Sal seeds across the border. Targets were fixed for RMPs with regard to collection of Sal seeds. But no such target was fixed for the quantity of oil extracted from the seeds, providing unfettered discretion to these RMPs in processing. The solvent extraction plants were under no obligation to furnish any record regarding the amount and volume of oil extracted. Moreover, the state never tried to find out what steps the sick industries had

taken to come out of sickness. This gave RMPs the opportunity to smuggle out Sal seeds to the bordering state of Madhya Pradesh (now Chattisgarh) where the rates were high. It cannot be a mere coincidence that all the SEPs in Orissa are strategically located in the bordering districts.¹¹

Most of the SEPs are sick and are not running to their capacity. Even after all restrictions and conditions on processing were withdrawn, sal seed trade does not seem to have taken off in recent years. Oil production is gradually coming down. Only one solvent extraction plant, Priti Oils, is operational at the moment.

Due to improper collection, primary processing, storage and transport methods, the sal oil produced invariably has a very high FFA content, which is considered highly uncompetitive as an export product. One area of concern in sal seed processing is the time taken between collection and shipment to factories for crushing. The smaller the gap between collection and crushing, the higher is the quality of the oil. The ideal gap is 72 hours, for getting low FFA level sal oil. The process of procurement and shipment to traders is so lengthy that the gap, at times, goes beyond 4-5 months. The primary collectors collect the kernel, give it to the self-help groups, the agent collects from them, then the first tender, second tender and so on. During this time, the kernels are stored in godowns with or without proper storing facilities. It is interesting to note that some domestic trading houses and exporters have put a ban on procurement of oil from kernels collected from

Orissa. They only prefer to buy oil from industries that use kernels collected from the forests of Chattisgarh and MP. For example, according to Priti Oils, the Kolkata-based Mitsui Co Ltd, which is a premier exporter of sal oil/fat, refuses to buy oil from them on the ground of poor oil quality.¹²

Apart from storage and transport, timely collection and primary processing techniques also play an important role in enhancing oil quality. The quality of oil increases if the kernel has a certain minimum moisture content. In a relatively dry season, the seed is 60-80% dry at the time of fall. Minimum processing and storage in a dry place would enable the kernel to achieve the desired dryness. Of late, it is being suggested that in order to collect a dry kernel, the seed should not be burnt which affects the quality of kernel and the FFA content.

A crucial aspect of the trade has been the monopoly of the exporter(s). As of now, there is only one exporter who collects sal oil from the eastern and central Indian extraction plants. The quality standards and the price that it quotes are, for all practical purposes, non-negotiable.



Entry tax issue

Prior to 2003, there was no specific tax arrangement like entry tax, except for a 4% sales tax on the sale price for shipment of sal seeds/oil. In 2003, Chattisgarh imposed a 25% entry tax on Sal seed from Orissa with the obvious intention of stopping its entry to the State. In 2003, the Chattisgarh Government

raised the sal seed procurement price from 3.50/ per kg to 5/ per kg. When the buyers started complaining about this unrealistic price, in the fear of unsold stocks, the State banned entry of sal seeds from neighbouring states through imposing an entry surcharge of 25%.¹³



Notes : ⁸ Processing of sal seeds at the primary level is fairly difficult because of its physical constitution. After collection, the seeds are dried which takes two days. Then they are crushed and the wings are removed manually. These decorticated seeds are then sold to the agents. This process of kernel collection is highly unwieldy. Besides, the ratio of kernel production out of the seeds is almost 2:1 i.e., one kg of kernel is fetched from 2 kg of seeds. If a family of four people collects 20 kg of seeds, after three days 10 kg of kernel is collected and sold to the agents in Rs. 1.75/- per kg. If they get the declared price, their average income is less than Rs.10/ per day.

⁹ The State Government had decided to form an Advisory Sub-Committee specifically for the purpose under the provisions of section 6 of Orissa Forest Produce (Control of Trade) Act, 1981 to discuss the question of fixing the minimum wages in respect of sal seed collection, assessment of royalty etc. The committee was supposed to sit on the 18th and 19th May 1995. But without waiting for the decision of the Advisory Sub-Committee, sub-lease agreements were executed by OFDC and TDCC with the RMPs on 17th May 1995. This clearly indicates that the formation of the sub-committee was merely an eyewash and the State Government had no intention whatsoever of interfering with the low payment situation in the field.

¹⁰ In the 1999 crop year, the collection price was raised to Rs. 3/, which created a deadlock in collection. The hike in price was considered improper and unacceptable and the RMPs, sought the help of the judiciary. This resulted in massive loss of revenue for the state and livelihood for the tribals as during the prime collection season, the fate of Sal seed trade was locked up in the four walls of the High Court creating utter confusion with regard to procurement.

¹¹ The difference in rates per MT of sal seeds between Orissa and MP is quite high. While it is Rs. 2310/- in Orissa, it is almost Rs. 6000/- in MP. According to some senior level forest officials, 'some RMPs smuggle out the seeds to a few SEPs in MP. At one level, on procuring less than the target, they pay a sum of Rs.50/- as fine per MT, On the other, they smuggle sal seeds at Rs. 4200/- per MT. In the early part of 1997 Hanuman Vitamin Foods reportedly confessed that it decided to start an SEP in Bargarh to avoid payment of that extra Rs. 1900/- that it was paying to these units. This was apparently the sole propelling factor to participate in trading of sal seeds. Needless to say that these SEPs lose Rs.250/- (Rs.200/- per MT as royalty and Rs.50/-per MT as fine) on non-procurement of sal seeds and get Rs. 1900/-per MT by just selling it across the border'.

¹² Collected on the basis of Information discussion with Mr. S. Agarwal, Priti Oils, Rengali

¹³ Owing to the hike in price and the entry surcharge, only 8178 quintals could be sold. Though nearly 550 million INR was spent for collection of sal seeds, the expected income from sale of total produce is only 22 million INR. In the process, the expected loss for the Chattisgarh Government would be to the tune of 300 million INR. The corresponding loss to Orissa was between 10-15 million INR.

Suggested recommendations

Over the last decade, sal seed policy has been blatantly inegalitarian and patently anti-poor. It has adversely affected rural economy as well as production. However, the recent restoration of the agent system has brought semblance of order and justice in the trade by raising production figures and collection price, though the production figures are still much less than the targeted procurement.

Collection, processing and storage

- The procedure of collection, primary processing, storage and fat extraction needs to be streamlined for higher productivity with low FFA and pesticides level.
- Primary collectors should be trained on sustainable harvesting, processing and storage methods to raise product quality. For example, they should be trained not to use Malathin for fumigation, keep the kernels loose while storing and only pack them during transportation.
- Extraction of starch from the oil cake may add to the income of the processing industries.
- Government agencies should take over at least one sick solvent extraction plant and start processing oil on an experimental basis. The possibility of a joint venture can also be explored with strict monitoring measures.

Procurement policy and arrangement

- Since the flowering of Sal takes place in early March, production targets and rates should be fixed well in advance to avoid confusion about the declared price and to attract more traders from outside the State. Experience shows that the collection season starts from mid - May but the price is fixed only towards end-May.
- The sal seed procurement should be long term, consistent and should not be based on adhoc mechanisms as it is now.
- It is also important that agents are given particular forest divisions for a longer period of time and no intermittent changes in division allotment are done as a lot of manpower and money is spent in infrastructure building and other procurement processes.
- Efforts should be made to increase the procurement to 50% of the sal forest. This will raise production and pay dividends to the primary collectors.
- Free trade with licensing facility may improve primary processing and storage and hence a better end product, ensuring better price for the primary collectors and the processing industries.
- Procurement of sal seeds needs to be properly organised. Primary

collectors should be informed well in advance about the procurement agent, center, price etc.

- Since sal is a regional forest produce influencing primary collectors, traders and the State agencies at a regional level, there should be some efforts for common policy and programme in Madhya Pradesh, Chattisgarh, Orissa and Jharkhand. This will certainly raise procurement level, price, enhance quality of processed goods, and returns to the State exchequer and primary collectors.
- Problems in the present procurement arrangement should be identified and addressed to enhance procurement. Effective practices like instant payment and regular procurement should be introduced.
- Corporations should streamline their procurement and not allow the kernels to be stored at the SHG level. Efforts should be made to minimise the gap period between collection and processing at the factory to enhance the quality of oil.

Market promotion

- Unless Government corporations start operating as market promotion bodies, no substantial gains can be achieved in the trade in sal seed. Instead of only being procuring outfits, they should get involved in trade expansion by identifying more traders. More traders would mean greater demand and increase in production and more people depending on sal seed collections.
- Government should start thinking in terms of a product research and quality assessment team comprising of forest

officers, and researchers with special expertise on taxonomy, which will take up research on product development.

- A collective effort is required to break the monopoly of one exporter. Some efforts should be made for direct contact and negotiations with export houses and chocolate industries abroad for sale of sal fat/oil.

Research and development

- Research institutes in India should take up comparative studies on the quality of chocolate prepared from sal fat vis-à-vis other cocoa butter substitutes and publish the findings to counter the allegations of sal fat being an inferior substitute.
- Both State and non-state agencies should engage themselves in studying traditional collection, processing and storage practices, which are known for being sustainable and productive, and for producing a better quality of oil.
- Further research needs to be undertaken on sal fat constituents and its various usages in different food and confectionary industries. Special efforts should be given to product development research that would look for opportunities for better domestic market for sal fat, especially when the international market is so unpredictable.
- Besides, research should also be carried out on how collection, primary processing, storage and transport affect the product quality. The influences of each activity should be made public. On the basis of its findings, primary collectors should be trained and primary processing should be strengthened.

- State agencies and the Forest department are extremely poor in product development research. Efforts should be made on a priority basis to initiate product development research and link them to the market.
- The Regional Research Laboratory should be equipped to take up research on quality of forest produces. With regard to sal seed, FFA testing facilities would be extremely helpful to processing plants that mostly depend on the exporter for this test. This reduces the bargaining abilities of the extraction plants as the testing and the buying authorities are the one and the same.
- Government should think of some industrial promotion packages for sal oil extraction plants with checks and balances. Strict monitoring of production, growth, turn over and returns may be thought of.
- Certification of sal fat/oil may help in selling the produce in the competitive market.



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- ◆ *Bhuin Nimba* (*Kalmegh- Andrographis paniculata*)
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RCDC has a website known as www.banajata.org that deals with NTFP procurement and trade at a regional level. The site carries market informations including traders' list, market price, trading centres and information on important NTFP markets in the country.



About us

Goals

- ◆ to develop understanding and capacity to sensitise various development stakeholders including NGOs, PRIs, the bureaucracy and the government on the intricacies of development issues and policies
- ◆ to assess devolution of power and strengthen PRIs at various levels in at least two districts of the state and to help others do the same in other districts for decentralised governance
- ◆ to enumerate, map out and strengthen management of natural resources by communities in Orissa through collaboration with others

Objectives

- ◆ to play a watchdog role in the development process in Orissa.
- ◆ to function as an applied resources centre on natural resource management (NRM) and environment with special attention to bio-diversity conservation
- ◆ to promote the concept of forest as a development resource and community forestry initiatives.
- ◆ to facilitate greater democratic decentralisation of development and resource management.
- ◆ to work towards devolution of real power to the communities and Panchayati Raj Institutions (PRIs)
- ◆ to ensure food security in the drought-prone areas of Western Orissa

Strategy

- ◆ collaboration with various government departments and agencies, NGOs and individuals in an effort to work out a common development agenda
- ◆ working with institutions and experts in the field to analyse policy as part of its role as watchdog, initiation of debate on various development issues and evolving an effective mechanism for prompt response to them, working with mass organisations-both local and international-towards information dissemination, awareness generation, advocacy and lobbying to influence policy in the interests of the poor.
- ◆ exploration of alternative media
- ◆ building up strategic interface and alliance with bureaucrats
- ◆ strengthening citizens' action groups
- ◆ organisation of public forums and hearings
- ◆ mainstreaming gender as an organisational strategy in all developmental interventions
- ◆ periodic overhaul of the organisational structure as per changes in perception