

PREFACE

The Inter- Ministerial Task Force on Agricultural Marketing Reforms in their Report in May 2002, suggested several measures for undertaking various reforms in the Agricultural Marketing System in the country. In consideration of the keen competition in the domestic, as well as export markets, it has become imperative to launch awareness programme vigorously to up date and up-grade the technical know-how of various stakeholders involved in the marketing of farm produce in multidimensional aspects of agricultural marketing system.

The Potato is the staple food and fourth important food crop in the world. Due to it's burgeoning need, the Food and Agriculture Organization (F.A.O) of United Nations (U.N) has declared the year of 2008 as the "*International Year of Potato*". Considering it's importance, an attempt has been made to draft a comprehensive and educative manual covering various aspects of it's post-harvest managerial measures. Accordingly, the present ***Manual on Good Agricultural Marketing Practices for Potato*** has been drafted by SHRI SUBRATA SAHA, Marketing Officer under the supervision of SHRI P.J.CHIMALWAR, Assistant Agricultural Marketing Adviser and under guidance of SHRI B.D.SHERKAR, Deputy Agricultural Marketing Adviser, Branch Head Office.

The Government of India should not be regarded as assuming the responsibility for any of the statements contained in this manual. However, any creative suggestion to bring about further improvement in the manual would be most welcome.

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MANUAL ON GOOD AGRICULTURAL MARKETING PRACTICES FOR POTATO

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POTATO

1.0 INTRODUCTION :

Potato (*Solanum tuberosum* L.) popularly known as ‘the king of vegetables’, has emerged as fourth most important food crop in India after rice, wheat and maize. Indian vegetable basket is incomplete without Potato.

The dry matter, edible energy and edible protein content of potato makes it nutritionally superior vegetable as well as staple food not only in India but also throughout the world. It has become an essential part of breakfast, lunch and dinner in the world. Being a short duration crop, it produces more quantity of dry matter, edible energy and edible protein in lesser duration of time than cereals like rice, wheat, hence it proved to be a useful tool to achieve the nutritional security of the nation. Moreover during present trend of diversification from cereals to horticultural crops, shifting from wheat, barley cultivation to potato cultivation gives returns more to the farmers.

Potato is one of the main commercial crop cultivated in our country. The Indo-Gangetic region i.e. Uttar Pradesh, West Bengal, Bihar, Punjab and Haryana accounts more than 80 percent of total production, and the country achieved a tremendous growth in potato production during last four to five decades. The annual compound growth rate of potato is higher than other major food crops in respect of area, production and productivity, resulting in its bumper yields which reflects in glut situations and unremunerative prices for the farmers in almost every year. To overcome this situation, the remedial measures have been taken at different levels like – Marketing, Processing and Export etc.

The National Horticultural Board (NHB), National Agricultural and Cooperative Marketing Federation (NAFED), State Marketing Board and Agricultural Marketing Department at state level play an important role in marketing of Potato.

Indian potato (fresh and processed) has preferred worldwide due to the taste in term of quality like disease freeness, shape, size, skin colour, flesh and dry matter content has a wide export market. It has been observed that Indian potato has a great demand for quality processed potato products at middle East, Japan, Singapore, Korea, Malaysia and China. Recently many varieties have been released by the different research organization for processing purpose. Food parks are being built for development of potato processing industry. The Government of India has set up four Agri Export Zones (AEZs) for potato in Punjab, West Bengal, Uttar Pradesh and Madhya Pradesh an efforts in strengthening and creating infrastructure for export of fresh and processed potato products by these zones are tackling the export matters of potato and it's products.

2.0 NUTRITIONAL VALUE :

Potato is a high quality vegetable cum food crop and used in preparing more than 100 types of recipes in India. The protein of potato has high biological value than proteins of cereals and even better than that of milk. The biological value of mixture of egg and potato supplement the meat and milk products for improving their taste, lowering energy intake and reducing food cost. Keeping in view the nutritional value of potato it is a wholesome food and deserves to be promoted as a potential high quality vegetable cum food crop in India.

The constituent of potato is given as under (in 100 gm.)

SI.No.	Constituents	Weight (grams)
1.	Water	74.70
2.	Carbohydrates (Starch and Sugar)	22.60
3.	Proteins	1.60
4.	Fibre	0.40
5.	Fat	0.10
6.	Minerals	0.60

The Minerals and Vitamins as available in Potato is summed up below:

SI. No.	Minerals / Vitamins	Content (mg/100 gm of fresh weight)
1.	Calcium	7.7
2.	Copper	0.15
3.	Iron	0.75
4.	Magnesium	24.2
5.	Phosphorus	40.3
6.	Potassium	568.0
7.	Sodium	6.5
8.	Vitamin C	14.0 – 25.0.
9.	Thiamin	0.18
10.	Riboflavin	0.01-0.07
11.	Niacin	0.4—3.1
12.	Total Folate	5.0-35.0
13.	Pyridoxine	0.13-0.25

3.0 ZONE WISE MAJOR COMMERCIAL VARIETIES :

I) Zone – North Western Hills				
Area	Name of Variety	Yield (Metric tonne/hectre)	Dry matter	Consumer and Processing quality
Hills of Himachal Pradesh and southern Jammu & Kashmmir	Kufri Jyoti	20	Medium	Easy to cook, texture is waxy, mild flavour, occasional discolouration after cooking. Suitable for instant flakes and chips.
II) Zone – Hills of Uttaranchal				
Nainital Almora, Dehradoon, Uttarkashi, Garhwal, Chamoti districts.	Kufri jyoti	20	medium	Easy to cook, texture is waxy, mild flavour, occasional, discolouration after cooking. Suitable for instant flakes and chips.
III) Zone - North Eastern Hills				
Hills of Meghalaya, Manipur, Tripura, Nagaland, Arunachal Pradesh, Mizoram	Kufri Jyoti	10	Medium	Easy to cook, waxy texture, mild flavour, free from discoloration after cooking. Not suitable for processing.
	Kufri Giriraj	20	Medium	
IV) Zone - Southern Hills				
Nilgiri and Palani Hills of Tamil Nadu	Kufri Jyoti Kufri Swarna	20-21 25	Medium Medium	Easy to cook, floury texture, mild flavour, free from discoloration after cooking. Not suitable for processing.
V) Zone – North Central Plains				
Madhya Pradesh (Indore, Gwalior, Sarguja, Ujjain, Chindwara, Sidhi, Tikamgarh, Shajapur, Dewas districts),	Kufri Badsah,	40-50	Medium	Easy to cook, texture is waxy, mild flavour, occasional discolouration after cooking. Suitable for instant flakes and chips.
	Kufri Jyoti,	20-21	Medium	
	Kufri Lavkar.	30	Medium	
Western U.P. and Gujarat	Kufri Bahar,	45	Medium	Easy to cook, texture is waxy, mild flavour, free from discolouration after cooking. Suitable for instant flakes and chips.
	Kufri Chandramukhi,	25	Medium	
	Kufri Chipsona.	25		
VI) Zone – North Eastern Plains				
Bihar and Jharkhand (Samastipur, Madhubani, Siwan, Champaran, Hazaribagh, Purnea, Nalanda, Ranchi districts)	Kufri Jyoti	20- 21	Medium	Cooks on prolong boiling, floury texture, mild flavour, free from discoloration after boiling
	Kufri Lalima	40	Medium	
	Kufri Sindhuri	40	Medium	

VII) Zone – Plateau Region				
Area	Name of variety	Yield (Metric tonne per hectare)	Dry matter	Consumer and Processing quality
Maharashtra, Karnataka and parts of M.P. and Orissa	Kufri Jyoti,	25	Medium	Easy to cook, floury texture, mild flavour, free from discoloration after cooking. Due to high dry matter content, the variety is suitable for processing.
	Kufri Lavkar.	30	Medium	
	Kufri	25	Medium	
	Chandramukhi			

4.0 HARVESTING AND POST HARVEST CARE :

(A) HARVESTING CARE :

The following harvesting care should be taken :

- Follow the practice of Dehaulming (cutting of haulms /aerial parts by sickle or killing by chemicals or destroying by machines) when the aerial part of the plant turns yellow.
- Always harvest in dry weather.
- Stop irrigation about two weeks before dehaulming .
- Avoid bruising and skinning of tubers otherwise tubers become susceptible to diseases.

(B) POST HARVEST CARE :

The following care should be taken during drying:

- Dry the harvested tuber quickly to remove excess moisture from the surface of tubers for improving their keeping quality.
- Dry the harvested tuber in shed to avoid exposure to sun because it causes the greening of potatoes.
- Avoid storage of tubers exposed to rain after harvest.
- Curing should be done at 25⁰C with 95 per cent relative humidity. This helps in optimum suberization as curing is essential for healing the wounds of tubers.
- While sorting care should be taken to remove the damaged and diseased tubers.

5.0 GRADING :

Grading plays an important role in the marketing process of Potato.

Importance :

- i) It helps the producer and seller to determine the price.
- ii) It reduces the cost of marketing and helps the consumers to get standard potato at fair price.
- iii) It facilitates the scope to widen the avenue for potato export.
- iv) It has a direct influence on utilization point of view, as the small to medium sized tubers are prepared for 'seed tubers' and large sized tubers for processing purpose.

Methods of Grading :

Grading of tubers is carried out both by hand as well as by mechanical graders. The different practices of grading of potato are as follows:

- i) In a manual grading a set of rectangular pair of sieves having round holes of varying diameters, are placed one above the other and shaken to and fro by two persons and the third person continuously feeds the upper sieve.
- ii) The grading is done through sieves hung on chains or ropes and move forward and backward.
- iii) In mechanical grading, the sieves are mounted on the oscillation of frame as operated mechanically by power. This machine can be operated with 1H.P. electric motor, engine or tractor.
- iv) Grading is done through power operated potato grader with conveyer attachment, which gives better grading efficiency (90 per cent). The power requirement is 1.5 H.P .It can grade four categories viz less than 10gms,10-25 gms, 25-60 gms, and more than 60 gms.
- v) The rubber roller type of potato grader as developed by the C.P.R.I, Shimla, can grade six categories of grades viz. less than 10gms, 10-25 gms, 25-50 gms, 50-75 gms, 75-100 gms, and more than 100 gms.

This system consist of mainframe, grading rollers, conveyer belt and power transmission system. The grading machine is operated by 2H.P electric motor.

I) AGMARK GRADE STANDARDS / SPECIFICATIONS

Under the Agricultural Produce (Grading and Marking) Act, 1937, the table potato Grading and Marking rules 1950 was notified by the Govt. of India. The quality factors like size of tubers, conformity to the variety, tolerance limits for under sized and over sized tubers percentage of diseased and damaged tubers and earth and extraneous matters etc. are taken into consideration. The Agmark grade standard of Potato is given in Annexure-I.

II) AGMARK GRADE SPECIFICATIONS FOR EXPORT :

For grading the table potatoes for export, the “Export Grading and Marking Rules 1964” was notified by Government of India. The details are furnished in Annexure-II

- i) Mettupalayam variety (oval or long or round or mixed)
- ii) Katwa or Farukhabad variety (round)
- iii) Varieties other than Mettupalayam (oval or long)
- iv) Varieties other than Mettupalayam and Katwa or Farukhabad (round)

In terms of foreign consumer preferences, the popular grades in export grading of potato are given in Annexure – II.

III) CODEX ALIMENTARIUS COMMISSION :

The Codex Alimentarius Commission (CAC) was established in 1963 by Food and Agricultural Organization of the United Nations (FAO) and World Health Organization (WHO) to develop food standards, guidelines and related texts such as codes of practices under the Joint FAO/WHO Food Standards Programme. It's main purpose is to protect the health of consumers and ensuring fair trade practices in food trade and promoting conditions of food and food standards work undertaken by International governmental and non-governmental organizations. The codex alimentarius standard is given in Annexure – IV.

6.0 PACKAGING:

Handling and packaging of potatoes is done on farm, not in pack houses as commonly practiced in fruits and other vegetables. After harvesting, the tubers are kept in a heaped temporarily and covered with straw. After few days, sorting is done by separating the diseased and cut tubers, which are further packed in hessian cloth bags or netlon bags.

Materials used for Packaging

a) Jute / Hessian bags :

Ordinary hessian bags are used for packing potatoes. There are different sizes, viz. 80 kgs, 50 kgs and 20kgs.

b) Netlon bags:

25 kgs bags made of plastic net are preferred for export to some countries in which potatoes can be stored for longer period.

7.0 TRANSPORTATION:

a) Head Loads :

It is an age old method of transportation from field. It is convenient for:

- i) Places like hilly areas.
- ii) Carrying small quantity of produce.
- iii) Transporting nearest market with short distance.

b) Bullock / Camel carts :

Bullock / Camel carts are the primary means of transport in rural areas. It is convenient for following reasons.

- i) Cheap and easily available conveyance for the farmers to transport 5-10 quintals of produce to short distant areas.
- ii) Operational Cost is low.
- iii) Easily manufactured by rural artisans from locally available materials (wood)
- iv) It is operated in muddy, katcha or sandy roads.
- v) This transport system creates employment to rural artisans.

c) Tractor trollys :

The use of tractor attached with a trolley is commonly used for transporting potatoes in many parts in India. It is convenient for :

- i) Carrying large quantity of produce in lesser duration of time.
- ii) Suitable in surplus producing areas than the trucks for carrying produce to the primary assembling markets in the absence of pucca roads.

d) Trucks :

Bulk quantity of potatoes are carried by the trucks to the distant places through out the country.

It is convenient for following :

- i) Easy availability
- ii) Time saving
- iii) Quick movement of produce
- iv) Door to door delivery.
- v) Less transit losses due to least handing of loading and unloading

e) Railway transport:

During harvesting season of Feb-March, considerable quantities of potato are transported by railway wagons. This is convenient for:

- i) Suitable for carrying larger quantity of potatoes over long distances.
- ii) Comparatively cheaper and safer mode of transport available through a wide network of railways.

8.0 STORAGE :

The stored tubers (potato) are living organisms, which produces heat through respiration and losses moisture. An ideal environment must be provided to store upto 10 months. The potato store must be designed to :

- a) Maintain desired temperature.
- b) Maintain high relative humidity (RH)
- c) Provide sufficient oxygen.
- d) Remove carbon dioxide and other toxic gases.
- e) Deal with adverse storage condition like wet, rotting, chilled / frozen or too warm.

Storage Methods :

The following methods are adopted for storing potato.

A) Conventional / Traditional :

Under this method the potatoes are stored in heaps, pits, bamboo racks, handis.

Advantage :

- a) It is cheap and minimum investment is required.
- b) Material required are locally available.
- c) This type is acceptable to farmers.

I) Heap :

This is one of the low cost method of potato storage where the probability of rain within two to three months after harvest is negligible. The soil platforms with a height of 0.2 to 0.25 mt. are made under the shade of tree. These platforms are spread with mancozeb solution (.3 to 0.5 per cent solution) to avoid the potato from rotting. Nearly 25 to 30 kg. of potatoes are stored in one heap. The heaps are covered with the potato haulms or wheat / paddy straw to avoid the potato from exposed to sun. The heaps are normally made early in the morning before the sunrise the damaged and cut potatoes are removed. Significant quantities of potatoes are stored in heap for a period of two months. The losses due to rotting are negligible and the quality of potatoes as good as it remains fresh. The polythene sheets are used for covering the heap to protect it from rain.

II) Pit storage:

This is a traditional method of storage. In this storage system, two types of pits are prepared i.e. katchha and pucca pits. Katchha pit is rectangular in shape measures 4.5 mt. (length) x 3.6 mt. (width) x 14 mt.(depth)* whereas pucca pit is normally circular in shape with a diameter of about 4.2 mt. All the pits are covered with 0.3 mt. thick available straw material (wheat, paddy). It is a popular storage method in Madhya Pradesh. The following recommendations are fallows for safe storage:

- * Follow all cultural practices, recommendations applicable in heap storage method.
- * Always store disease free and cured potatoes.
- * Measure the soil moisture level for determinations of depth of pit.
- * Keep the length and width of the pit according to the quantity of potatoes to be stored.
- * Maintain an average 25.6°C of temperature and 66 percent relative humidity.

III) Handis :

Handis are large trenches dug preferably under the shade of big tree. Some times pucca shades are also built above the handis. The pits are dug about 10 feet's or till the pucca soil layer appears (morum). The mancozeb solution (0.3 to 0.5 per cent) are sprayed in pits thoroughly to avoid the potatoes from rotting. Dry sugarcane leaves are spread in the pits and the potatoes are stored in the handis till ground level and the handis are covered again with dry sugarcane leaves. Follow all practices, recommendations applicable in heap storage method. The polythene sheets are covered on the top of the handis.

IV) Earthen Pots and Babmoo Racks :

This type of method is used in north-eastern part of India where small quantities of potatoes are stored. After harvest the potatoes are spread in room under cots for about a month and then stored it on bamboo racks in the house. The potatoes are also stored in earthen pots by keeping the pots one on top of the other in a corner of the house.

B) Scientific Storage System

There are different methods of scientific storages. They are :

- i) Evaporatively cooled storage.
- ii) Cold storage.
- iii) Vapour compression cooling.
- iv) Forced draught cooling.
- v) Ice-bank cooling.
- vi) Co₂ control system.
- vii) Irradiation

MAJOR STORAGE DISEASES AND PESTS AND ITS' CONTROL MEASURES

Important diseases and pests affecting tubers in storage may be classified as under:

STORAGE DISEASES			
Name of Disease	Causal organisms	Nature of damage	Remedy
1) Charcol rot	<i>Macrophomina phaseolina</i>	Formed darkened patches on tubers which later become water soaked and black.	Require early harvesting before middle of March i.e. before soil temperature reaches 28 ^o C.
2) Late blight	<i>Phytophthora infestans</i>	Brown colouration of infected tubers, wet rot in storage causes huge losses.	<ul style="list-style-type: none"> i) Seed treatment with fungicides and proper pre harvest cares. ii) Cultivation of disease resistant varieties like Kufri Jyoti, Kufri Giriraj etc. iii) Prophylactic spray with 0.2 per cent mancozeb at field.
3) Wart	<i>Synchytrium endobioticum</i>	Tubers become undersized.	<ul style="list-style-type: none"> i) Heat treatment of tubers. ii) Cultivation of disease resistant varieties like Kufri Jyoti, Kufri Giriraj, Kufri Kamehan etc.
4) Soft rot	<i>Erwina spp.</i>	Tubers are infected through wounds.	Wash tubers with 30 per cent boric acid 30 minutes before storage.
STORAGE PESTS			
Name of Pest	Causal organisms	Nature of damage	Remedy
1) Tuber moth	<i>Phthorimaea spp.</i>	The larvae enter the tuber through eyes and bore tunnels. The larval damage results in direct weight loss and it's infection greatly reduced the market value of tubers	<ul style="list-style-type: none"> i) Keep the tubers covered with earth in the field. ii) Fumigate the godown with Methyl Bromide at 4.8 Kg/100 cubic meter for 3 hrs. (only for seed potato and not for table potato) iii) Gramlo viruses (GVs) is highly effective in reducing tuber with damage in table potato in stores (preparation of 1 kg.) mix 1 kg. Talc powder in one litre of water and 20 GV infected larvae and 5 ml. triton in shade to make the formulation in dust form. 5 kg. of GV dust is sufficient for one tonne of potato.

9.0 IMPORTANT ASSEMBLING MARKETS :

The following are the major assembling markets located in Uttar Pradesh, Haryana, Himachal Pradesh, Punjab and West Bengal in the country.

Major assembling markets in major producing states in India are furnished below :

SI No.	Name of State	Name of district	Name of major markets / mandies
1.	2.	3.	4.
1.	Uttar Pradesh	1) Agra	Agra, Samshabad
		2) Firozabad	Sirshaganj
		3) Kanpur nagar	Kanpur nagar
		4) Etawah	Etawah
		5) Kaunauj	Kaunauj, Chhibraman
		6) Allahabad	Allahabad
		7) Varanashi	Varanashi
		8) Gorakhpur	Gorakhpur
		9) Lucknow	Lucknow
		10) Raibarily	Laxmanpur
2.	West Bengal	1) Kolkata	Burrabazar Posta Market, Koley Market
		2) Hoogly	Champadanga, Haripal, Tarakeshwar, Panduah, Arambag, Seoraphulli, Dhaniakhali.
		3) Midnapur(west)	Midnapur, Garbeta, C.K Road
		4) Murshidabad	Kandi, Jangipur, Neema
		5) Howrah	Udaynarayanpur, Amta, Ramrajatala Bazar
3.	Delhi	1) North Delhi	Azadpur Mandi
		2) South Delhi	Okhla
		3) West Delhi	Tilaknagar
4.	Punjab	1) Bhatinda	Bhatinda, Bhuchhon, Maur, Rampurphul, Talwandi Sabo
		2) Mansa	Mansa, Budhlada, Sardulgarh
		3) Amritsar	Amritsar, Gheri, Khemkaran, Patti, Raiya, Tarantaran.
		4) Ferozpur	Ferozpur city, Ferozpur cantt., Abohar, Fazilka, Makha, Jalalabad, Kotissekhani, Mallanwaler, Zeera, Mamelot, Guruharsahai, Talwandi Bhai.
		5) Roper	Roper, Morinda, Kurali, Harar, Chamkaur Sahib, Anandpur Sahib
		6) Fatehgarh Sahib	Sirhind, Amlah, Bassipathana, Khamano
		7) Gurdaspur	Gurdaspur, Batala, Derababananak, Deena Nagar

1.	2.	3.	4.
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5.	Haryana	1) Ambala	Ambala
		2) Yamunanagar	Yamunanagar
		3) Kurukshetra	Kurukshetra
		4) Panipat	Panipat
6.	Himachal Pradesh	1) Chamba	Chamba
		2) Hamirpur	Hamirpur
		3) Kangra	Kangra
		4) Kinnaur	Kinnaur
		5) Kullu	Kullu
		6) Lahulspiti	Lahulspiti
		7) Mandi	Mandi
		8) Shimla	Shimla
		9) Solan	Solan
		10) Una	Una

10.0 MARKETING CHANNELS:

Market channel is a group of inter related intermediaries who market the produce from the farmers to consumer. Private and institutional channels are the important marketing channels in the movement or distribution of major agricultural commodities. The common channels for potato are as under.

I) Private:

Different private agencies namely village merchants, wholesalers, commission agents, processors, retailers are involved in potato marketing channels as follows:-

1. Producer → wholesaler → Retailer → Consumer
2. Producer → Commission Agent → Wholesaler → Retailer → Consumer
3. Producer → Cold storage → Commission Agent → Wholesaler → Retailer → Consumer.

II) Institutional:

Marketing of potato is complicated because it is a semi perishable and bulky commodity. It's marketing and export depends upon the type of end uses i.e. either for seed purpose or table purpose. Various institutions are involved in marketing and export of potato. National Agricultural Co-operative Marketing Federation (NAFED) and co-operative societies are entrusted for procurement operations in domestic markets where as the Agricultural and Processed Food Export Development Authority (APEDA),

Marketing Federation (MARKFED) of Punjab deals with potato export. The institutions involved in the potato marketing channels are as follows:

- 1) Producer → State Marketing Agencies → Retailer → Consumer
- 2) Producer → Cooperative societies → Retailer → Consumer
- 3) Producer → NAFED → Retailer → Consumer
- 4) Producer → Marketing Federation (MARKFED) → Retailer → Consumer
Export

11.0 MARKET INFORMATION AND EXTENSION SERVICE :

Marketing information plays an important role in planning production and marketing of the produce by the farmers. It is also necessary for the market participants in arriving at optimal trading decisions. The availability and dissemination of marketing information is the basic necessity for achieving both operational and pricing efficiency in the marketing system.

Marketing Information:

Agricultural Marketing Information comprises of collection, analysis, compilation and dissemination of agricultural marketing related information to the farmers for modern market oriented farming by improving the quality and productivity of the produce. To improve this entire system Directorate of Marketing and Inspection under Ministry of Agriculture, Govt. of India has started supplying of information on the website namely www.agmarknet.nic.in.

Marketing extension:

Marketing extension is a tool to educate and grow awareness among the farmers and other beneficiaries in the chain of marketing system.

**Govt. and Semi Govt. organizations providing services on
Marketing Information and Extension**

Sl. No	Organization and it's website	Services provided
1.	2.	3.
1.	<p align="center">Directorate of Marketing and Inspection (DMI), Head Office, CGO Complex N.H.IV. Faridabad –121 001.</p> <p align="center">Website: www.agmarknet.nic.in</p>	<ul style="list-style-type: none"> ▶ To promote grading of agricultural produce under the Agricultural Produce (Grading & Marking) Act, 1937. ▶ To facilitate the construction of marketing infrastructure of agricultural produce. ▶ To render advice on statutory regulation, development and management of agricultural markets by states / U.Ts. ▶ Marketing research, surveys and planning ▶ To train personnel in agricultural marketing
2.	<p align="center">Agricultural and Processed Food Export Development Authority (APEDA), Head Office, 4, Siri Institutional Area, Opp. Asiad Village, August Kranti Marg, New Delhi-110016</p> <p align="center">Website: www.apeda.com</p>	<ul style="list-style-type: none"> ▶ Promote export of agricultural commodities including potato and it's products to foreign countries. ▶ Adopting standards and specifications for the purpose of export of schedule products.
3.	<p align="center">National Horticulture Board, Plot No-85, Sector18, Institutional Area, Gurgaon-122015</p> <p align="center">Website: www.hortibizindia.nic.in</p>	<ul style="list-style-type: none"> ▶ To develop post harvest infrastructural facilities of horticultural commodities including potato.
4.	<p align="center">Ministry of Food Processing Industries (MOFPI), Panchsheel Bhawan, New Delhi.</p> <p align="center">Website: www.mofpi.nic.in</p>	<ul style="list-style-type: none"> ▶ Grant and support for food park component which in turn also help in setting up of Agri Export Zone.
5.	<p align="center">National Agricultural Cooperative Marketing Federation of India Ltd.(NAFED) Head Office, 1, Siddarth Enclave, Ashram Chowk, Ring Road, New Delhi.</p> <p align="center">Website: www.nafed-India.com</p>	<ul style="list-style-type: none"> ▶ To act as a nodal agency for implementing the market intervention scheme to avoid glut situation and price craze of potato.

1.	2.	3.
6.	State Marketing Boards at State Capitals.	<ul style="list-style-type: none"> ▶ Regulation management and development of marketing in concerned state. ▶ To implement different schemes on agricultural marketing including potato. ▶ To co-ordinate functioning of all market committees. ▶ Grading of agricultural produce. ▶ Publicity on regulated marketing of agro produce.
7.	Agricultural Produce Market Committees (APMCs) at different regulated markets of different states.	<ul style="list-style-type: none"> ▶ For better marketing of agricultural produce the APMC provide the following facilities : ▶ Facilitates drying of produce. ▶ Providing grading, weighing and storage facilities of produce, brought to APMC complexes.

12.0 ALTERNATIVE SYSTEMS OF MARKETING :

I) Future trading :

In terms of price discovery and risk management, the forward and future markets have been identified as an important tool for price stabilization. Presently, forward and future market system is followed in certain agricultural commodities including potato.

- 1) **The forward market** supports two economic functions, namely price discovery and price risk management, which enables the traders and stockiest to protect against the risk of adverse fluctuation of prices. It is governed in India under the Forward Contract Regulation Act, 1952.
- 2) **The future market** facilitates the trading of agricultural commodity for the purchase or sale of the commodity for future delivery, where contracts are made on a future exchange on the basis of standard quality, quantity, delivery time, locations and the price. The Central Govt. determines the policy by which the future trading is permitted and recognized for a particular commodity.

The Benefits of Future trading:

- a) Price risk management of an agricultural commodity e.g potato.
- b) Facilitates production, and improve the quality of produce.
- c) Acts as a price barometer to farmers and other trade functionaries.
- d) It benefits indirectly to the exporters / farmers through better information, lower and more stable marketing and processing margins.

- e) It gives an idea of prices to the consumers, which enable them to enter forward contract margins.
- f) It ensures a balance in demand and supply position through out the year.
- g) It promotes an integrated price structure through out the country.

Name of Exchanges dealing in Potato

Sl.No.	Name of Exchange
1.	Multi Commodity Exchange (MCX)
2.	National Commodity and Derivative Exchange (NCDEX)

II) Contract marketing :

The “Contract marketing” is a system in which the commodity is marketed by farmers under a pre-agreed buy-back contract with an agency engaged in trading or processing. In contract marketing, a producer will produce and deliver to the contractor, a quantum of required quality of produce, based upon anticipated yield and contracted acreage, at a pre-agreed price. In this agreement, agency contributes input supply and renders technical guidance. The company also bears the entire cost of transaction and marketing. By entering in to contract, farmer’s risk of price reduces and the agency reduces the risk of non-availability of raw material. The inputs and extension services provided by the agency include improved seed, credit, fertilizers, pesticides, farm machinery, technical guidance, extension, marketing of produce etc. In present scenario, Contract marketing is one of the way by which producers, especially small farmers, participates in the production of good quality potato to get higher return. Contract Farming enables producers to adopt new technologies to ensure maximum value addition and access to new global markets. It also ensures efficient post harvest handling and meeting specific needs of customers.

In such arrangement, the purchaser, may be exporter or processing unit, generally provides inputs, technical know-how and financial support. Thus sharing the risk by both the, buyers and sellers. It is an approach that can contribute to increased income to farmers, avoidance of risk of adverse price fluctuation, and higher profitability to sponsors. Many companies have entered into contracts with farmers for production and marketing of agricultural produce including potato.

As for example, the Himalaya International Ltd. (HIL) has made backward linkage through contract farming in potatoes with farmers of Ponta Sahib in Himachal Pradesh. In this system, company is providing seeds, organic manure and total technology to 150 farmers during 2005, the company has introduced baby potato skin stuffed with cheese and tomatoes for rapidly growing market involving constant innovation and diversity of cuisine. Being potato content low starch and high fibre content, these potatoes are better for health than large potatoes. The HCL is exporting IQF frozen potatoes to U.S.A and U.K.

In West Bengal, a similar system to contract marketing started. The Dept. of Food Processing Industries & Horticulture, Govt. of West Bengal has made an experiment through an arrangement between Frito-lay India Ltd and a few co-operative societies for supply of chip quality potato to the processing units since 2003-04. The varieties tried are Chipsona I & II, Jyoti, Atlantic (Dutch Variety) and Chandramukhi. On the basis of trial "*Jyoti*" was selected. Frito-lay India Ltd supplied G-2 micro tubers to some Co-operative Societies in Hoogly and Burdwan Dists at a fixed price. Co-operatives in turn supplies seeds to its growers. Initial results has been reported encouraging. Frito-lay buys a sizeable quantity of the chip grade potato so produced at a fixed price and also pay service charge to the societies on final procurement.

The participators are:

- A. *Frito-lay--***
 - a) supplying seed potatoes to each society under contract at a fixed price;
 - b) providing technical guidance and supervision ;
 - c) testing the potato;
 - d) buying back the potato at a fixed price;
 - e) providing service charges to the society.

- B. *The Societies--***
 - a) making contractual agreement with Frito-lay for growing chip grade potato through the member farmers ;
 - b) procure and supply seed to the member farmers ;
 - c) arrange cultivation and supply of potatoes of acceptable grade by the farmers ;
 - d) arrangement of organizing training to the farmers by the Dept. Frito- lay and experts from Universities and other outsourcing.

- C. *The Govt. Department --***
 - a) maintain liaison with societies and Frito-lay ;
 - b) providing training to farmers for getting desired grade potatoes.

✓ **Benefits / opportunities of contract marketing :**

Types of benefits / opportunities	To farmer / producer	To contracting agency
1) Access	Access to inputs	Access to required quality of produce.
2) Risk	Minimums prices risk	Minimizes risk of scarcity in consistent supply of raw materials.
3) Quality	Use of good quality of inputs like seeds, fertilizers.	Getting supply of desirable quality supply of produce.
4) New skills of post harvest handling / practices.	Facilitates the adoption of new skills of post harvest handling / practices at low cost.	Adopt more efficient and better post harvest handling / practices.
5) Mutual Relationship	Strengthen long term relationship with buyer for mutual interests.	Strengthen long term relationship with farmer for mutual interest.
6) Profit	Increases	Increases.

III) Direct marketing :

The direct marketing system enables the farmers to meet the specific demands of wholesalers or traders from the farmer's inventory of graded and certified produce on one hand and of consumers according to consumer's preference on other hand helps the farmers to take advantage of favourable prices. This system encourages the farmers to undertake sorting, grading and quality marking at their farms. The model of marketing has been introduced in Punjab in the name of Apni Mandi and in Andhra Pradesh in the name of Rythu Bazar for fruits and vegetables.

IV) Co-operative marketing :

The Co-operative marketing is the system by which a group of farmers join together to carry on some or all the processes involved in bringing goods from producer to consumers. In other ways, it is the association of cultivators / farmers for the purpose of helping them to market their produce in a more profitable way than private trading system.

Different levels of co-operative organisation involved in potato marketing :

- 1) **National** – e.g National Agricultural Co-operative Marketing Federation (NAFED)
- 2) **State** – e.g. 'BENFED' in West Bengal, 'MARKFED' in Punjab and 'HAFED' in Haryana, Nilgiri Co-operative Society in Tamil Nadu, Gardener Co-operative Production Supply and Sales Society in Karnataka, Potato Growers Co-operative Association Gujarat and Farukkabad Co-operative Marketing Society in Uttar Pradesh.

13.0 INSTITUTIONAL CREDIT FACILITIES :

i) Pledge finance system:

The Indian farming community mostly consists of small and marginal farmers. They do not have the economic strength to retain the surplus produce till favourable market price, and often compelled to sell their produce immediately after harvest, when the prices are low. The solution to this problem lies in providing safe and scientific storage of their produce and availing easy marketing credit against the stored produce. Hence, the systems of pledge finance have emerged as an unique avenue of finance to farmer's.

Facilities of loan under Pledge Finance System

Loan system	Eligibility	Rate of interest	Participating banks
As per guidelines of Reserve Bank of India, loan / advances can be given against hypothecation / pledge of Agril. Produce including potato.	Person can avail this facility of pledge loan by storing their produce in cold storage.	It is determined by respective banks.	Commercial Bank / Cooperative Banks / Regional Rural Banks.

ii) **Others :** Following types of credit facilities are available for production, post harvest operations & marketing of agro-commodities including potato.

Name of scheme	Eligibility	Facility
1.	2.	3.
1. Produce Marketing Loan scheme	All the categories of farmers i.e., small / marginal / others are eligible.	This type of loan is given upto 1 lakh against pledge/hypothecation of agricultural produce for a period not exceeding 6 months.
2. Kissan 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 can meet his production and other contingency needs by using easy convenient withdrawal slips. The minimum credit limit is Rs.3000/- and based on operational land, holding, cropping pattern.
3. Crop Loan	All categories of farmers i.e., Small/Marginal and others are eligible	Provides financial assistance to meet cultivation expenditure for various crops including potato as short term loan.

1.	2.	3.
4. Agricultural Term Loans	All categories of farmers and agricultural labourers are eligible for this loan provided they should possess the necessary experience in this activity.	It is provided to the activities i.e. land development, minor irrigation, farm mechanization, horticulture, dairying, etc. This loan is offered in the form of direct finance to farmers with a repayment span not less than 3 years and not exceeding 15 years.
5. Self-help Groups (SHGs) linkage credit programme	S.H.Gs are the self managed homogeneous group of economically backward people who promote savings among themselves and can pool their agricultural activities.	Self -help groups are supplemented by bank credit when these groups gain experience.
6. National Agricultural Insurance Scheme (NAIS)	<p>On compulsory basis: All farmers producing notified crops and availing Seasonal Agricultural Operational (SAO) loans from financial institutions i.e., loanee farmers.</p> <p>On Voluntary basis: All other farmers (Non-loanee farmers) producing notified crops.</p>	Provides insurance coverage and financial support to the farmers in case of failure of any notified crop due to any natural calamities, pests and diseases. It also encourage the farmers to adopt progressive farming high value inputs and high agricultural technology. Besides, it helps to stabilize the farm income during disaster years.

14.0 ORGANISATIONS PROVIDING MARKETING SERVICES:

The names of Govt., Semi-Govt. and State Govt. organisations who provide and assist marketing services like procurement, grading, storage, and processing in the field of potato are given below:

Sl.No.	Organization	Services provided
1.	2.	3.
1.	<p>Directorate of Marketing and Inspection (DMI), Head Office, CGO Complex N.H.IV. Faridabad –121 001.</p> <p>Website: www.agmarknet.nic.in</p>	<ul style="list-style-type: none"> ▶ To promote grading of agricultural produce under the Agricultural Produce(Grading & Marking) Act,1937. ▶ To facilitate the construction of Marketing Infrastructure in Agricultural, Horticultural, Dairy, Poultry and forestry sector under MIGS scheme. ▶ To render advice on statutory regulation, development and management of agricultural markets by states/U.Ts. ▶ Marketing research, surveys and planning ▶ To train personnel in agricultural marketing

1.	2.	3.
2.	<p align="center">National Agricultural Cooperative Marketing Federation Ltd. (NAFED), Head Office, Siddhartha Enclave, Ring Road, Asram Chowk, New Delhi-110014.</p> <p>Website: www.nafed-india.com.</p>	<p>▶ To act as a nodal agency for implementing the Market Intervention scheme to avoid glut situations and price crash of potato.</p>
3.	<p align="center">Ministry of Food Processing Industries (MOFPI), Govt. Of India, Panchsheel Bhawan, August Kranti Marg, New Delhi-110049.</p> <p>Website: www.mofpi.nic.in</p>	<p>▶ Provides grants and supports for food parks component which will in turn also help in setting up of Agri- Export Zones (AEZs) of potato.</p>
4.	<p align="center">Agricultural and Processed Food Export Development Authority (APEDA), 3, Institutional Area, August Kranti Marg, New Delhi-110016.</p> <p>Website: www.apeda.com</p>	<p>▶ Promotes export of agricultural commodities including potato and its products to foreign countries.</p> <p>▶ Adapting standards and specifications for the purpose of export of scheduled products.</p>
5.	<p align="center">National Horticultural Board, Plot No.85, Sector-18, Institutional Area, Gurgaon-122015</p> <p>Website: www.hortibiziindia.nic.in</p>	<p>▶ To develop post harvest infrastructural facilities of horticultural commodities.</p>
6.	<p align="center">State Marketing Departments / Directorates at States.</p>	<p>▶ Regulation management and development of marketing in concerned state.</p> <p>▶ To implement different schemes on agricultural marketing.</p> <p>▶ To co-ordinate functioning of all market committees.</p> <p>▶ Grading of agricultural produce.</p> <p>▶ Publicity of matters related to regulated marketing of agro produce.</p>

1.	2.	3.
7.	<p>Agricultural Produce Market Committees (APMCs) at different regulated markets of different states.</p>	<p>► For better marketing of agricultural produce the APMC provide the following facilities:</p> <ul style="list-style-type: none"> ➤ Providing covered common auction hall, open common auction platform to facilitate the display and sale of agricultural produce. ➤ Facilitates drying of produce. ➤ Providing grading, weighing and storage facilities of produce, brought to APMC complexes.

15.0 DO'S & DON'TS :

DO'S

1. Harvest the crop, when the weather is dry.
2. Stop irrigation two weeks before dehauling.
3. Avoid bruising and skinning of tubers during harvesting.
4. Dry the harvested tubers in storage shade.
5. Separate the damaged and diseased tubers before storing.
6. Store always the matured tubers.
7. Store potatoes at 2-4 degree centigrade in cold store for the purpose of preventing sprouting.
8. Use sprout inhibitors(e.g, CIPC) to store potatoes at 10-12 degree centigrade in cold store
9. Grade the potatoes manually or mechanically by graders before marketing.
10. For getting better price of produce, sell it to the co-operative society, nearest procurement centers of National Agricultural Co-operative Marketing Federation (NAFED) / other agencies or at regulated markets.
11. Avail benefit of contract farming with any agency to ensure better marketing of the produce.
12. Get the market information on potato regularly from newspaper, T.V. concerned APMC offices, websites of different organizations namely Agmarknet website.
13. Avail the system of future trading to avoid price risk arising due to wide fluctuation in commodity prices.
14. Contact the Central Potato Research Institute (CPRI), Shimla (H.P.) for availing the procedure of phytosanitary measure for export of potatoes.

DON'T'S

1. Harvest the crop, when the weather is moist.
2. Continue irrigation two weeks before dehauling.
3. Neglect bruising and skinning of tubers during harvesting.
4. Dry the harvested tubers in sun.
5. Mix the damaged and diseased tubers before storing.
6. Store the matured tubers with immature tubers.
7. Store potatoes above 2-4 degree centigrade in cold store for the purpose of preventing sprouting.
8. Store potatoes at 10-12 degree centigrade in cold store without using sprout inhibitors (e.g, CIPC).
9. Marketing the potatoes without grading manually or mechanically by graders.
10. Sell the produce to local traders or itinerant merchants at low prices.
11. Produce potatoes without assessing & assuring it's market demand for that year.
12. Sell potatoes without collecting/ verifying any marketing information.
13. Sell the produce at fluctuating prices or in glut situation.
14. Export potatoes without any phytosanitary measure.

TABLE POTATO GRADING AND MARKING RULES

1. **Short Title** — These rules may be called the Table Potato Grading and Marking Rules, 1950.
2. **Grade designation** — Grade designations to indicate the quality of table potatoes produced in India shall be as set out in column 1 of Schedules I and II annexed to these Rules.
3. **Definition of quality** — The quality indicated by the respective grade designations shall be as set out against each designation in columns 2 to 8 of the Schedules I and II
4. **Grade designation marks** — The grade designation mark shall consist of a label of the design and colour specified in Schedule III in conjunction with the grade designation.
5. **Method of marking** — The grade designation mark label shall be securely attached to each container and shall clearly show the following particulars —
 - (a) Grade designation with the words “table potatoes”.
 - (b) Variety or trade name
 - (c) Net weight.
 - (d) Name of packing station.
 - (e) Date of packing
6. **Method of packing** —
 1. Containers shall be clean, suitable for the purpose and shall be securely closed.
 2. The tubers in any container shall be of one grade and reasonably uniform. The top layer shall be representative of the entire contents of the package in respect of variety, size, colour and freedom from defects.

SCHEDULE – I

Grade Designations and Definition of Quality of Table Potatoes (Oval or long varieties*)

Grade designation	General	Applicable to single tuber's size (Minimum diameter in) millimeters	Definition of quality				
			Applicable to quantities				
			Conformity to variety etc.	Tolerance			
Under size or over-size	Disease + Damage etc	Earth and extraneous matter		Maximum aggregate of all defects under column 5,6 & 7			
Extra special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption	41 mm**	At least 95% by weight must conform to the variety	Not more than 2% of the total weight may pass through sieve having circular holes with a diameter of the minimum size specified (in column 3) for the grade; included in this not more than 0.5% of the total weight may pass through a 25 mm.mesh	Not more than 2% of the total weight may consist of appreciably diseased, damaged or unsightly potatoes and included in this amount	Not more than 2% may be total present, the percentage to be calculated on the net weight of screened potatoes.	4% of the total weight
Special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption	29 mm	At least 95% by weight must conform to the variety	Not more than 2% of the total weight may pass through sieve having circular holes with a diameter of the minimum size specified (in column 3) for the grade; included in this not more than 0.5% of the total weight may pass through a 25 mm.mesh	Not more than 2% of the total weight may consist of appreciably diseased, damaged or unsightly potatoes and included in this amount	Not more than 2% may be total present, the percentage to be calculated on the net weight of screened potatoes.	4% of the total weight

* The word "Oval or Long": shall be marked following the grade name on the AGMARK label by means of a rubber stamp.

** When the potatoes have been passed over a riddle of greater mesh than 41 mm. the minimum size may at the seller's discretion be appended to the grade name, e.g. "Extra Special" (51 mm., 57 mm, 64 mm etc.) but potatoes which exceed 89 mm in their smallest diameter shall be excluded from grading.

- + 1. Any disease or defect the presence of which may be established by cutting open the potato shall be taken into account, and potatoes having cuts worm and slug holes penetrating into the flesh shall be regarded as damaged.
2. Potatoes affected by greenness superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/10 of the surface is so affected.
3. A potato shall only regarded as being obviously affected with the soft rot, if at the time of inspection, it is squashy or the surface is at some part distinctly broken or wet owing to disease.

SCHEDULE – II

Grade Designations and Definition of Quality of Table Potatoes (round varieties*)

Grade designation	General	Applicable to single tuber's size (Minimum diameter in) millimeters	Definition of quality				
			Applicable to quantities				
			Conformity to variety etc.	Tolerance			
Under size or over-size	Disease + Damage etc	Earth and extraneous matter		Maximum aggregate of all defects under column 5,6 & 7			
Extra special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption	45 mm**	At least 95% by weight must conform to the variety	Not more than 2% of the total weight may pass through sieve having circular holes with a diameter of the minimum size specified (in column 3) for the grade; included in this not more than 0.5% of the total weight may pass through a 25 mm.mesh	Not more than 2% of the total weight may consist of appreciably diseased, damaged or unsightly potatoes and included in this amount	Not more than 2% may be total present, the percentage to be calculated on the net weight of screened potatoes.	4% of the total weight
Special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption	32 mm	At least 95% by weight must conform to the variety	Not more than 2% of the total weight may pass through sieve having circular holes with a diameter of the minimum size specified (in column 3) for the grade; included in this not more than 0.5% of the total weight may pass through a 25 mm.mesh	Not more than 2% of the total weight may consist of appreciably diseased, damaged or unsightly potatoes and included in this amount	Not more than 2% may be total present, the percentage to be calculated on the net weight of screened potatoes.	4% of the total weight

* Potatoes of round varieties shall be packed separately The word "Oval or Long": shall be marked following the grade name on the AGMARK label by means of a rubber stamp.

** When the potatoes have been passed over a riddle of greater mesh than 45 mm. the minimum size may at the seller's discretion be appended to the grade name, e.g. "Extra Special" (51 mm., 57 mm, 64 mm etc.) but potatoes which exceed 83 mm in their smallest diameter shall be excluded from grading*.

- + 1. Any disease or defect the presence of which may be established by cutting open the potato shall be taken into account, and potatoes having cuts worm and slug holes penetrating into the flesh shall be regarded as damaged.
2. Potatoes affected by greenness superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/10 of the surface is so affected.
3. A potato shall only regarded as being obviously affected with the soft rot, if at the time of inspection, it is squashy or the surface is at some part distinctly broken or wet owing to disease.

TABLE POTATOES FOR EXPORT (GRADING AND MARKING) RULES

1. **Short title and application.—** (1) These rules may be called the Table Potatoes Grading for export (Grading and Marking) Rules, 1964.
(2) They shall apply to Table Potatoes (*Solanum tuberosum*) produced in India and meant for export.
2. **Definitions.—** In these rules:—
 - (a) “Agricultural Marketing Adviser” means the Agricultural Marketing Adviser to the Government of India.
 - (b) “Schedule” means a Schedule appended in these rules.
3. **Grade designation.—** Grade designations to indicate the quality of Table Potatoes produced in India shall be as set out in column 1 of Schedule II to V.
4. **Definition of quality.—** The quality indicated by the respective grade designations shall be as set out against each grade designation in columns 2 to 7 of Schedules II to V.
5. **Grade designation mark.—** The grade designation mark shall consist of a label specifying the grade designation and bearing a design (consisting of an outline map of India with the word “AGMARK” and the figures of the rising sun, with the words “Produce of India” and “Hkkjrh; mRikn” resembling the one set out in Schedule I.
6. **Method of marking.—** (1) The grade designation mark label shall be securely affixed to each container in a manner approved by the Agricultural Marketing Adviser and shall clearly show the following particulars
 - (a) Grade designation with the words “Table Potato for export”.
 - (b) Variety or trade name.
 - (c) Net weight.
 - (d) Date of packing.(2) An authorized packer may, after obtaining the prior approval of the Agricultural Marketing Adviser, mark his private trade mark on a container, in a manner approved by the said officer, provided that the private trade mark does not represent quality or grade of Table Potatoes different from that indicated by the grade designation mark affixed to the container in accordance with these rules.
7. **Method of packing.—** (1) Only sound, clean and dry container made of jute shall be used for packing. They shall be free from any insect infestation or fungus contamination and also be free from any undesirable smell.
(2) The containers shall be securely closed and sealed in a manner approved by the Agricultural Marketing Adviser.
(3) Each package shall contain Table Potatoes of one trade description and grade description and grade designation only.
8. **Special conditions of certificate of authorization.—** In addition to the conditions specified in rule 4 of the General Grading and Marking Rules, 1937, following special conditions shall be observed by packers to the satisfaction of the Agricultural Marketing Adviser : -
 - (a) An authorized packer shall make such arrangements for testing seed potatoes as may be prescribed by the Agricultural Marketing Adviser.
 - (b) An authorized packer shall provide all facilities as may be necessary for sampling, testing etc. to the Inspecting Officers duly authorized by the Agricultural Marketing Adviser in this behalf.

SCHEDULE – I

(See Rule 5)

The grade designation mark for table potatoes shall consist of the following design in conjunction with a grade designation.



NOTE : The Tamil Nadu and Telugu words will not occur in the labels In case where commodities are graded for the purpose of export.

The labels will be of following colour :

Extra Special	---	White
Special	---	Red
General	---	Blue

SCHEDULE – II

(See Rules 3 and 4)

Grade Designation and Definition of Quality of Table Potatoes of Mettupalayam Variety (Oval or long or round or mixed*)

Grade designation	General	Definition of quality				
		Applicable to single tuber's size (min. dia in mm)	Conformity to variety etc.**	Applicable to quantities		
				Tolerance		
				Under size or over-size	Disease, Damages, etc	Earth and extraneous matter
1.	2.	3.	4.	5.	6.	7.
Extra special	Reasonably clean, healthy potatoes, free from serious defect and suitable	46 @	At least 95% by weight must conform to the variety	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
Special	Reasonably clean, healthy potatoes, free from serious defect and suitable	35	At least 95% by weight must conform to the variety	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
General	Reasonably clean, healthy potatoes, free from serious defect and suitable	25	At least 95% by weight must conform to the variety	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.

*The word "Oval Long or Round or Mixed" shall be marked, following the trade description, on the AGMARK label, by means of rubber stamp,

**Column 4 relating to conformation to variety will not apply to mixed lots.

@ In case when the potatoes have been passed over a riddle of greater mesh than 46 mm. the minimum size may, at the seller's discretion, be appended to the grade name e.g., "Extra Special" (51 mm., 57 mm., 64 mm, etc.) but potatoes which exceed 89 mm., in their smallest diameter shall be excluded from grading.

1. Any disease or defect, the presence of which maybe established by cutting open the potato, shall be taken into account and potatoes having cuts, worm or slug holes penetrating into the flesh shall be regarded as damaged.
2. Potatoes affected by greenness, superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/5 of the surface is so affected.
3. A potato shall only be regarded as being obviously affected with the soft rot, if at the time of inspection, it is squasy or the surface is at some part distinctly broken or wet owing to disease.

SCHEDULE – III

(See Rules 3 and 4)

Grade Designation and Definition of Quality of Katva or Farukhabad Table Potatoes (round**)

Grade designation	General	Definition of quality				
		Applicable to single tuber's size (min. dia in mm)	Conformity to variety etc.	Applicable to quantities		
				Tolerance		
				Under size or over-size	Disease, Damages, etc	Earth and extraneous matter
1.	2.	3.	4.	5.	6.	7.
Extra special	Reasonably clean, healthy potatoes free from serious defect and suitable for human consumption.	25 @	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through having circular with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged or sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
Special	Reasonably clean, healthy potatoes free from serious defect and suitable for human consumption.	20	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through having circular with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged or sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.

*The word 'Round' shall be marked, following the trade description, on the AGMARK label, by means of rubber Stamp.

@ When the potatoes have been passed over a riddle of greater mesh than 25 mm. the minimum size may, at the seller's discretion, be appended to the grade name eg., 'Extra Special' (51 mm., 57 mm, 64mm., etc.) but potatoes which exceed 89 mm, in their smallest diameter shall be excluded from grading.

1. Any disease or defect, the presence of which may be established by cutting open the potato, shall be taken into account and potatoes having cuts, worm or slug holes penetrating into the flesh shall be regarded as a damaged.
2. Potatoes affected by greenness, superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/5 of the surface is so affected.
3. A potato shall only be regarded as being obviously affected with the soft rot, if the time of inspection, it is squashy or the surface is at some part distinctly broken or wet owing to disease.

SCHEDULE – IV
(See Rules 3 and 4)

Grade Designation and Definition of Quality of Table Potatoes of (Oval or long*) of variety other than Mettupalayam Potatoes

Grade designation	General	Definition of quality				
		Applicable to single tuber's size (min. dia in mm)	Conformity to variety etc.	Applicable to quantities		
				Tolerance		
1.	2.	3.	4.	5.	6.	7.
Extra special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption.	40 @	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
Special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption.	30	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
General	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption.	20	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.

*The word 'Oval or long' shall be marked, following the trade description, on the AGMARK label, by means of rubber Stamp.

@ When the potatoes have been passed over a riddle of greater mesh than 25 mm. the minimum size may, at the seller's discretion, be appended to the grade name eg., 'Extra Special' (51 mm., 57 mm., 64mm., etc.) but potatoes which exceed 89 mm, in their smallest diameter shall be excluded from grading.

1. Any disease or defect, the presence of which may be established by cutting open the potato, shall be taken into account and potatoes having cuts, worm or slug holes penetrating into the flesh shall be regarded as a damaged.
2. Potatoes affected by greenness, superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/5 of the surface is so affected.
3. A potato shall only be regarded as being obviously affected with the soft rot, if the time of inspection, it is squashy or the surface is at some part distinctly broken or wet owing to disease.

SCHEDULE – V

(See Rules 3 and 4)

Grade Designation and Definition of Quality of Table Potatoes (round*) other than Mettupalayam and Katva or Farukhabad Potatoes

Grade designation	General	Definition of quality				
		Applicable to single tuber's size (min. dia in mm)	Conformity to variety etc.	Applicable to quantities		
				Tolerance		
1.	2.	3.	4.	5.	6.	7.
Extra special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption.	45 @	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.
Special	Reasonably clean, healthy potatoes, free from serious defect and suitable for human consumption.	32	At least 95% by weight must conform to the variety.	Not more than 3% of the total weight may pass through sieve having circular holes with a diameter of a minimum size specified (in column 3) for the grade.	Not more than 2% of the total weight may consist of diseased, damaged and sprouted potatoes.	Not more than 2% may be present, the percentage to be calculated on the net weight of screened potatoes.

*The word 'Round' shall be marked, following the trade description, on the AGMARK label, by means of rubber Stamp.

@ When the potatoes have been passed over a riddle of greater mesh than 45 mm. the minimum size may, at the seller's discretion, be appended to the grade name eg., 'Extra Special' (51 mm., 57 mm, 64mm., etc.) but potatoes which exceed 89 mm, in their smallest diameter shall be excluded from grading.

1. Any disease or defect, the presence of which may be established by cutting open the potato, shall be taken into account and potatoes having cuts, worm or slug holes penetrating into the flesh shall be regarded as a damaged.
2. Potatoes affected by greenness, superficial disease or damage shall not be regarded as diseased or damaged unless more than 1/5th of the surface is so affected.
3. A potato shall only be regarded as being obviously affected with the soft rot, if the time of inspection, it is squashy or the surface is at some part distinctly broken or wet owing to disease.

Characteristics requirements of Potato for preparation of Potato Products

Characteristics	Type of Potato Products			
	Dehydrated	French Fries	Chips	Canned
Tuber size	30	50	40-60	35
Specific gravity	1.080	1.080	1.085	1.080
Dry matter (percentage)	22-25	20-234	22-25	18-20
Starch (percentage)	15-19	14-16	15-18	12-24
Reducing Sugar (percentage)	0.5	0.5	0.25	0.5
Shapes/ Sizes preferred	Medium to large sized tubers	Long oval shaped tubers	Round to oval shaped tubers	Small sized tubers

CODEX Specifications of Potato/ Potato Products

**CODEX STANDARD FOR QUICK FROZEN FRENCH FRIED POTATOES
CODEX STAN 114-1981**

1. SCOPE

This standard shall apply to quick frozen French fried potatoes which have been prepared from tubers of the species *Solanum tuberosum* L. and offered for direct consumption without further processing except for repacking if required.

2. DESCRIPTION

2.1 Product Definition

Quick frozen French fried potatoes is the product prepared from clean, mature, sound tubers of the potato plant conforming to the characteristics of the species *Solanum tuberosum* L. Such tubers shall have been sorted, washed, peeled, cut into strips, and treated as necessary to achieve satisfactory colour and fried in edible oil or fat. The treatment and frying operations shall be sufficient to ensure adequate stability of colour and flavour during normal marketing cycles.

2.2 Process Definition

2.2.1 Quick frozen French fried potatoes is the product subjected to a freezing process in appropriate equipment and complying with the conditions laid down hereafter. The freezing operation shall be carried out in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18° C (0°F) at the thermal centre after thermal stabilization.

2.2.2 The recognized practice of repacking quick frozen foods under controlled conditions is permitted.

2.3 Handling Practice

The product shall be handled under such conditions as will maintain the quality during transportation, storage and distribution up to and including the time of final sale. It is recommended that the product be handled in accordance with the provisions in the Recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976).

2.4 Presentation

2.4.1 Styles

The styles of the product shall be determined by the nature of the surface and the nature of the cross section.

2.4.1.1 Nature of the Surface

The product shall be presented in one of the following styles:

- (a) ***Straight cut*** - strips of potato with practically parallel sides and with smooth surfaces.
- (b) ***Crinkle cut*** - strips of potato with practically parallel sides and in which two or more sides have a corrugated surface.

2.4.1.2 Dimensions of the cross section

The cross sectional dimensions of strips of quick frozen French fried potatoes which have been cut on all four sides shall not be less than 5 mm when measured in the frozen condition. The quick frozen French fried potatoes within each pack shall be of similar cross sections.

The product may be identified by the approximate dimensions of the cross sections or by reference to the following system for designations:

Designation surface	Dimension in mm across the largest cut
Shoestring	5 - 8
Medium	8 - 12
Thick cut	12 - 16
Extra large greater than	16

2.4.2 Other Styles

Any other presentation of the product, based on differing cross sections shall be permitted provided that it:

- (a) is sufficiently distinctive from other forms of presentation laid down in this standard;
- (b) meets all other requirements of this standard;
- (c) is adequately described on the label to avoid confusing or misleading the consumer.

3. **ESSENTIAL COMPOSITION AND QUALITY FACTORS**

3.1 **Composition**

3.1.1 **Basic Ingredients**

- (a) Potatoes as defined in Section 2.1
- (b) Edible fats and oils as defined by the Codex Alimentarius Commission.

3.1.2 **Optional Ingredients**

- (a) Sugars (sucrose, invert sugar, dextrose, fructose, glucose syrup, dried glucose syrup) as defined by the Codex Alimentarius Commission;
- (b) Salt (sodium chloride);
- (c) Condiments, such as herbs and spices.

3.2 **Quality Factors**

3.2.1 **General Requirements**

Quick frozen French fried potatoes shall:

- be free from any foreign flavours and odours;
- be clean, sound and practically free from foreign matter;
- have a reasonably uniform colour;

and with respect to visual defects subject to a tolerance shall be:

- without excessive external defects such as blemishes, eyes and discolouration;
- without excessive sorting effects, such as slivers, small pieces and scrap;
- reasonably free from frying defects, such as burnt parts.

When prepared in accordance with the manufacturer's instructions quick frozen French fried potatoes shall:

- have a reasonably uniform colour;
- have a texture characteristic of the product and be neither excessively hard nor excessively soft or soggy.

3.2.2 **Analytical Requirements**

3.2.2.1 Moisture - the maximum moisture content of the whole product in the styles shoestring, medium and thick cut shall be 76% m/m; and in extra large and other styles 78% m/m.

3.2.2.2 The fat or oil extracted from the product shall have a free fatty acid content of not more than 1.5% m/m measured as oleic acid or an equivalent fatty acid value based on the predominant fatty acid in the fat or oil.

3.2.3 **Definition of Visual Defects**

3.2.3.1 **External defects** are blemishes or discolouration (either internally or on the surface) due to exposure to light, mechanical, pathological or pest agents, eye material or peeling remnants.

- (a) Minor defect - A unit affected by disease, dark or intense discolouration, eye material, or dark peel covering an area or a circle greater than 3 mm but less than 7 mm in diameter; pale brown peel or light discolouration of any area greater than 3 mm in diameter.
- (b) Major defect - A unit affected by disease, dark or intense discolouration, eye material, or dark peeling covering an area or a circle greater than 7 mm but less than 12 mm in diameter.
- (c) Serious defect - A unit affected by disease, dark or intense discolouration, eye material, or dark peel covering an area or a circle of 12 mm in diameter or more.

Note: ("slight" external defects which in either area or intensity fall below the definition shown for minor defects shall be ignored)

3.2.3.2 **Sorting Defects**

- (a) Sliver - a very thin unit (generally an edge piece) which will pass through a slot the width of which is 50% of the minimum dimension of the nominal or normal size.
- (b) Small piece - Any unit less than 25 mm in length.
- (c) Scrap - Potato material of irregular form not conforming to the general conformation of French fried potatoes.

3.2.3.3 **Frying Defects**

Burnt pieces - Any unit which is dark brown and hard due to gross over frying.

3.2.4 **Standard Sample Size**

The standard sample size shall be 1 kilogramme.

3.2.5 **Tolerances for Visual Defects**

For tolerances based on the standard sample size as specified in Section 3.2.4 the visual external defects are classified as "minor" or "major" or "serious". The tolerances in respect of external defects are dependent on the cross section of the French fried potatoes.

To be acceptable, the standard samples shall not contain units in excess of the numbers shown for the respective categories, including total, in Table 1.

TABLE 1 - Tolerances for external defects

Defect category	Number of Units Affected Cross section of strips	
	5 - 16 mm	over 16 mm
Serious	7	3
Serious + major	21	9
Total (serious + major + minor)	60	27

The tolerances for the other defects (not depending on cross section) are:

Sorting defects

- Slivers - max. 12% m/m
- Small Pieces and Scraps - max. 6% m/m
- Total Sorting Defects - max. 12% m/m

Frying defects max. 0.5% m/m

3.3 Definition of "defective" for Composition and Quality Factors

Any sample unit taken in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL 6.5) (CAC/RM 42-1969) (see Codex Alimentarius Volume 13) shall be regarded as a "defective" for the respective characteristics when:

- (a) it fails to meet any of the requirements given in Section 3.1;
- (b) it fails to meet any of the general requirements given in Section 3.2.1;
- (c) when it exceeds the tolerances for visual defects in any one or more respective defect categories in Section 3.2.5.

3.4 Lot Acceptance for Composition and Quality Factors

A lot will be considered acceptable with respect to Composition and Quality Factors when the number of "defectives" as defined in Section 3.5 does not exceed the acceptance number (c) for the appropriate sample size as specified in the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL 6.5)(CAC/RM 42-1969) (See Codex Alimentarius Volume 13). In applying the acceptance procedure each "defective" (as defined in section 3.3(a) to (c)) is treated individually for the respective characteristics.

3.5 Definition of "defective" for Analytical Requirements

See Codex Alimentarius Volume 13.

3.6 Lot Acceptance for Analytical Requirements

See Codex Alimentarius Volume 13.

4. FOOD ADDITIVES

4.1 Sequestrants

4.1.1 Disodium dihydrogen pyrophosphate

4.1.2 Tetrasodium pyrophosphate

4.1.3 Ethylene diamine tetra-acetic acid
(Ca-diNa salt)

4.1.4 Ascorbic acid

4.1.5 Citric acid

4.1.6 Malic acid

Maximum Level in Final Product

100 mg/kg singly or in
combination (phosphates
expressed as P₂O₅)

Limited by GMP

4.2 Processing Aids

4.2.1 Sulphite, bisulphite, metabisulphite
(sodium or potassium salt))

4.2.2 Sodium hydroxide

4.2.3 Potassium hydroxide

4.2.4 Citric acid

4.2.5 Dimethylpolysiloxane

50 mg/kg, singly or in
combination, expressed as
SO₂

Limited by GMP

- 10 mg/kg on a fat basis

4.3 Carry-Over Principle

"Section 3" of the "Principle Relating to the Carry-Over of Food Additives into Foods" as set forth in Volume 1 of the Codex Alimentarius shall apply.

5. HYGIENE

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

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

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

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

6. LABELLING

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

6.1 The Name of the Food

6.1.1 The name of the food as declared on the label shall include the designation "French Fried Potatoes" or the equivalent designation used in the country in which the product is intended to be sold.

6.1.2 In addition, there shall appear on the label a designation of the style as appropriate, i.e. "straight cut" or "crinkle cut" and there may also appear an indication of the approximate dimensions of the cross section or the appropriate designation, i.e. "shoestring", "medium", "thick cut" or "extra large".

6.1.3 If the product is produced in accordance with Section 2.4.2, the label shall contain in close proximity to the words "French Fried Potatoes" such additional words or phrases that will avoid misleading or confusing the consumer.

6.1.4 The words "Quick Frozen" shall also appear on the label, except that the term "Frozen" ¹ may be applied in countries where this term is customarily used for describing the product processed in accordance with Section 2.2 of this standard.

6.2 Additional Requirements

The packages shall bear clear directions for keeping from the time they are purchased from the retailer to the time of their use, as well as directions for cooking.

¹ "Frozen": This term is used as an alternative to "quick frozen" in some English speaking countries.

6.3 Bulk Pack

In the case of quick frozen French fried potatoes in bulk, the information required above shall either be placed on the container or be given in accompanying documents, except that the name of the food accompanied by the words "quick frozen" (the term "frozen" may be used in accordance with Section 6.1.4 of this standard) and the name and address of the manufacturer or packer shall appear on the container.

7. PACKAGING

Packaging used for quick frozen French fried potatoes shall:

- (a) protect the organoleptic and other quality characteristics of the product;
- (b) protect the product against microbiological and other contamination;
- (c) protect the product from dehydration and, where appropriate, leakage as far as technologically practicable; and
- (d) not pass on to the product any odour, taste, colour or other foreign characteristics, throughout the processing (where applicable) and distribution of the product up to the time of final sale.

8. METHODS OF ANALYSIS AND SAMPLING

See Codex Alimentarius Volume 13.