POST-HARVEST PROFILE OF RED GRAM

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1.0 INTRODUCTION

Red gram is an important pulse crop in India. It is also known as Pigeonpea, Arhar and Tur. Red gram is mainly cultivated and consumed in developing countries of the world. This crop is widely grown in India. India is the largest producer and consumer of Red gram in the world. Red gram accounted for about 20 percent of the total production of pulses in the country during the year 2000-2001.

Red gram is a protein rich staple food. It contains about 22 percent protein, which is almost three times that of cereals. Red gram supplies a major share of protein requirement of vegetarian population of the country. Red gram is mainly consumed in the form of split pulse as **Dal**, which is an essential supplement of cereal based diet. The combinations of Dal-Chawal (pulse-rice) or Dal-Roti (pulse-wheat bread) are the main ingredients in the average Indian diet. The biological value improves greatly, when wheat or rice is combined with Red gram because of the complementary relationship of the essential amino acids. It is particularly rich in lysine, riboflavin, thiamine, niacin and iron.

In addition to being an important source of human food and animal feed, Red gram also plays an important role in sustaining soil fertility by improving physical properties of soil and fixing atmospheric nitrogen. Being a drought resistant crop, it is suitable for dryland farming and predominantly used as an intercrop with other crops. Nutritional values of edible portion of Red gram are given in Table No.1.

Table No. 1: Nutritional values of edible portion per 100 g of Red gram

Crop	Energy (cal)	Protein (g)	Fat (g)	Ca (mg)	Fe (mg)	Thia-min (mg)	Ribofla-vin (mg)	Niacin (mg)	Vit.A value (mcg)
Red gram Dal	335	22.3	1.7	7.3	5.8	0.45	0.19	2.9	132

Source: Nutritive value of Indian Foods, by Gopalan, C., et al., Indian council of Medical Research publication, 1971, PP. 60-114.

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1.1 Origin:

Its actual place of origin is very controversial as some people believe, it originated in India, while others say, it originated in Africa. According to Vavilov (1928), genus *Cajanus* originated in the Hindustan. As per Van Der Maesen (1980) also, the centre of origin of the crop is India. According to Bentham (1861) and De Candolle (1886), it originated in Africa.

Botanical Description:

Red gram [*Cajanus cajan* (L.) Millsp.] belongs to family Leguminosae. Numerous nodules are present on roots, these nodules contain Rhizobium bacteria, which fixes atmospheric nitrogen. The flowers are self-pollinated but cross-fertilization may also occur to some extent. The fruit of the Red gram is a pod. Seeds are round or lens shaped. Numerous

species of *Cajanus* are known, differing in height, habit, time of maturity, colour, size and shape of pods and seeds. All these cultivated types belong to two categories:

i) *Cajanus cajan* var. bicolor: This group includes late maturing varieties, having tall bushy plants and bear flowers at the end of the branches. The pods are relatively longer and contain 4-5 seeds.

ii) *Cajanus cajan* var. flavus: This group includes early maturing varieties, having smaller plants and flowers at several points along the branches. The pods are also shorter which bear 2-3 seeds.

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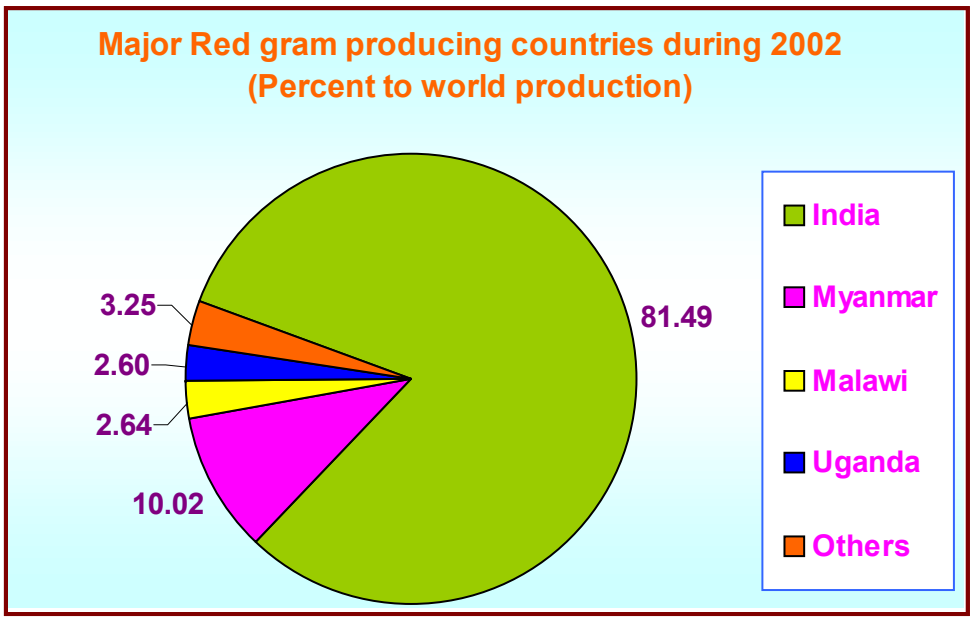
1.2 Importance:

India alone accounted for about 81 percent of total world's production in the year 2002 and 90 percent of total world's consumption of Red gram. The total pulse production of the country was 11.08 million tonnes in 2000-01 including Red gram (2.25 million tonnes). Generally, this crop is not grown as commercial crop and major portion of the produce is consumed in the respective state itself. Every Red gram plant is a mini-fertilizer factory as the crop has unique characteristics of restoring and maintaining soil fertility through fixing atmospheric nitrogen in symbiotic association with Rhizobium bacteria present in the root nodules. Red gram crop is suitable for inter-cropping, with different crops (Cotton, Sorghum, Pearl millet, Green gram, Black gram, Maize, Soybean, Groundnut) for increasing production and maintaining soil fertility.

2.0 PRODUCTION

2.1 Major producing countries in the world:



Red gram is grown throughout the tropical and subtropical countries of the world especially in South Asia, Eastern and Southern Africa, Latin America, Caribbean countries and Australia. According to FAO statistics, worldwide Red gram was grown in about 4.16 million hectares and its production was 2.99 million tonnes in 2002. India is the largest producer of Red gram accounting 81.49 percent of total production and 80.59 percent of total area of the world. Other major Red gram producing countries are Myanmar (10.02 percent), Malawi (2.64 percent) and Uganda (2.60 percent). The productivity is highest in Uganda (1000 kg/ha) followed by Nepal (875kg/ha) and India (728 kg/ha).

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Area, production and yield of Red gram during 2000-2002 in major growing countries of the world are given below:

Table No. 2: Area, production and yield of Red gram in major producing countries

Country	Area ('000 Hectares)				Production ('000 Tonnes)				Yield (kg/ha)		
	2000	2001	2002	% to world	2000	2001	2002	% to world	2000	2001	2002
India	3430.00	3680.00	3350.00	80.59	2690.00	2260.00	2440.00	81.49	784	614	728
Myanmar	306.00	480.00	480.00	11.54	188.73	300.00	300.00	10.02	617	625	625
Malawi	123.00	123.00	123.00	2.96	79.00	79.00	79.00	2.64	642	642	642
Uganda	78.00	78.00	78.00	1.88	78.00	78.00	78.00	2.60	1000	1000	1000
Tanzania	66.00	66.00	66.00	1.59	47.00	47.00	47.00	1.57	712	712	712
Nepal	22.71	24.04	24.00	0.58	22.47	20.94	21.00	0.70	989	871	875
Others	38.85	35.42	35.98	0.86	29.13	28.14	29.32	0.98	750	795	815
World	**4064.56**	**4486.46**	**4156.98**	**100.0**	**3134.34**	**2813.08**	**2994.32**	**100.0**	**771**	**627**	**720**

Source: Website www.fao.org

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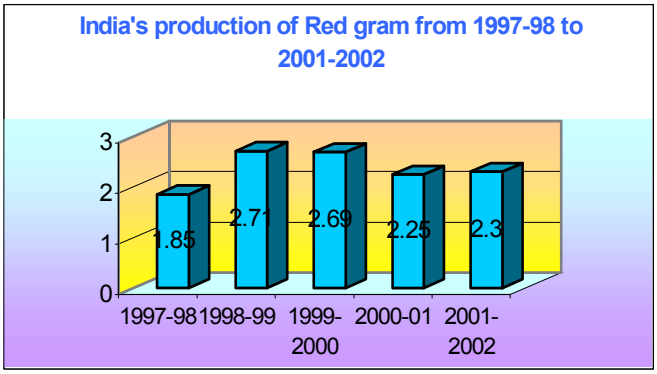
2.2 Major producing states in India:

In India, Red gram is one of the most widely cultivated pulse crops. It was grown over an area of 3.38 million hectares with a production of 2.30 million tonnes in 2001-2002. Area, production and yield of Red gram in India for the last five years are given in Table No. 3.

Table No. 3: All-India area, production and yield of Red gram from 1997-98 to 2001-02

Year	Area (Million hec-tares)	Produc-tion (Million tonnes)	Yield (Kg/ha)
1997-98	3.36	1.85	551
1998-99	3.44	2.71	787
1999-2000	3.43	2.69	786
2000-2001	3.63	2.25	618
2001-02 (Final)	3.38	2.30	681



Source: Department of Agriculture and Cooperation, New Delhi.

Maharashtra is the largest producer of Red gram accounting for nearly 33.49 percent of the total production followed by Uttar Pradesh (19.73 percent), Madhya Pradesh (12.18 percent), Andhra Pradesh (8.17 percent), Gujarat (8.13 percent) and Karnataka (6.34 percent). These six major states together contribute about 88 percent of the total production and about 88 percent of the total area in the country in 2001-2002. Among major Red gram growing states, Maharashtra has the largest area under the crop. Maharashtra accounts 30.11 percent of the total area in the country followed by Karnataka (14.27 percent), Andhra Pradesh (12.40 percent), Uttar Pradesh (11.76 percent), Madhya Pradesh (9.91 percent) and Gujarat (9.84 percent), whereas productivity is highest in Bihar (1281 kg/ha) followed by Uttar Pradesh (1142 kg/ha), Madhya Pradesh (837kg/ha) and Maharashtra (757 kg/ha).

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Area, production and yield of Red gram in major producing states of India during 1999-2000 to 2001-2002 are given under:

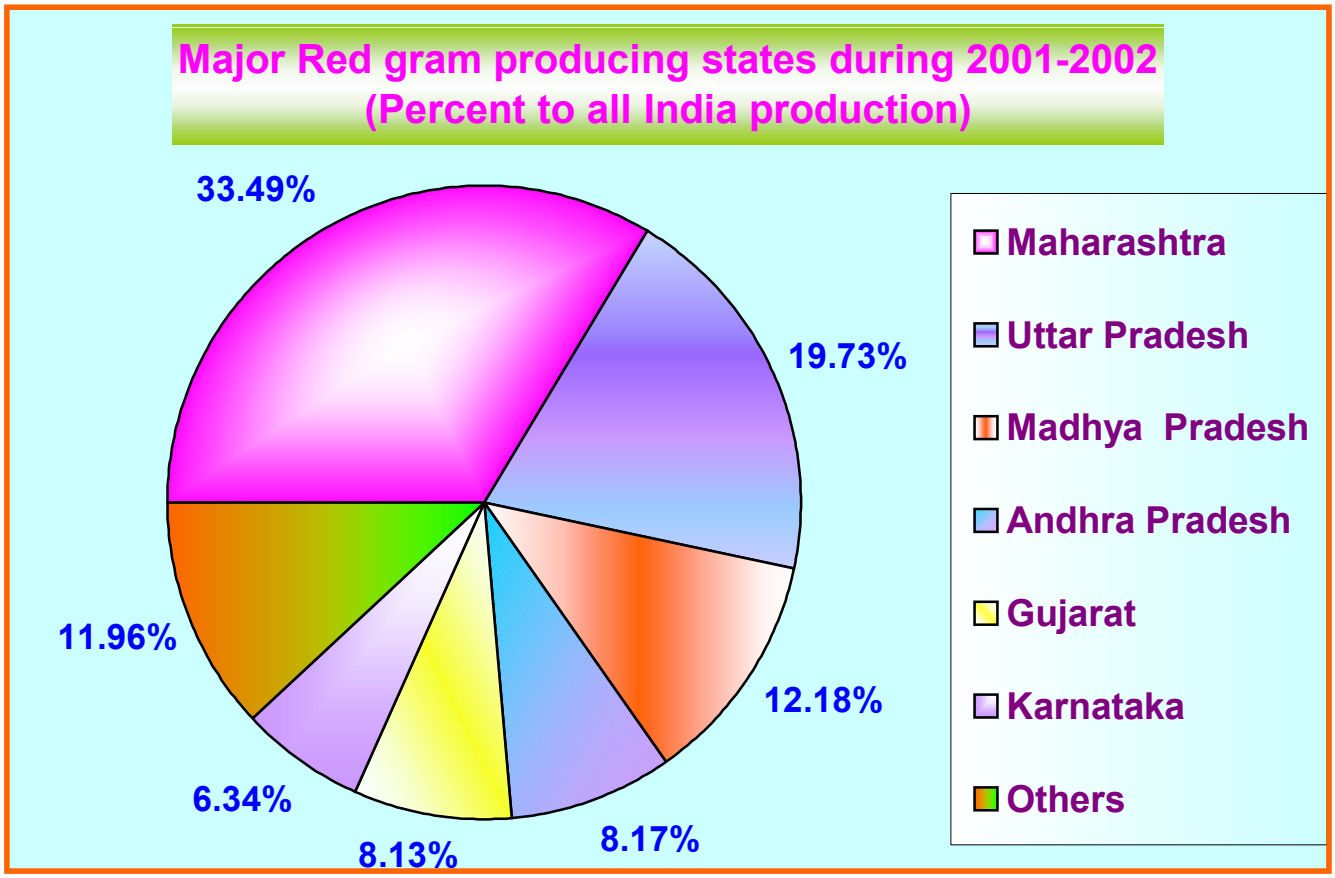

Table No. 4: Area, production and yield of Red gram in major producing states

State	Area ('000 Hectares)				Production ('000 Tonnes)				Yield (kg/ha)		
	1999-2000	2000-2001	2001-002 (F	%)	1999-2000	2000-2001	2001-002 (F	%)	1999-2000	2000-2001	2001-2002 (Final)
Andhra Pradesh	432.2	513	419	12.4	154.8	219	188	8.17	358	427	449
Bihar	66.5	43.7	42	1.24	82.1	58.9	53.8	2.34	1235	1348	1281
Gujarat	358	317.9	332.3	9.84	290.8	107.2	187	8.13	812	337	563
Karnataka	508.1	582.7	482	14.27	289.5	263.5	146	6.34	570	452	303
Madhya Pradesh	317.3	312.9	334.9	9.91	270.9	210.4	280.3	12.18	854	672	837
Maharashtra	1041	1096.1	1017.3	30.11	868	660.3	770.6	33.49	834	602	757
Orissa	136	149	141.6	4.19	85	75	78.6	3.42	625	503	555
Tamil Nadu	87.8	63.3	63.4	1.88	62.4	45.1	41.7	1.81	711	712	658
Uttar Pradesh	414.7	406.6	397.4	11.76	544	509.8	454	19.73	1312	1254	1142
Others	65.4	147.1	148.6	4.4	46.5	97.3	101.1	4.39	711	661	680
All India	3427	3	3	100	2694	22	2	100	786	618	681

Source: Department of Agriculture and Cooperation, New Delhi.

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2.3 Zone-wise major commercial varieties:

Table No. 5: Improved varieties of Red gram suitable for different zones in India

I. North-Western Zone: (Punjab, Haryana, Rajasthan, Himachal Pradesh, J & K)	
Early varieties	➢ 'Parbhat', 'UPAS 120', 'T 21', 'Pusa Ageti', 'Pusa 74', 'Pusa 84', 'Pant A 1','Pant A 2', 'HPA 1', 'TT 5', 'AL 15', 'Manak', 'H 77-216', 'Sagar' ('H 77-208'), 'BS 1'
Medium varieties	➢ 'Sharda' ('S 8'), 'Mukta' ('R 60')
Late varieties	
II. North-Eastern Zone: (Eastern Uttar Pradesh, Bihar, West Bengal, Orissa, Assam)	
Early varieties	➢ 'Parbhat', 'UPAS 120', 'T 21', 'Pusa Ageti', 'Pusa 74', 'Pusa 84', 'Pant A 1', 'TT 5', 'BS 1'
Medium varieties	183', 'C 11', '20(105)' ('Rabi')
Late varieties	
III. Central Zone: (Madhya Pradesh, Gujarat, Maharashtra)	
Early varieties	➢ 'Parbhat', 'UPAS 120', 'T 21', 'Pusa Ageti', 'Pusa 74', 'J 9-19', 'TAT 10', 'Visakha 1'('TT 6')
Medium varieties	'Khargone 2', 'T 15-15', 'PT 301', 'JA 3', 'No.84', 'No.290-21', 'Hyderabad 185'
Late varieties	
IV. Peninsular Zone: (Andhra Pradesh, Tamil Nadu, Kerala, Karnataka)	
Early varieties	➢ 'Parbhat', 'T 21', 'Pusa Ageti', 'BDN 2', 'PT 221'
Medium varieties	5', 'GS 1', 'CPDM 1', 'F 52', 'C 28', 'SA 1', 'Palanadu'
Late varieties	➢ 'SA 1'

Source: Advances in Pulse Production Technology, L.M.Jeswani and B. Baldev, pp.-86.

Table No.6: Hybrid varieties of Red gram recommended for different states in India

Varieties	Name of the states
ICPH-8	Madhya Pradesh,Maharashtra,Gujarat
PPH-4	Punjab
AKPH-4101	Maharashtra
COPH-2	TamilNadu

Source: Indian Farming, December, 2002, pp.13-20.

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Table No.7: Short duration varieties of Red gram recommended for different states of India

Varieties	Maturity (Days)	States
Pragati (ICPL 87)	140-150	M.P.,Maharashtra, Gujarat, Andhra Pradesh, Karnataka
Pusa 855	135-140	Punjab, Haryana, Uttar Pradesh, Madhya Pradesh
Paras (H 22-1)	135-140	Punjab, Haryana, Western Uttar Pradesh
Vambhan	----	Tamil Nadu
AL-201	135-140	Punjab, Haryana
ICPL 85010	125-130	Himachal Pradesh
Sarita	----	Himachal Pradesh
Durga(ICPL 84031)	125	Andhra Pradesh

Source: Indian Farming, December, 2002, pp.13-20.

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3.0 POST-HARVEST MANAGEMENT

3.1 Post-harvest losses:

There is a sizeable quantitative and qualitative loss of pulses during different post-harvest operations like threshing, winnowing, transportation, processing and storage. Hence, it is appropriate to give due emphasis to reduce qualitative as well as quantitative losses of pulses during post-harvest operations, which are estimated to be in the order of 9.5 percent. The Post-harvest losses of pulses estimated at various stages are given in Table No.8:

Table No. 8: Estimated post-harvest losses of pulses including Red gram

Sl.No.	Stages	Production loss (Percent)
1.	Threshing yard	0.5
2.	Transport	0.5
3.	Processing	1.0
4.	Storage	7.5
	Total	**9.5**

Source: Birewar, B.R. (1984) Post-Harvest Technology of Pulses, Pulse Production – Constraints and Opportunities. Oxford and IBH Publishing Co., New Delhi, India, PP. 425-438.

The post-harvest losses of Red gram can be minimised in the process of threshing, winnowing, storage, processing, handling and transportation.

(i) Threshing and Winnowing: The loss at threshing yard is reported to be to the extent of 0.5 percent. In order to reduce the losses, threshing and winnowing operations are required to be completed within a short period through improved equipments.

(ii) Transport losses: During transportation, the losses are reported to be to the extent of 0.5 percent and necessiating quick transportation to reduce the losses.

(iii) Processing: Due to using old and outdated methods of Dal milling, the loss at this stage is upto 1 percent. To reduce the milling losses and to increase the output, improved Dal milling method developed by C.F.T.R.I, Mysore should be adopted.

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(iv) Storage: Due to improper and inefficient methods of storage, the loss upto 7.5 percent is estimated during storage. Quantitative losses result from spoilage, driage, infestation by insects, rodents or birds. Therefore, improved storage facilities should be adopted to reduce the losses.

To avoid post-harvest losses, following preventive measures should be considered:

- Harvest timely to reduce losses.
- Use proper method of harvesting.
- Avoid the losses in threshing and winnowing by adopting modern mechanical methods.
- Use improved techniques of processing.
- Adopt grading for getting remunerative prices inter-alia to avoid financial loss.
- Use good packaging materials for storage as well as for transport i.e. B-Twill Jute bags or HDPE bags.
- Use proper techniques in storage.
- Use pest control measures during storage.
- Timely and proper handling (loading and unloading) with suitable transportation facilities at farm and market level.
- Avoid use of hooks by labour during handling.

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3.2 Harvesting care:

During harvesting, proper care should be taken to avoid quantitative and qualitative losses. Following care should be taken during harvesting:

- Harvesting should be done timely. Timely harvesting ensures optimum grain quality and consumer acceptance.
- Harvesting before the crops mature, usually result lower yields, higher proportion of immature seeds, poor grain quality and more chances of disease attack during storage.
- Delay in harvesting of Red gram, results in shattering of pods and other losses caused by birds, rats, insects etc.
- The best time to harvest the crop, when large (80) percent of the pods are fully matured.
- Avoid harvesting during adverse weather conditions i.e. rains and overcast weather.
- Right kind of harvest equipment (sickle) should be used.
- Avoid pest infestation prior to harvesting.
- All the harvested stems should be kept in one direction in order to ascertain efficient threshing.
- After cutting, if the weather permits, leave the harvested stems to dry in the field.
- If the threshing cannot be done immediately, the harvested materials should be bundled and stacked in a dry place. The stacking should be cubical to facilitate circulation of the air around.
- Rogue out the admixtures prior to harvesting, it helps in fetching good price in the market.

☛ Keep the harvested Red gram separately for each variety.

Maturity period of Red gram varies from variety to variety. Maturity period of different varieties of crop is given below:

Table No. 9: Maturity period of Red gram

Sl. No.	Varieties	Maturity period
1.	Short duration varieties	100-150 days
2.	Medium duration varieties	150-180 days
3.	Long duration varieties	180-300 days

Source: Advances in Pulse Production Technology, L.M. Jeswani and B. Baldev, pp.-84.

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3.3 Grading:

Grading means the sorting of the homogenous lots of the produce according to the fixed grade standards. Produce is graded in accordance with the various quality factors. The grading of Red gram is beneficial to the farmers, traders as well as to the consumers. Grading of the produce before sale enables farmers to get better price for their produce, whereas grading helps the consumers to get standard quality produce at fair price. After grading, it is easier for the consumer to compare the prices of different qualities of a produce in the market. There is no need of assurance about the quality of the graded produce. Grading also reduces the cost of marketing.

In the market, the sale 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, refraction and admixture with other varieties. In order to ensure remunerative price to the farmers as well as to gain the confidence of consumer, the Red gram should be graded systematically.

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3.3.1 Grade specifications:

i) Grading under AGMARK:

The Agricultural Produce (Grading and Marking) Act, 1937 was enacted to maintain the quality of agricultural produce in India. The Act authorises the Central Government to frame rules related to the fixing of grade standards and the procedure to be adopted to grade the agricultural commodities included in the schedules. According to this Act, specifications have been drawn up for Red gram according to various quality factors.

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The grade standards specified for Red gram whole and split notified by the Directorate of Marketing and Inspection are given below:

Grade specification and definition of quality of Red gram(Tur/Arhar) whole-under Agmark

A) Special requirements:

Grade designation	Maximum limits of tolerance (per cent by weight)					
	Moisture	Foreign matter		Other edible grains	Damaged grains	Weevilled grains percent by count
		Organic	Inorganic			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Special	10.0	0.10	Nil	0.5	0.5	3.0
Standard	12.0	0.50	0.10	2.0	2.0	5.0
General	14.0	0.75	0.25	5.0	5.0	10.0

Note- In foreign matter, the impurities of animal origin shall not be more than 0.10 percent by weight.

B) General requirements:

Arhar/Tur whole shall –

a) be the dried and mature seeds of Pulse (*Cajanus cajan)*;
b) be sweet, clear, wholesome, uniform in size, shape, colour and in sound merchantable condition;
c) be free from living and dead insects, fungus infestation, added colouring matter, moulds, obnoxious smell, discolouration;
d) be free from rodent hair and excreta;
e) be free from toxic or noxious seeds viz. Crotolaria (Crotolaria spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (Dhatura spp.), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health;
f) Uric acid and Aflatoxin shall not exceed 100 milligrams and 30 micrograms per kilogram respectively;
g) Comply with the restrictions in regard to poisonous metals (rule-57),crop contaminants (rule 57-A), naturally occurring toxic substances (rule 57-B), use of insecticides (rule-65), and other provisions prescribed under the Prevention of Food Adulteration Rules,1955, as amended from time to time.

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Grade specification and definition of quality of split husked Red gram (Arhar/Tur) pulse under Agmark

A) Special requirements:

Grade desig-nation	Maximum limits of tolerance (per cent by weight)						Weevilled grains, percent by count
	Moisture	Foreign matter		Other edible grains	Damaged grains	Brokens grains	
		Organic	Inorganic				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Special	10.0	0.10	Nil	Nil	0.5	2.0	1.0
Standard	12.0	0.50	0.10	0.2	2.0	5.0	2.0
General	14.0	0.75	0.25	0.5	5.0	8.0	3.0

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Note- In foreign matter, the impurities of animal origin shall not be more than 0.10 percent by weight.

B) General requirements:

Arhar/Tur Split (husked) shall –

(a) consist of husked and split seeds of pulse (*Cajanus cajan*);
(b) be sweet, clear, wholesome, uniform in size, shape, colour and in sound merchantable condition;
(c) be free from living and dead insects, fungus infestation, added colouring matter, moulds, obnoxious smell, discolouration;
(d) be free from rodent hair and excreta;
(e) be free from toxic or noxious seeds viz. Crotolaria (Crotolaria spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (Dhatura spp.), *Argemone mexicana*, Khesari and other seeds that are commonly recognized to health;
(f) Uric acid and Aflatoxin shall not exceed 100 milligrams and 30 micrograms per kilogram respectively;
(g) Comply with the restrictions in regard to poisonous metals (rule-57), crop contaminants (rule 57-A), naturally occurring toxic substances (rule 57-B), use of insecticides (rule 65), and other provisions prescribed under the Prevention of Food Adulteration Rules, 1955, as amended from time to time.

EXPLANATIONS:-

For the purpose of these rules,--

(1) "foreign matter means any extraneous matter other than food grains comprising of;
  (a) "Inorganic matter" includes metallic pieces, dust, sand, gravel, stones, dirt, pebbles, lumps of earth, clay and mud and animal filth etc.;
  (b) "Organic matter" consisting of husk, straws, weeds and other inedible grains etc.;
(2) "other edible grains" means any edible grains (including oil seeds) other than the one which is under consideration;
(3) "damaged grains" means grains that are sprouted or internally damaged as a result of heat, microbe, moisture or weather viz. ergot affected grains and kernel bunt grains;
(4) "Broken grains" includes pieces below 3/4th and above 1/4th of the full size splits.
(5) "broken and fragments" includes pieces below 3/4th of the full size splits.
(6) "weevilled grains" means grains that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains.
(7) "poisonous, toxic and/or harmful seeds" means any seeds which if present may have damaging or dangerous effect on health, organoleptic properties or technological performance such as Dhatura (*D. fastuosa* linn and *D. stramonium* linn.) Corn cokle (*Agrostemma githago* L. Machai Lallium remulenum linn.) Akra (Vicia species).

Source: Pulses Grading and Marking Rules, 2003, notified vide G.S.R. No. 129 dated 07-04-2004, Directorate of Marketing and Inspection.

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ii) Grading for Procurement by NAFED:

NAFED is the nodal agency of the Government of India for procuring Red gram in different states under the Price Support Scheme (PSS). The concerned State Co-operative Marketing Federations are the procuring agents for NAFED. Only one grade i.e. Fair Average Quality (FAQ) is prescribed every year/season for procurement of pulses including Red gram under the Price Support Scheme. All the purchases under the PSS by NAFED are made in accordance with these specifications.

NAFED grade specifications of Red gram (Price support operation during 2002-2003 marketing season)

A) General requirements:

i) Pulses shall have reasonably uniform size, shape and colour.
ii) Pulses shall be sweet, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances (including added colouring matter) and any other impurity except to the extent indicated in the schedule.

B) Special requirements:

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Sl. No.	Special characteristics	Maximum limits of tolerance (%by weight per qtl.) for FAQ
1.	Foreign matter	2
2.	Admixture	3
3.	Damaged pulses	3
4.	Slightly damaged pulses	4
5.	Immature and shrivelled pulses	3
6.	Weevilled pulses	4
7.	Moisture	12

C) Note:

1. Foreign matter includes dust, stones, lumps of earth, chaff, husks-stem, straw or any other impurity including edible and non-edible seeds.
2. Admixture means any pulses other than the principal pulse.
3. Damaged pulses are those pulses that are internally damaged or discoloured to such an extent that the damage or discolouration materially affects the quality of the pulses.
4. Slightly damaged pulses are those pulses that are superficially damaged or discoloured such damage or discolouration not materially affecting the quality of the pulses.
5. Immature and shrivelled pulses are those pulses that are not properly developed.
6. Weevilled pulses are those pulses that are partially or wholly bored or eaten by weevil or other grain insects.

Source: Action plan and operational arrangements for procurement of Oilseeds and Pulses under Price Support Scheme in Kharif Season 2002, NAFED, New Delhi.

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iii) Grading under Prevention of Food Adulteration Act (PFA):

SPLIT PULSE (DAL) ARHAR:

Dal Arhar shall consist of husk and split seeds of red gram [*Cajanus cajan* (L) Millsp]. It shall be sound, clean, sweet, dry, wholesome and free from admixture of unwholesome substance.

It shall also conform to the following standards, namely :-

(i) Moisture – Not more than 14 per cent by weight (obtained by heating the pulverised pulses at 130°C - 133°C for two hours).
(ii) Foreign matter – Not more than 2 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.
(iii) Other edible grains – Not more than 0.5 per cent by weight.
(iv) Damaged grains – Not more than 5 per cent by weight.
(v) Weevilled grains – Not more than 3 per cent by count.
(vi) Uric acid content – Not more than 100 mg per kilogram.
(vii) [1][A flatoxin – Not more than 30 micrograms per kilogram.]
[2][(viii) Rodent hair and excreta – Not more than 5 pieces per kg:]

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 6 per cent by weight.

1.Subs.by G.S.R. 692(E), dated 11th October, 1999 (w.e.f. 11-10-1999).
2.Subs.by G.S.R. 792(E), dated 13th December,1995(w.e.f. 13-12-1995).

Source: The Prevention of Food Adulteration Act, 1954 along with The Prevention of Food Adulteration Rules, 1955 as amended by The Prevention of Food Adulteration (Tenth Amendment) Rules,2000 together with Commodity Index.

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iv) Grading under CODEX Standard for Certain Pulses

CODEX STAN 171-1989 (Rev.1-1995)

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 the whole, shelled or split pulses defined below which are intended for direct human consumption. The Standard does not apply to pulses intended for factory grading and packaging, industrial processing, or to those pulses intended for use in the feeding of animals. It does not apply to fragmented pulses when sold as such, or to other legumes for which separate standards may be elaborated.

2. DESCRIPTION

2.1 Product Definition

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Pulses are dry seeds of leguminous plants which are distinguished from leguminous oil seeds by their low fat content.
The pulses covered by this Standard are the following:

- Beans of Phaseolus spp. (except *Phaseolus mungo* L. syn. *Vigna mungo* (L.) Hepper and *Phaseolus aureus* Roxb.syn.*Phaseolus radiatur* L., *Vigna radiata* (L.) Wilczek);

- Lentils of *Lens culinaris* Medic. Syn. *Lens esculenta* Moench.;

- Peas of *Pisum sativum* L.;

- Chick peas of *Cicer arientinum* L.;

- Field beans of *Vicia faba* L.;

- Cow peas of *Vigna unguiculata* (L.) Walp., syn. *Vigna sesquipedalis* Fruhw., *Vigna sinensis* (L.) Savi exd Hassk.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Quality Factors – General

3.1.1 Pulses shall be safe and suitable for human consumption.

3.1.2 Pulses shall be free from abnormal flavour, odours, and living insects.

3.1.3 Pulses shall be free from filth (impurities of animal origin, including dead insects) in amounts which may represent a hazard to human health.

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3.2 Quality Factors – Specific

3.2.1 Moisture Content

3.2.1.1 Two maximum moisture levels are provided to meet different climatic conditions and marketing practices. Lower values in the first column are suggested for countries with tropical climates or when long-term (more than one crop year) storage is a normal commercial practice. The values in the second column are suggested for more moderate climates or when other short-term storage is the normal commercial practice.

Pulse	**Moisture Content** (per cent)	
beans	15	19
lentils	15	16
peas	15	18
chick peas	14	16
cow peas	15	18
field beans	15	19

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

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3.2.1.2 In the case of pulses sold without their seed coat, the maximum moisture content shall be 2 percent (absolute) lower in each case.

3.2.2 Extraneous matter is mineral or organic matter (dust, twigs, seedcoats, seeds of other species, dead insects, fragments, or remains of insects, other impurities of animal origin). Pulses shall have not more than 1% extraneous matter of which not more than 0.25% shall be mineral matter and not more than 0.10% shall be dead insects, fragments or remains of insects, and/or other impurities of animal origin.

3.2.2.1 Toxic or noxious seeds

The products covered by the provisions of this standard shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.

Crotolaria (Crotalaria spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (*Datura* spp.), and other seeds that are commonly recognized as harmful to health.

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4. CONTAMINANTS

4.1 Heavy Metals

Pulses shall be free from heavy metals in amounts which may represent a hazard to health.

4.2 Pesticide Residues

Pulses shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3 Mycotoxins

Pulses shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the products 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 these products.

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

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

- 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 in amounts which may represent a hazard to health.

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6. PACKAGING

6.1 Pulses shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1-1991, Codex Alimentarius Volume 1A), the following specific provisions apply:

7.1 Name of the Product

The name of the product to be shown on the label shall be the commercial type of the pulse.

7.2 Labelling of Non-Retail Containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

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8. METHODS OF ANNALYSIS AND SAMPLING

See Codex Alimentarius Volume 13.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given we strongly recommend that users specify the appropriate limit and method of analysis.

FACTOR/DESCRIPTION	LIMIT	METHOD OF ANALYSIS
DEFECTS - Seeds with serious defects. Seeds in which the cotyledons have been affected or attached by pests; seeds with very slight traces of mould or decay; or slight cotyledon staining	MAX: 1.0%	Visual Examination
- Seeds with slight defects. Seeds which have not reached normal development; seeds with extensive seedcoat staining, without the	MAX: 7.0% of which broken pulses must not exceed 3.0%	

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cotyledon being affected; seeds in which the seedcoat is wrinkled, with pronounced folding, or broken pulses - Broken pulses. Broken in whole pulses are pulses in which the cotyledons are separated or one cotyledon has been broken. Broken in split pulses are pulses in which the cotyledon has been broken		
SEED DISCOLORATION - Seeds of a similar colour but a different commercial type (except in beans with white seeds) - Seeds of different colour (other than discoloured seeds) - Discoloured seeds - Discoloured seeds of the same commercial type - Beans with green seed and peas with green seeds with slight discolouration of the seed	MAX: 3.0% MAX: 6.0% MAX: 3.0% MAX: 10.0% MAX: 20.0%	Visual Examination
PRESENTATION - Shelled pulses. Pulses without their seedcoat, with the cotyledons not separated - Split pulses. Pulses without their seedcoat, with the two cotyledons separated one from the other	Buyer Preference	Visual Examination

Source: www.codexalimentarius.net

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3.3.2 Adulterants and Toxins:

Adulterants:

In India, normally adulteration / contamination in agricultural produce occurs either intentionally for financial gain or, incidentally due to carelessness and lack of proper hygienic

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condition of processing, packing, storing, transportation and marketing. The adulterants cause different food borne diseases.

In Red gram, following adulterants are commonly found:

Khesari Dal: Khesari Dal (*Lathyrus sativus*) is often mixed in Red gram Dal as adulterant. Khesari Dal contains a toxic substance known as Beta-oxylyl amino alanine (BOAA). It is a neurotoxin amino acid and water-soluble. When Khesari Dal is consumed in larger quantities (regularly) for long period, it causes neuro-paralysis of the lower limbs known as **Lathyrism.**

The method of control are the detoxification of toxic substance through a simple household procedure i.e. the toxin can be easily removed by soaking the Dal in boiling water and discarding the water before cooking.

Metanil yellow: It is used in colouring Red gram Dal to get attractive deep yellow colour. Metanil yellow is non-permitted coal tar dye commonly known as 'Kishori Rang', which is toxic and banned. It causes cancer. Food grade colours are available in the market but traders use metanil yellow, as it is cheap.

Lead chromate: This is also used to colour Red gram Dal. It is one of the most toxic salts of lead. It can cause anaemia, paralysis, mental retardation and brain damage in children and abortion in pregnant women. This may cause irreparable damage to human body system when eaten at regular intervals for a long period.

Adulteration is normally detected through laboratory tests. However, certain simple screening tests for detection of adulterants are given below:

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Table No. 10: Adulterants used in Red gram Dal (split) and their detection tests

Adulterants	Detection Test
1.Khesari Dal (Botanical name- *Lath*	Add 50 ml. of diluted HCl acid to a small quantity of Dal and keep on simmering water for about 15 minutes. Development of pink colour indicates the presence of Khesari Dal.
2.Metanil yellow	Add concentrated HCl to small quantity of Dal in a little amount of water. Immediate development of pink colour indicates the presence of metanil yellow and similar colour dyes.
3.Lead chromate	Shake 5 grams of Red gram Dal with 5 ml. of water and a few drops of HCl. Pink colour indicates presence of lead chromate.

Source: Central Agmark Laboratory, Directorate of Marketing and Inspection, Nagpur

Toxins:

Toxins are the natural toxic substances present in some food materials, which may cause serious illness.

Aflatoxin:

Aflatoxin contamination is most common occurrence in the agricultural produce/food. Aflatoxin is one type of mycotoxins containing toxic substances, which are produced by moulds or fungi. Aflatoxins contamination may occur in pulses in the field itself, in farm storage and after processing, whenever environmental conditions i.e high moisture/humidity and temperature, are favourable for the growth of fungi. Aflatoxins are produced by fungi namely

Aspergillus flavus, *Aspergillus ochraceus* and *Aspergillus parasiticus*. The aflatoxigenic Aspergilli is generally regarded as storage fungi.

The ingestion of aflatoxin suppresses growth, productivity and immunity of human being. Aflatoxins are carcinogenic, mutagenic and cause liver damage etc.

Prevention and control of aflatoxins:

- Store the Red gram after drying upto safe moisture level i.e. within the prescribed range.
- Prevent the growth of aflatoxin by proper drying of grains.
- Use proper and scientific storage.
- Prevent insect infestation by chemicals to avoid mould formation.
- Separate the infected grains from sound grains to avoid aflatoxin contamination.

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3.3.3 Grading at producers' level and under Agmark:

There is an increasing recognition to the fact that producers need to be assisted in grading their produce before sale so that they may get better price. For securing adequate returns to the producer-seller, the scheme of "Grading at Producers' Level" was introduced in 1962-63 by Directorate of Marketing and Inspection. The main objective of this scheme is to subject the produce to simple tests and assign a grade before it is offered for sale. After grading, the producers get prices commensurate with the quality of the produce. The programme is being implemented by the States/Union Territories. Up to 31-03-2002, 1411 grading units have been set up in the country. Grading of the produce at producers' level enables farmers to get higher price for their produce as well as it helps the consumers to get standard quality produce at fair price. Grading not only facilitates the dissemination of prices and market information but also assist systematic distribution at all stages.

Table No. 11: Progress of grading of Red gram at producers' level and under Agmark

Year	At producers' Level		Under Agmark*	
	Quantity (Tonnes)	Value (Rs.Lakh)	Quantity (Tonnes)	Value (Rs.Lakh)
2001- 2002	237939	32706.88	11636*	3326.37*
2002- 2003 (Provisional)	188896	27350.61	11708*	4964.16*

* Total Pulses (Pulse wise data is not available).

Source: Directorate of Marketing and Inspection, Faridabad.

During the year 2001-2002, about 237939 tonnes of Red gram valued at Rs. 32706.88 lakh was graded at producers' level against 188896 tonnes valued at Rs.27350.61 lakh in the year 2002-2003.

However, only 11636 tonnes of pulses valued worth Rs. 3326.37 lakhs were graded under Agmark during the year 2001-2002 for domestic consumption as against 11708 tonnes valued at Rs. 4964.16 lakhs during the year 2002-2003(provisional).

3.4 Packaging:

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Packaging is an important function in the marketing of Red gram. It is a practice to protect the produce from any damage during storage, transportation and other marketing operations. In recent years, packaging plays an important role in marketing of produce. The good packaging of Red gram not only facilitates convenience in transportation and storage but also attracts consumer to pay more. The packaging reduces the marketing cost and protects the quality.

Availability of packaging materials:

The following packaging materials are used in packaging of Red gram:

1. Jute bags: Gunny bags made up of jute are widely used by farmers and traders. As per NAFED, packing of Red gram should be made in New B Twill (Jute) gunny bags in 100 kg net. The main source of these bags is Directorate General of Supplies and Disposal (DGS & D), Kolkata.

2. HDPE/pp bags: These bags are also used for packaging Red gram.

3. Polythene impregnated jute bags: These are the jute bags blended with synthetics.

4. Poly pouches: In recent years, Red gram is packed in poly pouches with attractive label and brand name. Generally, these are available in 1, 2 and 5 kg. pack size.

5. Cloth bags: In some areas, cloth bags are also used in packing of Red gram. Generally, Red gram used for seed purpose is packed in cloth bags.

For good packaging, the packaging must posses the following qualities:

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- It must protect quality and quantity.
- It must prevent spoilage during transit and storage.
- It must tell information about quality, variety, date of packing, weight and price etc.
- It must be convenient in handling operations.
- It must be convenient to stack.
- It must be cheap, clean and attractive.
- It must be biodegradable.
- It must be free from adverse chemicals.
- Packing materials should be useful after the first use.

Method of packing:

(i) Pulses shall be packed in gunny bags/jute bags, poly woven bags, poly pouches, cloth bags or other suitable packages which shall be clean, sound, free from insect, fungal infestation and the packing material shall be as permitted under the Prevention of food adulteration rules, 1955.

(ii) Pulses shall be packed in containers which safeguard the hygienic, nutritional and organoleptic qualities of the products.

(iii) The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

(iv) The net weight of the Pulses in a package shall be as per the provisions prescribed under the Packaged Commodities Rules, 1977.

(v) Each package shall contain pulses of the same type and of the same grade designation.

(vi) Each package shall be securely closed and sealed.

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3.5 Transportation:

The transportation of Red gram is mainly done by head loads, bullock or camel cart, tractor-trolleys, trucks, railways and ships depending upon the availability of transportation means, quantity of the produce and the stage of marketing. The most common means of transportation used are given in Table No.12.

Table No. 12: Means of transportation used at different stages of marketing

Stage of marketing	Agencies	Means of transport used
✷ From threshing floor to the village market or primary market.	Farmers	By head load, pack animal, bullock or camel cart and tractor trolley.
✷ From primary market to secondary whole sale market and miller	Traders / millers	By trucks, railways.
✷ From wholesale markets and miller to retailer	Millers / retailers	By trucks, railways, mini trucks, tractor trolley.
✷ From retailer to consumer	Consumers	By hand, bicycle, rickshaw.
✷ For export and import	Exporters and importers	By railways and ship

Availability of cheaper and convenient modes of transport:

There are different modes of transport used in Red gram transportation. Road and Rail transport is normally used for internal markets; however, for export and import mainly Sea transport is used. The most common modes of transportation are

1) Road transportation: Road transport is the most pre-dominant mode of transport used in the movement of Red gram right from the producing fields to the ultimate consumer. The following means of road transport are used in different parts of the country to transport Red gram:

a) Head load

b) Pack animals

c) Bullock carts

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d) Tractors trolley

e) Trucks

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

3) Water transport: This is the oldest and cheapest mode of transport. It includes river transport, canal transport and sea transport. Only small quantities are transported through internal waterways. The export and import is mainly done by sea transport. This transport system is slow but cheap and suitable for carrying large quantity of Red gram.

Selection of mode of transportation:

For the selection of mode of transportation, following points should be considered:

- The mode of transportation should be cheaper among available alternatives.
- It should be convenient during loading and unloading.
- It must protect during transportation from adverse weather conditions.
- It should be safe from pilferage etc.
- It must deliver Red gram to consignee in stipulated period.
- It should be easily available particularly during post harvest period.

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☛ Distances should be considered.

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3.6 Storage:

The storage is an important aspect of post harvest technology because Red gram is seasonally produced but consumed throughout the year. Therefore, the supply of Red gram has to be maintained by proper storage throughout the year. Storage protects the quality of grains from deterioration and helps in stabilization of prices by regularising demand and supply. In our country, the storage losses caused by insects, rodents and microorganisms are maximum. Lack of storage facilities force the farmers to sell their produce at low price immediately after harvest. It is essential that during storage, Red gram should remain in good condition and not undergo any deterioration due to fungal and insect infection or attack by rodents.

Requirements for safe storage:

The following requirements should be fulfilled for safe storage of Red gram:

- **Selection of site (location):**
  The storage structure should be located on a raised well-drained place. It should be easily accessible. The storage structure should be protected from humidity, excessive heat, direct sun rays, insects and rodents. Storage godown should be constructed on a well-built platform at a height of not less than 1 foot above ground level to prevent dampness.
- **Selection of storage structure:**
  The storage structure should be selected according to the quantity of Red gram to be stored.
- **Cleaning of storage structures:**
  The storage structures should be properly cleaned before storing Red gram. There should be no left over grains, cracks, holes and crevices in the structure, which may harbour insects. Before storage, the storage structure should be fumigated.

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- **Cleaning and drying of Red gram:**
  Before storage, the Red gram should be properly cleaned and dried. Grains should be free from foreign matter and excessive moisture to avoid quality deterioration and pest attack.
- **Cleaning of bags:**
  As far as possible, new gunny bags should be used. The old gunny bags should be properly cleaned, dried and fumigated before use.
- **Separate storage of new and old stock:**
  To check infestation and to maintain hygienic condition of godown, the new and old stocks should be stored separately.
- **Cleaning of vehicles:**
  The vehicles used for transporting Red gram should be properly cleaned with phenyl.
- **Use of dunnage:**
  Dunnage should be used before stacking bags to avoid absorption of moisture from floor. Bags should be kept on wooden crates or bamboo mats along with a cover of polythene sheet, preferably.
- **Proper aeration:**
  There should be proper aeration during clear weather condition but care should be taken to avoid aeration during rainy season.
- **Regular inspection:**

Regular inspection of stored Red gram should be carried out to check infestation. It is necessary to maintain proper health and hygiene of the stock.

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3.6.1 Major storage pests and their control measures:

A number of pests damage the produce during storage. These pests cause both quantitative and qualitative losses. Pests of Red gram also damage seed viability and nutritive value of the produce. The infestation of these pests depends on various factors like moisture content of the grain, relative humidity, temperature, storage structures, storage period, processing, unhygienic condition, fumigation frequency, etc. The major stored grain pests of Red gram and their control measures are given below:

Name of pests	Figure of pest	Nature of damage	Control measures
1. Pulse beetle *Callosobruchus sps.*	 **Beetle**	i) The larvae bore into grains and feed the entire content of the grain leaving only the shell (seed coat) behind. ii) Adults cut out circular holes in seeds. iii) Sometimes these insects begin their infestation, when the pods are in the ripening stage in the field, and are subsequently carried with the grains into the store after harvest. iv) These pests do not attack split pulses.	Two types of treatments are followed to control infestation. **A)Prophylactic treat-ment (preventive):** Use following insecticides to prevent infestation in godown and stock of Red gram. **1.Malathion (50 percentEC):** Mix 1 litre in 100 litre of water. Use 3 litre

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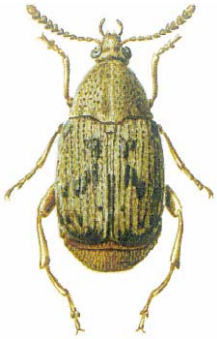
2.Khapra beetle *Trogoderma granarium (Everts)*	 **Beetle**  **Larvae**	i) Larvae are one of the most serious stored grain pests but the beetle itself does not damage. ii) The larvae starts feeding from embryo point and later consume the entire kernel, which makes the grain hollow and only the husk remains. iii) Infested grains are full with frass, cast skins of larvae and excreta, which results in deterioration of quality of grains. iv) The larvae are often found on edges of jute stacks and make the infested store unhygienic.	prepared solution per 100 square meter area. Spray at 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. **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 fumi-gants to control infested stock/godown of Red gram. **1.Alluminium phosphide:** For stack fumigation, use 3 tablets/tonne and put polythene cover on infested stock. For godown fumigation, use 120 to 140 tablets/100 cubic meter area and keep godown structure airtight and closed for 7 days.
3. Dried bean weevil *Acanthoscelides obtectus (Say)*		i) Infestation is induced in the field on ripening of crop when pods are split. ii) Larvae feed on the seed by boring.	
4. Rice moth *Corcyra cephalonica (Stainton)*	 **Moth**	i) Larvae contaminate the food grains with dense webbing, excreta and hairs. ii) Whole grains are bound into lumps.	
5.Confused flour beetle *Tribolium confusum J.du V.*		i) Beetle and larvae both feed on broken and damaged grains produced by milling and handling or attacked damaged grains of other insects.	

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6. Rodents		i) Rodents eat whole grains and split pulses. ii) They also cause mechanical damage to gunny bags and other storage structures of Red gram by cutting, which results spilling of grains. iii) They spill more grains than they consume. iv) Rodents also contaminate Red gram by hair, urine and feces, which deteriorate the quality and cause many diseases, like cholera, food poisoning, ringworm, rabbies 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 pesti-cide like Zinc phosphide is mixed with bread or any other food stuff used as bait. Keep baits for a week.

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3.6.2 Storage structures:

Traditional storage structures: Some common structures are:

Mud bins or Kothi: Cylindrical in shape and are made up of clay mixture with straw and cow dung or mud and bricks.

Metal drums: Cylindrical in shape and are made up of iron sheets.

Thekka: Rectangular in shape and are made up of gunny or, cotton wound around wooden support.

Gunny bags: Gunny bags are made up of jute.

Improved storage structures:

The Government of India has made efforts to promote improved storage facilities at the farm level and launched a programme to impart scientific knowledge to farmers regarding storage of grains known as the Save Food Grain Compaign. Indian scientists and agriculturists have designed and fabricated improved storage bins for the use of farmers, which are moisture resistant and rodent-proof.

i) Improved bins:

a)	Pusa kothi	b)	Nanda bins	c)	Hapur kothi
d)	PAU bins	e)	PKV bins	f)	Chittore stone bins etc.

ii) Warehouse: Warehouse is scientific storage structure constructed and used by different organisations like CWC, SWC, NAFED etc.

iii) CAP storage (cover and plinth): It is an economical way of storage on a large scale.

iv) Silos: Silos are used for storage of food grains. Silos are made from bricks, concrete and metallic materials with automatic loading and unloading equipments.

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3.6.3 Storage facilities:

i) Producers' storage:

Producers store Red gram in various types of traditional and improved structures. Generally, these storage structures are used for short period. Different organizations /institutions have developed improved structures for storage with varying capacities and shapes like Hapur kothi, Pusa kothi, Nanda bins, PKV bins. These are usually constructed on a raised platform or plinth constructed of plastered mud brickwork, stone slabs or wooden planks. Some producers also store Red gram in jute gunny bags or in gunny bags lined with polythene stacked in the room.

ii) Rural godowns:

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godown Scheme, in collaboration with NABARD and NCDC, to construct scientific storage godown with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. Upto 31-12-2002, 2373 new construction godown projects were sanctioned through NABARD and NCDC with the total storage capacity of 36.62 lakh tonnes and 973 godown projects having the capacity of 0.956 lakh tonnes under renovation and expansion under this scheme. The main advantages of Rural Godown Scheme are as under:

i) To prevent distress sale of food grains and other agricultural commodities immediately after harvest.
ii) To reduce quantitative-cum-qualitative losses due to storage in sub-standard godowns.
iii) To reduce pressure on transport system during 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 States and Union Territories have enacted Agricultural Produce Market (Regulation) Act. The reduction of loss of produce was aimed in the scheme of regulated market. The regulated markets developed modern market yards with necessary infrastructural facilities. The APMCs have constructed godowns so that the agricultural produce brought into the market should be stored safely by market committees. The produce is weighed in the presence of producer-seller at the time of keeping the produce in the godown after grading and receipt is issued indicating the quality and weight of produce to be stored. The receipt is issued by the licensed general commission agents or brokers depending upon the case. The CWC, SWC and Co-operative societies have also constructed godowns in the market yards.

In most of the secondary and terminal regulated markets, central and state warehousing corporations also provide scientific storage facilities at prescribed storage charge and issue warehousing receipt against pledge of produce, which is a negotiable document for obtaining finance from the Scheduled Banks.

iv) Central Warehousing Corporation (CWC):

CWC was established during 1957. It is one of the biggest public warehouse operators in the country. In March 2002, CWC was operating 475 warehouses all over the country under 16 regions, covering total 225 districts, with a total storage capacity of 8.91 million tonnes. State-wise storage capacity with CWC as on 31-03-2002 is given below:

Table No.13: State-wise storage capacity with CWC as on 31-03-2002

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Name of state	No. of warehouses	Total capacity (Tonnes)
1.Andhra Pradesh	49	1259450
2.Assam	6	46934
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, procurement and distribution, disinfestation services, fumigation services and other ancillary activities i.e. 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 and use of public warehouses.

The CWC is also operating 109 custom bonded warehouses with a total operated capacity of 6.95 lakh tonnes as on 31-03-2002.These bonded warehouses are specially constructed at a seaport or an airport and accept imported commodities for storage till the payment of customs 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 are district place of the state. The total share capital of the state warehousing corporations is contributed equally by the Central Warehousing Corporation and the concerned State Government. 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 capacity with SWCs as on 31-12-2002 are given below.

Table No.14: State-wise storage capacity available with the State Warehousing Corporations (SWC) 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.Chhattisgarh	95	6.66
5.Gujarat	50	1.43
6.Haryana	113	20.48
7.Karnataka	107	6.67
8.Kerala	62	1.85
9.Madhya Pradesh	219	11.57
10.Maharashtra	157	10.32
11.Meghalaya	5	0.11
12.Orissa	52	2.30
13.Punjab	115	72.03
14.Rajasthan	87	7.04
15.Tamil Nadu	67	6.34
16.Uttar Pradesh	168	30.42
17.West Bengal	32	2.58
Total	**1537**	**201.90**

Source: Central Warehousing Corporation, New Delhi.

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vi) Co-operatives:

The National Co-operative Development Corporation (NCDC) has been making systematic and sustained efforts to assist in the construction of scientific storage facilities at co-operative level. The NCDC has been implementing storage programme through different schemes i.e. Centrally sponsored scheme, Corporation sponsored scheme and other Internationally aided projects.

The objective of the scheme is to avoid distress sale by farmers and to make available the farm inputs at a reasonable price. Upto 31-03-2001, storage capacity of 137.63 lakh tonnes has been established by NCDC.

The state-wise number and capacity of co-operative godowns available with NCDC are as under:

Table No.15: State-wise co-operative storage capacity available with NCDC as on 31-03-2001

Name of state	Rural level	Urban/Semi-urban level	Total capacity (Tonnes)
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
Total	**55886**	**9426**	**13763463**

Source: Annual Report 2000-2001, National Co-operative Development Corporation, New Delhi.

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3.6.4 Pledge finance system:

Micro level studies indicate that distress sale by the small farmers account for about 50% 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, under this scheme loan/advances upto 75 percent of the value of the produce kept in the godown can be given to farmers against pledge/hypothecation of agricultural produce (including warehouse receipts) subject to a ceiling of Rs. 1 lakh per borrower.

Such loan is given for a period of 6 months, which can be extended upto 12 months based on financing banks commercial judgement. The commercial banks/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) can directly finance individual farmers on the strength of the pledge.

Benefits:

(i) This increases the retention capacity of the small farmers, which consequently also enable the farmers to avoid distress sale.

(ii) This minimises the farmers' dependence on the commission agents as the pledge finance provides financial support to them immediately after harvest period.

(iii) Participation of the farmers, irrespective of their land holding size, increases the arrivals in market yards throughout the year.

(iv) This 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:

Assembling is an important marketing function. Assembling includes the operation of collecting Red gram produce from different villages to a central place i.e. primary market and secondary market for its further movement to the Dal millers or the consumers.

Major assembling markets:

Some important assembling markets of different states are as under:

Name of the major producing states	Important markets
1. Andhra Pradesh	Asifabad, Echoda, Kagaznagar, Adilabad, Narayanpet, Badepally, Shadnagar, Gadwal, Alampur, Karimnagar, Jagityal, Jammikunta, Warangal, Kesamudram, Jangaon, Mahaboobabad, Jaheerabad, Tandur, Vikarabad, Pargi, Vijayawada, Tenali, Suryapat, Miryalaguda, Vizianagaram.
2. Karnataka	Sedam, Gulbarga, Bidar, Raichur, Yadgir, Shorapur, Basvakalyani, Bhalki, Gadag, Holealur, Mundagi, Hubli, Ranibennur, Bangalore, Haveri, Bijapur, Chitradurga, Chelekere, Mysore, Kollegal, Gauveri, Biddenur, Chenapatna, Arsikere, Chintamani, Hiriyur, Devengere, Tumkur, Pavagada, Madhugiri, Sira, Bhagalkota, Badami.
3. Madhya Pradesh	Jabalpur, Shahpura, Katni, Gadarwara, Tendukheda, Chhindwara, Betul, Rewa, Bhopal, Gairatganj, Udaipura, Khirkiya, Itarsi, Pipariya, Satna, Sidhi, Khategaon, Kannod, Dabra, Bhind, Alampur, Lahar, Indore, Khandwa, Burhanpur, Harsud, Sagar, Damoh, Ajaygarh, Loundi, Dewas.

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4. Maharashtra	Jamkhed, Karjat, Kopargaon, Newasa, Parner, Pathardi, Rahuri, Sangamner, Shevgaon, Shrigonda, Shrirampur, Dhule, Akole, Dondaicha, Baramati, Sangli, Solapur, Aurangabad, Jalna, Murud, Nagpur.
5. Uttar Pradesh	Kanpur, Varanasi, Gorakhpur, Agra, Allahabad, Hathras, Lucknow, Bahraich, Banthra, Ballia, Robertsganj, Bareilly, Meerut, Sitapur.

4.1.1 Arrivals:

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The disposal of Red gram commences shortly after threshing since the producers require funds for the purpose of discharging their various financial obligations. During 2000-2001, the total arrivals of Red gram in the 12 markets of Uttar Pradesh were reported to be 1,92,013 tonnes followed by 21 markets in Maharashtra (83286.2 tonnes), whereas the arrivals in Karnataka, Madhya Pradesh and Andhra Pradesh were 57056.5, 55776 and 23521 tonnes respectively. The arrivals of Red gram during 1999-2000 to 2001-2002 in important markets of major producing states are given as under.

Table No. 16: Arrivals of Red gram in important markets of major producing states in India

Sl. No.	Name of the states	Arrivals (in tonnes)		
		1999-2000	2000-2001	2001-2002
1.	Andhra Pradesh (20 markets)	35982	23521	27246
2.	Karnataka (4 markets)	55743.8	57056.5	51774.3
3.	Madhya Pradesh (30 markets)	85722	55776	65114
4.	Maharashtra (21 markets)	97438.2	83286.2	NA
5.	Uttar Pradesh (12 markets)	140265	192013	167859

Source: Sub-offices of Directorate of Marketing and Inspection

4.1.2 Despatches:

Pulses including Red gram (except Bengal gram) were mostly despatched to the markets within the state or to the markets of the adjoining states. Pulses including Red gram (except Bengal gram) from Uttar Pradesh markets were mainly despatched to Assam, Bihar, West Bengal and Tamil Nadu. West Bengal markets despatched mainly to Assam. Andhra Pradesh markets despatched to Assam, Delhi and West Bengal, whereas Bihar markets despatched to Assam and West Bengal. Delhi markets despatched pulses mainly to Assam, Uttar Pradesh, Tamil Nadu and West Bengal whereas Maharashtra markets despatched to Delhi, Uttar pradesh, West Bengal and Rajasthan. During 1998-99 to 2000-2001, the despatches of pulses including Red gram (except Bengal gram) from different states are as under:

States from where despatched	States to which arrived
1.Andhra Pradesh	Assam, Delhi, West Bengal
2.Bihar	Assam, West Bengal, Tamil Nadu, Tripura
3.Delhi	Assam, Uttar Pradesh, Tamil Nadu, West Bengal, Andhra Pradesh
4.Haryana	Assam, Gujarat
5.Maharashtra	Delhi, Uttar Pradesh, West Bengal, Punjab, Rajasthan

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6.Madhya Pradesh	Bihar, Orissa, West Bengal
7.Rajasthan	Tamil Nadu, Jammu & Kashmir, Uttar Pradesh
8.Uttar Pradesh	Assam, Bihar, West Bengal, Tamil Nadu, Andhra Pradesh, Arunachal Pradesh, Karnataka, Rajasthan
9.West Bengal	Assam, Delhi, Nagaland

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

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4.2 Distribution:

Assembling and distribution of the agricultural produce are interlinked. The assembling deals with the movement of Red gram from the farm to the assembling centre while the distribution deals with its further movement to the consumer.

Agencies involved:

Following agencies are involved in distribution of Red gram in whole and or split husked form at various stages:

- Producers
- Village traders
- Itinerant traders
- Wholesale merchants
- Retailers
- Commission agents or, Arhatias
- Representative of Dal miller
- Co-operative organisations
- Government organisations

4.2.1 Inter-state movements:

The main states despatching the pulses including Red gram (except Bengal gram) to other states are Uttar Pradesh, Maharashtra, Madhya Pradesh, Bihar, Andhra Pradesh, Delhi, West Bengal and Rajasthan whereas Assam, Delhi, West Bengal and Tamil Nadu are major importing states.

The inter-state movement of pulses observed during the year 1999-2000 was that Maharashtra exported 663481 quintals of pulses including Red gram (except Bengal gram) mainly to Delhi, Punjab, Uttar Pradesh, West Bengal and Maharashtra port. Delhi stood next to Maharashtra, where 167740 quintals of pulses were exported to Assam and Uttar Pradesh since it is the big assembling market and Dal processing centre. Bihar exported 135562 quintals of pulses to Assam and West Bengal, whereas Uttar Pradesh exported 114970 quintals of pulses to Assam and Tamil Nadu. However, Madhya Pradesh exported 58180 quintals to Orissa and Bihar.

The inter-state movements of pulses including Red gram (except Bengal gram) by rail, river and air during 1998-99 to 2000-2001 are given below.

Table No. 17: Inter-state movement/flow of pulses including Red gram (except gram) by rail, river and air during 1998-99 to 2000-2001

(Quantity – in quintals)

States from where despatched	1998-99	1999-00	2000-01

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1.Andhra Pradesh	0.00	17170	73590
2.Bihar	134069	135562	74738
3.Delhi	132060	167740	37270
4.Gujarat	508	440	0.00
5.Haryana	NIL	38450	16450
6.Maharashtra	38170	663481	2520
7.Madhya Pradesh	500	58180	NIL
8.Orissa	NIL	NIL	540
9.Punjab	480	NIL	280
10. Rajasthan	42389	10264	3763
11.Uttar Pradesh	234889	114970	550700
12.West Bengal	40560	44710	79906
Total	**623625**	**1250967**	**839757**

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

4.3 Export and import:

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Export:

As mentioned earlier, India is the largest Red gram producing country and major portion of production is consumed in the country itself. Since India is deficit in pulses, only small quantities of Red gram were exported mainly to UAE, USA, UK, Kuwait, Malaysia, Singapore and Saudi Arabia. During the year 2000-2001, the country exported 7401 tonnes of Red gram valued at Rs19.24 crores against 9087 tonnes valued at Rs 24.49 crores in the year 2001-2002.

During the year 1999-2000 to 2001-2002 export of Red gram from India to different countries and their value are given below:

Table No. 18: India's export of Red gram (country wise) from 1999-2000 to 2001-2002
(Quantity in quintals and Value in Rs. thousand)

Name of country	1999-2000		2000-2001		2001-2002	
	Quantity	Value	Quantity	Value	Quantity	Value
Australia	1422.96	4982.35	792.54	2575.87	2110.56	5763.95
Baharain	219.1	630.21	321.7	922.25	731.5	1757.53
Canada	3831.17	10857.87	2886.29	7329.2	3618.91	9758.86
Kuwait	2746.72	7419.01	2309.45	6043.75	5094.8	12533.15
Malaysia	6275.01	16329.43	7295.16	17674.94	4183.74	10119.38
Mauritious	2572.85	6671.43	925	2249.01	1057.8	3124.35
Qatar	230	569.32	226.56	513.84	1175.4	2974.23
Saudi Arab	1949.56	5442.34	3348.28	8660.36	1918.84	4690.7
Singapore	2149.1	6676	3202.32	9141.92	1837.15	4963.14
Sri Lanka	1116.42	2701.94	2880.62	4201.6	3532.54	7497.96
U A E	23513.82	65912.01	15773.92	38876.05	20560.8	51117.99

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U K	1325.48	3872.38	6280.6	15839.18	6685.37	16582.75
U S A	21567.33	64149.18	24825.9	68180.02	35127.23	104767.05
Others	1590.35	4291.45	2945.5	10180.42	3239.42	9245.12
Total	**70509.87**	**200504.92**	**74013.84**	**192388.41**	**90874.06**	**244896.16**

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

Import:

During the year 2000-2001, India imported 43458.90 tonnes of Red gram valued at Rs. 62.78 crores against 354175.93 tonnes valued at Rs. 484.57 crores in the year 2001-2002 mainly from Myanmar (about 90 percent). During 1999-2000 to 2001-2002, import of Red gram in India from different countries was as under:

Table No.19: India's import of Red gram (country-wise) from 1999-2000 to 2001-2002

Name of country	Quantity (Tonnes)	Value (Rs in Crore)	Quantity (Tonnes)	Value (Rs in Crore)	Quantity (Tonnes)	Value (Rs in Crore)
	1999-2000		**2000-2001**		**2001-2002**	
Kenya	0.00	0.00	0.00	0.00	2541.00	3.84
Myanmar	5361.00	10.08	39194.00	56.16	338544.37	461.89
New Zealand	0.00	0.00	0.00	0.00	908.00	1.25
Pakistan	0.00	0.00	0.00	0.00	675.05	1.35
Singapore	86.00	0.15	3180.56	4.73	1849.00	2.50
Tanzania	66.00	0.10	0.00	0.00	8254.00	11.45
Others	569.00	0.88	1084.34	1.89	1404.51	2.29
Total	**6082.00**	**11.21**	**43458.90**	**62.78**	**354175.93**	**484.57**

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

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4.3.1 Sanitary and 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:

- 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 feedstuffs.
- Risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests.

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- 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 (Labelling 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.

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.

Major export markets:

UAE, USA, UK, Kuwait, Singapore, Saudi Arabia and Malaysia are the important overseas markets for export of Red gram from India.

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4.3.2 Export procedures:

The exporter should keep in mind about the following laid down procedure while exporting Red gram :

1. Registration with Reserve Bank of India (RBI). (Apply in prescribed form (CNX) to obtain code number. This code number is to be quoted on all export papers).
2. Importer-Exporter code (IE code) number is to be obtained from the Director General of Foreign Trade (DGFT).
3. 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.
4. Exporter then procures the export orders.
5. Quality of the produce is to be assessed by the inspecting agency and a certificate is issued to this effect.
6. Produce is now shifted to port.

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7. Obtain marine insurance cover from any insurance company.
8. Contact the 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.
9. 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.
10. The C&F agent presents shipping bill to preventive officer for loading into ship.
11. 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.
12. After the payment, C&F agent takes mate's receipt and requests port authority to prepare bill of lading to the respective exporter.
13. Then C&F agent sends the bill of lading to the respective exporter.
14. After receiving the documents, exporter obtains a certificate of origin from chamber of commerce, stating that the produce is of Indian origin.
15. Importer is informed by exporter regarding date of shipment, name of vessel, bill of lading, customer's invoice, packing list etc.
16. Exporter submits all documents to his bank for verification and bank verifies the papers against original letter of credit.
17. After verification, bank sends documents to foreign importer to enable him to take delivery of produce.
18. After receiving papers, importer makes payment through bank and sends the GR form to RBI, an evidence of realisation of export proceeds.
19. Exporter now applies for various benefits from duty drawback schemes.

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4.4 Marketing constraints:

The following are main marketing constraints:

- **Distress sale:** Due to financial crisis, farmers are forced to sell their produce just after harvesting. During this period, farmers get lower price due to glut in the market. The producers cannot withhold or store their produce for some period to get better price since the farmers have to meet urgent requirement of money.
- **Unstable price:** Generally, the price of Red gram prevails low in the early post harvest period due to more arrivals in the market and later on prices go up. Due to this unstable price, the farmers get lesser price.
- **Lack of marketing information:** Due to lack of information regarding arrivals and prices prevailing in other markets, producers market the Red gram in the village and nearby market at lower price, which can be avoided.

- **Adoption of standards:** Farmers usually do not grade their produce, as a result they do not get remunerative price in the market.
- **Inadequate storage facilities:** Due to inadequate storage facilities in rural areas, farmers loose a substantial quantity of their produce by way of driage, spoilage, rodents etc. Farmers are also forced to sell their produce just after harvest due to lack of storage facilities. Hence, rural godowns are must to avoid the sale immediately after the harvest.
- **Transportation facilities at producers' level:** Due to inadequate transportation facilities at village level, producers sell their Red gram to traders directly from their farm or in the village, which offer them lesser price than prevailing in the markets.
- **Training to producers:** The training to producers regarding marketing of their produce is essential. It improves their skill for better marketing of their produce.
- **Infrastructure facilities:** Due to inadequate infrastructure facilities with producers, traders and at market level, the marketing of Red gram is affected adversely.
- **Malpractices in markets:** There are many malpractices prevailing in markets like excess weighment, delay in payment, large quantity of samples from the produce, different kinds of arbitrary deductions for religious and charitable purposes from producers, high commission charges, delay in weighing, loading, unloading and weighing charges from producers.
- **Superfluous middlemen:** The existence of a long chain of middlemen reduces the share of the consumer's price received by the producer-seller.

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5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels:

The following are the important marketing channels for Red gram (Chart No.1).

A) Private marketing channel:

This is a traditional channel and the most common marketing channel in India. The main private marketing channels for Red gram are as under:

i) Producer → Dal Miller → Consumer

ii) Producer → VillageTrader → Dal Miller → Wholesaler → Retailer → Consumer

iii) Producer → Dal Miller → Retailer → Consumer

iv) Producer → Wholesaler → Dal Miller → Retailer → Consumer

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v) Producer → Wholesaler → Dal Miller → Wholesaler → Retailer → Consumer

vi) Producer → Commission Agent → Dal Miller → Wholesaler → Retailer → Consumer

B) Institutional marketing channel:

Some institutions have been entrusted with marketing activities of Red gram like National Agricultural Co-operative Marketing Federation of India Limited (NAFED). NAFED is the nodal agency for procuring Red gram for providing minimum support prices to the farmers for their produce. The main institutional marketing channels for Red gram are as under:

Producer → Procuring Agency → Dal Miller → Consumer

Producer → Procuring Agency → Dal Miller → Wholesaler → Retailer → Consumer

Producer → Procuring Agency → Dal Miller → Retailer → Consumer

Criteria for selection of channels:

Following criteria should be considered in selecting a marketing channel:

1. The channel, which ensures the higher share to producer and also provides cheaper price to consumer, is considered as the most efficient channel.

2. The shorter channel having lesser market cost.

3. Avoid the longer channel with more intermediaries causing higher marketing costs and less producers' share.

4. Select the channel which distributes the produce appropriately at least expenses and secure the desired volume of disposal.

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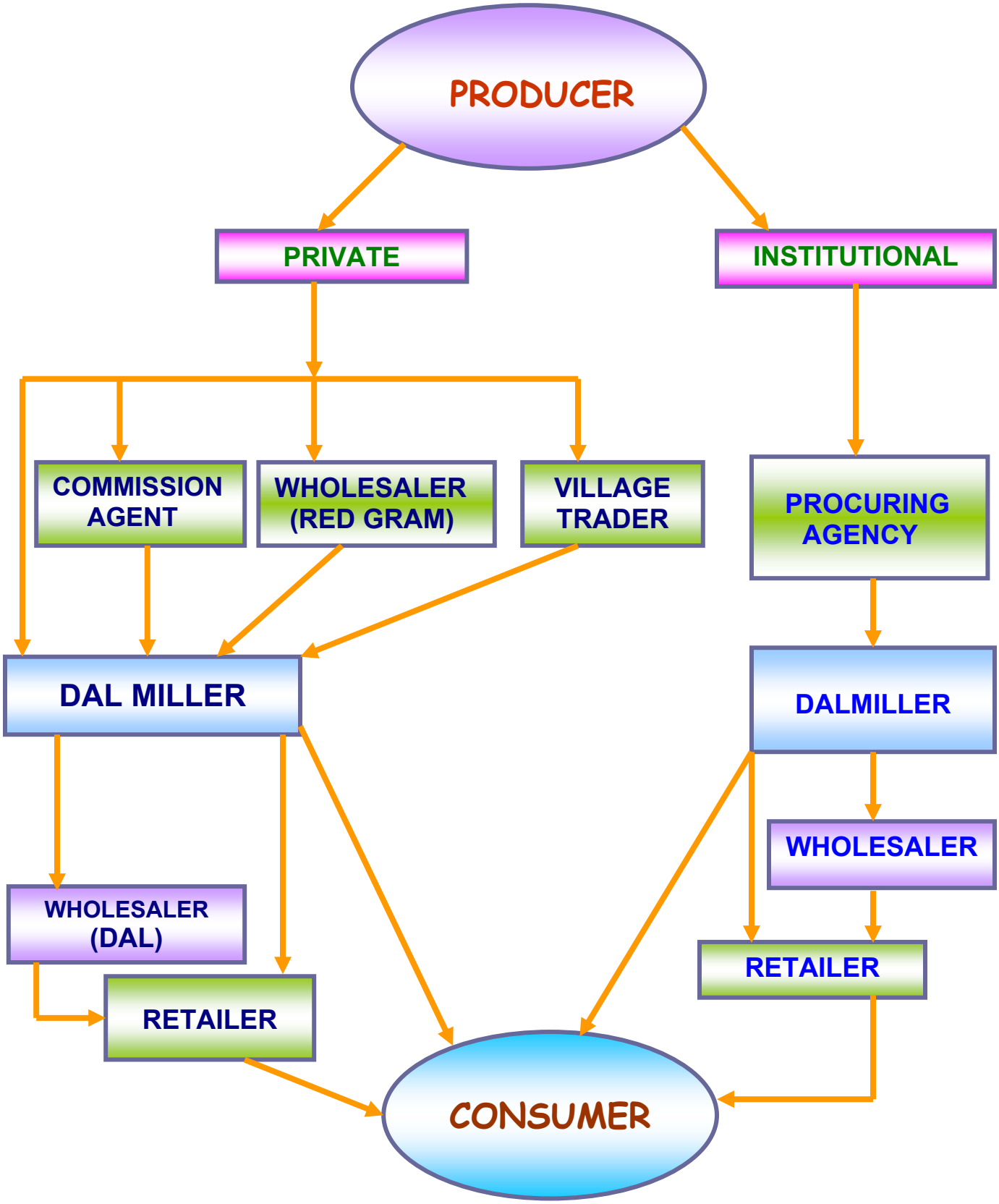
CHART NO.1

MARKETING CHANNELS OF RED GRAM



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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 wholesalers and retailers
(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. The total marketing margin includes cost involved in moving the Red gram 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. The marketing cost incurred by farmers and traders at Regulated markets includes i) Market fee, ii) Commission, iii) Taxes, and iv) Other miscellaneous charges.

i) Market fee: Market fee or entry fee is collected by the market committee of the market. 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 per cent to 2.0 per cent ad valoram.

ii) Commission: It is paid to the commission agent, and may be payable either by seller or by the buyer or sometimes by both. The charge is usually made in cash and varies considerably.

iii) Taxes: Different taxes are charged in different markets such as toll tax, terminal tax, sales tax, octroi etc. These taxes leviable 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 to the above mentioned charges, some other charges are levied in markets. These include handling and weighment charges (weighing, loading, unloading, cleaning etc.), charity contribution in cash and kind, grading charges, postage, charges payable to water man, sweeper, choukidar etc. These charges may be payable either by the seller or by the buyers.

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Market fee, commission charges, taxes and other miscellaneous charges in different states are given in the Table No.20.

Table No.20: Market fee, commission, taxes and miscellaneous charges on Red gram in major producing states

State	Market fee	Commi-ssion	Sales tax	License fee Rs. Per annum	Other charges
1.Andhra Pradesh	1%	1.5 – 2%	4%	C. A. cum traders A – 3000/- B – 2000/- (For C – 1000/- 5 yrs.) Commission agent-125 per annum	---
2.Gujarat	0.5%	1.5%	NIL	A – type traders cum C. A. – Rs.125/- A – type traders – Rs.90/- A – type limited traders – Rs.50/- B – type traders – Rs.75/- C – type special traders – Rs.50/- Retail traders – Rs.10/- Dalals – Rs.5/-	NIL
3.Karnataka	1%	2%	NIL to 2%	Trader/C. A. – Rs.200 Importer/exporter – Rs.100 Processor – Rs.100 Stockists – Rs.100	---
4.Madhya Pradesh	2%	NIL	NIL	Traders – Rs.1000/- Processor – Rs.1000/-	---
5.Maharashtra	0.60 to 1.05%	1.25% to 3.25%	---	Issuing fee Renewal Traders – Rs. 100-210 Rs. 90-200 (Vary from market to market)	---
6.Orissa	1%	0 to 0.4%	4%	Trader – Rs.35 – 300/-	---
7.Tamil Nadu	1%	NIL	NIL	Wholesaler – Rs.100/- Other trader – Rs.75/- Petty trader – Rs.75/-	---
8.Rajasthan	1.6%	4%	---	Trader/C. A. – Rs.200 Trader + C. A. – Rs.300 (for one time)	---
9.Uttar Pradesh	2.5%	1.5%	2%	Wholesaler cum C.A. / Wholesaler / Arhatia / Dalal – Rs.250/- Retailer – Rs.100/-	Dalali – 0.5%

Note: The charges for weighing, unloading, loading, cleaning etc. vary from Rs 0.2 to 1.15 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 a key factor for efficient marketing decisions, regulate the competitive marketing processes and to restrict the monopoly or profiteering individuals in the market. It is needed by producers in planning production and marketing of their produce, and is equally needed by other market participants. Farmers need to be fully familiarized in different areas of agricultural marketing in order to improve price realization. Marketing information is important in all the stages of marketing right from farm to ultimate consumption and simultaneously, for all the participants in these stages i.e. producers, traders, millers, consumers, etc. It is the key to achieve both operational and pricing efficiency in the marketing system.

Marketing extension:

Marketing extension is a vital factor in enlightening the farmers about proper marketing of their produce and solving their marketing problems. It envisages educating the farmers, traders and consumers for bringing desired changes in their knowledge, skills, attitude and behaviour. In the present global agricultural scenario, the farmers need to be educated to accept modern market-oriented farming by taking care of productivity, quality and market demand. Farmers need to reorient their cropping pattern as per the market demand. The farmers should keep pace with fast changing technology, economic reforms, consumer awareness and new export-import policies for agricultural commodities.

An effective marketing extension service is need of the hour. This has gained even greater importance in the light of fast changing business environment as a result of liberalization of economy under WTO Agreement. The marketing extension functionaries should disseminate the complete, accurate and latest market information to the grass root level in areas such as market driven production programmes, post harvest management, availability of marketing finance, facilities for grading, packaging, storage, transportation, online market information system, marketing channels, contract farming, direct marketing, alternative markets including forward and future markets etc.

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Benefits:

1) To producers: In present situation, an effective market information and extension service facilitates decision making about when, where and how to market Red gram.

2) To consumers: With the help of market information and extension, producers will produce Red gram according to consumer preferences for fetching remunerative price.

3) To traders: Market information and extension foster true competition among the market players. It helps them to take decisions regarding purchase, sale and storage of Red gram by knowing the trend of arrivals, demand, consuming centers, grading, packaging, stock position etc. in the markets.

4) To government: Market information plays vital role in formulating appropriate agricultural policies about procurement, export and import, minimum support price.

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Sources:

In our country, there are a number of sources/institutions that are directly or indirectly disseminating marketing information and providing extension services as given below:

Source / Institution	Activities for marketing information and extension
1.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 consumers, producers, graders, etc. ➢ Marketing research and surveys. ➢ Publication of reports, pamphlets, leaflets, Agricultural Marketing journal, Agmark standards etc.
2. Agricultural Produce Market Committees (APMC),	➢ Provide market information on arrivals, prevailing prices, despatches etc. ➢ Provide market information of adjoining / other market committees. ➢ Arranges training, tours, exhibitions etc.
3. Directorate General of Commercial Intelligence and Statistics (DGCIS), 1,Council House Street, Kolkata-1 Website: www.dgciskol.nic.in	➢ Collection, compilation and dissemination of marketing related data i.e. export-import data, inter state movement of foodgrains etc.
4. State Agricultural Marketing Boards, at different state capital	➢ Provide marketing related information to co-ordinate all the market committees in the state. ➢ Arrange seminars, workshops and exhibitions on subjects related to agricultural marketing. ➢ Provide training facilities to producers, traders and employees of the Boards.
5.Directorate of Economics and Statistics, Shastri Bhavan, New Delhi. Website: www.agricoop.nic.in	➢ Compilation of agricultural data on area, production and yield for development and planning. ➢ Dissemination of market intelligence through publication and Internet.
6.Central Warehousing Corporation (CWC), 4/1 Siri Institutional Area, Opp. Siri fort, New Delhi-110016 Website: www.fieo.com/cwc/	➢ Farmers Extension Service Scheme 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.

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7.Federation of Indian Export Organisations (FIEO), PHQ House(3rd Floor) Opp. Asian Games , New Delhi-110016	➤ Provide information to its members about latest developments of export and import. ➤ Organise seminars, workshops, presentations, tours, buyer-seller meets, sponsoring participation in international trade fairs, exhibitions and providing advisory services with specialized divisions. ➤ Provide information about market development assistance schemes. ➤ Provide useful information on India's export and import with diverse database.
8. Kisan Call Centers (New Delhi, Mumbai, Chennai, Kolkata, Hyderabad, Banglore, Chandigarh and Luknow)	➤ Provides expert advise to the farmers. ➤ These centers operate through toll free telecom lines throughout the country. ➤ A country-wide common four digit number 1551 has been allocated to these centers.
9. 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 Indira Gandhi National Open University (IGNOU). **ii)** The second component is use of low and high power transmitters of Doordarshan for providing area 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 is use of FM transmitter network of All India Radio (AIR) to provide area specific broadcasting through 96 FM stations.
10. 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 graduates 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.

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11. Different websites on Agricultural Marketing Information	www.agmarknet.nic.in www.agricoop.nic.in www.fieo.com/cwc/ www.ncdc.nic.in www.apeda.com www.fmc.gov.in www.icar.org.in www.fao.org www.dpd.mp.nic.in www.agriculturalinformation.com www.agriwatch.com www.kisan.net www.agnic.org www.nafed-india.com www.indiaagronet.com www.commodityindia.com

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7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 Direct marketing:

This concept involves marketing of produce i.e. Red gram by the farmer directly to the consumers/millers without any middlemen. Direct marketing enables producers and millers and other bulk buyers to economize 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 help of the middlemen. In these markets, mainly fruits and vegetables are marketed alongwith other commodities at present.

Benefits:

- It increases profit of the producer.
- It minimizes marketing cost.
- It encourages distribution efficiency of the marketing system.
- It promotes employment to the producer.
- Direct marketing enhances the consumer satisfaction.
- It provides better marketing techniques to producers.
- It encourages direct contact between producers and consumers for demand driven production.
- 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, where selected crop is grown for marketing by farmers under a 'buy-back' agreement with an agency (entrepreneur or trader or processor or manufacturer). In the wake of economic liberalization, it has gained momentum as the national and multinational companies enter into contracts for marketing of agricultural produce. They also provide technical guidance, capital and input supply to contracted farmers. Contract marketing ensures continuous supply of quality produce at mutually contracted price to contracting agencies, as well as ensures timely marketing of the produce. Contract marketing is beneficial to both the parties i.e. farmers and the contracting agencies.

Advantages to farmers: -

- Price stability ensuring fair return of produce
- Assured marketing outlet and no involvement of middlemen.
- Prompt and assured payments
- Technical advice in the field of production till harvesting
- Fair trade practices
- Credit facility
- Crop insurance
- Exposure to new technology and best practices

Advantages to contracting agency: -

- Assured supply of produce (raw materials)
- Control on need based production/post harvest handling
- Control on quality of produce
- Stability in price as per mutually agreed contract terms and conditions
- Opportunities to acquire and introduce desired varieties of crop
- Help in meeting specific customer needs/choice
- Better control on logistics
- Strengthen producer-buyer relationship

The Pepsi has already taken up contract marketing of pulses in Punjab.

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7.3 Co-operative marketing:

The co-operative societies sell the member's produce directly in the markets, which fetch remunerative prices. Co-operative societies market the members produce collectively and secure advantages of economy of scale to its members.

Services:

- Procurement and disposal of farm produce
- Processing of produce
- Grading
- Packing
- Storage
- Transport
- Credit
- Protection against marketing malpractices

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National Co-operative Development Corporation (NCDC) was established in 1956 for strengthening and promoting agricultural marketing through co-operative societies.
The co-operative marketing societies consists 3-tier structure: -

i) Primary Marketing Society (PMS) at the village level.
ii) State Co-operative Marketing Federation (SCMF) at the state level.
iii) National Agricultural Co-operative Marketing Federation of India Limited (NAFED) at the national level.

There are 3216 general purpose and 5385 special commodity co-operative marketing societies in the country. General purpose apex level marketing federations have been set up in 26 states and 4 Union Territories (Andman and Nicobar Islands, Delhi, Lakshadweep and Pondicherry) with National Agricultural Co-operative Marketing Federation of India Limited (NAFED).

Benefits:

- Remunerative price to producers
- Reduction in cost of marketing
- Reduction in commission charges
- Effective use of infrastructure
- Credit facilities
- Timely transportation service
- Reduces malpractices
- Marketing information
- Supply of agricultural inputs
- Collective processing

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7.4 Forward and future markets:

Forward trading means an agreement or a contract between seller and purchaser, for a certain quality 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 in February 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, Red gram has been allowed for future trading, under section 15 of the Forward Contracts (Regulation) Act of 1952. Earlier, Red gram was not allowed for future trading.

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Forward contracts are broadly of two types:

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 term, etc. are incorporated in the contracts. Specific delivery contracts are 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, these are called as 'future contracts'. Futures contracts are forward contracts other than specific delivery contracts. These contracts are usually entered into 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 all standardised and contracting parties have to negotiate only the rate at which contract is entered into.

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Benefits:

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 to the producer because they can get idea of price likely to prevail at a future point of time and, therefore, can decide time and planning of production that suits them.

Traders/Exporters: The future 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-

i) Price stabilization: In times of violent fluctuations, futures trading reduces the price variations.

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

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

iv) 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 / Public Sector:

Name of the scheme/imple-menting organisation	Facilities provided/salient features/ objectives
1.Gramin Bhandaran Yojana (Rural Godowns Scheme) Directorate of Marketing & 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, standardization 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 tonnes. ▶ 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 lakhs.
2.Agmark grading and standardisation Directorate of Marketing & 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 are framed based on their intrinsic quality. Food safety factors are being incorporated in the standards to compete in the 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 producer and consumer.
3.Agricultural Marketing Information Network	▶ To establish a nationwide information network for speedy collection and dissemination of market data for its efficient and timely utilization.

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Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	▶ 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 provided 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. These SAMD/Boards/ Markets are to 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.
4.Price Support Scheme (PSS), National Agricultural Cooperative Marketing Federation of India Limited (NAFED) Nafed House, Sidhartha Enclave, New Delhi-1100014	▶ NAFED is the nodal agency of Government of India to undertake procurement of Red gram under price support scheme. ▶ The objective of scheme is to provide regular marketing support to sustain and improve the production of Red gram. ▶ Purchases under PSS are undertaken when the prices of Red gram rate at or below the declared support prices for a particular year.
5.Co-operative Marketing, Processing storage etc. programmes in comparatively under/least developed states. National Co-operative Development Corporation (NCDC), Hauz Khas, New Delhi-110016	▶ To correct regional imbalances and to provide needed momentum to the pace of development of various programme of co-operative 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.

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8.2 Institutional credit facilities:

The institutional credit to agriculture is disbursed through co-operatives, which was targeted 43 percent share in rural credit flow in agriculture during 2002-2003 (Rs.82073 crore), 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.	➢ short term loan. farmers with a repayment period not exceeding 18 months.
2.Produce Marketing Loan (PML)	All categories of farmers.	on their own to avoid distress sale. loans for next crop. months.
3. Kisan Credit Card Scheme	All agriculture clients having good track record for the last two years.	farmers to meet their production credit and contingency needs. the farmers to avail the crop loans as and when they need. based on operational land holding, cropping pattern and scale of finance. convenient withdrawl slips. The Kisan Credit Card is valid for 3 years subject to annual review. permanent disability; a maximum amount of Rs. 50,000 and Rs. 25,000 respectively.

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4.National Agricultural Insurance Scheme	Scheme is available to all farmers – loanee and non-loanee both- irrespective of the size of their holding.	➢ to the farmers in the event of failure of any of the notified crops as a result of natural calamities, pests and diseases attack. farming practices, high value in-puts and higher technology in agriculture. disaster years. Implementing Agency. yield of the area insured. pulses), oilseeds and annual commercial/horticultural crops. 50 percent of premium charged from them. The subsidy will be phased out over a period of 5 years on sunset basis.

Long term loans:

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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.	➤ assets facilitating crop production/income generation. ➤ development, minor irrigation, farm mechanization, plantation and horticulture, dairying, poultry, sericulture, dry land/ waste land development schemes etc. ➤ farmers with a repayment span not less than 3 years and not exceeding 15 years.

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8.3 Organisations/agencies providing marketing services:

Name of the organisation and address	Services provided
1.Directorate of Marketing and Inspection (DMI) NH-IV, CGO Complex Faridabad Website: www.agmarknet.nic.in	➤ allied produce in the country. allied produce. designing of physical markets. its regional offices (11) and sub-offices (37) spread all over the country.
2.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	industries for export. conducting surveys, sensibility studies, reliefs and subsidy schemes. export of scheduled products. ensuring the quality of such products. scheduled products. of scheduled products. scheduled products.
3.National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) Nafed House, Sidhartha Enclave, New Delhi – 110014 Website: www.nafed-india.com	of pulses, millets and oilseeds under price support scheme. and import. consumers in Delhi through the network of its retail outlets (NAFED BAZAR) by providing consumer items of daily need.

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4.Central Warehousing Corporation (CWC) 4/1 Siri Institutional Area Opp. Siri fort New Delhi-110016 Website : www.fieo.com/cwc/	➤ warehousing infrastructure to different agencies.
5.National Co-operative Development Corporation (NCDC) 4, Siri Institutional Area, New Delhi-110016 Website: www.ncdc.nic.in	production, processing, marketing, storage, export and import of agricultural produce. level 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 ii) Purchase of transport vehicles.
6.Director General of Foreign Trade, (DGFT) Udyog Bhavan, New Delhi. Website: www.nic.in/eximpol	different commodities. agricultural commodities.
7.State Agricultural Marketing Board (SAMBs),	agricultural produce. services. the form of loans and grants. subjects relating to agricultural marketing.

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9.0 UTILIZATION

9.1 Processing:

Processing is an important marketing function in the present day marketing of Red gram. Processing convert the raw materials and bring the produce nearer to human consumption. It is concerned with value addition to the produce by changing its form. Pulses are generally converted into Dal by decutilating and splitting the whole seed. Over 75 percent of the total legumes produced in the country are split into Dal.

Processing of Red gram is generally known as Dal milling or dehulling. Milling means removal of the outer husk and splitting the grain into two equal halves. Dal milling is one of the major food processing industries in the country, next to rice milling. The efficiency of conversion of grain to Dal by traditional methods of milling is low and the resultant product especially that from the wet method is inferior in cooking quality. The average Dal yield varies from 68-75 percent (theoretical value 85 percent), i.e. a net loss of 10-17 percent during the conversion of Red gram into finished Dal by traditional methods.

In modernizing the Dal milling industry, the Central Food Technological Research Institute (CFTRI), Mysore, has recommended an improved method of Dal milling as presented on Chart No.2 (Page No.50).

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9.2 Uses:

The Red gram plants and seeds are used in many ways as human food, fodder, fuel, fencing materials and maintaining soil fertility. The main uses of Red gram are as follows:

- **Dal:** Decorticated split cotyledon of whole seed is called Dal. Red gram is consumed mainly as Dal in India. Red gram Dal is a staple food and is an important ingredient of diet of Indian people. It is also consumed as Dal in other South Asian countries, in Tanzania and Uganda in Africa.
- **Whole dry seed:** Whole dry seed is boiled and consumed in Eastern Africa, the West Indies and Indonesia. It is also consumed in Myanmar.
- **Roasted and puffed seed:** Roasted and puffed seeds are consumed in India.
- **Green (Immature) seed:** Used as vegetable in parts of India (mainly in Gujarat), also in Caribbean countries, in Latin American countries and East Southern Africa.
- **Young pods:** Very young pods before the seed formation cooked like beans in curries are consumed in parts of India, Java and U.K.
- **Seed purpose:** Generally, farmers retain a part of his produce for seed purpose for sowing in next season.
- **Animal feed:** The green leaves and tops of plants are used as animal feed in South Asia, Africa and Caribbean countries. The by-product of seed coats, broken bits and powder from Dal mills form a valuable protein source of dairy animals. Cracked and shrivelled seeds are also used as animal feed. The husk of pods and leaves obtained during threshing constitute a valuable cattle feed.
- **Fuel purpose:** The dry stem of the plant and dry leaves are used as fuel for cooking by the poor population in rural India.
- **Fencing purpose:** The dry stalks of the plant is used in fencing and in basket making.
- **Lac culture:** In China and Myanmar, the crop is also grown to culture the lac producing insects.
- **To improve soil fertility:** Rhizobium bacteria are present in the root nodules of Red gram. The Red gram crop fixes atmospheric nitrogen in symbiotic association with Rhizobium bacteria and maintains the soil fertility.

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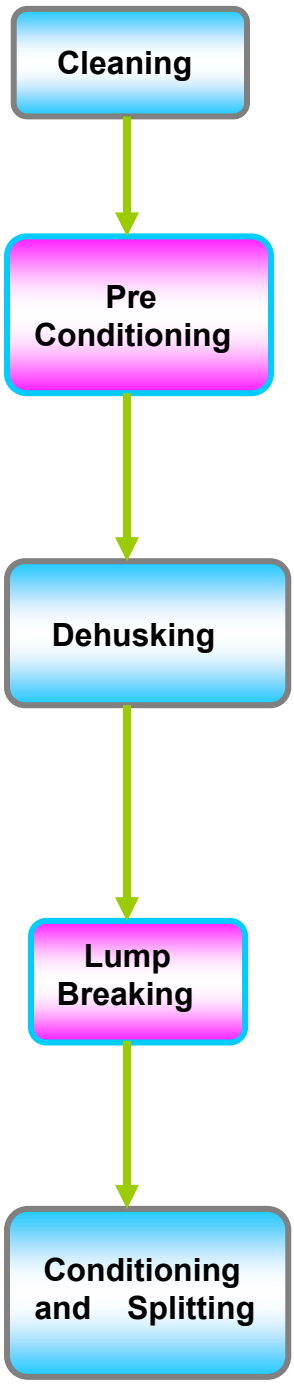
CHART NO. 2

STEPS OF DAL MILLING



Remove all impurities i.e. dust, chaff, dirt, grits etc from Red gram grains (whole) and separate according to size. Cleaning is done in rotary seed cleaners.

LSU type dryer is used to condition the clean Red gram grains. Cleaned grains are passed twice through hot air at about 100°C for a certain period of time and tempered after each pass in the tempering bins for about six hours. Preconditioning of Red gram helps in loosening of husk.

After preconditioning the Red gram grains are dehusked. Pearler or dehusker are used to dehusk the preconditioned grains and almost all the grains are dehusked in a single operation. Dehusked whole Red gram grains are separated from split Red gram and mixture of husk, broken etc. The dehusked wholegrains are received in a screw conveyor where water is added at a controlled rate. The moistened gota are collected on the floor and allowed to remain as such for about half an hour.

A lump breaker is used to break the lumps formed by some of the moistened whole grains.

The dehusked whole grains, after lump breaking are dried upto the proper moisture level in LSU type dryer. The hot conditioned and dried dehusked whole grains are splitted in emery roller. All the whole grains are not splitted in one pass. So grade 'I' pulses, dehusked whole grains and small brokens are separated from the mixture. For subsequent splitting the unsplit dehusked grains are again feed to the conditioner.

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10.0 DO'S AND DON'TS

DO'S	DON'TS
✔ Harvest the Red gram at proper time of maturity.	✘ Delay in harvesting which results shattering of pods.
✔ Harvest the Red gram crop when 80% of the pods are mature (turned yellow).	✘ fully mature, which results lower yields, higher proportion of immature seeds,
✔ Harvest during conducive weather condition.	✘ crop during adverse weather condition (during rain and over
(pucca) floor.	kutcha floor.
✔ he Red gram after AGMARK grading to get remunerative prices in the	✘ Market Red gram without grading, which will fetch lower prices.
✔ market information regularly from agmarknet.nic.in website, newspapers,	✘ Market produce without collecting / verifying marketing information.
✔ g post harvest period and sell it later when the prices	✘ ing post harvest period when the prices are low during this period due to glut.
storage.	✘ ventional and outdated method of storage, which causes storage
✔ GRAMIN BHANDARAN YOJANA scheme for construction of rural godowns and store Red gram to minimise losses.	✘ Store Red gram at unscientific place in a haphazard manner, which will result qualitative and quantitative deterioration
✔ shortest and efficient marketing channel to get highest share	✘ nnel, which reduces the producer's share as well as
✔ erly to protect the quality and quantity of produce during transit and storage.	during transit and storage.
✔ mode of transportation from the	✘ Use the mode of transport, which will cause losses and require higher cost.

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✔ Transportation of Red gram should be done in bags to minimize the grain ✔ post harvest technology and processing techniques to avoid post harvest losses. ✔ Avail the facility of Price Support Scheme during glut situation. Phyto-Sanitary measures during export. ✔ re better marketing of the produce, avail benefit of contract ✔ ing to avoid price risk arising due to wide fluctuations in commodity prices.	✘ Transport Red gram in bulk, which ✘ onal techniques in post harvest operations quantitative and qualitative losses. ✘ Sell Red gram to local traders or situation. Sanitary measures. and assuring its market demand for that year. ✘ Sell the produce at fluctuating prices or in glut situation.

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