POST HARVEST PROFILE OF SOYBEAN

CONTENTS

1.0 INTRODUCTION

Soybean is known as the *"GOLDEN BEAN"* of the 20th Century. Though Soybean is a legume crop, yet it is widely used as oilseed. Due to very poor cookability and digestibility on account of inherent presence of trypsin inhibitor, it can not be utilized as a pulse. It is now the second largest oilseed in India after groundnut. It grows in varied agro-climatic conditions. It has emerged as one of the important commercial crop in many countries. Due to its worldwide popularity, the international trade of Soybean is spread globally. Several countries such as Japan, China, Indonesia, Philippines, and European countries are importing Soybean to supplement their domestic requirement for human consumption and cattle feed.

Soybean has great potential as an exceptionally nutritive and very rich protein food. It can supply the much needed protein to human diets, because it contains above 40 per cent protein of superior quality and all the essential amino acids particularly glycine, tryptophan and lysine, similar to cow's milk and animal proteins. Soybean also contains about 20 per cent oil with an important fatty acid, lecithin and Vitamin A and D. The 4 percent mineral salts of Soybeans are fairly rich in phosphorous and calcium.

1.1 Origin : It is reported to be originated from China

1.2 Importance : The Soybean is gaining popularity on account of it's following unique characteristics:-

- Adaptability to varied agro-climatic conditions.
- Unmatched composition of 40 percent protein and 20 percent oil.
- Nutritional superiority on account of protein containing essential amino acids, unsaturated fatty acids, carbohydrates, vitamins and minerals.
- Significant role in preventing and treating chronic diseases such as heart ailments, osteoporosis, cancer, kidney ailments and menopausal syndromes.
- Scope for manufacturing numerous processed food products.
- Widely used as a source of animal feed.

Major constituents of Soybean :

Components	Percentage
Proteins	40
Carbohydrates	30
Fibre	05
Lecithins	0.5
Saponins	04
Oil	18-20

Source: www.commodityindia.com, October 2003.

2.0 PRODUCTION

2.1 Major producing countries in the world:

Although, a native of China, Soybean for all practical reasons is an American crop today. USA is the major producer of Soybean and ranks first in production. It's share in the world production is almost 35 percent. Brazil, Argentina and China rank second, third and fourth position in terms of production respectively. India occupies fifth place. The following Table presents the picture of global production of Soybean.

Table No. –1
Total world production of Soybean during 2002- 03 and 2003-04

Country	2002-2003		2003-2004	
	Production (In tonnes)	Percentage share	Production (In tonnes)	Percentage share
USA	74,824,768	41.40	65,795,340	34.77
Brazil	42,124,892	23.31	51,532,344	27.23
Argentina	30,000,000	16.60	34,818,552	18.40
China	16,507,368	9.13	16,500,368	8.72
India	4,558,100	2.52	6,800,000	3.59
Paraguay	3,300,000	1.83	4,400,000	2.33
Canada	2,335,700	1.29	2,268,300	1.20
Others	7,078,442	3.92	7,118,844	3.76
All World	180,729,270	100.00	189,233,748	100.00

Source : www.apps.fao.org

2.2 Major producing states in India:

In the recent past, Soybean cultivation has increased many folds as compared to any other oil seed crop in the country and stands next to Groundnut, though commercial production of Soybean began in 1971-72. Madhya Pradesh, Maharashtra and Rajasthan accounted for 56 percent, 35 percent and 5 percent production respectively during the year 2002-03 covering an area of 67 percent, 21 percent and 8 percent in India. Area and production of major Soybean producing states during 2001-02 and 2002-03 are given in Table No.2.

Table No.-2
State-wise area and production of Soybean during 2001-02 and 2002-03
(Area- '000 hectares; Production- '000 tonnes)

STATE	2001-2002		2002-2003			
	Area	Production	Area	Percent share	Production	Percent share
Madhya Pradesh	4449.7	3735.0	3951.3	67.36	2576.1	
Maharashtra	1104.9	1385.5	1255.5	21.41	1576.0	56.51

Rajasthan	655.9	715.9	471.7	8.04	236.4	5.19
Others	132.6	126.3	187.1	3.19	169.8	3.73
All India	6343.1	5962.7	5865.6	100.00	4558.3	100.00

Source: Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India.

2.3 Zone-wise major commercial varieties:

Table No. –3

Soybean varieties suitable for different zones in India

Zone	State	Name of variety	Yield (Kg./ha.)	Oil percent
North zone	Uttar Pradesh and Rajasthan	Alankar	2200	--
		Ankur	2300	--
		Clark - 63	1800	--
		PK-1042	3300	--
		PK-262	2800	--
		PK-308	2600	20-23
		PK-327	2300	--
		PK-416	3200-3800	41-56
		PK-564	3000	--
		Shilajeeth	2200	--
		Bragg	1800	--
		Calitur	1800	--
		Durga	2100	--
		Gaurav	2200	--
		Indira Soya -9	2300	--
		JS-2	1800	--
		JS-71-05	2000-2400	41
		JS-75-46	1600-3100	--
		JS-76-205	1600-2000	--
		JS-79-81	2800	--
		JS-80-21	2500-3000	--
		JS-90-41	2500-3000	--
		JS-335	2500-3000	17-19

Central zone	Madhya Pradesh and Maharashtra	MACS-13	2700	15-22
		MACS-58	2000-2500	--
		MAUS-47 (Parbhani Sona)	2500-3000	20
		MS-335	2800	--
		NRC-12(Ahilya-2)	2800	--
		NRC-2(Ahilya-1)	3500-4000	21
		NRC-7(Ahilya-3)	3200	--
		PK-472	3300	--
		PUSA-16	2800	--
		PUSA-22	2600	--
		PUSA-37	2800	--
		TYPE-49	2200	--
		MACS-57	2800	--
		MACS-450	2500	20
		MAUS-2	2450	--
		MAUS-1	2800	--
		MAUS-32(Prasad)	3000-3500	19
Southern zone	Karnataka	KB-79(Sneha)	1700	--
		MACS-124	2500-3200	--
		PUSA-40	2600	--

3.0 POST-HARVEST MANAGEMENT

3.1 Post-harvest losses :

Post-harvest losses occur at different stages viz. harvesting, threshing, winnowing, storage, packaging, and transportation, processing and marketing of Soybean. storage at farmer's level, spoilage and losses may occur mishandling, use of very old and damaged gunny bags and The losses during storage at farm level have been to be about 0.5 percent. During transport of Soybean from house to the assembling markets and from assembling to the secondary markets or consuming centers, losses account of pilferage, leakage of gunny bags and rough The losses are around to be not more than 0.2 to 0.5

During due to rodents. estimated the farm markets occur on handling. percent.

The storage losses with the processors are mainly driage loss due to storage of Soybean for a longer period. The pest damage to the Soybean is less because of its hard testa. Some losses also occur due to rodents. The losses at the processing units on these counts have been estimated to be about one percent only.

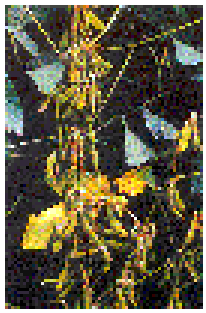
To minimise post-harvest losses, the following measures should be followed.

- Timely harvest at optimum moisture percentage (not more than 14 percent).
- Use of proper method of harvesting.
- Avoid the losses in threshing and winnowing by adopting better mechanical methods.
- In threshing, precaution must be taken to avoid severe beating as it may decrease the germination of the seeds.
- Avoid excessive drying, fast drying and rewetting of grains.
- Ensure uniform drying to avoid hot and wet spots on grain and mechanical damage due to handling.
- Adopt the grading practices to get more profit.
- Use efficient and good packaging for storage and transportation.

- Use proper scientific technique in storage for maintaining optimum moisture content i.e. less than 9 percent.
- Use pest control measures (fumigation) before storage.
- Provide aeration to stored grain and stir bulk grain occasionally.
- Move stocks in sacks to discourage pest incidence and their multiplication.
- Proper handling (loading and unloading) of Soybean with good transportation facilitates helps in reduction in losses at farm and market levels.

3.2 Harvesting care:

The season of harvesting of Soybean depends on the time of sowing and the variety grown such as short duration or long duration. Generally, *Kharif* Soybean is harvested during the period October – November and *Rabi* crops harvested in the month of January – February. The harvesting losses depend on the time of harvest and the variety grown. In some varieties, the shattering is more. Losses in the field also occur due to untimely harvest, poor agricultural operations, careless handling, natural calamities like heavy rainfall, hailstorm, birds, rodents, etc., These losses of Soybean in the field are estimated to be 1 to 2 percent in normal cases.



The following harvesting care should be taken.

- Soybean should be harvested, when leaves start falling and pods look dry, but before getting dried completely.
- The moisture in the seeds at the time of harvesting should not be more than 14 percent.
- Harvesting before maturity means a low yield and also a higher proportion of immature seeds, poor quality and more chances of disease attack during storage of grain.

- Delay in harvesting results in grain shattering and cracking of grains in the pods and exposure to insects, rodents, birds and pests attack.
- Avoid harvesting during wet weather conditions.
- Harvesting should be done by adopting proper method.
- Protect the harvested grains from rain and excessive dew by covering.
- Keep the harvested grains separately for each variety, to get true to type variety seed.
- Dry harvested crop for 8-10 days at the threshing floor.
- Avoid direct sun drying and excessive drying, which leads to an increase in breakage of the grains.
- If the threshing is delayed, keep the harvested Soybean in a dry and shady place, which facilitates the air circulation and prevents excessive heating.
- Transport the grain in bags, which minimises the grain losses.
- Avoid too much post harvest handling to minimise the grain losses.
- Pack the Soybean in sound B-Twill jute bags totally free from any contamination.

3.3 Post-harvest equipment:

The following implements are developed by Central Institute of Agricultural Engineering (C.I.A.E), Bhopal for better threshing of Soybean:

1) CIAE high capacity multicrop thresher

It is suitable for threshing of Soybean which was developed by CIAE, Bhopal during 1989-94.

Specifications

Dimension: 3.42 X 2.43 X 2.33
Weight(kgs.): 1200
Cylinder Size(mm.): 700 dia X 1100
Beater size: 40X10X180mm flats, 112 Nos.
Blowers : Aspirator type, 600mm.dia, 4 bladed.3 Nos.
Power source: 20 hp electric motor or 35 hp tractor pto
Performance results for Soybean:
Cylinder speed, m/s: 8.0
Broken grain percent:0.91
Total grain losses percent:1.55
Threshing efficiency percent: 99.9
Cleaning efficiency percent: 98.0
Output capacity kg./h: 780
Power consumption kw:8.4
Labour requirement(man-h/q): 0.2-0.6

CIAE High capacity multi-crop thresher

Source : Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal

2) CIAE multicrop thresher

It is suitable for threshing of Soybean which was developed by CIAE, Bhopal during 1981-85.

Specifications :

Dimension: 1.95 X1.65 X 1.45

Weight(kgs.): 450

Cylinder Size(mm.): 500 dia X 584

No. of beaters and size : 92 Nos., 25x 8x80 mm flats

No.of blowers and size : 1 No. , 672mm dia, 4 bladed

Size of straw thrower : 540 mm, 4 bladed

Power source: 5 hp electric motor

Performance results for Soybean:

Cylinder speed, m/s: 7.8

Broken grain percent: 2.2

Total grain losses percent: 4.01

Threshing efficiency percent: 98.8

Cleaning efficiency percent: 93.0

Output capacity kg./h: 200

Power consumption k/w : 2.8

Labour requirement(man-h/q): 0.24-1

CIAE Multi crop thresher

Source : Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal

3.4 Grading :

Grading is an important facilitating service in the marketing process of an agricultural commodity. It has been observed that uniform variety having bold grains fetch higher price in the market. The traders, who purchase Soybean negotiate the price on the basis of its quality such as cleanliness, boldness, colour, moisture, shrinkage, admixture, etc.

Importance :

- To get higher price of the produce and facilitate marketing.
- It widens the marketing process because buying and selling take place between two parties at distant places and reduces the cost of marketing and minimises storage and handling losses.
- It facilitates the keeping quality of the produce and easy finance.
- In case of dispute it facilitates to settle the claims.
- It facilitates the future trading.

3.4.1 Grade specifications:

I) Agmark specifications:

The Agmark grade standards for Soybean notified under the Agricultural Produce (Grading and Marking) Act 1937 by the Central Government (Directorate of Marketing and Inspection) are given in Table No.- 4.

Table No.–4

Grade designation and definition of quality of Soybean seeds

Grade desig-nations	Special requirements							
	Oil content on dry basis percent by weight	Acid value of oil	Moisture content percent by weight	Damaged, discoloured, insect infested beans percent by weight	Immature, shrivelled beans percent by weight	Splits, brokens, cracked beans percent by weight	Inorganic foreign matter percent by weight	Organic foreign matter percent by weight
	Mini-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum
Grade –I	20	3	10	1	2	5	0.5	0.5
Grade – II	18	4	12	2	3	10	0.5	0.5
Grade –III	15	6	12	3	5	20	0.5	1.5

General Characteristics:

Soybean shall be;

a) the mature, dried, clean and wholesome seeds of the plant *Glycine max (L) Merrill;*
b) of uniform size , shape and colour characteristic of the variety;
c) free from mould, musty odour or added colouring matter;
d) completely free from admixture of any poisonous, toxic, harmful or non-edible seeds like neem, argemone, khesari, castor, mahua, etc;

e) free from pesticides/insecticide residue, except to the extent permissible under the PFA Rules and shall not contain uric acid exceeding 100 mg/kg and mycotoxin including afflatoxin exceeding 30 micrograms per kilogram.

Explanations:

1) Damaged and discoloured :	Include beans or pieces of beans which are sprouted, mouldy, diseased or materially damaged due to heat, moisture or microbial action.
2) Insect infected :	Include beans or pieces of beans that are partially or wholly bored or eaten by insects.
3) Immature and shriveled :	Include beans which are not fully mature or properly developed and shrunk out of shape.
4) Splits, broken and cracked beans :	Include mechanically damaged beans or pieces of beans with broken seed coat.
5) Inorganic foreign matter :	Includes sand, dust, dirt, stones, lumps of earth.
6) Organic foreign matter :	Includes chaff, stem, straw, husk and other edible seeds.

II) Specifications followed by NAFED for procurement :

National Agricultural Co-operative Marketing Federation (NAFED) is the central nodal agency of Government of India, which arranges procurement of Soybean under Price Support Scheme (P.S.S.). The grade specifications followed during marketing season 2003-2004 is given in Table No.–5.

Table No. – 5

Grade specifications of Soybean followed by NAFED for price support scheme during 2003-04 marketing season

S.No.	Special Characteristics	Maximum limits of tolerance(percentage by weight per quintal) for FAQ
1.	Foreign matter and impurities	2
2.	Shrivelled and immature beans	5
3.	Damaged and Weevilled beans	3
4.	Mechanically damaged beans (split, broken and crack)	15
5.	Moisture content	12
Support price for naked beans (Yellow)		Rs.930/- per quintal
(Black)		Rs.840/- per quintal

Definitions:

1. Foreign matter means dust, dirt, stones, lumps of earth, chaff, stem, straw or any other impurity.

2. Damaged and weevilled beans are the beans or pieces of these which have sprouted or are internally damaged as a result of heat, moisture, insect or microbial action.
3. Shriveled and immature beans are the beans that are shrunk, out of shape, or are not fully mature or developed and are often discoloured.

[Source: National Agricultural Co-operative Marketing Federation (NAFED)]

III) Grade Specifications of Soybean Processors Association of India (SOPA) :

SOPA has a vision to focus on quality of Indian Soybean products marketed both in domestic and international markets to ensure reliable, consistent and uniform quality and to create brand equity in both the markets. SOPA certify those Soybean products which are covered by SOPA standards. Specifications for Soybean seed followed by SOPA are as follows:

S.No.	Characteristic	Limit	Requirement
1	Moisture, percent by mass	Maximum	12.00 %
2	Protein (N x 6.25), percent by mass	Minimum	36.00 %
3	Crude fat or ether extract, percent by mass	Minimum	18.00 %
4	Acid insoluble ash, percent by mass	Maximum	01.50 %
5	Damaged Seeds, percent by mass	Maximum	05.00 %
6	Foreign matter, percent by mass	Maximum	04.00 %

Source : www.sopa.org

IV) CODEX standards :

A) The CODEX standards for Soybean:

Maximum residue limits for pesticides as per Codex for Soybean (dry) are given in Table No.- 6.

Table No. –6

Maximum residue limits for pesticides as per Codex for Soybean (dry)

Sl .No.	Pesticides	MRL (Mg / Kg.)
1.	Azinphos-methyl	MRL 0.05*
2.	Carbaryl	MRL 1
3.	Diquat	MRL 0.2
4.	Fenitrothion	MRL 0.1
5.	Paraquat	MRL 0.1
6.	Parathion	MRL 0.05*
7.	Carbondazim	MRL 0.2
8.	Fenamiphos	MRL 0.05*
9.	Methamyl	MRL 0.02
10.	Acephate	MRL 0.5

11.	Carbafuran	MRL	0.2
12.	Methamidophos	MRL	0.05
13.	Phorate	MRL	0.05
14.	Aldicarb	MRL	0.02*
15.	Cypermethrin	MRL	0.05*
16.	Fenvalerate	MRL	0.1
17.	Permethrin	MRL	0.05*
18.	Oxamyl	MRL	0.1
19.	Diflubenzuron	MRL	0.1
20.	Metalaxyl	MRL	0.05*
21.	Triozophas	MRL	0.05*
22.	Ethoprophos	MRL	0.02*
23.	Glyphospate	MRL	2.0
24.	Terbufos	MRL	0.05*
25.	Profenofos	MRL	0.05*
26.	Bentazone	MRL	0.05*
27.	Glufosinate ammonium	MRL	0.1
28.	Cycloxydim	MRL	2

Note : MRL -- Maximum Residue Limit.
EMRL -- Extraneous Maximum Residue Limit.
* -- At or about the limit of determination.

Source : www.codexalimentarius.net

B) CODEX GENERAL STANDARD FOR SOY PROTEIN PRODUCTS

CODEX STAN 175-1989

1. SCOPE

This standard applies to Vegetable Protein Products (VPP) prepared from Soybeans (seeds of *Glycine Max*.L.) by various separation and extraction processes. These products are intended for use in foods requiring further preparation and by the food processing industry.

2. DESCRIPTION

Soy Protein Products (SPP) covered by this standard are food products produced by the reduction or removal from Soybeans of certain of the major non-protein constituents (water, oil, carbohydrates) in a manner to achieve a protein (N x 6.25) content of:

- in the case of soy protein flour (SPF) 50% or more and less than 65%;
- in the case of soy protein concentrate (SPC) 65% or more and less than 90%;
- in the case of soy protein isolate (SPI) 90% or more.

The protein content is calculated on a dry weight basis excluding added vitamins, minerals, amino acids and food additives.

3. ESSENTIAL COMPOSITION AND QUALITY AND NUTRITIONAL FACTORS

3.1 Raw materials

Clean, sound, mature, dry seeds essentially free from other seeds and foreign matter in accordance with Good Manufacturing Practice, or SPP of lower protein content meeting the specifications contained in this standard.

3.2 SPP shall conform to the following compositional requirements:

3.2.1 Moisture content shall not exceed 10% (m/m).

3.2.2 Crude Protein (N x 6.25) shall be:

- in the case of SPF, 50% or more and less than 65%
- in the case of SPC, 65% or more and less than 90%
- in the case of SPI, 90% or more

on a dry weight basis excluding added vitamins, minerals, amino acids and food additives.

3.2.3 Ash

The yield of ash on incineration shall not exceed 8% on a dry weight basis.

3.2.4 Fat

The residual fat content shall be compatible with Good Manufacturing Practices.

3.2.5 Crude fibre content shall not exceed:

- in the case of SPF, 5%
- in the case of SPC, 6%
- in the case of SPI, 0.5%

on a dry weight basis.

3.3 Optional ingredients

(a) carbohydrates, including sugars
(b) edible fats and oils
(c) other protein products
(d) vitamins and minerals
(e) salt
(f) herbs and spices

3.4 Nutritional Factors

Processing should be carefully controlled and sufficiently thorough to secure optimum flavour and palatability, as well as to control such factors as trypsin inhibitor, hemaglutinins, etc., in

accordance with intended use. Where it is necessary to control trypsin inhibitor activity in a food, the maximum level allowed should be defined in terms of the finished product. Certain SPP are produced under low temperature conditions to avoid loss of protein solubility or enzyme activity. The special purpose SPP shall be assayed for protein nutritive value after appropriate heat treatment. Processing must not be so severe as to appreciably impair the nutritive value.

4. FOOD ADDITIVES

During the course of manufacturing SPP the following classes of processing aids, as compiled in the advisory inventory of the Codex Alimentarius Commission, may be used:

Acidity Regulators
Antifoam Agents
Firming Agents
Enzyme Preparations
Extraction Solvents
Antidusting Agents
Flour Treatment Agents
Viscosity Control Agents.

5. CONTAMINANTS

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

6. HYGIENE

6.1 It is recommended that the products covered by the provisions of this standard be prepared in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 2-1985, Codex Alimentarius Volume 1B).

6.2 To the extent possible in Good Manufacturing Practice, the products shall be free from objectionable matter.

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

(a) shall be free from microorganisms in amounts which may represent a hazard to health;
(b) shall not contain substances originating from microorganisms in amounts which may represent a hazard to health; and
(c) shall not contain other poisonous substances in amounts which may represent a hazard to health.

7. PACKAGING

SPP shall be packed in suitable hygienic containers which will maintain the product during storage and transport in a dry and sanitary condition.

8. LABELLING

The provisions of the General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev 1-1991, Codex Alimentarius Volume 1A) shall apply.

8.1 Name of the food

8.1.1 The name of the food to be declared on the label shall be:

"soy protein flour" or "soya protein flour" when the protein content is 50% or more and less than 65%.

"Soy protein concentrate" or "soya protein concentrate" when the protein content is 65% or more and less than 90%.

"Soy protein isolate" or "isolated soy protein" or "soya protein isolate" or "isolated soya protein" when the protein content is 90% or more.

8.1.2 The name may include a term which accurately describes the physical form of the product, e.g., "granules" or "bits",

8.1.3 When the SPP is subjected to a texturization process, the name of the product may include an appropriate qualifying term such as "textured" or "structured".

8.2 List of Ingredients

A complete list of ingredients shall be declared on the label in descending order of proportion except that in the case of added vitamins and added minerals, these ingredients shall be arranged as separate groups for vitamins and minerals, respectively, and within these groups the vitamins and minerals need not be listed in descending order of proportion.

8.3 Labeling of Non-Retail Containers

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

Source : www.codexalimentarius.net

V) PFA Standards for Solvent Extract Soya Flour :

Solvent Extract Soya Flour means the product obtained from clean, sound healthy Soybeans by a process of cracking, dehulling, solvent extraction with food grade hexane and grinding. It

shall be in the form of coarse or fine powder or grits, white to creamy white in colour, of uniform composition and free from rancid and objectionable odour, extraneous matter, insects, fingus, rodent hair and excreta. It shall be free from any added colour and flavour. It shall conform to the following standards, namely:-

(a)	Moisture	Not more than 9.0 per cent, by weight
(b)	Total ash	Not more than 7.2 per cent by weight on dry basis
(c)	Ash insoluble in dilute HCL	Not more than 0.4 per cent by weight on dry basis
(d)	Protein (N x 6.25)	Not less than 48 per cent by weight on dry basis
(e)	Crude fibre	Not more than 4.2 per cent by weight on dry basis
(f)	Fat	Not more than 1.5 per cent by weight on dry basis
(g)	Total bacterial count	Not more than 50,000 per gm
(h)	Coliform bacteria	Not more than 10 per gm
(i)	Salmonella bacteria	Nil in 25 gm
(j)	Hexane (Food grade)	Not more than 10.00 ppm.

Source: The P.F.A. Act, 1954 – Edition 2004

3.4.2 Adulterants and toxins:

The Soybean is one of the products in which Aflatoxins are produced. The fungi (mould) that produce aflatoxins infect it before, during and after harvest. These fungi, specially, *Aspergilus flavus*, *A.parasiticus* and *Fusarium sp* are normal soil borne inhabitants in our envioromnent, growing on both living and decaying plant matter.

Mycotoxins include metabolic by-products, produced by a number of different fungi that may or may not be toxic. Four different aflatoxins i.e. B1, B2, G1 and G2 have been identified with B1 being the most toxic, carcinogenic and prevalent.

3.4.3 Grading at producers' level:

The scheme for grading at 'Producer level' was introduced in1962-63 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. The programme is being implemented by the state government. During the year 2001-02, about 3143 tonnes of Soybean valued at Rs. 239.07 lakh as against 2088 tonnes valued at Rupees 198.40 lakh during the year 2002-2003 were graded at producers' level.

3.5 Packaging:

The Government of India has made it mandatory to pack food grains cereals, pulses etc., in Jute bags and an official notification in this regard was issued by the Ministry of Textiles on 30th June, 1997. The jute gunny bags of 89X54 cms. sizes are usually used for packing Soybean. The standard capacity of

the bag for Soybean is 95 kgs. The small size seed of Soybean can be filled up to 100 kgs. However, it has been observed that sometimes small consumer packaging is carried out in transparent thick polyethylene bags.

Table No. –8

Properties of jute bags and HDPE bags

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

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

Criteria for selection of packaging material for Soybean:

➔ Packaging material should be;
1) Suitable according to transportation and storage method.
2) Suitable according to climatic and environmental conditions.
3) Safe to handle during transportation.
4) Cheap, economical, readily available, easy to handle and store.
5) Convenient and suit the need of the customer.
6) Attractive for display.
7) Environment friendly and biodegradable.
8) Conform to the requirements as laid down under PFA standards as amended from time to time.

➔ Soybean seed should be packed in clean, hygienic bags of any material, which does not affect the produce and prevents it from absorbing moisture.

➔ The packing material used should have sufficient aeration facilities

➔ The material must provide protective strength to the produce.

3.6 Transportation:

1) Road : Road transport is the most popular means for movement of Soybean to the assembling markets as well as to the distribution centres.

a) Bullock / camel carts: Bullock or camel carts are the primary means of transport in most rural areas of India. It is convenient due to following reasons:-

Bullock cart

- ⇨ Cheap and early available conveyance.
- ⇨ Good for small quantity of produce.
- ⇨ Easy transport to short distance.
- ⇨ Operational cost is low.
- ⇨ Easily manufactured by village artisans from materials (wood) available at village and the repairing facilities are also readily available there.
- ⇨ No special type of road is required, can be operated on *kaccha* road, muddy or sandy path also.

b) Tractor trolley: Transportation by tractor trolley is convenient due to following reasons –

Tractor trolly

- ➔ To carry larger quantity of produce than bullock carts in less duration of time.
- ➔ Suitable in surplus producing areas than the trucks for carrying produce to the primary assembling markets where there is absence of proper *pucca* road connecting the villages.

c) Trucks: The movement of Soybean from assembling markets to the secondary markets and consuming markets is invariably by trucks. For larger or bulk quantity, the truck is the most convenient mode of transport throughout the country and in some cases better than railway wagons since the railway wagon transportation poses some difficulties like timely non-availability of wagons, safety of goods and problems of loading-unloading of produce directly at godowns. It is convenient due to following reasons:

Truck

- ⇨Easy availability
- ⇨Time saving
- ⇨Quick movement of stocks
- ⇨Door to door delivery
- ⇨Comparatively cheaper for short / medium distances
- ⇨Suitable for smaller quantities at a given time
- ⇨Flexibility in operation and reliability in handling of produce
- ⇨Minimum transit losses due to least handling of loading and unloading

2) Rail: Railway system in India is Asia's largest and World's fourth largest in terms of route kilometers. For faster movement of goods, super express goods trains operate at fixed timings on trunk and other important routes. The transportation of Soybean by railway wagons may become convenient for following reasons:

Rail

- Suitable for carrying larger quantity of produce over long distances through out India.
- Comparatively cheaper and safer mode of transport available through a wide network of railways.
- Facilities of three categories of tariff are as :
  1) Telescopic/Class rate 2) Wagon load scale 3) Station to station rate

During transportation, following care should be taken:

- The packs of Soybean should be handled and transported in such a way so that they remain well protected from sun, rain or other sources of excessive heat, objectionable odour and from any type of cross infestation especially, while transporting through ships.
- During transportation, there should be proper arrangement of sufficient aeration and insulation to reduce the heat.
- Stacking height should be kept up to 6 to 10 tiers.
- While handling and lifting of bags during transportation, too much use of hooks by labourers should be avoided, which may cause spoilage losses from the Soybean bags.

3.7 Storage:

Most of the farmers store Soybean in their own houses. They usually store in gunny bags. The filled bags are stacked above wooden planks and gunny bags or paddy straw is spread over the floor to avoid dampness. The big farmers normally have *pucca*-floored houses, where the Soybean is stored.

Traders, commission agents and brokers usually have their own godown facilities. They keep the Soybean in bags in their own godowns in packed condition. The processing units are the main agencies who stock Soybean for a longer period. They purchase and stock Soybean to meet the requirements for the whole year. Generally Soybean is not stored in loose form. The bags are stored in the godowns, which have cemented floors.

Basic requirements for safe storage:

The following requirements are basic prerequisite for safe storage of Soybean:

I) Selection of godown
II) Cleaning of godowns
III) Use of dunnage
IV) Cleaning of bags
V) Cleaning of vehicles
VI) Aeration of godown
VII) Separate storage of old and new stock
VIII) Cleaning and drying of Soybean
IX) Regular inspection of stocks

Godown

The code of storage practices of Soybean meant for milling and other industrial purposes are as follows:

■ Godowns:

- The godown for storage of Soybean shall be of 'A' Class construction with moisture proof flooring, leak proof roofing, tight fitting doors and ventilators. High plinth level of godown may prevent the entry of rodents and water.

- Soybean shall not be stored in compartment having fertilizer, cement or any other substance having deleterious effect. Godowns where fertilizers have recently been stored shall thoroughly be washed with caustic soda, fully aerated and when no traces of odour are present, Soybean shall be stored.

■ Dunnage:

- Wooden crates dunnage is preferable for the storage of Soybean. However, in the absence of wooden crates, polythene film sandwiched between two layers of bamboo mats may be used. Mat dunnage used for fertilizer, cement etc. should not be used for Soybean.

■ Stacking:

- Soybean bags shall be stacked in the godowns away from walls, pillars, doors, etc. leaving an alleyway space of 0.6 – 0.9m (2 to 3ft.). the main alleyway may not be less than 1.2m (4ft.). The base of stack shall not be more than 9.14m x 6.06m (30 x 20 ft.)
- Stack height of 15 layers is considered suitable for freshly harvested Soybean. Well dried stock with moisture content of less than 9 percent can however, be stacked a few layers higher.

Stack arrangement

■ Preservation:

- The Soybean which is rich in protein, as well as fat is vulnerable to infestation by insects, mites. Soybean is susceptible to *Cadra cautella, spp. Rhizopertha* d*oninica, Trogoderma granarium, Oryzaephilus surinamensis, Caryeodon gonargra,* etc. depending upon climatic conditions. Soybean containing less than 9 percent moisture generally remains free from the attack of pests.
- In case infestation occurs, fumigation shall be done with Aluminium phosphide at the prescribed dosage. In no case, methyl bromide should be used, as the commodity is rich in oil contact.
- Excellent godown hygiene should be maintained to minimize the chances of insect infestation. Selective aeration of stock on clear sunny days should be done to maintain the quality of stock.

- Regular prophylactic treatments should be provided to the stocks with approved chemicals at recommended dosages.
- Regular inspection of stock should be done fortnightly by the usual procedure to examine the health of stock and to plan future pest control measures.

■ Insurance:

- Soybean is classified as non-hazardous for the purpose of fire insurance.

7.1 Major storage pests and their control measures:

The details of the major insects and their control measures are given in Table No- 9 .

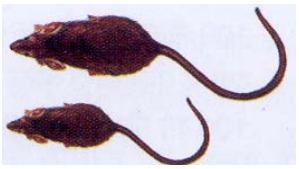
Table No. –9

Major storage pests and their control measures

Insect	Control/ remedial measure	Method of application
1. Cigaratte beetle *Lasioderma serricorne (Fabricus)*  2. Lesser grain borer *Rhizopertha dominica (F)* 	1. Malathion (50 percent E.C.): Mix 1 litre Malathion in 100 litre of water and spray this 3 litre prepared solution per 100 Sq. metre area.	Spraying is to be done at 15 days interval during March to Oct. and at 21 days interval during Nov. to Feb.
3. Saw-toothed grain beetle *Oryzophilus surinamsis(L)*  4. Groundnut borer *Caryedon sp* 	2. D.D.V.P. (76 percent E.C.): Mix 1 litre D.D.V.P. in 150 litre of water and spray this 3 litre prepared solution per 100 Sq. metre area.	Spraying not to be done directly to the oilseed bags. Air charging of D.D.V.P is to be done on the walls and floor of the godown as and when required.

5. Khapra beetle *Trogoderma granarium Ev.*   Adult *Larvae*	3. Deltamethrin : Mix 1 Kg Delta-methrin with 25 litres of water and spray this 3 litre prepared solution per 100 Sq. metre area	Spraying is to be done at 3 months interval directly on the oilseed bags.

Rodents: Besides above, rodent causes mechanical damage to stored Soybean gunny bags by cutting, which results in bleeding and quantitative loss of the produce. Moreover, the rodent's excreta, hair, etc., deteriorate the hygiene of Soybean. To control the rodents following measures are to be taken:



Control measures:

a) Use of Rat cage :	Different types of rat cages are available in the market. Rats caught by these rat cages can be killed by dipping into water.
b) Use of poison baits :	For killing the rats, poison baits are used. In this process, anti-coagulant pesticide like Zinc Phosphide is mixed with bread or any other food stuff used as bait. This kind of pesticide affects gradually the body of rodents which ultimately kills them.
c) Rat burrow fumigation :	To control the rat hazards, the rat holes/burrows if any found inside the godown or surrounding areas may be fumigated by putting two Alluminium Phosphide tablets into it and sealing the mouth of the hole/burrow by mud mixture.

3.7.2 Storage structures:

◆ Bins:

1.Mud-bin : Made by bricks and mud or by straw and cow dung. These are usually cylindrical in shape with varying capacity.

2.Bamboo reed bin: Made by bamboo splits plastered with mixture of mud and cow dung.

3.Metal drums : Made up with iron sheets in cylindrical and square shape with various sizes.

4.Improved bins : Different organisations developed and designed improved storage structures for scientific storage of foodgrains, which are moisture resistant and rodent-proof. These are:

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

◆ Godown:

1. Kaccha godown : These are made by brick or stone walls with mud mixture for storing Soybean in bulk and bags.

2. Pucca godown : These are made by brick-walls with cemented flooring for storing Soybean in bulk and bags.

◆ CAP (Cover and plinth) storage : It is an economical way of storage on a large scale. The plinth is made by cement concrete and bags are staked on open and covered by polythene cover.

3.7.3 Storage facilities:

I) Producers' storage :

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

II) Rural godowns :

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godowns Scheme in collaboration with NABARD and NCDC. Its objective is to construct scientific storage godowns with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. The main objectives of Rural Godowns Scheme are as under:

1. Creation of 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;
2. Promotion of grading, standardization and quality control of agricultural produce to improve their marketability;
3. Strengthen agricultural marketing infrastructure in the country by paving the way for the introduction of a national system of warehouse receipts in the respect of agricultural commodities stored in such godowns;
4. Prevention of distress sale immediately after harvest by providing the facility of pledge financing and marketing credit; and
5. Reverse the declining trend of investment in the agriculture sector by encouraging the private and cooperative sectors to invest in the creation of storage infrastructure in the country.

III) Mandi godowns :

Most of the Soybean is moved to the market after the harvest. Generally, Soybean is stored both in bulk and in bags in every mandi. Most of the States and U.Ts. have enacted Agricultural Produce

(Marketing Regulation) Acts. The APMCs constructed storage godowns in the market yards. At the time of keeping produce in godown, a receipt is issued indicating the kind and weight of produce stored. The receipt is treated as negotiable instrument and eligible for pledge finance. The CWC and SWCs were also allowed to construct godowns in the market yards. Co-operative societies also constructed godowns in the market yards, both in producing and consuming areas/markets. Traders also possess permanent storage in the form of own godowns or warehouses, or on hire basis.

IV) Central Warehousing Corporation (CWC) :

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

Table No. –10

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

Name of State	No of warehouses	Total capacity (in tonnes)
1.Assam	6	46934
2.Andhra Pradesh	49	1259450
3.Bihar	13	104524
4.Chhattisgarh	10	259964
5.Delhi	11	135517
6.Gujarat	30	515301
7.Haryana	23	338860
8.Karnataka	36	436893
9.Kerala	7	93599
10.Madhya Pradesh	31	665873
11.Maharashtra	52	1248510
12.Orissa	10	150906
13.Punjab	31	820604
14.Rajasthan	26	371013
15.Tamil Nadu	27	676411
16.Uttaranchal	7	73490
17.Uttar Pradesh	50	1018821
18.West Bengal	43	563698
19.Others	13	136826
Total	475	8917194

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

V) State Warehousing Corporations (SWCs) :

Different States have set up their own warehouses in the country. The area of operation of the State Warehousing Corporations is district places of the State. The total share capital of the State Warehousing Corporations is contributed equally by the Central Warehousing Corporation and concerned State Government. The SWCs are under the dual control of the State Government and the CWC. At the end of December 2002, SWCs were operating 1537 warehouses in 17 States of the country with the total

capacity of 201.90 lakh tonnes. The State-wise storage capacities with SWCs as on 31-12-2002 are given below.

Table No. –11

State-wise storage capacity with SWCs as on 31-12-2002.

Name of SWC	No. of warehouses	Total capacity (in lakh tonnes)
1. Andhra Pradesh	120	17.14
2. Assam	44	2.67
3. Bihar	44	2.29
4. Gujarat	50	1.43
5. Haryana	113	20.48
6. Karnataka	107	6.67
7. Kerala	62	1.85
8. Madhya Pradesh	219	11.57
9. Maharashtra	157	10.32
10.Meghalaya	5	0.11
11.Orissa	52	2.30
12.Punjab	115	72.03
13.Rajasthan	87	7.04
14.Tamil Nadu	67	6.34
15.Uttar Pradesh	168	30.42
16.West Bengal	32	2.58
17.Chhattisgarh	95	6.66
Total	1537	201.90

Source : Central Warehousing Corporation, New Delhi

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. –12

State-wise cooperative storage facilities as on 31-3-2001.

Name of State	Rural level	Market level	Total capacity (in tones)
1. Andhra Pradesh	4003	571	690470
2. Assam	770	262	297900

3. Bihar	2455	496	557600
4. Gujarat	1815	401	372100
5. Haryana	1454	376	693960
6. Himachal Pradesh	1634	203	202050
7. Karnataka	4828	921	941660
8. Kerala	1943	131	319585
9. Madhya Pradesh	5166	878	1106060
10.Maharashtra	3852	1488	1950920
11.Orissa	1951	595	486780
12.Punjab	3884	830	1986690
13.Rajasthan	4308	378	496120
14.Tamil Nadu	4757	409	956578
15.Uttar Pradesh	9244	762	1913450
16.West Bengal	2791	469	478560
17.Other States	1031	256	312980
Total	55886	9426	13763463

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

3.7.4 Pledge finance system :

The Indian farmers usually have small holdings. They do not have the financial capability to retain their surplus produce till favourable market price and are often compelled to sell their produce, immediately after the harvest when the prices are usually low. The only way out to this nagging problem is creating infrastructure which could provide them with safe and scientific storage of their produce and also make proper avenue for availing marketing finance against their stored produce. The creation of rural godown coupled with the system of pledge finance is emerging as a befitting mechanism to benefit them in a great way.

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

Benefits :

- Increases the retention capacity of the small farmers to avoid distress sale.

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

4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 Assembling :

4.1.1 Major assembling markets:

The major assembling markets for Soybean are located in Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. Some major assembling markets of Soybean in major producing states in India are listed below in Table No. -13.

Table No.– 13

Major assembling markets of Soybean

State	Name of District	Name of major market/*mandies*
1.Madhya Pradesh	Ujjain	Badnagar, Mahindpur,Ujjain
	Indore	Indore, Gautampura,Mhow
	Dewas	Dewas, Khategaon,Soankachh
	Mandsour	Mandsour
	Neemach	Neemach
	Ratlam	Ratlam, Jaora
	Dhar	Dhar, Badnawar
	Khandwa	Khandwa
	Harda	Harda
	Baitul	Baitul
	Hoshangabad	Itarshi, Pipariya
	Sahjahpur	Shujalpur
	Rajgarh	Biora,Pachore
	Sihore	Sihore, Ashta
	Bhopal	Bhopal
2.Maharashtra	Ahmednagar	Kopargaon, Newasa, Rahuri, Shrigonda, Shrirampur, Akole
	Dhule	Dhule,
	Nandurbar	Shahada, Akkallkuwa
	Jalgaon	Chopada, Pachora, Raver

	Nashik	Lasalgaon, Malegaon, Manmad, Nandgaon, Sinnar, Kalvan, Dindori
	Kolhapur	Gadhinglaj, Jaysingpur
	Pune	Vadgaonpeth, Baramati, Shirur
	Sangli	Islampur, Sangli, Tasgaon
	Satara	Karad, Koregaon, Patan, Satara
	Solapur	Akluj
	Aurangabad	Kannad, Lasurstation, Sillod,
	Beed	Ambejogai, Kille Dharur, Gevrai, Kaij,
	Jalna	Jalna, Ambad (Vadi Godri), Bhokardan
	Latur	Ahmedpur, Ausa, Murud, Udgir
	Nanded	Bhokar, Hadgaon, Loha, Mudkhed, Nanded
	Osmanabad	Kalamb,Osmanabad, Tuljalpur
	Parbhani	Akhadabalapur, Ghangakhed, Hingoli, Jintur, Kalalmnuri, Parbhani, Sengaon, Purna,Sailu, Jawala-bajar, Tadkalas, Palam
	Akola	Akola, Akot, Balapur, Karanja, Mangrulpeer, Manora Murtizapur, Patur, Risod, Telhara, Washim
	Amravati	Achalpur, Amaravati, Anajngaon-Surji , Chandur Rly., Chandur Bajar, Daryapur, Dharni, Morshi, Nandagaon,
	Buldhana	Varud, Chikali, Deulgaon Raja, hamgaon,Lonar, Sind kher-raja, Malkapur, Mehkar, Motala, Nandura
	Yeotmal	Darwha, Digras, Ghatanji, Maregaon, Nerparasopant, Pandharkawada, Pusad, Ralegaon, Umarkhed , Vani, Yeotmal, Kalamb
	Bhandara	Bhandara, Lakhandur, Pavani, Tumsar
	Chandrapur	Brahmpuri, Chandrapur, Chimur, Mul, Nagbhid, Varora, Gondpimpri, Bhadrawati, Aheri, Chamorshi
	Nagpur	Bhiwapur, Katol, Mandhal, Nagpur, Narkhed, Saoner, Umred, Parshiwani
	Wardha	Arvi, Hinganghat, Ashti, Pulgaon, Sindi, Wardha, Samudrapur
3.Rajasthan	Barang	Anta, Atur, Barang, Chhabra
	Bhilwara	Mandalgarh
	Jaipur	Jaipur
	Sawai Madhopur	Sawai Madhopur
	Bundi	Bundi, Keshorai Patan
	Jhalawar	Bhawani Mandi, Iklera, Jhalarapatan, Khanpur
	Kota	Itawa, Kota, Ramganj Mandi
	Chhitorgarh	Badisadri, Begu, Chitorgarh, Pratapgarh
	Udaipur	Fatehnagar
	Banswara	Banswara
4.Uttar Pradesh	Ghaziabad	Ghaziabad
	Jalalun	Orai, Konch, Madhav Garh, Jalaun
	Lalitpur	Lalitpur
	Hamirpur	Rath, Kurara, Muskara
	Banda	Banda, Atarra

	Bahraich	Nanpara, Bahraich, Mihipurna, Risia
	Faizabad	Faizabad
	Gautam Budh Nagar	Dadri
	Varanasi	Varanasi
	Lucknow	Lucknow
	Sitapur	Sitapur
	Badaun	Bisauli
	Unnao	Unnao, Bangarmah
	Allahabad	Jasra
	Mahoba	Mahoba
	Bijnaur	Dhampur
	Kanpur Nagar	Kanpur
	Kanpur dehat	Pukhrayan
	Jhansi	Jhansi, Barua sagar, Chirgaon, Month

4.1.2 Arrivals:

It was reported that the total arrivals of Soybean in 26 markets of Madhya Pradesh were 1777341 tonnes followed by 137 markets of Maharastra with 303843.4 tonnes and 23 markets of Rajasthan with 335373 tonnes during the year 2000-2001. The detailed information about the quantity of arrivals of Soybean in major assembling markets of main producing states is shown in Table No-14.

Table No.14

Arrivals of Soybean in major assembling markets:

Sl.No.	Name of the state and number of markets	Marketing year	Total qty. of arrivals (in tonnes)
1.	Madhya Pradesh (26 markets)	1999-2000 2000-2001 2001-2002	1816584 1777341 1633567
2.	Maharashtra (137 markets)	1999-2000 2000-2001	409851.6 303843.4
3.	Rajasthan (23 markets)	1999-2000 2000-2001 2001-2002	383316 335373 410154
4.	Uttar Pradesh (33 markets)	2000-2001 2001-2002	13377 4195

Source : Department of Agriculture and Cooperation, New Delhi.

4.1.3 Despatches :

In Madhya Pradesh, the maximum arrivals and dispatches were at Indore, Dewas, Ujjain, Sahajapur, Sehore, Ratlam and Dhar markets. The processing units are mainly situated at Indore, Dewas, Sahajapur, Sehore, Pethampur and Betul, etc., and, as such, a major share of dispatches were to these centers. Large scale dispatches outside the state were to Jamnagar and Rajkot in Gujarat.In Maharashtra, Nagpur, Amravati and Wardha are important assembling markets. Soybean from these markets were despatched to Mumbai, Nasik, Aurangabad and Akola. In Rajasthan state, Kota, Chittorgarh and Jhalawar are the important assembling markets. Soybean was dispatched to Gujarat, Madhya Pradesh and Delhi for further processing. , Substantial quantity of Soybean is moved to the processing units in Madhya Pradesh from Uttar Pradesh. The trend of despatches of Soybean observed as follows:

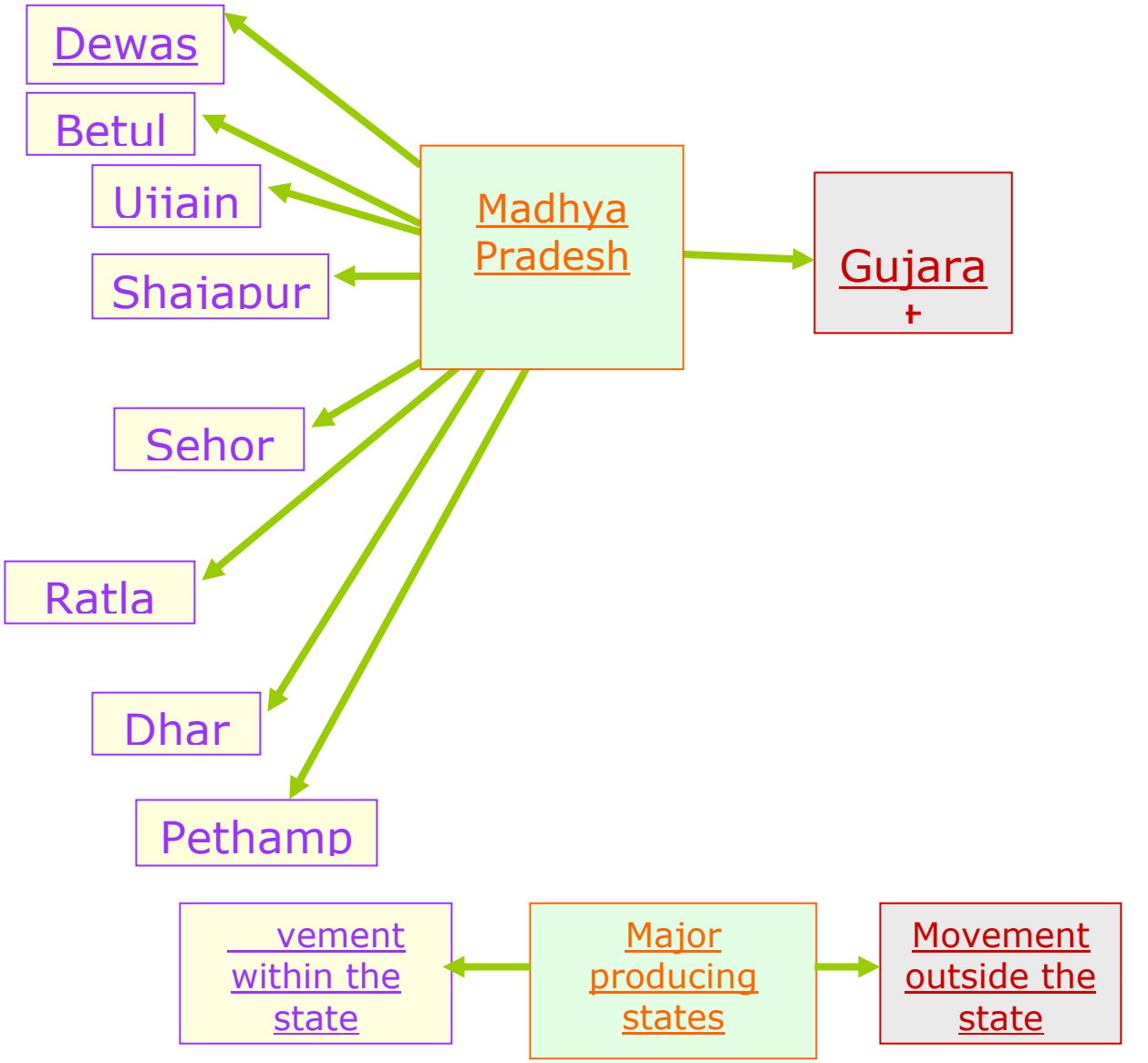
Sl.No.	Place of dispatch	Place of arrival
1.	Indore, Dewas, Ujjain, Sahajapur, Sehore, Ratlam, Dhar	Pithampur, Betul, Jamnagar, Rajkot
2.	Nagpur, Amravati, Wardha	Mumbai, Nasik, Aurangabad, Akola
3.	Kota, Chittorgarh, Jhalawar	Madhya Pradesh, Gujarat, Delhi
4.	Uttar Pradesh	Madhya Pradesh

4.2 Distribution:

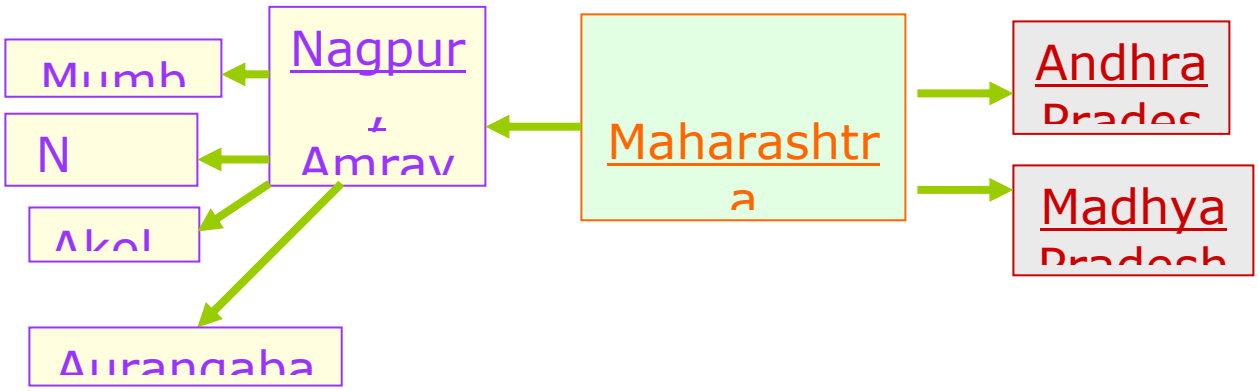
In the producing states, commission agents are the major agency in distribution of Soybean. In the consuming states, the distribution is confined to retailers. The purchase of Soybean for processing units is mainly done by the commission agents in all major assembling markets. As such, commission agents are the important distributing agency for Soybean. They attend to handling, packing and dispatch of Soybean on behalf of their clients. In the assembling markets, processing units also purchase and dispatch Soybean to their own units. Brokers and wholesalers play some role in distribution of Soybean but not to the extent of commission agents. The distribution for retail sale in the non-producing states is mainly affected through wholesalers.

4.2.1 Inter-state movements :- The inter-state movement from the major producing states are exhibited in diagrammatic flow chart below :

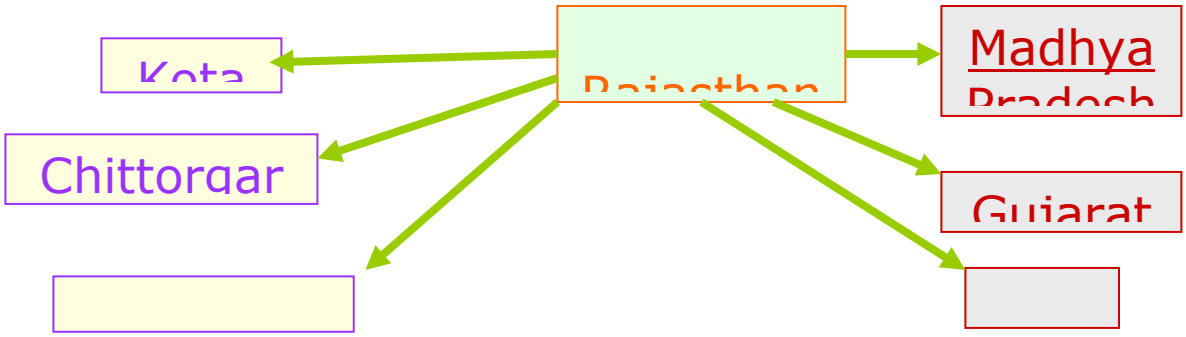
I) Madhya Pradesh State :



II) Maharashtra State :



III) Rajasthan State :



4.3 Export and import

✱ Export: India being a net importer of oilseeds and vegetable oils, the export of Soybean from India is negligible. The export of Soybean seed and oil was mainly to Bangladesh, Indonesia, Sri Lanka, Nepal, Singapore, New Zealand, etc. However, a substantial quantity of Soybean oil cake has been exported from India, contributing valuable foreign exchange to the country. India's share in the world Soybean oil meal export was around 8.2 percent during the year 1998-99.

Table No.–15

India's export of Soybean and its products during 1998-99 and 1999-2000

Commodity	1998-99		1999-2000	
	Quantity (in tonnes)	Value (in crores Rs.)	Quantity (in tonnes)	Value (in crores Rs.)
Soybeans	1326	0.89	1727	7.3
Flours and meals of Soybean	3418.9	5.1	5647	7.1
Soybean oil factions	640	0.1	28.5	1.0
Oil cake and meal of Soybean	4895.5	3.4	45524	33.9
Deoiled cake of Soybean	242459	149.4	245969	173.9
Deoiled cake of Soybean, SE	2633968	1578.6	2108553	1372.3
Total	2886707.4	1737.49	2407448.5	1596.1

Source : Oilseeds Situation ---- A Statistical Compendium (2002),
Dte. of Oilseeds Research, Rajendranagar, Hyderabad (A.P).

✱ Import: Total import of Soybean (Broken) in India was 132009 kg. valued at Rs. 3057517 during the year 2000-2001 mainly from the countries Canada, Indonesia and Singapore as against 57000 kg. valued at Rs. 914370 in the year 2001-2002 from Canada only.

India's country-wise Import.

Soybean (Broken) (Quantity: Kilogram, Value: Rupees)

S. N.	Name of Country	2000-01		2001-02	
		Quantity	Value	Quantity	Value(Rs.)
1	Canada	114000	2170577	57000	914370
2	Indonesia	10000	7068633	---	---
3	Singapore	8009	178307	---	---
	Total	132009	3057517	57000	914370

Source : DGCIS, Kolkota.

4.3.1 Sanitary and phyto-sanitary measures:

The Sanitary and phytosanitary (SPS) measures are a n integral part of export trade as per agreement made under GATT (General Agreement on Trade and Tariffs), 1994. As per provisions made under this agreement, the standards framed should be such that the minimum level of protection required by an importing country may be fulfilled. In order to achieve this objective, the agreement to set up international standards and guidelines under the aegis of Codex Alimentaris Commission (Codex), which was earlier set up in 1963 by the Food and Agriculture Organisation (FAO) and World Health Organisation (WHO) to develop food standards, by laying down guidelines and related texts such as Code of tactics under the joint aegies of FAO/WHO, Food standards programme is aimed at protecting health of the consumers and ensuring fair trade practices in the food trade as well as to promote co-ordination of all food standards work undertaken by international governmental and non-governmental organisations. The SPS measures thus adopted safeguard the risks arising from;

✱ The entry, establishment or spread of pest, disease or any disease causal organism.
✱ The additives, contaminants, toxins or disease causing organism on foodstuff.
✱ The disease carried by animals, plants or their products.

During export, in order to make the plant/seeds free from any quarantine pests and diseases, the exporter should give a disinfection treatment by keeping the viability of the plant/seeds unaffected. The disinfection treatment before shipment should be carried out by authorized expert/technical personnel since the above process is hazardous. To assure the pest free product, the disinfection treatment should be done just before shipment of produce.

In this process, the exporter has to apply to the officer in-charge for Phyto Sanitary Certificate (PSC) in the prescribed form at least 7 –10 days in advance of the export. Before submitting

the application for PSC, it is to be ensured that the cargo is treated properly by any licensed PCO to avoid any last minute detention by the Plant Quarantine Authority who is authorized to issue P.S.C.

The Soybean, which is rich in protein as well as fat is vulnerable to infestation by insects, mites and if contains more moisture makes it prone to the infection by fungi. Soybean should be dried to reduce its moisture content preferably below 9 percent before packing. Soybean should be packed in clean, dry, sound single hessian bags. In case, infestation occurs, fumigation should be done with Aluminium phosphide, at prescribed dosage. In no case, 'Methyl Bromide' should be used, as the commodity is rich in oil content. Regular inspection of stocks to check health of the seed and regular prophylactic treatment should be provided with the approved chemicals.

4.3.2 Export procedures:

The exporter may follow the following terms and conditions for exports of Soybean seeds. It's export is allowed subject to payment of duty. Export procedure has been simplified under Open General Licence (OGL), and there is no licence or restrictions are imposed. Generally, the buyers have to mention the quality in the contract.

However, the exporter may follow the following points during the export of Soybean seeds :

- Importer-Exporter Code (IEC) number to be obtained from the Director General of Foreign Trade (DGFT).
- Quality of product is to assessed by any approved inspecting agency to obtain the certificate.
- Product is then to be shifted to ports.
- Marine insurance cover is to be obtained from any insurance agency.
- Contact clearing and forwarding (C&F) agent for sorting of goods in godowns.
- They collect the shipping bill for allowing shipment by custom authority.
- Shipping bill is to be submitted by C&F agent to custom houses for verification.
- Verified shipping bill is given to Shed Superintendent by C&F agent and carting order is to be obtained.
- The C&F agent presents shipping bill to the Preventive Officer for loading in to the ship.
- After loading, a mate receipt is to be issued by the Captain of the ship to the Superintendent of the port who calculates the port charges and collects the same from C&F agent.
- After that payment is made, the mate receipt is obtained from the port authority to prepare bill of loading for the respective exporter.
- Then the C&F agent sends the bill of loading to the respective exporter.
- After receiving the documents, the exporter obtains a certificate of origin from chamber of commerce i e the goods are of Indian origin.
- Exporter informs the importer regarding the date of shipment, name of vessel, bill of loading, customer's invoice, packing list etc.
- The exporter for verification of documents submits all papers to the concerned bank.

- Bank sends documents to the foreign importer to enable him to take delivery of goods.
- After receiving papers, importer makes payment through bank and also sends documents called GR Form to RBI.
- Then exporter applies for various benefits from duty drawback schemes.

4.4 Marketing constraints and remedial measures:

1) The co-operative agencies have done a commendable job in Madhya Pradesh and Uttar Pradesh for marketing of Soybean. In other states, these agencies should also come forward to improve the marketing system of Soybean.

2) The consumers and processors prefer yellow variety of Soybean for which a higher premium prevails. The cake obtained from yellow variety also gets a higher price. Therefore, the development agencies must popularize high yielding yellow variety Soybean and discourage black variety of Soybean.

3) At present, the Soybean meal/cake is exported outside the country. This cheap source of protein can solve the problem of caloric malnutrition in the country. The existing Soybean solvent extraction plants can produce Soybean fat for human consumption by installing additional equipment and improving the hygienic conditions.

4) There is a good scope for small units manufacturing protein rich food products from Soybean. Such agro-based industries may help the cultivators to improve their economic conditions and provide protein rich Soybean products. Therefore, Government should encourage incentives for soy based agro industries.

5) Soybean has not entered in to the general food habits of the common people of the country. Therefore, there is strong need to launch consumer awareness programme in order to popularize various soy products.

6) There is lack of adequate scientific storage facilities in the villages. The present storage facilities are available mainly in the urban areas. Farmers should build rural godowns under the centrally sponsored 'Gramin Bhandaran Yojana' availing subsidy and benefit from the scheme.

7) The grade specifications formulated by Directorate of Marketing and Inspection should be popularized among the farmers, traders and processors. Grading at producers' level should also be encouraged.

8) There is no proper and adequate market intelligence system for Soybean in the states as in Madhya Pradesh where I.T.C. (Indian Tobacco Company) has established its I.T. (Information Technology) based market intelligence system and succeeded in revolutionizing e-commerce as a pioneering effort to set example for others.

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels :

The different existing marketing channels of Soybean are given below.

A) General marketing channels for Soybean :

The common marketing channels as routed from producer to consumer through village trader, commission agent, broker, co-operative society, private miller, wholesaler, co-operative mill are as follows:

1) Producer - Village trader - Private miller - Consumers
2) Producer - Village trader – Wholesaler - Consumers
3) Producer - Commission agent - Private miller - Consumers
4) Producer - Commission agent - Wholesaler - Consumers
5) Producer - Broker - Wholesaler – Consumers.
6) Producer - Broker - Cooperative mill – Consumers.
7) Producer - Cooperative society - Cooperative mill – Consumers.

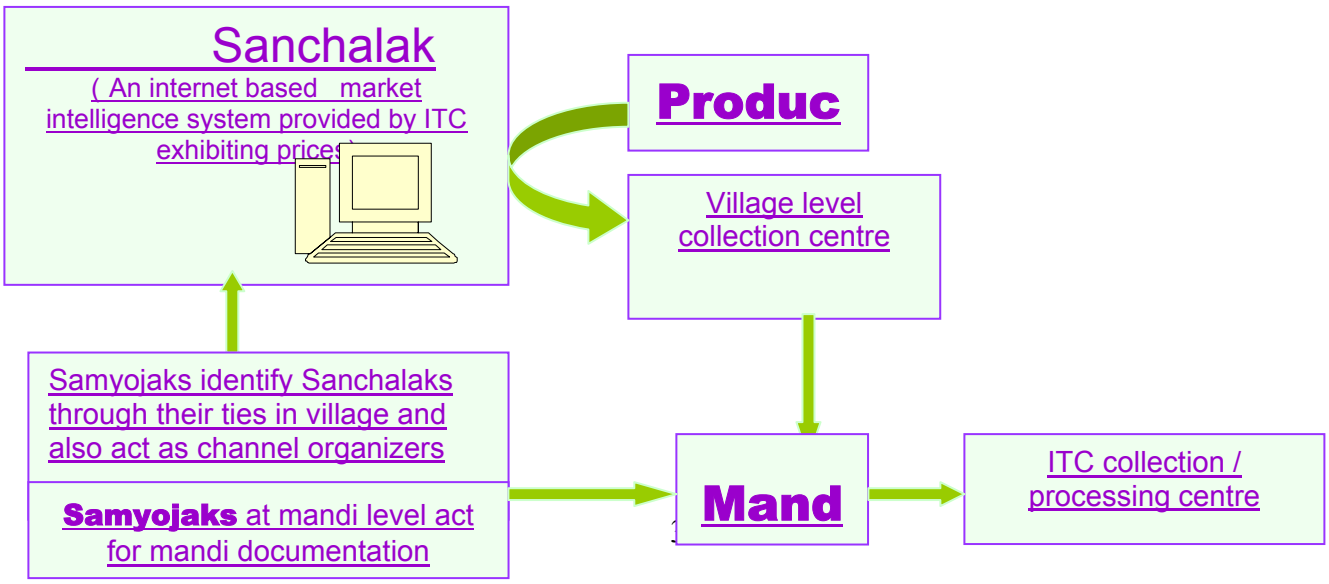
B) Internet based marketing channels for Soybean.

[Established by Indian Tobacco Company (ITC) in Madhya Pradesh]

ITC has launched, e-*Choupal* since June 2000 as a more efficient supply chain aimed at delivering value to its customers around the world on a sustainable basis. As a real-time information and customised knowledge it enhances the ability of farmers to take decisions and align their farm output with market demand and secure quality and productivity. As a direct marketing channel, virtually linked to the '*mandi*' system for price discovery, 'e-Choupal' eliminates wasteful intermediation and multiple handling. A diagrammatic representation is shown below:

Source:

www.soyachoupal.com



5.2 Marketing cost and margins:

- Marketing cost: Marketing cost refer to the actual expenses incurred for bringing Soybean from farmgate to the consumers. It includes the following;

  - Handling charges at local points
  - Assembling charges
  - Transportation and storage costs
  - Handling by wholesalers and retailer charges to consumers
  - Expenses on secondary services like financing, risk taking and market intelligence
  - Profit margins taken out by different agencies.

The marketing costs i.e. the charges which are paid by buyers and sellers have been depicted in Table No.–16.

Table No. –16

Market fee, commission, taxes and miscellaneous charges for Soybean in different States

Name of state	Payable by farmers(sellers)/ traders(buyers)		Payable by traders/others		Payable by traders(buyers)	
	Market charges (Rupees/unit)	Commi-ssion	License fee per annum	Market fee	Sales tax	Octroi
1.Rajas-than	Unloading– 0.5-1 Broker – 2 *Hamal*–1to 4 Cleaning 1 to 2 Weighing—1-2	2 %	Traders-200/- commission agent- 200/-	1.6 %	2 %	Nil
2.Uttar Pradesh	Unloading–0.20/qtl. Cleaning– 0.60/qtl. Lot making–0.20/qtl. Weighing—0.50/qtl	1.5 %	Traders – 250/- transport agency-200/- oil millers-150/- retailers-100/-	2.0 % +0.5 % as developmental charges =2.5 %	4 %	Nil
3.Maha-rashtra	Unloading– Cleaning – Brokers- *Hamal* – Weighing— Different rates exist at different markets	2 – 4 %	Traders- Rs.3 to 200/- (Rate varies from market to market)	0.75 – 1.0 %	Exemp-ted	Nil
4.Madhya Pradesh	Unloading- Cleaning- Brokers - *Hamal* -	2 %	Traders – 1000/- Processor - 1000	2 %	N/A	Nil

	Weighing- No fixed rate, it varies in different markets					

Source: Sub Offices of Directorate of Marketing and Inspection (DMI), Government of India.

❒ Marketing Margins :

The marketing margin of Soybean is the difference between the actual price paid by the consumer and the price received by the farmer for an equivalent quantity of Soybean. It is explained in terms of price spread applied for a particular situation. Studies on marketing margins and price spread reveal that as the number of market functionaries increases, it increases the cost of commodity in the market, which results in the decline of producer's share in consumer's rupee.

The scientists of the Department of Agricultural Economics, S.K.M. College of Agriculture, Jobner (Jaipur - Rajasthan) had carried out a study on the marketing cost, margins and price spread for major agricultural commodities including Soybean in Rajasthan. The findings of the study have been presented in the Table No – 17.

1) Producer-seller-Oilseed Growers' Cooperative Society-Tilham Sangh
2) Producer-seller-Commission Agent-Tilham Sangh
3) Producer-seller-Commission agent-Local processor
4) Producer-seller-Commission agent-Wholesaler-Local Processor
5) Producer-seller-Commission agent-Wholesaler-Outside processor.

Table No. –17

Price-spread in marketing of Soybean in Rajasthan (percent)

Particulars	Sale of Soybean through channels				
	(I)	(II)	(III)	(IV)	(V)
1. Producer's share	96.22	92.08	90.91	85.95	90.14
2. Marketing cost of-	3.78	7.92	9.09	10.04	9.86
a) Producer-farmers	0.46	1.18	1.16	1.10	1.14
b)Tilham sangh	--	3.32	6.74	--	--
c)Wholesaler	--	--	--	8.51	--
d)Processor	--	--	7.93	--	--
e)Outside processor	--	--	--	--	8.72
3.Margin of wholesaler	--	--	--	4.01	--
4.Processor's price	100	100	100	100	100

Source: Indian Journal of Agril. Marketing (Conf,Spl.) 12(3) ,1998.

The study under reference was undertaken in Kota district, which commanded almost half of the total Soybean area and production of the state. As depicted in the Table above, channel – I of sale of Soybean seeds to oilseed growers society was observed as most cost effective since more than 70 percent of surplus Soybean output moved through this channel.

The outcome of the study revealed, that the producer – farmers received the highest share of 96.22 percent of the processors price, when they marketed their Soybean through channel – I in villages through the oilseeds grower's society. In the remaining four channels, producer's share varied between 86-92 percent. As far as marketing costs are concerned, they counted for less than four percent in channel – I and varied from 8-10 percent in other channels. The wholesaler's margin/ share was around 4 percent in the price paid by the processors in channel IV.

6.0 MARKETING INFORMATION AND EXTENSION

The prices of Soybean seeds and oil are published in local newspapers of each state and also covered in the radio and T.V. programmes. The concerned state agricultural marketing department collects the arrivals and prices of Soybean from selected markets. With the information revolution brought by the computer and internet facility, the Government of India has launched its website 'www.agmarknet.nic.in' under the supervision of Directorate of Marketing and Inspection interlinking selected markets throughout the country.

NAFED / MARKFED / OILFED / SOPA- INDORE also collect information on Soybean production, arrivals, prices, stocks, imports and exports, etc., in the country. Recently, ITC Ltd., started e - choupals in the villages, which provide complete information on Soybean production, marketing and utilization through internet kiosks on a small price to the farmers.

❒ Extension: The National Research Centre on Soybean, Indore (Madhya Pradesh), is the National level research agency under Indian Council of Agricultural Research. It is the main agency to disseminate information on Soybean production technology to farmers, extension workers, state agencies and agricultural universities. Similarly, Soybean Processors' Association, Indore, a trade body also promotes Soybean cultivation through distribution of pamphlets, posters, seminars, etc. Agricultural Universities and all India coordinated research project on Soybean also promote Soybean cultivation by educating the farmers about the latest trends in production technology.

The consumers are educated about the nutritional value of Soybean products by Soybean Processors Association, Indore and Central Institute of Agricultural Engineering, ICAR, Bhopal and provide feed back information to industrialists and processors about the manufacturing technology.

Table No.–18

List of Government, semi Government and private organizations providing the services on marketing information and extension

Sl. No.	Source/Organisation	Services provided
1.	Directorate of Marketing and Inspection (DMI) , New C.G.O Complex, NH-IV,	►It is at present implementing a plan scheme i.e. 'Market Research and Information Network' (MRIN) through NIC for establishing a network for speedy collection and

	Faridabad. website: www.agmarknet.nic.in	dissemination of market information for it's effective utilization. Under the scheme, important agricultural markets, state agricultural marketing boards/departments are being linked through computerized internet services. The user or beneficiary may collect the detailed information on various aspects of agricultural commodities including Soybean. ▶Publishes journal on Agricultural Marketing. ▶It also undertakes marketing extension services.
2.	Soybean Processing and Utilization Centre, Central Institute of Agricultural Engineering (CIAE), Bhopal website: www.ciae.nic.in	▶Demonstration and training in production and promotion of soy based food products.
3.	Soybean Processors' Association of India (SOPA), Indore website: www.sopaindia.org	▶It is a trade body which promotes Soybean development programme through distribution of extension materials, audio/ video cassettes and literatures on Soybean among farmers. ▶It organizes seminars,workshops and trade fairs relating to Soybean marketing, processing, quality control and promotion.
4.	ITC e-choupal. website: www.itcportal.com	▶ITC has launched e-Choupal in June 2000 as a more efficient supply chain aimed at delivering value to its customers around the world on a sustainable basis. At present, 4200 e-Choupals are functioning in Uttar Pradesh, Andhra Pradesh, Madhya Pradesh and Karnataka. It provides free market information service to the farmers and procuring directly Soybean and other commodities. It has eradicated middlemen from the marketing and makes immediate payment to the farmers. The ITC has a plan to set up 20 thousand e-

		choupals in 15 states covering one lakh villages. ▶It facilitates access to the farmers in their local language on market prices of Soybean. ▶It facilitates information-based decision making for the sale of Soybean.
5.	Directorate of Economics and Statistics, Ministry of Agriculture, Shastri Bhawan, New Delhi Website: www.agricoop.nic.in	▶Compilation of statistical data on agricultural commodities for planning and development. ▶Dissemination of data/information on oilseeds including Soybean through publication and internet.
6.	Director General of Commercial Intelligence and Statistics (D.G.C.I.S.),1, Old Court House Street, Kolkata-700 001.	▶Collection, compilation and dissemination of data of export-import and interstate movement of agro commodities including Soybean.
7.	Central Warehousing Corporation (CWC), Siri Institutional Area Opp. Siri Fort, New Delhi-110016 Website: www.fieo.com/cwc	▶Promoting Farmer's Extension Service (FESS) with the following objectives: ➢Educating farmers about the benefits of scientific public warehouses for agro commodities. ➢Demonstrating of spraying and fumigation to control storage pests of agro commodities .e.g. Soybean ➢Orienting about the facility of getting loans from banks against pledge of warehouse receipts.
8.	State Agricultural Marketing Departments/Directorates/ Boards at State Capitals.	▶Provideing oilseeds marketing related information. ▶Arranging publicity programme through demonstration, farmers' meeting, etc. ▶Disseminating of information of oilseeds e.g. Soybean through literature, Radio and T.V. programme.
9.	Agricultural Produce Market Committees (APMCs) of regulated markets in different states.	▶Providing market information on arrivals of oilseeds, e.g. Soybean and prevailing prices of it at different markets through display boards, public address system, etc.

		▶Providing information of other markets of Soybean. ▶Organising training programme, tours, exhibitions for farmers and other beneficiaries.
10.	Akashvani Kendras of New Delhi/ State capitals/ other cities	▶Broadcasts programme to disseminate the marketing information on agricultural commodities e.g. Soybean.
11.	Doordarshan Kendras of New Delhi/ / State capitals/ other cities	▶Telecasts programme to disseminate marketing information on agricultural commodities including Soybean.
12.	G.B.Pant University of Agriculture and Technology, Pantnagar (Uttaranchal)	▶Training related to entrepreneurship development for production and marketing of soy based food products.
13.	Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur (Madhya Pradesh)	
14.	Assam Agricultural University, Jorhat	
15.	Panjabrao Krishi Viswa Vidyalaya, Akola (Maharashtra)	

❒ Kisan Call Centre :

The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India launched Kisan Call Centres on January 21st,2004 throughout the country. It has the objective of affording instant solution to the problems faced by the farmers during crop cultivation under diverse challenging situations and facilitating their full comprehension by the use of local language. The call centres are acting as composite help centres, which consist of a complex tele-communication infrastructure, computer support and human resources organized to manage effectively and efficiently the queries raised by farmers instantly in local languages. The subject matter specialists using telephone and

computer are used to interact with farmers to understand their problems and answer their queries as soon as possible. This is a new dimension in agricultural extension management, which makes the full use of on-going information and communication revolution by connecting the farming community in the remotest areas of the country with the experts of agricultural field.

Soybean farmers can avail this facility through a nationwide toll free number - 1551

7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 Direct marketing:

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

The Indian Tobacco Company (ITC), which has established an IT-based direct marketing system in the form of *e-choupal* which eliminates wasteful intermediation and multiple handling, therefore, it significantly reduces the transaction cost. I.T.C. provides real time information to enhanced farm productivity and quality for higher farm gate prices.

Benefits :

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

7.2 Contract farming :

Contract farming essentially includes the tie-up for agricultural marketing, wherein the prospective buyer or any trading / processing agency enters into a contract with the farmer and promises to purchase the farmer's produce under pre-negotiated condition and prices. In this type of contract, the trading / processing agency support the farmers through supply of inputs and other technical support and the farmers can get the assured market at a fixed or pre determined price. By entering in this type of contract, farmers do not require to rely on middleman and risk of price also reduces. In present context of economic liberalisation and global scenario, contract farming opens the venue to adopt new-technologies and access to present global markets.

❒ Benefits: Contract farming is beneficial to the farmers / producers as well as to the contracting agency as given in Table No.-19.

Table No.–19

Benefits of contract farming

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

7.3 Co-operative marketing:

In the co-operative marketing system, a group of farmers join together to carry on some or all the processes involved in bringing produce from producer to consumer in a more profitable way than private trade system. The main objectives of cooperative marketing are to ensure remunerative prices to the producers, reduction in the cost of marketing, reduce the monopoly of traders and improve the marketing system. The cooperative marketing structure in the different states consists of;

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

Different co-operative organisations involved in Soybean marketing:

1. NAFED: National Agricultural Co-operative Marketing Federation (NAFED) is a well known national apex body of the co-operative marketing system in co-ordination with State level Marketing Federations, Regional and District level co-operative societies. NAFED was established with a aim to promote co-operative marketing of agricultural produce and to ensure the farmers to get ready market as well as remunerative price for their produce. In order to protect the farmers from steep fall in prices in market, the Government of India has appointed NAFED as central nodal agency to undertake the procurement operations of commodity like Soybean by declaring support prices at every marketing season.

Quantity of Soybean procured by NAFED under Price Support System (PSS)

Commodity	Year	Crop season	Minimum support price	Quantity procured (in tonnes)	Value (Rs.in lakhs)
Soybean	1999-2000	Kharif-1999	845(Yellow) 755 (Black)	494938	45699.94
	2000-2001	Kharif-2000	865(Yellow) 775 (Black)	54745	5206.25

Source : NAFED, New Delhi.

2. MP-MARKFED: Madhya Pradesh State Co-operative Marketing Federation Limited (M.P.-Markfed) was established during 1956 as an apex level federation of marketing societies and was registered under the Madhya Pradesh Co-operative Societies Act 1960. One of the main activities of the Federation is the marketing of oilseeds including Soybean. In order to help the farmers in this regard, the federation makes purchases of farmer's produce in the *mandies*. It also undertakes price support operations of oilsees including Soybean on behalf of State Government

Quantity of Soybean procured by MP-MARKFED

(Quantity in tonnes)

Commodity	2000-2001	2001-2002

Soybean	32367	2081

Source : www.mpmarkfed.net

7.4 Forward and future markets :

After the decision during February 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, future trading has been allowed for 148 commodities, under section 15 of the Forward Contracts (Regulation) Act of 1952. The coverage of commodities under futures market will minimize the wide fluctuation in commodity prices and for hedging the risk arising from price fluctuations. The future contracts are an agreement to purchase or sale a stipulated quantity of a commodity at a predetermined price with settlement expected to take place at a future date. The futures contracts are standardized in terms of quality and quantity and place and date of delivery of the commodity. In India, all the futures contracts are regulated by Forward Markets Commission (F.M.C.), Mumbai. The National Board of Trade, Indore was started during the year 1999 to offer an integrated, state of art hedging under futures trading. The exchange was permitted and recognised by FMC for futures trading in Soybean. Soybean seed, oil and cake are traded in this exchange.

The exchanges in which futures contracts are traded in respect of Soybean:

- The National Board of Trade, Indore
- SGI Commodity Exchange, Mumbai

The regulatory body for commodity trading :

Forward Markets Commission (FMC) set up under the forward contracts (Regulation) Act of 1952 with it's headquarter in Mumbai and Regional Office in Kolkata.

8.0 INSTITUTIONAL FACILITIES:

8.1 Marketing related schemes of Government / public sector organisations

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Scheme and Name of organisation	Facilities
1.Agmark grading Directorate of Marketing and Inspection (D.M.I.) Head Office, N.H.-IV, Faridabad	➢ Promotion of grading of agricultural and allied commodities under Agricultural Produce (Grading & Marking) Act.1937. ➢ Agmark specifications for agricultural commodities have been framed, based on their intrinsic quality. Food safety factors are being incorporated in the standards to compete in world trade. Standards are being harmonised with international standards keeping in view the WTO requirements. Certification of agricultural commodities is carried out for the benefit of

	consumers and producers.
2.Gramin bhandaran yojana (Rural godown scheme) Directorate of Marketing and Inspection. Head Office, N.H.-IV, Faridabad	➢ It is a capital investment subsidy scheme for construction/renovation/expansion of rural godowns. The scheme is implemented by DMI in collaboration with NABARD and NCDC. The objectives of the scheme are to create scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs. ➢ To prevent distress sale immediately after harvest. ➢ To promote grading and quality control of agricultural produce to improve their marketability. ➢ To promote pledge financing and marketing credit to strengthen agricultural marketing in the country for the introduction of a national system of warehouse receipt in respect of agricultural commodities stored in such godowns. ➢ The entrepreneur will be free to construct godown at any place and of any size except for restrictions that it would be outside the limits of Municipal Corporation area and be of a minimum capacity of 100 MT. ➢ The scheme provides credit linked back-ended capital investment subsidy @25 percent of the project cost with a ceiling of Rs. 37.50 lakh per project. For the projects in North-Eastern states and hilly areas with altitude of more than 1000 m above mean sea level and SC/ST entrepreneurs, maximum subsidy admissible is @ 33 percent of the project cost, with a ceiling of Rs. 50.00 lakh.
3.Price support Scheme National Agricultural Co-operative Marketing Federation Ltd. (NAFED).	►Procurement of oilseeds including Soybean under the price support scheme when market price is ruling at or below the declared support price for a particular year.
4.Scheme of procurement The M.P. State Cooperative Marketing Federation (MP-MARKFED), Head Office, Jhangirabad, Bhopal-468 008 Website www.mp.nic.in/markfed	►Procurement of oilseeds under the Price Support Scheme (P.S.S.).

5.Small Farmers Agribusiness Consortium (SFAC) Department of Agriculture and Cooperation, Ministry of Agri(GOI), New Delhi	►Promotes the growth of agriculture and agro industry. ►Promotes organizations having domestic and export marketing chains. ►Facilitates the establishment of integrated producers' organizations with forward and backward linkages. Besides above, it has also facilities like- **A.** Organising primary producers in suitable groups to achieve the objective of consortium **B.** Reviving /strengthening of local institutions as the instrument of agricultural development. **C.** Organises various services through public, private and cooperative sector.

8.2 Institutional credit facilities:

Agricultural credit is disbursed in the form of short-term, medium-term and long-term loans through the following agencies –

* Commercial Banks (CBs)
* Regional Rural Banks (RRBs)
* Co-operatives.

The type of institutional credit facilities which are available for production, post harvest operations and marketing of agro-commodities (e.g-Soybean) are given in Table No-20.

Table No. –20

Types of credit facilities

Name of scheme	Eligibility	Facility
1. Produce Marketing Loan Scheme	All the categories of farmers i.e., small / marginal / others are eligible.	This type of loan is given upto Rs. 1 lakh against pledge /hypothecation of agricultural produce (including warehouse receipts) for a period not exceeding 6 months.
2. Kishan Credit Card Scheme	All types of agricultural clients having good track record for last two years are eligible.	Kissan credit card is valid for 3 years through which the barrower / farmer meet his production and other contingency needs by using easy convenient withdrawal slips. The minimum credit limit is Rs.3000/- and is based on

		operational landholding, cropping pattern and scale of finance.
3. Credit Schemes of Nationalised Banks	For different categories of farmers	Provide credit for construction of godowns, agri-business, contract farming, agro processing etc.

8.3 Organigations / agencies providing marketing services:

Organisation	Services provided
1. Directorate of Marketing and Inspection (DMI) NH-4, CGO Complex Faridabad Website: www.agmarknet.nic.in	➢ To integrate development of marketing of agricultural and allied produce in the country. ➢ Promotion of grading of agricultural and allied produce. ➢ Market development through regulation, planning and designing of physical markets. ➢ Promotion of cold storage. ➢ Liaison between the Central and State Governments through its regional offices (11) and sub-offices (37) spread all over the country.
2. Soybean Processors Association of India (SOPA), Sceme No. 53, Malviya Nagar, A B Road, Indore-452 008 Website : www.sopa.org	➢ Quality control services. ➢ Arbitration. ➢ Promotion of value added products. ➢ Export promotion of Soybean meal and value added products.
3. Soybean Processing and Utilisation Centre, Central Institute of Agricultural Engineering (CIAE), Navi Bagh, Berasia Road, Bhopal-462 038 (MP) Website : www.ciae.nic.in	➢ Technology for diversified soy based food products. ➢ Commercialisation of soy based food products technology through training and entrepreneurship development.
4. Uttar Pradesh Co-operative Marketing Federation	➢ Purchases Soybean through local Sahakari Kraya Vikraya Sangh. ➢ Provides subsidy and short term crop loans to the Soybean cultivators.
5. Madhya Pradesh State Co-operative Marketing Federation (M.P.-MARKFED) Head Office, Jhangirabad, Bhopal-468 008 Website: www.mp.nic.in/markfed	➢ Assists and strengthens it's members and other marketing societies. ➢ Provides agricultural inputs to the farmers through member societies to promote their agricultural production. ➢ Procures the produce from farmers in regulated markets. ➢ Undertakes welfare activities as per the State Government directives. ➢ Constructs godowns to increase the storage facilities in Madhya Pradesh state.
6. National Dairy Development Board (N.D.D.B.), Anand-388 001 Gujrat Website : www.nddb.org	➢ Initiated the "Restructuring Edible Oil and Oilseeds Production and Marketing Project". ➢ Motivates farmers' investment in oilseeds sector through farmer owned co-operatives. ➢ Capacity creation to crush oilseeds, solvent extracts, oilcake and refine edible oil. ➢ Establishes storage capacity for storage of oilseeds and oil.

7. National Agricultural Co-operative Marketing Federation Ltd. (NAFED), Nafed House, 1 Sidharth Enclave, Ashram Chowk, New Delhi-110 014 Website : www.nafed-india.com	➢ Organises, promotes and develops marketing, processing and storage of oilseeds. ➢ Undertakes inter-state movement of oilseeds. ➢ Extends marketing support to the farmers through it's offices located all around the country. ➢ Central nodal agency for procurement of oilseeds and pulses under price support scheme at the minimum support price (MSP).
8. Central Warehoushing Corporation (CWC), 4/1 Siri Institutional Area Opp. Siri Fort, New Delhi-110016. Website : www.fieo.com/cwc	➢ Provides scientific storage and handling facilities. ➢ Offers consultancy services/ training for the construction of warehousing infrastructure to different agencies. ➢ Import and export warehousing facilities. ➢ Provides disinfestation services.
9. National Co-operative Development Corporation (NCDC) 4, Siri Institutional Area, New Delhi-110016. Website : www.ncdc.nic.in	➢ Planning, promoting and financing programmes for production, processing, marketing, storage, export and import of agricultural produce. ➢ Financial support to primary, regional, State and National level co-operative marketing societies is provided towards; ➢ Margin money and working capital finance to augment business operations of agricultural produce. ➢ Strengthening the share capital base and ➢ Purchase of transport vehicles.
10. Director General of Foreign Trade, (DGFT), Udyog Bhavan, New Delhi.	➢ Provides guidelines / procedure of export and import of various commodities. ➢ Allot import-export code number (IEC No) to the exporter of agricultural commodities.
11. Forward Markets Commission (FMC), "Everest" 3RD floor, 100, Marine Drive, MUMBAI– 400002. Web site: - www.fmc.gov.in	➢ To keep forward markets under observation. ➢ To publish information regarding the trading conditions in respect of goods and supply, demand and prices.
12. State Agricultural Marketing Boards (SAMBs),	➢ Implementation of the regulation of marketing in the state. ➢ Provide infra-structural facilities for the marketing of notified agricultural produce. ➢ Provide grading of agricultural produce in the markets. ➢ To co-ordinate all the market committees for information services. ➢ Provide aid to financially weak or needy market committees in the form of loans and grants. ➢ Eliminate malpractices in the marketing system. ➢ Arrange or organise seminars, workshops or exhibitions on subjects relating to agricultural marketing and farmers training programme on various aspects of agricultural marketing. ➢ Some of the SAMBs are also promoting agro-business.

9.0 UTILIZATION

9.1 Processing:

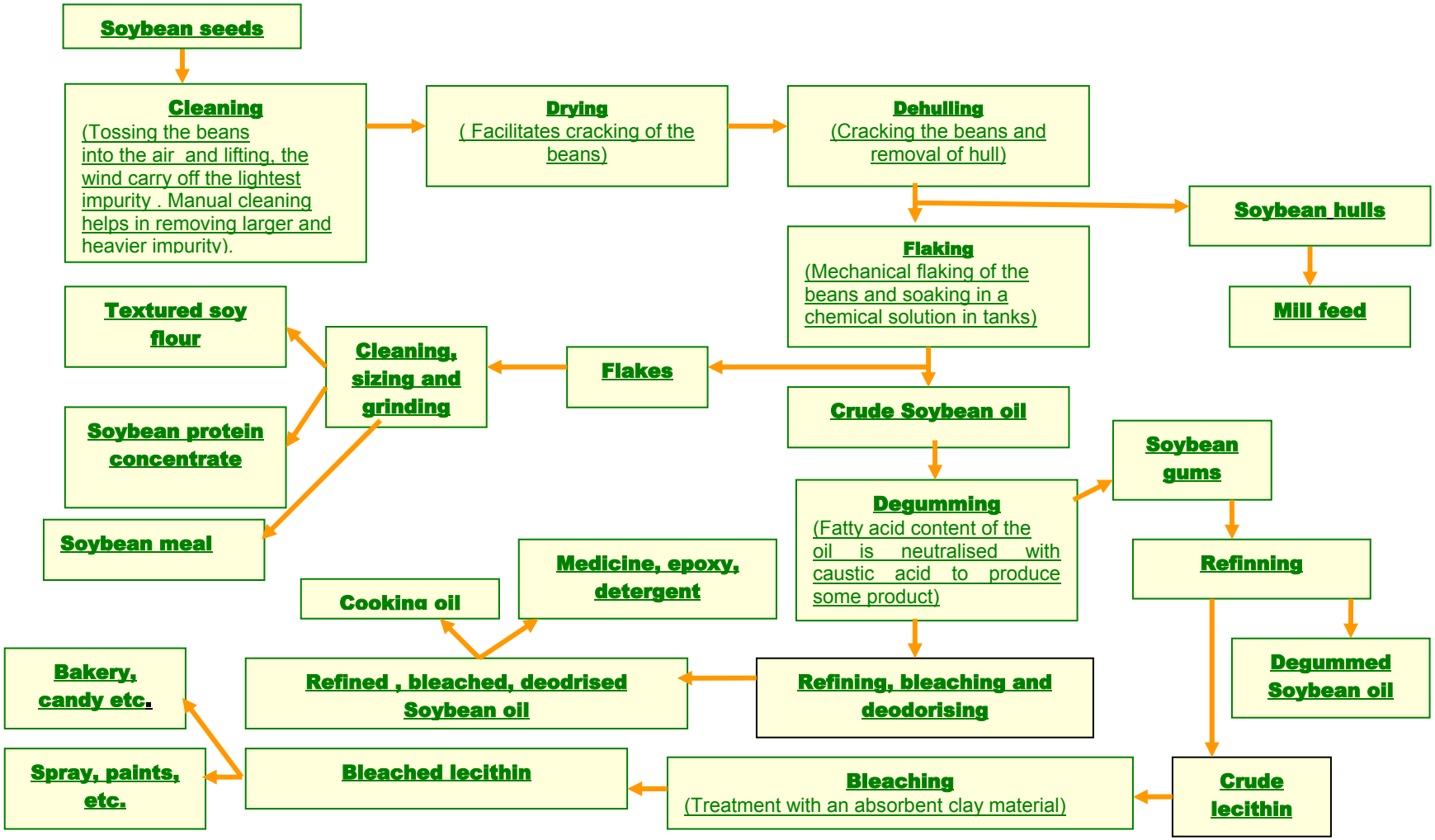
Soybean have attained unique distinction for it's varied uses and extra-ordinary nutritional qualities. However, Soybean requires proper processing to make suitable for use as food, feed or industrial products. Largely, Soybean is processed to get oil and meal. During the year 2003-04 (November-October), it has been estimated that 20 lakh tones of Soybean oil was consumed in the country. The mechanical process was employed earlier to extract oil and meal by hydraulic press method. However, the processing has been shifted to the modern solvent extraction process, which is more efficient and tuned to the existing needs.

The Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal has developed tofu making processing unit from Soybean

Soybean processing machinary for tofu making

Source : Central Institute of Agricultural Engineering (C.I.A.E.) , Bhopal

Processing and utilisation of Soybean:



9.2 Uses:

In India, Soybean oil is mainly used as cooking medium. The soya milk consumption now-a-days has emerged as a healthy drink habit as it is a high protein and low calorie food specially to those, who are intolerant to lactose present in animal milk. In addition, it also serves as raw material for manufacture of vanaspati. Soybean cake is mostly used as an ingredient in the manufacture of cattle feed. The emerging consumer acceptance has lead to manufacture of many protein rich food products such as nutri-nuggets, protesnac, nutri soy powder, etc., which are being manufactured in the country from soy protein. The Soybean meal has also been added in the manufacture of bread by some agencies for raising nutritive value of product without any significant change in flavour or price of the bread.

The Agro-Industries can exploit the potentialities of Soybeans because it has multifarious uses. It can be utilized in the preparation of Antibiotics, in the manufacture of lard, margarine, vegetable oil and ghee, paints, varnishes, linoleum, printing inks, glycerine, explosive, etc. besides, in every home its products like, Soy flour, Soy milk, Soy oil as cooking medium, Soybean cake is rich in nitrogen and mineral content and can be very well utilised as a manure for the soil and as a cattle feed for the animals.

The multifaceted uses of Soybean at the national and global level are as follows:

✧ Whole Soybean products :
Seed
Soy flour
Soy sauce
Soy paneer (Tofu)
Soy milk

✧ Soybean oil products:
Cooking oil
Baking products
Margarine
Salad oil

✧ Soybean meal:

Animal feed
Poultry feed
Feed for aqua culture

✧ Soybean protein products:
Textured vegetable protein
Isolated soy protein

✧ Soybean based industrial products :
Printing inks
Cosmetics
Paints
Soaps/detergents/toiletries
Plastics and rubber industry

Soybean food products

Pharmaceuticals
Pesticide industry

10.0 DOS AND DON'TS

1. Harvest the crop, when plants turn yellow and moisture is around 14 percent to avoid shattering in the field. Do not harvest the crop before it turns yellow and moisture is more than 14 percent.

2. Avoid more beating of the pods to prevent damage to the seeds while threshing.

3. Adjust the speed of the harvester depending upon the moisture of the seed.

4. The produce should be cleaned and graded at producer's level to fetch higher price. Do not sell the produce without cleaning and grading.

5. The moisture in the Soybean should be brought down to about 9 percent before sale.

6. Store Soybean in a damp proof and rat free room after reducing moisture to less than 9 %.

7. Store different varieties separately. Do not mix different varieties together.

8. Get the market information regarding arrivals and prices of Soybean from different markets and then select the market for selling the produce.

9. Sell the produce through the co-operative society or directly in the nearest regulated market to get a higher price. Do not sell Soybean to the middlemen instead of Co-operative Societies or in regulated markets.

10. Store Soybean in scientific rural godowns to hold the produce for sometime to get higher price during lean period. Do not sell Soybean in glut period.

11. Go for contract farming with an agency to get better assured price.

12. Avail the facility of future markets for trading of Soybean. Do not trade Soybean to the middleman without proper planning.

13. Sell the produce at periodic intervals to fetch better price. Do not sell the entire produce immediately after harvest.

14. Avail the pledge finance facility by storing produce in Central/ State Warehouses. Do not store the produce in unplanned manner in private unscientific godowns.

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1.0 INTRODUCTION

Soybean is known as the *"GOLDEN BEAN"* of the 20th Century. Though Soybean is a legume crop, yet it is widely used as oilseed. Due to very poor cookability and digestibility on account of inherent presence of trypsin inhibitor, it can not be utilized as a pulse. It is now the second largest oilseed in India after groundnut. It grows in varied agro-climatic conditions. It has emerged as one of the important commercial crop in many countries. Due to its worldwide popularity, the international trade of Soybean is spread globally. Several countries such as Japan, China, Indonesia, Philippines, and European countries are importing Soybean to supplement their domestic requirement for human consumption and cattle feed.

Soybean has great potential as an exceptionally nutritive and very rich protein food. It can supply the much needed protein to human diets, because it contains above 40 per cent protein of superior quality and all the essential amino acids particularly glycine, tryptophan and lysine, similar to cow's milk and animal proteins. Soybean also contains about 20 per cent oil with an important fatty acid, lecithin and Vitamin A and D. The 4 percent mineral salts of Soybeans are fairly rich in phosphorous and calcium.

1.1 Origin : It is reported to be originated from China

1.2 Importance : The Soybean is gaining popularity on account of it's following unique characteristics:-

- Adaptability to varied agro-climatic conditions.
- Unmatched composition of 40 percent protein and 20 percent oil.
- Nutritional superiority on account of protein containing essential amino acids, unsaturated fatty acids, carbohydrates, vitamins and minerals.
- Significant role in preventing and treating chronic diseases such as heart ailments, osteoporosis, cancer, kidney ailments and menopausal syndromes.
- Scope for manufacturing numerous processed food products.
- Widely used as a source of animal feed.

Major constituents of Soybean :

Components	Percentage
Proteins	40
Carbohydrates	30
Fibre	05
Lecithins	0.5
Saponins	04
Oil	18-20

Source: www.commodityindia.com, October 2003.

2.0 PRODUCTION

2.1 Major producing countries in the world:

Although, a native of China, Soybean for all practical reasons is an American crop today. USA is the major producer of Soybean and ranks first in production. It's share in the world production is almost 35 percent. Brazil, Argentina and China rank second, third and fourth position in terms of production respectively. India occupies fifth place. The following Table presents the picture of global production of Soybean.

Table No. –1
Total world production of Soybean during 2002- 03 and 2003-04

Country	2002-2003		2003-2004	
	Production (In tonnes)	Percentage share	Production (In tonnes)	Percentage share
USA	74,824,768	41.40	65,795,340	34.77
Brazil	42,124,892	23.31	51,532,344	27.23
Argentina	30,000,000	16.60	34,818,552	18.40
China	16,507,368	9.13	16,500,368	8.72
India	**4,558,100**	**2.52**	**6,800,000**	**3.59**
Paraguay	3,300,000	1.83	4,400,000	2.33
Canada	2,335,700	1.29	2,268,300	1.20
Others	7,078,442	3.92	7,118,844	3.76
All World	**180,729,270**	**100.00**	**189,233,748**	**100.00**

Source : www.apps.fao.org

2.2 Major producing states in India:

In the recent past, Soybean cultivation has increased many folds as compared to any other oil seed crop in the country and stands next to Groundnut, though commercial production of Soybean began in 1971-72. Madhya Pradesh, Maharashtra and Rajasthan accounted for 56 percent, 35 percent and 5 percent production respectively during the year 2002-03 covering an area of 67 percent, 21 percent and 8 percent in India. Area and production of major Soybean producing states during 2001-02 and 2002-03 are given in Table No.2.

Table No.-2
State-wise area and production of Soybean during 2001-02 and 2002-03
(Area- '000 hectares; Production- '000 tonnes)

STATE	2001-2002		2002-2003			
	Area	Production	Area	Percent share	Production	Percent share
Madhya Pradesh	4449.7	3735.0	3951.3	67.36	2576.1	
Maharashtra	1104.9	1385.5	1255.5	21.41	1576.0	56.51
Rajasthan	655.9	715.9	471.7	8.04	236.4	5.19
Others	132.6	126.3	187.1	3.19	169.8	3.73
All India	**6343.1**	**5962.7**	**5865.6**	**100.00**	**4558.3**	**100.00**

Source: Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India.

2.3 Zone-wise major commercial varieties:

Table No. –3

Soybean varieties suitable for different zones in India

Zone	State	Name of variety	Yield (Kg./ha.)	Oil percent
North zone	Uttar Pradesh and Rajasthan	Alankar	2200	--
		Ankur	2300	--
		Clark - 63	1800	--
		PK-1042	3300	--
		PK-262	2800	--
		PK-308	2600	20-23
		PK-327	2300	--
		PK-416	3200-3800	41-56
		PK-564	3000	--
		Shilajeeth	2200	--
Central zone	Madhya Pradesh and Maharashtra	Bragg	1800	--
		Calitur	1800	--
		Durga	2100	--
		Gaurav	2200	--
		Indira Soya -9	2300	--
		JS-2	1800	--
		JS-71-05	2000-2400	41
		JS-75-46	1600-3100	--
		JS-76-205	1600-2000	--
		JS-79-81	2800	--
		JS-80-21	2500-3000	--
		JS-90-41	2500-3000	--
		JS-335	2500-3000	17-19
		MACS-13	2700	15-22
		MACS-58	2000-2500	--
		MAUS-47 (Parbhani Sona)	2500-3000	20
		MS-335	2800	--
		NRC-12(Ahilya-2)	2800	--
		NRC-2(Ahilya-1)	3500-4000	21
		NRC-7(Ahilya-3)	3200	--
		PK-472	3300	--
		PUSA-16	2800	--
		PUSA-22	2600	--
		PUSA-37	2800	--
		TYPE-49	2200	--
		MACS-57	2800	--
		MACS-450	2500	20
		MAUS-2	2450	--
		MAUS-1	2800	--
		MAUS-32(Prasad)	3000-3500	19
Southern zone	Karnataka	KB-79(Sneha)	1700	--
		MACS-124	2500-3200	--
		PUSA-40	2600	--

3.0 POST-HARVEST MANAGEMENT

3.1 Post-harvest losses :

Post-harvest losses occur at different stages viz. harvesting, threshing, winnowing, storage, packaging, and transportation, processing and marketing of Soybean. During storage at farmer's level, spoilage and losses may occur due to mishandling, use of very old and damaged gunny bags and rodents. The losses during storage at farm level have been estimated to be about 0.5 percent. During transport of Soybean from the farm house to the assembling markets and from assembling markets to the secondary markets or consuming centers, losses occur on account of pilferage, leakage of gunny bags and rough handling. The losses are around to be not more than 0.2 to 0.5 percent. The storage losses with the processors are mainly driage loss due to storage of Soybean for a longer period. The pest damage to the Soybean is less because of its hard testa. Some losses also occur due to rodents. The losses at the processing units on these counts have been estimated to be about one percent only.

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

- Timely harvest at optimum moisture percentage (not more than 14 percent).
- Use of proper method of harvesting.
- Avoid the losses in threshing and winnowing by adopting better mechanical methods.
- In threshing, precaution must be taken to avoid severe beating as it may decrease the germination of the seeds.
- Avoid excessive drying, fast drying and rewetting of grains.
- Ensure uniform drying to avoid hot and wet spots on grain and mechanical damage due to handling.
- Adopt the grading practices to get more profit.
- Use efficient and good packaging for storage and transportation.
- Use proper scientific technique in storage for maintaining optimum moisture content i.e. less than 9 percent.
- Use pest control measures (fumigation) before storage.
- Provide aeration to stored grain and stir bulk grain occasionally.
- Move stocks in sacks to discourage pest incidence and their multiplication.
- Proper handling (loading and unloading) of Soybean with good transportation facilitates helps in reduction in losses at farm and market levels.

3.2 Harvesting care:

The season of harvesting of Soybean depends on the time of sowing and the variety grown such as short duration or long duration. Generally, *Kharif* Soybean is harvested during the period October – November and *Rabi* crops harvested in the month of January – February. The harvesting losses depend on the time of harvest and the variety grown. In some varieties, the shattering is more. Losses in the field also occur due to untimely harvest, poor agricultural operations, careless handling, natural calamities like heavy rainfall, hailstorm, birds, rodents, etc., These losses of Soybean in the field are estimated to be 1 to 2 percent in normal cases.

The following harvesting care should be taken.

- Soybean should be harvested, when leaves start falling and pods look dry, but before getting dried completely.
- The moisture in the seeds at the time of harvesting should not be more than 14 percent.
- Harvesting before maturity means a low yield and also a higher proportion of immature seeds, poor quality and more chances of disease attack during storage of grain.
- Delay in harvesting results in grain shattering and cracking of grains in the pods and exposure to insects, rodents, birds and pests attack.
- Avoid harvesting during wet weather conditions.
- Harvesting should be done by adopting proper method.
- Protect the harvested grains from rain and excessive dew by covering.
- Keep the harvested grains separately for each variety, to get true to type variety seed.
- Dry harvested crop for 8-10 days at the threshing floor.
- Avoid direct sun drying and excessive drying, which leads to an increase in breakage of the grains.
- If the threshing is delayed, keep the harvested Soybean in a dry and shady place, which facilitates the air circulation and prevents excessive heating.
- Transport the grain in bags, which minimises the grain losses.
- Avoid too much post harvest handling to minimise the grain losses.
- Pack the Soybean in sound B-Twill jute bags totally free from any contamination.

3.3 Post-harvest equipment:

The following implements are developed by Central Institute of Agricultural Engineering (C.I.A.E), Bhopal for better threshing of Soybean:

1) CIAE high capacity multicrop thresher

It is suitable for threshing of Soybean which was developed by CIAE, Bhopal during 1989-94.

Specifications

Dimension: 3.42 X 2.43 X 2.33
Weight(kgs.): 1200
Cylinder Size(mm.): 700 dia X 1100
Beater size: 40X10X180mm flats, 112 Nos.
Blowers : Aspirator type, 600mm.dia, 4 bladed.3 Nos.
Power source: 20 hp electric motor or 35 hp tractor pto

Performance results for Soybean:

Cylinder speed, m/s: 8.0
Broken grain percent:0.91
Total grain losses percent:1.55
Threshing efficiency percent: 99.9
Cleaning efficiency percent: 98.0
Output capacity kg./h: 780
Power consumption kw:8.4
Labour requirement(man-h/q): 0.2-0.6

CIAE High capacity multi-crop thresher

Source : Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal

2) CIAE multicrop thresher

It is suitable for threshing of Soybean which was developed by CIAE, Bhopal during 1981-85.

Specifications :

Dimension: 1.95 X1.65 X 1.45
Weight(kgs.): 450
Cylinder Size(mm.): 500 dia X 584
No. of beaters and size : 92 Nos., 25x 8x80 mm flats
No.of blowers and size : 1 No. , 672mm dia, 4 bladed
Size of straw thrower : 540 mm, 4 bladed
Power source: 5 hp electric motor

Performance results for Soybean:

Cylinder speed, m/s: 7.8
Broken grain percent: 2.2
Total grain losses percent: 4.01
Threshing efficiency percent: 98.8
Cleaning efficiency percent: 93.0
Output capacity kg./h: 200
Power consumption k/w : 2.8
Labour requirement(man-h/q): 0.24-1

CIAE Multi crop thresher

Source : Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal

3.4 Grading :

Grading is an important facilitating service in the marketing process of an agricultural commodity. It has been observed that uniform variety having bold grains fetch higher price in the market. The traders, who purchase Soybean negotiate the price on the basis of its quality such as cleanliness, boldness, colour, moisture, shrinkage, admixture, etc.

Importance :

- To get higher price of the produce and facilitate marketing.
- It widens the marketing process because buying and selling take place between two parties at distant places and reduces the cost of marketing and minimises storage and handling losses.
- It facilitates the keeping quality of the produce and easy finance.
- In case of dispute it facilitates to settle the claims.
- It facilitates the future trading.

3.4.1 Grade specifications:

I) Agmark specifications:

The Agmark grade standards for Soybean notified under the Agricultural Produce (Grading and Marking) Act 1937 by the Central Government (Directorate of Marketing and Inspection) are given in Table No.- 4.

Table No.–4

Grade designation and definition of quality of Soybean seeds

Grade desig-nations	Special requirements							
	Oil content on dry basis percent by weight	Acid value of oil	Moisture content percent by weight	Damaged, discoloured, insect infested beans percent by weight	Immature, shrivelled beans percent by weight	Splits, brokens, cracked beans percent by weight	Inorganic foreign matter percent by weight	Organic foreign matter percent by weight
	Mini-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum	Maxi-mum
Grade –I	20	3	10	1	2	5	0.5	0.5
Grade – II	18	4	12	2	3	10	0.5	0.5
Grade –III	15	6	12	3	5	20	0.5	1.5

General Characteristics:

Soybean shall be;

a) the mature, dried, clean and wholesome seeds of the plant *Glycine max (L) Merrill;*
b) of uniform size , shape and colour characteristic of the variety;
c) free from mould, musty odour or added colouring matter;
d) completely free from admixture of any poisonous, toxic, harmful or non-edible seeds like neem, argemone, khesari, castor, mahua, etc;
e) free from pesticides/insecticide residue, except to the extent permissible under the PFA Rules and shall not contain uric acid exceeding 100 mg/kg and mycotoxin including afflatoxin exceeding 30 micrograms per kilogram.

Explanations:

1) Damaged and discoloured	**:**	Include beans or pieces of beans which are sprouted, mouldy, diseased or materially damaged due to heat, moisture or microbial action.
2) Insect infected	**:**	Include beans or pieces of beans that are partially or wholly bored or eaten by insects.
3) Immature and shriveled	**:**	Include beans which are not fully mature or properly developed and shrunk out of shape.
4) Splits, broken and cracked beans	**:**	Include mechanically damaged beans or pieces of beans with broken seed coat.
5) Inorganic foreign matter	**:**	Includes sand, dust, dirt, stones, lumps of earth.
6) Organic foreign matter	**:**	Includes chaff, stem, straw, husk and other edible seeds.

II) Specifications followed by NAFED for procurement :

National Agricultural Co-operative Marketing Federation (NAFED) is the central nodal agency of Government of India, which arranges procurement of Soybean under Price Support Scheme (P.S.S.). The grade specifications followed during marketing season 2003-2004 is given in Table No.–5.

Table No. – 5

Grade specifications of Soybean followed by NAFED for price support scheme during 2003-04 marketing season

S.No.	Special Characteristics	Maximum limits of tolerance(percentage by weight per quintal) for FAQ
1.	Foreign matter and impurities	**2**
2.	Shrivelled and immature beans	**5**
3.	Damaged and Weevilled beans	**3**
4.	Mechanically damaged beans (split, broken and crack)	**15**
5.	Moisture content	**12**
Support price for naked beans	(Yellow) (Black)	Rs.930/- per quintal Rs.840/- per quintal

Definitions:

1. Foreign matter means dust, dirt, stones, lumps of earth, chaff, stem, straw or any other impurity.
2. Damaged and weevilled beans are the beans or pieces of these which have sprouted or are internally damaged as a result of heat, moisture, insect or microbial action.
3. Shriveled and immature beans are the beans that are shrunk, out of shape, or are not fully mature or developed and are often discoloured.

[Source: National Agricultural Co-operative Marketing Federation (NAFED)]

III) Grade Specifications of Soybean Processors Association of India (SOPA) :

SOPA has a vision to focus on quality of Indian Soybean products marketed both in domestic and international markets to ensure reliable, consistent and uniform quality and to create brand equity in both the markets. SOPA certify those Soybean products which are covered by SOPA standards. Specifications for Soybean seed followed by SOPA are as follows:

S.No.	Characteristic	Limit	Requirement
1	Moisture, percent by mass	Maximum	12.00 %
2	Protein (N x 6.25), percent by mass	Minimum	36.00 %
3	Crude fat or ether extract, percent by mass	Minimum	18.00 %
4	Acid insoluble ash, percent by mass	Maximum	01.50 %
5	Damaged Seeds, percent by mass	Maximum	05.00 %
6	Foreign matter, percent by mass	Maximum	04.00 %

Source : www.sopa.org

IV) CODEX standards :

A) The CODEX standards for Soybean:

Maximum residue limits for pesticides as per Codex for Soybean (dry) are given in Table No.- 6.

Table No. –6

Maximum residue limits for pesticides as per Codex for Soybean (dry)

Sl .No.	Pesticides	MRL (Mg / Kg.)
1.	Azinphos-methyl	MRL 0.05*
2.	Carbaryl	MRL 1
3.	Diquat	MRL 0.2
4.	Fenitrothion	MRL 0.1
5.	Paraquat	MRL 0.1
6.	Parathion	MRL 0.05*
7.	Carbondazim	MRL 0.2
8.	Fenamiphos	MRL 0.05*
9.	Methamyl	MRL 0.02
10.	Acephate	MRL 0.5
11.	Carbafuran	MRL 0.2
12.	Methamidophos	MRL 0.05
13.	Phorate	MRL 0.05
14.	Aldicarb	MRL 0.02*
15.	Cypermethrin	MRL 0.05*
16.	Fenvalerate	MRL 0.1
17.	Permethrin	MRL 0.05*
18.	Oxamyl	MRL 0.1
19.	Diflubenzuron	MRL 0.1
20.	Metalaxyl	MRL 0.05*
21.	Triozophas	MRL 0.05*
22.	Ethoprophos	MRL 0.02*
23.	Glyphospate	MRL 2.0

24.	Terbufos	MRL	0.05*
25.	Profenofos	MRL	0.05*
26.	Bentazone	MRL	0.05*
27.	Glufosinate ammonium	MRL	0.1
28.	Cycloxydim	MRL	2

Note : MRL -- Maximum Residue Limit.
EMRL -- Extraneous Maximum Residue Limit.
* -- At or about the limit of determination.

Source : www.codexalimentarius.net

B) CODEX GENERAL STANDARD FOR SOY PROTEIN PRODUCTS

CODEX STAN 175-1989

1. SCOPE

This standard applies to Vegetable Protein Products (VPP) prepared from Soybeans (seeds of *Glycine Max*.L.) by various separation and extraction processes. These products are intended for use in foods requiring further preparation and by the food processing industry.

2. DESCRIPTION

Soy Protein Products (SPP) covered by this standard are food products produced by the reduction or removal from Soybeans of certain of the major non-protein constituents (water, oil, carbohydrates) in a manner to achieve a protein (N x 6.25) content of:

- in the case of soy protein flour (SPF) 50% or more and less than 65%;
- in the case of soy protein concentrate (SPC) 65% or more and less than 90%;
- in the case of soy protein isolate (SPI) 90% or more.

The protein content is calculated on a dry weight basis excluding added vitamins, minerals, amino acids and food additives.

3. ESSENTIAL COMPOSITION AND QUALITY AND NUTRITIONAL FACTORS

3.1 **Raw materials**

Clean, sound, mature, dry seeds essentially free from other seeds and foreign matter in accordance with Good Manufacturing Practice, or SPP of lower protein content meeting the specifications contained in this standard.

3.2 SPP shall conform to the following compositional requirements:

3.2.1 **Moisture** content shall not exceed 10% (m/m).

3.2.2 **Crude Protein** (N x 6.25) shall be:

- in the case of SPF, 50% or more and less than 65%
- in the case of SPC, 65% or more and less than 90%
- in the case of SPI, 90% or more

on a dry weight basis excluding added vitamins, minerals, amino acids and food additives.

3.2.3 **Ash**

The yield of ash on incineration shall not exceed 8% on a dry weight basis.

3.2.4 **Fat**

The residual fat content shall be compatible with Good Manufacturing Practices.

3.2.5 **Crude fibre** content shall not exceed:

- in the case of SPF, 5%
- in the case of SPC, 6%
- in the case of SPI, 0.5%

on a dry weight basis.

3.3 **Optional ingredients**

(a) carbohydrates, including sugars
(b) edible fats and oils
(c) other protein products
(d) vitamins and minerals
(e) salt
(f) herbs and spices

3.4 **Nutritional Factors**

Processing should be carefully controlled and sufficiently thorough to secure optimum flavour and palatability, as well as to control such factors as trypsin inhibitor, hemaglutinins, etc., in accordance with intended use. Where it is necessary to control trypsin inhibitor activity in a food, the maximum level allowed should be defined in terms of the finished product. Certain SPP are produced under low temperature conditions to avoid loss of protein solubility or enzyme activity. The special purpose SPP shall be assayed for protein nutritive value after appropriate heat treatment. Processing must not be so severe as to appreciably impair the nutritive value.

4. FOOD ADDITIVES

During the course of manufacturing SPP the following classes of processing aids, as compiled in the advisory inventory of the Codex Alimentarius Commission, may be used:

Acidity Regulators
Antifoam Agents
Firming Agents
Enzyme Preparations
Extraction Solvents
Antidusting Agents
Flour Treatment Agents
Viscosity Control Agents.

5. CONTAMINANTS

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

6. HYGIENE

6.1 It is recommended that the products covered by the provisions of this standard be prepared in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 2-1985, Codex Alimentarius Volume 1B).

6.2 To the extent possible in Good Manufacturing Practice, the products shall be free from objectionable matter.

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

(a) shall be free from microorganisms in amounts which may represent a hazard to health;

(b) shall not contain substances originating from microorganisms in amounts which may represent a hazard to health; and

(c) shall not contain other poisonous substances in amounts which may represent a hazard to health.

7. PACKAGING

SPP shall be packed in suitable hygienic containers which will maintain the product during storage and transport in a dry and sanitary condition.

8. LABELLING

The provisions of the General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev 1-1991, Codex Alimentarius Volume 1A) shall apply.

8.1 Name of the food

8.1.1 The name of the food to be declared on the label shall be:

"soy protein flour" or "soya protein flour" when the protein content is 50% or more and less than 65%.

"Soy protein concentrate" or "soya protein concentrate" when the protein content is 65% or more and less than 90%.

"Soy protein isolate" or "isolated soy protein" or "soya protein isolate" or "isolated soya protein" when the protein content is 90% or more.

8.1.2 The name may include a term which accurately describes the physical form of the product, e.g., "granules" or "bits",

8.1.3 When the SPP is subjected to a texturization process, the name of the product may include an appropriate qualifying term such as "textured" or "structured".

8.2 List of Ingredients

A complete list of ingredients shall be declared on the label in descending order of proportion except that in the case of added vitamins and added minerals, these ingredients shall be arranged as separate groups for vitamins and minerals, respectively, and within these groups the vitamins and minerals need not be listed in descending order of proportion.

8.3 Labelling of Non-Retail Containers

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

Source : www.codexalimentarius.net

V) PFA Standards for Solvent Extract Soya Flour :

Solvent Extract Soya Flour means the product obtained from clean, sound healthy Soybeans by a process of cracking, dehulling, solvent extraction with food grade hexane and grinding. It shall be in the form of coarse or fine powder or grits, white to creamy white in colour, of uniform composition and free from rancid and objectionable odour, extraneous matter, insects, fingus, rodent hair and excreta. It shall be free from any added colour and flavour. It shall conform to the following standards, namely:-

(a)	Moisture	Not more than 9.0 per cent, by weight
(b)	Total ash	Not more than 7.2 per cent by weight on dry basis
(c)	Ash insoluble in dilute HCL	Not more than 0.4 per cent by weight on dry basis
(d)	Protein (N x 6.25)	Not less than 48 per cent by weight on dry basis
(e)	Crude fibre	Not more than 4.2 per cent by weight on dry basis
(f)	Fat	Not more than 1.5 per cent by weight on dry basis
(g)	Total bacterial count	Not more than 50,000 per gm
(h)	Coliform bacteria	Not more than 10 per gm
(i)	Salmonella bacteria	Nil in 25 gm
(j)	Hexane (Food grade)	Not more than 10.00 ppm.

Source: The P.F.A. Act, 1954 – Edition 2004

3.4.2 Adulterants and toxins:

The Soybean is one of the products in which Aflatoxins are produced. The fungi (mould) that produce aflatoxins infect it before, during and after harvest. These fungi, specially, *Aspergilus flavus*, *A.parasiticus* and *Fusarium sp* are normal soil borne inhabitants in our envioromnent, growing on both living and decaying plant matter.

Mycotoxins include metabolic by-products, produced by a number of different fungi that may or may not be toxic. Four different aflatoxins i.e. B1, B2, G1 and G2 have been identified with B1 being the most toxic, carcinogenic and prevalent.

3.4.3 Grading at producers' level:

The scheme for grading at 'Producer level' was introduced in1962-63 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. The programme is being implemented by the state government. During the year 2001-02, about 3143 tonnes of Soybean valued at Rs. 239.07 lakh as against 2088 tonnes valued at Rupees 198.40 lakh during the year 2002-2003 were graded at producers' level.

3.5 Packaging:

The Government of India has made it mandatory to pack food grains cereals, pulses etc., in Jute bags and an official notification in this regard was issued by the Ministry of Textiles on 30th June, 1997. The jute gunny bags of 89X54 cms. sizes are usually used for packing Soybean. The standard capacity of the bag for Soybean is 95 kgs. The small size seed of Soybean can be filled up to 100 kgs. However, it has been observed that sometimes small consumer packaging is carried out in transparent thick polyethylene bags.

Table No. –8
Properties of jute bags and HDPE bags

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

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

Criteria for selection of packaging material for Soybean:

➔ Packaging material should be;
1) Suitable according to transportation and storage method.
2) Suitable according to climatic and environmental conditions.
3) Safe to handle during transportation.
4) Cheap, economical, readily available, easy to handle and store.
5) Convenient and suit the need of the customer.
6) Attractive for display.
7) Environment friendly and biodegradable.
8) Conform to the requirements as laid down under PFA standards as amended from time to time.

➔ Soybean seed should be packed in clean, hygienic bags of any material, which does not affect the produce and prevents it from absorbing moisture.
➔ The packing material used should have sufficient aeration facilities
➔ The material must provide protective strength to the produce.

3.6 Transportation:

1) Road : Road transport is the most popular means for movement of Soybean to the assembling markets as well as to the distribution centres.

a) Bullock / camel carts: Bullock or camel carts are the primary means of transport in most rural areas of India. It is convenient due to following reasons:-

Bullock cart

- ⇨ Cheap and early available conveyance.
- ⇨ Good for small quantity of produce.
- ⇨ Easy transport to short distance.
- ⇨ Operational cost is low.
- ⇨ Easily manufactured by village artisans from materials (wood) available at village and the repairing facilities are also readily available there.
- ⇨ No special type of road is required, can be operated on *kaccha* road, muddy or sandy path also.

b) Tractor trolley: Transportation by tractor trolley is convenient due to following reasons –

Tractor trolly

- ➔ To carry larger quantity of produce than bullock carts in less duration of time.
- ➔ Suitable in surplus producing areas than the trucks for carrying produce to the primary assembling markets where there is absence of proper *pucca* road connecting the villages.

c) Trucks: The movement of Soybean from assembling markets to the secondary markets and consuming markets is invariably by trucks. For larger or bulk quantity, the truck is the most convenient mode of transport throughout the country and in some cases better than railway wagons since the railway wagon transportation poses some difficulties like timely non-availability of wagons, safety of goods and problems of loading-unloading of produce directly at godowns. It is convenient due to following reasons:

Truck

- ⇨Easy availability
- ⇨Time saving
- ⇨Quick movement of stocks
- ⇨Door to door delivery
- ⇨Comparatively cheaper for short / medium distances
- ⇨Suitable for smaller quantities at a given time
- ⇨Flexibility in operation and reliability in handling of produce
- ⇨Minimum transit losses due to least handling of loading and unloading

2) Rail: Railway system in India is Asia's largest and World's fourth largest in terms of route kilometers. For faster movement of goods, super express goods trains operate at fixed timings on trunk and other important routes. The transportation of Soybean by railway wagons may become convenient for following reasons:

Rail

- Suitable for carrying larger quantity of produce over long distances through out India.
- Comparatively cheaper and safer mode of transport available through a wide network of railways.
- Facilities of three categories of tariff are as :
  1) Telescopic/Class rate 2) Wagon load scale 3) Station to station rate

During transportation, following care should be taken:

- The packs of Soybean should be handled and transported in such a way so that they remain well protected from sun, rain or other sources of excessive heat, objectionable odour and from any type of cross infestation especially, while transporting through ships.
- During transportation, there should be proper arrangement of sufficient aeration and insulation to reduce the heat.
- Stacking height should be kept up to 6 to 10 tiers.
- While handling and lifting of bags during transportation, too much use of hooks by labourers should be avoided, which may cause spoilage losses from the Soybean bags.

3.7 Storage:

Most of the farmers store Soybean in their own houses. They usually store in gunny bags. The filled bags are stacked above wooden planks and gunny bags or paddy straw is spread over the floor to avoid dampness. The big farmers normally have *pucca*-floored houses, where the Soybean is stored.

Traders, commission agents and brokers usually have their own godown facilities. They keep the Soybean in bags in their own godowns in packed condition. The processing units are the main agencies who stock Soybean for a longer period. They purchase and stock Soybean to meet the requirements for the whole year. Generally Soybean is not stored in loose form. The bags are stored in the godowns, which have cemented floors.

Basic requirements for safe storage:

The following requirements are basic prerequisite for safe storage of Soybean:

I) Selection of godown
II) Cleaning of godowns
III) Use of dunnage
IV) Cleaning of bags
V) Cleaning of vehicles
VI) Aeration of godown
VII) Separate storage of old and new stock
VIII) Cleaning and drying of Soybean
IX) Regular inspection of stocks

Godown

The code of storage practices of Soybean meant for milling and other industrial purposes are as follows:

■ Godowns:

- The godown for storage of Soybean shall be of 'A' Class construction with moisture proof flooring, leak proof roofing, tight fitting doors and ventilators. High plinth level of godown may prevent the entry of rodents and water.
- Soybean shall not be stored in compartment having fertilizer, cement or any other substance having deleterious effect. Godowns where fertilizers have recently been stored shall thoroughly be washed with caustic soda, fully aerated and when no traces of odour are present, Soybean shall be stored.

■ Dunnage:

- Wooden crates dunnage is preferable for the storage of Soybean. However, in the absence of wooden crates, polythene film sandwiched between two layers of bamboo mats may be used. Mat dunnage used for fertilizer, cement etc. should not be used for Soybean.

■ Stacking:

- Soybean bags shall be stacked in the godowns away from walls, pillars, doors, etc. leaving an alleyway space of 0.6 – 0.9m (2 to 3ft.). the main alleyway may not be less than 1.2m (4ft.). The base of stack shall not be more than 9.14m x 6.06m (30 x 20 ft.)
- Stack height of 15 layers is considered suitable for freshly harvested Soybean. Well dried stock with moisture content of less than 9 percent can however, be stacked a few layers higher.

Stack arrangement

■ Preservation:

- The Soybean which is rich in protein, as well as fat is vulnerable to infestation by insects, mites. Soybean is susceptible to *Cadra cautella, spp. Rhizopertha* d*oninica, Trogoderma granarium, Oryzaephilus surinamensis, Caryeodon gonargra,* etc. depending upon climatic conditions. Soybean containing less than 9 percent moisture generally remains free from the attack of pests.
- In case infestation occurs, fumigation shall be done with Aluminium phosphide at the prescribed dosage. In no case, methyl bromide should be used, as the commodity is rich in oil contact.
- Excellent godown hygiene should be maintained to minimize the chances of insect infestation. Selective aeration of stock on clear sunny days should be done to maintain the quality of stock.
- Regular prophylactic treatments should be provided to the stocks with approved chemicals at recommended dosages.
- Regular inspection of stock should be done fortnightly by the usual procedure to examine the health of stock and to plan future pest control measures.

■ Insurance:

- Soybean is classified as non-hazardous for the purpose of fire insurance.

7.1 Major storage pests and their control measures:

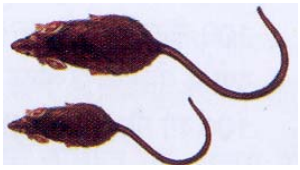
The details of the major insects and their control measures are given in Table No- 9 .

Table No. –9

Major storage pests and their control measures

Insect	Control/ remedial measure	Method of application
1. Cigaratte beetle *Lasioderma serricorne (Fabricus)*  **2. Lesser grain borer** *Rhizopertha dominica (F)*  **3. Saw-toothed grain beetle** *Oryzophilus surinamsis(L)*  **4. Groundnut borer** *Caryedon sp*  **5. Khapra beetle** *Trogoderma granarium Ev.*  **Adult**  ***Larvae***	**1. Malthion (50 percent E.C.):** Mix 1 litre Malathion in 100 litre of water and spray this 3 litre prepared solution per 100 Sq. metre area. **2. D.D.V.P. (76 percent E.C.):** Mix 1 litre D.D.V.P. in 150 litre of water and spray this 3 litre prepared solution per 100 Sq. metre area. **3. Deltamethrin :** Mix 1 Kg Delta-methrin with 25 litres of water and spray this 3 litre prepared solution per 100 Sq. metre area	Spraying is to be done at 15 days interval during March to Oct. and at 21 days interval during Nov. to Feb. Spraying not to be done directly to the oilseed bags. Air charging of D.D.V.P is to be done on the walls and floor of the godown as and when required. Spraying is to be done at 3 months interval directly on the oilseed bags.

Rodents: Besides above, rodent causes mechanical damage to stored Soybean gunny bags by cutting, which results in bleeding and quantitative loss of the produce. Moreover, the rodent's excreta, hair, etc., deteriorate the hygiene of Soybean. To control the rodents following measures are to be taken:



Control measures:

a) Use of Rat cage : Different types of rat cages are available in the market. Rats caught by these rat cages can be killed by dipping into water.

b) Use of poison baits : For killing the rats, poison baits are used. In this process, anti-coagulant pesticide like Zinc Phosphide is mixed with bread or any other food stuff used as bait. This kind of pesticide affects gradually the body of rodents which ultimately kills them.

c) Rat burrow fumigation : To control the rat hazards, the rat holes/burrows if any found inside the godown or surrounding areas may be fumigated by putting two Alluminium Phosphide tablets into it and sealing the mouth of the hole/burrow by mud mixture.

3.7.2 Storage structures:

◆ **Bins:**

1.Mud-bin : Made by bricks and mud or by straw and cow dung. These are usually cylindrical in shape with varying capacity.

2.Bamboo reed bin: Made by bamboo splits plastered with mixture of mud and cow dung.

3.Metal drums : Made up with iron sheets in cylindrical and square shape with various sizes.

4.Improved bins : Different organisations developed and designed improved storage structures for scientific storage of foodgrains, which are moisture resistant and rodent-proof. These are:

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

◆ **Godown:**

1. Kaccha godown : These are made by brick or stone walls with mud mixture for storing Soybean in bulk and bags.

2. Pucca godown : These are made by brick-walls with cemented flooring for storing Soybean in bulk and bags.

◆ **CAP (Cover and plinth) storage** : It is an economical way of storage on a large scale. The plinth is made by cement concrete and bags are staked on open and covered by polythene cover.

3.7.3 Storage facilities:

I) Producers' storage :

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

II) Rural godowns :

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godowns Scheme in collaboration with NABARD and NCDC. Its objective is to construct scientific storage godowns with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. The main objectives of Rural Godowns Scheme are as under:

1. Creation of 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;
2. Promotion of grading, standardization and quality control of agricultural produce to improve their marketability;
3. Strengthen agricultural marketing infrastructure in the country by paving the way for the introduction of a national system of warehouse receipts in the respect of agricultural commodities stored in such godowns;

4. Prevention of distress sale immediately after harvest by providing the facility of pledge financing and marketing credit; and
5. Reverse the declining trend of investment in the agriculture sector by encouraging the private and cooperative sectors to invest in the creation of storage infrastructure in the country.

III) Mandi godowns :

Most of the Soybean is moved to the market after the harvest. Generally, Soybean is stored both in bulk and in bags in every mandi. Most of the States and U.Ts. have enacted Agricultural Produce (Marketing Regulation) Acts. The APMCs constructed storage godowns in the market yards. At the time of keeping produce in godown, a receipt is issued indicating the kind and weight of produce stored. The receipt is treated as negotiable instrument and eligible for pledge finance. The CWC and SWCs were also allowed to construct godowns in the market yards. Co-operative societies also constructed godowns in the market yards, both in producing and consuming areas/markets. Traders also possess permanent storage in the form of own godowns or warehouses, or on hire basis.

IV) Central Warehousing Corporation (CWC) :

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

Table No. –10
State-wise storage capacity with CWC as on 31-03-2002.

Name of State	No of warehouses	Total capacity (in tonnes)
1.Assam	6	46934
2.Andhra Pradesh	49	1259450
3.Bihar	13	104524
4.Chhattisgarh	10	259964
5.Delhi	11	135517
6.Gujarat	30	515301
7.Haryana	23	338860
8.Karnataka	36	436893
9.Kerala	7	93599
10.Madhya Pradesh	31	665873
11.Maharashtra	52	1248510
12.Orissa	10	150906
13.Punjab	31	820604
14.Rajasthan	26	371013
15.Tamil Nadu	27	676411
16.Uttaranchal	7	73490
17.Uttar Pradesh	50	1018821
18.West Bengal	43	563698
19.Others	13	136826
Total	**475**	**8917194**

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

V) State Warehousing Corporations (SWCs) :

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

Table No. –11

State-wise storage capacity with SWCs as on 31-12-2002.

Name of SWC	No. of warehouses	Total capacity (in lakh tonnes)
1. Andhra Pradesh	120	17.14
2. Assam	44	2.67
3. Bihar	44	2.29
4. Gujarat	50	1.43
5. Haryana	113	20.48
6. Karnataka	107	6.67
7. Kerala	62	1.85
8. Madhya Pradesh	219	11.57
9. Maharashtra	157	10.32
10.Meghalaya	5	0.11
11.Orissa	52	2.30
12.Punjab	115	72.03
13.Rajasthan	87	7.04
14.Tamil Nadu	67	6.34
15.Uttar Pradesh	168	30.42
16.West Bengal	32	2.58
17.Chhattisgarh	95	6.66
Total	**1537**	**201.90**

Source : Central Warehousing Corporation, New Delhi

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. –12

State-wise cooperative storage facilities as on 31-3-2001.

Name of State	Rural level	Market level	Total capacity (in tones)
1. Andhra Pradesh	4003	571	690470
2. Assam	770	262	297900
3. Bihar	2455	496	557600

4. Gujarat	1815	401	372100
5. Haryana	1454	376	693960
6. Himachal Pradesh	1634	203	202050
7. Karnataka	4828	921	941660
8. Kerala	1943	131	319585
9. Madhya Pradesh	5166	878	1106060
10.Maharashtra	3852	1488	1950920
11.Orissa	1951	595	486780
12.Punjab	3884	830	1986690
13.Rajasthan	4308	378	496120
14.Tamil Nadu	4757	409	956578
15.Uttar Pradesh	9244	762	1913450
16.West Bengal	2791	469	478560
17.Other States	1031	256	312980
Total	**55886**	**9426**	**13763463**

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

3.7.4 Pledge finance system :

The Indian farmers usually have small holdings. They do not have the financial capability to retain their surplus produce till favourable market price and are often compelled to sell their produce, immediately after the harvest when the prices are usually low. The only way out to this nagging problem is creating infrastructure which could provide them with safe and scientific storage of their produce and also make proper avenue for availing marketing finance against their stored produce. The creation of rural godown coupled with the system of pledge finance is emerging as a befitting mechanism to benefit them in a great way.

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

Benefits :

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

4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 Assembling :

4.1.1 Major assembling markets:

The major assembling markets for Soybean are located in Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. Some major assembling markets of Soybean in major producing states in India are listed below in Table No. -13.

Table No.– 13
Major assembling markets of Soybean

State	Name of District	Name of major market/*mandies*
1.Madhya Pradesh	Ujjain	Badnagar, Mahindpur,Ujjain
	Indore	Indore, Gautampura,Mhow
	Dewas	Dewas, Khategaon,Soankachh
	Mandsour	Mandsour
	Neemach	Neemach
	Ratlam	Ratlam, Jaora
	Dhar	Dhar, Badnawar
	Khandwa	Khandwa
	Harda	Harda
	Baitul	Baitul
	Hoshangabad	Itarshi, Pipariya
	Sahjahpur	Shujalpur
	Rajgarh	Biora,Pachore
	Sihore	Sihore, Ashta
	Bhopal	Bhopal
2.Maharashtra	Ahmednagar	Kopargaon, Newasa, Rahuri, Shrigonda, Shrirampur, Akole
	Dhule	Dhule,
	Nandurbar	Shahada, Akkallkuwa
	Jalgaon	Chopada, Pachora, Raver
	Nashik	Lasalgaon, Malegaon, Manmad, Nandgaon, Sinnar, Kalvan, Dindori
	Kolhapur	Gadhinglaj, Jaysingpur
	Pune	Vadgaonpeth, Baramati, Shirur
	Sangli	Islampur, Sangli, Tasgaon
	Satara	Karad, Koregaon, Patan, Satara
	Solapur	Akluj
	Aurangabad	Kannad, Lasurstation, Sillod,
	Beed	Ambejogai, Kille Dharur, Gevrai, Kaij,
	Jalna	Jalna, Ambad (Vadi Godri), Bhokardan
	Latur	Ahmedpur, Ausa, Murud, Udgir
	Nanded	Bhokar, Hadgaon, Loha, Mudkhed, Nanded
	Osmanabad	Kalamb,Osmanabad, Tuljalpur
	Parbhani	Akhadabalapur, Ghangakhed, Hingoli, Jintur, Kalalmnuri, Parbhani, Sengaon, Purna,Sailu, Jawala-bajar, Tadkalas, Palam

	Akola	Akola, Akot, Balapur, Karanja, Mangrulpeer, Manora Murtizapur, Patur, Risod, Telhara, Washim
	Amravati	Achalpur, Amaravati, Anajngaon-Surji , Chandur Rly., Chandur Bajar, Daryapur, Dharni, Morshi, Nandagaon,
	Buldhana	Varud, Chikali, Deulgaon Raja, hamgaon,Lonar, Sind kher-raja, Malkapur, Mehkar, Motala, Nandura
	Yeotmal	Darwha, Digras, Ghatanji, Maregaon, Nerparasopant, Pandharkawada, Pusad, Ralegaon, Umarkhed , Vani, Yeotmal, Kalamb
	Bhandara	Bhandara, Lakhandur, Pavani, Tumsar
	Chandrapur	Brahmpuri, Chandrapur, Chimur, Mul, Nagbhid, Varora, Gondpimpri, Bhadrawati, Aheri, Chamorshi
	Nagpur	Bhiwapur, Katol, Mandhal, Nagpur, Narkhed, Saoner, Umred, Parshiwani
	Wardha	Arvi, Hinganghat, Ashti, Pulgaon, Sindi, Wardha, Samudrapur
3.Rajasthan	Barang	Anta, Atur, Barang, Chhabra
	Bhilwara	Mandalgarh
	Jaipur	Jaipur
	Sawai Madhopur	Sawai Madhopur
	Bundi	Bundi, Keshorai Patan
	Jhalawar	Bhawani Mandi, Iklera, Jhalarapatan, Khanpur
	Kota	Itawa, Kota, Ramganj Mandi
	Chhitorgarh	Badisadri, Begu, Chitorgarh, Pratapgarh
	Udaipur	Fatehnagar
	Banswara	Banswara
4.Uttar Pradesh	Ghaziabad	Ghaziabad
	Jalalun	Orai, Konch, Madhav Garh, Jalaun
	Lalitpur	Lalitpur
	Hamirpur	Rath, Kurara, Muskara
	Banda	Banda, Atarra
	Bahraich	Nanpara, Bahraich, Mihipurna, Risia
	Faizabad	Faizabad
	Gautam Budh Nagar	Dadri
	Varanasi	Varanasi
	Lucknow	Lucknow
	Sitapur	Sitapur
	Badaun	Bisauli
	Unnao	Unnao, Bangarmah
	Allahabad	Jasra
	Mahoba	Mahoba
	Bijnaur	Dhampur
	Kanpur Nagar	Kanpur
	Kanpur dehat	Pukhrayan
	Jhansi	Jhansi, Barua sagar, Chirgaon, Month

4.1.2 Arrivals:

It was reported that the total arrivals of Soybean in 26 markets of Madhya Pradesh were 1777341 tonnes followed by 137 markets of Maharastra with 303843.4 tonnes and 23 markets of Rajasthan with 335373 tonnes during the year 2000-2001. The detailed information about the quantity of arrivals of Soybean in major assembling markets of main producing states is shown in Table No-14.

Table No.14
Arrivals of Soybean in major assembling markets:

Sl.No.	Name of the state and number of markets	Marketing year	Total qty. of arrivals (in tonnes)
1.	**Madhya Pradesh** (26 markets)	1999-2000 2000-2001 2001-2002	1816584 1777341 1633567
2.	**Maharashtra** (137 markets)	1999-2000 2000-2001	409851.6 303843.4
3.	**Rajasthan** (23 markets)	1999-2000 2000-2001 2001-2002	383316 335373 410154
4.	**Uttar Pradesh** (33 markets)	2000-2001 2001-2002	13377 4195

Source : Department of Agriculture and Cooperation, New Delhi.

4.1.3 Despatches :

In Madhya Pradesh, the maximum arrivals and dispatches were at Indore, Dewas, Ujjain, Sahajapur, Sehore, Ratlam and Dhar markets. The processing units are mainly situated at Indore, Dewas, Sahajapur, Sehore, Pethampur and Betul, etc., and, as such, a major share of dispatches were to these centers. Large scale dispatches outside the state were to Jamnagar and Rajkot in Gujarat.In Maharashtra, Nagpur, Amravati and Wardha are important assembling markets. Soybean from these markets were despatched to Mumbai, Nasik, Aurangabad and Akola. In Rajasthan state, Kota, Chittorgarh and Jhalawar are the important assembling markets. Soybean was dispatched to Gujarat, Madhya Pradesh and Delhi for further processing. , Substantial quantity of Soybean is moved to the processing units in Madhya Pradesh from Uttar Pradesh. The trend of despatches of Soybean observed as follows:

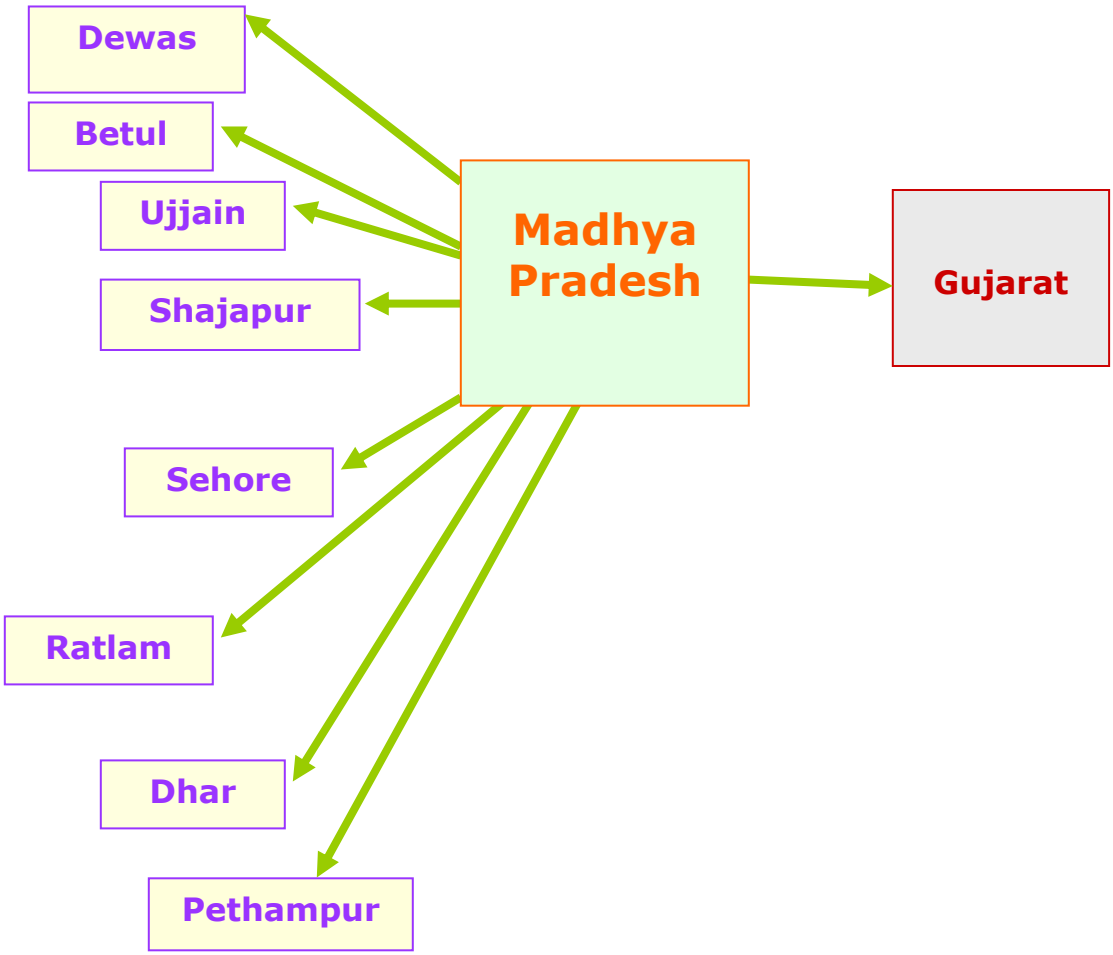
Sl.No.	Place of dispatch	Place of arrival
1.	**Indore, Dewas, Ujjain, Sahajapur, Sehore, Ratlam, Dhar**	Pithampur, Betul, Jamnagar, Rajkot
2.	**Nagpur, Amravati, Wardha**	Mumbai, Nasik, Aurangabad, Akola
3.	**Kota, Chittorgarh, Jhalawar**	Madhya Pradesh, Gujarat, Delhi
4.	**Uttar Pradesh**	Madhya Pradesh

4.2 Distribution:

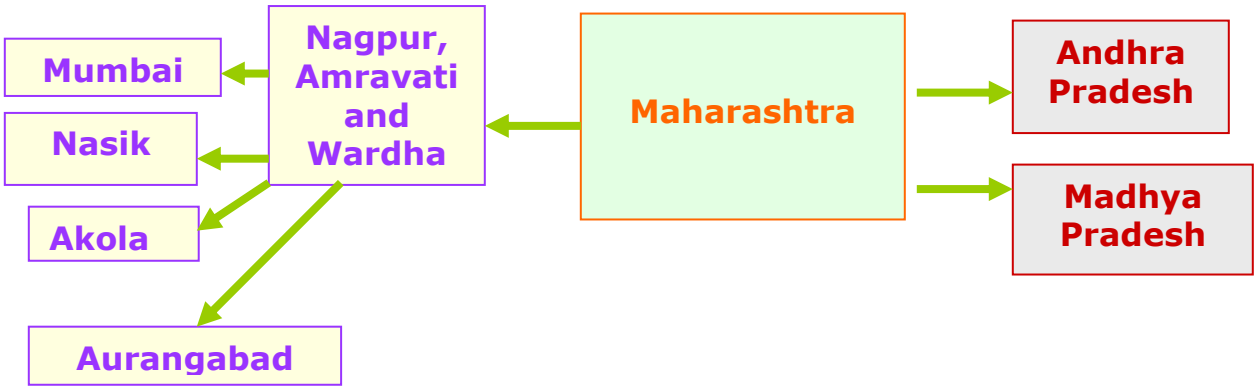
In the producing states, commission agents are the major agency in distribution of Soybean. In the consuming states, the distribution is confined to retailers. The purchase of Soybean for processing units is mainly done by the commission agents in all major assembling markets. As such, commission agents are the important distributing agency for Soybean. They attend to handling, packing and dispatch of Soybean on behalf of their clients. In the assembling markets, processing units also purchase and dispatch Soybean to their own units. Brokers and wholesalers play some role in distribution of Soybean but not to the extent of commission agents. The distribution for retail sale in the non-producing states is mainly affected through wholesalers.

4.2.1 Inter-state movements :- The inter-state movement from the major producing states are exhibited in diagrammatic flow chart below :

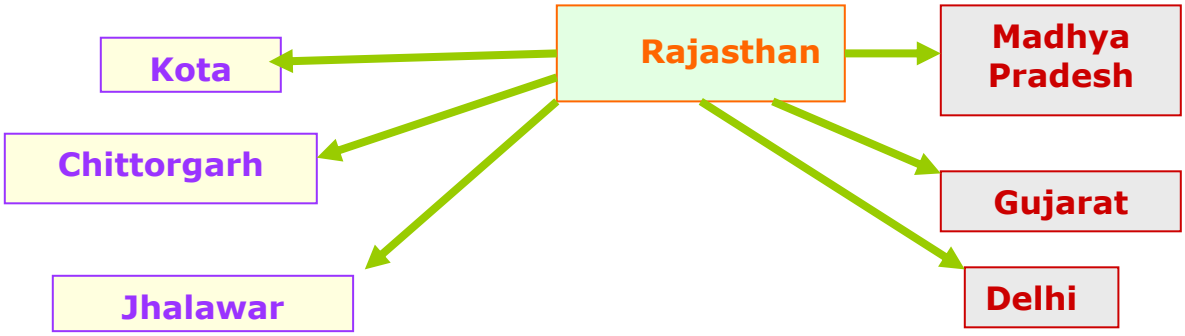
I) Madhya Pradesh State :



II) Maharashtra State :



III) Rajasthan State :



4.3 Export and import

❋ **Export:** India being a net importer of oilseeds and vegetable oils, the export of Soybean from India is negligible. The export of Soybean seed and oil was mainly to Bangladesh, Indonesia, Sri Lanka, Nepal, Singapore, New Zealand, etc. However, a substantial quantity of Soybean oil cake has been exported from India, contributing valuable foreign exchange to the country. India's share in the world Soybean oil meal export was around 8.2 percent during the year 1998-99.

Table No.–15
India's export of Soybean and its products during 1998-99 and 1999-2000

Commodity	1998-99		1999-2000	
	Quantity (in tonnes)	Value (in crores Rs.)	Quantity (in tonnes)	Value (in crores Rs.)
Soybeans	1326	0.89	1727	7.3
Flours and meals of Soybean	3418.9	5.1	5647	7.1
Soybean oil factions	640	0.1	28.5	1.0
Oil cake and meal of Soybean	4895.5	3.4	45524	33.9
Deoiled cake of Soybean	242459	149.4	245969	173.9
Deoiled cake of Soybean, SE	2633968	1578.6	2108553	1372.3
Total	**2886707.4**	**1737.49**	**2407448.5**	**1596.1**

Source : Oilseeds Situation ---- A Statistical Compendium (2002),
Dte. of Oilseeds Research, Rajendranagar, Hyderabad (A.P).

❋ **Import:** Total import of Soybean (Broken) in India was 132009 kg. valued at Rs. 3057517 during the year 2000-2001 mainly from the countries Canada, Indonesia and Singapore as against 57000 kg. valued at Rs. 914370 in the year 2001-2002 from Canada only.

India's country-wise Import.

Soybean (Broken) **(Quantity: Kilogram, Value: Rupees)**

S. N.	Name of Country	2000-01		2001-02	
		Quantity	Value	Quantity	Value(Rs.)
1	Canada	114000	2170577	57000	914370
2	Indonesia	10000	7068633	---	---
3	Singapore	8009	178307	---	---
	Total	**132009**	**3057517**	**57000**	**914370**

Source : DGCIS, Kolkota.

4.3.1 Sanitary and phyto-sanitary measures:

The Sanitary and phytosanitary (SPS) measures are a n integral part of export trade as per agreement made under GATT (General Agreement on Trade and Tariffs), 1994. As per provisions made under this agreement, the standards framed should be such that the minimum level of protection required by an importing country may be fulfilled. In order to achieve this objective, the agreement to set up international standards and guidelines under the aegis of Codex Alimentaris Commission (Codex), which was earlier set up in 1963 by the Food and Agriculture Organisation (FAO) and World Health Organisation (WHO) to develop food standards, by laying down guidelines and related texts such as Code of tactics under the joint aegies of FAO/WHO, Food standards programme is aimed at protecting health of the consumers and ensuring fair trade practices in the food trade as well as to promote co-ordination of all food standards work undertaken by international governmental and non-governmental organisations. The SPS measures thus adopted safeguard the risks arising from;

- The entry, establishment or spread of pest, disease or any disease causal organism.
- The additives, contaminants, toxins or disease causing organism on foodstuff.
- The disease carried by animals, plants or their products.

During export, in order to make the plant/seeds free from any quarantine pests and diseases, the exporter should give a disinfection treatment by keeping the viability of the plant/seeds unaffected. The disinfection treatment before shipment should be carried out by authorized expert/technical personnel since the above process is hazardous. To assure the pest free product, the disinfection treatment should be done just before shipment of produce.

In this process, the exporter has to apply to the officer in-charge for Phyto Sanitary Certificate (PSC) in the prescribed form at least 7 –10 days in advance of the export. Before submitting the application for PSC, it is to be ensured that the cargo is treated properly by any licensed PCO to avoid any last minute detention by the Plant Quarantine Authority who is authorized to issue P.S.C.

The Soybean, which is rich in protein as well as fat is vulnerable to infestation by insects, mites and if contains more moisture makes it prone to the infection by fungi. Soybean should be dried to reduce its moisture content preferably below 9 percent before packing. Soybean should be packed in clean, dry, sound single hessian bags. In case, infestation occurs, fumigation should be done with Aluminium phosphide, at prescribed dosage. In no case, ‘Methyl Bromide’ should be used, as the commodity is rich in oil content. Regular inspection of stocks to check health of the seed and regular prophylactic treatment should be provided with the approved chemicals.

4.3.2 Export procedures:

The exporter may follow the following terms and conditions for exports of Soybean seeds. It's export is allowed subject to payment of duty. Export procedure has been simplified under Open General Licence (OGL), and there is no licence or restrictions are imposed. Generally, the buyers have to mention the quality in the contract.

However, the exporter may follow the following points during the export of Soybean seeds :

- Importer-Exporter Code (IEC) number to be obtained from the Director General of Foreign Trade (DGFT).
- Quality of product is to assessed by any approved inspecting agency to obtain the certificate.
- Product is then to be shifted to ports.
- Marine insurance cover is to be obtained from any insurance agency.
- Contact clearing and forwarding (C&F) agent for sorting of goods in godowns.
- They collect the shipping bill for allowing shipment by custom authority.
- Shipping bill is to be submitted by C&F agent to custom houses for verification.
- Verified shipping bill is given to Shed Superintendent by C&F agent and carting order is to be obtained.
- The C&F agent presents shipping bill to the Preventive Officer for loading in to the ship.
- After loading, a mate receipt is to be issued by the Captain of the ship to the Superintendent of the port who calculates the port charges and collects the same from C&F agent.
- After that payment is made, the mate receipt is obtained from the port authority to prepare bill of loading for the respective exporter.
- Then the C&F agent sends the bill of loading to the respective exporter.
- After receiving the documents, the exporter obtains a certificate of origin from chamber of commerce i e the goods are of Indian origin.
- Exporter informs the importer regarding the date of shipment, name of vessel, bill of loading, customer's invoice, packing list etc.
- The exporter for verification of documents submits all papers to the concerned bank.
- Bank sends documents to the foreign importer to enable him to take delivery of goods.
- After receiving papers, importer makes payment through bank and also sends documents called GR Form to RBI.
- Then exporter applies for various benefits from duty drawback schemes.

4.4 Marketing constraints and remedial measures:

1) The co-operative agencies have done a commendable job in Madhya Pradesh and Uttar Pradesh for marketing of Soybean. In other states, these agencies should also come forward to improve the marketing system of Soybean.

2) The consumers and processors prefer yellow variety of Soybean for which a higher premium prevails. The cake obtained from yellow variety also gets a higher price. Therefore, the development agencies must popularize high yielding yellow variety Soybean and discourage black variety of Soybean.

3) At present, the Soybean meal/cake is exported outside the country. This cheap source of protein can solve the problem of caloric malnutrition in the country. The existing Soybean solvent extraction plants can produce Soybean fat for human consumption by installing additional equipment and improving the hygienic conditions.

4) There is a good scope for small units manufacturing protein rich food products from Soybean. Such agro-based industries may help the cultivators to improve their economic conditions and provide protein rich Soybean products. Therefore, Government should encourage incentives for soy based agro industries.

5) Soybean has not entered in to the general food habits of the common people of the country. Therefore, there is strong need to launch consumer awareness programme in order to popularize various soy products.

6) There is lack of adequate scientific storage facilities in the villages. The present storage facilities are available mainly in the urban areas. Farmers should build rural godowns under the centrally sponsored 'Gramin Bhandaran Yojana' availing subsidy and benefit from the scheme.

7) The grade specifications formulated by Directorate of Marketing and Inspection should be popularized among the farmers, traders and processors. Grading at producers' level should also be encouraged.

8) There is no proper and adequate market intelligence system for Soybean in the states as in Madhya Pradesh where I.T.C. (Indian Tobacco Company) has established its I.T. (Information Technology) based market intelligence system and succeeded in revolutionizing e-commerce as a pioneering effort to set example for others.

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels :

The different existing marketing channels of Soybean are given below.

A) General marketing channels for Soybean :

The common marketing channels as routed from producer to consumer through village trader, commission agent, broker, co-operative society, private miller, wholesaler, co-operative mill are as follows:

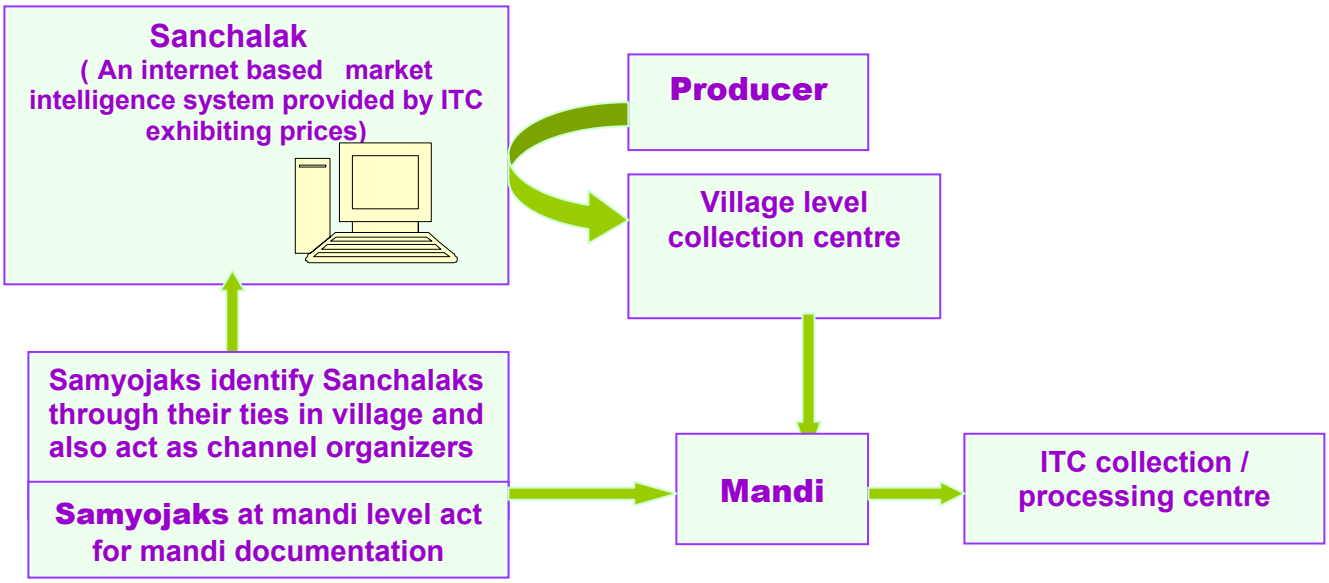
1) **Producer - Village trader - Private miller - Consumers**
2) **Producer - Village trader – Wholesaler - Consumers**
3) **Producer - Commission agent - Private miller - Consumers**
4) **Producer - Commission agent - Wholesaler - Consumers**
5) **Producer - Broker - Wholesaler – Consumers.**
6) **Producer - Broker - Cooperative mill – Consumers.**
7) **Producer - Cooperative society - Cooperative mill – Consumers.**

B) Internet based marketing channels for Soybean.

[Established by Indian Tobacco Company (ITC) in Madhya Pradesh]

ITC has launched, e-*Choupal* since June 2000 as a more efficient supply chain aimed at delivering value to its customers around the world on a sustainable basis. As a real-time information and customised knowledge it enhances the ability of farmers to take decisions and align their farm output with market demand and secure quality and productivity. As a direct marketing channel, virtually linked to the '*mandi*' system for price discovery, 'e-Choupal' eliminates wasteful intermediation and multiple handling. A diagrammatic representation is shown below:

Source: www.soyachoupal.com



5.2 Marketing cost and margins:

❒ **Marketing cost:** Marketing cost refer to the actual expenses incurred for bringing Soybean from farmgate to the consumers. It includes the following;

- Handling charges at local points
- Assembling charges
- Transportation and storage costs
- Handling by wholesalers and retailer charges to consumers
- Expenses on secondary services like financing, risk taking and market intelligence
- Profit margins taken out by different agencies.

The marketing costs i.e. the charges which are paid by buyers and sellers have been depicted in Table No.–16.

Table No. –16

Market fee, commission, taxes and miscellaneous charges for Soybean in different States

Name of state	Payable by farmers(sellers)/ traders(buyers)		Payable by traders/others		Payable by traders(buyers)	
	Market charges (Rupees/unit)	Commi-ssion	License fee per annum	Market fee	Sales tax	Octroi
1.Rajas-than	Unloading– 0.5-1 Broker – 2 *Hamal*–1to 4 Cleaning 1 to 2 Weighing—1-2	2 %	Traders-200/- commission agent- 200/-	1.6 %	2 %	Nil
2.Uttar Pradesh	Unloading– 0.20/qtl. Cleaning– 0.60/qtl. Lot making– 0.20/qtl. Weighing—0.50/qtl	1.5 %	Traders – 250/- transport agency- 200/- oil millers-150/- retailers-100/-	2.0 % +0.5 % as developmental charges =2.5 %	4 %	Nil
3.Maha-rashtra	Unloading– Cleaning – Brokers- *Hamal* – Weighing— Different rates exist at different markets	2 – 4 %	Traders- Rs.3 to 200/- (Rate varies from market to market)	0.75 – 1.0 %	Exemp-ted	Nil
4.Madhya Pradesh	Unloading- Cleaning- Brokers - *Hamal* - Weighing- No fixed rate, it varies in different markets	2 %	Traders – 1000/- Processor - 1000	2 %	N/A	Nil

Source: Sub Offices of Directorate of Marketing and Inspection (DMI), Government of India.

❒ Marketing Margins :

The marketing margin of Soybean is the difference between the actual price paid by the consumer and the price received by the farmer for an equivalent quantity of Soybean. It is explained in terms of price spread applied for a particular situation. Studies on marketing margins and price spread reveal that as the number of market functionaries increases, it increases the cost of commodity in the market, which results in the decline of producer's share in consumer's rupee.

The scientists of the Department of Agricultural Economics, S.K.M. College of Agriculture, Jobner (Jaipur - Rajasthan) had carried out a study on the marketing cost, margins and price spread for major agricultural commodities including Soybean in Rajasthan. The findings of the study have been presented in the Table No – 17.

1) Producer-seller-Oilseed Growers' Cooperative Society-Tilham Sangh
2) Producer-seller-Commission Agent-Tilham Sangh
3) Producer-seller-Commission agent-Local processor
4) Producer-seller-Commission agent-Wholesaler-Local Processor
5) Producer-seller-Commission agent-Wholesaler-Outside processor.

Table No. –17
Price-spread in marketing of Soybean in Rajasthan (percent)

Particulars	Sale of Soybean through channels				
	(I)	(II)	(III)	(IV)	(V)
1. Producer's share	96.22	92.08	90.91	85.95	90.14
2. Marketing cost of-	3.78	7.92	9.09	10.04	9.86
a) Producer-farmers	0.46	1.18	1.16	1.10	1.14
b)Tilham sangh	--	3.32	6.74	--	--
c)Wholesaler	--	--	--	8.51	--
d)Processor	--	--	7.93	--	--
e)Outside processor	--	--	--	--	8.72
3.Margin of wholesaler	--	--	--	4.01	--
4.Processor's price	**100**	**100**	**100**	**100**	**100**

Source: Indian Journal of Agril. Marketing (Conf,Spl.) 12(3) ,1998.

The study under reference was undertaken in Kota district, which commanded almost half of the total Soybean area and production of the state. As depicted in the Table above, channel – I of sale of Soybean seeds to oilseed growers society was observed as most cost effective since more than 70 percent of surplus Soybean output moved through this channel.

The outcome of the study revealed, that the producer – farmers received the highest share of 96.22 percent of the processors price, when they marketed their Soybean through channel – I in villages through the oilseeds grower's society. In the remaining four channels, producer's share varied between 86-92 percent. As far as marketing costs are concerned, they counted for less than four percent in channel – I and varied from 8-10 percent in other channels. The wholesaler's margin/ share was around 4 percent in the price paid by the processors in channel IV.

6.0 MARKETING INFORMATION AND EXTENSION

The prices of Soybean seeds and oil are published in local newspapers of each state and also covered in the radio and T.V. programmes. The concerned state agricultural marketing department collects the arrivals and prices of Soybean from selected markets. With the information revolution brought by the computer and internet facility, the Government of India has launched its website 'www.agmarknet.nic.in' under the supervision of Directorate of Marketing and Inspection interlinking selected markets throughout the country.

NAFED / MARKFED / OILFED / SOPA- INDORE also collect information on Soybean production, arrivals, prices, stocks, imports and exports, etc., in the country. Recently, ITC Ltd., started e - choupals in the villages, which provide complete information on Soybean production, marketing and utilization through internet kiosks on a small price to the farmers.

❒ **Extension:** The National Research Centre on Soybean, Indore (Madhya Pradesh), is the National level research agency under Indian Council of Agricultural Research. It is the main agency to disseminate information on Soybean production technology to farmers, extension workers, state agencies and agricultural universities. Similarly, Soybean Processors' Association, Indore, a trade body also promotes Soybean cultivation through distribution of pamphlets, posters, seminars, etc. Agricultural Universities and all India coordinated research project on Soybean also promote Soybean cultivation by educating the farmers about the latest trends in production technology.

The consumers are educated about the nutritional value of Soybean products by Soybean Processors Association, Indore and Central Institute of Agricultural Engineering, ICAR, Bhopal and provide feed back information to industrialists and processors about the manufacturing technology.

Table No.–18

List of Government, semi Government and private organizations providing the services on marketing information and extension

Sl. No.	Source/Organisation	Services provided
1.	**Directorate of Marketing and Inspection (DMI) ,** New C.G.O Complex, NH-IV, Faridabad. **website**: www.agmarknet.nic.in	►It is at present implementing a plan scheme i.e. 'Market Research and Information Network' (MRIN) through NIC for establishing a network for speedy collection and dissemination of market information for it's effective utilization. Under the scheme, important agricultural markets, state agricultural marketing boards/departments are being linked through computerized internet services. The user or beneficiary may collect the detailed information on various aspects of agricultural commodities including Soybean. ►Publishes journal on Agricultural Marketing. ►It also undertakes marketing extension services.
2.	**Soybean Processing and Utilization Centre, Central Institute of Agricultural Engineering (CIAE), Bhopal** **website:** www.ciae.nic.in	►Demonstration and training in production and promotion of soy based food products.

3.	**Soybean Processors' Association of India (SOPA), Indore** **website:** www.sopaindia.org	▶It is a trade body which promotes Soybean development programme through distribution of extension materials, audio/ video cassettes and literatures on Soybean among farmers. ▶It organizes seminars,workshops and trade fairs relating to Soybean marketing, processing, quality control and promotion.
4.	**ITC e-choupal.** **website:** www.itcportal.com	▶ITC has launched e-Choupal in June 2000 as a more efficient supply chain aimed at delivering value to its customers around the world on a sustainable basis. At present, 4200 e-Choupals are functioning in Uttar Pradesh, Andhra Pradesh, Madhya Pradesh and Karnataka. It provides free market information service to the farmers and procuring directly Soybean and other commodities. It has eradicated middlemen from the marketing and makes immediate payment to the farmers. The ITC has a plan to set up 20 thousand e-choupals in 15 states covering one lakh villages. ▶It facilitates access to the farmers in their local language on market prices of Soybean. ▶It facilitates information-based decision making for the sale of Soybean.
5.	**Directorate of Economics and Statistics, Ministry of Agriculture, Shastri Bhawan, New Delhi** **Website:** www.agricoop.nic.in	▶Compilation of statistical data on agricultural commodities for planning and development. ▶Dissemination of data/information on oilseeds including Soybean through publication and internet.
6.	**Director General of Commercial Intelligence and Statistics (D.G.C.I.S.),**1, Old Court House Street, Kolkata-700 001.	▶Collection, compilation and dissemination of data of export-import and interstate movement of agro commodities including Soybean.
7.	**Central Warehousing Corporation (CWC),** Siri Institutional Area Opp. Siri Fort, New Delhi-110016 **Website:** www.fieo.com/cwc	▶Promoting Farmer's Extension Service (FESS) with the following objectives: ➢Educating farmers about the benefits of scientific public warehouses for agro commodities. ➢Demonstrating of spraying and fumigation to control storage pests of agro commodities .e.g. Soybean ➢Orienting about the facility of getting loans from banks against pledge of warehouse receipts.
8.	**State Agricultural Marketing Departments/Directorates/ Boards at State Capitals.**	▶Provideing oilseeds marketing related information. ▶Arranging publicity programme through demonstration, farmers' meeting, etc. ▶Disseminating of information of oilseeds e.g. Soybean through literature, Radio and T.V. programme.

9.	**Agricultural Produce Market Committees (APMCs) of regulated markets in different states.**	►Providing market information on arrivals of oilseeds, e.g. Soybean and prevailing prices of it at different markets through display boards, public address system, etc. ►Providing information of other markets of Soybean. ►Organising training programme, tours, exhibitions for farmers and other beneficiaries.
10.	**Akashvani Kendras of New Delhi/ State capitals/ other cities**	►Broadcasts programme to disseminate the marketing information on agricultural commodities e.g. Soybean.
11.	**Doordarshan Kendras of New Delhi/ / State capitals/ other cities**	►Telecasts programme to disseminate marketing information on agricultural commodities including Soybean.
12.	**G.B.Pant University of Agriculture and Technology, Pantnagar (Uttaranchal)**	►Training related to entrepreneurship development for production and marketing of soy based food products.
13.	**Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur (Madhya Pradesh)**	
14.	**Assam Agricultural University, Jorhat**	
15.	**Panjabrao Krishi Viswa Vidyalaya, Akola (Maharashtra)**	

❒ Kisan Call Centre :

The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India launched Kisan Call Centres on January 21st,2004 throughout the country. It has the objective of affording instant solution to the problems faced by the farmers during crop cultivation under diverse challenging situations and facilitating their full comprehension by the use of local language. The call centres are acting as composite help centres, which consist of a complex tele-communication infrastructure, computer support and human resources organized to manage effectively and efficiently the queries raised by farmers instantly in local languages. The subject matter specialists using telephone and computer are used to interact with farmers to understand their problems and answer their queries as soon as possible. This is a new dimension in agricultural extension management, which makes the full use of on-going information and communication revolution by connecting the farming community in the remotest areas of the country with the experts of agricultural field.

Soybean farmers can avail this facility through a nationwide toll free number - 1551

7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 Direct marketing:

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

The Indian Tobacco Company (ITC), which has established an IT-based direct marketing system in the form of *e-choupal* which eliminates wasteful intermediation and multiple handling, therefore, it significantly reduces the transaction cost. I.T.C. provides real time information to enhanced farm productivity and quality for higher farm gate prices.

Benefits :

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

7.2 Contract farming :

Contract farming essentially includes the tie-up for agricultural marketing, wherein the prospective buyer or any trading / processing agency enters into a contract with the farmer and promises to purchase the farmer's produce under pre-negotiated condition and prices. In this type of contract, the trading / processing agency support the farmers through supply of inputs and other technical support and the farmers can get the assured market at a fixed or pre determined price. By entering in this type of contract, farmers do not require to rely on middleman and risk of price also reduces. In present context of economic liberalisation and global scenario, contract farming opens the venue to adopt new-technologies and access to present global markets.

❒ **Benefits:** Contract farming is beneficial to the farmers / producers as well as to the contracting agency as given in Table No.-19.

Table No.–19
Benefits of contract farming

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

7.3 Co-operative marketing:

In the co-operative marketing system, a group of farmers join together to carry on some or all the processes involved in bringing produce from producer to consumer in a more profitable way than private trade system. The main objectives of cooperative marketing are to ensure remunerative prices to the producers, reduction in the cost of marketing, reduce the monopoly of traders and improve the marketing system. The cooperative marketing structure in the different states consists of;

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

Different co-operative organisations involved in Soybean marketing:

1. NAFED: National Agricultural Co-operative Marketing Federation (NAFED) is a well known national apex body of the co-operative marketing system in co-ordination with State level Marketing Federations, Regional and District level co-operative societies. NAFED was established with a aim to promote co-operative marketing of agricultural produce and to ensure the farmers to get ready market as well as remunerative price for their produce. In order to protect the farmers from steep fall in prices in market, the Government of India has appointed NAFED as central nodal agency to undertake the procurement operations of commodity like Soybean by declaring support prices at every marketing season.

Quantity of Soybean procured by NAFED under Price Support System (PSS)

Commodity	Year	Crop season	Minimum support price	Quantity procured (in tonnes)	Value (Rs.in lakhs)
Soybean	1999-2000	Kharif-1999	845(Yellow) 755 (Black)	494938	45699.94
	2000-2001	Kharif-2000	865(Yellow) 775 (Black)	54745	5206.25

Source : NAFED, New Delhi.

2. MP-MARKFED: Madhya Pradesh State Co-operative Marketing Federation Limited (M.P.-Markfed) was established during 1956 as an apex level federation of marketing societies and was registered under the Madhya Pradesh Co-operative Societies Act 1960. One of the main activities of the Federation is the marketing of oilseeds including Soybean. In order to help the farmers in this regard, the federation makes purchases of farmer's produce in the *mandies*. It also undertakes price support operations of oilsees including Soybean on behalf of State Government

Quantity of Soybean procured by MP-MARKFED

(Quantity in tonnes)

Commodity	2000-2001	2001-2002
Soybean	32367	2081

Source : www.mpmarkfed.net

7.4 Forward and future markets :

After the decision during February 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, future trading has been allowed for 148 commodities, under section 15 of the Forward Contracts (Regulation) Act of 1952. The coverage of commodities under futures market will minimize the wide fluctuation in commodity prices and for hedging the risk arising from price fluctuations. The future contracts are an agreement to purchase or sale a stipulated quantity of a commodity at a predetermined price with settlement expected to take place at a future date. The futures contracts are standardized in terms of quality and quantity and place and date of delivery of the commodity. In India, all the futures contracts are regulated by Forward Markets Commission (F.M.C.), Mumbai. The National Board of Trade, Indore was started during the year 1999 to offer an integrated, state of art hedging under futures trading. The exchange was permitted and recognised by FMC for futures trading in Soybean. Soybean seed, oil and cake are traded in this exchange.

The exchanges in which futures contracts are traded in respect of Soybean:

- The National Board of Trade, Indore
- SGI Commodity Exchange, Mumbai

The regulatory body for commodity trading :

Forward Markets Commission (FMC) set up under the forward contracts (Regulation) Act of 1952 with it's headquarter in Mumbai and Regional Office in Kolkata.

8.0 INSTITUTIONAL FACILITIES:

8.1 Marketing related schemes of Government / public sector organisations

Scheme and Name of organisation	Facilities
1.Agmark grading **Directorate of Marketing and Inspection (D.M.I.)** Head Office, N.H.-IV, Faridabad	➢ Promotion of grading of agricultural and allied commodities under Agricultural Produce (Grading & Marking) Act.1937. ➢ Agmark specifications for agricultural commodities have been framed, based on their intrinsic quality. Food safety factors are being incorporated in the standards to compete in world trade. Standards are being harmonised with international standards keeping in view the WTO requirements. Certification of agricultural commodities is carried out for the benefit of consumers and producers.
2.Gramin bhandaran yojana (Rural godown scheme) **Directorate of Marketing and Inspection.** Head Office, N.H.-IV, Faridabad	➢ It is a capital investment subsidy scheme for construction/renovation/expansion of rural godowns. The scheme is implemented by DMI in collaboration with NABARD and NCDC. The objectives of the scheme are to create scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs. ➢ To prevent distress sale immediately after harvest. ➢ To promote grading and quality control of agricultural produce to improve their marketability. ➢ To promote pledge financing and marketing credit to strengthen agricultural marketing in the country for the introduction of a national system of warehouse receipt in respect of agricultural commodities stored in such godowns. ➢ The entrepreneur will be free to construct godown at any place and of any size except for restrictions that it would be outside the limits of Municipal Corporation area and be of a minimum capacity of 100 MT. ➢ The scheme provides credit linked back-ended capital investment subsidy @25 percent of the project cost with a ceiling of Rs. 37.50 lakh per project. For the projects in North-Eastern states and hilly areas with altitude of more than 1000 m above mean sea level and SC/ST entrepreneurs, maximum subsidy admissible is @ 33 percent of the project cost, with a ceiling of Rs. 50.00 lakh.
3.Price support Scheme **National Agricultural Co-operative Marketing Federation Ltd. (NAFED).**	►Procurement of oilseeds including Soybean under the price support scheme when market price is ruling at or below the declared support price for a particular year.

4.Scheme of procurement The M.P. State Cooperative Marketing Federation (MP-MARKFED), Head Office, Jhangirabad, Bhopal-468 008 Website www.mp.nic.in/markfed	►Procurement of oilseeds under the Price Support Scheme (P.S.S.).
5.Small Farmers Agribusiness Consortium (SFAC) Department of Agriculture and Cooperation, Ministry of Agri(GOI), New Delhi	►Promotes the growth of agriculture and agro industry. ►Promotes organizations having domestic and export marketing chains. ►Facilitates the establishment of integrated producers' organizations with forward and backward linkages. Besides above, it has also facilities like- **A.** Organising primary producers in suitable groups to achieve the objective of consortium **B.** Reviving /strengthening of local institutions as the instrument of agricultural development. **C.** Organises various services through public, private and cooperative sector.

8.2 Institutional credit facilities:

Agricultural credit is disbursed in the form of short-term, medium-term and long-term loans through the following agencies –

* **Commercial Banks (CBs)**
* **Regional Rural Banks (RRBs)**
* **Co-operatives.**

The type of institutional credit facilities which are available for production, post harvest operations and marketing of agro-commodities (e.g-Soybean) are given in Table No-20.

Table No. –20
Types of credit facilities

Name of scheme	Eligibility	Facility
1. Produce Marketing Loan Scheme	All the categories of farmers i.e., small / marginal / others are eligible.	This type of loan is given upto Rs. 1 lakh against pledge /hypothecation of agricultural produce (including warehouse receipts) for a period not exceeding 6 months.
2. Kishan Credit Card Scheme	All types of agricultural clients having good track record for last two years are eligible.	Kissan credit card is valid for 3 years through which the barrower / farmer meet his production and other contingency needs by using easy convenient withdrawal slips. The minimum credit limit is Rs.3000/- and is based on operational landholding, cropping pattern and scale of finance.
3. Credit Schemes of Nationalised Banks	For different categories of farmers	Provide credit for construction of godowns, agri-business, contract farming, agro processing etc.

8.3 Organigations / agencies providing marketing services:

Organisation	Services provided
1. **Directorate of Marketing and Inspection (DMI)** NH-4, CGO Complex Faridabad Website: www.agmarknet.nic.in	➢ To integrate development of marketing of agricultural and allied produce in the country. ➢ Promotion of grading of agricultural and allied produce. ➢ Market development through regulation, planning and designing of physical markets. ➢ Promotion of cold storage. ➢ Liaison between the Central and State Governments through its regional offices (11) and sub-offices (37) spread all over the country.
2. **Soybean Processors Association of India (SOPA),** Sceme No. 53, Malviya Nagar, A B Road, Indore-452 008 Website : www.sopa.org	➢ Quality control services. ➢ Arbitration. ➢ Promotion of value added products. ➢ Export promotion of Soybean meal and value added products.
3. **Soybean Processing and Utilisation Centre, Central Institute of Agricultural Engineering (CIAE),** Navi Bagh, Berasia Road, Bhopal-462 038 (MP) Website : www.ciae.nic.in	➢ Technology for diversified soy based food products. ➢ Commercialisation of soy based food products technology through training and entrepreneurship development.
4. **Uttar Pradesh Co-operative Marketing Federation**	➢ Purchases Soybean through local Sahakari Kraya Vikraya Sangh. ➢ Provides subsidy and short term crop loans to the Soybean cultivators.
5. **Madhya Pradesh State Co-operative Marketing Federation (M.P.- MARKFED)** Head Office, Jhangirabad, Bhopal-468 008 Website: www.mp.nic.in/markfed	➢ Assists and strengthens it's members and other marketing societies. ➢ Provides agricultural inputs to the farmers through member societies to promote their agricultural production. ➢ Procures the produce from farmers in regulated markets. ➢ Undertakes welfare activities as per the State Government directives. ➢ Constructs godowns to increase the storage facilities in Madhya Pradesh state.
6. **National Dairy Development Board (N.D.D.B.),** Anand-388 001 Gujrat Website : www.nddb.org	➢ Initiated the “Restructuring Edible Oil and Oilseeds Production and Marketing Project”. ➢ Motivates farmers’ investment in oilseeds sector through farmer owned co-operatives. ➢ Capacity creation to crush oilseeds, solvent extracts, oilcake and refine edible oil. ➢ Establishes storage capacity for storage of oilseeds and oil.

7. **National Agricultural Co-operative Marketing Federation Ltd. (NAFED),** Nafed House, 1 Sidharth Enclave, Ashram Chowk, New Delhi-110 014 Website : www.nafed-india.com	➢ Organises, promotes and develops marketing, processing and storage of oilseeds. ➢ Undertakes inter-state movement of oilseeds. ➢ Extends marketing support to the farmers through it's offices located all around the country. ➢ Central nodal agency for procurement of oilseeds and pulses under price support scheme at the minimum support price (MSP).
8. **Central Warehousing Corporation (CWC),** 4/1 Siri Institutional Area Opp. Siri Fort, New Delhi-110016. Website : www.fieo.com/cwc	➢ Provides scientific storage and handling facilities. ➢ Offers consultancy services/ training for the construction of warehousing infrastructure to different agencies. ➢ Import and export warehousing facilities. ➢ Provides disinfestation services.
9. **National Co-operative Development Corporation (NCDC)** 4, Siri Institutional Area, New Delhi-110016. Website : www.ncdc.nic.in	➢ Planning, promoting and financing programmes for production, processing, marketing, storage, export and import of agricultural produce. ➢ Financial support to primary, regional, State and National level co-operative marketing societies is provided towards; ➢ Margin money and working capital finance to augment business operations of agricultural produce. ➢ Strengthening the share capital base and ➢ Purchase of transport vehicles.
10. **Director General of Foreign Trade, (DGFT),** Udyog Bhavan, New Delhi.	➢ Provides guidelines / procedure of export and import of various commodities. ➢ Allot import-export code number (IEC No) to the exporter of agricultural commodities.
11. **Forward Markets Commission (FMC),** "Everest" 3RD floor, 100, Marine Drive, MUMBAI– 400002. Web site: - www.fmc.gov.in	➢ To keep forward markets under observation. ➢ To publish information regarding the trading conditions in respect of goods and supply, demand and prices.
12. **State Agricultural Marketing Boards (SAMBs),**	➢ Implementation of the regulation of marketing in the state. ➢ Provide infra-structural facilities for the marketing of notified agricultural produce. ➢ Provide grading of agricultural produce in the markets. ➢ To co-ordinate all the market committees for information services. ➢ Provide aid to financially weak or needy market committees in the form of loans and grants. ➢ Eliminate malpractices in the marketing system. ➢ Arrange or organise seminars, workshops or exhibitions on subjects relating to agricultural marketing and farmers training programme on various aspects of agricultural marketing. ➢ Some of the SAMBs are also promoting agro-business.

9.0 UTILIZATION

9.1 Processing:

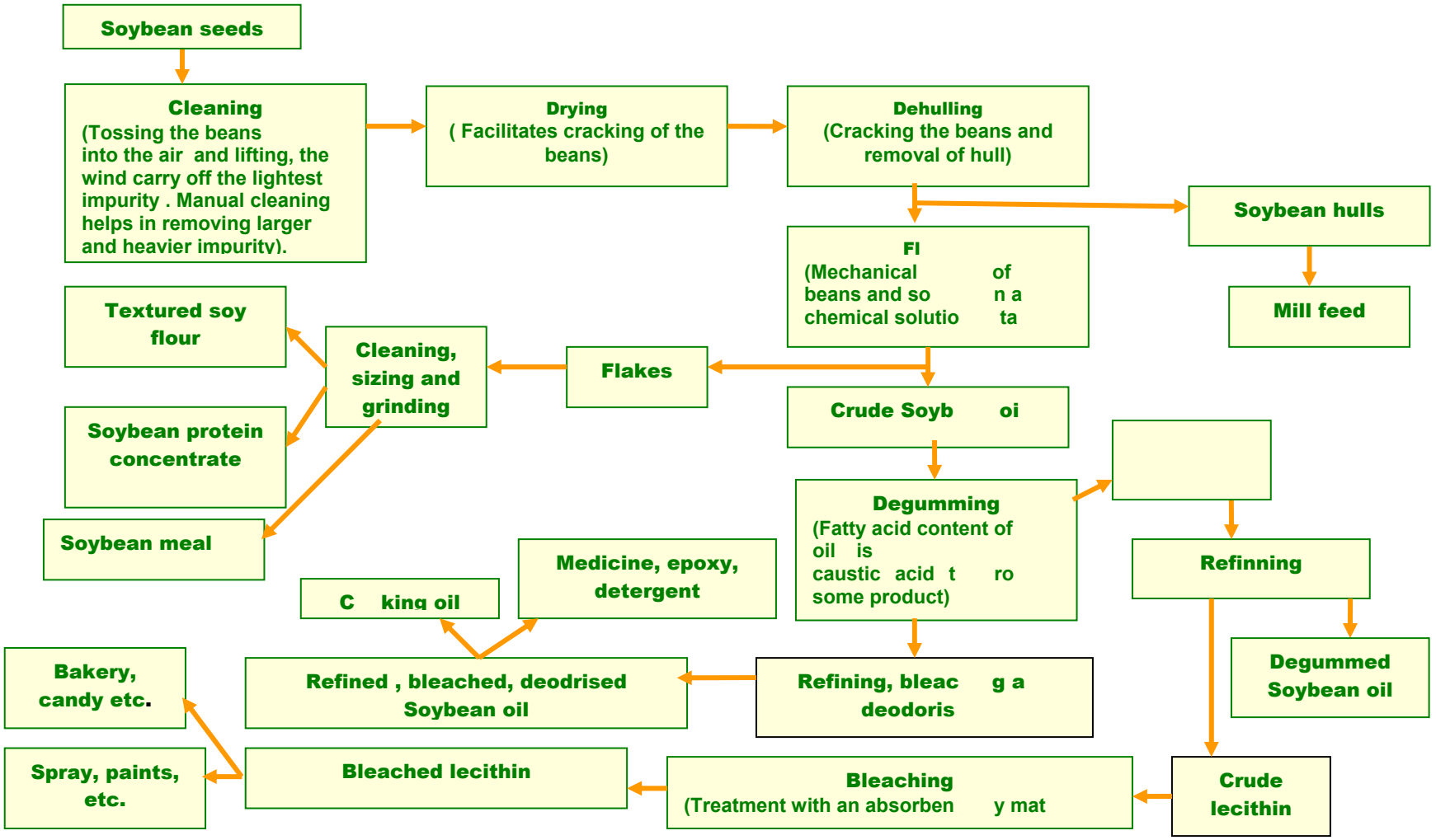
Soybean have attained unique distinction for it's varied uses and extra-ordinary nutritional qualities. However, Soybean requires proper processing to make suitable for use as food, feed or industrial products. Largely, Soybean is processed to get oil and meal. During the year 2003-04 (November-October), it has been estimated that 20 lakh tones of Soybean oil was consumed in the country. The mechanical process was employed earlier to extract oil and meal by hydraulic press method. However, the processing has been shifted to the modern solvent extraction process, which is more efficient and tuned to the existing needs.

The Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal has developed tofu making processing unit from Soybean

Soybean processing machinary for tofu making

Source : Central Institute of Agricultural Engineering (C.I.A.E.) , Bhopal

Processing and utilisation of Soybean:



9.2 Uses:

In India, Soybean oil is mainly used as cooking medium. The soya milk consumption now-a-days has emerged as a healthy drink habit as it is a high protein and low calorie food specially to those, who are intolerant to lactose present in animal milk. In addition, it also serves as raw material for manufacture of vanaspati. Soybean cake is mostly used as an ingredient in the manufacture of cattle feed. The emerging consumer acceptance has lead to manufacture of many protein rich food products such as nutri-nuggets, protesnac, nutri soy powder, etc., which are being manufactured in the country from soy protein. The Soybean meal has also been added in the manufacture of bread by some agencies for raising nutritive value of product without any significant change in flavour or price of the bread.

The Agro-Industries can exploit the potentialities of Soybeans because it has multifarious uses. It can be utilized in the preparation of Antibiotics, in the manufacture of lard, margarine, vegetable oil and ghee, paints, varnishes, linoleum, printing inks, glycerine, explosive, etc. besides, in every home its products like, Soy flour, Soy milk, Soy oil as cooking medium, Soybean cake is rich in nitrogen and mineral content and can be very well utilised as a manure for the soil and as a cattle feed for the animals.

The multifaceted uses of Soybean at the national and global level are as follows:

✧ **Whole Soybean products :**

Seed
Soy flour
Soy sauce
Soy paneer (Tofu)
Soy milk

✧ **Soybean oil products:**

Cooking oil
Baking products
Margarine
Salad oil

✧ **Soybean meal:**

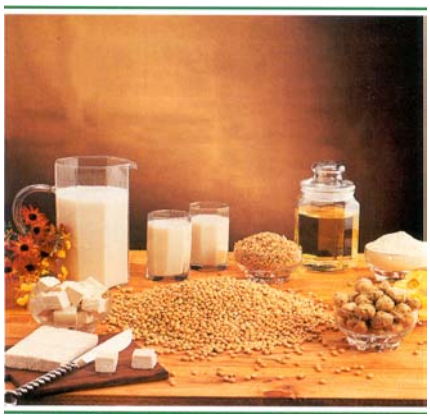
Animal feed
Poultry feed
Feed for aqua culture

✧ **Soybean protein products:**

Textured vegetable protein
Isolated soy protein

✧ **Soybean based industrial products :**

Printing inks
Cosmetics
Paints
Soaps/detergents/toiletries
Plastics and rubber industry
Pharmaceuticals
Pesticide industry



Soybean food products

10.0 DOS AND DON'TS

1. Harvest the crop, when plants turn yellow and moisture is around 14 percent to avoid shattering in the field. Do not harvest the crop before it turns yellow and moisture is more than 14 percent.

2. Avoid more beating of the pods to prevent damage to the seeds while threshing.

3. Adjust the speed of the harvester depending upon the moisture of the seed.

4. The produce should be cleaned and graded at producer's level to fetch higher price. Do not sell the produce without cleaning and grading.

5. The moisture in the Soybean should be brought down to about 9 percent before sale.

6. Store Soybean in a damp proof and rat free room after reducing moisture to less than 9 %.

7. Store different varieties separately. Do not mix different varieties together.

8. Get the market information regarding arrivals and prices of Soybean from different markets and then select the market for selling the produce.

9. Sell the produce through the co-operative society or directly in the nearest regulated market to get a higher price. Do not sell Soybean to the middlemen instead of Co-operative Societies or in regulated markets.

10. Store Soybean in scientific rural godowns to hold the produce for sometime to get higher price during lean period. Do not sell Soybean in glut period.

11. Go for contract farming with an agency to get better assured price.

12. Avail the facility of future markets for trading of Soybean. Do not trade Soybean to the middleman without proper planning.

13. Sell the produce at periodic intervals to fetch better price. Do not sell the entire produce immediately after harvest.

14. Avail the pledge finance facility by storing produce in Central/ State Warehouses. Do not store the produce in unplanned manner in private unscientific godowns.

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