POST HARVEST PROFILE OF PADDY/RICE

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1.0 INTRODUCTION

Paddy is the most important and extensively grown food crop in the World. It is the staple food of more than 60 percent of the world population. Rice is mainly produced and consumed in the Asian region. India has the largest area under paddy in the world and ranks second in the production after China. Country has also emerged as a major rice consumer.

Rice is primarily a high energy calorie food. The major part of rice consists of carbohydrate in the form of starch, which is about 72-75 percent of the total grain composition. The protein content of rice is around 7 percent. The protein of rice contains glutelin, which is also known as oryzenin. The nutritive value of rice protein (biological value = 80) is much higher than that of wheat (biological value = 60) and maize (biological value = 50) or other cereals. Rice contains most of the minerals mainly located in the pericarp and germ and about 4 percent phosphorus. Rice also contains some enzymes.

Table No. 1: Nutritional value of edible portion of rice per 100 gram.

Type of Rice	Energy (cal.)	Protein (g)	Fat (g)	Ca (mg)	Fe (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)
Raw (milled)	345	6.8	0.5	10	3.1	0.06	0.06	1.9
Parboiled (milled)	346	6.4	0.4	9	4.0	0.21	0.05	3.8
Flakes	346	6.6	1.2	20	20.0	0.21	0.05	4.0
Puffed	325	7.5	0.1	20	6.6	0.21	0.01	4.1

Source : Nutritive value of Indian Foods, by Gopalan, C. et al., (1971), Indian Council of Medical Research Publication, pp.60-114

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1.1 Origin :

In India, paddy has been cultivated since ancient period. According to De Candolle (1886) and Watt (1892), South India was the place, from where cultivated paddy originated, whereas Vavilov (1926) opined that India and Burma should be regarded as the center of origin of cultivated paddy.

Botanical Description :

Rice botanically belongs to *Oryza sativa* L. of Gramineae family. Paddy is a self-pollinated crop. A complete seed of rice is called paddy and contains one rice kernel. Outer layer of rice shell is called husk. The next layer is called rice bran and the innermost part is called rice kernel.

There are two most important cultivated species of paddy namely i) *Oryza sativa* and ii) *Oryza glaberriumn.* There are around 18 wild species of paddy grown in the continents of Asia, Africa and America. While *Oryza sativa* is grown in most parts of the Asian and American continents, *Oryza glaberriumn* is grown only in Africa.

There are three sub species of paddy in the world i.e. *Indica* (long grain), *Japonica* (round grain) and *Javanica* (medium grain). *Indica* rice is grown in warm climate zone of Indo-China, India, Pakistan, Thailand, Brazil and Southern U.S.A., *Japonica* is mostly grown in cold climate zone of Northern China, Korea, Japan and California. The *Javanica* is grown in Indonesia only.

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1.2 Importance :

In world paddy production, Asia's share is more than 90 percent. Paddy is a primary foodgrain crop of India and occupies about 37 percent of the area under foodgrains and contributed more than 40 percent of foodgrains production in the country during 2000-01. More than 50 percent of country's population depends fully or partially on rice as it constitutes the main cereal food crop of the diet. During 1999-2000, in the states like Andhra Pradesh, Assam, Kerala, Orissa, Tamil Nadu and West Bengal, rice consumption accounted for more than 80 percent share in total cereal intake.

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2.0 PRODUCTION

2.1 Major producing countries in the world :

Paddy is cultivated in more than 100 countries in the world. During 2000, paddy occupied an area of 156 million hectares in the world with production of 5,98,852 thousand tonnes. Paddy is mainly produced in Asian countries (91percent). China is the largest producer of paddy accounting 31.76 percent of total world production followed by India (22.40 percent). Together these two countries, accounted about half of world paddy area and production. Indonesia (8.52 percent), Bangladesh (5.98 percent), Vietnam (5.44 percent), Thailand (3.91 percent) and Myanmar (3.34 percent) are the other major paddy producing countries. In case of productivity, Egypt ranks first with 9086 kg/ha followed by USA (7037 kg/ha), Japan (6702 kg/ha) and Korea Rep (6592 kg/ha). Area, production and average yield of major paddy producing countries during 1998 to 2000 are given below.

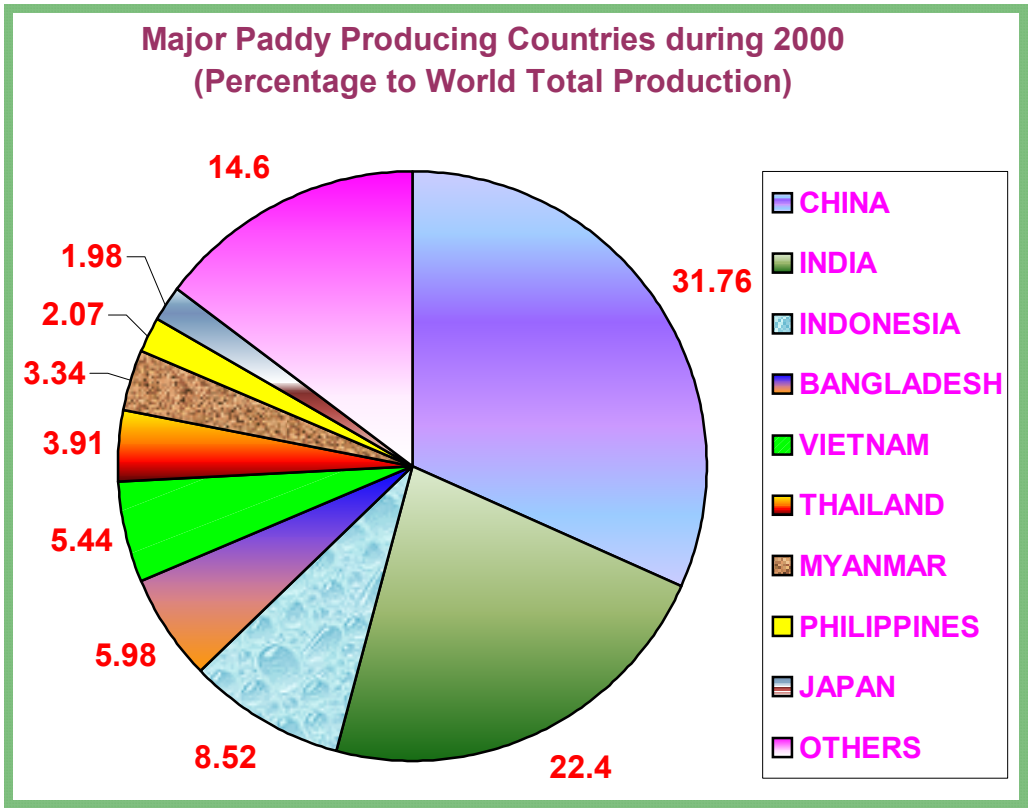

Table No. 2: Area, production and average yield of paddy in the major producing countries.

Name of Country	Area ('000 Ha)				Production ('000 tonnes)				Yield (Kg/Ha)		
	1998	1999	2000	% to world	1998	1999	2000	% to world	1998	1999	2000
1.Bangladesh	101116	10708*	10700	6.96	29708	34427*	35821	5.98	2937	3215	3348

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2.Brazil	3062	3840	3672	2.39	7716	11783	11168	1.86	2520	3068	3041
3.China	31572	31637	30503	19.84	200572	200403	190168	31.76	6353	6334	6234
4.Egypt	515	655	660	0.43	4474	5817	5997	1.00	8693	8880	9086
5.India	44598	44607	44600	29.01	128928	132300	134150	22.40	2891	2966	3008
6.Indonesia	11716	11963	11523	7.49	49200	50866	51000	8.52	4199	4252	4426
7.Japan	1801	1788	1770	1.15	11200	11469	11863	1.98	6219	6414	6702
8.Korea Rep.	1056	1059	1072	0.70	6779	7271	7067	1.18	6417	6868	6592
9.Myanmar	5459	6211	6000	3.90	17077	20125	20000	3.34	3128	3240	3333
10.Nigeria	2044	2061	2061	1.34	3275	3277	3277	0.55	1602	1590	1590
11.Pakistan	2424	2515	2312	1.50	7011	7733	7000	1.17	2893	3074	3027
12.Philippines	3170	4000	4037	2.63	8554	11787	12415	2.07	2698	2947	3075
13.Thailand	9900	10080	10048	6.53	22784	23313	23403	3.91	2301	2313	2329
14.Vietnam	7363	7648	7655	4.98	29146	31394	32554	5.44	3959	4105	4253
15.USA	1318	1421	1232	0.80	8366	9345	8669	1.45	6347	6575	7037
Asia	**136620**	**139908**	**137600**	**89.49**	**531279**	**552234**	**545477**	**91.09**	**3889**	**3947**	**3964**
World	**152002**	**156462**	**153766**	**100**	**578785**	**607780**	**598852**	**100**	**3808**	**3885**	**3895**

Source : Food and Agriculture Organisation (FAO) Production Yearbook, 2000, Vol. 54.

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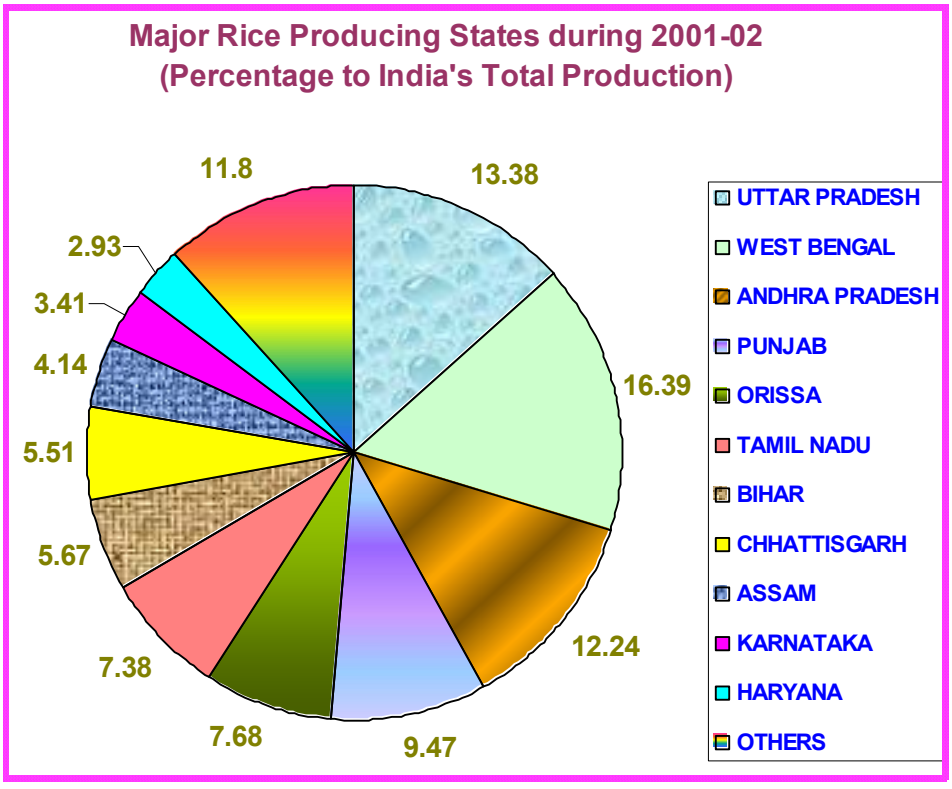
2.2 Major producing states in India :



During the year 2001-02, India accounted for 44622 thousand hectare area with production level of 93084.5 thousand tonnes of rice. It has been observed that West Bengal, was the largest rice producer (16.39 percent) during 2001-02, followed by Uttar Pradesh (13.38 percent), Andhra Pradesh (12.24 percent), Punjab (9.47 percent), Orissa (7.68 percent) and Tamil Nadu (7.38 percent). In area, West Bengal ranked first with 13.60 percent of total area followed by Uttar Pradesh (13.17 percent), Orissa (10.08 percent), Andhra Pradesh (8.57 percent), Chhattisgarh (8.37 percent) and Bihar (8.00 percent). Whereas, in productivity, Punjab stood first with 3545 kg/ha followed by Tamil Nadu (3263 kg/ha) and Andhra Pradesh (2978 kg/ha). Area, production and average yield of major rice producing states during 1999-2000 to 2001-2002 are given in Table No. 3.

Table No. 3: Area, production and average yield of rice in the major producing states during 1999-2000 to 2001-2002.

Name of State	Area ('000 Hectares)	Production ('000 Tonnes)	Yield (Kg./Ha.)

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	1999-2000	2000-01	2001-2002		1999-2000	2000-2001	2001-02		1999-00	2000-01	2001-02
			Final	%			Final	%			Final
1.Andhra Pradesh	4014.2	4243.0	3825.0	8.57	10637.8	12458.0	11390.0	12.24	2650	2936	2978
2.Assam	2646.0	2646.3	2528.5	5.67	3861.0	3998.5	3854.3	4.14	1459	1511	1524
3.Bihar	5001.8	3656.3	3568.8	8.00	7251.9	8164.1	5281.6	5.67	1450	2233	1480
4.Chhattisgarh	NA	3796.7	3734.6	8.37	NA	2369.3	5132.6	5.51	NA	629	1374
5.Haryana	1083.0	1054.0	1027.0	2.30	2583.0	2695.0	2724.0	2.93	2385	2557	2652
6.Jharkhand	NA	1481.0	1481.0	3.32	NA	1644.7	1644.7	1.77	NA	1111	1111
7.Karnataka	1449.8	1483.4	1418.0	3.18	3716.7	3846.7	3170.0	3.41	2564	2593	2236
8.Madhya Pradesh	5354.2	1707.6	1755.4	3.93	6376.5	982.1	1663.6	1.79	1191	575	948
9.Maharashtra	1519.8	1511.4	1514.2	3.39	2558.9	1929.2	2651.3	2.85	1684	1276	1751
10.Orissa	4601.8	4434.0	4500.0	10.08	5187.0	4614.0	7148.4	7.68	1127	1041	1589
11.Punjab	2604.0	2611.0	2487.0	5.57	8716.0	9154.0	8816.0	9.47	3347	3506	3545
12.Tamil Nadu	2163.6	2080.0	2106.4	4.72	7532.1	7366.3	6872.8	7.38	3481	3541	3263
13.Uttar Pradesh	6080.0	5907.1	5876.8	13.17	13231	11679.2	12458.5	13.38	2176	1977	2120
14.West Bengal	6150.4	5435.2	6069.1	13.60	13759.7	12428.1	15256.7	16.39	2237	2287	2514
15.Others	2493.1	2665.0	2730.2	6.12	4271.3	4368.9	5020.0	5.39	---	---	---
All India	45161.7	44712	44622	100.00	89682.9	87698.1	93084.5	100.0	1986	1961	2086

Source : Department of Agriculture and Cooperation, New Delhi.

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2.3 Zone-wise major commercial varieties :

Table No. 4: Basmati and recent hybrid varieties.

Basmati Varieties	Pusa Basmati, Kasturi, Haryana Basmati, IET 15391, IET 15392, IET 13846, IET 13548, IET 13549, IET 14131, IET 14132, IET 15833, Basmati 370 (Punjab Basmati), Taraori Basmati (HBC 19), Type 3 (Dehradun Basmati), Karnal Local, Basmati 385, Basmati 386
Hybrid Varieties	DRRH-1, HRI-120, CORH-1, CORH-2, PHB-1, PHB-71, PA-6201, KRH-1, KRH-2, Pant Sankar Dhan-1, Sahayadri, ADTRH-1, APHR-1, MGR-1, PHR-10, CRH-1

Table No. 5: Popular commercial varieties and non-Basmati aromatic varieties of rice.

Popular commercial varieties	Non-Basmati aromatic varieties
I. North-Western Zone : (Punjab, Haryana, Rajasthan, Himachal Pradesh, J. & K.)	
Jaya, PR-103, PR-106, PR-113, PR-114, PR-115, PR-116, IR-8, IR-64, HKR-126, Vikas, Pant Dhan-16, Pusa-44, Puja-677, Ratna, BK-190, Jaya, Chambal, Kaveri, Vivek Dhan-82, Palam Dhan-957, China-1039, Ratna, IET-1410	Kesar, Kamod, Kala Badal, Nawabi Kolam, Madumati, Muskh Budgi, Khusabu,
II. North-Eastern Zone : (Uttar Pradesh, Bihar, Orissa, Assam, West Bengal)	
Pant Dhan-4, Pant Dhan-12, Pant Dhan-16, Vikas, Sarju-52, Pusa-834, Pusa-2-21, Narendra Usar-3,	Duniapet, Kala Sukhdas, Kalanamak, Hansraj, Tilak Chandan, Bindli,

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Narendra-97, Narendra-359, Malviya-36, Mahsuri, Kushal, Bahadur, Ranjit, Kiran, Sudha, Gautam, Rajendra Dhan-201, Turata, Prabhat, Kanak, Janki, Rajshree, Vandana, Ananda, Subhadra, Annapurna, Sakti, Pankaj, T-90, BAM-6, Parijat, CR-1009, CR-1014, Mahalakshmi, Manika, IR-36, IR-42, IR-64, Mansarovar, Pranava, Bhupen, Heera	Vishnuparag, Sakkarchinni, Lalmati, Badshah Pasand, Badshabhog, Prasad bhog, Malbhog, Ram Tulsi, Mohan bhog, Tulsimanjari, NP 49, T 812, Randhunipagal, Kataribhog, Bansmoti, Sitabhog, Gopalbhog, Govindabhog, Kaminibhog
III. Central Zone : (Madhya Pradesh, Gujarat, Maharashtra)	
Kalinga-3, Mahamaya, IR-36, IR-64, Kranti, RS-74-11, Ananda, Aditya, Jaya, Karjat-3, Karjat-184, Ratnagiri-1, Ratnagiri-24, Ratnagiri-71, Ratnagiri-185-2, Sakoli-1, Palghar-1	Chattri, Dubrai, Chinoor, Kali Kamod, Baspatri, Kali Mooch, Kamod 118, Pankhali 203, Kolhapur Scented, Ambemohar 102, Ambemohar 157, Ambemohar 159, Krishnasal, Pankhali 203, Kamod, Jirasel
IV. Peninsular Zone : (Andhra Pradesh, Tamil Nadu, Kerala, Karnataka)	
Pusa-834, Moruteru Sannalu (IET-14348), Jaya, NLR-30491, Suraksha, RGL-2538, NLR-30491, Bhadrakali, Bhadra, KAU-1531, Swarnaprabha, Jyothi, Masoori, Mangla, Prakash, IIT-7575, IIT-8116, IR-30864, Puspa, Hemavati, KHP-5, Akash, Karjana, Mahatriveni, Kairali, ADT-38, ADT-40, ADT-43, PMK-1, PMK-2, TKM-11, CO-47, IR-20, IR-50	Amritsari (HR 22), Sukhda (HR 47), Kaki Rekhalu (HR 59), Kagasali, Sindigi, Local, Jeeraga Samba

Varieties of International Demand :

India exports both Basmati and non-Basmati varieties but India's Basmati rice is famous in the world. The varieties, which have good demand, are furnished as under.

Table No. 6: Varieties of International Demand.

Traditional verities	New varieties
Basmati 370, Basmati 386,Type-3, Taraori Basmati (HBC-19), Basmati 217, Ranbir Basmati (IET 11348)	Pusa Basmati (IET10364), Punjab Basmati - 1 (Bauni Basmati), Haryana Basmati-1 (HKR-228/IET10367), Mahi sugandha, Kasturi (IET-8580).

3.0 POST-HARVEST MANAGEMENT

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3.1 Post-harvest losses :

It is estimated that about 10 percent of foodgrains produced in India, are lost in processing and storage. It has been reported that about 9 percent of paddy is lost due to use of old and outdated methods of drying and milling, improper and unscientific methods of storage, transport and handling. It has been estimated that total post harvest losses of paddy at producers' level was about 2.71 percent of total production.

Table No. 7: Estimated post-harvest losses of paddy at producers' level.

Operations	Losses (percent to total production)
1. Transport from field to threshing floor	0.79
2. Threshing	0.89
3. Winnowing	0.48
4. Transport from threshing floor to storage	0.16

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5. Storage	0.40
Total	**2.71**

Source : Marketable Surplus and Post Harvest Losses of Paddy in India, 2002, Directorate of Marketing and Inspection, Nagpur

To minimise post harvest losses, the following measures should be followed.

- Timely harvest at optimum moisture percentage (20 percent to 22 percent).
- Use of proper method of harvesting.
- Avoid excessive drying, fast drying and rewetting of grains, which causes more broken rice.
- Immediate drying the wet grain after harvest, preferably within 24 hours to avoid heat accumulation.
- Ensure uniform drying to avoid hot and wet spots and mechanical damage due to handling.
- Avoid the losses in threshing and winnowing by better mechanical methods.
- Follow sanitation during drying, milling and after milling to avoid contamination of grains and protect from insects, rodents and birds.
- Use proper technique of processing i.e. cleaning, parboiling and milling.
- Adopt the grading practices to get more profit and to avoid the economic losses.
- Use efficient and good packaging for storage, as well as in transportation.
- Use proper scientific technique in storage for maintaining optimum moisture content i.e. 12 percent for longer period and 14 percent for shorter storage period.
- Use pest control measures (fumigation) before storage.
- Provide aeration to stored grain and stir grain bulk occasionally.
- Move stocks in sacks to discourage pest incidence and their multiplication.
- Proper handling (loading and unloading) of paddy/rice with good transportation facilitates helps in reduction in losses at farm and market level.

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3.2 Harvesting care :

The maturity period for harvest of paddy

Varieties	Days after planting	Days after flowering
Early varieties	110-115	25-30
Medium varieties	120-130	30-35
Late varieties	More than 130	35-40

The following harvesting care should be taken.

- Paddy crop should be harvested, when the grains become hard and contain about 20-22 percent moisture.
- Harvesting before maturity means a low milling recovery and also a higher proportion of immature seeds, high percentage of broken rice, poor grain quality and more chances of disease attack during storage of grain.
- Delay in harvesting results in grain shattering and cracking of rice in the husk and expose the crop to insects, rodents, birds and pests attack, as well as lodging.
- Avoid harvesting during wet weather conditions.

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- Harvesting should be done by adopting proper method and avoid missing of the secondary tiller panicles.
- Drain out the water from paddy field about a week or 10 days before the expected harvesting, which helps in employing mechanical harvesters.
- Avoid pest infestation prior to harvesting.
- All the panicles shall be kept in one direction in order to ensure efficient threshing.
- Protect the harvested material from rain and excessive dew by covering.
- Keep the harvested paddy separately for each variety, to get true to type variety (grains).
- Avoid direct sun drying, which leads to an increase in breakage of the grains during milling.
- Avoid excessive drying of paddy to avoid breakage of the grains.
- If the threshing is delayed, keep the harvested paddy stalk bundles in a dry and shady place, which facilitates the air circulation and prevents excessive heating.
- Thresh the paddy in the field itself. Transport the grain in bags, which minimises the grain losses.
- Avoid too much post harvest handling of paddy to minimise the grain losses.
- Pack the paddy in sound B-Twill jute bags totally free from any contamination.

3.3 Post-harvest equipments :

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(a) Combine harvesters :

In regions, where sufficient work force is not available, harvesting with combine harvesters is in vogue. Tractor operated and self propelled combine harvesters are commercially manufactured in India. About 700-800 combine are sold annually in the country. Combine harvester is manufactured in India with track type traction device exclusively for paddy crop. The combines of 8-14 ft. cutter bar size are available but the combines having 14 ft. cutter bar length are most popular size operated by 60-75 kw engines. These machines cut the crop, thresh it and deliver the clean grain in the grain tank.

(b) Threshers :

(i) Pedal operated paddy threshers:

Paddy crop is easy to thresh by beating but the losses are quiet high. Pedal operated paddy threshers reduce drudgery. These types of threshers consist of rotating drum having pegs on periphery and are operated by pedal. The work capacity of such threshers is 40-50 kg per hour. its

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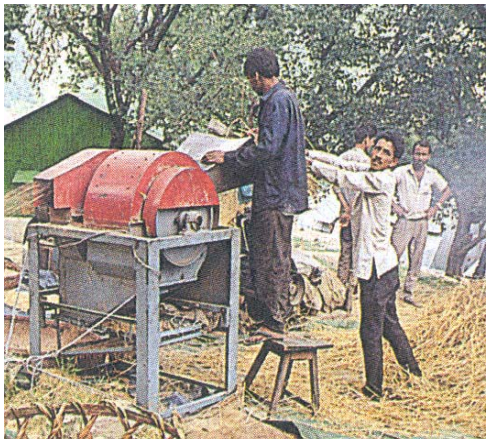
Portable rice thresher

(ii) Power operated paddy threshers:

The power operated rasp bar type, wire loop type, semi axial and axial flow threshers are also available. These threshers are operated by 5-10 hp electric motor or diesel engine and tractor. The work capacity of these threshers varies from 200-1300 kg per hour.

Multi crop thresher



Paddy thresher

(c) Winnowing fans :

The hand operated and power operated winnowing fans are commercially available. The paddy threshed by manual beating or by pedal operated paddy thresher is cleaned by using these fans. These winnowing fans consist of frame either made up of wood, angle iron, welded steel or combination of the two along with driving mechanisms namely, sprocket and chain, belt and pulleys and single or double reduction gears.

(d) Hullers / rice mills :

Cleaned paddy on an average yields 72 percent rice, 22 percent husk and 6 percent bran. The traditional hand pounding or foot pounding (Dhenki) has now become noncompetitive. The rice hullers, shellers and modern rice mills have gained popularity. Hullers seldom give about 65 percent total yields with 20-30 percent broken besides, it does not give completely cleaned rice. The most modern rice mills (single Pass) are available in 2-4 tons per hour capacity. The mini modern rice mills are available with capacity of 150-550 kg per hour and yields higher recovery. The modern rice mills give yield recovery of 70 percent with a grain breakage of 10 percent only.

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3.4 Grading :

Grading is the process of sorting of a given product according to the grades or classes. In grading of paddy, mainly thickness or length of grain is considered and graded accordingly. Grading of paddy/rice is usually done through mechanical devices i.e. rotating graders, plansifier, trieurs, circular purifier, colour grader/sorter etc. Paddy grains having the same length but different thickness are graded by rotating graders; whereas, grains with the same thickness but different lengths, are separated by trieurs. Sometimes both the rotating graders and the trieurs are used. In the market, the sale of paddy/rice is generally done on the basis of visual inspection of available

sample and with local commercial name. Buyers offer price on the visual examination of whole lot considering the quality factors like size and colour of the grains, moisture content, aroma, broken grains, foreign matter and admixture of other varieties.

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3.4.1 Grade specifications :

i) Specifications under AGMARK :

Under the Agricultural Produce (Grading and Marking) Act 1937, the national standards for paddy/rice have been notified. In this Act, certain varieties including Basmati rice have been covered. Various quality factors, which determine the grades, are (a) foreign matter other than rice (b) broken rice (c) fragments (d) damaged grains (e) weevilled grains (f) chalky grains (g) 1000 kernel weight and (h) size of grain i.e. length and breadth(L/B ratio). Agmark standards for paddy and rice are given below.

I] Specification of paddy under Agmark

(i) Grade Specification (quality) of paddy.

A) General characteristics :

Paddy shall:-

a) be the dried mature grains (with husk) of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) not have moisture exceeding 14 percent.

B) Special characteristics :

Grade designation	Maximum limit of tolerance		
	Foreign matter (% by wt.)	Admixture (% by wt.)	Damaged, immature, weevilled (% by wt.)
I	1.0	5.0	1.0
II	2.0	10.0	2.0
III	4.0	15.0	5.0
IV	7.0	30.0	10.0

C) Definitions :

1) **Foreign -** It includes dust, stone, lumps of earth, chaff, stem or straw and any other **matter** Impurities

   In case of admixture of other foodgrains in paddy, 0.5 percent of other foodgrains shall be treated as free tolerance and any thing above 0.5 percent shall be treated as foreign matter.
2) **Admixture -** Presence of inferior varieties shall be considered as admixture.
3) **Damaged-** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damaged grains shall not exceed 5.0 percent for grade IV.
4) **Immature -** Grains that are not properly developed.

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5) **Weevilled -** Grains that are partially or wholly bored or eaten by weevil or other grain insects.

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II] Specification of rice under Agmark

(i) Grade Specification (quality) of Raw Milled Superfine Rice and Raw Milled fine Rice.

A) General characteristics :

Raw milled super fine rice and raw milled fine rice shall:-

a) be the dried mature kernel of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition;
e) not have moisture exceeding 14 percent; and
f) be polished as per the Rice Milling Industry (Regulation) Act, 1958.

B) Special characteristics :

Grade designation	Maximum limit of tolerance			
	Foreign matter (% by wt.)	Admixture (% by wt.)	Broken (% by wt.)	Damaged and discoloured, chalky, immature and green (% by wt.)
I	0.3	5.0	5.0	0.25
II	0.7	10.0	10.0	0.50
III	1.5	15.0	15.0	1.0
IV	3.0	25.0	30.0	4.0

C) Definitions :

1) **Foreign matter -** It includes dust, stones, lumps of earth, chaff, stem or straw and any other Impurities.
2) **Admixture -** Presence of inferior varieties and red kernels will be considered as admixture. The Admixture of common rice shall not exceed 50 percent of the total admixture within the limits prescribed. The proportion of red kernels shall not exceed 0.5, 1.0 and 1.5 percent for grade I, II & III respectively.
3) **Red kernel -** Kernels, whole or broken, which have 25 percent of more of their surface coated with red bran.
4) **Broken -** Brokens shall include pieces of kernel which are less than three-fourth of a whole kernels. The pieces smaller than one-forth of the whole kernels are to be treated as fragments. The proportion of fragments shall not exceed 1.0, 2.0 and 3.0 percent for grades I, II and III respectively.
5) **Damaged and** -Grains that are internally damaged or discoloured, damage and **discoloured** discolouration materially affecting the quality.
6) **Chalky** - Grain at least half of which is milky white in colour and brittle in nature.
7) **Immature and green**– Grains that are not properly developed or are green in colour.

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(ii) Grade Specification (quality) of Raw Milled Medium Rice

A) General characteristics :

Top

Raw milled medium rice shall:-

a) be the dried mature kernels of *Oryza sativa* L.;

b) have uniform size, shape and colour;

c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;

d) be in sound merchantable condition;

e) not have moisture exceeding 14 percent; and

f) be polished as per the Rice Milling Industry (Regulation) Act, 1958.

B) Special characteristics :

Grade designation	Maximum limit of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture (% by wt.)	Damaged and discoloured, chalky, immature and green (% by wt.)
I	0.5	10.0	5.0	2.0
II	1.0	20.0	10.0	3.0
III	1.5	30.0	15.0	5.0
IV	3.0	40.0	30.0	9.0

C) Definitions :

1) **Foreign matter –** it includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) **Broken –** Brokens shall include pieces of kernel, which are less than three-fourth of a whole kernel. The pieces smaller than one-fourth of the whole kernel are to be treated as fragments. The proportion of fragments shall not exceed 1.0, 2.0 and 3.0 percent for grades I, II and III respectively.

3) **Admixture –** The presence of inferior varieties and red kernels shall be considered as admixture.
The proportion of red kernels shall not exceed 2.0, 4.0 and 6.0 percent for Grades I, II and III respectively.

4) **Red kernels** – Kernels, whole or broken, which have 25% or more of their surface coated with red bran.

5) **Damaged and discoloured** – Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. 'The proportion of damaged grains shall not exceed 5.0 percent for grade IV.

6) **Chalky** – Grains at least half of which is milky white in colour and brittle in nature.

7) **Immature and green** – Grains that are not properly developed or green in colour.

Top

(iii) Grade Specification (quality) of Raw Milled Common (Coarse) Rice

A) General characteristics :

Raw milled Common (Coarse) Rice shall:-

a) be the dried mature kernels of *Oryza sativa* L.;

b) have uniform size, shape and colour;

Top

c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;

d) be in sound merchantable condition;

e) not have moisture exceeding 14 percent; and

f) be polished as per the Rice milling industry (Regulation) Act, 1958.

B) Special characteristics :

Grade designation	Maximum limit of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture of red grains in white (% by wt.)	Damaged and discoloured, chalky, immature and green (% by wt.)
I	1.0	20.0	5.0	3.0
II	1.5	30.0	10.0	5.0
III	2.0	40.0	15.0	7.0
IV	4.0	50.0	20.0	10.0

C) Definitions :

1) **Foreign matter** – It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2) **Broken** – Brokens shall include pieces of kernel which are less than three-fourths of a whole kernel.
   The pieces, smaller than one-fourth of the whole kernels are to be treated as fragments. The proportion of fragments shall not exceed 4.0, 6.0, 8.0 and 10.0 percent for grades I, II, III and IV respectively.
3) **Admixture –** Presence of inferior varieties and red kernels shall be considered as admixture.
4) **Damaged and–** Grains that are internally damaged or discoloured, damage and **discoloured** discolouration materially affecting tha quality. The proportion of the damaged grains shall not exceed 5.0 percent for grades III and IV.
5) **Chalky –** Grain at least half of which is milky white in colour and brittle in nature.
6) **Immature and** – Grains that are not properly developed or are green in colour.
   green

Top

(iv) Grade Specification (quality) of Raw Handpounded Medium Rice

A) General characteristics :

Raw handpounded medium rice shall:-

a) be the dried mature kernels of *Oryza sativa* L.;

b) have uniform size, shape and colour;

c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;

d) be in sound merchantable condition; and

e) not have moisture exceeding 14 percent;

B) Special characteristics :

Grade	Maximum limit of tolerance

Top

Top

designation	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture (% by wt.)	Damaged and discoloured, chalky, green and immature, (% by wt.)
I	0.5	15.0	6.0	2.0
II	1.0	25.0	12.0	3.0
III	1.5	35.0	18.0	5.0
IV	3.0	50.0	25.0	9.0

C) Definitions :

1) **Foreign matter –** It includes dust, stone, lumps of earth, chaff, stem or straw and any other impurity.

2) **Broken –** Brokens shall include pieces of kernel which are less than three-fourth of a whole kernel.
The pieces smaller than one-fourth of the whole kernel are to be treated as fragments. The proportion of fragments shall not exceed 2.0, 3.0, 4.0 percent for grades I, II, III and IV respectively.

3) **Admixture –** Presence of inferior varieties and red kernels shall be considered as admixture. The proportion of red kernels shall not exceed 2.0, 4.0 and 6.0 percent for grades I, II, and III respectively.

4) **Red kernels –** Kernels whole or broken, which have 25% or more of their surface coated with red bran.

5) **Damaged and discoloured –** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damaged grains shall not exceed 5.0 percent for Grade IV.

6) **Chalky** – Grains at least half of which is milky white in colour and brittle in nature.

7) **Immature and green** – Grains that are not properly developed or are green in colour.

Top

(V) Grade Specification (quality) of Raw Handpounded Common (Coarse) Rice

A) General characteristics :

Raw Handpounded Common (Coarse) Rice shall:

a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) not have moisture exceeding 14 percent.

B) Special characteristics :

Grade designation	Maximum limit of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture of red grains in white (% by wt.)	Damaged, discoloured, chalky, immature and green (% by wt.)
I	1.0	24.0	5.0	3.0
II	1.5	35.0	10.0	5.0

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III	2.0	44.0	15.0	7.0
IV	3.0	64.0	25.	10.0

C) Definitions :

1) **Foreign matter–** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2) **Broken –** Brokens shall include pieces of kernel which are less than three-fourth of a whole kernels, The proportions of fragments shall not exceed 5.0, 6.0, 8.0 and 11.0 percent for grades I, II, III and IV respectively. The pieces smaller than one-fourth of the whole kernels are to be treated as fragments.
3) **Admixture –** Not applicable in case of red grained varieties.
4) **Damaged and discoloured –** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damage shall not exceed 5.0% for grades III & IV.
5) **Immature and green –** Grains that are not properly developed or are green in colour.
6) **Chalky** – Grains at least half of which is milky white in colour and brittle in nature.

Top

(vi) Grade Specification (quality) of Parboiled Milled Superfine Rice and Parboiled Milled Fine Rice

A) General characteristics :

Parboiled milled superfine rice and parboiled milled fine rice shall:

a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition;
e) not have moisture exceeding 15 percent; and
f) be polished as per Rice milling industry (Regulation) Act, 1958.

B) Special characteristics :

Grade designation	Max. limits of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture (% by wt.)	Damaged, discoloured (% by wt.)
I	0.2	3.0	5.0	0.25
II	0.5	7.0	10.0	0.50
III	1.0	12.0	15.0	1.00
IV	2.0	20.0	25.0	4.0

C) Definitions :

1) **Foreign matter –** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2) **Brokens –** Brokens shall include pieces of kernel which are less than three-fourth of a whole kernel. The pieces smaller than one-fourth of the whole kernel are to be treated as fragments. The proportions of fragments shall not exceed 0.5, 1.0 and 1.5 percent for grades I, II and III respectively.

Top

3) **Admixture -** The presence of inferior varieties and red kernels shall be considered as admixture. The admixture of common rice shall not exceed 50 percent of the total admixture within the limit prescribed. The proportion of red kernels shall not exceed 1.0, 2.0, 3.0 and 6.0 percent for grades I, II, III and IV respectively.

4) **Red kernel -** Kernels, whole or broken, which have 25 percent or more of their surface coated with red bran.

5) Damaged and discoloured - Grains that are internally damaged or discoloured, damaged and discolouration materially affecting the quality.

Top

(vii) Grade Specification (quality) of Parboiled Milled Medium Rice

A) General characteristics :

Parboiled milled medium rice shall:

a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition;
e) not have moisture exceeding 15 percent; and
f) be polished as per Rice Milling Industry (Regulation Act), 1958.

B) Special characteristics :

Grade designation	Maximum limits of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture (% by wt.)	Damaged, discoloured (% by wt.)
I	0.3	7.0	2.0	5.0
II	0.7	15.0	3.0	10.0
III	1.2	20.0	5.0	15.0
IV	2.0	30.0	10.0	30.0

C) Definitions :

1) **Foreign matter -** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) **Brokens -** Brokens shall include pieces of kernel which are less than three fourth of a whole kernels. The pieces smaller than one-fourth of the whole kernels are to be treated as fragments. The proportion of fragment shall not exceed 0.5, 1.0 and 1.5 percent for grades I, II and III respectively.

3) **Damaged and discoloured–** Grains that are internally damaged and discooured, damaged and discolouration materially affecting the quality. The proportion of damaged shall not exceed 5.0 percent for grade IV.

4) **Admixture –** The presence of inferior varieties and red kernels shall be considered as admixture. The proportion of red kernels shall not exceed 2.0 and 3.0 percent for grades I and II respectively.

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5) **Red kernel –** Kernels, whole or broken, which have 25 % or more of their surface coated with bran.

Top

(viii) Grade Specification (quality) of Parboiled Milled Common (Coarse) Rice

A) General characteristics :

Parboiled milled common rice shall:

a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition;
e) not have moisture exceeding 15 percent ; and
f) be polished as per Rice Milling Industry (Regulation Act), 1958.

B) Special characteristics :

Grade designation	Maximum limit of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture of red grain in white (% by wt.)	Damaged and discoloured (% by wt.)
I	0.5	10.0	5.0	3.0
II	1.0	20.0	10.0	5.0
III	1.5	30.0	15.0	7.0
IV	3.0	40.0	20.0	10.0

C) Definitions :

1) **Foreign matter –** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2) **Brokens –** Brokens shall include pieces of kernel which are less than three-fourth of a whole kernels. The pieces smaller than one-fourth of the whole kernels are to be treated as fragments. The proportions of fragments shall not exceed 0.5, 1.0 and 1.5 percent for grades I, II and III respectively.
3) **Damaged and discoloured-** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damage grains shall not exceed 5.0 percent for grades III and IV.
4) **Admixture** - The presence of inferior varieties and red kernel shall be considered as admixture.

Top

(ix) Grade Specification (quality) of Parboiled Handpounded Medium Rice

A) General characteristics :

Parboiled handpounded medium rice shall:

a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;

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c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) shall not have moisture exceeding 15 percent.

B) Special characteristics :

Grade designation	Max. limits of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture (% by wt.)	Damaged, discoloured (% by wt.)
I	0.3	5.5	6.0	2.0
II	0.7	9.5	12.0	3.0
III	1.2	14.5	18.0	5.0
IV	2.0	22.5	30.0	9.0

C) Definitions :

1) **Foreign matter-** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.
2) Brokens – Shall include pieces of kernels which are less than three-fourth of a whole kernels. The pieces smaller than one-fourth of the whole kernels are to be treated as fragments. The proportions of fragments shall not exceed 0.5, 1.0 and 1.5 percent for grades I, II and III respectively.
3) **Admixture –** The presence of inferior varieties and red kernels shall be considered as admixture. The proportion of red kernels shall not exceed 2.0, 4.0 and 6.0 percent for grade I, II and III respectively.
4) **Red kernel** – Kernels, whole or broken, which have 25 percent or more of their surface coated with red bran.
5) **Damaged and discoloured** - Grains that are internally damaged or discooured, damage and discolouration materially affecting the quality. The proportion of damage shall not exceed 5.0 percent for grade IV.

Top

(x) Grade Specification (quality) of Parboiled Handpounded Common (Coarse) Rice

A) General characteristics :

Parboiled handpounded common coarse rice shall:
a) be the dried mature kernels of *Oryza sativa* L.;
b) have uniform size, shape and colour;
c) be sweet, hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) not have moisture exceeding 15 percent.

B) Special characteristics :

Grade designation	Maximum limits of tolerance			
	Foreign matter (% by wt.)	Brokens (% by wt.)	Admixture of red grains in white, (% by wt.)	Damaged, discoloured (% by wt.)
I	0.5	12.5	5.0	3.0
II	1.0	22.5	10.0	5.0
III	1.5	32.5	15.0	7.0

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IV	3.0	42.5	25.0	10.0

C) Definitions :

1) **Foreign matter-** It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) Broken – Shall include pieces of kernel which are less than three-fourth of a whole kernels. The pieces smaller than one fourth of the whole kernels are to be treated as fragments. The proportions of fragments shall not exceed 0.5, 1.0 and 1.5 percent for grades I, II & III respectively.

3) **Damaged and discoloured-** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damaged grains shall not exceed 5.0 percent for grades III and IV .

Top

(xi) Grade Specification (quality) of Fine Broken Rice

A) General characteristics :

Fine broken shall:

a) be the piece of kernels of scented varieties of rice (*Oryza sativa* L.*)*;
b) have uniform colour;
c) be scented, sweet, dry, hard, clean, and free from mould, weevils, obnoxious smell, discolouration, admixture of deleterious substances, and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) not have moisture exceeding 14 and 15 percent for raw and parboiled varieties respectively.

B) Special characteristics :

Grade designation	Maximum limit of tolerance		
	Foreign matter (% by wt.)	Brokens (% by wt.)	Damaged and discoloured chalky * (% by wt.)
I	2.0	Not less than 80	5.0
II	4.0	Not less than 60	10.0
III	4.0	Less than 60	15.0

***** In which damaged grains will not exceed 3, 5 and 5 percents for grades I, II and III respectively.

D) Definitions :

1) Foreign matter – It includes dust, stones, lumps of earth, chaffs, stem or straw and any other impurity.

2) **Brokens –** Pieces of kernel which are less than three-fourth but more than one fourth of a whole kernels.

3) **Fragments –** Pieces of kernels which are less than one-fourth of the whole kernel.

4) **Damaged and discoloured –** Grains that are internally damaged or discoored, damage and discolouration materially affecting the quality.

5) Chalky - Grains at least half of which is milky white in colour and brittle in nature.

Top

(xii) Grade Specification (quality) of common Broken Rice

Top

A) General characteristics :

Common broken rice shall:

a) be the pieces of kernels of the non-scented varieties of rice (*Oryza sativa* L.);
b) have uniform colour;
c) be sweet, dry, hard, clean and free from moulds, weevilled, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics;
d) be in sound merchantable condition; and
e) not have moisture exceeding 14 and 15 percent for raw and parboiled varieties of rice respectively.

B) Special characteristics :

Grade designation	Maximum limit of tolerance		
	Foreign matter (% by wt.)	Brokens (% by wt.)	Damaged, discoloured chalky * (% by wt.)
I	3.0	Not less than 80	5.0
II	4.0	Not less than 60	10.5
III	4.0	Less than 60	15.0

* In which damaged grains will not exceed 3, 5 and 5 percents for grades I, II and III respectively.

C) Definitions :

1) Foreign matter - It includes dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) **Brokens –** Pieces of kernel which are less than three-fourth but more than one-fourth of a whole kernels.

3) **Fragments –** Pieces of kernels which are less than one-fourth of the whole kernel.

4) **Damaged and discoloured -** Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality.

5) Chalky grains - Grains at least half of which is milky white in colour and brittle in nature.

Top

(xiii) Grade Specification (quality) of Basmati raw milled rice (for export only)

A) General characteristics :

1. The grains shall be long slender of white creamy-white or greyish colour and translucent.
2. The rice :
   a) Shall be the dried matured kernels of *Oryza sativa* L.: and have uniform size, shape and colour;
   b) Shall possess in a marked degree the natural fragrance characteristic of Basmati rice both in the raw and cooked state;
   c) Shall not have been artificially coloured and shall be free from polishing agents;
   d) May contain upto 3 percent of grains with appreciable amount of bran thereon;
   e) Shall be free from musty or obnoxious odour and shall carry no sign of mould or containing webs and dead or live weevils;
   f) Shall have length 6.0 mm. and above and length breadth ratio 3 and above;
   g) Shall be in sound merchantable condition.

B) Special characteristics :

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Grade designation	Special characteristics (maximum limits of tolerance) percent by weight				
	Foreign matter	Brokens and fragments*	Other rice including red grains*	Damaged discoloured and chalky grains	Moisture
Special	0.5	5.0	10.0	1.0	14.0
A	1.0	10.0	15.0	2.0	14.0
B	2.0	10.0	20.0	3.0	14.0

* Red grains shall not exceed 2%

C) Definitions :

1) **Foreign matter** - Shall include dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) **Brokens and fragments** - Shall include pieces of rice kernels which are less than three-fourth of a whole kernel. The pieces of kernels, smaller than one-fourth of the whole kernels, shall be treated as fragments.

3) **Other rice including red grains -** Shall consist of contrasting and/or inferior varieties of rice. Red grains shall be the kernels, whole or broken, which have 25 percent or more of their surface coated with red bran.

4) **Damaged discoloured and chalky grains** - Shall include rice, kernels, brokens, fragments or whole that are internally damaged or discoloured, materially affecting the quality. Chalky grains shall be the grains at least half of which is milky white in colour and brittle in nature.

Top

xiv) Grade Specification (quality) of Basmati parboiled rice (for export only)

A) General characteristics :

1. The grains shall be long slender of creamy-white, brownish or grayish colour and translucent.
2. The rice :
   a) Shall be the dried matured kernels of *Oryza sativa* L.; and have uniform size, shape and colour;
   b) Shall possess in a marked degree the natural fragrance characteristic of Basmati rice both in the raw and cooked state;
   c) Shall not have been artificially coloured and shall be free from polishing agents;
   d) May contain upto 3 percent of grains with appreciable amount of bran thereon;
   e) Shall be free from musty or obnoxious odour and shall carry no sign of mould or containing webs and dead or live weevils;
   f) Shall have length 6.0 mm. and above and length breadth ratio 3 and above;
   g) Shall be in sound merchantable condition.

B) Special characteristics :

	Special characteristics (maximum limits of tolerance) (percent by weight)

Top

Grade designation	Foreign matter	Brokens and fragments	Other rice including red grains*	Damaged discoloured and chalky grains	Moisture
Special	0.5	5.0	10.0	1.0	14.0
A	1.0	10.0	15.0	2.0	14.0
B	2.0	10.0	20.0	3.0	14.0

* Red grains shall not exceed 2%

C) Definitions :

1) **Foreign matter** - Shall include dust, stones, lumps of earth, chaff, stem or straw and any other impurity.

2) **Brokens and fragments** - Shall include pieces of rice kernels which are less than three-fourth of a whole kernel. The pieces of kernels, smaller than one-fourth of the whole kernels, shall be treated as fragments.

3) **Other rice including red grains** - Shall consist of contrasting and/or inferior varieties. Red grains shall be the kernels, whole or broken, which have 25 percent or more of their surface coated with red bran.

4) **Damaged discoloured– and chalky grains** Shall include rice, kernels, broken, fragments or whole that are internally damaged or discoloured, materially affecting the quality. Chalky grains shall be the grains at least half of which is milky white in colour and brittle in nature.

Source: Agricultural Produce (Grading and Marking), Act, 1937 with Rules, made upto 31st December,1979, (Fifth Edition),(Marketing Series No.192), Directorate of Marketing and Inspection.

ii) STANDARDS FOR INTERNATIONAL TRADE :

CODEX ALIMENTARIUS COMMISSION (CAC): Codex Alimentarius Commission (CAC) implements joint FAO/WHO Food Standards Programme. The purpose of the CAC programme is to protect the health of consumers and ensure fair practices in the food trade. The CAC is a collection of internationally adopted food standards presented in a uniform manner. Sanitary and Phyto-Sanitary Agreement and Technical Barriers to Trade Agreement of World Trade Organisation recognizes standards framed by CAC with respect to safety and quality aspects of food items. Thus for international trade, standards framed by CAC are recognized.

Codex Alimentarius Commission has not yet formulated quality standards for paddy. Paddy is not consumed directly as food. It is consumed after removal of the husk. As such it is suggested that after removal of husk, the resultant product may comply with following Food Safety parameters prescribed by CAC for rice.

CODEX STANDARD FOR RICE (CODEX STAN 198-1995)

The Annex to this standard contains provisions which are not intended to be applied within the meaning of the acceptance provisions of Section 4.A(I)(b) of the General Principles of the Codex Alimentarius.

1. SCOPE

This standard applies to husked rice, milled rice, and parboiled rice, all for direct human consumption; i.e., ready for its intended use as human food, presented in packaged form or sold

loose from the package directly to the consumer. It does not apply to other products derived from rice or to glutinous rice.

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2. DESCRIPTION

2.1 Definitions

2.1.1 Rice is whole and broken kernels obtained from the species *Oryza sativa* L.

2.1.1.1 Paddy rice is rice which has retained its husk after threshing.

2.1.1.2 Husked rice (brown rice or cargo rice) is paddy rice from which the husk only has been removed. The process of husking and handling may result in some loss of bran

2.1.1.3 Milled rice (white rice) is husked rice from which all or part of the bran and germ have been removed by milling.

2.1.1.4 Parboiled rice may be husked or milled rice processed from paddy or husked rice that has been soaked in water and subjected to a heat treatment so that the starch is fully gelatinized, followed by a drying process.

2.1.1.5 Glutinous rice; waxy rice: Kernels of special varieties of rice which have a white and opaque appearance. The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1. Quality Factors – General

3.1.1 Rice shall be safe and suitable for human consumption.

3.1.2 Rice shall be free from abnormal flavours, odours, living insects and mites.

3.2. Quality Factors – Specific

3.2.1 **Moisture Content** 15% m/m max

Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standards are requested to indicate and justify the requirements in force in their country.

3.2.2 **Extraneous Matter** : is defined as organic and inorganic components other than kernels of rice.

3.2.2.1 **Filth** : impurities of animal origin (including dead insects) 0.1% m/m max

3.2.2.2 **Other organic extraneous matter** such as foreign seeds, husk, bran, fragments of straw, etc. shall not exceed the following limits :

	Maximum Level
Husked Rice	1.5% m/m
Milled Rice	0.5% m/m
Husked Parboiled Rice	1.5% m/m
Milled Parboiled Rice	0.5% m/m

3.2.2.3 **Inorganic extraneous matter** such as stones, sand, dust, etc. shall not exceed the following limits :

	Maximum Level
Husked Rice	0.1% m/m

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Milled Rice	0.1% m/m
Husked Parboiled Rice	0.1% m/m
Milled Parboiled Rice	0.1% m/m

4. CONTAMINANTS

4.1 **Heavy Metals**

The products covered by the provisions of this standard shall be free from heavy metals in amounts which may represent a hazard to human health.

Maximum levels for lead 0.2 mg/kg.

4.2 **Pesticide Residues**

Rice shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity. These are :

Table No. 8: Pesticide residues.

Sl. No.	PESTICIDE	MRL	(Mg/kg)
1.	2,4-D	MRL	0.05
2.	BENTAZONE	MRL	0.1
3.	CARBARYL	MRL	5
4.	CHLORPYRIFOS	MRL	0.1
5.	CHLORPYRIFOS-METHYL	MRL	0.1
6.	DIQUAT	MRL	10
7.	DISULFOTON	MRL	0.5
8.	ENDOSULFAN	MRL	0.1
9.	FENTIN	MRL	0.1
10.	GLYPHOSATE	MRL	0.1
11.	PARAQUAT	MRL	10

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice General Principles of Food Hygiene (CAC/RCP 1-1969, Rev.2-1985, Codex Alimentarius Volume 1B), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product :

shall be free from microorganisms in amounts which may represent a hazard to health;
shall be free from parasites which may represent a hazard to health; and
shall not contain any substance originating from microorganisms, including fungi, in amounts which may represent a hazard to health.

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ANNEXURE

1 CLASSIFICATION

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If rice is classified as long grain, medium grain or short grain, the classification should be in accordance with one of the following specifications. Traders should indicate which classification option is chosen.

OPTION 1 : kernel length/width ratio

1.1 **Long grain rice:**

1.1.1 Husked rice or parboiled husked rice with a length/width ratio of 3.1 or more.

1.1.2 Milled rice or parboiled milled rice with a length/width ratio of 3.0 or more.

1.2 **Medium grain rice:**

1.2.1 Husked rice or parboiled husked rice with a length/width ratio of 2.1-3.0.

1.2.2 Milled rice or parboiled milled rice with a length/width ratio of 2.0-2.9.

1.3 **Short grain rice:**

1.3.1 Husked rice or parboiled rice with a length/width ratio of 2.0 or less.

1.3.2 Milled rice or parboiled milled rice with a length/width ratio of 1.9 or less.

OPTION 2: the kernel length

1.1 **Long grain rice** has a kernel length of 6.6 mm or more.

1.2 **Medium grain rice** has a kernel length of 6.2 mm or more but less than 6.6 mm.

1.3 **Short grain rice** has a kernel length of less that 6.2 mm.

OPTION 3: a combination of the kernel length and the length/width ratio

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1.1 **Long grain rice** has either:

1.1.1 a kernel length of more than 6.0 mm and with a length/width ratio of more than 2 but less than 3, or ;

1.1.2 a kernel length of more than 6.0 mm and with a length/width ratio of 3 or more.

1.2 **Medium grain rice** has a kernel length of more than 5.2 mm but not more than 6.0 mm and a length/width ratio of less than 3.

1.3 **Short grain rice** has a kernel length of 5.2 mm or less and a length/width ratio of less than 2.

2. MILLING DEGREE

2.1 **Milled rice** (white rice) may be further classified into the following degrees of milling:

2.2 **Undermilled rice** is obtained by milling husked rice but not to the degree necessary to meet the requirements of well-milled rice.

2.3 **Well-milled rice** is obtained by milling husked rice in such a way that some of the germ and all the external layers and most of the internal layers of the bran have been removed.

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2.4 **Extra-well-milled rice** is obtained by milling husked rice in such a way that almost all of the germ, all of the external layers and the largest part of the internal layers of the bran, and some of the endosperm, have been removed.

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3. OPTIONAL INGREDIENTS

Nutrients

Vitamins, minerals and specific amino acids may be added in conformity with the legislation of the country in which the product is sold. (Governments accepting the Standard are requested to indicate the requirements in force in their country.)

Source : Codex Alimentarius, Vol. 7, 1995.

iii) Specifications of Food Corporation of India (FCI):

Food Corporation of India (FCI) is the nodal Government agency for procuring paddy/rice from all States for the distribution under Public Distribution System and maintaining buffer stock of paddy/rice. For procurement purpose, FCI adopts certain grade specifications for paddy/rice. These specifications are circulated and adopted by FCI for each season separately. As per these specifications, paddy and rice are classified into two groups Common and Grade 'A'. These specifications (for kharif, 2002-2003) are given below.

Table No. 9: Specifications for Grade 'A' and Common rice followed by FCI (Marketing season 2002-03).

General characters : Rice shall be in sound merchantable condition, sweet, dry, clean, wholesome, of good food value, uniform in colour and size of grains and free from moulds, weevils, obnoxious smell, admixture of unwholesome poisonous substances, *Argemone mexicana* and *Lathyrus sativus* (Khesari) in any form, or colouring agents and all impurities except to the extent in the schedule below. It shall also conform to PFA Standard.
Special characters : Maximum limit (percent)
Moisture content*** (Raw/Parboiled) = 14.0

Grade	Broken*		Foreign matter**	Damaged/Slightly damaged		Discoloured grains		Chalky grains	Red grains		Admixture of lower class		Dehusked grains
	Raw	Par.	Raw/Par.	Raw	Par.	Raw	Par.	Raw	Raw	Par.	Raw	Par.	Raw/Par.
Grade 'A'	25.0	16.0	0.5	2.0	4.0	3.0	5.0	5.0	3.0	3.0	10.0	0	12.0
Common	25.0	16.0	0.5	2.0	4.0	3.0	5.0	5.0	3.0	3.0	10.0	0	12.0

* Including 1 percent small brokens. Par. = Parboiled

** Not more than 0.25 percent by weight shall be mineral matter and not more than 0.10 percent by weight shall be impurities of animal origin.

*** Rice (both raw and parboiled) can be procured with moisture content up to a maximum limit of 15 percent with value cut. There will be no value cut up to 14 percent. Between 14 percent to 15 percent moisture, value cut will be applicable at the rate of full value.

Table No. 10: Specifications for all varieties of paddy followed by FCI (Marketing season 2002-2003).

General characters : Paddy shall be in sound merchantable condition, dry, clean, wholesome, of good food value, uniform in colour and size of grains and free from moulds, weevils, obnoxious smell, *Argemone mexicana, Lathyrus sativus* (Khesari), admixture of deleterious substances. Paddy will be classified into Grade 'A' and Common grade.
Special characters :

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Refractions	Maximum Limits (percent)
1. Foreign matter a) Inorganic / b) Organic	1.0
2. Damaged, discoloured, sprouted and weevilled grains	3.0
3. Immature, shrunken and shriveled grains	3.0
4. Admixture of lower class	10.0
5. Moisture	17.0

Note: I) The definitions of the above refractions and method of analysis are to be followed as per BIS method of analysis of foodgrains IS: 4333 (Part-I), IS: 4333 (Part-II), 1967 and Terminology for foodgrains IS: 2813 – 1970, as amended from time to time. II) The method of sampling is to be followed as per BIS method for sampling of Cereals and Pulses IS: 2814-1964 as amended from time to time. III) Within the overall limit of 1.0 percent for organic foreign matter, poisonous seeds shall not exceed 0.5 percent of which Dhatura and Akra seeds (*Vicia* species) not to exceed 0.025 percent and 0.2 percent respectively.

Source: Food Corporation of India, New Delhi.

iv) Specifications of Agricultural and Processed Food Products Export Development Authority (APEDA) :

APEDA has categorised Indian Basmati as raw milled rice, milled parboiled rice, brown Basmati rice and parboiled brown Basmati rice. These standards have been formulated on the basis of certain quality characteristics considering their minimum and maximum limits. The main characteristics are average precook length of rice grain, moisture percent, minimum and maximum damaged, discoloured, chalky and broken grains percentage, foreign matter, other factors like percent of green grains, paddy grains, etc. The schedule of these standards is given in Table No.11.

Table No. 11: Grade Specification for Indian Basmati rice adopted by APEDA.

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* Spl. = Special Grade

Source: "Procedure for Basmati Rice Mill Registration", May-2002, by Agricultural and Processed Food Products Export Development Authority, New Delhi.

Rice terminology

1. **Rough rice or paddy:** Defined as rice in the husk after threshing.
2. **Stalk paddy:** Defined as unthreshed in the husk, harvested with part of the stalk.
3. **Husked rice:** Rice from which the husk only has been removed retaining still the bran layers and most of the germs. Such rice is sometimes reflected to as bran rice even though there are variations having red or white bran coats.
4. **Milled rice:** Rice from which husk, germs, bran layers have been substantially removed by lower machinery, also known as polished rice and if milled to high degree it is called as white rice.
5. **Under milled rice**: Rice from which the husk germs and bran layers have been partially removed by power machinery and is also known as unpolished rice.
6. **Hand produced rice:** Rice from which the husk, germ and bran layers have been partially removed, without the use of power machinery, also known as "home produced" or "hand milled rice".

TYPE OF BASMATI RICE	MILLED			MILLED PARBOILED			BROWN			BROWN PARBOILED		
Specification	**Spl.***	**'A'**	**'B'**	**Spl.***	**'A'**	**'B'**	**Spl.***	**'A'**	**'B'**	**Spl.***	**'A'**	**'B'**
Average precook length in mm	7.1	7.0	6.8	7.1	7.0	6.8	7.4	7.2	7.0	7.4	7.2	7.0
Min. L/B ratio	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Max. moisture content percent	14	14	14	14	14	14	14	14	14	14	14	14
Max. damaged discoloured grain	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0
Max. chalky grain black kernels percent	3	5	7	0.1	0.5	1.0	3	5	7	0.5	1.0	2.0
Max. broken & fragments	2	3	5	2	3	5	2	3	5	2	3	5
Max. foreign matter	0.1	0.25	0.4	0.10	0.25	0.40	0.2	0.5	1.00	0.2	0.5	1.0
Max. other grain percent	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2
Max. other rice varieties	5	8	15	5	8	15	5	8	15	5	8	15
Max under milled & red striped	2.0	2.5	3.5	2.0	2.5	3.5	2.0	2.5	3.5	2.0	2.5	3.5
Max. paddy grain percent	0.1	0.2	0.3	0.1	0.2	0.3	0.2	0.5	0.8	0.1	0.2	0.3
Minimum elongation ratio	1.7	1.7	1.7	1.5	1.5	1.5	1.7	1.7	1.7	1.5	1.5	1.5
Maximum green grain percent	--	--	--	--	--	--	2.0	4.0	6.0	2.0	4.0	6.0

7. **Parboiled rice**: Rice, which has been specially processed by steaming or soaking in water, heating usually by steam and drying. Parboiled paddy can be milled to various degrees or home produced in the same way as ordinary paddy. It is called as parboiled milled or parboiled hand pounded.
8. **Raw milled:** The paddy, which is milled not after giving heat treatment, such as parboiling.

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9. **Coated rice:** Defined as rice milled to a high degree and then coated with glucose on "Talcum".
10. **Whole grain:** Refers to husked, milled or hand produced rice which does not contain any broken grains smaller than 3/4 of the size of the whole kernel.
11. **Broken rice:** Husked, milled or hand produced rice consisting of broken grains of less than $3/4^{th}$ size of the whole grain but not less than $1/4^{th}$.
12. **Fragmented rice:** Small brokens upto $1/4^{th}$ size of the whole grain.
13. **Husk:** The by-product from the milling of rice consisting of the outermost covering of the rice kernels.
14. **Bran:** A by-product from the milling of rice consisting of the outer layer of the kernels with part of germ.
15. **Rice polishing:** Now defined as the by-product from milling rice, consisting of the inner bran layer of the kernel with part of the germ and a small percentage of the stoney interior also known as rice meal or rice flour elsewhere.
16. **Glutinous rice:** A type of rice, which after cooking has a peculiar stickyness regardless of how it is cooked.
17. **Scented rice:** A type of rice, which contains aroma and gives scented smell on cooking.

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3.4.2 Adulterants and toxins

In paddy/rice, apart from foreign materials and inferior quality, some chemical, fungal as well as natural contaminations also occur, which tantamount to adulteration. The common adulterants found in paddy/rice are given below;

Table No. 12: Adulterants in paddy/rice and their effect on health.

Adulterants	Health effects
1. Admixtures: Sand, marble chips, stones etc.	Damages in digestive tract.
2. Chemicals: Residues on contaminated seeds like mercury, copper, tin, zinc etc. and pesticide residues (beyond safe limit)	Vomiting, diarrhoea, paralysis, damage to liver, kidney and brain, leading to death
3. Fungal: Toxins in moist grains from : *fusarium sportrichiella* Toxins in yellow rice from *Penicillium inslandium, Penicillium citreovirede, Penicillium atricum, Rhizopus, Aspergillus*	Causes Urov disease (Kaschin-Beck disease) Causes toxic mouldy rice disease, liver damage.
4. Viral: Machupo virus: Due to rodent's urine	Bolivian hemorrhagic fever.
5. Natural contamination: Asbestos (present in talc, kaolin etc. in polished rice.)	Absorption in particulate form by human body, may produce cancer.

Some simple screening tests for detection of adulteration in paddy/rice are given below.

Adulteration	Detection Test
1. Sand, marble chips, stones in grain	By visual examination, these adulterants can be detected. By using grading machines like drum grader and colour sorter etc.
2. Hidden insect	Take a filter paper impregnated with Ninhydrin (1 percent in

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infestation in grains	alcohol). Put some grains on it and then fold the filter paper and crush the grains with hammer. A spot of bluish purple colour indicate presence of hidden insect's infestation.

Toxins : Aflatoxin : -

Aflatoxins are the type of mycotoxins, which are derived from the fungi, which affect human health. Aflatoxins are produced by *Aspergillus flavus, Aspergillus ochraceus* and *Aspergillus parasiticus.* Contamination of Aflatoxins occurs at any stage from field to storage, whenever environmental conditions are conducive for fungi. The fungie are generally regarded as storage fungi, which grow under conditions of relatively high moisture/humidity. It causes severe liver damage and both liver and intestinal cancer in humans.

Generally, milled rice contains low levels of Aflatoxins, but parboiled rice and paddy harvested in rainy season contains high Aflatoxin levels. Storage insects like rice weevil, lesser grain borer, khapra beetle, etc also encourage Aflatoxins in paddy/rice. According to PFA Rules, 1955, the Aflatoxins in rice should not be more than 30 microgram / kilogram.

Prevention and Control of Aflatoxins :

- The paddy/rice should the stored at safe moisture level.
- Prevent the growth of fungi by drying of grains.
- Use proper and scientific storage method.
- Prevent insect infestation by adopting chemical treatment to avoid fungus contamination.
- Separate the infected grains.

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3.4.3 Grading at producers' level and under Agmark :

The scheme, "Grading at Producers' level" was introduced in 1962-63 by Directorate of Marketing and Inspection (DMI). The main objective of this scheme is to subject the produce to simple tests and assign a grade before it is offered for sale. The programme is being implemented by the State Governments, for which 1411 grading units were set up in the country upto 31-03-2002. During the year 2001-02, about 1865539 tonnes of paddy valued at Rs. 67938.03 lakh and about 29479 tonnes of rice valued at Rs.2377.14 lakh were graded at producers' level.

Table No. 13: Grading at producers' level: State-wise quantity graded and estimated value, during 2001-2002.

(Quantity: tonnes ; Value: Rs. Lakh)

State	Paddy		Rice		No. of grading units at producers' level
	Quantity	Value	Quantity	Value	
Andhra Pradesh	501	27.60	--	--	30
Gujarat	567	52.67	--	--	8
Haryana	44000	2302.00	--	--	20
Karnataka	26591	1601.26	--	--	44
Maharashtra	27221	142.91	7072	810.87	373
Punjab	365030	20440.15	--	--	116
Tamil Nadu	32985	1882.73	--	--	96
Uttar Pradesh	1368644	41488.71	22407	1566.27	63
Total	**1865539**	**67938.03**	**29479**	**2377.14**	**1411***

* Including 661 units in other states.

Source: Directorate of Marketing & Inspection, Faridabad

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Grading under Agmark :

Grading under Agmark is carried out by the Directorate of Marketing & Inspection in accordance with the grade specifications notified by the Central Government under the provisions of Agricultural Produce (Grading and Marking) Act, 1937 and Rules made there-under. Grading of rice under AGMARK is voluntary for internal consumption.

Table No.14: Progress of grading of paddy/rice at producers' level and under Agmark.

(Quantity: tonnes ; Value: Rs.Lakh)

Grading Type	2001-02		2002-2003 (Provisional)	
	Quantity	Value	Quantity	Value
Grading at producers' level				
Paddy	1865539	67938.03	1211393	89383.94
Rice	29479	2377.14	49172	52283.27
Grading under Agmark				
Voluntary grading : Rice	25046	3714.70	31736	5707.19
Compulsory grading for Export				
Basmati rice	15064	3796.80	--	--

Source: Directorate of Marketing & Inspection, Faridabad

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3.5 Packaging :

Good packaging provides not only convenient handling in transportation and storage but also attracts consumers to pay more. Packaging is essential to avoid spoilage and to prolong the quality. Packaging of paddy/rice is also important for long-term storage to fulfill the demand of old rice in the market, particularly in case of Basmati and non-parboiled rice. Paddy/rice, if kept in open, quality may be adversely affected.

Packaging is closely related to labeling and branding. In present scenario, branding and labeling of rice has significant impact on consumer preference. More care is required in packaging of rice meant for export. This is because of demonstrative effect and the requirements of consumers in different countries; exporters have now started using transparent, colourful and attractive packaging. For good packaging, the packages must possesses following qualities:

- It must protect rice very well and should be long lasting.
- It must look clean.
- It must be convenient to handle and carry out from the store easily.
- It must attract the consumer.
- It must be easily identifiable.
- It must resist spoiling.
- It must tell information about rice i.e. name and address of packer, pack-size (quantity), quality (grade), variety and date of packing etc.

Method of packing :

1. The graded rice should be packed in new, clean, sound and dry jute bags, cloth bags, polywoven bags, polyethylene, polypropylene, high molecular high density polyethylene paper packages or in other food grade plastic/packaging materials.
2. The packages shall be free from insect infestation, fungus contamination, deleterious substances and undesirable or obnoxious smell.
3. Each package shall be securely closed and suitably sealed.
4. Each package shall contain rice of one grade only.

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5. The rice shall be packed in quantities as specified under the provisions of the Standards of Weights and Measures (Packaged Commodities) Rules, 1977 as amended from time to time.
6. Suitable number of consumer packs containing graded material of the same lot may be packed in master container.

Availability of packaging material :

The following packaging material is used in packaging of paddy/rice.

(1) Jute bags

(2) HDPE / PP bags

(3) Polythene impregnated jute bags

(4) Poly pouches

(5) Cloth bags

Jute bags Vs HDPE bags : Jute is a biodegradable material, while synthetic is not environmentally friendly. The disposal of unserviceable jute bags is easy as compared to synthetic bags. Summary of comparative properties of HDPE (High Density Poly Ethylene) and jute bags is given as under :

Table No. 15: Properties of jute bags and HDPE bags.

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Properties	HDPE bags	Jute bags
1. Seam strength	Poor	Strong
2. Surface texture	Smooth	Rough
3. Operational convenience	Poor (with accident risk)	Good
4. Capacity utilization	Poor	Excellent
5. Stack stability	Poor	Excellent
6. Resistance to hooking	Poor	Fair
7. Drop test performance	Poor	Good
8. End use performance (w.r.t. bursting, damage, spillage, replacement)	Poor	Good
9. Grain preservation efficiency	Poor	Excellent

Source : Indian Institute of Packaging seminar paper - Packaging India, Feb-Mar, '99. pp-63.

Qualities of good packaging material :

- ✓ It should be convenient in operations.
- ✓ The packaging material must preserve the quality of produce.
- ✓ It should be convenient to stack.
- ✓ It should be able to prevent spoilage during transit and storage.
- ✓ It should be cost-effective.
- ✓ It should be clean and attractive.
- ✓ It should be biodegradable.
- ✓ It should help in checking adulteration and be free from adverse chemicals.
- ✓ It should be helpful in reducing the marketing

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cost by reducing the handling and retailing cost.

- ✓ The packaging material should be made of substances, which are safe and suitable for intended use.
- ✓ Packing material should be reusable.

Economics of packaging :

Usually, the cost of a HDPE bags may be around 50-60 percent of the cost of jute bags. In paddy/rice, usually B-Twill jute bags are used. The initial cost of packaging varies according to the type of material used for making bags. Rice is stored in HDPE bags for six months, whereas in jute bags, for 3 months. Thus, the economics of packaging depends not only on the type of packaging material but also the duration for which the paddy/rice is likely to be stored.

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3.6 Transportation :

Paddy is transported usually in bulk from field to the market, while rice is transported both in bulk and bags. The following means of transportation are used at different stages of marketing.

CHART NO. 1

Means of transportation used at different stage of marketing

Stage of marketing	Transportation is done by	Means of transport used
From threshing floor to the village/primary market.	Farmer	By head load, pack animal, bullock cart or tractor's trolley.
From primary market to secondary wholesale market and miller	Trader / miller	By trucks, railway wagons.
From miller and wholesale markets to retailer	Miller / retailer	By trucks, railway wagons, mini trucks.
From retailer to consumer	Consumer	By head loads, pack animal, bullock cart, rickshaw, bicycle.
For export	Exporter / trader	By ship, air cargo.

Availability of cheaper and convenient modes of transport:

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There are different modes of transport used in paddy/rice transportation. Road and rail transport are normally used for internal markets, whereas, for export markets, the mode of transport is by Sea. The most common modes of transportation are;

1) Road transportation : Road transport is the most predominant mode of transport used in the movement of paddy/rice. Road transport is used in right from the producing fields to the ultimate consumer. The initial movement of paddy/rice is done on village roads, which are generally non tarred (*Kachha*), and mostly tracks wind through the fields. Over the years, road transport has expanded phenomenally, due to the development of roads in rural areas, as well as by the increase of numbers and efficiency of different types of vehicles i.e. trucks and tractors etc. The following means of road transport are employed in different parts of the country to transport paddy/rice.

a) Head load

b) Bullock carts

TYPES OF ROAD TRANSPORTATION

c)Tractor trolley

d)

Trucks

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2) Railways : Railway is one of the most important means of transportation of paddy/rice. Railway is cheaper than road transport and more suitable for longer distance, as well as for large quantity of paddy/rice. The rate charged for the transport of paddy/rice depends on distance, quantity etc. Railway transportation requires more handling cost, as it requires loading and unloading charges and local transportation cost. However, losses are more in case of transport by railways.

3) Water transport : This is the oldest and cheapest mode of transportation. This form of transport is used in case of cities situated on or near the bank of a river, canal or in coastal parts. The export of paddy/rice is mainly done by sea

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transport. This transport system is slow but cheap and suitable for carrying large quantity. The following means of water transport are used in paddy/rice transport :

a) River transport: This system is used in some states like Uttar Pradesh, Bihar, Orissa, Kerala, Tamil Nadu, West Bengal, Assam, etc.

b) Canal transport: Canals are used for paddy/rice transportation to certain extent in Uttar Pradesh, West Bengal, Bihar, Orissa, Tamil Nadu and Andhra Pradesh.

c) Sea transport: The coastal trade is in practice mainly in Maharashtra, Orissa, West Bengal, Tamil Nadu, Kerala and Goa. Rice is shipped to a number of European Countries, Gulf Countries, Asian Countries and African Countries.

Selection of mode of transportation :

For the selection of mode of transportation, following points may be considered.

- ✓ The mode of transportation should be comparatively cheaper among available alternatives.
- ✓ It should be convenient during loading and unloading of paddy/rice.
- ✓ It should protect paddy/rice during transportation from adverse weather conditions i.e. rain, floods etc.
- ✓ It should be insured against any accident.
- ✓ It should be safe from pilferage etc.
- ✓ The delivery of paddy/rice to consignee should be made as per specified time schedule.
- ✓ It should be easily available particularly during post harvest period.
- ✓ It should be producer friendly for the payment of transportation.

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3.7 Storage :

Basic requirements for safe and scientific storage:

For safe and scientific storage of paddy/rice, the following requirements should be followed.

i) **Selection of site:** The storage structure should be located on a raised well-drained site. It should be easily accessible. The land of the site should be protected from moisture, excessive heat, insects, rodents, and bad weather conditions.

ii) **Selection of storage structure**: The storage structure should be selected according to quantity of paddy/rice to be stored. In godowns, sufficient space should be provided between two stacks for proper aeration.

iii) **Cleaning and fumigation:** For safe storage, storage structure should be clean. There should be no left-over grains, cracks, holes and crevices in the structure. The structure should be fumigated before storage.

iv) **Drying and cleaning grains:** Before storage, paddy/rice grains should be properly dried and cleaned to avoid quality deterioration.

v) **Cleaning of bags:** Always use new and dry gunny bags. Disinfect the old gunny bags by boiling in 1 percent Malathion solution for 3-4. minutes and dry it.

vi) **Separate storage of new and old stock:** To check infestation and to maintain hygienic condition, the new and old stocks should be store separately.

vii) **Use of dunnage:** Bags of paddy/rice should be kept on wooden crates or bamboo mats along with a cover of polythene sheet to avoid absorption of moisture from the floor.

viii) **Proper aeration:** There should be proper aeration during clean weather condition but care is to be taken to avoid aeration in rainy season.

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ix) **Cleaning of vehicles:** The vehicles used for transportation of paddy/rice should be cleaned by phenyl to avoid infestation.

x) **Regular Inspection:** To maintain proper health and hygiene of stock, regular inspection of stored paddy/rice is essential.

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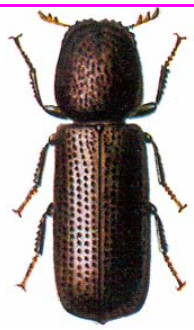
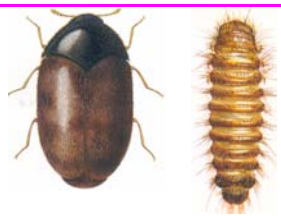
3.7.1 Major storage pests and their control measures :

Paddy/rice is being damaged by a number of pests, which causes considerable losses both qualitatively and quantitatively. It also damages seed viability and storage structures made of wood, mud, bricks etc. The severity of infestation depends on factors like grain moisture, relative humidity in atmosphere, temperature, type of storage structures, storage period, processing method adopted, sanitation, fumigation frequency etc. The damages of major stored grain pests of paddy/rice along with their control measures are given below.

Name of pest	Figure of pest	Damage	ures
1. Rice weevil *Sitophilus oryzae* (Linn.)	 Adult Larvae	Adults and larvae both bore into grains and feed on the grain.	Two types of treatments are followed to control infestation. **A)Prophylactic treatment :** Use following insecticide to prevent infestation in godown and stock of paddy/rice. **1.Malathion (50 percent EC):** Mix 1 litre in 100 litre of water. Use 3 litre prepared solution per 100 square meter area. Spray every 15 days interval. **2.DDVP (76 percent EC):** Mix 1 litre in 150 litre of water. Use 3 litre prepared solution per 100 square meter area. Do not spray on stock. Spray on walls and floors of the godown as and when required or once in a month.
2. Lesser grain borer *Rhizopertha dominica* (fabr.)		Beetles and larvae both penetrate the grain and feed. Sometimes, larvae feed on the waste flour produced by the adults. Heavy infestation makes the grain warm and moist, which leads to mould formation. It eats mainly paddy kernels but may also damage milled rice.	
3. Khapra beetle *Trogoderma granarium*	 Beetle Larvae	Larvae is a very serious stored pest but the beetle itself does not damage. First the larvae feed germ portion and later other parts of the grains.	

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4. Saw-toothed grain beetle *Oryzaephilus surinamensis* (Linn.)		Both beetle and larvae feed broken grains and damaged grains of other insects. They are usually found as a secondary pest together with other grain pests.	**3.Deltamethrin (2.5/WP):** Mix 1 kg. in 25 litre of water. Use 3 litre prepared solution per 100 square meter area. Spray on gunny bags after 3 months' interval. **B) Curative Treatment :** Use following fumigation insecticide to control infested stock/godown of paddy/rice in airtight condition. **1.Alluminium phosphide:** For stack fumigation use 3 tablets / tonne and put polythene cover on infected stock. For godown fumigation, use 120 to 140 tablets per 100 cubic meter area and keep godown structure airtight and closed for 7 days.
5. Red rust/Confused flour beetle *Tribolium castaneum (Herbst.)* *Tribolium confusum (J.du V.)*	 Red rust Flour Beetle Confused Flour Beetle	Beetle and larvae both do not cause damage to whole grain but feed on broken and damaged grains produced by milling and handling or infested /damaged grains of other insects.	
6. Tropical warehouse moth *Ephestia cautella*		The moth is usually found in warehouses. The larvae feed on damaged or processed grains leaving the whole grains undamaged. In heavy infestation, larvae cover all available surface with webbing.	
7. Rice moth *Corcyra cephalonica*		Larvae feed broken and processed paddy/rice. Larvae produce dense webbings. Whole grain kernels are bound into lumps.	
8. Rodents	 	Rodents eat whole grains, broken grains, flour etc. They spill more grains than they consume. Rodents also contaminate paddy/rice by hair, urine and feces, which cause diseases like cholera, food poisoning, ringworm, rabies etc. They also damage the storage structures and other accessories of storage like wire and cable etc.	**Rat cage :** Different types of rat cages are available in the market. Caught rats can be killed by dipping into water. **Poison baits :** Anti-coagulant pesticide like Zinc Phosphide is mixed with bread or any other food stuff used as bait. Keep baits for a week. **Rat burrow fumigation:** Put tablets of Aluminum Phosphide in each hole and burrow and block that

			hole by mud mixture to make it airtight.

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3.7.2 Storage structures :

Paddy, as well as rice are stored to maintain the supplies between two harvests. Storage provides protection against weather, moisture, insects, micro-organisms, rats, birds and any type of infestation and contamination. In India, paddy/rice is stored in following manners.

Traditional storage structures		
1.Mud-bin	Made by bricks and mud or by straw and cow dung. These are usually cylindrical in shape with varying capacity.	 Mud-bin
2.Bamboo reed bin	Made by bamboo splits plastered with mixture of mud and cow dung.	
3.Thekka	These are made up of gunny or cotton cloth wound around wooden support and generally in rectangular shape.	 Metal drum
4.Metal drums	Made up with iron sheets in cylindrical and square shape with various sizes.	
5.Gunny bags	Made up of jute.	
1.Improved bins	Different organisations developed and designed improved storage structures for scientific storage of foodgrains, which are moisture resistant and rodent-proof. These are: a) Pusa Kothi c) Nanda bins e) PKV bins b) PAU bins d) Hapur Kothi f) Chittore stone bins etc.	
2.Brick-build godowns	These are made by brick-walls with cemented flooring for storing paddy/rice in bulk and bags.	 Brick-build godowns
3.Cement plastered bamboo bin	This bin developed by Post Harvest Technology Centre, Kharagpur, in which bamboo strips are used to form the skeleton of the bin and cement-sand mortar (1:2.5 ratio) is plastered on outer and inner surface of the bin.	
4.CAP (Cover and plinth) storage	It is an economical way of storage on a large scale. The plinth is made by cement concrete and bags are staked on open and covered by polythene cover.	 CAP storage
5.Silos	Silos are used for storage of foodgrains. These are made from concrete, bricks and metallic materials with loading and unloading equipment.	 Silo

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3.7.3 Storage facilities :

I) Producers' storage :

Producers store paddy/rice in bulk at farm godown or own house using various types of traditional and improved structures. Generally, these storage containers are used for short period. Different organisation/institutions developed improved structures for paddy/rice storage with various capacities like Hapur Kothi, Pusa bin, Nanda bin, PKV bin, etc. Different storage structures are also used for this purpose like bricks-built rural godown, mud stone godown etc. Producers also use flexible PVC sheets covering for temporary storage. Some producers also pack paddy/rice in jute gunny bags or in gunny bags lined with polythene and stack in room.

II) Rural godowns :

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godowns Scheme, in collaboration with NABARD and NCDC. Its objective is to construct scientific storage godowns with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. Upto 31-12-2002, construction of 2373 godowns were sanctioned through NABARD and NCDC with the total capacity of 36.62 lakh tones. In addition, 973 godowns with storage capacity of 0.956 lakh tonnes were sanctioned under renovation and expansion. The main objectives of Rural Godowns Scheme are as under:

i) To prevent distress sale of foodgrains and other agricultural commodities immediately after harvest.
ii) To reduce quantity and quality losses arising from sub-standard storage.
iii) To reduce pressure on transport system in the post-harvest period.
iv) To help the farmers in getting pledge loans against the stored produce

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III) Mandi godowns :

Most of the paddy/rice is moved to the market after the harvest. Generally, paddy is stored both in bulk and in bags in every State, while the rice is kept in bags. Most of the States and U.Ts. have enacted Agricultural Produce Marketing Regulation Acts. The APMCs constructed storage godowns in the market yards. At the time of keeping produce in godown, a receipt is issued indicating the kind and weight of produce stored. The receipt is treated as negotiable instrument and is eligible for pledge finance. The CWC and SWCs were also allowed to construct godowns in the market yards. Co-operative societies also constructed godowns in the market yards.

Both in producing and consuming centers/markets, traders also possess permanent storage in the form of godowns or warehouses, or on hire basis. Generally, paddy/rice is kept for a period of one month to six months in markets, based on market demand or for speculative gains.

IV) Central Warehousing Corporation (CWC) :

CWC was established during 1957. It is the largest public warehouse operator in the country. In March 2002, CWC was operating 475 warehouses in the country. It has 16 regions, covering 225 districts, with a total storage capacity of 8.91 million tonnes. State-wise storage capacity with CWC as on31-03-2002 is given below.

Table No. 16: State-wise storage capacity with CWC as on 31-03-2002.

Name of State	No of warehouses	Total capacity (in tonnes)
1.Assam	6	46934

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2.Andhra Pradesh	49	1259450
3.Bihar	13	104524
4.Chhattisgarh	10	259964
5.Delhi	11	135517
6.Gujarat	30	515301
7.Haryana	23	338860
8.Karnataka	36	436893
9.Kerala	7	93599
10.Madhya Pradesh	31	665873
11.Maharashtra	52	1248510
12.Orissa	10	150906
13.Punjab	31	820604
14.Rajasthan	26	371013
15.Tamil Nadu	27	676411
16.Uttaranchal	7	73490
17.Uttar Pradesh	50	1018821
18.West Bengal	43	563698
19.Others	13	136826
Total	**475**	**8917194**

Source : Annual Report-2001-2002, Central Warehousing Corporation, New Delhi.

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Apart from storage, CWC also offers services in the area of clearing and forwarding, handling and transportation, distribution, disinfestation, fumigation and other ancillary services like safety and security, insurance, standardization and documentation. The CWC has also introduced a scheme, called the Farmers' Extension Service at selected centres to educate farmers about the benefits of a scientific storage. The CWC is also operating 109 custom bonded warehouses with a total operating capacity of 6.95 lakh tonnes as on 31-03-2002.These bonded warehouses are specially constructed at a seaport or airport and accept imported commodities for storage till the payment of customs duties by the importer of the commodities.

V) State Warehousing Corporations (SWCs) :

Different States have set up their own warehouses in the country. The area of operation of the State Warehousing Corporations is district places of the State. The total share capital of the State Warehousing Corporations is contributed equally by the Central Warehousing Corporation and concerned State Government. The SWCs are under the dual control of the State Government and the CWC. At the end of December 2002, SWCs were operating 1537 warehouses in 17 States of the country with the total capacity of 201.90 lakh tonnes. The State-wise storage capacities with SWCs as on 31-12-2002 are given below.

Table No. 17: State-wise storage capacity with SWCs as on 31-12-2002.

Name of SWC	No. of warehouses	Total capacity (in lakh tonnes)
1. Andhra Pradesh	120	17.14
2. Assam	44	2.67
3. Bihar	44	2.29
4. Gujarat	50	1.43
5. Haryana	113	20.48

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6. Karnataka	107	6.67
7. Kerala	62	1.85
8. Madhya Pradesh	219	11.57
9. Maharashtra	157	10.32
10.Meghalaya	5	0.11
11.Orissa	52	2.30
12.Punjab	115	72.03
13.Rajasthan	87	7.04
14.Tamil Nadu	67	6.34
15.Uttar Pradesh	168	30.42
16.West Bengal	32	2.58
17.Chhattisgarh	95	6.66
Total	**1537**	**201.90**

Source : Central Warehousing Corporation, New Delhi

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VI) Cooperatives :

Cooperative storage facilities are provided to the producer at cheaper rates, which reduces the storage cost. These cooperatives also provide pledge loan against the produce and storage is more systematic and scientific than traditional storage. Financial assistance and subsidies are provided by Government organisations/banks to build cooperative storage.

To meet the increasing need for storage capacity, the National Cooperative Development Corporation (NCDC) encourages construction of storage facilities by cooperatives, particularly at rural and market level. The number and capacity of cooperative godowns assisted by NCDC in major states are given below.

Table No. 18: State-wise cooperative storage facilities as on 31-3-2001.

Name of State	Rural level	Market level	Total capacity (in tones)
1. Andhra Pradesh	4003	571	690470
2. Assam	770	262	297900
3. Bihar	2455	496	557600
4. Gujarat	1815	401	372100
5. Haryana	1454	376	693960
6. Himachal Pradesh	1634	203	202050
7. Karnataka	4828	921	941660
8. Kerala	1943	131	319585
9. Madhya Pradesh	5166	878	1106060
10.Maharashtra	3852	1488	1950920
11.Orissa	1951	595	486780
12.Punjab	3884	830	1986690
13.Rajasthan	4308	378	496120
14.Tamil Nadu	4757	409	956578
15.Uttar Pradesh	9244	762	1913450
16.West Bengal	2791	469	478560
17.Other States	1031	256	312980

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Total	55886	9426	13763463

Source: Annual Report, 2000-01, National Cooperative Development Corporation, New Delhi.

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3.7.4 Pledge finance system :

Micro level studies indicate that distress sale by small farmers accounts for about 50 percent of the marketable surplus. The farmers are often compelled to sell their produce immediately after harvest, when the prices are low. To avoid such distress sale, Government of India, promoted Pledge Finance Scheme through a network of rural godowns and negotiable warehouse receipt system. Through this scheme, small and marginal farmers can get immediate financial support to meet their requirements and retain the produce till they get remunerative price.

According to the RBI guidelines, loan/advances upto 75 percent of the value of the produce stored in the godown can be advanced to farmers against pledge/hypothecation of agricultural produce (including warehouse receipts) subject to a ceiling of Rs. 1 lakh per borrower. Such loan shall be for a period of 6 months, which can be extended upto 12 months based on financing banks commercial judgment. The commercial /co-operative banks/RRBs provide credit to the farmers for the produce stored in the godown under this scheme. The banking institutions accept the godown receipt on its being duly endorsed and delivered to bank for pledge loan against hypothecation of produce as per RBI guidelines. Farmers are given freedom to take back their produce once the pledge loan is repaid. Facility of pledge finance is extended to all farmers, whether they are the borrowing members of Primary Agricultural Credit Societies (PACS) or not and the District Central Cooperative Banks (DCCBs) directly finance individual farmers on the strength of the pledge.

Benefits :

- Increases the retention capacity of the small farmers to avoid distress sale.
- Minimises the farmers' dependence on the commission agents as the pledge finance provides financial support to them immediately after harvest period.
- Participation of the farmers, irrespective of their land holding, helps in increasing the arrivals in market yards throughout the year.
- Gives a sense of security to the farmers even if their produce is not sold out in the market yard immediately.

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4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 Assembling :

The various agencies engaged in the assembling of paddy / rice may belong to one of the following categories:

i) Producers

ii) Village merchants

iii) Itinerant merchants

iv) Wholesale merchants and commission agents

v) Rice mill agents

vi) Co-operative organisations

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vii) Government organisations (FCI, State Government, etc.)

Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal are the important States in the country in terms of production and market arrivals.

Major assembling markets :

The following are the major assembling markets for paddy/rice producing states in the country.

Table No. 19: Major markets for paddy / rice producing States.

Name of State	Name of the markets
Andhra Pradesh	Guntur, Narsaraopet, Ongole, Tadepalligadem, Vijaywada, Gudivadu, Machilipattanum, Nellore, Kovur, Amudalavalas, Ramchandra Puram, Kottaleta, Khamam, Mahbubnagar, Badapally, Nandyal, Siddipet, Karimnagar, Jammikutty, Jagityal, Pedupally, Warangal, Mulug, Nizamabad, Boddhan, Suryapet, Miryalgod, Lunettipet
Bihar	Patna City, Ara, Buxar, Mohonia, Sasaram, Siwan, Maharajganj, Muzaffarpur, Motihari, Narkatiaganj, Darbhanga, Madhubani,Sahrsa, Tribeniganj, Samstipur, Katihar, Bhagalpur, Munger, Aurangabad, Gaya, Sonbarsa, Betiah, Farbisganj,
Gujarat	Ahmedabad, Nadiad, Anand, Borsad, Petlad, Godhra, Dahod, Zalod, Himmat Nagar, Kalot, Valsad, Navsari, Dharmpur, Surat, Bardoli, Vadodara
Haryana	Ambala, Panchkula, Yamuna Nagar, Kurukshetra, Kaithal, Karnal, Panipat, Hissar, Fathehabad, Sirsa, Rohtak, Jind, Sonepat, Faridabad, Gurgaon
Karnataka	Bangalore, Bhadravati, Devanagere, Gangavatti, Lingasugur, Manvi, Raichur, T. Narasipur, Bangarpet, Madurai, Mangalore, Mysore, Tumkur, Bellary
Kerala	Ernakulam, Trivendrum, Kozhikode, Nedumudi
Madhya Pradesh	Balaghat, Katani, Vara Seoni, Satna, Mandla, Nainpur, Bichhia, Barghat, Jabalpur, Rewa, Panna, Shahpura, Dabra, Hanumana
Maharas-htra	Pune, Panvel, Kalyan, Sangli, Solapur, Jalna, Nagpur, Gondia, Tumsar, Pavni, Amgaon, Tiroda, Dhule, Nashik, Dharmabad
Orissa	Atabira, Bargarh, Cuttak, Sambalpur, Bolangir, Balasore
Punjab	Amritsar, Bathida, Fatehgar Saheb, Ferozpur, Faridkot, Gurdaspur, Hosiarpur, Jallandhar, Kapurthalla, Ludhiana, Mansa, Moga, Muktasur, Narasahar, Patiala, Ropar, Sangrur
Tamil Nadu	Thanjavar, Thiruvannamabai, Villupurm, Nagpattinum, Gimbatore, Erode, Trichitapallai, Pudukottai, Madurai, Dindigal
Uttar Pradesh	Sahajhanpur, Pilibhit, Hardoi, Ghaziabad, Sitapur, Mainpuri, Pukhrayan, Barilly, Chandauli, Powayan, Puranpur, Saharanpur, Golapokarannath, Baheri, Meerut, Dudhi, Bulandshahart, Basti, Sultanpur Kasganj, Kasipur, Rampur, Badaun, Bijnor, Moradabad, J.B. Phulnagar
West Bengal	Haldibari, Tufanganj, Alipurdwar, Siliguri, Islampur, Kandi, Bethudahari, Karmpur, Panduah, Kalna, Katwa, Burdwan, Rampurhat, Suri, Bolpur, Bishnupur, Bankura, Midnapore, Jhargram.

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4.1.1 Arrivals :

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The marketing period of paddy/rice is generally October to September. It was reported that the total arrivals of paddy in 135 markets of Uttar Pradesh were 19688 thousand quintals followed by 38 markets of Punjab with 18124 thousand quintals and 47 markets of Andhra Pradesh with 17764 thousand quintals during the year 2000-2001. In case of arrivals of rice, Uttar Pradesh stood first with 17668 thousand quintals in 135 markets followed by 47 markets of Andhra Pradesh with 14297 thousand quintals and 38 markets of Punjab with 11066 thousand quintals during the year 2000-01. The arrivals of 1999-99 to 2000-01 in major paddy/rice producing states are given below.

Table No. 20: Arrivals of paddy/rice in markets of major producing states in India during 1998-99 to 2000-01.

(000' Quintals)

S. N.	Name of important states	PADDY			RICE		
		1998-99	1999-2000	2000-01	1998-99	1999-2000	2000-01
1	Andhra Pradesh(47 Markets)	17277.6	16186.7	17764.3	14288.9	12433.9	14297.6
2	Bihar (37 Markets)	429.9	467.5	411.7	1107.7	1350.3	1127.2
3	Gujarat (46 Markets)	1133.8	1326.4	872.6	988.9	873.2	738.8
4	Haryana (23 Markets)	6414.7	5350.5	5408.6	4421.8	3581.2	3602.8
5	Karnataka (48 Markets)	2084.5	2006.4	2700.3	1645.1	1674.8	2399.8
6	Kerala (4 Markets)	233.7	236	198.3	932.6	879.8	730.4
7	Madhya Pradesh(37 Markets)	1756	2152.2	1425.9	1135.1	1414.3	956.7
8	Maharashtra (76 Markets)	464.7	412.1	344.3	656.7	763.1	944.2
9	Orissa (15 Markets)	973.6	973.6	973.6	1281.2	1281.2	1281.2
10	Punjab (38 Markets)	25175.2	17939	18124.1	17491.8	12898.7	11066.4
11	Tamil Nadu (46 Markets)	12470.9	13741.7	8216.5	8645.1	10710.1	6601.2
12	Uttar Pradesh (135 Markets)	19856.8	21274.4	19688	18561.6	18319.9	17668.8
13	West Bengal (39 Markets)	2547.3	2649.4	3314.7	6745.1	6749.6	6650.9
	Total (591 Markets)	90818.7	84715.9	79442.9	77901.6	72930.1	68066.0

Source : Department of Agriculture and Cooperation, New Delhi

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4.1.2 Despatches :

Paddy and rice is mostly despatched to the markets with in the same state or to the markets of adjoining states. It has been noticed that in the states like Punjab, Haryana, Andhra Pradesh and West Bengal, paddy/rice was despatched to the markets at longer distances. The paddy/rice from 47 markets of Andhra Pradesh was mostly despatched to the markets of Karnataka, Kerala, Tamil Nadu, West Bengal and Gujarat. Punjab and Haryana despatched mainly to Bihar, Delhi, Madhya Pradesh, Maharashtra and Uttar Pradesh. West Bengal despatched paddy/rice to Bihar, Uttar Pradesh, Orissa and North Eastern states. The despatches from major paddy/rice producing states are as follows.

Table No. 21: Despatches from major paddy producing states in India.

States	Despatches to states apart from local markets
1.Andhra Pradesh	Karnataka, Kerala, Tamil Nadu, Gujarat, Maharashtra, West Bengal
2.Bihar	Uttar Pradesh, West Bengal, Madhya Pradesh, North Eastern States
3.Gujarat	Kerala, Maharashtra
4.Haryana	Assam, Bihar, Delhi, Madhya Pradesh, Maharashtra, Orissa, U. P.

5.Karnataka	Maharashtra, Andhra Pradesh, Tamil Nadu, Kerala
6.Kerala	Tamil Nadu
7.Madhya Pradesh	Andhra Pradesh, Maharashtra, Assam, Gujarat, Orissa, West Bengal
8.Maharashtra	Madhya Pradesh, Uttar Pradesh, Gujarat, West Bengal, A. P., Orissa
9.Orissa	West Bengal, Madhya Pradesh
10.Punjab	Assam, Bihar, Delhi, Uttar Pradesh, West Bengal, Madhya Pradesh, Maharashtra, Rajasthan, Andhra Pradesh
11.Tamil Nadu	Kerala, Karnataka, Gujarat, Pondichary, Orissa
12.Uttar Pradesh	Assam, Delhi, Bihar, Haryana, Uttaranchal, Rajasthan, Maharashtra, West Bengal
13. West Bengal	Bihar, Uttar Pradesh, Orissa, North Eastern States

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4.2 Distribution :

Assembling and distribution system of marketing are closely related. The producer makes the movement of paddy from the farm to the assembling centers, while a number of market functionaries can be involved in the distribution dealing with its subsequent movement to the final consumer. In the Survey of Marketable Surplus and Post-Harvest Losses of Paddy (2002), it has been estimated that the producer retained 44.54 percent of production for their farm-family requirement. The marketable surplus was estimated to be about 55.46 percent of the total production. The total marketable surplus of paddy/rice is distributed through different ways i.e. wholesale distribution, retail distribution, direct marketing to miller, contract farming etc. The following agencies are engaged in the distribution of paddy/rice at various stages of marketing.

- **Producers**
- **Village traders**
- **Itinerant traders**
- **Retailers**
- **Wholesale merchants**
- **Commission agents**
- **Rice millers**
- **Co-operative organisation**
- **Government organisation**
- **Exporter and importer**

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4.2.1 Inter-state movement :

In case of paddy, during the year 2000-2001, Tamil Nadu despatched 1805554 quintals to Assam, Bihar, Gujarat, Kerala, Pondichary and Orissa. Uttar Pradesh despatched 304540 quintals paddy to Assam, Bihar, Delhi, Maharashtra and West Bengal.

During the year 2000-2001, 35945250 quintals of rice from Andhra Pradesh were marketed for the inter-state movement mainly to Karnataka, Kerala, Tamil Nadu, Maharashtra, Madhya Pradesh and Gujarat. The state of Punjab and Haryana marketed 33513610 quintals and 6859140 quintals rice respectively to Assam, Bihar, Delhi, Uttar Pradesh, Madhya Pradesh, Maharashtra, Orissa, West Bengal and Southern States. The Inter-state movement of paddy and rice by rail, river and air during 1998 to 2001 is given below.

Table No. 22: Inter-state movement of paddy and rice by rail, river and air during 1998-99 to 2000-01.

(Quantity in Quintal)

Sl No	State (Exported from)	Paddy			Rice		
		1998-99	1999-2000	2000-2001	1998-1999	1999-2000	2000-2001
1	Andhra Pradesh	--	--	--	61080	--	35945250
2	Assam	--	--	--	73917	--	880753

3	Bihar	--	--	2060	--	42150	91825
4	Chandigarh	--	--	--	--	--	381040
5	Delhi	--	--	--	1740	--	707300
6	Gujarat	--	3600	--	--	--	8016
7	Haryana	430	--	40	46800	--	6859140
8	Karnataka	--	--	--	2411	--	46690
9	Kerala	--	9340	--	--	--	1126256
10	Madhya Pradesh	335850	13570	7070	--	--	2838710
11	Maharashtra	--	--	--	--	--	673070
12	Pondichary & Karikal	1034973	665765	718628	--	--	64794
13	Punjab	1420	--	--	53020	--	33513610
14	Rajasthan	11018	52164	23086	--	--	55082
15	Tamil Nadu	2055484	1615779	1805554	--	--	594239
16	Uttar Pradesh	17490	37780	304540	560	--	3716460
17	West Bengal	17030	5980	--	79840	155450	431757
	Total	**3473695**	**2403978**	**2860978**	**319368**	**197600**	**88024122***

* :- Including others

Source: Director General of Commercial Intelligence & Statistics (DGCIS), Kolkata

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4.3 Export and Import :

Export:

Up to 1972, India was one of the major rice importing countries. However, India now exports rice to a large number of countries in the World. India's total exports of rice were 2208560 tonnes in 2001-2002 valued at Rs. 3174 crore. The share of Basmati rice was 667070 tonnes valued at Rs. 1842 crore and non-Basmati rice was 1541490 tonnes valued at Rs. 1331 crore. The flow diagram of world export of rice is given in Chart No.2. The export of rice during 1999-2000 to 2001-02 is given in Table No.23 while country-wise export of rice during the same period is given in Table No.24.

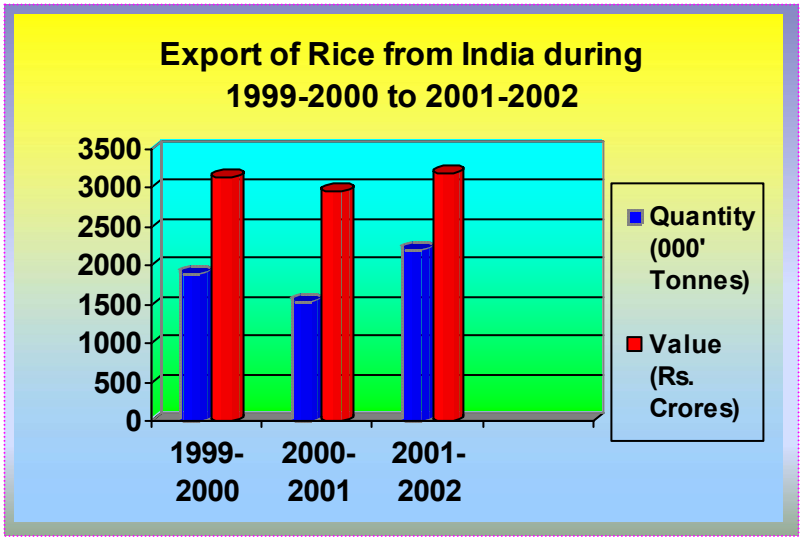

Table No. 23: Export of rice from India during 1999-2000 to 2001-02.

(Quantity : 000' tonnes.; Value : Rs. Crore)

Description	1999-2000		2000-2001		2001-2002	
	Quantity	Value	Quantity	Value	Quantity	Value
1. Rice in husk (Paddy)	2.51	1.69	5.39	6.79	42.33	33.18
2. Husked (Brown rice)	0.70	0.44	0.26	0.13	0.25	0.15
3. Rice parboiled	737.25	776.25	381.99	432.04	723.73	600.35
4. Other rice	465.95	530.55	293.4	336.56	751.23	680.93
5. Broken rice	51.33	36.74	1.72	1.97	23.95	16.76
Total non-Basmati	**1257.74**	**1345.67**	**682.76**	**777.49**	**1541.49**	**1331.37**
6. Basmati rice	**638.38**	**1780.34**	**851.72**	**2165.96**	**667.07**	**1842.77**
Total	**1896.12**	**3126.01**	**1534.48**	**2943.45**	**2208.56**	**3174.14**

Source: Director General of Commercial Intelligence & Statistics (DGCIS), Kolkata

Quality of rice for export :

The taste of consumers varies from country to country. In Basmati and non-Basmati varieties not only the taste but average precook length, colour, number of broken rice, admixture of other grains, freedom from pests and diseases are also considered in quality determination. Basmati rice is exported to more than 80 countries mainly to Gulf and European Countries. The Indian Basmati rice varieties have special pleasant aroma, long slender grain with soft texture on cooking. Indian parboiled rice has good demand in countries like Bangladesh, Saudi Arabia, Russia, Singapore etc; whereas in some African countries, consumers prefer yellow tinted parboiled rice. India also exports paddy to some countries like Indonesia, Srilanka, Russia etc. India also exports non-Basmati rice, brown rice, and broken rice to many countries.

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Table No. 24: India's country-wise export.

BASMATI RICE (Quantity: Tonnes, Value: Rs. Lakh)

S. N.	Name of Country	1999-2000		2000-01		2001-02	
		Quantity	Value	Quantity	Value	Quantity	Value(Rs.)
1	Bahrain	2944.26	738.72	3176.60	964.49	2060.40	711.15
2	Belgium	7512.15	2409.02	8854.29	2362.12	7194.86	1947.25
3	Canada	2450.39	822.45	8479.49	3021.50	7126.27	2532.99
4	Israel	12027.90	3368.10	22140.37	5784.73	9083.50	2370.49
5	Italy	3677.42	1166.62	8658.95	2360.52	6051.17	1742.05
6	Kuwait	3374.57	735.01	889.29	345.64	987.37	353.70
7	Mauritius	4100.30	1044.97	8439.00	2005.36	6039.11	151.45
8	Netherlands	47738.14	12592.36	82799.58	22734.60	65257.26	19611.09
9	Qatar	7935.53	1739.50	3535.94	966.92	1092.22	324.85
10	Russia	5979.50	1645.01	1469.06	488.14	220.00	129.99
11	Saudi Arabia	4250.10	1194.30	4745.63	1218.87	2723.02	731.04
12	Singapore	6462.48	1620.77	7186.84	1988.79	2993.41	868.07
13	Sweden	3306.90	863.96	2417.44	739.92	2262.96	691.88
14	U. A. E.	851.50	247.95	1444.72	377.68	850.78	221.25
15	U S A	396676.31	105851.37	478124.53	109878.43	406096.73	105880.68
16	Others	126435.51	41228.51	204683.12	60063.64	143630.86	45155.77
	Total	**638380.14**	**178033.83**	**851721.83**	**216596.16**	**667065.81**	**184276.63**

PARBOILED RICE

1	Bahrain	2271.71	294.18	2856.12	395.27	1784.24	199.36
2	Bangladesh	224606.31	21373.75	187842.06	17343.95	67055.35	5380.24
3	Kuwait	4987.00	736.94	3236.00	491.88	3115.67	374.84
4	Nigeria	82137.40	7865.04	0.00	0.00	163540.14	12186.75
5	Russia	105284.10	12073.95	1645.00	206.06	19982.00	1461.11
6	Saudi Arabia	44369.93	5680.19	57412.81	8798.83	34202.08	3380.72
7	Singapore	12054.99	2113.71	12121.94	1938.80	20982.02	2969.28
8	Somalia	19769.00	2004.79	2745.00	327.13	13444.00	995.98
9	South Africa	89595.50	10173.40	51952.75	5377.02	182308.08	13698.54
10	U A E	23091.48	2739.05	15502.58	1944.90	23058.76	2250.14
11	Others	129085.49	12561.15	46672.78	6380.25	194259.65	17138.07
	Total	**737252.91**	**77616.15**	**381987.04**	**43204.09**	**723731.99**	**60035.03**

RICE EXCPTG PARBOILED (EXCL BASMATI RICE)

1	Bahrain	2609.10	318.91	1875.14	238.53	2414.60	342.35
2	Bangladesh	1545270.25	14776.81	130055.72	12308.46	34739.97	2588.48
3	Kuwait	5607.72	814.10	4284.28	656.44	7683.97	866.58
4	Nigeria	26909.00	3043.42	0.00	0.00	138609.00	15466.21
5	Russia	36248.00	3450.05	0.00	0.00	10936.10	1059.39
6	Saudi Arabia	115768.21	15416.00	95868.49	12250.93	142382.03	15214.71
7	Singapore	3156.95	517.69	2506.06	418.27	15591.27	1079.27
8	South Africa	34537.45	3974.37	4787.17	621.41	124080.81	9253.73
9	U A E	15299.40	1939.49	10785.35	1163.66	9364.20	1093.95
10	Yemen Rep.	10418.07	1621.50	6252.33	940.15	5839.20	1105.35
11	Others	45762.11	7182.58	36985.38	5057.73	259585.38	20023.30
	Total	**1841586.26**	**53054.92**	**293399.92**	**33655.58**	**751226.53**	**68093.32**

Source: Director General of Commercial Intelligence & Statistics (DGCIS), Kolkata

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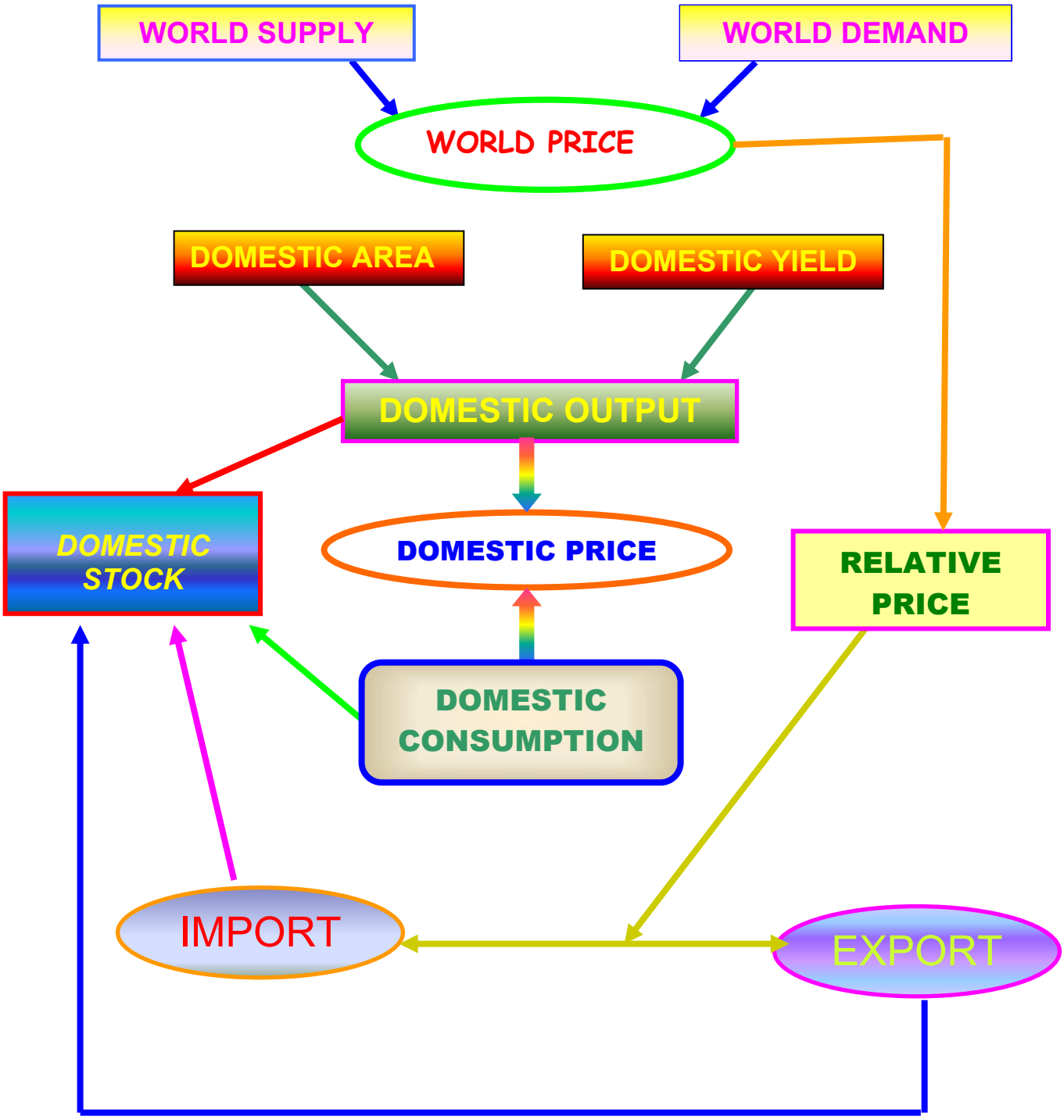
CHART NO. 2

FLOW DIAGRAM OF WORLD EXPORT OF RICE



Source : Indian Journal of Agricultural Economics, Vol. 58, No. 1, Jan.-March, 2003.

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Major export markets :

Earlier, exports of Basmati rice were more than the non-Basmati rice but after the liberalization under the WTO regime, many new markets have been opened for Indian Basmati and non-Basmati rice. The major markets of rice are as under

Table No. 25: Major export markets of Indian rice in the world.

Type of rice	Countries where exported
Basmati rice	Saudi Arabia, Kuwait, UK, USA, Belgium, Canada, France, Germany, Netherlands, Italy, Oman, Qatar etc.
Parboiled Rice	Saudi Arabia, Russia, Bangladesh, Egypt ARP, Singapore, Srilanka, United Arab Emits, Yemen Republic, Malaysia, Maldives, Oman etc.
Non Basmati (Excluding Parboiled)	Bangladesh, Indonesia, Malaysia, Singapore, South Africa, Philippines and USA etc.
Paddy (Rice in the husk)	Australia, Germany, Srilanka, Myanmar, Malaysia, South Africa, Saudi Arabia.
Brown Rice (Husked)	Australia, Germany, Srilanka, Japan, South Africa, Saudi Arabia, USA.
Broken Rice	Ethiopia, France, Kuwait, Malaysia, Oman, South Africa, Saudi Arabia, Singapore, UAE, USA.

Agricultural Export Zones for Basmati rice:

Agricultural Export Zones for Basmati rice have been set up in Punjab (6 districts), Uttaranchal (4 districts) and Uttar Pradesh (13 districts). These zones are set up by identifying the potential of that geographical region, in which Basmati rice is cultivated. These zones adopted an end-to-end approach of integrating the complete process right from the stage of production till it reaches the market(s). It is expected that during next 5 years, India would export Basmati rice worth Rs. 3084.54 crores from these zones to foreign markets.

Table No. 26: Agricultural Export Zones for Basmati rice in the country.

Name of zone	Districts covered
1.Punjab	Nawansahar
2.Uttaranchal	Udham Sing Nagar, Dehradun, Haridwar and Nainital
3.Uttar Pradesh	J.B.Phulanagar, Saharanpur, Mujjafur Nagar, Meerut, Bulandsahar and Gaziabad.

The benefits of setting up of such zones are as follows:

- Strengthening of backward linkages with a market oriented approach.
- Product acceptability and its competitiveness abroad as well as in the domestic markets.
- Value addition to basic agricultural produce.
- Cut down the cost of production through economy of scale.
- Better price for agricultural produce.
- Improvement in product quality and packaging.
- Promotion of trade related research and development.
- Increase in employment opportunities.

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Import :

In earlier decades, India was a major paddy/rice importing country. After green revolution and introduction of high yielding varieties, the country became self-sufficient in production of paddy / rice. During 1999-2000 to 2001-02, the following quantities of paddy and rice were imported.

Table No. 27: India's Import of paddy and rice during 1999-2000 to 2001-02.

Year	1999-2	2000	2001-02
	3611.00	12745.72	62.47
Value (Lakh Rs.)	490.92	1736.67	6.75

Source: Director General of Commercial Intelligence & Statistics (DGCIS), Kolkata

4.3.1 Sanitary & Phyto-Sanitary (SPS) requirements :

The agreement on Sanitary and Phyto-Sanitary (SPS) measures is a part of the GATT Agreement, 1994, for export and import trade. The aim of the agreement is to prevent the risk of introduction of new pests and diseases in new regions i. e. importing countries. The main purpose of the agreement is to protect human health, animal health, and Phyto-Sanitary situation of all member countries and protect the members from arbitrary or unjustifiable discrimination due to different Sanitary and Phyto-Sanitary Standards.

The SPS agreement applies to all Sanitary and Phyto-sanitary measures, which may directly or indirectly, affect international trade. Sanitary measures deal with human or animal health, and Phyto-Sanitary measures are related to plant health. SPS measures are applied in four situations for the protection of human, animal or plant health :

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- Risks arising from the entry, establishment or spread of pests, diseases, disease- carrying organisms or disease causing organisms.
- Risks coming from additives, contaminants, toning or disease-causing organisms in foods, beverages or feed stuffs.
- Risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment, or spread of pests.
- Prevention or limitation of damage caused by the entry, establishment or spread of pests.

The SPS standards commonly applied by Governments, which affect imports are:

i) **Import ban** (Total/partial) is generally applied when there is a significant rate of risk about a hazard.
ii) **Technical specifications** (Process standards/Technical standards) are most widely applied measures and permit import subject to compliance with pre-determined specifications.
iii) **Information requirements** (Labeling requirements/Control on voluntary claims) permit imports provided they are appropriately labelled.

Procedure for issue of SPS certificate for export:

In order to make plant materials free from quarantine and other injurious pests to conform with the prevailing phyto-sanitary regulations of the importing country, the exporter needs to give a suitable disinfestation / disinfection treatment, without affecting the viability for sowing / edibility of the plants/seeds.

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For plant materials (seed, meal, extraction, etc.) meant for export, Government of India, has authorised some Private Pest Control Operators (PCO), who have the expertise, men and materials for treating the export agricultural cargo / produce. The exporter has to apply to the officer-In-charge (Plant Protection and Quarantine Authority, Department of Agriculture and Cooperation) for Phyto-Sanitary Certificate (PSC) in prescribed application form at least 7 to 10 days in advance of the export. Before submitting the application for issue of PSC, it should be ensured that the cargo is treated properly by the licensed PCO's.

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4.3.2 Export procedure :

For export of paddy/rice from India, exporter can take the help of following laid down procedure.

- Registration with RBI and obtain RBI code number. {Apply in prescribed form (CNX) to obtain registration No. from RBI and the number is to be quoted on all export papers}.
- Importer – Exporter code (IEC) number to be obtained from Director General of Foreign Trade (DGFT).
- Register with Agricultural and Processed Food Products Export Development Authority (APEDA) to obtain registration cum membership certificate. This is required to obtain permissible benefits from the Government.
- For Basmati rice export RCAC (Registration Cum Allocation Certificate) is issued by APEDA. (Non-Basmati rice can be freely exported; no RCAC is required, only exporter has to register with APEDA).
- For RCAC, exporter will be required to submit the export details and contract along with fee.
- RCAC is valid for 3 months, after that revalidation is required. RCAC is a statutory document and no duplicates can be issued after the misplacement of the original one.
- Exporter then procures their export orders.
- Quality of the produce is to be assessed by the inspecting agency and a certificate is issued to this effect.
- Produce is then shifted to port.
- Obtain marine insurance cover from any insurance company.
- Contact clearing and forwarding (C. & F.) agent for sorting the produce in godowns and to get the shipping bill for allowing shipment by the Custom Authority.
- Shipping bill is submitted by C. & F. Agent to custom house for verification and verified shipping bill is given to the shed superintendent to obtain carting order for export.
- The C. & F. Agent presents shipping bill to preventive officer for loading into ship.
- After loading into ship, a mate's receipt is issued by captain of ship to the superintendent of the port, who calculates port charges and collects the same from the C. & F. Agent.
- After the payment, C. & F. Agent takes mate's receipt and requests port authority to prepare bill of lading to the respective exporter.
- Then C. & F. Agent sends the bill of lading to the respective exporter.
- After receiving the documents, exporter obtains a certificate of origin from chamber of commerce, stating that the goods are of Indian origin.
- Importer is informed by exporter regarding date of shipment, name of vessel, bill of lading, customer's invoice, packing list etc.
- Exporter submits all documents to his bank for verification and bank verifies the papers against original letter of credit.

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- After verification, bank sends documents to foreign importer to enable him to take delivery of produce.
- After receiving papers, importer makes payment through bank and sends the GR form to RBI, an evidence of realisation of export proceeds.
- Exporter now applies for various benefits from duty drawback schemes.

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4.4 Marketing constraints :

- **Unstable price:** Generally, the price of paddy/rice goes down in the post harvest period (3-4 months immediately after harvest) due to heavy arrivals in the market and later shoots up, which results in unstable prices.
- **Spurt in production and heavy arrivals:** After the introduction of high yielding varieties of rice, the production has increased manifolds, increasing the arrivals in the markets, which results in distress sale after harvest.
- **Lack of marketing information:** Due to lack of market information regarding prevailing prices, arrivals etc., most of the producers market the paddy/rice in the village itself, which deprives them of getting remunerative returns.
- **Adoption of grading:** Grading of paddy/rice at producers' level ensures better prices to producers and better quality to consumers. However, most of the markets are lagging behind in providing grading service at producers' level.
- **Inadequate storage facilities in rural areas:** To avoid the distress sale, storage facilities in villages are found to be inadequate. Due to lack of storage facilities at rural stage, substantial quantity is lost.
- **Transportation facilities at producers' level:** Due to inadequate facilities of transportation at village level, in most of the states, producers are forced to sell paddy/rice in the village itself to itinerant merchants or traders directly at low prices.
- **Training of producer:** The farmers are not trained in marketing system. Training shall improve their skill for better marketing of their produce.
- **Malpractices in markets:** Many malpractices prevail in the markets of paddy/rice i.e. excess weighment, delay in payment, high commission charges, delay in weighing and auction, different kinds of arbitrary deductions for religious and charitable purposes etc.
- **Financial problem:** Lack of market finance is one of the major marketing problems in the smooth running of marketing chain.
- **Infra-structure facilities:** Due to inadequate infra-structural facilities with producers, traders, millers and at market level, the marketing efficiency is affected adversely.
- **Superfluous middlemen:** The existence of a long chain of middlemen reduces the producer's share in consumer's rupee.

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5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels :

The following are the important marketing channels existing in the marketing of paddy/rice (Chart No. 3).

(i) Private:

The major marketing channels identified in the private sector are;

1) **Producer ➳ Miller ➳ Wholesaler ➳ Retailer ➳ Consumer**
2) **Producer ➳ Commission Agent ➳ Miller ➳ Wholesaler ➳ Retailer ➳ Consumer**
3) **Producer ➳ Itinerant Merchant ➳ Miller ➳ Wholesaler ➳ Retailer ➳Consumer**
4) **Producer ➳ Wholesaler (Paddy) ➳ Miller ➳ Wholesaler(Rice) ➳ Retailer ➳ Consumer**
5) **Producer ➳ Miller ➳ Retailer ➳ Consumer**
6) **Producer ➳ Miller ➳ Consumer.**

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(ii) Institutional :

It covers the public and co-operative sector agencies. It plays a very significant role in the procurement and distribution of paddy/rice. Food Corporation of India is the main agency for procurement, buffer stock operations and distribution of rice. The main institutional marketing channel for rice is as under;

Producer ➳ Procuring Agency (FCI/State Govt./Co-operatives) ➳ Miller (FCI/Co-operatives/Private) ➳ Distributing Agency (State Govt.) ➳ Fair price/Ration shop ➳ Consumer.

Criteria for selection of channels :

There are many marketing channels involved in marketing of paddy/rice. The following are the criteria for the selection of efficient marketing channels.

- ✓ The channel, which ensures reasonable return to producer, is considered to be good or efficient.
- ✓ Transportation cost in that channel.
- ✓ Commission charges and market margins received by the intermediaries, such as trader, commission agent, wholesaler and retailer.
- ✓ Financial resources.
- ✓ The shorter channel with minimum market cost should be selected.

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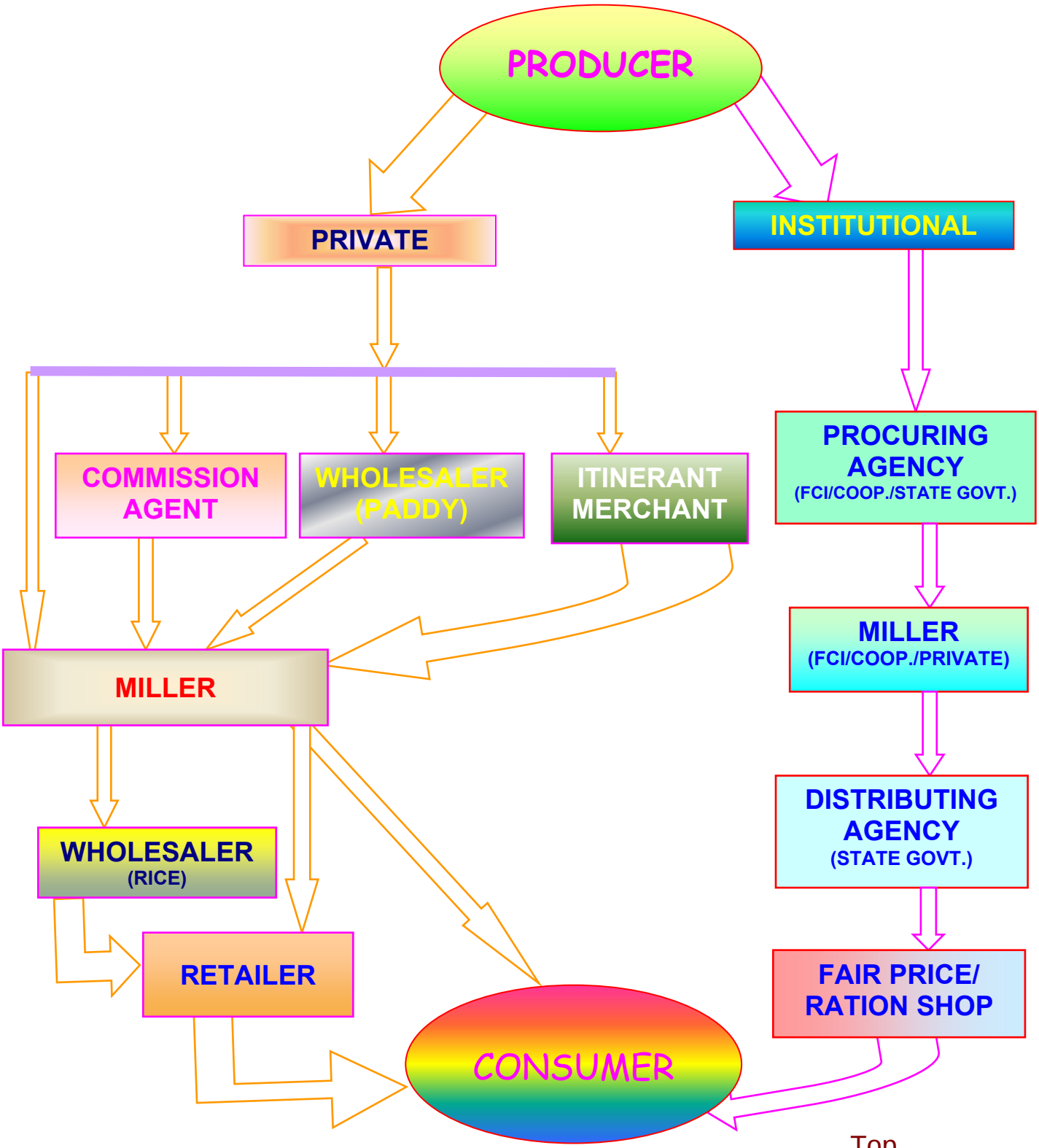
CHART NO. 3

MARKETING CHANNELS OF PADDY / RICE



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5.2 Marketing costs and margins :

Marketing costs :

Marketing costs are the actual expenses incurred in bringing goods and services from the producer to the consumers. The marketing costs normally include;

(i) handling charges at local points
(ii) assembling charges
(iii) transport and storage costs
(iv) handling charges by wholesaler and retailer
(v) expenses on secondary services like financing, risk taking and market intelligence, and
(vi) profit margins taken by different agencies.

Marketing margins :

Margin refers to the difference between the price paid and received by a specific marketing agency such as a single retailer, or by any type of marketing agency, i.e. retailers or wholesalers or by any combination of marketing agencies in the marketing system as a whole. Total marketing margin includes cost involved in moving the paddy/rice from producer to consumer and profits of various market functionaries.

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The absolute value of the total marketing margin varies from market to market, channel to channel and time to time.

i) Market fee : It is charged either on the basis of weight or on the basis of the value of the produce. It is usually collected from the buyers. The market fee differs from state to state. It varies from 0.5 percent to 2.0 percent ad valorem.

ii) Commission : The charges are usually made in cash and vary from market to market. These charge were observed to be nil in the states of Assam, Kerala, Madhya Pradesh, Goa, Arunachal Pradesh.

iii) Taxes : Different taxes are charged in different markets such as toll tax, terminal tax, sales tax, octroi etc. These taxes leviable on paddy/rice differ from market to market in the same state as also from state to state. These taxes are usually payable by the seller.

iv) Miscellaneous charges : In addition, some other charges are also levied. These include handling, weighing, loading, unloading, cleaning, charity contribution in cash and kind, etc. These charges may be payable either by the seller or by the buyers.

Market charges and taxation in different states are given in the Table No. 28.

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Table No. 28: Market fees, commission charges and taxes on paddy/rice in major states.

Sl. N.	State	fee	Comm-ission charges	Sales tax	Other charges	
1.	**Andhra Pradesh**	1%	1.5-2%	4%	--	C.A. cum trader A- Rs. 3000 / 5 years C.A. cum trader B- Rs. 2000 / 5 years C.A. cum trader C- Rs. 1000 / 5 years C.A. A Rs. 125 / annum
2.	**Assam**	1%	Nil to Rs.3-5/Qtl.	Nil to 2%	Nil to Rs.3/Qtl.	Traders Rs. 100
3.	**Delhi**	1%	2%	NA	1.5% (And hat)	Trader 'A'&'B' Rs. 100
4.	**Gujarat**	0.5%	1.5%	NA	--	Trader/C.A. 'A' Rs. 125, trader 'A' Rs. 90 limited trader 'A' Rs. 50, trader 'B' Rs. 75 trader 'C' Rs. 50, retail trader Rs. 10
5.	**Haryana**	2%	2.5%	--	Security	Lic. fee + security Processor Rs.100 + 500 Commission agent Rs. 60 + 300 Other dealer Rs. 20 + 100
6.	**Himachal Pradesh**	1%	2-3%	3-5%	--	Traders/C.A. Rs. 100 Renewal Rs. 60
7.	**Karnataka**	1%	2%	Nil	--	Trader/C.A. Rs. 200 Processor/stockiest/broker Rs. 100
8.	**Kerala**	--	8%	Nil	Entry; head load 2/-, bycycle 3/- bullock cart 10/- mini truck 30/-	--
9.	**Madhya Pradesh**	2%	Nil	NA	--	Trader / processor Rs. 1000
10.	**Maharashtra**	0.8 to 1.05%	2-3.25%	--	--	Traders issuing Rs. 100-210 Renewal charges Rs. 90-200
11.	**Orissa**	1%	0-0.4%	4%	--	Traders 'A' – Rs. 50-300, traders 'B' – Rs. 50 traders 'C' – Rs. 35
12.	**Punjab**	2%	2.5%	4%	Rural development 2%	Traders Rs. 100/ 3 years
13.	**Rajasthan**	1.6%	4%	--	--	Traders 'A'/'B' Rs.200 for one time C.A. cum trader Rs. 300 for one time
14.	**Uttaranchal**	2.5%	1.5%	4%	Dalali 0.5%	Traders Rs. 250
15.	**Uttar Pradesh**	2.5%	1.5%	4%	Dalali 0.5%	Wholesaler agent / cum C.A., processor Rs. 250, retailer Rs. 100, small rice mill Rs. 150
16.	**Tamil Nadu**	1%	Nil	Nil	--	Wholesaler Rs. 100 small / other trader Rs. 75
17.	**West Bengal**	0.5%	Nil	2% only for rice	--	Traders Rs. 150, C.A./processor Rs. 200, brocker Rs. 100

Note: The charges for weighing, unloading, loading, cleaning etc. vary from Rs. 0.5 to 5.0 per unit

Source: Sub Offices of Directorate of Marketing and Inspection.

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6.0 MARKETING INFORMATION AND EXTENSION

Marketing information :

Marketing Information is essential for producers in planning production and market led production. It is equally important for other market participants for trading.

Recently, Govt. of India has launched Agricultural Marketing Information Network Scheme through Directorate of Marketing & Information (DMI) to bring out improvement in the present market information scenario by linking all Agricultural produce wholesale markets in the States and Union Territories. The data received from markets is being displayed on the website **www.agmarknet.nic.in**.

Marketing extension :

Market extension is a vital factor enlightening the farmers about proper marketing and removal of marketing constraints and improves their awareness in various modern post harvest measures for efficient and cost effective marketability.

Benefits :

- Provides the up-to-date information on the arrivals and prices of agricultural commodities in different markets.
- Guides the producers to take right decision, when, where and how to market their produce.
- Educate the producers/traders about the post harvest management i.e.
  a. Harvesting care
  b. Techniques to minimise losses during post harvest period.
  c. Value addition to the produce by proper cleaning, processing, packaging, storage and transportation.
- Orient the producers/traders about prevailing price trends, demand and supply situation etc.
- Orient the producer regarding the importance of grading, cooperative/group marketing, direct marketing, contract farming, futures trading etc.
- Provides the information about the sources of credit availability, various Govt. schemes, policies, rules and regulations etc.

Sources :

The following are the sources of marketing information available in the country.

Source / Institution	Activities for marketing information and extension
Directorate of Marketing and Inspection (DMI), NH-IV, CGO Complex, Faridabad. **Website: www.agmarknet.nic.in**	➢ Provides information through nationwide Marketing Information Network (**"AGMARKNET"** portal). ➢ Marketing extension through training to educate producers, graders, consumers etc. ➢ Marketing research survey. ➢ Publication of reports, pamphlets, leaflets, Agricultural Marketing journal, Agmark standards etc.

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Central Warehousing Corporation (CWC), 4/1 Siri Institutional Area Opp. Siri fort New Delhi-110016 Website : www.fieo.com/cwc/	➢ Farmers Extension Service Scheme (FESS) was launched by CWC in the year 1978-79 with the following objectives : **i)** To educate farmers about the benefit of scientific storage and use of public warehouses. **ii)** To impart training to the farmers on the techniques of scientific storage and preservation of foodgrains. **iii)** To assist farmers in getting loans from the banks against pledge of warehouse receipt. **iv)** Demonstration of spraying and fumigation methods to control insects.
Director General of Commercial Intelligence & Statistics (DGCIS), 1, Council House Street Kolkata -1	➢ Collection, compilation and dissemination of marketing related data i.e. export-import data, inter-state movement of foodgrains etc.
Directorate of Economics and Statistics, Shastri Bhavan,New Delhi Website: www.agricoop.nic.in	➢ Compilation of agricultural data for development and planning. ➢ Dissemination of market intelligence through publication and internet.
Agriculture Produce Marketing Committee (APMC)	➢ Provides market information on arrivals, prevailing prices, despatches etc ➢ Provides market information of adjoining / other market committees. ➢ Arranges training, tours, exhibitions etc.
Federation of Indian Export Organisations (FIEO), PHQ House(3rd Floor) Opp. Asian Games , New Delhi-110016	➢ Provides information to its members about latest developments in export and import. ➢ Organises seminars, workshops, presentation, tours, buyer-seller meets, sponsoring participation in international trade fair, exhibitions and providing advisory services with specialized divisions. ➢ Provides useful information on India's export and import with diverse database.
State Agricultural Marketing Boards, At different State capital	➢ Provides marketing related information to co-ordinate all the market committees in the state. ➢ Arrange training, seminars, workshops and exhibitions on subjects related to agricultural marketing.
Kisan Call Centers (New Delhi, Mumbai, Chennai, Kolkata, Hyderabad, Banglore, Chandigarh and Luknow)	➢ Provides expert advise to the farmers. ➢ These centers will operate through toll free telecom lines throughout the country. ➢ A country wide common four digit number 1551 has been allocated to these centers.

Mass Media Support to Agriculture Extension	➢ Mass media support to agriculture extension has been augmented with three new initiatives. **i)** The first component establishes a cable satellite channel for national broadcast using the existing facilities available with Inira Gandhi National Open University (IGNOU). **ii)** The second component is use of low and high power transmitters of Doordarshan for providing areas specific telecast. Initially, 12 locations chosen to launch broadcasting are Jalpaiguri (West Bengal), Indore (Madhya Pradesh), Sambhalpur (Orissa), Shillong (Meghalaya), Hissar (Haryana), Muzzafarpur (Bihar), Dibrugarh (Assam), Varanasi (Uttar Pradesh), Vijaywada (Andhra Pradesh), Gulbarga (Karnataka), Rajkot (Gujarat), Daltonganj (Jharkhand). **iii)** The third component of the mass media is use of FM transmitter network of All India Radio (AIR) to provide area specific broadcasting through 96 FM stations.
Agriculture-Clinics and Agri-Business by Agriculture Graduates	➢ A central sector scheme "Establishment of Agriculture-Clinics and Agri-business Managed by Agriculture graduates" is being implemented since 2001-02. ➢ The aim is to provide opportunity to all eligible agriculture graduated, to support agriculture development through economically viable ventures. ➢ The scheme is being jointly implemented by NABARD, National Institute of Agricultural Extension Management (MANAGE) and Small Farmers' Agri-business Consortium (SFAC) in association with about 66 reputed training institutes in the country.
Different websites on Agricultural Marketing Information	www.agmaknet.nic.in www.agricoop.nic.in www.fciweb.nic.in www.fieo.com/cwc/ www.ncdc.nic.in www.apeda.com www.nic.in/eximpol www.fmc.gov.in www.nmce.com www.icar.org.in www.fao.org www.agrisurf.com www.agriculturalinformation.com www.agriwatch.com www.kisan.net www.agnic.org www.isapindia.org www.indiaagronet.com www.commodityindia.com

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7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 Direct marketing :

Direct marketing is an innovative concept, which involves marketing of produce i.e. paddy/rice by the farmers directly to the consumers/millers without any middlemen. Direct marketing enables producers and millers and other bulk buyers to economise on transportation cost and improve price realization. It also provides incentive to large scale marketing companies i.e. millers and exporters to purchase directly from producing areas. Direct marketing by farmers to the consumers has been experimented in the country through *Apni Mandis* in Punjab and Haryana. The concept with certain improvements has been popularised in Andhra Pradesh through *Rythu Bazars.* At present, these markets are being run at the expense of the state exchequer, as a promotional measure, to encourage marketing by small and marginal producers without the involvement of the middlemen. In these markets, many commodities are marketed along with fruits and vegetables.

Benefits :

- Direct marketing helps in better marketing of paddy/rice.
- It increases profit of the producer.
- It minimises marketing cost.
- It encourages distributional efficiency.
- It satisfies the consumer through better quality of produce at reasonable price.
- It provides better marketing techniques to producers.
- It encourages direct contact between producers and consumer.
- It encourages the farmers for retail sale of their produce.

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7.2 Contract marketing :

"Contract marketing" is a system of marketing in which the commodity is marketed by farmers under a pre-agreed buy-back contract with an agency engaged in trading or processing. In contract marketing, a producer will produce and deliver to the contractor, a quantum of required quality of produce, based upon anticipated yield and contracted acreage, at a pre-agreed price. In this agreement, agency contributes input supply and renders technical guidance. The company also bears the entire cost of transaction and marketing. By entering in to contract, farmer's risk of price reduces and the agency reduces the risk of non-availability of raw material. The inputs and extension services provided by the agency include improved seed, credit, fertilizers, pesticides, farm machinery, technical guidance, extension, marketing of produce etc.

In present scenario, contract marketing is one of the ways by which producers, especially small farmers, can participate in the production of good quality paddy/rice to get higher return. Contract marketing enables producers to adopt new technologies to ensure maximum value addition and access to new global markets. It also ensures efficient post harvest handling and meeting specific needs of customers. In the wake of economic liberalization, the national and multinational companies are selectively entering into contract marketing of rice. There are a few success stories of contract marketing in rice such as PepsiCo India Holdings Pvt. Ltd. on Basmati rice in Punjab, Western U.P. and Haryana, in collaboration with Tata Rallis India, ICICI Bank and LT Overseas Ltd. in Punjab, Satnam Overseas Ltd., Escorts Ltd., BRK Ltd., etc. for Basmati rice.

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Benefits :

Contract marketing is beneficial to both producer as well as to contracting agency. These benefits are summed up below:

Benefits	To Producer	To Contracting agency
Risk	It minimises the price risk.	It minimises risk of raw material supply.
Price	Price stability ensuring fair price.	Price stability as per pre-agreed contract.
Quality	Use of quality seed and inputs.	Get good quality produce and control on quality.
Payment	Assured and regular payments through bank tie up.	Easy handling and better control on payment.
Post-harvest handling	Minimises risk and cost of handling.	Control and efficient handling.
New technology	Facilitates in farm management and practices.	For better and desired produce to meet consumer needs.
Fair trade practices	Minimises malpractices and no involvement of middle man.	Better control on trade practices.
Crop insurance	Reduces risk.	Reduces risk.
Mutual relationship	Strengthens.	Strengthens.
Profit	Increases.	Increases.

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7.3 Cooperative marketing :

"Cooperative marketing" is the system of marketing in which a group of producers join together and register them under respective State Cooperative Societies Act to market their produce jointly. The members also deal in a number of cooperative marketing activities i.e. processing of produce, grading, packing, storage, transport, finance, etc. The cooperative marketing means selling of the member's produce directly in the market, which fetches best prices. It helps the member to produce better quality of paddy/rice, which has good demand in the market. It also provides clean handling, fair trade practices and protect against manipulations / malpractices. The main objectives of cooperative marketing are to ensure remunerative prices to the producers, reduction in the cost of marketing, reduces the monopoly of traders and improve the marketing system. The cooperative marketing structure in the different states consists of;

1. **PMS** (Primary Marketing Society) at the Mandi level
2. **SCMF** (State Cooperative Marketing Federation) at the State level
3. **NAFED** (National Agricultural Cooperative Marketing Federation of India Ltd.) is at the National Level.

There are many Cooperative Marketing Societies dealing with marketing of paddy/rice. National Cooperative Development Corporation (NCDC) and State Governments are providing financial assistance and other facilities to such Cooperative Marketing Societies. By the end of 2000-2001, 597 cooperative rice mills were installed in different states with the financial assistance of National Cooperative Development Corporation (NCDC).

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Benefits :

- Remunerative price to producers.
- Reduction in cost of marketing.
- Reduction in commission charges.
- Effective use of infra-structure.
- Credit facilities.
- Collective processing.
- Easy transportation.
- Reduces malpractices.
- Supply of agricultural inputs.
- Marketing information.

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7.4 Forward and futures markets :

Forward trading means an agreement or a contract between seller and purchaser, for a certain kind and quantity of a commodity for making delivery at a specified future time, at contracted price. It is a type of trading, which provides protection against the price fluctuations of agricultural produce. Producers, traders and millers utilize the future contracts to transfer the price risk. Presently, future markets in the country are regulated through Forward Contracts (Regulation) Act, 1952. The Forward Markets Commission (FMC) performs the functions of advisory, monitoring, supervision and regulation in future and forward trading. Forward trading transactions are performed through exchanges owned by the associations registered under the Act. These exchanges operate independently under the guidelines issued by the FMC.

After the recent decision during February 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, future trading has been allowed for 148 commodities including rice, under section 15 of the Forward Contracts (Regulation) Act of 1952. Earlier, rice was not allowed for future trading. Only rice bran, its oil and oilcake were allowed only through the Bombay Commodity Exchange Ltd. Mumbai.

Forward contracts are broadly of two types. i.e. (a) Specific delivery contracts; and (b) Other than specific delivery contracts.

(a) Specific delivery contracts: Specific delivery contracts are essentially merchandising contracts, which enable producers and consumers of commodities to market their produce and cover their requirements respectively. These contracts are generally negotiated directly between parties depending on availability and requirement of produce. During negotiation, terms of quality, quantity, price, period of delivery, place of delivery, payment terms etc. are incorporated in the contracts. Specific delivery contracts are again of two types:

i) Transferable specific delivery contracts (T.S.D.).
ii) Non-transferable specific delivery contracts (NTSD).

In the TSD Contracts, transfer of the rights or obligations under the contract is permitted, while in NTSD, it is not permitted.

(b) Other than specific delivery contracts: Though this contract has not been specifically defined under the act but these are called as 'futures contracts'. Futures contracts are forward contracts other than specific delivery contracts. These contracts are usually entered under the auspices of an Exchange or Association. In the futures contracts, the quality and quantity of commodity, the time of maturity of contract, place of delivery etc. are standardised and contracting parties have to negotiate only the rate at which contract is entered into.

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Benefits :

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Futures contracts perform two important functions i) Price discovery and ii) Price risk management. It is useful to all segments of economy.

Producers : It is useful for producers because they can get idea of price likely to prevail at a future point of time and, therefore help to decide time and planning of production that suits them.

Traders/Exporters : The futures trading is very useful to the traders/exporters as it provides an advance indication of the price likely to prevail. This helps the traders/exporters in quoting a realistic price and, thereby, secure trading/export contract in a competitive market.

Millers/Consumers : Futures trading enables the millers/consumers to get an idea of the price at which the commodity would be available at a future point of time.

The other benefits of future trading are-

Price stabilization: In times of violent fluctuations, futures trading reduce the price variations.

Competition: Futures trading encourages competition and provides competitive price to farmers, millers or traders.

Supply and demand: It ensures a balance in demand and supply position throughout the year.

Integration of price: Futures trading promotes an integrated price structure throughout the country.

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8.0 INSTITUTIONAL FACILITIES

8.1 Marketing related schemes of government and public sector :

scheme/implementing organisation	Facilities provided/salient features/objectives
1.Agricultural Marketing Information Network Directorate of Marketing and Inspection, Head Office, N.H.-IV, Faridabad.	➢ To establish a nationwide information network for speedy collection and dissemination of market data for its efficient and timely utilization. ➢ To ensure flow of regular and reliable data to the producers, traders and consumers to derive maximum advantage out of their sales and purchases. ➢ To increase efficiency in marketing by effective improvement in the existing market information system. ➢ The scheme provides connectivity to 710 nodes comprising the State Agricultural Marketing Department (SAMD) /Boards/ Markets. These concerned nodes have been provided with one computer and its peripherals. The SAMD/Boards/ Markets collect desired market information and pass on to respective state authorities and Head Office of the DMI for forward dissemination. The eligible markets will get 100 percent grant by Ministry of Agriculture. National Agriculture Policy has proposed for coverage of another 2000 nodes during the Tenth Plan.

2. Gramin Bhandaran Yojana (Rural Godowns Scheme) Directorate of Marketing and Inspection, Head Office, N.H.-IV, Faridabad	➢ It is a capital investment subsidy scheme for construction/renovation/expansion of rural godowns. The scheme is implemented by DMI in collaboration with NABARD and NCDC. The objectives of the scheme are to create scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs. ➢ To prevent distress sale immediately after harvest. ➢ To promote grading and quality control of agricultural produce to improve their marketability. ➢ To promote pledge financing and marketing credit to strengthen agricultural marketing in the country for the introduction of a national system of warehouse receipt in respect of agricultural commodities stored in such godowns. ➢ The entrepreneur will be free to construct godown at any place and of any size except for restrictions that it would be outside the limits of Municipal Corporation area and be of a minimum capacity of 100 MT. ➢ The scheme provides credit linked back-ended capital investment subsidy @25 percent of the project cost with a ceiling of Rs. 37.50 lakh per project. For the projects in North-Eastern states and hilly areas with altitude of more than 1000 m above mean sea level and SC/ST entrepreneurs, maximum subsidy admissible is @ 33 percent of the project cost, with a ceiling of Rs. 50.00 lakh.
3.Agmark Grading and Standardisation Directorate of Marketing and Inspection, Head Office, N.H.-IV, Faridabad.	➢ Promotion of grading of agricultural and allied commodities under Agricultural Produce (Grading & Marking) Act.1937. ➢ Agmark specifications for agricultural commodities have been framed, based on their intrinsic quality. Food safety factors are being incorporated in the standards to compete in world trade. Standards are being harmonised with international standards keeping in view the WTO requirements. Certification of agricultural commodities is carried out for the benefit of consumers.
4.Co-operative Marketing, Processing, Storage etc. Programmes in Comparatively under/least developed states. National Co-operative Development Corporation, Hauz Khas, New Delhi-110016	➢ To correct regional imbalances and to provide needed momentum to the pace of development of various programmes of cooperative agricultural marketing, processing, storage etc. in under/least developed states/UTs by providing financial assistance on liberal terms to augment the income of farmers and weaker sections of the community. ➢ The scheme provides for distribution of agricultural inputs, development of agro-processing including storage, marketing of foodgrains and plantation/horticulture crops, development of weaker and tribal sections, cooperatives, in dairy, poultry and fisheries.

5.Price Support Scheme (PSS), Food Corporation of India, Barakhamba Lane, Cannaught Place, New Delhi-110001	➢ Nodal agency of Government of India to undertake procurement of paddy under price support scheme. ➢ Provides regular marketing support to the farmers to sustain and improve the production of paddy.

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8.2 Institutional credit facilities :

Institutional credit is the vital factor in agricultural development. The National Agriculture Policy targeted annual growth rate of 4 percent over the 10th plan period. The Task Force on Agricultural Credit has estimated a credit flow of Rs. 736570 crore for five years during the 10th Five year plan. During 1996-97, the total institutional credit for agriculture was 26,411 crore against Rs. 82,073 crore (target) during the year 2002-03. The main emphasis was laid down on adequate and timely credit support to the farmers, particularly small and marginal farmers for adoption of modern technology and improved agricultural practices.

The institutional credit disbursed through co-operatives, with targeted 43 percent share in rural credit flow in Agriculture during 2002-2003 was shared by Commercial Banks (50 percent) and Regional Rural Banks (7 percent). The institutional credit to Agriculture is offered in the form of short term, medium term and long term credit facilities:

Short term and medium term loans:

Name of scheme	Eligibility	Objective/Facilities
1. Crop Loan	All categories of farmers.	➢ To meet cultivation expenses for various crops as short-term loan. ➢ This loan is extended in the form of direct finance to farmers with a repayment period not exceeding 18 months.
2.Produce Marketing Loan	All categories of farmers.	➢ This loan is given to help farmers to store produce on their own to avoid distress sale. ➢ This loan also facilitates immediate renewal of crop loans for next crop. ➢ The repayment period of the loan does not exceed 6 months.
3. Kisan Credit Card Scheme (KCCS)	All agriculture clients having good track record for the last two years.	➢ This card provides running account facilities to farmers to meet their production credit and contingency needs. ➢ The scheme follows simplified procedures to enable the farmers to avail the crop loans as and when they need. ➢ Minimum credit limit is Rs. 3000/-. Credit limit is based on operational land holding, cropping pattern and scale of finance. ➢ Withdrawals can be made by using easy and convenient withdrawal slips. The Kisan Credit Card is valid for 3 years subject to annual review. ➢ It also covers personal insurance against death or permanent disability for maximum amount of Rs. 50,000 and Rs. 25,000 respectively.

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4. National Agricult-ural Insurance Scheme (NAIS)	Scheme is available to all farmers – loanee and non-loanee both- irrespective of the size of their holding.	➢ To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests and diseases attack. ➢ To encourage the farmers to adopt progressive farming practices, high value in-puts and high technology in agriculture. ➢ To help to stabilize farm incomes, particularly in disaster years. ➢ General Insurance Corporation of India (GIC) is the Implementing Agency. ➢ Sum insured may extend to the value of threshold yield of the area insured. ➢ Covers all food crops (cereals, millets and pulses), oilseeds and annual commercial/horticultural crops. ➢ Provides subsidy of 50 percent in premium of small and marginal farmers. The subsidy will be phased out over a period of 5 years on sunset basis.

Long term loan

Name of Scheme	Eligibility	Objective/Facilities
Agricultural Term Loan	All categories of farmers (small/medium and agricultural labourers) are eligible, provided they have necessary experience in the activity and required area.	➢ The banks extend this loan to farmers to create assets facilitating crop production/income generation. ➢ Activities covered under this scheme are land development, minor irrigation, farm mechanization, plantation and horticulture, dairying, poultry, sericulture, dry land / waste land development schemes etc. ➢ This loan is offered in the form of direct finance to farmers with a repayment span not lass than 3 years and not exceeding 15 years.

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8.3 Organisations providing marketing services :

Name of the organisation	Services provided
1.Directorate of Marketing and Inspection (DMI) NH-4, CGO Complex Faridabad- Website: www.agmarknet.nic.in	➢ To integrate development of marketing of agricultural and allied produce in the country. ➢ Promotion of grading of agricultural and allied produce. ➢ Market development through regulation, planning and designing of physical markets. ➢ Administration of Meat Food Products Order (1973); ➢ Promotion of cold storage. ➢ Liaison between the Central and State Governments through its regional offices (11) and sub-offices (37) spread all over the country.

2.Food Corporation of India (FCI), Barakhamba Lane, Cannaught Place, New Delhi-110001 Website:www.fciweb.nic.in	▶ Procurement of foodgrains for effective price support operations for safeguarding the interests of the farmers. ▶ Distribution of foodgrains throughout the country for Public Distribution System. ▶ Maintaining satisfactory level of operational/buffer stocks of foodgrains to ensure National Food Security.
3.Central Warehousing Corporation (CWC), 4/1 Siri Institutional Area Opp. Siri Fort New Delhi-110016 website: www.fieo.com/cwc/	▶ Provides scientific storage and handling facilities. ▶ Offers consultancy services/ training for the construction of warehousing infrastructure to different agencies. ▶ Import and export warehousing facilities. ▶ Provides disinfestation services.
4.Agricultural and Processed Food Products Export Development Authority (APEDA), NCUI Building 3, Siri Institutional Area August Kranti Marg, New Delhi 110016 Website: www.apeda.com	▶ Development of scheduled agriculture products related industries for export. ▶ Provides financial assistance to these industries for conducting surveys, sensibility studies, relief and subsidy schemes. ▶ Registration of exporters for scheduled products. ▶ Adapting standards and specifications for the purpose of export of scheduled products. ▶ Carrying out inspection of meat and meat products for ensuring the quality of such products. ▶ Improving the packaging of the scheduled products. ▶ Promotion of export oriented production and development of scheduled products. ▶ Collection and publication of statistics for improving marketing of scheduled products. ▶ Training in the various aspects of industries related to the scheduled products.
5.National Co-operative Development Corporation (NCDC), 4, Siri Institutional Area, New Delhi-110016 website: www.ncdc.nic.in	▶ Planning, promoting and financing programmes for production, processing, marketing, storage, export and import of agricultural produce. ▶ Financial support to primary, regional, State and National level co-operative marketing societies is provided towards; i) Margin money and working capital finance to augment business operations of agricultural produce. ii) Strengthening the share capital base and Iii) Purchase of transport vehicles.
6.Director General of Foreign Trade, (DGFT), Udyog Bhavan, New Delhi. Website: www.nic.in/eximpol	▶ Provides guidelines / procedure of export and import of various commodities. ▶ Allot import-export code number (IEC No) to the exporter of agricultural commodities.

7.State Agricultural Marketing Boards (SAMBs),	▶ Implementation of the regulation of marketing in the state. ▶ Provide infra-structural facilities for the marketing of notified agricultural produce. ▶ Provide grading of agricultural produce in the markets. ▶ To co-ordinate all the market committees for information services. ▶ Provide aid to financially weak or needy market committees in the form of loans and grants. ▶ Eliminate malpractices in the marketing system. ▶ Arrange or organise seminars, workshops or exhibitions on subjects relating to agricultural marketing and farmers training programme on various aspects of agricultural marketing. ▶ Some of the SAMBs are also promoting agro-business.

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9.0 UTILIZATION

9.1 Processing :

There are 1392998 rice processing mills in India. The State-wise details are given below.

Table No. 29: Number of rice mills as on 01.01.2002.

Sl. No.	Name of State	Hullers	Shellers	Hullers cum shellers	Modern/ modernised rice mills	Total
1	**Andhra Pradesh**	4609	1776	2364	12995	21744
2	**Bihar**	4749	63	9	51	4872
3	**Haryana**	807	—	—	990	1797
4	**Karnataka**	9131	462	1103	3674	14370
5	**Kerala**	13664	—	13	2533	16210
6	**Madhya Pradesh**	3918	201	262	1761	6142
7	**Maharashtra**	8199	273	541	1759	10772
8	**Orissa**	6398	125	289	552	7364
9	**Punjab**	4416	442	—	1965	6823
10	**Tamil Nadu**	13684	448	1324	3922	19378
11	**Uttar Pradesh**	5707	562	150	1415	7834
12	**West Bengal**	9554	3	72	926	10555
13	**Others**	6451	183	2258	2545	11437
Total		**91287**	**4538**	**8385**	**35088**	**139298**

Source: Ministry of Food, Civil Supplies and Consumer Affairs, GOI, New Delhi.

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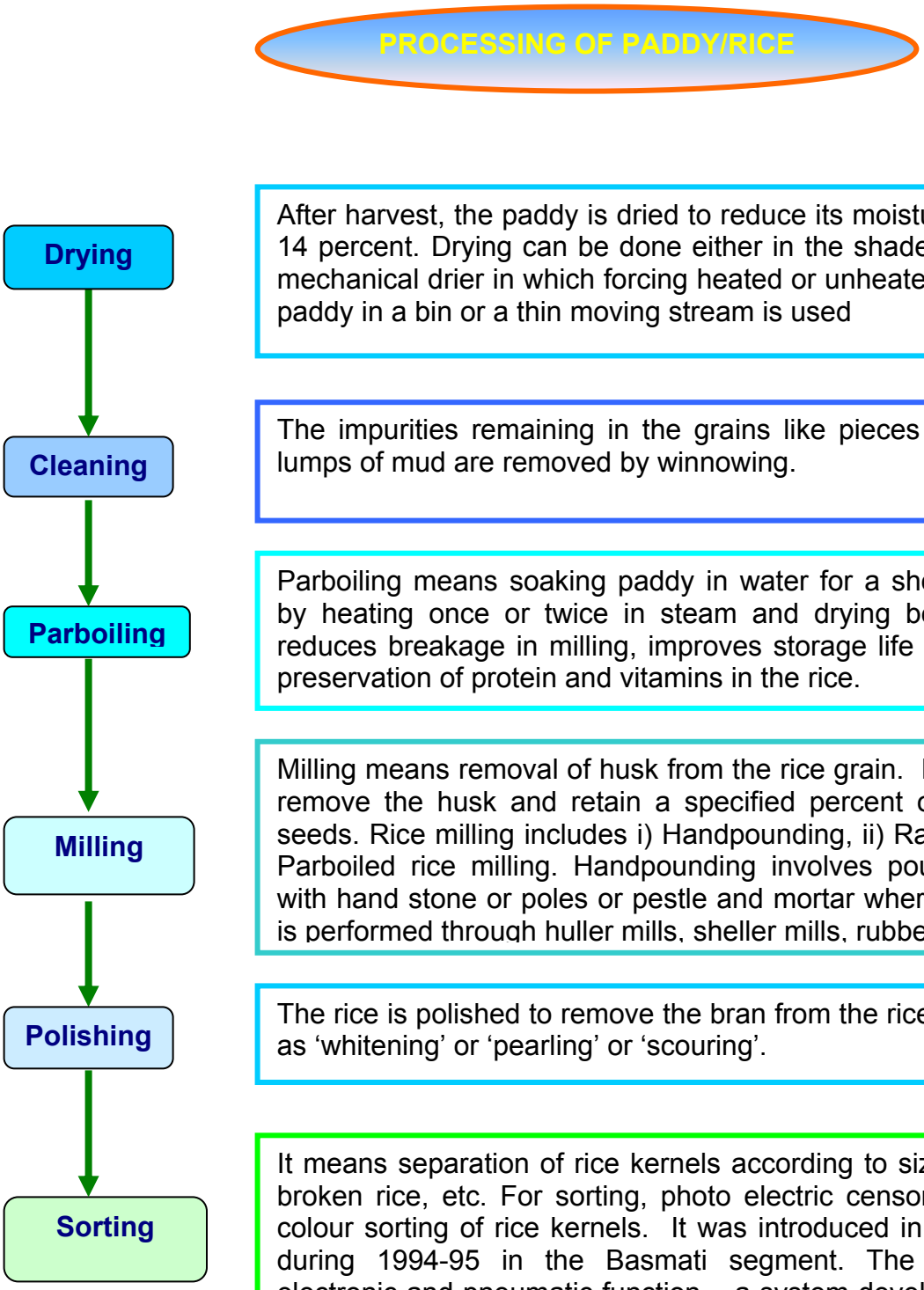
The following methods are adopted in processing of paddy/rice.



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9.2 USES

Rice is a staple food and used by many ways as under.

- **Staple food :** Rice is used as a staple food by more than 60 percent of World population. Cooking of rice is a most popular way of eating. There are many ways of domestic use like *khichadi, pulav, kheer, zeerarice, iddli, dosa* etc.
- **Starch :** Rice starch is used in making ice-cream, custard powder, puddings, gel, distillation of potable alcohol, etc.
- **Rice bran :** It is used in confectionery products like bread, snacks, cookies and biscuits. The defatted bran is also used as cattle feed, organic fertilizer (compost), medicinal purpose and in wax making.
- **Rice bran oil :** Rice bran oil is used as edible oil, in soap and fatty acids manufacturing. It is also used in cosmetics, synthetic fibers, plasticisers, detergents and emulsifiers. At present, about 6 lakhs tonnes of rice bran oil is produced from 35 lakhs tonnes rice bran per annum in the country. It is nutritionally superior and provides better protection to heart,
- **Flaked rice :** It is made from parboiled rice and used in many preparations.
- **Puffed rice :** It is made from paddy and used as whole for eating.
- **Parched rice :** It is made from parboiled rice and is easily digestible. In India, about 4-5 percent of total supplies of rice is used as parched rice.
- **Rice husk:** It is used as a fuel, in board and paper manufacturing, packing and building materials and as an insulator. It is also used for compost making and chemical derivatives.
- **Rice broken :** It is used for making food item like breakfast cereals, baby foods, rice flour, noodles, rice cakes, *Idli* and *dosa* etc. and also used as a poultry feed.

- **Rice straw :** Mainly used as animal feed, fuel, mushroom bed, for mulching in horticultural crops and in preparation of paper and compost.
- **Paddy as a seed:** The paddy is used as seed. The proportion utilized for seed purpose varies from 2 to 6 percent of total production.

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10.0 DO'S and DON'TS :

Do's	Don'ts
✓ become hard and contain about 20-22 percent moisture.	✗ which means a lower yield and also a higher proportion of immature grains.
maturity.	shedding and cracking of rice in the husk.
period.	for preventing breakage of grains during milling.
(*Pucca*) floor.	kucha floor.

✓	✗
Market the paddy/rice after grading to get higher return.	fetches lower prices.
from www.agmarknet.nic.in website, newspaper, T.V., concerned APMC offices etc. before marketing the produce.	information regarding price trend etc.
forward contracts to avoid price risk arising due to wide fluctuation in rice prices.	a glut situation.
to insure better price of the produce.	assuming its future demand.
period and sell it when prices are favourable.	post-harvest period, because usually the prices prevail low due to more arrivals.
BHANDARAN YOJANA scheme for construction of rural godowns and store paddy/rice to minimise losses in qualitative and quantitative terms.	which leads to qualitative and quantitative deterioration of grains.
Scheme during glut situation.	merchant during glut situation.
harvest technology and processing techniques to avoid post harvest losses.	techniques in post harvest operations and in processing which cause quantitative and qualitative losses.
marketing channel to get higher share in marketing.	longer, at the cost of producer's share.
storage.	of storage which cause storage losses.
mode of transportation from the available alternatives.	causes losses, and incur more expenses on transport.
protect the quality and quantity during transit and storage.	during transit and storage.
minimises grain losses.	enhances grain losses.
properly for export.	

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