

POST HARVEST PROFILE OF GREEN GRAM



**GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE AND COOPERATION)
DIRECTORATE OF MARKETING AND INSPECTION
BRANCH HEAD OFFICE
NAGPUR – 440001**

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POST-HARVEST PROFILE OF GREEN GRAM

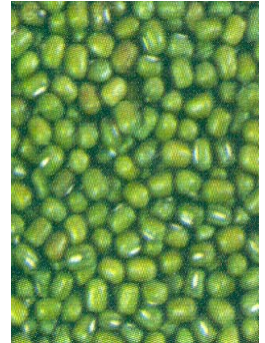
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1.0 INTRODUCTION

Green gram is one of the important pulse crop in India. It has been reported that Green gram has been cultivated in India since ancient times.. It is believed that Green gram is a native of India and Central Asia and grown in these regions since prehistoric times. It is widely cultivated throughout the Asia, including India, Pakistan, Bangladesh, Sri Lanka, Thailand, Laos, Cambodia, Vietnam, Indonesia, Malaysia, south China, and Formosa. In Africa and U.S.A. it is probably recent.



Green gram is a protein rich staple food. It contains about 25 percent protein, which is almost three times that of cereals. It supplies protein requirement of vegetarian population of the country. It is consumed in the form of split pulse as well as whole pulse, which is an essential supplement of cereal based diet. The moong dal Khichdi is recommended to the ill or aged person as it is easily digestible and considered as complete diet. Roti with Moong dal and Moong dal chawal is an important ingredient in the average Indian diet. The biological value improves greatly, when wheat or rice is combined with Green gram because of the complementary relationship of the essential amino acids. It is particularly rich in Leucine, Phenylalanine, Lysine, Valine, Isoleucine, etc.

In addition to being an important source of human food and animal feed, Green gram also plays an important role in sustaining soil fertility by improving soil physical properties and fixing atmospheric nitrogen. It is a drought resistant crop and suitable for dryland farming and predominantly used as an intercrop with other crops. The chemical composition of Green gram is given below.

Table No. 1
Chemical composition of Green gram (Dal)

Calorific value (cal./100g)	Crude protein (%)	Fat (%)	Carb-ohyd- rate (%)	Ca (mg/100g)	Fe (mg/100g)	P (mg/100g)	Vitamine(mg/100g)		
							B ₁	B ₂	Niacine
334	24.0	1.3	56.6	140	8.4	280	0.47	0.39	2.0

Source: Pulse Crops, by B.Baldev, S.Ramanujam and H.K.Jain, PP. 563.

1.1 Botanical description

Green gram [*Vigna radiata*] belongs to the family Leguminosae. It is a small herbaceous annual plant growing to a height of 30 to 120 centimeters with a slight tendency to twining in the upper branches. The central stems are more or less erect while side branches are semi-erect. The leaves are 5-10 cm long trifoliate with long petioles. Both the stems and leaves are covered with short hairs, generally shorter than those in urd (Black gram). The pods are linear, sometimes curved,

round and slender with short pubescence. The seeds are small and nearly globular. The colour of seed is usually green, but yellow brown or purple brown seeds also occur. The colour of cotyledons is yellow. The crop is fully self-fertile and self-pollinated.

2.0 PRODUCTION:

2.1 Major producing countries in the world

As has been mentioned earlier, Green gram is widely cultivated throughout the Asia, including India, Pakistan, Bangladesh, Sri Lanka, Thailand, Laos, Cambodia, Vietnam, Indonesia, Malaysia, south China, and Famosa. In Africa and U.S.A. it is probably recent especially in Oklahoma and has been introduced in parts of Australia. It is spreading in many other Countries.

2.2 Major Producing States In India

In India, Green gram is one of the most widely cultivated pulse crops. It is grown over on an area of 30084 hectares with a production of 10232 tonnes in 2000-2001. Area, Production and Yield of Green gram in India for the last three years are given as under

Table No. 2
Area, Production and Yield of Green gram
from 1998-1999 to 2000-2001 in the country

'000 tonnes
'000 hectare
Production:
Yeild:
'kg/ha

EAR	EA AR (('0 00 HECT.)	PRODU CTION (('000 TONNES)	YIELD (KG/HA)
998-1999	.54 30	11.39	373
999-2000	.05 29	10.77	371
000-2001	.08 30	10.23	340

Source: Directorate of Pulses Development, Bhopal

2.3 State-wise area, production and yield :

Maharashtra is the largest producer of Green gram accounting nearly for 23.05 percent of the total production followed by Karnataka (17.46 percent), Andhra Pradesh (17.39 percent), Bihar (14.69 percent), Rajasthan (7.50 percent)

and Tamil Nadu (7.25 percent). These five major states together contribute about 87 percent of total production and about 84 percent of total area in the country during the year 2000-2001. The productivity is highest in Kerla (824 kg/ha) followed by Punjab (624Kg/ha), West Bengal (580 kg/ha), Bihar (576 kg/ha) and Assam (459 kg/ha).

Area, production and yield of Green gram in major producing states of India during 1998-1999 to 2000-2001 are given under:

Table No. 3
Area, production and yield of Green gram in major producing states in India:

‘000 hectare

’000 tonnes

‘kg/ha

Area:

Production:

Yeild:

State	Area ('000 Hectares)			Production ('000 Tonnes)			Yield (kg/ha)		
	1998-1999	1999-2000	2000-2001	1998-1999	1999-2000	2000-2001	1998-1999	1999-2000	2000-2001
Andhra Pradesh	4.70	4.58	5.20	2.173	2.127	1.84	462	464	354
Assam	0.08	0.08	0.07	0.035	0.035	0.034	443	449	459
Bihar	1.87	1.84	2.70	1.04	1.012	1.554	557	551	576
Chhattisgarh	-	-	0.14	-	-	0.035	-	-	248
Gujarat	1.74	1.08	0.84	0.691	0.261	0.247	397	243	294
Hayyana	0.19	0.11	0.10	0.05	0.023	0.018	260	204	184
Himachal Pradesh	0.003	0.005	0.003	0.001	0.002	0.001	333	400	333
Jammu & Kashmir	0.02	0.01	0.02	0.012	0.01	0.009	2000	476	450
Karnataka	3.28	3.93	4.510	0.642	1.343	1.848	196	341	410
Kerala	0.04	0.03	0.02	0.028	0.023	0.014	700	756	824
Madhya Pradesh	1.13	1.10	0.90	0.368	0.335	0.228	325	306	253
Maharashtra	6.64	6.75	7.14	3.82	3.292	2.439	575	488	341
Orissa	2.23	1.91	1.47	0.437	0.39	0.293	196	204	199
Punjab	0.42	0.39	0.30	0.256	0.23	0.184	605	593	624
Rajasthan	5.64	4.15	4.58	0.585	0.412	0.793	104	99	173
Sikkim	-	-	-	-	-	-	-	-	-
Tamil Nadu	1.24	1.77	1.27	0.674	0.767	0.606	542	433	476
Tripura	0.01	0.01	0.02	0.006	0.008	0.01	462	800	455
Uttar Pradesh	1.10	1.09	0.82	0.474	0.576	0.326	430	530	400
West Bengal	0.13	0.20	0.11	0.05	0.09	0.065	391	459	580
Pandicherry	0.03	0.03	0.03	0.008	0.013	0.014	320	520	560
All India	30.50	29.05	30.24	11.35	10.94	10.58	372	376	349

Source: Directorate of Pulses Development, Bhopal.

2.4 State-wise major commercial varieties:

Table No. 4
Improved varieties of Green gram grown in different states in India

SL. No.	State	Name of variety	Kharif or Rabi	Duration of crop (in days)
1	Andhra Pradesh	ML-267	Kharif and Rabi	70-75
		LGG-450	Kharif	65-70
		LGG-460	Kharif	65-70
		LGG-407	Kharif	65-70
		WGG-37	Kharif and Rabi	65-70
		Pusa-105	Kharif and Rabi	70-75
2	Andaman & Nicobar	K-851	Rabi	60-65
3	Gujarat	K-851	Kharif	120
		GM-4	Kharif	120
4	Jharkhand	Pant G 114	Rabi	135-145
		H-208	Rabi	135-145
		Radhe	Rabi	135-145
		C-235	Rabi	135-145
		BG-256	Rabi	135-145
		BR-77	Rabi	135-145
5	Karnataka	K-158	Kharif and Rabi	85-90
		PS-16	Kharif and Rabi	75-80
		China Moong	Kharif and Rabi	85-90
		S-4	Kharif and Rabi	85-90
		Pusa Baisaki	Kharif and Rabi	85-90
6	Maharashtra	Kopargaon	Kharif	70-75
		S-8	Kharif	60-65
		T-44	Kharif	60-65
		BM-4	Kharif	60-65
		Chamki	Kharif	70-80
		Mughlai	Kharif	60-70
		Fule M-2	Kharif	65-70
7	Orissa	Local	Kharif	70-85
		Tarm-1	summer and Rabi	85
		Pusa 9072	summer and Rabi	65-75
		LGG-407	summer and Rabi	70-75
		Pusa Baisakhi	Kharif	75

		K-851	Kharif	75
		ML-5	Kharif	85
		ML-131	Kharif	65
		Sujata	summer and Pre Rabi	70
		Dhauri	summer and Pre Rabi	65
		PDM-54	summer and Pre Rabi	65
		PDM-11	summer and Pre Rabi	65
		Pant-2	Kharif & Summer	65
8	Tamil Nadu	ADT2,ADT3, Vamban, Paiur- 1, K-1, URM(GGI)	Kharif and Rabi	65 to 95 days
		CO4,CO5, VBN(GG2) CO6	Kharif , Rabi And summer	65 to 95 days
9	Uttar Pradesh	Pant Moong-1	Kharif, Summer	70-75
		Type-44	Kharif, Summer	60-65
		Pant Moong-2	Kharif, Summer	65-70
		Pant Moong-3	Kharif	75-85
		Narendra Moong-1	Kharif, Summer	65-70
		PDM-54	Kharif, Summer	70-75
		Pant Moong-4	Kharif	65-70
		PDM11	Kharif, Summer	65-70
		Malvia Jyoti	Kharif, Summer	65-70
		Samrat	Kharif, Summer	60-65
		Malika Janchetna	Kharif	65-70
		Malika Janpriya	Kharif and Summer	65-70
10	West Bengal	B-77	Rabi	95-110
		B-108	Rabi	95-110
		T-163	Kharif	100-115
		T-44	Kharif	100-115

Source: Regional offices / Survey reports of D.M.I.

3.0 POST-HARVEST MANAGEMENT:

3.1 POST-HARVEST LOSSES

There is a sizeable quantitative and qualitative loss of pulses during different post-harvest operations like threshing, winnowing, transportation, processing and storage. Hence, it is appropriate to give due emphasis to reduce qualitative as well as quantitative losses of pulses during post-harvest operations. It has been reported that about 2.38 percent losses occurred during post harvest operations at the producers' level. The details are as under:

Table No. 5
Estimated post-harvest losses of Green gram at producers level

Sl. No.	Stages	Production loss (Percent)
1	Losses in transport from field to threshing floor	0.67
2	Losses in threshing	0.63
3	Losses in winnowing	0.61
4	Losses in transport from threshing floor to storage	0.19
5	Losses in storage at producers level	0.29
Total losses at producers level		2.38

Source: Report on Marketable Surplus and post harvest losses of Green gram in India-2002,DMI

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

(i) Threshing and Winnowing:

It has been reported that during threshing about 0.63 percent losses and 0.61 percent losses in winnowing are occurred. In order to reduce the losses, threshing and winnowing operations are required to be completed within a short period through improved equipments on the pucca platform.

(ii) Transport Losses:

During transportation, it has been observed that 0.67 percent losses are occurred in transporting the produce from the field to threshing floor. Losses to the tune of 0.19 percent for transporting the produce from threshing floor to storage. Efficient and quick transportation supported by good packaging material is necessary to reduce the losses.

(iii) Processing:

Due to use of old and outdated methods in processing, the loss at this stage has been reported to be upto 1 percent. To reduce the milling losses and to increase the output, improved dal milling method developed by C.F.T.R.I, Mysore should be adopted.

(iv) Storage:

Due to improper and inefficient methods of storage, the loss about 7.5 percent is estimated during storage. Quantitative losses mainly results from spoilage, driage or portion of produce, infestation by insects, rodents or birds. Improved scientific storage facilities should be adopted to reduce the losses considerably.

Following preventive measures should be adopted to avoid post harvest losses,

- © Harvest at proper stage of maturity to reduce losses.
- © Use proper method of harvesting.
- © Adopt modern mechanical methods, to avoid the losses in threshing and winnowing
- © Use improved technique of processing.
- © Adopt cleaning and grading for remunerative prices inter-alia to avoid financial loss.
- © Use good packaging materials for storage and in transport i.e. B-Twill Jute bags or HDPE bags.
- © Adopt proper technique in storage.
- © Apply pest control measures during storage.
- © Proper handling i.e. (loading and unloading) of Green gram with good transportation facilities at farm and market level reduces losses.
- © Avoid use of hooks.

3.2 HARVESTING CARE:

During harvesting, proper care should be taken to minimize quantitative and qualitative losses.

Following care should be taken during harvesting:

- * Harvesting should be done at proper maturity to ensure optimum grain quality and consumer acceptance.
- * Harvesting before the maturity of crop, usually result in lower yields, higher proportion of immature seeds, poor grain quality and more chances of infestation during storage.
- * Delay in harvesting of Green gram, results in shattering of pods and other losses caused by birds, rats, insects etc.
- * The best time to harvest the crop, when large i.e. 80 percent of the pods are fully matured.

- * Avoid harvesting during adverse weather condition i.e. rains and overcast weather.
- * Use right kind of harvest equipment (sickle).
- * Avoid pest infestation prior to harvesting.
- * The harvested bundles should be kept in one direction in order to ascertain efficient threshing.
- * Keep the harvested bundles for drying in the field after cutting on the threshing floor, if weather permits.
- * The harvested produce should be stacked in a dry, clean place in cubical way to facilitate circulation of the air around.
- * Rogue out the admixtures prior to harvesting.
- * Keep the harvested Green gram separately from one variety to another to get true to type variety (grains).

3.3 GRADING:

Grading means the sorting of the homogenous lots of the produce according to the fixed grade standard. Produce is graded in accordance with various quality factors.

3.3.1 Benefits of grading:

- i) The grading is beneficial to the farmers, traders as well as to the consumers.**
- ii) Grading of the produce before sale enables farmers to get better price for their produce.**
- iii) Grading helps the consumers to get standard quality produce at fair price.**
- iv) It facilitates the consumer to compare the prices of different qualities of a produce in the market.**
- v) It assures the quality of the produce and also reduces the cost of the marketing and transportation.**

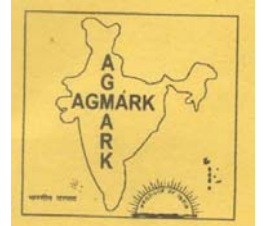
In the market, the sale is generally done on the basis of visual inspection of available sample and with local commercial name. Buyers offer price on the

visual examination of whole lot considering the quality factors like size of the grains, colour of the grains, moisture content, refraction and admixture with other varieties. In order to ensure the remunerative price to the farmers as well as to gain the confidence of consumer, the Green gram should be graded systematically.

3.3.2 GRADE SPECIFICATIONS

1) Grading under AGMARK:

The Agricultural Produce (Grading and Marking) Act, 1937 was enacted to maintain the quality of agricultural produce in India. According to this Act, specifications have been drawn up for Green gram for various quality factors.



The grade standards specified for Green gram whole, split and split (unhusked), drawn by Directorate of Marketing and Inspection, are given below.

I) Grade specification of quality of Green

gram (Moong Whole)

A) General Characteristics:

Green gram (Moong whole) shall –

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



B) Special Characteristics:

Grade Designation	Maximum limits of tolerance (per cent by weight)					Weevilled grains per cent by count
	Moisture	Foreign matter		Other edible grains	Damaged Grains	
		Organic	Inorganic			
1	2	3	4	5	6	7
Special	10.0	0.10	Nil	0.1	0.5	2.0
Standard	12.0	0.50	0.10	0.5	2.0	4.0
General	14.0	0.75	0.25	3.0	5.0	6.0

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

II} Grade specification of quality of Green gram split (Moong split husked)

A) General Characteristics:

The **Green gram** split (Moong husked) pulse shall:

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

B) Special Characteristics:

Maximum limits of tolerance (per cent by weight)

Grade Designation	Moisture	Foreign matter		Other edible grains	Damage to Grains	Broken grains	Weevilled grains per cent by count
		Organic	Inorganic				
1	2	3	4	5	6	7	8
Special	10.0	0.10	Nil	0.1	0.5	1.0	1.0
Standard	12.0	0.50	0.10	0.5	2.0	3.0	2.0
General	14.0	0.75	0.25	3.0	5.0	6.0	3.0

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

III} Grade specification of quality of Green gram Split (Moong split Unhusked)

A) General Characteristics:

The Green gram split (unhusked) pulse shall:

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

B) Special Characteristics:

Maximum limits of tolerance (per cent by weight)							
Grade Designation	Moisture	<u>Foreign matter</u>		Other edible grains	Damaged Grains	Broken and Fragments grains	Weevilled grains per cent by count
		Organic	Inorganic				
1	2	3	4	5	6	7	8
Special	10.0	0.10	Nil	0.1	0.5	0.5	1.0
Standard	12.0	0.50	0.10	0.5	2.0	2.0	2.0
General	14.0	0.75	0.25	3.0	5.0	5.0	3.0

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

Source: AGMARK STANDARDS for FOODGRAINS AND ALLIED PRODUCTS Under The Agricultural Produce (Grading and Marking), Act, 1937 Rules made upto 1st June, 2005, (Sixth Edition) Volume- VII and website of the Directorate of Marketing and Inspection "www.agmarknet.nic.in"

ii) Grade specifications of National Agricultural Cooperative Federation (NAFED):

NAFED is the nodal agency of Government of India for procuring Green gram in different states under the Price Support Scheme (PSS). The concerned State Co-operative Marketing Federations are the procuring agents for NAFED.

Organization has prescribed only one grade i.e. Fair Average Quality (FAQ) for procurement of pulses including Green gram under the Price Support Scheme. All the purchases under the PSS by NAFED are made in accordance with the prescribed grade / specifications which are given below.

Grade Specifications of Green gram during 2003-2004 marketing season of NAFED

A) General Requirements:

i) Pulses shall have reasonably uniform size, shape and colour.

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

B) Special Requirements:

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

C) Note: -

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

Source: Action Plan and Operational arrangements for Procurement of Oilseeds and Pulses under Price Support Scheme in Kharif Season 2003, NAFED, New Delhi.

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

A.18.06.07-MOONG WHOLE:

Moong whole shall consist of seeds of Green gram (*Phaseolous aureus* Roxb., *Phaseolous radiatus* (Roxb.)). It shall be sound, dry, sweet, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely: -

- | | |
|------------------------------------|---|
| (i) Moisture – | Not more than 14 per cent by weight (obtained by heating the pulverised grains at 130°C - 133°C for two hours). |
| (ii) Foreign matter- | (Extraneous matter) – Not more than 1 per cent by weight of which not more than 0.25 per cent by weight shall be mineral matter and not more than 0.10 per cent by weight shall be impurities of animal origin. |
| (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 5 per cent by count |
| (vi) Uric acid – | Not more than 100 mg per kilogram |
| (vii) Aflatoxin – | Not more than 30 micrograms per kilogram. |

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 9 per cent by weight.

A.18.06.10 – SPLIT PULSE (DAL):

Dal Moong shall consist of split seeds of pulse (*Phaseolous aureus* Roxb., *Phaseolous radiatus* Roxb.)..]. It shall be sound, dry, sweet, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely: -

- | | |
|------------------------------------|---|
| (i) Moisture – | Not more than 14 per cent by weight (obtained by heating the pulverised pulses at 130°C - 133°C for two hours). |
| (ii) Foreign matter -- | (Extraneous matter) – Not more than 1 per cent by weight of which not more than 0.25 per cent by weight shall be mineral matter and not more than 0.10 per cent by weight shall be impurities of animal origin. |
| (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 3 per cent by count
- (vi) **Uric acid** – Not more than 100 mg per kilogram
- (vii) **Aflatoxin** – Not more than 30 micrograms per kilogram.

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 8 per cent by weight.

Source: The Prevention of Food Adulteration Act, 1954 alongwith The Prevention of Food Adulteration Rules, 1955 as amended by The Prevention of Food Adulteration (Tenth Amendment) Rules,2002 together with Commodity Index.

3.3.3 ADULTERANTS AND TOXINS

Adulterants:

Normally adulteration / contamination in agricultural produce occurs either intentionally for financial gain or, incidentally due to carelessness and lack of proper hygienic condition of processing, packing, storing, transportation and marketing. The adulterants cause different food borne diseases. In Green gram dal, following adulterants are commonly found:

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

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

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

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

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

Table No. 6
Adulterants used in Green gram dals (split) and their detection tests

Adulterants	Detection Test
1.Khesari dal (Botanical Name- <i>Lathyrus sativus</i>)	Add 50 ml. of diluted HCl acid to a small quantity of dal and keep on simmering water for about 15 minutes. Development of pink colour indicates the presence of khesari dal.
2.Metanil Yellow	Add concentrated HCl to small quantity of dal in a little amount of water. Immediate development of pink colour indicates the presence of metanil yellow and similar colour dyes.
3.Lead Chromate	Shake 5 grams of Green gram dal with 5 ml. of water and a few drops of HCl. Pink colour indicates presence of lead chromate.

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

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

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

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

Prevention and control of Aflatoxins:

- ◆ Store the Green gram after drying upto safe moisture level i.e. within the prescribed range.

- ◆ Prevent the growth of aflatoxin by proper drying of grains.
- ◆ Use proper and scientific storage.
- ◆ Prevent insect infestation by chemicals to avoid mould formation.
- ◆ Separate the infected grains from sound grains to avoid aflatoxin contamination.

3.3.4 GRADING AT PRODUCERS' LEVEL AND UNDER AGMARK

There is an increasing recognition to the fact that producers need to be assisted in grading their produce before sale so that farmers may get better price. For securing adequate returns to the producer/seller, the scheme of "Grading at Producers' Level" was introduced in 1962-63 by Directorate of Marketing and Inspection. The main objective of this scheme is to subject the produce to simple test and assign a grade before it is offered for sale. After grading, the producers get prices commensurate with the quality of the produce. The programme is being implemented by the States/Union Territories. Up to 31-03-2005, 1968 grading units have been set up in the country.

Benefits:

1. Grading of the produce at producers' level enable farmers to get higher price for their produce as well as it helps the consumers to get standard quality produce at fair price.
2. Grading not only facilitates the dissemination of prices and market information but also assist the machinery of distribution at all stages.

Table No. 7
Progress of grading during the year 2002-2003 to 2004-2005

Year	At Producers' Level		Under Agmark*	
	Quantity (in Tonnes)	Value (in Rs.Lakh)	Quantity (in Tonnes)	Value (in Rs.Lakh)
2002- 2003	42549**	6452.93**	11708.38*	4964.16*
2003-2004	27793**	5056.14**	12618.42*	3638.67*
2004-2005	17262**	2945.08**	15733.65*	4813.12*

**Quantity of Green gram

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

Source: Directorate of Marketing and Inspection, Agmark grading Statistics, Faridabad.

During the year 2002-2003, about 42549 tonnes of Green gram valued at Rs. 6452.93 lakh was graded at producers' level, highest in last three years as against 17262 tonnes valued at Rs.2945.08 lakh in the year 2004-2005.

Where as, 11708 tonnes of pulses valued worth Rs. 4964.16 lakhs were graded under Agmark during the year 2002-2003 for domestic consumption as against 15733.65 tonnes valued at Rs. 4813.12 lakhs during the year 2004-2005.

3.3.5 State-wise Pulses Graded Under Agmark During 2004-2005

Sl.No.	State	Quantity (in Tonnes)	Value (in Rs.Lakh)	Percentage
1	Andhra Pradesh	2104.00	472.92	13.37
2	Delhi	182.06	54.22	1.16
3	Gujarat	1476.04	368.99	9.38
4	Maharashtra	441.95	130.51	2.81
5	Tamil Nadu	11529.60	3786.48	73.28
	Total	15733.65	4813.12	100.00

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

Source: Directorate of Marketing and Inspection, Faridabad.

During 2004-2005, 11529.60 tonnes, valued Rs. 3786.48 Lakhs (73.28 percent) of pulses, were graded in Tamil Nadu, under Agmark and was maximum in the country.

3.4 PACKAGING

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

Packaging materials

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

- 1) Jute bags:** Gunny bags made up of jute are widely used by farmers and traders. As per NAFED, packing of Green gram should be made in New B Twill (Jute) gunny bags in 100 kg net.

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

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

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

(5) Cloth bags: Cloth bags are also used in packing of Green gram.

The good packaging material must possess the following qualities:

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

Method of packing :

- (i) Pulses shall be packed in gunny bags/jute bags, poly woven bags, poly pouches, cloth bags or other suitable packages which shall be clean, sound, and free from insect, fungal infestation and the packing material shall be as permitted under the Prevention of food adulteration rules, 1955.
- (ii) Pulses shall be packed in containers, which safeguard the hygienic, nutritional and organoleptic qualities of the products.
- (iii) The containers, including packaging material, shall be made of substances, which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.
- (iv) The net weight of the Pulses in a package shall be as per the provision prescribed under the packaged commodities rules, 1977.
- (v) Each package shall contain Pulses of the same type and of the same grade designation.
- (vi) Each package shall be securely closed and sealed and marked.

3.5 TRANSPORTATION

The transportation of Green gram is mainly done by head loads, bullock or camel cart, tractor-trolleys, trucks, railways and ships depending upon the availability of transportation means, quantity of the produce and the stage of marketing. The most common means of transportation used are given in Table No.8.



Table No. 8
Means of transportation used at different stages of marketing

Stage of Marketing	Agencies	Means of Transport Used
➔ From threshing floor to the village market or primary market.	Farmers	By head load, pack animal, bullock or camel cart and tractor trolley.
➔ From primary market to secondary whole sale market and miller	Traders / Millers	By trucks, railways.
➔ From wholesale markets and miller to retailer	Millers / Retailers	By trucks, railways, mini trucks, tractor trolley.
➔ From retailer to consumer	Consumers	By hand, bicycle, rickshaw.
➔ For Export and Import	Exporters and Importers	By railways and ship

Availability of cheaper and convenient modes of Transport:

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

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

- a) **Head Load** b) **Pack Animals** c) **Bullock cart**
d) **Tractors Trolley** e) **Trucks**

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

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

- **Selection of Mode of Transportation:**

Following points should be considered for the selection of mode of transportation:

- The mode of transportation should be cheaper among available alternatives.
- It should be convenient during loading and unloading of Green gram.
- It must protect Green gram during transportation from adverse weather conditions.
- It should be safe from pilferage etc.
- It must deliver Green gram to consignee in stipulated period as the price changes every day.
- It should be easily available particularly during post harvest period.
- Distances should be considered.

3.6 STORAGE

The storage is an important aspect of post harvest technology because Green gram is seasonally produced (mainly during kharif season) but consumed throughout the year. Therefore, the supply of Green gram has to be maintained by proper storage throughout the year. Storage protects the quality of grains from deterioration and helps in stabilization of prices by regularising demand and supply. The storage losses caused by insects, rodents and microorganisms are more as compared to transportation, handling, processing. Lack of storage facilities at village Laval, forces the farmer to sell their produce, at low price, immediately after harvest. It is essential that during storage, Green gram should remain in good condition and not undergo any deterioration due to fungal and insect infection or, attack by rodents.



Requirements for safe storage:

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

* Selection of site (location):

The storage structure should be located on a raised well-drained place. It should be easily accessible. The storage structure should be protected from humidity, excessive heat, direct sunrays, insect and rodents. Storage godown should be constructed on a well-built platform at a height of not less than 1 foot from ground level to prevent dampness.

* Selection of storage structure:

The storage structure should be selected according to the quantity of Green gram to be stored.

- * **Cleaning of storage structures:**
The storage structures should be properly cleaned before storing Green gram. There should be no left over grains, cracks, holes and crevices in structure, which may be harbour of insects. Before storage, the storage structure should be fumigated.
- * **Cleaning and Drying**
Before storage, the Green gram should be properly cleaned and dried. Grains should be free from foreign matters and excessive moisture to avoid quality deterioration and pest attack.
- * **Cleaning of bags:**
As far as possible, new gunny bags should be used. The old gunny bags should be properly cleaned, dried and fumigated before use.
- * **Separate storage of new and old stock:**
To check infestation and to maintain hygienic condition of godown, the new and old stock should be stored separately.
- * **Cleaning of vehicles:**
The vehicles used for transporting Green gram should be properly cleaned with phenyl.
- * **Use of dunnage:**
Dunnage should be used before stacking bags to avoid absorption of moisture from floor. Bags should be kept on wooden crates or bamboo mats preferably along with a cover of polythene sheet.
- * **Proper aeration:**
There should be proper aeration during clear weather condition but care should be taken to avoid aeration during rainy season.
- * **Regular inspection:**
Regular inspection of stored Green gram should be carried out to check infestation. It is necessary to maintain proper health and hygiene of the stock.

3.6.1 Major stored grain pests and it's control measures

Post-harvest protection of pulses assumes a greater importance in overall crop protection system. All the efforts put in while raising the crop would go in vain, if adequate measures are not adopted during storage. The produce is to be essentially stored for longer or shorter duration, either for consumption or as seed for sowing during the next cropping season.

The various factors responsible for deteriorate of grains and seeds stored can be broadly classify under two categories.

1. Biotic factors


Insect
Rodents
Birds
Fungi
Mites
Bacteria

2. Abiotic factors

Moisture content/Relative humidity
Temperature

Under varying combinations of biotic and abiotic factors, the grains and seeds get deteriorated resulting in insect infestation, loss in weight, quality, germinability, discolouration of the commodity, odour, unacceptability in the trade and finally leading to huge monetary losses.



Major store grain pests:

	Figure o f P e s t	Nature of Damage
<p>1. Pulse beetle</p> <p><i>allosobruchus</i> <i>sps.</i></p>	 <p>B e e t l e</p>	<p>i) The larvae bore into pulses and feed the entire content of the seed leaving only the shell (seed coat) behind.</p> <p>ii) Adults cut out circular holes in seeds.</p> <p>iii) Sometimes these insects begin their infestation, when the pods are in the ripening stage in the field, and are subsequently carried with the seeds into the store after harvest.</p> <p>iv) These pests do not attack split pulses.</p>

2.Khapra beetle





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- i) Larvae are one of the most serious stored seed pest but the beetle itself does not damages.
 - ii) The larvae starts feeding from embryo point and later consume the entire kernel/seed which makes the grain hollow and only the husk remains.
 - iii) Infested seeds are full with frass, cast skins of larvae and excreta, which results in deterioration of quality of pulses.
 - 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>canthoscelides</i></p>		<ul style="list-style-type: none"> i) Infestation is induced in the field on ripening of crop when pods are split. ii) Larvae feed on the seed by boring.
<p>4. Rice moth</p> <p><i>Corcyra cephalonica</i> (Stainton)</p>	 <p style="text-align: center;">o t h</p>	<ul style="list-style-type: none"> i) Larvae contaminate the seeds with webbing, excreta and hairs. ii) Whole seeds are bound into lumps.



i) Beetle and larvae both feed on broken and damaged seeds produced by milling and handling or attacked damaged seeds of other insects.

*Tribolium
confusum
J.du V.*

		<ul style="list-style-type: none"> i) Rodents feed whole seeds and split pulses. ii) They also cause mechanical damage to gunny bags and other storage structures of pulses by cutting, which results in spilling of grains. iii) They spill more seeds than they eat. iv) Rodents also contaminate pulses with hair, urine and feces, which deteriorate the quality and cause many diseases, like cholera, food poisoning, ringworm, rabies etc.
		<p>Temperature is an important abiotic factor governing the condition of pulses in store. All the insects do breed within a limit of minimum and maximum temperature. The optimum temperature for breeding of most of the insects in storage, ranges between 27°C - 37°C.</p>

3.6.2 Insect Pest Management

3.6.2.1 Use of Chemicals

This is one of the important components of Insect Pest Management in grain and seed storage but warrants judicious use. In view of the problem of residue and health hazards involvement, the use of chemicals for direct mixing with the grain meant for consumption, is not advised. The use is restricted to prophylactic treatment or mixing

in case of seeds. The use of BHC 5% or pyrethrum 0.06% dust @ 25 gm/sq.meter area has been in practice for treatment of the surface area of the stacks with repeated application after interval of 3 weeks as prophylactic treatment. Spray of BHC wettable powder, pyrethrum E.C. with interval of 3 weeks for repeat performance may be carried, the details of which are as follows.

BHC WP (50%)	3	L/100	sq.meter	area
Dilution 1:25				
Pyrethrum (2.5 E.C.)	3	L/100	sq.meter	area
Dilution 1:300				
Malathion (50 E.C.)	3	L/100	sq.meter	area
Dilution 1:300				

For preservation of seeds, malathion which has low mammalian toxicity can effectively check insect infestation when applied @ 10 ppm. However, organophosphates viz. fenitrothion, pirimiphos methyl, bromophos, idofenfos, etrimphos may be used as seed protectants.

The most recent in use is treatment of bags with deltamethrin W.P. (2.5%) @ 30 mg/per sq.meter surface area. It has been found to be very promising prophylactic treatment. The problem of development of resistance in insects to some of the insecticides due to indiscriminate use has forced to search for alternative eco-friendly measures of grain protection.

3.6.2.2 Fumigation

For the control of insect and pests the process of fumigation continues to play an important role in protection of stored grains and seeds and is considered to be one of the most efficient methods. A fumigant may be defined as "A chemical which at required temperature and pressure can exist in gaseous state in sufficient concentration to be lethal to a given pest organism". In the strict sense of definition, a fumigant acts in gaseous form. It is generally felt that fumigation is resorted to when insect infestation has taken place but the fact is that it also acts as preventive device to get rid of the infestation in the empty godown or storage structure prior loading. Utmost care is needed while selecting a fumigant for use against stored seeds. The following points need to be given due consideration:

1. The chemical may remain as undesirable residue.
2. A physiologically active compound may impair the viability of seeds.
3. Effect of repeated fumigation on the viability of seeds.

3.6.2.3 Altered/ Modified Atmosphere

Inert gases like carbon dioxide, nitrogen, carbon monoxide could be used. This method of grain protection with atmospheric conditions unfavorable for the insect development is not new one and has been used in the past without knowing, how it works, in underground pits in the soil. Purging air-tight containers with carbon dioxide increased to 70 per cent or above or reducing oxygen below 2 per cent, is practiced for disinfection of stored grains. However, the process of altering the atmosphere has its limitations.

3.6.2.4 Use of Plant Products

In search of safe, biodegradable substitute for chemical insecticides, large number of plant products with antifeedant, and deterrent or repellent quality have been used with promising results. The practice of adding a small quantity of vegetable oil or mineral oil to grains of legumes to protect them from insects is common. Vegetable oils obtained from ground nut, mustard, rape, soybean, cottonseed, neem, palm, sesame, safflower, rice bran, etc have been found effective. The treatment of oil results in prevention of egg laying, reduced fecundity, adult mortality, reduction in egg hatching, interference with larval development and finally reduces adult progeny. Mixing of local plants viz. neem kernel powder, custard apple seed powder, crushed dried fruits of black pepper have been found to be effective.

3.6.2.5 Good Storage Practices

Post harvest system is a true example of insect pest management where one single method of protection will not suffice the purpose of achieving the desired goal. There is strong need to combine various processes. Insect pest management in storage of grains can be divided under two heads. A) Preventive measures. 2). Curative measures.

1) Preventive Measures

Drying of Grains

Moisture content less than 9 percent has been found to be safe and does not permit insects to breed. The grains may be dried to the desired moisture content by exposing them to solar radiation, in thin layers on a cemented floor or solar absorbance bed developed at Indian Agriculture Research Institute, New Delhi. Mechanical drier provided with hot air blowing process could also dry the grains on larger scale.

Maintenance of Hygiene

Dirt, rubbish, webbing or refuse material of the previous leftover grain should be swept from the store. Cracks and crevices, holes in the wall, floor or ceiling should be scrapped off and replaced by new one. Rat holes should be closed and store be white washed. Turn inside out and expose to sun or fumigate, if old bags are being reused to avoid any insect presence.

Use of Improved Storage Structures

Properly dried grains should be stored in improved storage structures where ecological conditions viz. temperature, moisture, oxygen and carbon dioxide can be manipulated to suit the safe storage conditions.

Prophylactic Treatment

Disinfestation of the godown be carried with chemical spray, dust or fumigation. Surface treatment of the bags with suitable persistent insecticide. Mixing of insecticide and fungicides with the seeds.

Curative Measures

It is advisable to treat the seeds with insecticide if the insect infestation has taken place for lapses and in case of grains meant for consumption, be exposed to sun or fumigated with appropriate fumigant.

3.6.3 STORAGE STRUCTURES

Traditional storage structures: Some common structures are:

- ◆ **Mud bins or Kothi:** Cylindrical in shape and are made up of clay mixture with straw and cow dung or mud and bricks.
- ◆ **Metal Drums:** Cylindrical in shape and are made up of iron sheets.
- ◆ **Thekka:** Rectangular in shape and are made up of gunny or, cotton wound around wooden support.
- ◆ **Gunny Bags:** Gunny bags are made up of jute.

Improved storage structures:

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

i) Improved bins:

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

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

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

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

3.6.4 STORAGE FACILITIES

Storage of the Green gram is performed at different level i.e. at Producers' level, at Rural level, at Mandi level, at CWC and SWC level and at Co-operative level.

i) At Producer's Level:

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

ii) At Rural Level:

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godown Scheme, in collaboration with NABARD and NCDC, to construct scientific storage godown with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. Initially scheme was approved for two years i.e. 2001 to 2003. Since there had been huge response to the scheme, it was extended up to 30.9.2004. Beyond this date the scheme has been approved for continuation up to 31.3.2007 with some modifications. Under the pre-revised scheme, back ended subsidy @ 25% of capital cost of the project has been provided. In case of NE States, hilly areas and SC/ ST entrepreneurs, subsidy has been provided @ 33.33% of the capital cost of the project. Under the revised scheme, subsidy @ 25% will be given to all categories of farmers, Agriculture graduates, cooperatives & CWC/ SWCs. All other categories of individuals companies and corporations would be given subsidy @ 15% of the project cost. In case of NE States/hilly areas & SC/ST entrepreneurs and their cooperatives, subsidy shall be 33.33%.

Though a total of 90 lakh tonne capacity of Rural Godown was targeted during 10th Plan period, the same has now been revised upwards to 140 lakh tonne on the target of 90 lakh tonne capacity was already achieved during 2004-05 itself. Increased requirement of Rural Storage has been necessitated on account of increase in the production of food grain and its continuing increasing trend. During last three years 9483 storage projects having a capacity of 141.83 lakh tonne have already been sanctioned under the scheme by now. The capacity-wise break-up of godown are given below:-

Capacity-wise breakup of sanctioned project

100-500 tonne	501-1000 tonne	1001-5000 tonne	5000-10000 tonne	Total
---------------	----------------	-----------------	------------------	-------

5602	1224	2221	436	9483
------	------	------	-----	------

Out of 9483 godowns sanctioned so far, 335 godowns are in public sector, 2376 are in farmers cooperative, 5050 godowns belong to farmers and 1722 godowns are owned by others like traders, companies, etc.

The year-wise physical and financial performance under the scheme has been as under: -

	Financial (Rs. in crores)			
	Target	Achievement	R.E.	Expenditure
2001-03	20	67.35	84.86	84.86
2003-04	27	37.57	80.00	80.00
2004-05	38	36.91	100.00	100.00
2005-06	26	--	80.00	--
2006-07	10	--	35.00	--
Total	121	141.83	369.86	264.86

The scheme has now been made farmers' friendly by allowing subsidy for smaller godowns of 50 MT size in general and of 25 in hilly areas. Five lakh tones capacity to be created is reserved for small farmers and the target of construction in the Tenth Plan is enhanced from 90 to 140 lakh tonne.

Aims of the scheme: -

- i) To prevent distress sale of food grains and other agricultural commodities immediately after harvest.
- ii) To reduce quantitative-cum-qualitative losses due to storage in sub-standard godowns.
- iii) To reduce pressure on transport system during the post-harvest period.
- iv) To help the farmers in getting pledge loans against the stored produce.

iii) At Mandi level:

Most of the States and Union Territories have enacted Agricultural Produce Market (Regulation) Act. The reduction of loss of produce was aimed in the scheme of regulated market. The regulated markets developed modern market yard with necessary infrastructural facilities. The APMCs have constructed auction platforms for protecting the produce from rains and dampness. Godowns have been constructed so that the agricultural produce brought into the market should be stored safely by market committees. The produce is auctioned, weighed in the presence of producer/seller at the time of keeping the produce in the godown after grading and receipt is issued indicating the quality and weight of produce to be stored. The receipt is issued by the licensed general commission agents or brokers depending upon the case. The CWC, SWC and Co-operative societies have also constructed godown in the market yards.

In most of the secondary and terminal regulated markets, central and state warehousing corporations also provide scientific storage facilities at prescribed storage charge and issue warehousing receipt against pledge of

produce, which is a negotiable document for obtaining finance from the Scheduled Banks.

iv) At CWC & SWC level:

a) Central Warehousing Corporation (CWC):

CWC was established during 1957. It is one of the biggest public warehouse operators in the country. In March 2005, CWC was operating 484 warehouses all over the country under 16 regions, covering total 229 districts, with a total storage capacity of 101.90 lakhs tonnes. State-wise storage capacity with CWC as on 31-03-2005 is given below.

Table No.9
State-wise storage capacity with CWC as on 31-03-2005.

Name of State	No of CWC	Total Capacity (Tonnes)
1.Andhra Pradesh	50	14.40
2.Assam	6	0.64
3.Bihar	13	0.97
4.Chhattisgarh	10	2.37
5.Delhi	11	0.18
6.Gujarat	29	6.23
7.Haryana	25	4.40
8.Karnataka	32	4.54
9.Kerala	9	1.30
10.Madhya Pradesh	31	6.75
11.Maharashtra	57	15.64
12.Orissa	11	1.88
13.Punjab	30	7.74
14.Rajasthan	27	3.75
15.Tamil Nadu	26	8.02
16.Uttaranchal	7	0.75
17.Uttar Pradesh	50	11.56
18.West Bengal	40	6.86
19. Others	20	3.92
Total	484	101.90

Source: Annual Report 2004-2005, Central Warehousing Corporation, New Delhi.

Apart from storage, CWC also offers services in the area of clearing and forwarding, handling and transportation, procurement and distribution, disinfestation services, fumigation services and other ancillary activities i.e. safety and security, insurance, standardization and documentation. The CWC has also introduced a scheme, called the Farmers Extension Service at selected centres to educate farmers about the benefits of a scientific storage and use of public warehouses.

b) State Warehousing Corporation (SWCs):

Different states have set up their own warehouses in the country. The areas of operation of the SWC are district place of the state. The total share capital of the state warehousing corporations is contributed equally by the

Central Warehousing Corporation and the concerned State Government. At the end of June 2005, SWCs were operating 467 warehouses in 18 states of the country with the total capacity of 195.20 lakh tonnes. The state-wise storage capacity with SWCs as on 30-06-2005 is given below.

Table No.10
State-wise storage capacity with SWCs as on June 2005.

Name of SWC	Total capacity (in lakh tonnes)
1. Andhra Pradesh	22.82
2. Assam	2.48
3. Bihar	2.03
4.Chhattisgarh	6.07
5. Gujarat	2.27
6. Haryana	16.07
7. Karnataka	8.98
8. Kerala	1.92
9. Madhya Pradesh	11.38
10. Maharashtra	12.20
11. Meghalaya	0.11
12.Orissa	4.05
13.Punjab	60.12
14.Rajasthan	7.19
15.Tamil Nadu	6.36
16.Uttar Pradesh	28.88
17.West Bengal	2.27
Grand Total	195.20

Source: Central Warehousing Corporation, New Delhi

VI) Cooperatives:

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

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

Table No. 11
State-wise cooperative storage facilities as on 31-3-2004

Name of State	Rural level	Market level	Total capacity (in tones)
1. Andhra Pradesh	4003	571	690470

2. Assam	770	264	298900
3. Bihar	2455	496	557600
4. Gujarat	1815	401	372100
5. Haryana	1454	376	693960
6. Himachal Pradesh	1640	209	204800
7. Karnataka	4958	960	693590
8. Kerala	1959	133	323335
9. Madhya Pradesh	5166	1024	1305900
10. Maharashtra	3852	1492	2010920
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	2834	469	483060
17. Other States	1046	233	644830
Grand Total	56096	9602	14119083

Source: Annual Report 2003-2004, National Cooperative Development Corporation, New Delhi.

3.6.5 PLEDGE FINANCE SYSTEM

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

According to the RBI guidelines, loan/advances upto 75 percent of the value of the produce stored in the godown can be advanced to farmers against pledge/hypothecation of agricultural produce (including warehouse receipts) subject to a ceiling of Rs. 5 lakh per borrower.

Such loan is given for a period of 6 months, which can be extended upto 12 months based on financing banks commercial judgement. The commercial banks/co-operative banks/RRBs provide credit to the farmers for the produce stored in the godown under this scheme. The banking institutions accept the godown receipts on its being duly endorsed and delivered to bank for pledge

loan against hypothecation of produce as per RBI guidelines. Farmers are given freedom to take back their produce once the pledge loan is repaid. Facility of pledge finance is extended to all farmers, whether they are the borrowing members of Primary Agricultural Credit Societies (PACS) or not and the District Central Cooperative Banks (DCCBs) can directly finance individual farmers on the strength of the pledge.

Benefits of Pledge finance scheme

- (i) This increases the retention capacity of the small farmers, which consequently also enable the farmers to avoid distress sale.
- (ii) This minimises the farmer's dependency on the commission agents as the pledge finance provide financial support to them immediately after harvest period.
- (iii) Participation of the farmers, irrespective of their land holding size, increases the arrivals in market yard throughout the year.
- (iv) This gives a sense of security to the farmers even if their produce not sold out in the market yard immediately.

4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 ASSEMBLING (MAJOR ASSEMBLING MARKETS)

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

Major Assembling Markets:

Some major assembling markets of different states are as under:

Sl. No.	Name of State	Name of Dist.	Location / Place of Regulated Markets	Whether Primary / Sub-Market	Distance from District H.Q. (km)
1.	Andhra Pradesh	East Godawari	Kakinada	Primary	0
			Kothapeta	Primary	65
			Ambuje Peta	Primary	60
			Rajanmundri	Primary	70
			Bikkavole	Primary	30
			Mulkipuram	Primary	90
			Tinu	Primary	80
		Prakasam	Ongole	Primary	0
			Addaniki	Primary	40
			Markapur	Primary	90
			Kambam	Primary	115
			Kondepi	Primary	30
			Santanutllapady	Primary	20
		Nalgonda	Nalgonda	Primary	0
			Miryalguda	Primary	60
			Suryapet	Primary	60
			Bhounagir	Primary	75
			Makrekal	Primary	30
			Thirumalgiri	Primary	70
			Valigonda	Primary	50
			Choutuppal	Primary	50
			MOtnkur	Primary	70
		Medak	Sadashiupet	Primary	18
			Zaheerubad	Primary	60
			Jogipet	Primary	30
		Karim Nagar	Karim Nagar	Primary	0
			Jogityal	Primary	50
Dharmavaram	Primary		40		

			Gangadhara	Primary	25
			Choppadandi	Primary	18
2.	Andaman Nikobar	Not Available			
3.	Gujarat	Banaskantha	Palanpur	Principal	3
			Deera	Principal	25
			Chunera	Principal	50
			Panthuwada	Principal	70
			Bhabhur	Principal	88
			Thura	Principal	80
			Tharal	Principal	81
		Mensena	Mensena	Principal	2
			Kadi	Principal	60
			Vadnagar	Principal	35
			Vigapur	Principal	45
			Visanagar	Principal	30
		Kutchh (H.Z. Bhuj)	Bhuj	Principal	5
			Mandavi	Principal	50
			Anjar	Principal	34
Bachan	Principal		64		
Rapar	Principal		84		
		Mundra	Principal	52	
4.	Jammu & Kashmir	Not Available			
5.	Karnataka	Bangalore (U)	Bangalore	Terminal	0
		Mysore	Mysore	Primary	0
		Gulbarga	Gulbarga	Primary	0
			Sedam	Primary	55
			Yadgir	Primary	72
		Bidar	Bidar	Primary	0
			Bhulki	Primary	40
		Raichur	Raichur	Primary	0
		Dharwar	Dharwar	Primary	0
			Hubli	Primary	20
		Gadag	Gadag	Primary	0
Laxmeshwar	Primary		36		
6.	Maharashtra	Parbhani	Parbhani	Primary	0
			Gangakhed	Primary	45
			Jintur	Primary	45
			Manwat	Primary	40
			Purna	Primary	42
			Selu	Primary	48
			Pathuri	Primary	48
			Palamr	Primary	60
7.	Orissa	Anugul	Anugul	Principal	0
		Balangir	Balangir	Principal	0
		Cuttack	Kendupatana	Principal	33

		Jagatsingpur	Jagatsingpur	Principal	0
		Jajpur	Jajpur	Principal	0
		Kalahandi	Junagarh	Principal	26
			Bhawanipatha	Principal	0
			Kesinga	Principal	35
	Orissa	Khurda	Balugoan	Principal	65
		Mayurbhanj	Baripada	Principal	0
		Sundarfarh	Sargipalli	Principal	18
8.	Rajasthan	Nagaur	Nagaur	Primary	N.A.
			Merta city	Primary	N.A.
			Kucneman city	Primary	N.A.
		Tonk	Malpura	Primary	N.A.
		Ajmer	Kekri	Primary	N.A.
		Jodhpur	Jodhpur	Primary	N.A.
9.	Tamil Nadu	Salem	APMC Salem	Primary	0
			APMC Authur	Primary	60
		Namakkal	APMC Namakkal	Primary	0
		Virudhunagar	APMC Virudhunagar	Primary	0
		Tuti corin	APMC Tuticorin	Primary	0
			APMC Kovilpatti	Primary	60
		Coimbatore	APMC Coimbatore	Primary	0
		Thanjavur	APMC Thanjavur	Primary	0
		Erode	APMC Erode	Primary	0
10.	Uttar Pradesh	Miruit	Miruit	Primary	10
		Ghaziabad	Ghaziabad	Primary	16
		Mainpuri	Mainpuri	Primary	3
		Hathras	Hathras	Primary	5
		Barilly	Barilly	Primary	10
		Moradabad	Moradabad	Primary	8
		Kanpur Nagar	Kanpur	Primary	15
		Allahabad	Allahabad	Primary	15
		Lalipur	Lalipur	Primary	5
		Varanashi	Varanashi	Primary	5
		Lakhow	Lakhow	Primary	8
		Saharanpur	Saharanpur	Primary	10
11.	West Bengal	Madinapur West	Kharagpur	Primary	14
		Madinapur	Contai	Principal Market	50
		24 Pargana South	Barbipur	Sub-Market	30
			Jaya Nagar	Sub-Market	40

West Bengal	Burdwan	Asansale	Principal Market	90
	Purulia	Purulia	Principal Market	3
	Nadra	Bellanadhani	Principal Market	33
		Karimpur	Principal Market	90
	Malda	Samuc	Principal Market	60
	Birbhun	Suithana	Sub-Market	40
	Coochbehar	Coochbehar	Principal Market	2
	Darjiling	Darjiling	Principal Market	2.5

4.1.1 ARRIVALS

The disposal of Green gram commences shortly after threshing since the producers require funds for the purpose of discharging their various financial obligations. During 2002-2003, the total arrivals of Green gram in 12 markets of Karnataka were 56650 tonnes, followed by 30 markets of Andhra Pradesh where 44892 tonnes of arrivals was reported. 7 markets in Tamil Nadu (29586 tonnes), 12 markets in Uttar Pradesh (27750 tonnes) arrivals were reported. Gujrath, Maharashtra and Orissa reported about 4500 tonnes of arrivals in the main markets. The arrivals of Green gram during 2000-2001 to 2002-2003 in important markets of major producing states are given as under.

Table No. 12
Arrivals in important markets of major Green gram producing states

Sl. No.	Name of the States	Arrivals (in Tonnes)		
		2000-2001	2001-2002	2002-2003
1.	Andhra Pradesh	106555	80562	44892
2.	Gujarat	8091	9104	4278
3.	Karnataka	74870	35799	56650
4.	Maharashtra	2283	3251	4590

5.	Orissa	4202	3593	4597
6.	Rajasthan	25681	50278	N.A.
7.	Tamil Nadu	26124	36550	29586
8.	Uttar Pradesh	23930	18490	27750
9.	West Bengal	2519	2186	4590

Source: Sub-offices of Directorate of Marketing and Inspection

4.1.2 DESPATCHES

Pulses including Green gram were mostly despatched to the markets of within the state or, to the markets of the adjoining states with the exception of Bengal gram which is sent to other states also. The major exporter of Green gram is Karnataka State , it exported 56650 tonnes Of Green gram to other markets. Andhra Pradesh exported 44892 tonnes to the other districts of Andhra Pradesh. Tamil Nadu exported 24600 tonnes of Green gram to other markets of the state. The despatches of Green gram from different states are as under for 2000-2001,2001-2002, and 2003-2004.

States from where despatched	Quantity Despatched (Tonnes)			States to which despatched
	2000-2001	2001-2002	2002-2003	
Andhra Pradesh	106555	80562	44892	Within the state, Karnataka and Kolkata.
Gujarat	3999	4634	2375	Within State
Karnataka	74870	35799	56650	Within state and other states
Maharashtra				N.A.
Orissa	9855	1719	2472	With in the state, Jharkhand, West Bengal, Bihar, Madhya Pradesh, and Chatisgarh
Rajasthan	N.A.	N.A.	N.A.	Within State
Tamil Nadu	21600	31900	24600	All major consuming centers within the state
Uttar Pradesh	959	450	140	Delhi, Bihar, and West Bengal
West Bengal	1214	878	933	Within State and Assam.

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

4.2 DISTRIBUTION

Assembling and distribution of the agricultural produce are interlinked. The assembling deals with the movement of the Green gram from the farm to the

assembling centre while the distribution deals with its further movement to the consumer.

Agencies involved:

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

- ☒ Producers
- ☒ Village Traders
- ☒ Itinerant Traders organisations
- ☒ Wholesale merchants organisations
- ☒ Retailers
- ☒ Commission Agents or, Representative of Dal Miller
- ☒ Co-operative organisations
- ☒ Government organisations

4.3 EXPORT AND IMPORT

Export

India is deficit in pulses. Only small quantities of pulses are exported. Separate data is available only for the year 2002-2003. During 2002-2003, country exported 5840 tonnes of green gram valued at Rs. 1663 Lakhs.

Table No. 13
India's export of Green gram (country wise) from 2002-2003

Name of Country	2002-2003	
	Quantity (Kgs)	Value (Rs)
Australia	59912	1502489
Bahrain IS	191653	4614396
Bangladesh	236400	4982146
Bhutan	-	-
Brunei	1700	56507
Cambodia	5000	139761
Canada	567046	16238581
China P R	1900	72689
Congo	80	3437
Denmark	20790	557643
France	51744	1404023
German	74142	2240325

Ghana	1300	51676
Italy	59660	1683319
Japan	11825	377325
Kenya	29116	739120
Korea	21100	620890
Kuwait	645380	16358003
Malaysia	8854	229853
Maldives	1899	48840
Mauritius	25000	614090
Nepal	35100	796746
Nether land	2190	67744
New Zealand	31492	855793
Nigeria	2000	64131
Norway	624	23804
Oman	8540	264038
Qatar	38150	931254
Saudi Arab	49000	1228768
Senegal	45	1264
Singapore	33897	993983
South Africa	5300	205702
Spain	13442	421246
Sri Lanka	113300	2320236
Switzerland	12092	335602
U A E	584603	14344475
U K	978520	26868320
U S A	1917884	64071311
Total	5840680	166329530

Import

During the year 2002-2003, India imported 262566 tonnes of Green gram valued at Rs. 46507 lakh. Import in India from different countries is as under:

Table No.14

India's import of Green gram (country-wise) for year 2002- 2003

Name of Country	2002-2003	
	Quantity (Kgs)	Value (Rs)
Australia	4023200	81803920
Canada	10036000	131989739
Taiwan	3878000	65724210
China	34551149	642587647

Ethiopia	1223880	21349604
France	1000000	11035813
Indonesia	241000	4167178
Iran	22720720	404147694
Kenya	9088675	177421338
Malaysia	227500	3996943
Mauritius	100000	1503165
Myanmar	130113237	2258700158
Mozambique	120000	1399121
Pakistan	24777950	472173216
Panama Re	4161640	89768201
Saudi Arab	18000	449024
Syria	4519165	75279365
Tanzania	3323000	57939952
Thailand	1623758	29715740
U Arab Emts	367000	6404298
Ukraine	294000	3427846
U S A	63000	1169604
Uzbekistan	5922491	105517230
Unspecified	173153	3113425
Total	262566518	4650784431

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

4.3.1 SANITARY AND PHYTO-SANITARY REQUIREMENTS

The agreement on Sanitary and Phyto-Sanitary (SPS) measures is a part of the GATT Agreement, 1994, for export and import trade. The aim of the agreement is to prevent the risk of introduction of new pests and diseases in new region 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.

When SPS Required: The SPS agreement applies to all Sanitary and Phyto-Sanitary measures, which may directly or indirectly, affect international trade. Sanitary measures deals 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) are generally applied, when there is a significant rate risk about a hazard.
- (ii) Technical specification (Process standards/Technical standards) are most widely applied measures and permit import subject to compliance with pre-determined specification.
- (iii) Information Requirements (Labelling Requirements/Control on Voluntary claims) permit imports provided they are appropriately labelled.

Procedure for issue of SPS certificate for export:

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

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

Major Export Markets:

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

4.3.2 EXPORT PROCEDURES

The exporter should keep in mind about the following laid down procedure during the export of Green 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 now 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 now shifted to port.
7. Obtain marine insurance cover from any Insurance Company.
8. Contact the Clearing and Forwarding (C&F) agent for sorting the produce in godowns and to get the shipping bill for allowing shipment by the Custom Authority.
9. Shipping Bill is submitted by C & F agent to custom house for verification and verified shipping bill is given to the shed superintendent to obtain carting order for export.

10. The C&F agent presents shipping bill to preventive officer for loading into ship.
11. After loading into ship, a mate's receipt is issued by captain of ship to the superintendent of the port, who calculates port charges and collect 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 loading to the respective exporter.
13. Then C&F agent sends the bill of loading 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 loading, 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 send the GR form to RBI, an evidence of realisation of export proceeds.
19. Exporter now applies for various benefits from duty drawback schemes.

4.4 MARKETING CONSTRAINTS

The following are main marketing constraints in Green gram:

- ▶ **Distress sale:**
Due to financial crisis, farmers are forced to sale their produce just after harvesting. During this period, farmers get lower price due to glut in the market. The producers cannot withhold or store their produce for some period to get more price since the farmers have to meet urgent requirement of money.
- ▶ **Unstable price:::**
Generally, the price of Green gram goes down or prevails low in the early post harvest period due to more arrivals in the market and later on prices goes up. Due to this unstable price, the farmers get lesser price in the market.
- ▶ **Lack of Marketing Information:::**
Due to lack of information regarding arrivals and prices prevailing in other markets, producers market the Green gram in the village and nearby market at lower price, which can be avoided.
- ▶ **Adoption of Standards:::**
Farmers usually do not grade their produce, as a result they do not get remunerative price in the market.

▶ **Inadequate storage facilities at rural stage:**

Due to inadequate storage facilities at rural stage, farmers lose a substantial quantity of their produce by way of drying, spoilage, rodents etc. Farmers are also forced to sell their produce just after harvest due to lack of storage facilities. So rural godowns are must to avoid the sale immediately after the harvest so as to enable to get more prices to producers.

▶ **Transportation facilities at producers' level:**

Due to inadequate transportation facilities at villages level, producers sale their Green gram to traders directly from their farm or in the village, which offer them lesser price than prevailing in the markets.

▶ **Training to producer:**

The training to producer regarding marketing of their produce is required. It improves their skill for better marketing of their produce.

▶ **Infrastructure facilities:**

Due to inadequate infrastructure facilities at producers level, traders and market level, the marketing of Green gram is affected adversaly.

▶ **Malpractices of markets:**

There are many malpractices prevailing in markets like excess weighment, delay in payment, large quantity of sample from the produce, different kinds of arbitrary deductions for religious and charitable purpose from producers, high commission charges, delay in weighing, loading, unloading and weighing charges from producers.

▶ **Superfluous middlemen:**

The existence of a long chain of middlemen reduces the share of the consumer's price received by the actual cultivator.

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 MARKETING CHANNELS

The following are the important marketing channels exist in the marketing of Green gram.

A) Private Marketing Channel:

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

i) **Producer ^ Dal Miller ^ Consumer**

ii) **Producer ^ VillageTrader ^ Dal Miller ^ Wholesaler ^ Retailer ^ Consumer**

iii) **Producer ^ Dal Miller ^ Retailer ^ Consumer**

iv) **Producer ^ Wholesaler ^ Dal Miller ^ Retailer ^ Consumer**

v) **Producer ^ Wholesaler ^ Dal Miller ^ Wholesaler ^ Retailer ^ Consumer**

ivi) **Producer ^ Wholesaler ^ Retailer ^ Consumer (For whole Green gram)**

vii) **Producer ^ Commission Agent ^ Dal Miller ^ Wholesaler ^ Retailer ^ Consumer**

B) Institutional Marketing Channel:

Some institutions have been entrusted with marketing activities of Green gram like NAFED. NAFED is the nodal agency for procuring Green gram through providing minimum support prices to the farmers for their produce. The main institutional marketing channels for Green gram are as under:

Producer ^ Procuring Agency ^ Dal Miller ^ Consumer

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

Producer ^ Procuring Agency ^ Dal Miller ^ Retailer ^ Consumer

Criteria for selection of channels:

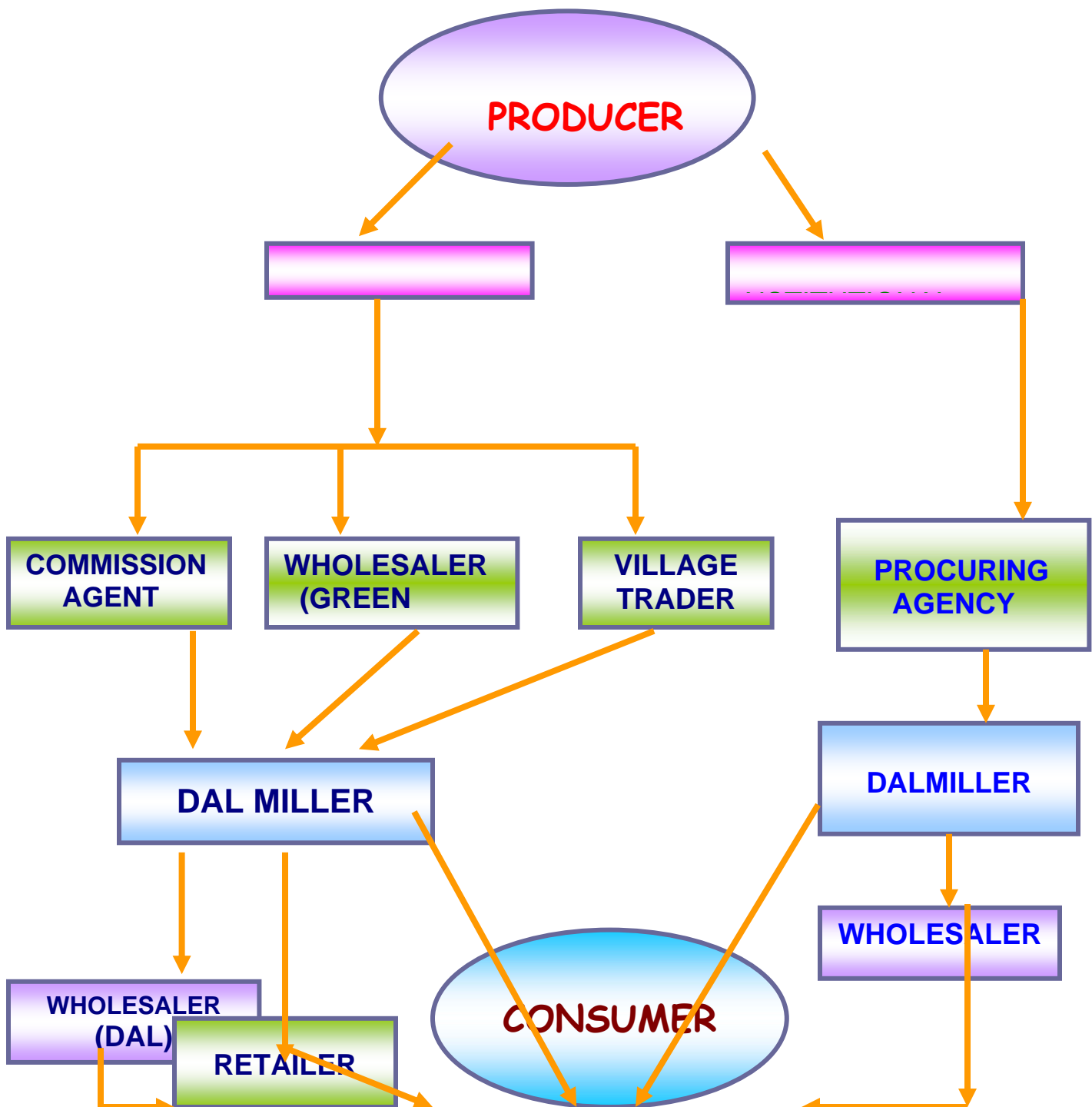
Following criteria should be considered during selecting a marketing channel:

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

2. Selection should be for shorter channel having lesser market cost.
3. Avoid the longer channel having more intermediaries causing higher market cost and less producer's share.

CHART NO.1
MARKETING CHANNELS OF GREEN GRAM

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



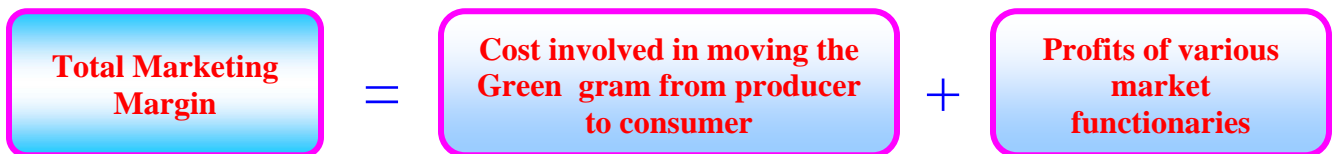
5.2 MARKETING COSTS AND MARGINS

Marketing Costs: Marketing Costs are the actual expenses required in bringing goods and services from the producer to the consumers. The marketing cost normally includes

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

Market Margins: Margin refers to the difference between the price paid and received by a specific marketing agency such as a single retailer, or by any type of marketing agency, i.e. retailers or assemblers or by any combination of marketing agencies in the marketing system as a whole.

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



The absolute value of the marketing margin varies from market to market, channel to channel and time to time. The Market Cost incurred by farmers and traders at Regulated market includes i) Market fee, ii) Commission, iii) Taxes, and iv) Other miscellaneous charges.

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

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

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

iv) Miscellaneous charges: In addition to the above-mentioned charges, some other charges are levied in markets of Green gram. These includes handling and weighment charges (weighing, loading, unloading, cleaning etc.), charity

contribution in cash and kind, grading charges, postage, charges payable to water man, sweeper, Chowkidar etc. These charges may be payable either by the seller or by the buyers.

6.0 MARKETING INFORMATION AND EXTENSION

Marketing Information:

Marketing information is a key function to take efficient marketing decisions, regulate the competitive marketing processes and to restrict the monopoly or profiteering individuals in the market. It is needed by producers in planning production and marketing of their produce, and is equally required by other market participants. Farmers need to be fully familiarized in different areas of agricultural marketing in order to improve price realization. Marketing information is important 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.

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 behavior. In the present global agricultural scenario, the farmers need to be educated to accept modern market-oriented farming by taking care of productivity, quality and market demand. 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.

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 future markets etc.

Benefits of Marketing Information and Extension:

Marketing information and Extension is important for all the concern participants of agricultural marketing.

Benefits:

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

2) Consumers: With the help of market information and extension, producers will produce Green 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 decision regarding purchase, sale and storage of Green gram by knowing the trend of arrivals, demands, consuming centers, grading, packaging, stock position etc. in the markets.

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

Sources of Marketing Information:

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

Sources / Institutions	Activities for Marketing Information and Extension
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 (Agmark net portal). ➤ Marketing extension through training to Consumers, Producers, Graders, etc. ➤ Marketing Research and Survey. ➤ Publication of reports, pamphlets, leaflets, Agricultural Marketing journals, Agmark Grade standards etc.
2. Agricultural Produce Market Committee (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.
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 foods grains etc.

<p>4. State Agricultural Marketing Boards, at different state capital</p>	<ul style="list-style-type: none"> ➤ Provide marketing related information to co-ordinate all the market committees in the state. ➤ Arrange seminars, workshops and exhibitions on subject related to agricultural marketing. ➤ Provide training facilities to producer, traders and employees of the Boards.
<p>5. Directorate of Economics and Statistics, Shastri Bhavan, New Delhi. Website: www.agricoop.nic.in</p>	<ul style="list-style-type: none"> ➤ Compilation of agricultural data on area, production and yield for development and planning. ➤ Dissemination of market intelligence through publication and Internet.
<p>6. 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"> ➤ 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 food grains. ◆ 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.
<p>7. Federation of Indian Export Organisations (FIEO) PHQ House(3rd Floor) Opp. Asian Games , New Delhi-110016</p>	<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.
<p>8. Different websites on Agricultural Marketing Information</p>	<p>www.agmarknet.nic.in www.agricoop.nic.in www.fieo.com/cwc/ www.ncdc.nic.in www.apeda.com www.fmc.gov.in www.icar.org.in www.fao.org www.dpd.mp.nic.in www.agriculturalinformation.com</p>

	www.agriwatch.com www.kisan.net www.agnic.org www.nafed-india.com www.indiaagronet.com www.commodityindia.com
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7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 DIRECT MARKETING

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

Benefits:

- ⊕ Direct marketing helps in better marketing of the produce.
- ⊕ It increases profit of the producer.
- ⊕ It minimizes marketing cost.
- ⊕ It encourages distribution efficiency of the marketing system.
- ⊕ It promotes employment to the producer.
- ⊕ Direct marketing satisfy the consumer.
- ⊕ It provides better marketing techniques to producers.
- ⊕ It encourages direct contact between producers and consumers.
- ⊕ It encourages the farmers for retail sale of their produce.

7.2 CONTRACT MARKETING

Contract farming is a mutual linkage between agri-business farms and farmers which emphasize on competitiveness in terms of quality but also optimizes of production. It is effective for management and assures markets with mutual agreed price are the basic component of contract farming. Contract

Marketing is a system of marketing, where selected crop is grown for marketing by farmers under a 'buy back' agreement with an agency (entrepreneur or trader or processor or manufacturer). In the wake of economic liberalization, it has gained momentum as the national and multinational companies enter into contracts for marketing of agricultural produce. They also provide technical guidance, capital, input supply to contracted farmers. Contract Marketing ensures continuous supply of quality produce at mutually contracted price to contracting agencies, as well as ensures timely marketing of the produce. Contract Marketing is beneficial to both parties i.e. farmers and the contracting agency.

Advantages to farmers: -

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

Advantages to contracting Agency: -

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

Punjab Foodgrains Corporation has promoted the contract farming system in Punjab state for Green gram i.e. Summer Moong. In Punjab, Summer Moong is grown in the districts of Ferozpur, Ludhiana, Gurdaspur, Amritsar, Kapurthala, Roopnagar, Faridkot, Moga, Sangur and Patiala. The growing season commences in the month of March-April and marketed in May-June. The varieties grown are SML 134, SML 668 and SML32.

Marketing Channel: There are two significant marketing channels in contract farming, which are as under:

- 1) Producer-contracting agency-processor-wholesaler-retailer-consumer.
- 2) Producer-contracting agency-miller-wholesaler-retailer-consumer

The Punjab Agri-buisness Farm Corporation provides high yielding varieties of seed, technical support etc; and declare support price in advance.

7.3 CO-OPERATIVE MARKETING

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

Co-operative marketing provides the following services

- ☒ Procurement and disposal of farm produce
- ☒ Processing of produce
- ☒ Grading
- ☒ Packing
- ☒ Storage
- ☒ Transport
- ☒ Credit
- ☒ Fair trade practices
- ☒ Protect against marketing malpractices

National Co-operative Development Corporation was established in 1956 for strengthening and promoting agricultural marketing through co-operative societies.

The co-operative marketing societies consists 3-tier structure: -

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

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

Benefits:

- ☒ Remunerative price to producers
- ☒ Reduction in cost of marketing
- ☒ Reduction in commission charges
- ☒ Effective use of infrastructure
- ☒ Credit facilities
- ☒ Timely transportation service
- ☒ Reduces malpractices
- ☒ Marketing Information

- ▣ Supply of agricultural inputs
- ▣ Collective processing

7.4 FORWARD AND FUTURE MARKETS

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

Green gram is allowed under forward trading.

Forward contracts are broadly of two types:

(a) Specific delivery contracts: Specific delivery contracts are essentially merchandising contracts, which enables 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 of two types:

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

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

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

Benefits :

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

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

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. This helps the traders/exporters in quoting a realistic price and, thereby, secure trading/export contract in a competitive market.

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

The other benefits of future trading are-

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

ii) Competition: Future trading encourages competitions and provide competitive price to farmers, millers or traders.

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

iv) Integration of price: Future trading promotes an integrated price structure throughout the country.

8.0 INSTITUTIONAL FACILITIES

8.1 MARKETING RELATED SCHEMES OF GOVERNMENT AND PUBLIC SECTOR ORGANISATIONS

Name of the scheme/Implementing Organisation(s)	Facilities provided /Objectives/Salient features
<p>1.Gramin Bhandaran Yojana (Rural Godown Scheme)</p> <p>Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.</p>	<ul style="list-style-type: none"> ▶ It is a capital investment subsidy scheme for construction/renovation/expansion of rural godown. 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 lakh per project. For the projects in North-Eastern states and hilly areas with altitude of more than 1000 m above mean sea level and SC/ST entrepreneurs, maximum subsidy admissible is Rs. 50.00 lakh @33% of the project cost.
<p>3.Agricultural Marketing Information Network</p> <p>Directorate of Marketing & Inspection, Head Office, N.H.-IV,</p>	<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 utilization. ▶ To ensure flow of regular and reliable data to the producers, traders and consumers to derive maximum advantage out of their sales and purchases. ▶ To increase efficiency in marketing by effective improvement in the

Faridabad.	<p>existing market information system.</p> <ul style="list-style-type: none"> ▶ 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 forward dissemination. The eligible markets will get 100% grant by Ministry of Agriculture. 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 Green gram under price support scheme. ▶ The objective of scheme is to provide regular marketing support to sustain and improve the production of Green gram. ▶ Purchases under PSS are undertaken when the prices of Green gram rate are at or below the declared support prices for a particular 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 and to provide needed momentum to the pace of development of various programme of Cooperative Agricultural Marketing, Processing, Storage etc. in under/least developed states/UTs by providing financial assistance on liberal terms to augment the income of farmers and weaker sections of the community. ▶ The scheme provides for distribution of agricultural inputs, development of agro-processing including storage, marketing of food grains 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, which targeted 43 percent share in rural credit flow in Agriculture during 2002-2003 (Rs.82073 crore), Commercial Banks (50 percent) and Regional Rural Banks (7 percent).

The institutional credit to Agriculture is offered in the form of short term, medium term and long term credit facilities:

Short Term and Medium Term Loans:

Name of scheme	Eligibility	Objective/Facilities
1.Crop Loan	All categories of farmers—small/marginal and others	<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)	All categories of farmers small/marginal and others	<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 clients having 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 procedures 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; a maximum amount Rs. 50,000 and Rs. 25,000 respectively.

4. National Agricultural Insurance Scheme

Scheme is available to all farmers – loanee and non-loanee both – irrespective of the size of their holding.

- © To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified 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% of premium charged from them. The subsidy will be phased out over a period of 5 years on sunset basis.

Long Term Loans:

Name of scheme	Eligibility	Objective/Facilities
Agricultural Term Loan	All categories of farmers (small/medium and agricultural labourers) are eligible, provided they have necessary experience in the activity and required area.	<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 mechanization, plantation and horticulture, dairying, poultry, sericulture, dry land, waste land development schemes, etc. ➤ This loan is offered in the form of direct finance to farmers with a repayment span not less than 3 years and not exceeding 15 years.

8.3 ORGANISATIONS/ AGENCIES PROVIDING MARKETING SERVICES

Name of the Organisations / Agencies & Address	Services Provided
<p>1. Directorate of Marketing and Inspection (DMI)</p> <p>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 standardization and grading of agricultural and allied produce. ➤ Market development through Regulation, Planning and Designing of physical market. ➤ Administration of Meat Food Products Order (1973). ➤ Promotion of Cold Storage. ➤ Liaison between the Central and State Governments through its regional offices (11) and sub-offices (37) spread all over the country.
<p>2. Agricultural and Processed Food Products Export Development Authority (APEDA)</p> <p>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, sensibility studies, reliefs and subsidy schemes. ➤ Registration of scheduled product exporters on payment of such fees as may be prescribed. ➤ Adapting standards and specification for the purpose of export of scheduled products. ➤ Carrying out inspection of meat and meat products for ensuring the quality of such products. ➤ Improving the packaging of the scheduled products. ➤ Promotion of export oriented production and development of scheduled products. ➤ Collection and publication of statistics for improving marketing of scheduled products. ➤ Training in the various aspects of industries related to the scheduled products.
<p>3. National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED)</p> <p>Nafed House, Sidhartha Enclave, New Delhi – 110014</p> <p>Website:</p>	<ul style="list-style-type: none"> ➤ Central nodal agency of Government 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. ➤ Consumer Marketing Division of NAFED serves the consumers in Delhi through the network of its retail

<p>www.nafed-india.com</p>	<p>outlets (NAFED BAZAR) by providing consumer items of daily need.</p> <ul style="list-style-type: none"> ➤ 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>	<ul style="list-style-type: none"> ➤ Planning, Promoting and Financing Programmes for production, processing, marketing, storage, export and import of agricultural produce. ➤ Financial support to Primary, Regional, State and National level marketing societies is provided towards <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 ii) 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 capital</p>	<ul style="list-style-type: none"> ➤ Implementation of the regulation of marketing in the state. ➤ Provides infrastructural facilities for the marketing of notified agricultural produce. ➤ Grading of agricultural produce in the markets. ➤ To co-ordinate all the market committees for information services. ➤ Provides aid to financially weak or needy market committees in the form of loans and grants. ➤ To eliminate malpractices in the marketing system. ➤ To arrange or organise seminars, workshops or exhibitions on subject relating to agricultural marketing.

9.0 UTILIZATION

9.1 PROCESSING

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

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

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

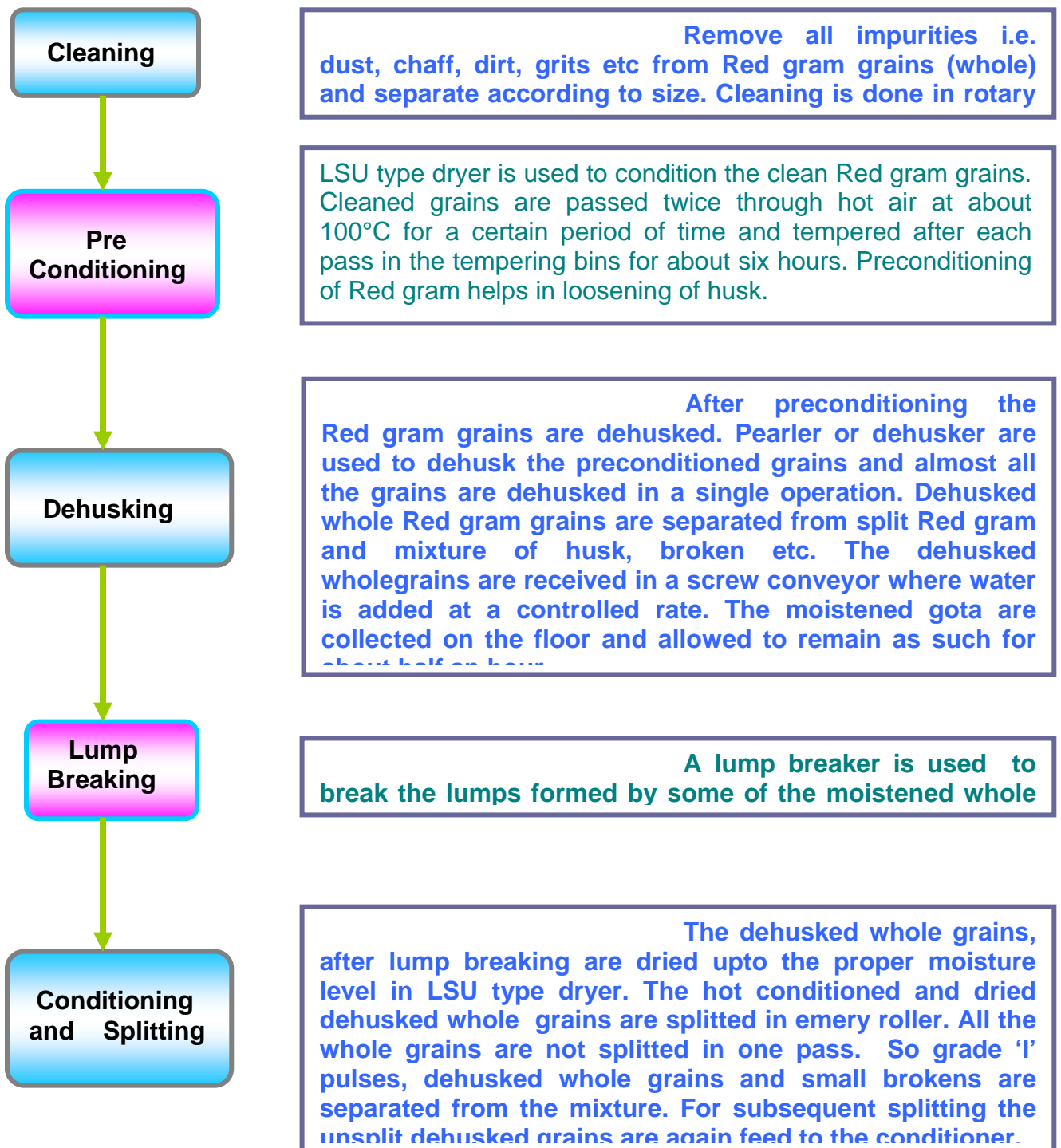
9.2 USES

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

- ▶ **Dal:** Decorticated split cotyledon of whole seed is called dal. Green gram is consumed mainly as dal in India. Green gram dal is a staple food and is an important ingredient of diet of Indian people. It is also consumed as dal in other South Asian countries, in Tanzania and Uganda in Africa.
- ▶ **Whole Dry Seed:** Whole dry seed is boiled and consumed in India, Eastern Africa, the West Indies and Indonesia. It is also consumed in Myanmar.
- ▶ **Seed Purpose:** Generally, farmers retain a part of his produce for seed purpose for sowing in next season.
- ▶ **Animal Feed:** The green leaves and tops of plants are used as animal feed in South Asia, Africa and Caribbean countries. The by-product of seed coats, broken bits and powder from dal mills forms a valuable protein source of dairy animals. Cracked and shrivelled seeds are also used as animal feed. The husk of pods and leaves obtained during threshing constitute a valuable cattle feed.
- ▶ **Fuel Purpose:** The dry stem of the plant and dry leaves are used as fuel for cooking by the poor population in rural India.

- **To Improve Soil Fertility:** Rhizobium bacteria are present on the root nodules of Green gram. The Green gram crop fixes atmospheric nitrogen in symbiotic association with Rhizobium bacteria and maintains the soil fertility.

CHART NO. 2 STEPS OF DAL MILLING



10.0 DO'S AND DON'TS

DO'S	DON'TS
<ul style="list-style-type: none"> ✓ Harvest the Green gram at proper stage of maturity i.e. Harvest the crop when 80% of the pods are mature (turned yellow). ✓ Harvest during conducive weather condition. ✓ Threshing and winnowing on cemented (pucca) floor. ✓ Market the Green gram after AGMARK grading to get remunerative prices in the market. ✓ Before marketing the produce, get the market information regularly from agmarknet.nic.in website, newspapers, T.V., radio, concerned APMC offices etc. ✓ Store the Green gram during post harvest period and sale it later when the prices are higher in the market. ✓ Use proper and scientific method of storage. ✓ Avail the benefit of centrally sponsored GRAMIN BHANDARAN YOJANA (scheme) for construction of rural godowns and store Green gram to minimise losses. ✓ Select the shortest and efficient marketing channel to get highest share in marketing. ✓ Package properly to protect the quality and quantity of produce during transit 	<ul style="list-style-type: none"> ✗ Delay in harvesting results in shattering of pods. Harvest of Green gram before the pods are fully mature, may result in lower yields, higher proportion of immature seeds, poor grain quality. ✗ Harvest the crop during adverse weather condition (during rain and over cast weather). ✗ Threshing and winnowing on kutcha floor leads to increase in post harvest losses ✗ Marketing of Green gram without grading will fetch lower prices. ✗ Market produce without collecting / verifying marketing information. ✗ Sale the Green gram during post harvest period when the prices are low during this period due to glut. ✗ Use conventional and outdated method of storage, which causes storage losses. ✗ Store Green gram at unscientific place in a haphazard manner, which will result qualitative and quantitative deterioration of Green gram grains. ✗ Use the long marketing channel, which reduces the producer's share as well as more commission charges. ✗ Improper package causes more losses

and storage.

- ✓ Select the cheapest and convenient mode of transportation from the available alternatives.
- ✓ Transportation of Green gram should be done in bags to minimize the grain losses.
- ✓ Use effective, efficient and improved post harvest technology and processing techniques to avoid post harvest losses.
- ✓ Avail the facility of Price Support Scheme during glut situation.
- ✓ Avail the procedure of Sanitary and Phyto-Sanitary measures during export.
- ✓ To assure better marketing of the produce, avail benefit of contract farming.
- ✓ Avail the benefits of future trading to avoid price risk arising due to wide fluctuations in commodity prices.

during transit and storage.

- ✗ Use the mode of transport, which will cause losses and require higher cost.
- ✗ Transport Green gram in bulk, which causes more losses.
- ✗ Use traditional and conventional techniques in post harvest operations and in processing which causes more quantitative and qualitative losses.
- ✗ Sale Green gram to local traders or itinerant merchant during glut situation.
- ✗ Export without any Sanitary and Phyto-Sanitary measures and face rejection.
- ✗ Produce Green gram without assessing and assuring its market demand for that year.
- ✗ Sell the produce at fluctuating prices or in glut situation.

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