

POST-HARVEST PROFILE OF BENGAL GRAM

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1.0 INTRODUCTION

Bengal gram is called Chickpea or Gram (*Cicer aritinum L.*) in South Asia and Garbanzo bean in most of the developed world. Bengal gram is a major pulse crop in India, widely grown for centuries and accounts for nearly 40 percent of the total pulse production. India is the major growing country of the world, accounting for 61.65 percent of the total world area under Bengal gram during 2002 and 68.13 percent of the total world production.

Bengal gram is widely appreciated as health food. It is a protein-rich supplement to cereal-based diets, especially to the poor in developing countries, where people are vegetarians or cannot afford animal protein. The pulse proteins are rich in lysine and have low sulfur containing amino acids. It offers the most practical means of eradicating protein malnutrition among vegetarian children and nursing mothers. Bengal gram has a very important role in human diet in our country.



Nutritional value of edible portion per 100 g of Bengal gram

Food	Energy calorie	Protein g	Fat g	Calcium mg	Iron mg	Thiamin mg	Riboflavin mg	Niacin mg	Vit. C mg	Vit. A mcg
1. Bengal gram (whole)	360	17.1	5.3	202	10.2	0.30	0.15	2.9	3	189
2. Bengal gram (Dal)	372	20.8	5.6	56	9.1	0.48	0.18	2.4	1	129

Source: Nutritive value of Indian foods, by Gopalan, C., et al, Indian Council of Medical Research Publication, 1971, PP. 60-114.

1.1 ORIGIN

Bengal gram is known in this country since ancient times. It is said to be one of the oldest pulses known and cultivated in Asia and Europe. According to **Aykroid and Doughty (1964)**, the centre of origin of Bengal gram is stated to be eastern Mediterranean, but its probable place of origin lies in Southwestern Asia, i.e. countries lying to North-west of India such as Afghanistan and Persia. According to **De Candolle**, the fact that gram has a *Sanskrit* name "**Chanaka**" which indicates that the crop was under cultivation in India longer than in any other country in the world.

Botanical description:

Bengal gram belongs to family *Leguminosae*. It is a small, much branched herbaceous plant. The Indian grams have been classified in two broad groups:

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K ***Cicer aritinum* L. (Desi Gram or Brown Gram):** In this group, the colour of the seed ranges from yellow to dark brown. Seed size is usually small. It is the most widely grown group cultivated in India.



K In this group, the colour of the seed is usually white. Grains are bold and attractive.



The Vernacular (name) prevailing in different states are given below.

Name of the State	Local Name
Uttar Pradesh, Rajasthan, Bihar, Madhya Pradesh, Gujarat and Haryana	Chana
Punjab	Chhole
West Bengal	Chola
Orissa	Boot
Assam	Butmah
Andhra Pradesh	Sanagalu
Maharashtra	Harbara
Tamil Nadu	Kadalai
Kerala	Kadala
Karnataka	Kadale

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1.2 IMPORTANCE

During 2001-2002, the total production touched to 5.27 million tonnes. The major producing states are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Andhra Pradesh and Karnataka. During 2001-2002, India's total export of Bengal gram was 1375.676 tonnes valued at Rs. 36.10 lakh, while export of Dal Chana was 4276.674 tonnes valued at Rs. 113.94 lakh. These exports were to USA, U.K, Canada, Saudi Arab, UAE, Srilanka, Malaysia etc. The total import of gram during the said period was 15684.26 tonnes worth Rs. 274.28 lakh and 6826 tonnes gram Dal worth Rs.1187.86 lakh. The main countries, which exported gram whole and Dal to India were Myanmar, Tanzania, Iran, Canada, Pakistan, Turkey, etc.

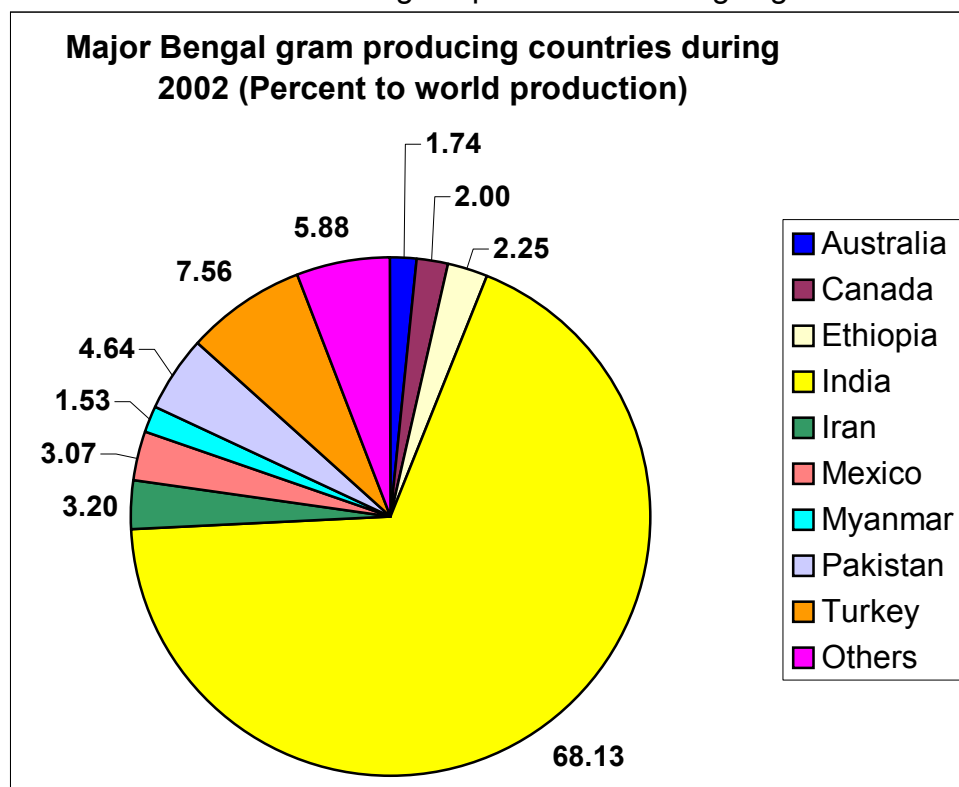
Sprouted seeds are recommended for curing scurvy. Malic and Oxalic acids collected from green leaves are prescribed for intestinal disorders. Gram seeds contain a higher percentage of oil (4-5%) than other pulses. It has also unique characteristic of maintaining and restoring soil fertility. It is consumed in different forms all over country and thus, forms an important component of Indians' diet.

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2.0 PRODUCTION

2.1 MAJOR PRODUCING COUNTRIES IN THE WORLD

India is the largest producer of Bengal gram in the world. During 2002, India



contributed for 61.65 percent of the total area under gram and 68.13 percent of total world production. Major Bengal gram producing countries were India followed by Turkey (7.56 percent), Pakistan (4.64 percent), Iran (3.20 percent), Mexico (3.07 percent) and Ethiopia (2.25 percent). The production of the World was about 7.8 million tonnes during the said period. Turkey, Mexico, USA, Afghanistan and Iran produced Kabuli type, while India, Pakistan, Bangladesh,

Myanmar, Ethiopia, Spain and Australia produced largely *Desi* type. It has been observed that the productivity of Bengal gram in India was 8721 kg per hectare as compared to the world average of 7892 kg per hectare in the year 2002.

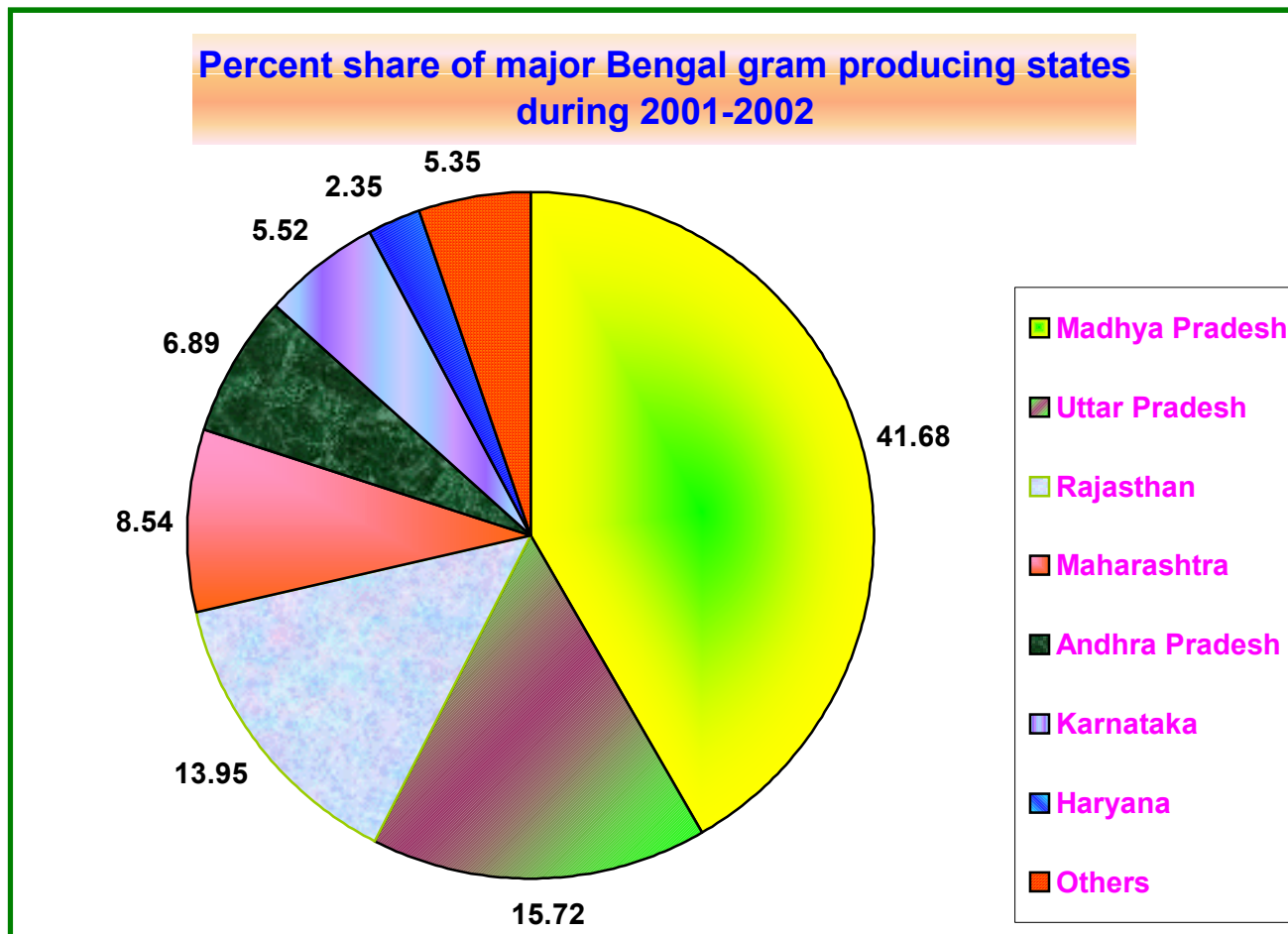
Area, Production and Average Yield of Bengal gram during 2000 to 2002

Country	Area (Hectare)				Production (Tonnes)				Yield (Kg/ Ha)		
	2000	2001	2002	% to Area	2000	2001	2002	% to Production	2000	2001	2002
Australia	262,000	195,000	201,000	2.03	162,000	258,000	136,000	1.74	6,183	13,231	6,766
Canada	283,000	476,000	154,000	1.56	387,000	465,000	156,000	2.00	13,675	9,769	10,130
Ethiopia	184,790	211,910	211,910	2.14	164,627	175,734	175,734	2.25	8,909	8,293	8,293
India	6,200,000	5,200,000	6,200,000	6.20	3,200,000	5,200,000	6,200,000	6.20	8,327	7,500	8,721
Iran	645,520	751,706	740,000	7.48	242,379	268,774	250,000	3.20	3,755	3,576	3,378
Mexico	134,909	194,464	150,000	1.52	233,809	326,119	240,000	3.07	17,331	16,770	16,000
Myanmar	129,424	164,378	164,378	1.66	84,279	119,269	119,269	1.53	6,512	7,256	7,256
Pakistan	971,800	905,000	933,900	9.44	564,500	397,000	362,100	4.64	5,809	4,387	3,877
Turkey	636,000	645,000	650,000	6.57	548,000	535,000	590,000	7.56	8,616	8,295	9,077
Others	579,177	569,867	588,484	5.95	359,552	398,205	458,788	5.88	6,208	6,988	7,796
World	9,313,325	9,313,325	9,313,325	100.00	7,886	7,348	7,892	100.00	7,886	7,348	7,892

Source: FAO Website: - www.fao.org

2.2 MAJOR PRODUCING STATES IN INDIA

Bengal gram is grown in winter season mainly in the northern and central region of the country. Due to increase in irrigated area, use of improved varieties and modern technology, its area is gradually shifting towards south-central region.



It has been noticed that during the year 2001-2002, Madhya Pradesh alone contributed 41.68 percent of total production followed by Uttar Pradesh (15.72 percent), Rajasthan (13.95 percent), Maharashtra (8.54 percent), Andhra Pradesh (6.89 percent) and Karnataka (5.52 percent). In case of area, Madhya Pradesh stood first with 36.45 percent followed by Rajasthan (15.90 percent), Uttar Pradesh (14.15 percent), Maharashtra (12.40 percent) and Karnataka (7.87 percent). In productivity, Andhra Pradesh ranked first with 1274 kg per hectare followed by Madhya Pradesh (989 kg per hectare) and Uttar Pradesh (960 kg per hectare). Area, production and average yield of major Bengal gram producing States during 1999-2000 to 2001-2002 are given below.

Area, Production and Yield of Bengal gram in major producing states from 1999-2000 to 2001-2002

	Area (000 Hectares)				Production (000Tonnes)				Yield (Kg/Hectare)		
	1999-2000	2000-2001	2001-2002		2000	2001	2001-2002		1999-2000	2000-2001	2001-2002
			(final)	%			(final)	%			
1	2	3	4	5	6	7	8	9	10	11	12
Madhya Pradesh	2571.9	1978.4	2222	36.45	2535.1	1620.3	2196.8	41.68	986	819	989
Uttar Pradesh	822.3	833	863	14.15	779.3	702.7	828.4	15.72	948	844	960
Rajasthan	975.3	672.6	969.6	15.90	677.9	396.6	735.5	13.95	695	590	759
Maharashtra	932	676	756	12.40	600	351	450	8.54	644	519	595
Andhra Pradesh	163	201	285	4.67	95.1	229	363	6.89	583	1139	1274
Karnataka	319.4	369.5	480	7.87	175.3	239.4	291	5.52	549	648	606
Haryana	100	125	145	2.38	58	80	124	2.35	580	640	855
Others	262.4	329.8	376.2	6.18	197.4	236.4	282.3	5.35	752	717	750
All India	6	5	60	10	5	3	5	10	833	744	865

Source: Department of Agriculture and Cooperation, New Delhi.

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2.3 ZONE-WISE MAJOR COMMERCIAL VARIETIES

Zone wise some improved varieties are as under:

Important improved varieties of Bengal gram for different zones in India

1. North-western Zone (Punjab, Haryana, Western Uttar Pradesh, Rajasthan, Himachal Pradesh, Delhi, Jammu & Kashmir)	C214, C235, H208, H355, G130, G543, RS10, RS11, 212, Pusa261, Pusa408, Gaurav, K850, Radhey, Pusa362, Pusa1053, Pusa256, RSG888, GPF2, PVG1, PG186, Uday, Pusa391, Haryana Chana1, Karnal Chana1, DCP-92-3, Gora Hisari, Samrat, Vardhan, Chamatkar, Pusa267, ICCV32, KAK2.
2. North-eastern Zone (Eastern Uttar Pradesh, Bihar, Orissa, West Bengal, Assam)	BR78, Radhey BR168, Pusa256, Pusa413, B110, B115, ST4, C235, Avrodhi, pusa209, pusa240, K4, K5, KGD1168, Uday, Annigeri (Co), Pusa362, Pusa1053, Pusa1003.
3 (Madhya Pradesh, Gujarat, Maharashtra)	JG62, JG74, JG221, JG315, JG5, Annigeri, Ujjain21, U24, Gwalior3, Dohad yellow, Chaffa, BDN 9-3, T3, H355, N31, N59, Vikas, D8, Pusa209, Pusa244, Pusa212, Pusa417, Pusa 256, Pusa391, BGD72, BGD1053, Pusa372, ICCV4, L550, Vaibhav, Vishal, GCPG62101, Radhey, JP315, Phule-G-12, Vijay, ICCV10(Bharti), Gulak1(Gulabi Akola1), Kak2, ICCV2.

4. Peninsular Zone (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu)	Annigeri, BDN 9-3, Chaffa, Co1, Co2, JG74, Jyothi, Radhey, ICC4, ICCV10 (Bharti), JG11, ICCL80074, ICCV37, ICCV2.
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Source: i) L.M.Jeswani and B.Baldev - Advances in Pulse Production Technology; pp. 61,62.
ii) Brochure/Pamphlet of Directorate of Pulses Development, Bhopal.

Short duration varieties cultivated in India

Varieties (Released)	(Days)	(Tonnes / ha)		tes
ICCV 10	90-95	1.5 to 2.5	Wilt resistant	Andhra Pradesh, Karnataka, Maharashtra
Vijay	1	1.8 to 2.5	Wilt resistant	Maharashtra
Vishal	105	1.8 to 2.5	Wilt resistant	Maharashtra
CO 3 & CO 4	105	1.2 to 1.5	----	Tamil Nadu
JG.11	100	1.5 to 1.8	Wilt tolerant and root rot	Madhya Pradesh
ICCV 2	90	1.8 to 2.0	Kabuli	Andhra Pradesh, Karnataka, Maharashtra

Source: - Indian Farming, December 2002, pp. 14.

3.0 POST-HARVEST MANAGEMENT

3.1 POST-HARVEST LOSSES

Due emphasis is needed to reduce qualitative as well as quantitative losses of pulses especially Bengal gram during post-harvest operations. It has been estimated that nearly 9.5 percent production is lost during post-harvest period.

Post-harvest losses of pulses including Bengal gram

Sl. No.	Stages	Production Loss (percent)
1.	Threshing Yard	0.5
2.		7.5
3.	Processi	1.0
4.	Transport	0.5
	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.

Following measures should be taken to avoid post-harvest losses.

- Timely harvest.
- Use of proper method of harvesting.
- Adopt modern mechanical methods of threshing and winnowing.
- Use of improved technique of processing.
- Cleaning and grading of produce as per standards.
- Use of efficient and good packaging for storage as well as for transportation i.e. B-Twill Jute bags or HDPE bags.
- Use of proper technique in storage.
- Use of pest control measures in storage.
- Proper care in handling (loading and unloading) of packages.
- Avoid use of hooks during handling.

3.2 HARVESTING CARE

Following care should be taken during harvesting.

- ✱ Avoid use of pesticides prior to harvest.
- ✱ Avoid over-maturity of crop.
- ✱ Harvesting before the crop matures usually means a lower yield and also a higher proportion of immature seeds, inviting insects attack during storage.
- ✱ Timely harvesting ensures optimum grain quality and consumer acceptance.
- ✱ Keep harvested crop for drying in the field.
- ✱ Tag the bundles properly and keep at proper place.
- ✱ Drying of Bengal gram to optimum moisture content results in safe storage of produce over a longer period of time.
- ✱ Avoid harvesting during adverse weather conditions.

3.3 GRADING

Grading and marking of agricultural produce as per accepted quality standards helps farmers, marketing functionaries, processors, traders and consumers in efficient marketing with numerous benefits as following:

- ◆ It enables the farmer to get higher price of the produce.
- ◆ It facilitates competitive marketing.
- ◆ It widens the marketing process as buying and selling can take place between two parties at distant places, by quoting standard grades.
- ◆ It reduces the cost of marketing and minimises storage losses.
- ◆ It facilitates in maintaining quality of the produce.
- ◆ It helps the consumers to get standard quality of produce at reasonable prices.
- ◆ It facilitates the futures trading and thus price stabilisation.

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3.3.1 Grade specifications

I. AGMARK specifications under Agricultural Produce (Grading & Marking) Act, 1937

Grade specifications (quality) of husked split Bengal gram (Chana) pulse under Agmark

A) General characteristics:

Bengal gram split pulse shall –

- (i) be the processed splits of mature, dried, whole grains of Cicer Arietinum;
- (ii) have reasonably uniform size, shape and colour, characteristic of the variety/ form;
- (iii) be sweet, clean, whole-some and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances (including added colouring matter) and all other impurities except to the extent indicated under special characteristics;
- (iv) be in sound merchantable condition;
- (v) not have moisture exceeding 12% and
- (vi) have good cooking quality.

B) Special characteristics:

Grade designation	Maximum limits of tolerance (per cent)								
	Foreign matter	Admixture	Damaged or discoloured	Slightly touched pulses	Green grains	Broken	Fragments	Weevilled pulses	Partially unhusked/ husked splits and wholes (both unhusked and husked)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

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Special	1.0	2.0	1.0	8.0	5.0	3.0	1.0	2.0	4.0
Good		3.0	2.0	10.0	6.0	5.0		4.0	6.0
Fair	4.0	6.0	4.0	15.0	8.0	10.0	5.0	6.0	

C) Definitions:

- 1.) **“Foreign matter”** includes dust, stones, lumps of earth, chaff, husk, stem, straw or any other impurity including edible and non-edible seeds.
- 2.) **“Admixture”** means any pulse other than the principal pulse;
- 3.) **“Damaged or discoloured pulses”** are those pulses that are internally damaged or discoloured to such an extent that such damage or discolouration materially affects the quality of the pulse.
- 4.) **“Weevilled pulses”** are those pulses that are partially or wholly bored or eaten by weevil or other grain insects.
- 5.) **“Broken”** include pieces below $\frac{3}{4}$ and above $\frac{1}{4}$ of the full size splits.
- 6.) **“Fragments”** include pieces below $\frac{1}{4}$ of the full size splits.
- 7.) **“Partially husked splits and wholes (both husked and unhusked)”** include:
 1. Pieces that are partially husked; and
 2. Wholes whether with husk or without husk.
- 8.) **“Slightly touched pulses”** are those pulses that are superficially damaged or discoloured such damaged or discolouration not materially affecting the quality of the pulse.
- 9.) **“Green grains”** are those pulses that are green in colour.

Grade specifications (quality) of Besan (Gram flour) under Agmark

A) General characteristics:

1. Besan shall be the product obtained by milling pure, clean, dried decuticled gram (*Cicer arietinum*) only and shall be free from any extraneous matter, colouring matter and preservatives.
2. It shall also be free from insect and fungus infestation and rodent contamination. Ninety-nine per cent of the material shall pass through 500 microns I.S. sieve.
3. It shall be free from any admixture of flour of Khesari dal (*Lathyrus sativus*).

B) Special characteristics:

Grade designation	Moisture %* by weight Max.	Total ash* (on dry basis) % by weight Max.	Acid* isol. ash (on dry basis) % by weight Max.	Alcoholic* acidity (as H ₂ SO ₄ in 90% alcohol % by weight max.	Crude protein* (Nx 6.25) (on dry basis) % by weight min.
(1)	(2)	(3)	(4)	(5)	(6)
Standard	12.5	4.0	0.35	0.1	21.0

*Adopted from I.S. 2400/1963.

Source: Directorate of Marketing and Inspection.

II. Grade specifications under the Prevention of Food Adulteration Act, 1954

A) Grade specifications and definition of quality of Chana Whole

Chana whole shall be the dried grains of gram (*Cicer arietinum* Linn). It shall be sound, clean, sweet, wholesome and free from unwholesome substances. It shall also conform to the following standards, namely:-

- (i) Moisture – Not more than 16 per cent by weight (obtained by heating the pulverised pulses at 130°C – 133°C for two hours).
- (ii) Foreign matter – Not more than 3 per cent by weight out of which the inorganic matter shall not exceed 1 per cent by weight.
- (iii) Other edible grains – Not more than 4 per cent by weight.
- (iv) Damaged grains – Not more than 5 per cent by weight.
- (v) Weevilled grains – Not more than 10 per cent by count.
- (vi) Uric acid – Not more than 100 mg per kilogram.
- (vii) Aflatoxin – Not more than 30 micrograms per kilogram.
- (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 9 per cent by weight.

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B) Grade specifications and definition of quality of Dal Chana

Dal Chana shall consist of split grains of gram (*Cicer arietinum* Linn.) It shall be sound, clean, sweet, dry, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely :-

- (i) Moisture – Not more than 16 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 2 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 – Not more than 100 mg per kilogram.
- (vii) Aflatoxin – Not more than 30 micrograms per kilogram.
- (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 7 per cent by weight.

C) Grade specifications and definition of quality of Besan

Besan means the product obtained by grinding dehusked Bengal gram (*Cicer arietinum*) and shall not contain any added colouring matter or any other foreign ingredient. Besan shall conform to the following standards:-

- (a) Total ash - Not more than 5 per cent.
- (b) Ash insoluble in diluted hydrochloric acid - Not more than 0.5 per cent.

Source:- The Prevention of Food Adulteration Act, 1954 by Universal Publication, pp. 183, 187-190.

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III. Grade specifications of NAFED :

The National Agricultural Cooperative Marketing Federation of India Limited (NAFED) an undertaking of Government of India had prescribed only one grade i.e. Fair Average Quality (FAQ) for the procurement of Bengal gram whole (Desi) under the Price Support Scheme (PSS) during 2002-2003 marketing season.

A. General characteristics:

- i) be the dried mature grains of Cicer Arietinum
- ii) have uniform size, shape and colour
- iii) be sweet, hard, clean, whole-some and free from moulds, living insects, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in schedule below:
- iv) be in sound merchantable condition
- v) conform to PFA rules

B. Schedule showing maximum permissible limits of different refractions:

Grade	Foreign matter percent	Other food-grains percent	Damaged grains percent	Slightly damaged, touched grains percent	Immature, shriveled & broken grains percent	Admixture of other varieties percent	Weevilled grains percent
FAQ	1.0	3.0	3.0	4.0	6.0	5.0	4.0

N.B : Moisture upto 14 percent is allowed. Stocks having more than 14 percent moisture are not to be accepted.

C. Definitions of Foreign matter:

Includes organic and inorganic matter. The inorganic matter shall include sand, gravel, dirt, pebbles, stones, lumps of earth, clay and mud. The organic matter shall include chaff straw, weedseeds and inedible grains.

Source: Action Plan and Operational Arrangements for Procurement of Oilseeds & Pulses under Price Support Scheme in Rabi Season 2002, pp.31.

IV. CODEX STANDARD FOR BENGAL GRAM (CICER ARIENTINUM L.)

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

Pulses are dry seeds of leguminous plants which are distinguished from leguminous oil seeds by their low fat content. The pulses namely Chick peas of *Cicer arietinum* L. (Bengal gram) covered under this standard.

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.

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.

<u>Pulse</u>	<u>Moisture Content</u> (percent)	
Bengal gram (Chick peas)	14	16

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.

- 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.

Crotalaria (*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 mater.

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

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- shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

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.

8. METHODS OF ANALYSIS 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	MAX: 1.0%	Visual Examination

<p>traces of mould or decay; or slight cotyledon staining</p> <ul style="list-style-type: none"> - Seeds with slight defects. Seeds which have not reached normal development; seeds with extensive seedcoat staining, without the 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 	<p>MAX: 7.0% of which broken pulses must not exceed 3.0%</p>	
<p>SEED DISCOLORATION</p> <ul style="list-style-type: none"> - 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 	<p>MAX: 3.0%</p> <p>MAX: 6.0%</p> <p>MAX: 3.0%</p> <p>MAX: 10.0%</p>	<p>Visual Examination</p>
<p>PRESENTATION</p> <ul style="list-style-type: none"> - 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 	<p>Buyer Preference</p>	<p>Visual Examination</p>

3.3.2 ADULTERANTS AND TOXINS

Adulterants are low quality, cheap, non-edible or toxic substances, which degrades or lowers or reduces the quality of the produce or make the produce toxic. Adulteration is the process by which the quality or, the nature of a given produce is reduced.

In India, normally adulteration in agricultural produce occurs either intentionally for financial gain and contamination occurs incidentally due to carelessness and lack in proper hygienic condition of packing, storage, transportation and marketing. The adulterants may cause different food-borne diseases. Following adulterants are normally used in Bengal gram.

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

Adulterants	Detection test
1. Metanil Yellow	Add concentrated HCl to a 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.
2. Lead Chromate	Shake 5 grams of pulses with 5 ml. of water and a few drops of HCl. Pink colour indicates presence of Lead Chromate.
3. Khesari Dal (Lathyrus sativus)	Add 50 ml. of diluted HCl acid to a small quantity of Dal/Besan and keep on simmering water for about 15 minutes. Development of pink colour indicates the presence of Khesari Dal.

Source: Central Agmark Laboratory, D.M.I., Nagpur.

- i) **Metanil Yellow :** It is used in colouring Bengal gram Dal to get attractive deep yellow colour. Metanil Yellow is non-permitted coal tar dye commonly known as 'Kishori Rang'. This is non-permissible toxic and banned colour. This is carcinogenic. In the long run, this may cause serious health hazards like cancer. Food grade colours are also available in the market but traders use metanil yellow as it is cheap.
- ii) **Lead Chromate :** This is used to colour Bengal gram Dal. It is one of the most toxic sorts 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 consumed regularly for a long period.
- iii) **Khesari Dal :** Khesari Dal (Lathyrus sativus) is often mixed in Besan as adulterant. Khesari Dal contains a toxic substance known as Beta-oxylyl amino alanine (BOAA). It is a neurotoxin amino acid. This amino acid is water-soluble. When khesari Dal is consumed in large quantities for long period, it causes neuro-paralysis of the lower limbs known as Lathyrism.

Toxins:

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

Aflatoxin:

Aflatoxin is of most common occurrence in the agricultural produce/food items. Aflatoxin is one type of mycotoxins containing toxic substances which are produced by moulds or fungi which impairs human health. 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 during infection in susceptible crops. The aflatoxigenic Aspergilli are generally regarded as storage fungi.

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

Prevention and control of Aflatoxins :

- K** Prevent the growth of aflatoxin by proper drying of grains.
- K** Use proper and scientific storage method.
- K** Prevent infestation by use of pesticides to avoid mould formation.
- K** Separate the infested grains from sound grains to avoid aflatoxin contamination.

3.3.3 Grading at producers' level and under Agmark :

There is an increasing recognition to grade the produce before sale to get better price and adequate returns. Directorate of Marketing and Inspection introduced the scheme of "Grading at Producers' level" in 1962-63. The main objective of this scheme is to subject the produce to simple tests of quality and assign a grade before sale. 1411 grading units at producers' level were set up in the country as on 31-03-2002. The progress of grading at producers' level and grading and marking under Agmark by the traders is given below:

Grading of Bengal gram at producers' level

Year	Quantity (Tonnes)	Value (Rs. Lakh)
2000-2001	133014.2	21847.96
2001-2002	143495	28577.03
2002-2003 (provisional)	186648	28241.97

Grading of Bengal gram under Agmark

Year	Quantity (Tonnes)	Value (Rs. Lakh)
2001-2002	11636*	3326.37*
2002-2003 (provisional)	11708*	4964.16*

* Total Pulses (pulse-wise data is not available).

Source: Directorate of Marketing & Inspection, Faridabad.

3.4 PACKAGING

Packaging provides physical protection against contamination, damage or handling losses during transportation of Bengal gram. The produce is handled many times between production and consumption. So it plays an important role in marketing of produce. More care is to be taken in packaging of Bengal gram meant for export. There are two levels of packaging:



1. Primary Packaging : i.e. which comes into direct contact with the product.
2. Secondary Packaging : i.e. containing the primary packages.

As per NAFED, packaging unit of Bengal gram is 100 kg. net in B-Twill new gunny bags. The packaging shall be arranged in uniform standard weight to be decided mutually. The traders may also utilize new or unmended once-used gunny bags, if available with them. The package must meet handling and marketing requirements in terms of weight, size and shape. Packaging materials used in packing of Bengal gram are given below.

- 1) Jute bags.
- 2) HDPE / PP bags.
- 3) Polythene impregnated jute bags.
- 4) Poly pouches.
- 5) Cloth bags.

Qualities of good packaging material:

- * The packaging material shall be made of substances which are safe and suitable for intended use.
- * The packaging material must preserve the quality of Bengal gram.
- * It must be cheap and convenient in handling.
- * It must be convenient to store.
- * It must prevent spoilage during transit and storage.
- * It must be clean and attractive.
- * It must help in reducing the marketing cost.
- * It must be biodegradable.
- * It must be free from chemical residue.
- * Packing material should be useful after the main use.
- * It must be free from undesirable odour or flavour or contamination of any toxicity to the product.

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3.5 TRANSPORTATION

Transportation of produce between places is one of the most important marketing functions. It minimising price difference by transporting the Bengal gram from surplus area to the place of scarcity / or deficit areas. It helps creation of employment to the persons engaged in the transport and handling activities of the product. The transportation of Bengal gram is mainly done by head loads, bullock or camel cart, tractor-trolleys, trucks and railways depending upon the availability of means of transportation, quantity of the product and the stages of marketing involved. The most common means of transportation used by different agencies are shown below.

Means of transport used at different stages of marketing

Agencies	Medium	Means of transport	Stage of marketing
♦ Farmer	Road & railways	head loads, bullock carts,	From the threshing floor nearest to the road or railway point.
♦ Trader	Road, railways & water	Trucks, buses, tractor-trolleys, railway wagons, water boat, ship	From the village market to secondary wholesale markets / miller/ retail markets. For export and import.
♦ Consumers	Road, railways & water	thela, bicycle, head loads, water	oil markets to co

Road, rail and river transport are normally used for internal markets but for export and import, mainly sea transport is used. The most common means of transportation are:

- a) Head load :
- b) Pack animals :
- c) Bullock carts :



(Bullock cart)



(Head load)

- 1) Road transportation:
 - i) Tractor-trolley
 - ii) Trucks



(Truck)

2) Railways :



3) Water transport :

- a) River transport
- b) Canal transport
- c) Sea transport



Selection of Mode of Transportation:

Following points should be considered while selecting mode of transportation.

- The mode of transportation should be cheaper among available alternatives.
- It should be convenient during loading and unloading.
- It must protect the produce during transportation from adverse weather conditions i.e. rain, floods etc.
- Insurance is desirable to meet any accidental loss.
- It must deliver the product to consignee in stipulated time.
- It should be easily available particularly during post- harvest period.
- It should be a single mode of transport and cost-effective.
- Distances should be considered.

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3.6 STORAGE

Storage protects the quality of grain from deterioration and helps in stabilization of prices by balancing demand and supply of Bengal gram over time. Bengal gram is produced in Rabi season but consumed throughout the year in the form of whole, Dal and by-products. In our country, storage losses are caused by insects, rodents and microorganisms.

Requirements for safe and scientific storage:

For safe and scientific storage of Bengal gram, the following requirements should be followed.


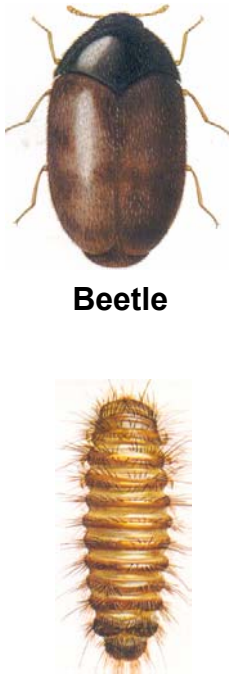
- i) **Selection of site** : The storage structure should be located on a raised well-drained site. The site should be protected from humidity (moisture), excessive heat, insect, rodents and bad weather conditions. It should be easily accessible.
- ii) **Selection of storage structure** : The storage structure should be selected according to quantity to be stored. Sufficient space should be provided between two stacks for proper aeration.
- iii) **Cleaning and fumigation** : Storage structure should be properly cleaned and there should be no left over of grains, cracks, holes and crevices in structure. The structure should be fumigated before storage.
- iv) **Drying and cleaning** : Bengal gram should be properly dried and cleaned to avoid quality deterioration before storage.
- v) **Cleaning of bags** : Only new and dry gunny bags should be used. Disinfested old gunny bags can also be used by boiling it in 1 percent Malathion solution for 4-5 minutes and then dried in the sun.
- vi) **Separate storage of new and old stock** : To check infestation and to maintain hygienic condition, the new and old stocks should be stored separately.
- vii) **Use of dunnage** : Bags of Bengal gram should be kept on wooden crates or bamboo mats along with a cover of polythene sheet to avoid absorption of moisture from the floor.
- viii) **Proper aeration** : There should be proper aeration during clean weather condition. Aeration in rainy season should be avoided.
- ix) **Cleaning of vehicles** : The vehicles used for transportation of grains should be cleaned by disinfectant to avoid infestation.
- x) **Regular inspection** : To maintain proper health and hygiene of stock, regular inspection of stored produce is essential.

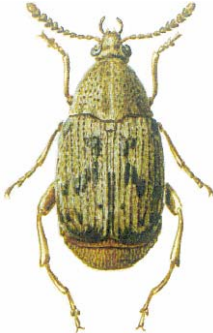



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3.6.1 Major storage pests and their control :

During storage of Bengal gram, a number of pests damage the produce. These pests cause both quantitative and qualitative losses. Pests 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, hygienic condition, fumigation frequency etc. The major storage pests of Bengal gram and their control measures are given below.

Major storage pests of Bengal gram and their control measures

Name of pests	Figure of pest	Nature of damage	Control measures
1. Pulse beetle <i>Callosobruchus</i> <i>sps.</i>	 <p style="text-align: center;">Beetle</p>	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 treatment are followed to control infestation. A) Prophylactic treatment (preventive): Use following insecticides to prevent infestation in godown and stock of Bengal gram. 1. Malathion (50% EC): Mix 1 litre in 100 litre of water. Use 3 litre prepared solution per 100 square meter area. Spray at every 15 days interval. 2. DDVP (76% 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.
2. Khapra beetle <i>Trogoderma</i> <i>granarium</i> <i>(Everts)</i>	 <p style="text-align: center;">Beetle</p> <p style="text-align: center;">Larvae</p>	i) Larvae are one of the most serious stored grain pest 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.	

<p>3. Dried bean weevil</p> <p><i>Acanthoscelides obtectus</i> (Say)</p>		<p>i) Infestation is induced in the field on ripening of crop when pods are split. ii) Larvae feed on the seed by boring.</p>	<p>B) Curative treatment: Use following fumigants to control infested stock/godown of Bengal gram.</p> <p>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.</p>
<p>4. Rice moth</p> <p><i>Corcyra cephalonica</i> (Stainton)</p>	 <p style="text-align: center;">Moth</p>	<p>i) Larvae contaminate the food grains with dense webbing, excreta and hairs. ii) Whole grains are bound into lumps.</p>	
<p>5. Confused flour beetle</p> <p><i>Tribolium confusum</i> J. du V.</p>		<p>Beetle and larvae both feed on broken and damaged grains produced by milling and handling or attack damaged grains by other insects.</p>	
<p>6. Rodents</p>		<p>i) Rodents feed whole grains and split pulses. ii) They also cause mechanical damage to gunny bags and other storage structures of Bengal gram by cutting, which results in spilling of grains. iii) They spill more grains than they consume. iv) Rodents also contaminate Bengal gram by hair, urine and feces, which deteriorate the quality and cause many diseases like cholera, food poisoning, ringworm, rabies etc.</p>	<p>Rat cage: Different types of rat cages are available in the market. Caught rats can be killed by dipping into water.</p> <p>Poison baits: Anti-coagulant pesticide like Zinc phosphide is mixed with bread or any other food stuff used as bait. Keep baits for a week.</p>

3.6.2 Storage structures:

► **Underground storage structures** : These are dug-out structures, may be circular or rectangular in shape. It is known by local name as *Khatti* in Uttar Pradesh and Punjab; *Khani* in Orissa; *Pev* in Maharashtra; and *Patra* in Andhra Pradesh.

► **Surface storage structures**: The surface storage structures are more convenient, hygienic and easy to take care of.

(1) Improved storage structures: Indian scientists have designed and fabricated improved storage bins for the use of farmers which are moisture resistant and rodent-proof.

- ◆ **PAU Bin** : Designed by PAU, Ludhiana. Its capacity ranges from 1.5 to 15 quintals.
- ◆ **Pussa Bin** : Designed by IARI, New Delhi is made of mud or bricks with a polythene film embedded within the walls.
- ◆ **Hapur Tekka** : Designed by IGSI, Hapur is a cylindrical rubberized cloth structure supported by bamboo poles on a metal tube base.

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- ◆ **CAP Storage (cover and plinth)** : This has been developed by the Food Corporation of India. It is an economical way of storage on a large scale.



- ◆ **Silos** : A silo is a cylindrical structure with facilities for loading grains in and out of it. This may be either of steel, aluminium or concrete. A few scientific silos in Punjab for foodgrains with storage capacity around 25,000 tonnes were constructed.

(2) Traditional storage structures :

- ◆ **Bag storage** : Farm produce is stored after placing in gunny bags made of jute.
- ◆ **Kothi or mud bins** : Made up of unburnt clay mixture with straw and cowdung or mud and bricks having 1-50 tonnes capacity in a cylindrical shape.
- ◆ **Kuthla** : These are cylindrical bins of mud-brick mixed with straw and cowdung.
- ◆ **Thekka** : Rectangular in shape, these are made up of gunny or cotton wound around wooden support.
- ◆ **Metal drums** : Cylindrical in shape, these are made up of iron sheets.

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3.6.3 Storage facilities

i) At producers' level :

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

The storage structures must possess the following qualities.

- Construction on raised platform and at clean surrounding area.
- Humidity / moisture proof.
- Rodent and termite proof.
- Free from any contamination and chemicals.
- Re-use.
- Facilities for easy loading and unloading.

ii) Rural godowns :

Directorate of Marketing & Inspection is implementing Rural Godown Scheme in collaboration with NABARD and NCDC to construct scientific storage godowns with allied facilities in rural areas to meet the requirements of farmers for storing farm produce and to prevent distress sale immediately after harvest. Under this scheme, the total number of 2373 new construction of godowns were sanctioned through NABARD and NCDC with the total storage capacity of 36.62 lakh tonnes and 973 godowns having storage capacity of 0.956 lakh tonnes under renovation and expansion programme upto 31-12-2002.

The main objectives of Rural Godown Scheme are as follows:

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- i) To prevent distress sale immediately after harvest.
- ii) To reduce quantitative and qualitative losses arising out by storing grains in faulty or sub-standard storage system.
- iii) To reduce pressure on transport system in the post-harvest period.
- iv) To help farmers in getting pledge loans against their stored produce.

iii) Mandi/APMC godowns:

The APMCs have constructed storage godowns in market yards so that farmers should store the agricultural produce brought to the market for sale. 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 charges and issue warehousing receipt against pledge of produce, which is a negotiable document for obtaining finance from the Scheduled Banks.

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iv) CWC and SWC Warehouses:

a) Central Warehousing Corporation (CWC):

CWC was established during 1957. It is the largest public warehouse operator in the country. In March 2002, CWC was operating 475 warehouses. It has 16 regions covering 225 districts, with a total storage capacity of 8.91 million tonnes. State-wise storage capacity with CWCs as on 31-03-2002 is given below.

Apart from storage, CWC also offers services in the area of clearing and forwarding, handling and transportation, procurement and distribution, disinfection services, fumigation services and other ancillary activities i.e. safety and security, insurance, standardisation and documentation. The CWC is also operating 109 custom bonded warehouses with a total operating capacity of 6.95 lakh tonnes as on 31-03-2002. These bonded warehouses are specially constructed at a seaport or an airport.

State-wise storage capacity with CWC as on 31-03-2002

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Sl. No.	Name of State	No. of CWC	Total capacity (Tonnes)
1.	Assam	6	46934
2.	Andhra Pradesh	49	1259450
3.	Bihar	13	104524
4.	Chhattisgarh	10	259964
5.	Delhi	11	135517
6.	Gujarat	30	515301
	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.	Othe	13	136826
Total		475	8917194

Source: Annual Report 2001-02 Central Warehousing Corporation, New Delhi.

b) State Warehousing Corporation (SWCs) :

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 is given below.

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**State-wise storage capacity with State Warehousing Corporations
as on 31-12-2002**

Sl. No.		No. of centres	Total capacity (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.

v) Co-operative storage:

Co-operative societies provide storage facilities to producers to store their Bengal gram produce immediately after harvest and sell it when the prices are favourable. Co-operative storage is the best option for producers as it provides storage facilities in bulk at cheaper rates, reducing storage cost per unit. Pledge finance to producers against their stored produce is also provided by co-operatives. The co-operative storages are more scientific than individual storage system.

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 also 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 during glut in the market. The storage capacity of 137.63 lakh tonnes has been established by NCDC upto 31-03-2001. Data regarding state-wise number and capacity of co-operative godowns available in the country by NCDC are as follows:

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State-wise co-operative storage facilities available with NCDC as on 31- 03-2001

Name of State	Rural (No.)	Semi-urban/Urban (No.)	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, pp-150.

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3.6.4 Pledge finance

The farmers are often compelled to sell their produce immediately after harvest when the prices are low. The solution for this problem lies in providing them access to safe and scientific storage of their produce and availing easy marketing credit facilities against their stored produce. The strategy aims at promotion of pledge financing through a network of rural godowns and negotiable warehousing receipt system.

According to the RBI guidelines, loan/advances upto 75 percent of the value of 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 shall be for a period of 6 months, which can be extended upto 12 months, based on financing banks commercial judgement. The rate of interest on such loans is charged as per RBI guidelines.

Benefits:

- i) It minimises the farmers' dependence on the commission agents, as the pledge finance provides financial support to them immediately after harvest of the crop.
- ii) It increases the retention capacity of the small farmers for longer period.
- iii) Participation of the farmers, irrespective of their land holding size, increases the arrivals in market yards.
- iv) To boost the bargaining power of the farmers in selling their produce to the commission agent and wholesaler, in the market.

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4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 ASSEMBLING

Assembling includes the operation of collecting Bengal gram from small producers scattered over a wide area to a central place for its further movement to its destination i.e the ultimate consumers. Some important assembling markets of different states for Bengal gram are listed below.

Important assembling markets of Bengal gram in different states of the country

Name of State	Important Markets
1. Andhra Pradesh	Nandyal, Koilkuntla, Allagadda, Banaganpalli, Tandur, Guntakal, Hyderabad, Uravakonda, Guntur, Cuddapah.
2. Bihar	Bhagalpur, Munger, Patna city, Mokama, Barh, Aara, Buxar.
3. Delhi	Najafgarh, Narela.
4. Gujarat	Jamnagar, Rajkot, Ahmedabad, Dahod, Mehsana.
5. Haryana	Hisar, Sirsa, Bhiwani, Fatehabad, Mahendragarh, Rohtak.
6. Karnataka	Gulbarga, Sedam, Dharwad, Bidar, Bangalore, Mysore, Raichur, Bellary.
7. Madhya Pradesh	Dewas, Sujalpur, Guna, Ashoknagar, Sagar, Bina, Deori, Panna, Narsinghpur, Kareli, Damoh, Neemaich, Bhopal, Sihohj, Satna, Peparia, Indore, Ujjain.
8. Maharashtra	Ahmednagar, Nagpur, Murud, Jalana, Aurangabad, Solapur, Sangli, Pune, Baramati, Kalyan, Dhule.
9. Punjab	Faridkot, Sangrur, Mukatsar.
10. Rajasthan	Alwar, Kota, Srimadhampur, Gangapur city, Bikaner, Jaipur, Sikar.
11. Tamil Nadu	Coimbatore, The Nilgiris, Thanjavur, Tuticorin, Virudhnagar, Pudukottai, Tiruchirapalli.
12. Tripura	Thalcherra, Ramnagar, Jalai, Fulbari, Bogmara, Golaghati, Dharmanagar.
13. Uttar Pradesh	Kanpur, Lalitpur, Meerut, Varanasi, Gorakhpur, Saharanpur, Mahoba, Bareilly.
14. West Bengal	Bolpur, Rampurhat, Katwa, Samsi, Kandi, Korimpore, Bethuadahari.

Source: Directorate of Marketing and Inspection.

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4.1.1 Arrivals

It has been reported that during the year 2001-2002, the total arrivals of Bengal gram in 37 markets of Madhya Pradesh was 3236.6 thousand quintals followed by 135 markets of Uttar Pradesh with 1811.8 thousand quintals and 28 markets of Rajasthan with 810 thousand quintals. Maharashtra and Haryana recorded 521.6 and 253.1 thousand quintals of Bengal gram from 76 markets and 46 markets respectively as given below.

Arrivals of Bengal gram in different states during 1998-99 to 2001-2002

Name of the major producing State	Arrivals (in thousand quintals)			
	1998-99	1999-2000	2000-01	2001-02
1. Madhya Pradesh (37 Markets)	4078.9	4143.1	3961.2	3236.6
2. Uttar Pradesh (135 Markets)	2310.7	1890.1	1905.8	1811.8
3. Rajasthan (28 Markets)	1080.2	1131.5	910.8	810.0
4. Maharashtra (76 Markets)	413.1	475.9	513.2	521.6
5. Haryana (46 Markets)	247.8	308.9	207.1	253.1
6. Bihar (37 Markets)	57.6	36.5	37.6	47.7
7. Punjab (38 Markets)	26.1	28.0	34.8	20.7
Total (374 Markets)	8214.4	8014.0	7570.5	6701.5

Source: Quarterly Bulletin of Market Arrivals from Villages, 2002, Department of Agriculture and Cooperation.

4.1.2 Despatches

The Bengal gram from 135 markets of Uttar Pradesh were mostly despatched to the markets of Gujarat, Tamil Nadu, Maharashtra, Delhi, Punjab, Madhya Pradesh, Uttaranchal, Bihar, Rajasthan, Orissa and Assam. Rajasthan despatched mainly to the markets of Tamil Nadu, Assam, Delhi, J&K and small quantity to Nagaland. The Tamil Nadu and Karnataka states were the main centres of despatches of Bengal gram from Andhra Pradesh. In the state of Tamil Nadu, Kerala, Andhra Pradesh, Maharashtra and Gujarat, the despatches were mainly from Karnataka.

4.2 DISTRIBUTION

The assembling deals with the movement of the Bengal gram from the farm to the assembling centers, while the distribution deals with its further movement to the consumers. Various agencies perform the task of assembling the Bengal gram and distributing it to the Dal millers/consumers. The following agencies are involved in distribution of Bengal gram.

1. Producers
2. Village traders
3. Itinerant merchants
4. Wholesale merchants
5. Commission agents
6. Retailers
7. Dal millers
8. Co-operatives and Government organisations

4.2.1 Inter-state movement :

During the year 2000-2001, the inter-state movement of Bengal gram was about 454479 quintals mainly from Delhi, Bihar, Rajasthan, Andhra Pradesh, West Bengal, Punjab, Uttar Pradesh etc. The state of Delhi, which is one of the major assembling markets and Dal processing center, exported 184810 quintals to Tamil Nadu, Chennai Port and Assam. Bihar state is next to Delhi state, which exported 63194 quintals of gram mainly to West Bengal, Tripura and Assam. However, Rajasthan exported 62078 quintals to Tamil Nadu, Assam, Delhi, J&K and Nagaland. The fourth major state was Andhra Pradesh, where from 49190 quintals gram was exported to Assam, Delhi, West Bengal and Rajasthan.

The inter-state movement of Bengal gram by rail, river and air during 1998-99 to 2000-2001 are given below.

Inter-state movement of Bengal gram and gram products during 1998-99 to 2000-2001

Sl. No.	where m	(in qtls)	(in qtls)	(in qtls)	hich despatched
1.	Andhra Pradesh	855	34300	49190	Assam, Delhi, Rajasthan, West Bengal, Madhya Pradesh.
2.	Bihar	83903	55188	63194	West Bengal, Assam, Tripura.
3.	Delhi	725380	307340	184810	Tamil Nadu, Andhra Pradesh, Assam, Punjab, Uttar Pradesh, West Bengal, Maharashtra, Karnataka, Bihar.
4.	Haryana	4350	580	2180	Delhi, Assam, Tamil Nadu, Uttar Pradesh, Andhra Pradesh.
5.	Madhya Pradesh	4210	46720	293	Assam, Bihar, Maharashtra, Andhra Pradesh, West Bengal.
6.	Punjab	3050	---	23990	Assam, Jammu & Kashmir
7.	Rajasthan	222869	82126	62078	Tamil Nadu, Assam, Bihar, Delhi, West Bengal, Jammu & Kashmir, Nagaland, Maharashtra, Uttar Pradesh.
8.	Tamil Nadu	---	560	13704	Gujarat, Bihar, Other States.
9.	Uttar Pradesh	13378	---	22000	Assam, West Bengal, Arunachal Pradesh, Andhra Pradesh, Tamil Nadu, Tripura.
10.	West Bengal	3900	9885	33040	Assam, Nagaland, Uttar Pradesh.
Total		1061895	536699	454479	---

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

4.3 EXPORT AND IMPORT

Bengal gram is exported mainly as whole and in the processed form as Dal. However, only small quantity of gram was exported to USA, UK, Canada, Saudi Arab, UAE etc. The total quantity exported during 2001-2002 was 13756.76 quintals worth Rs. 36.10 crore. The demand for Bengal gram is more where people of Indian origin reside.

INDIA'S EXPORT OF BENGAL GRAM

Countries	April 2001 to March 20 02		April 2000 to March 2001	
	Quantity (In K.G)	Value (In Rupees)	Quantity (In K.G)	Value (In Rupees)
U.S.A.	276828	7783622	338226	9689838
U. K.	277229	7128590	192925	4401232
Canada	170340	4661536	68826	1640396
Saudi Arab	132876	3817163	5000	110880
U Arab Emts	111836	2325707	578952	11080727
Singapore	65606	1963468	137200	4353717
Malaysia	57000	1845460	51550	1289986
Sri Lanka	99302	1796256	101999	1841623
Baharain	30980	838859	23640	529598
Bangladesh	40000	478500	108000	1257785
Others	113679	3466542	299900	8003468
Total	1375676	36105703	1906218	44199250

Source: Director General of Commercial Intelligence and Statistics, Kolkata.

In case of gram Dal, the total export was 42766.74 quintals valued at Rs. 11.39 crore during 2001-2002. The major importing countries were USA, UK, Malaysia, Kuwait, UAE, Srilanka, Canada etc. Indian pulses have good demand in international markets for their unique taste. Country-wise export is as under:

INDIA'S EXPORT OF GRAM DAL/ CHANA SPLIT (HUSKED)

Countries	April 2001 to March 20 02		April 2000 to March 2001	
	Quantity (In	Value (In Rupees)	Quantity (In K.G)	Value (In Rupees)
U S A	1189121	31411771	939017	25590485
U K	596416	16607175	1044907	22506565
Malaysia	371505	10682884	322309	6546124
Kuwait	381890	10297353	542471	11575976
U Arab Emts	364430	9297165	770092	17353265
Sri Lanka	463423	9110848	807108	14066957
Canada	189387	4923227	387930	9703667
Mauritious	102000	3031323	116000	2624168
Saudi Arab	112646	2703104	443060	9033789
Others	505856	15880662	3079797	73982524
Grand Total	4276674	113945512	8452691	192983520

Source: Director General of Commercial Intelligence and Statistics, Kolkata.

In order to meet the domestic demand of pulses, the country has to import sizable quantity of pulses every year. India used to import small quantity of Bengal gram and gram Dal from Myanmar, Tanzania, Canada, Iran, Australia, Pakistan etc. During 2001-2002, India imported 156842.60 quintals of gram and 68260 quintals of gram Dal worth Rs. 27.42 crore and 11.87 crore respectively.

INDIA'S IMPORT OF BENGAL GRAM

Countries	April 2001—March 2002		April 2000—March 2001	
		Value (In Rupees)	Quantity (In K.G)	Value (In Rupees)
MAYANMAR	8	151389346	77	180124599
TA	3455000	60453019	---	---
IRAN	1079260	21205278	---	---
CANADA	1108000		215000	3707782
THAILAND	814000	11879584	---	---
PAKISTAN	240000	4899086	170000	4186964
AUSTRALIA	440000	4636966	---	---
OTHERS	184000	4839501	163000	2852174
TOTAL	15684260	274279527	8296000	190871519

INDIA'S IMPORT OF BENGAL GRAM DAL

Countries	April 2001—March 2002		April 2000—March 2001	
	Quantity (In K.G)	Valu)	Quantity (In K.G)	Valu)
CANADA	2617000	43425360	---	---
IRAN	1919000	35469286	---	---
TURKEY	649000	11585187	---	---
TANZANIA	685000	11353395	---	---
PAKISTAN	262000	5405601	100000	1876363
CHINA RP	250000	4000526	---	---
OTHERS	444000	7546607	---	---
TOTAL	6826000	118785962	100000	1876363

Source: Director General of Commercial Intelligence and Statistics, Kolkata.

4.3.1 Sanitary & Phyto-sanitary Requirements :

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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.
- Prevention or limitation of damage caused by the entry, establishment or spread of pests.

The SPS standards commonly applied by Governments as they 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 the 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:

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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 agricultural export cargo / produce. The exporter has to apply to the officer in charge of 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.

4.3.2 Export Procedures

The exporter should keep in mind about the following laid down procedure during the export of Bengal gram from India: -

1. Registration with 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 can then procure their 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 then 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 customhouse 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 payments, 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 realization of export proceeds.
19. Exporter then applies for various benefits from duty drawback schemes.

4.4 MARKETING CONSTRAINTS

The following are the main marketing problems in Bengal gram:

- ◆ **Distress sale**
- ◆ **Unstable price**
- ◆ **Lack of marketing information**
- ◆ **Non-adoption of standards**
- ◆ **Inadequate storage facilities in rural areas**
- ◆ **Inadequate transportation facilities**
- ◆ **Lack of training facilities to producer**
- ◆ **Inadequate infrastructure facilities**
- ◆ **Malpractices in the markets**
- ◆ **Superfluous middlemen**

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 MARKETING CHANNELS

The marketing of produce is complete only when it reaches the hands of consumers. Marketing channels are the routes through which agricultural products move from producers to consumers. The important marketing channels prevailing in private and institutional sectors of marketing of Bengal gram are as under:

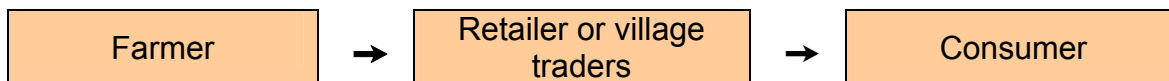
(A) Private Sector:

1) Direct :

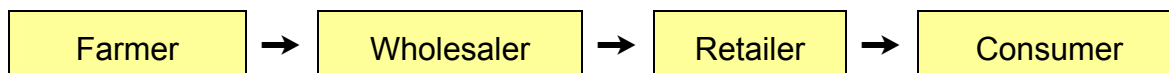


2) Indirect :

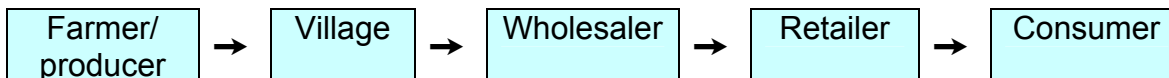
i)



ii)



iii)



iv)

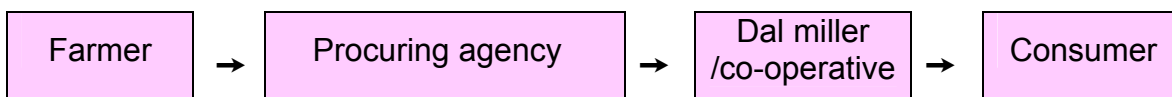


(B) Institutional Sector:

i)

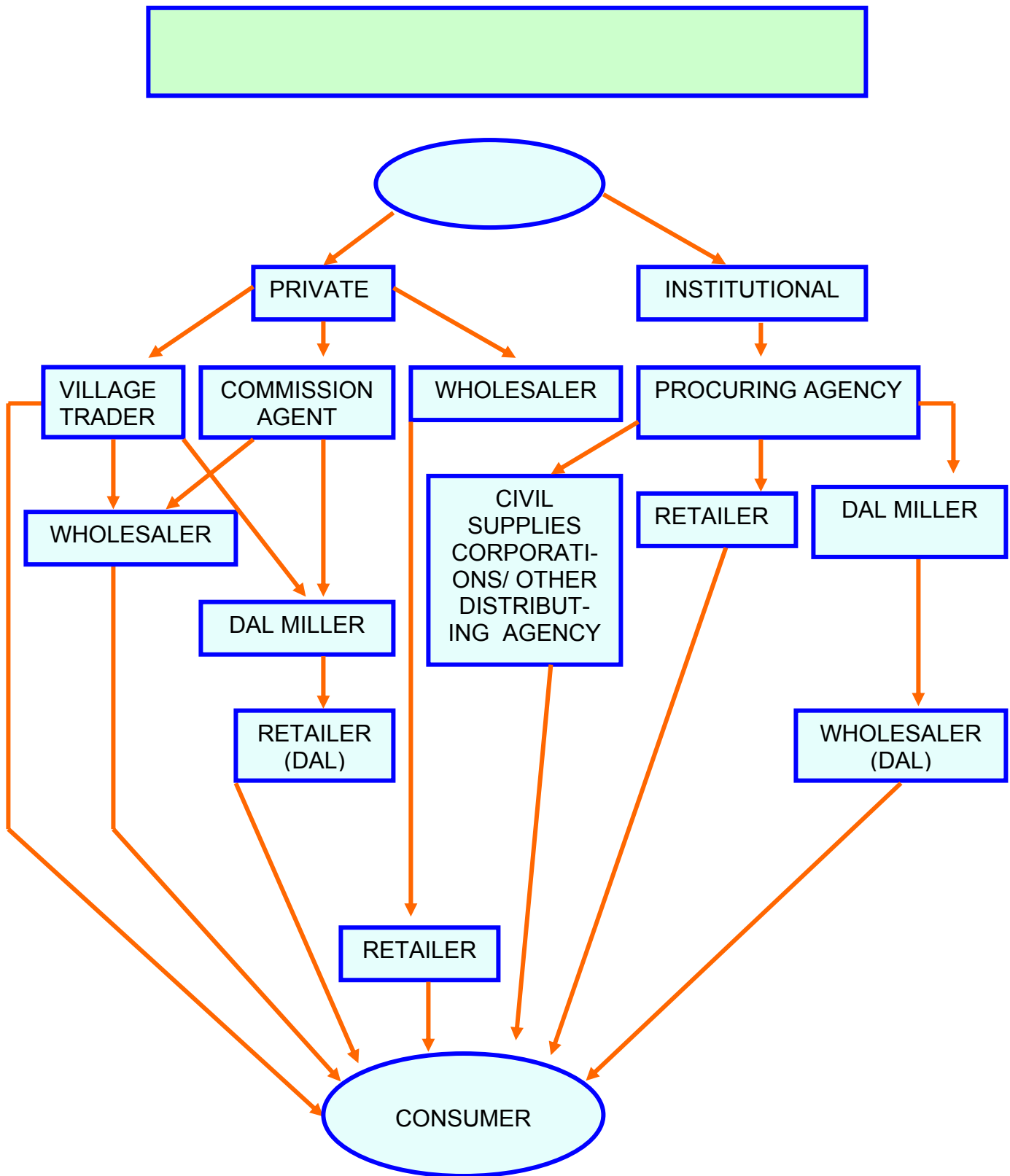


ii)

**Criteria for selection of channels:**

Following criteria should be followed for selecting a marketing channel:

- K** The channel, which ensures the highest share to producer and also provides commodities at the cheapest price to consumer, is considered as the most efficient channel.
- K** Selection should be for shorter channel having lesser market cost.
- K** Longer channel having more intermediaries causing higher marketing costs and less producers' share should be avoided.



5.2 MARKETING COSTS AND MARGINS

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

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

Marketing margins : Margin refers to the difference between the price paid and received by a specific marketing agency or by a combination of marketing agencies in the marketing system as a whole.

Total marketing margin includes cost involved in moving the Bengal gram from producer to consumer and profits of various market functionaries.

$$\begin{array}{|c|} \hline \text{Cost involved in moving} \\ \text{the Bengal gram from} \\ \text{producer to consumer} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Profits of various} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Total marketing} \\ \text{margin} \\ \hline \end{array}$$

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

- i) Market fee** : It is charged either on the basis of weight or on the basis of the value of the produce. It is usually collected from the buyers. The market fee differs from state to state and market to market. It varies from 0.5 percent to 2.0 percent ad valorem.
- ii) Commission** : The charges are usually made in cash and vary from market to market. It is paid to the commission agents and may be payable either by seller or by the buyer or sometimes by both.
- iii) Taxes** : Different taxes are charged in different markets such as toll tax, terminal tax, sales tax, octroi etc. These taxes 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 : Those include handling, weighing, loading, unloading, cleaning, charity contribution in cash and kind etc. These charges may be payable either by the seller or by the buyer.

Market fees, commission charges, taxes and miscellaneous charges on Bengal gram in major producing states

State	Market fee	mmi-charges	Sales tax	License fee Rs. per annum	Other charges
1.Andhra Pradesh	1%	1 – 2%	4%	C.A-cum-traders A-3000/- (FOR 5 YEARS) B-2000/- C-1000/-	---
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.Haryana	1%	2.5%	NIL	Dal mill-----Rs. 100 C.A/Wholesaler/Kacha Arthiya-Rs.60	---
4.Karnataka	1%	2%	0 to 2%	Trader/C. A. – Rs.200 Importer/Exporter – Rs.100 Processor – Rs.100 Stockists – Rs.100	---
5.Madhya Pradesh	2%	NIL	NIL	Traders– Rs.1000/- Processor– Rs.1000/-	---
6.Maharashtra	0.60 to 1.5%	1.25% to 3.25%	---	<u>Issuing fee</u> <u>Renewal fee</u> Traders – Rs. 100-210 Rs. 90-200 (Vary from market to market)	---
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% (2% Fee+ 0.5% D.C)	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 Re. 0.2 to Rs.1.15 per unit.

Source: Sub-Offices of Directorate of Marketing and Inspection.

6.0 MARKETING INFORMATION AND EXTENSION

6.1 MARKETING INFORMATION:

Marketing information is a key function to make efficient marketing decisions, regulate the competitive marketing process and to restrict the monopoly or profiteering by individuals in the market. It is needed by producers in planning production and marketing of their produce. Farmers need to be fully familiarized in different areas of agricultural marketing in order to improve price realization. Marketing information is important at all the stages of marketing right from farm level to ultimate consumption level 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.

6.2 MARKETING EXTENSION:

Marketing extension is a vital factor in enlightening the farmers about proper marketing of their produce and removal of 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 the modern market-oriented farming by taking care of quality, productivity and market demand. Farmer needs 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.

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An effective marketing extension service is need of the hour. This has assumed 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 programme, 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 futures markets etc.

Benefits :

Marketing information and extension are important for all the concerned participants of agricultural marketing.

- 1) Producers** : In present situation, an effective market information and extension service helps in decision making about when, where and how to market Bengal gram.
- 2) Consumers** : With the help of market information and extension, producers should produce Bengal gram according to consumer preferences for fetching remunerative price.
- 3) Traders** : Market information and extension foster true competition among the market players. It helps them to take decisions regarding purchase, sale and storage of Bengal gram by knowing the trend of arrivals, demand, consuming centers, grading, packaging, stock position etc. in the markets.

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4) Government

: Market information plays vital role in formulating appropriate agricultural policies about procurement, export, import and minimum support prices.

Sources/ Institutions:

In our country, there are a number of sources/institutions that are directly or indirectly disseminating marketing information and providing extension services. These are summarised here below;

A. Central level

Sources / Institutions	Activities
1. Directorate of Marketing and Inspection (DMI), NH-IV, CGO Complex, Faridabad. Website: www.agmarknet.nic.in	<ul style="list-style-type: none"> ➤ 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. Directorate of Economics and Statistics, Shastri Bhavan, New Delhi. Website: www.agricoop.nic.in	<ul style="list-style-type: none"> ➤ Compilation of agricultural data for development and planning. ➤ Dissemination of market intelligence through publication and Internet.
3. Directorate General of Commercial Intelligence and Statistics (DGCIS), 1, Council House Street, Kolkata-1	<ul style="list-style-type: none"> ➤ Collection, compilation and dissemination of marketing related data i.e. export-import data, inter- state movement of foodgrains etc.
4. Central Warehousing Corporation (CWC) 4/1 Siri Institutional Area, Opp. Siri fort, New Delhi-110016 Website: www.fieo.com/cwc/	<ul style="list-style-type: none"> ➤ Farmers Extension Service Scheme (FESS) was launched by CWC in the year 1978-79 with the following objectives : <ul style="list-style-type: none"> ◆ 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.

B. State level

Sources / Institutions	Activities
1. State Agricultural Marketing Boards, at different state capitals	<ul style="list-style-type: none"> ➤ Provides marketing related information to co-ordinate all the market committees in the state. ➤ Arrange seminars, workshops and exhibitions on subject related to agricultural marketing. ➤ Provides training facilities to producer, traders and employees of the Boards.
2. Agricultural Produce Market Committees (APMC)	<ul style="list-style-type: none"> ➤ Provides market information on arrivals, prevailing prices, despatches etc. ➤ Provides market information of adjoining / other market committees. ➤ Arranges training, tours / exhibitions etc.

C. Autonomous

Sources / Institutions	Activities
Federation of Indian Export Organisations (FIEO) PHQ House(3 rd Floor) Opp. Asian Games , New Delhi-110016	<ul style="list-style-type: none"> ➤ Provide information to its members about latest developments of export and import. ➤ Organise seminars, workshops, presentation, tours, buyer-seller meets, sponsoring participation in international trade fair, 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.

D. Websites

Websites:	www.agmarknet.nic.in www.agriculturalinformation.com www.agriwatch.com www.kisan.net www.agnic.org www.fao.org www.fieo.com/cwc/ www.commodityindia.com www.apeda.com www.ncdc.nic.in www.agricoop.nic.in www.indiaagronet.com www.nafed-india.com www.icar.org.in www.codexalimentarius.net
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7.0 ALTERNATIVE SYSTEMS OF MARKETING

Experts say that Indian agriculture is dependent on two things—Monsoon and Marketing. Whatever the farmer produces, he should find a market for it. The farmer should be able to sell his produce at a remunerative price. A good marketing setup will increase the farmer's income, which in turn will enlarge scope for more investment in agriculture.

7.1 DIRECT MARKETING

Direct marketing is an innovative concept, which involves marketing of produce by the farmers to the consumer/miller without any middlemen. It enables producer and miller and other bulk buyers to economise on transportation cost and to improve price realisation considerably. The price spread in direct marketing is considerably low. Direct marketing by farmers to the consumers has been experimented in the country through *Apni Mandis* in Punjab and Haryana. The concept of direct marketing with certain improvements has been popularised in Andhra Pradesh through *Rythu Bazars*. At present, small and marginal producers without the help of the middlemen are selling their produce in these markets. In these markets, mainly fruits and vegetables are marketed alongwith other commodities.

Benefits:

- ◆ It increases profit of the producers.
- ◆ It minimizes marketing cost.
- ◆ It increases distribution efficiency.
- ◆ It satisfies the consumers through better quality of produce at reasonable price.
- ◆ It provides better marketing techniques to producers.
- ◆ It encourages direct contact between producers and consumers.
- ◆ It minimizes the margin of the middlemen.
- ◆ It encourages the farmers to produce according to demand.

7.2 CONTRACT MARKETING

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Contract marketing is a system of farming, wherein farmers grow selected crops under a 'buy back' agreement at pre-determined prices with an agency involved in trading or processing. In the wake of economic liberalization, it has gained momentum as the national and multinational companies are entering into contracts for marketing of the produce with specific stipulated quality and quantity and also provide technical guidance, finance, input supply to contract farmers. Contract marketing ensures continuous supply of quality produce (raw materials) at mutually agreed price to contracting agency, whereas it also ensures timely marketing of the produce to farmers. Contract marketing is thus, a means of allocating the distribution risk between processor and grower.

Advantages to farmers :

- ☀ Price stability ensuring fair returns of produce.
- ☀ Direct contract providing monetary returns without involvement of middlemen.
- ☀ Prompt and assured payments.
- ☀ Technical support in the field of production to marketing.
- ☀ Fair trade practices.

- ✳ Credit facility.
- ✳ Exposure of latest technology and best market led practices.
- ✳ Supply of inputs to the farmers at their doorsteps.
- ✳ Supply of capital inflow and assured markets for crop.

Advantages to contracting agency :

- ✳ Assured and continuous supply of produce (raw materials).
- ✳ Control on need based production/post-harvest handling.
- ✳ Control on quality of produce.
- ✳ Price as per mutually agreed contract terms and conditions.
- ✳ Opportunities to acquire, introduce and experiment the production of desired varieties.
- ✳ Help in meeting specific customer needs/choice.
- ✳ Better control on logistics.
- ✳ Strengthen producers/buyers relationship.
- ✳ Relationship based on mutual trust.
- ✳ Direct purchase from farmers and no middlemen.

In the modern scenario of agricultural marketing under the regime of WTO, the process of contract marketing has already been started. The Pepsico has already taken up contract marketing of pulses in Punjab as a model. Since there are many success stories of contract marketing, there are possibilities of exploring the contract marketing in case of Bengal gram.

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7.3 CO-OPERATIVE MARKETING

National Co-operative Development Corporation was established in 1956 with a view to strengthen and promote agricultural marketing through co-operative societies. Co-operative marketing societies are associations of farmers for the collective marketing of their produce and securing advantages of large-scale business to its members. Co-operatives are the best instrument to ensure remunerative prices to farmers for their produce and also function as an interface for stabilizing market prices. The objective of co-operative marketing is to sell the members' produce directly in the market, which fetch the best favourable prices. The co-operative marketing structure consists 3-tier system.

- i) Primary Marketing Society (PMS) at the village level.
- ii) State Co-operative Marketing Federation (MARKFED) 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 functioning in 26 states and 4 Union Territories (Andman & Nicobar Islands, Delhi, Lakshadweep and Pondicherry) under NAFED. Co-operative marketing deals in a number of services i.e. procurement and disposal of farm produce, processing of produce, grading, packing, storage, transportation etc.

Benefits:

- Sale of produce of farmers' collectively at remunerative prices.
- Increase in volume of business on account of pooling of produce, which increases bargaining power.
- Helps in reduction of the marketing cost.
- Acts as a safeguard against the marketing malpractices.
- Provides scientific storage structures to its members for surplus produce.
- Provides credit facilities (loan) to its members against the security of their produce.
- Arranges transportation facilities for the produce collectively, which reduces per unit transportation cost.
- Provides facilities for grading of the produce.
- Provides marketing intelligence on prices, arrivals, demand etc. on day-to-day basis.
- Acts as an agency of Government for procurement of foodgrains and implementation of price support policy on behalf of Nafed.
- Supply of farm inputs to farmers such as improved seeds, fertilizers, insecticides and pesticides.
- Encourages members to produce better quality of Bengal gram, which has good demand in the market.
- Undertakes processing the Bengal gram to gram Dal.
- Makes collective bargain with Dal mills processing centre avoiding commission agents and thus, increasing their share.

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7.4 FORWARD AND FUTURES MARKETS

Forward trading means an agreement or a contract between seller and purchaser, for a certain kind and quantity of a commodity for making delivery at a specified future time, at contracted price. It provides protection against the price fluctuations. Producers, traders and millers can utilise the future contracts to transfer the price risk. Presently, futures 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/future trading is done in exchanges owned by the associations registered under the Act. These exchanges operate independently under the guidelines issued by the FMC and their byelaws.

After the recent decision during February 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, the number of commodities eligible for futures trading have now gone up to 148 including Bengal gram under section 15 of the Forward Contracts (Regulation) Act of 1952. Earlier Bengal gram was not included for futures trading. According to forward market committee, there are three broad categories of contracts under this Act, such as,

- i) Ready delivery contracts (outside the preview of the Act)
- ii) Forward contracts (governed by the Act)
- iii) Option in goods (totally prohibited under the Act)

Forward contracts are broadly of two types. i.e. (a) specific delivery contracts; and (b) other than specific delivery contracts ('future contracts').

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

Specific delivery contracts are again of two types:

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

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

b) Other than specific delivery contracts: Though this contract has not been specifically defined under the act, these are called as 'futures 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.

Benefits :

- (i) **Producers** : They can get idea of price likely to prevail at a future point of time and therefore, can do the planning of production that suits them best.
- (ii) **Traders/ Exporters** : The future trading is very useful to the traders/exporters as it provides an advance indication of the price likely to prevail and thereby, help the traders/exporters in quoting a realistic price and secure trading/export contract in a competitive market. Having entered into a trading/export contract, it enables them to hedge their risk by operating in futures market.
- (iii) **Millers/Consumers** : Futures trading enables consumers/millers to get an idea of the price at which the commodity would be available at a future point of time. They can do proper costing and also cover their purchases by marking forward contracts.
- (iv) **Price stabilization** : At time of violent fluctuations, futures trading reduces the price variation.
- (v) **Competition** : Futures trading encourages competition and provides competitive price to farmers, millers, traders.
- (vi) **Supply and demand** : It balances demand position throughout the year.
- (vii) **Integration of price** : Futures trading promotes an integrated price structure throughout the country.

8.0 INSTITUTIONAL FACILITIES

8.1 MARKETING SCHEMES OF GOVERNMENT/PUBLIC SECTOR

Name of the scheme/implementing organisation	Salient features
1. Gramin Bhandaran Yojana (Rural Godown Scheme) Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	<ul style="list-style-type: none"> ◆ 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% of the project cost with a ceiling of Rs. 37.50 lakhs 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 Rs. 50.00 lakhs @33% of the project cost.
2. Agmark Grading Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	<ul style="list-style-type: none"> ◆ 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 world trade. Standards are being harmonized 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	<ul style="list-style-type: none"> ◆ To establish a nationwide information network for speedy collection and dissemination of market data for its efficient and timely

<p>Information Network</p> <p>Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.</p>	<p>utilization.</p> <ul style="list-style-type: none"> ◆ 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 includes providing connectivity to 710 nodes comprising the State Agricultural Marketing Department (SAMD) /Boards/ Markets. These concerned nodes are being 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 dissemination. National Agriculture Policy has proposed for coverage of another 2000 nodes during the Tenth Plan.
<p>4.Price Support Scheme (PSS), National Agricultural Cooperative Marketing Federation of India Ltd., (NAFED), Nafed House, Sidhartha Enclave, New Delhi-1100014</p>	<ul style="list-style-type: none"> ◆ NAFED is the nodal agency of Government of India to undertake procurement of Bengal gram under price support scheme. ◆ The objective of scheme is to provide regular marketing support to sustain and improve the production of Bengal gram. ◆ Purchases under PSS are undertaken when the prices of Bengal gram go below the declared support price for that year.
<p>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</p>	<ul style="list-style-type: none"> ◆ To correct regional imbalances in the pace of development 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.

8.2 INSTITUTIONAL CREDIT FACILITIES

The institutional credit to agriculture disbursed through co-operatives 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:

Name of scheme	E	Facilities
1.Crop loan	All categ farmers–	<ul style="list-style-type: none"> ➤ To meet cultivation expenses for various crops as short term loan. ➤ This loan is extended in the form of direct finance to farmers with a repayment period not exceeding 18 months.
2.Produce marketing loan (PML)	farmers	<ul style="list-style-type: none"> ➤ This loan is given to help farmers to store produce on their own to avoid distress sale. ➤ This loan also facilitates immediate renewal of crop loans for next crop. ➤ The repayment period of the loan does not exceed 6 months.
3. Kisan Credit Card Scheme	All agriculture good track record for the last two years.	<ul style="list-style-type: none"> ➤ This card provides running account facilities to farmers to meet their production credit need and contingency needs. ➤ The scheme follows simplified procedure to enable the farmers to avail the crop loans as and when they need. ➤ Minimum credit limit – Rs. 3000/-. Credit limit is based on operational land holding, cropping pattern and scale of finance. ➤ Withdrawals can be made by using easy and convenient withdrawal slips. The Kisan Credit Card is valid for 3 years subject to annual review. ➤ It also covers personal insurance against death or permanent disability to a maximum amount of Rs. 50,000 and Rs. 25,000 respectively.

4.National Agricultural Insurance Scheme	<p>Scheme is available to all loanee and non-loanee both-irrespective of the size of their holding.</p>	<ul style="list-style-type: none"> ➤ To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crops as a result of natural calamities, pests and diseases attack. ➤ To encourage the farmers to adopt progressive farming practices, high value in-puts and higher technology in agriculture. ➤ To help in stabilizing farm incomes, particularly in disaster years. ➤ General Insurance Corporation of India (GIC) is the Implementing Agency. ➤ Sum insured may extend to the value of threshold yield of the area insured. ➤ Coverage of all food crops (cereals, millets and pulses), oilseeds and annual commercial/horticultural crops. ➤ Small and marginal farmers are provided subsidy of 50 percent of premium charged from them. The subsidy will be phased out over a period of 5 years on sunset basis.
5.Agricultural Term Loan	<p>All categories of farmers (small/medium and agricultural labourers) are eligible, provided they have necessary experience in the activity and required area.</p>	<ul style="list-style-type: none"> ➤ The banks extend this loan to farmers to create assets facilitating crop production/income generation. ➤ Activities covered under this scheme are land development, minor irrigation, farm mechanisation, plantation and horticulture, dairying, poultry, sericulture, dry land, waste land development schemes etc. ➤ This loan is offered in the form of direct finance to farmers with a repayment span not less than 3 years and not exceeding 15 years.

8.3 ORGANISATIONS/ AGENCIES PROVIDING MARKETING SERVICES

Organisations / Agencies	Services provided
<p>1. Directorate of Marketing and Inspection (DMI) NH-IV, CGO Complex Faridabad</p> <p>Website: www.agmarknet.nic.in</p>	<ul style="list-style-type: none"> ➤ To integrate development of marketing of agricultural and allied produce in the country. ➤ Promotion of marketing of agricultural and allied ➤ Market development through regulation, planning and design ➤ Administration ➤ Promotion of Cold Storage. ➤ Liaison of its regional offices (11) and sub-offices (37) spread all over the country
<p>2. Agricultural and Processed Food Products Export Development Authority (APEDA) NCUI Building, 3, Siri Institutional Area, August Kranti Marg, New Delhi-110016</p> <p>Website: www.apeda.com</p>	<ul style="list-style-type: none"> ➤ Development of scheduled agriculture products related industries for export. ➤ Provides financial assistance to these industries for conducting surveys, feasibility studies, reliefs and subsidy schemes. ➤ Registration of scheduled product exporters on payment of such fees as may be prescribed. ➤ Adapting standards and specifications for the purpose of export of scheduled products. ➤ Improving the packaging of the scheduled products. ➤ Promotion of export oriented production and development of scheduled products. ➤ Collection and publication of statistics for improving marketing of scheduled products. ➤ Training in the various aspects of industries related to the scheduled products.
<p>3. National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) Nafed House, Sidhartha Enclave, New Delhi – 110014</p> <p>Website: www.nafed-india.com</p>	<ul style="list-style-type: none"> ➤ Central office of India for procurement of pulses, millets and oilseeds under price support scheme. ➤ It undertakes sale of pulses and oilseeds procured under PSS and import. ➤ Provide storage facilities. ➤ Serves the consumers in Delhi through the network of its retail outlets (NAFED BAZAR) by providing consumer items of daily need. ➤ Processing of pulses, fruits etc. for internal trade.

<p>4. Central Warehousing Corporation (CWC) 4/1 Siri Institutional Area Opp. Siri fort New Delhi-110016 Website : www.fieo.com/cwc/</p>	<ul style="list-style-type: none"> ➤ Provides scientific storage and handling facilities. ➤ Offers consultancy services/ training for the construction of warehousing infrastructure to different agencies. ➤ Import and export warehousing facilities. ➤ Provides disinfestation services.
<p>5. National Co-operative Development Corporation (NCDC) 4, Siri Institutional Area, New Delhi-110016 Website: www.ncdc.nic.in</p>	<p>production, processing, marketing, storage, export and import of agricultural produce.</p> <p>level marketing societies is provided towards:</p> <ul style="list-style-type: none"> i) Margin money and working capital finance to augment business operations of agricultural produce ii) Strengthening the share capital base, and iii) Purchase of transport vehicles.
<p>6. Director General of Foreign Trade (DGFT) Udyog Bhavan, New Delhi. Website: www.nic.in/eximpol</p>	<ul style="list-style-type: none"> ➤ Provides guidelines / procedure of export and import of different commodities. ➤ Allot import-export code number (IEC No) to the exporter of agricultural commodities.
<p>7. State Agricultural Marketing Board at different state's capitals.</p>	<p>state.</p> <p>Provides infrastructure facilities for the marketing of notified</p> <ul style="list-style-type: none"> ➤ al produce in the markets. <p>services.</p> <p>in the form of loans and grants.</p> <p>agricultural marketing.</p>

9.0 UTILIZATION

9.1 PROCESSING

Processing is concerned with the addition of value to the product by changing its form. Value addition is the process of changing or transforming a product from its original state to a more valuable state. Processing adds the value to its product from Bengal gram into Dal and Besan. More than 75 percent of the Bengal gram is consumed as Dal (split grain) and Besan (flour). Milling of Bengal gram means removal of the outer husk and splitting of the grain into two equal halves. The important steps involved in Dal making are :

- ◆ **Cleaning** : Removing impurities (dust, dirt, grits, chaff) from Bengal gram.
- ◆ **Dampening** : Soaking grains in water for the desired period of time.
- ◆ **Pre-conditioning** : Keeping the soaked grams after removal from water for drying in the sun (by traditional method) / dryer (by machine).
- ◆ **Dehusking and splitting:** Removing the husk from the grains and splitting the grain to make Dal. Both dehusking and splitting are obtained in a single operation. Dal may be further processed by grinding it into flour (Besan).

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Traditional technologies for making Dal are laborious, time consuming, completely dependent on climate and low yielding. In modern technology, machineries are introduced for better and quick recovery to reduce the cost of processing and making the process independent of climatic conditions.

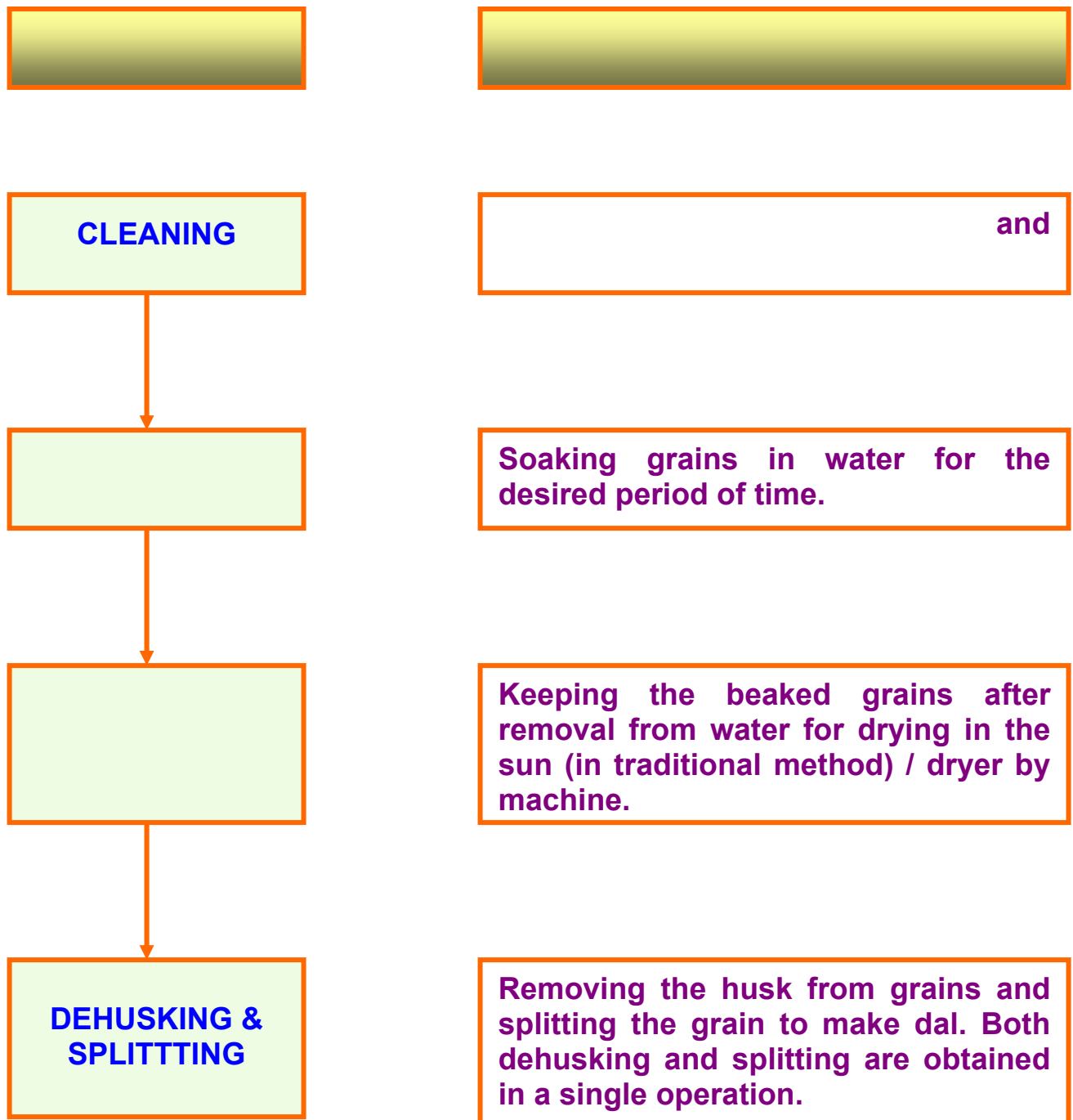
In the direction of modernization of Dal-mill industry, the Central Food Technological Research Institute (CFTRI), Mysore, has employed the 'conditioning technique' to loosen the husk without resorting to sun drying and oil and water application. This step has been mechanized with the introduction of conditioning units where the grains are incipiently roasted by a counter-current through flow technique and tempered in specially designed tempering bins where moisture is reduced to the desired levels. The husk, thus loosened and then removed in an abrasion-type dehusking machine wherein almost complete removal of the husk is achieved in a single operation. The scouring and breakage losses are minimized and the Dal obtained is 5-10 percent more than by using traditional method. The resultant product is also better in cooking quality. In India, pulse processing units are still running on old traditional system, while our major competitors—Canada, Australia, Germany, Spain are using modern sophisticated hi-tech technology for processing of pulses. On the strength of advanced modern pulses processing technology, features like pre-cleaning procedure, gravity cleaner, colour sortex, they are achieving more productivity, maintaining quality and giving special attention to modern packing system to attract buyers.

Value additon can increase the marketability and profitability by :

1. Processing and grading of Bengal gram.
2. Packaging and branding of Bengal gram.
3. Innovative uses of pulses.
4. Semi cooked, ready to eat pulses, parched and in other fast food development.

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CHART NO. 2



9.2 USES

The main uses of Bengal gram are as follows:

- ◆ **Dal** : Bengal gram is commonly used as *Dal*, consumed with rice and *Chapatís*.
- ◆ **Snack foods** : Prepared by heating, toasting (parching) or pulsing are traditional household items, consumed with cereals. It is also consumed as crushed gram or boiled gram.
- ◆ **Namkeen** : *Besan* prepared from gram is widely used in making *Pakorás*, *Kadhi*, *Namkins* and several other dishes.
- ◆ **Dough products** : Gram flour is used in baking various dough like products i.e. *Dhokla* etc.
- ◆ **Sweet and savoury products** : Bengal gram flour (*Besan*) is one of the chief ingredients alongwith *ghee* and sugar which is used to make many items of Indian confectionery.
- ◆ **Sattu** : Parched gram is grounded into flour called *Sattu*, which is very popular in the states of Bihar and Uttar Pradesh
- ◆ **Salad and sprouts** : It is widely appreciated as a health food, used in salad and as sprouts.
- ◆ **Chana saag** : The leaves are consumed as a nutritious green known as '*Chana Saag*'.
- ◆ **Medicinal** : The leaf extract, rich in malic acid, is sometimes used for medicinal purposes.
- ◆ **Animal feed** : The plants are also used for animal feed, where grazing vegetation is scarce. It is an important source of horse-feed ingredient.



10.0 DO'S AND DON'TS :

DO'S	DON'TS
<ul style="list-style-type: none"> ✓ Harvest the Bengal gram at Proper time of maturity. ✓ Harvest the crop when 80 percent of the pods are matured (turned yellow). ✓ Harvest during conducive weather condition. ✓ Store the Bengal gram during post-harvest period and sell it when the prices are higher in the market. ✓ Avail the benefit of centrally sponsored RAINBOW YOJANA for construction of rural godowns and store it to minimise losses. ✓ Market the Bengal gram through AGMARK grading to get fair prices in the market. ✓ Select the marketing channel to get higher share in marketing. ✓ Select the convenient and cheapest available alternatives. ✓ Pack the produce properly to protect the quality and quantity during transit and storage. ✓ Transport Bengal gram in bags to minimise the grain losses. ✓ Adopt improved processing techniques to get remunerative price. ✓ Threshing and winnowing on cemented (pucca) floor. 	<ul style="list-style-type: none"> ✗ Delay in harvesting which results in losses. ✗ Harvest Bengal gram before the pods are matured, which results in higher proportion of immature seeds, poor grain quality. ✗ Harvest during rain and bad weather condition i.e. during rain and bad weather. ✗ Sell the Bengal gram during post-harvest period when the prices are low in the market. ✗ Sell the Bengal gram in loose manner, which will cause qualitative and quantitative deterioration of Bengal gram. ✗ Market Bengal gram without grading, which will fetch lower prices. ✗ Adopt longer marketing channel, which reduces the producers' share. ✗ Use inconvenient mode of transportation, which results in more losses during transit and storage. ✗ Transport Bengal gram in bulk / loose, which causes more losses. ✗ Use traditional and conventional techniques of processing that will cause more quantitative and qualitative losses. ✗ Perform threshing and winnowing on Kutcha floor.

<p>✓ Get the market information regularly from Agmarknet website, newspapers, T.V., concerned APMC offices etc.</p> <p>✓ Avail the procedure of phyto-sanitary/sanitary measure during export.</p>	<p>✗ Market produce without collecting/verifying market information.</p> <p>✗ y phyto-sanitary/sanitary measures.</p>
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