

PN-AAN-GSU/62

15W-31828

9310973

Social Science Department
Working Paper Series
No. 1980 - 2

POTATO IN THE INDIAN ECONOMY

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ABSTRACT

Potatoes were introduced to India in the early 17th century, and by the close of the 19th century they had spread to various parts of the country. However, their recognition as an answer to the chronic food problem led to determined research and promotion only in the mid-1960s. The main constraint to production was identified as the non-availability of healthy seeds for the country's various climatic zones. The National Potato Research Institute has attended to this and related matters, paving the way for subsequent motivational campaigns. Much relevant information on potato production, marketing and utilization are lacking, but the following patterns emerge from available studies. Though potato cultivation has gained popularity in many parts of the country, yields in different states still vary from 1 t/ha (Andhra) to 24 t/ha (Gujarat). The bulk of potato growers are small farmers with poor resources and little capacity to withstand price crashes--the bane of India's potato economy. The marketing and distribution are mostly controlled by private traders. Glut conditions and low prices in producing areas sometimes co-exist with high prices in consuming markets. Limited cold storage capacity has been a major obstacle to adoption of a national potato price support policy. Studies of industrial workers' consumption show a fair increase in potato consumption. Yet the highest annual per capita figure does not exceed 25 kg. The explanation for low consumption seems to be relatively high potato prices (vis a vis cereals) during most of the year. If consumption is to be increased attention needs to be paid making potato prices attractive. India is well placed for expanding potato exports but a considerable export policy is lacking, as is a systematic study of potential markets.

RESUMEN

La papa fue introducida en la India a comienzos del siglo XVII y en las últimas décadas del siglo XIX se había extendido a varias partes del país. Sin embargo, sólo a mediados de la década de 1960 su reconocimiento como una respuesta a los problemas crónicos de falta de alimentos, condujo a la investigación y promoción de este cultivo. La falta de disponibilidad de semilla sana para las diversas regiones climáticas del país fue identificada como el principal factor limitante de la producción. El Instituto Nacional de Investigación de la Papa ha realizado trabajos en ese y en otros campos, incentivando subsecuentes campañas de motivación. La información sobre producción, mercadeo y utilización de la papa aún es deficitaria, pero de los estudios disponibles emergen los siguientes patrones. Si bien el cultivo de la papa se ha hecho popular en muchas partes del país, los rendimientos en algunos estados todavía fluctúan entre 1 t/ha en Andhra y 24 t/ha en Gujarat. La mayoría de los productores de papa son pequeños

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agricultores, con escasos recursos y poca capacidad para soportar las crisis de precios, lo cual es el peor mal de la economía de la papa en India. El mercadeo y la distribución están controlados principalmente por comerciantes privados. Abundancia de papa y precios bajos en las áreas de producción a veces coinciden con precios altos en los centros de consumo. La limitada capacidad de almacenamiento refrigerado constituye el mayor obstáculo para la adopción de una política nacional de precios de refugio. Estudios de consumo llevados a cabo entre los trabajadores de la industria muestran incrementos significativos en el consumo de papa. No obstante el consumo anual per capita no excede los 25 kg. La explicación del bajo consumo probablemente sea el precio alto de la papa en comparación con los cereales durante la mayor parte del año. Si se piensa en incrementar el consumo, es necesario fijar la atención en mecanismos que hagan más atractivos los precios de la papa. India está bien localizada para poder expandir sus exportaciones de papa, pero hace falta una política consistente de exportación, así como estudios sistemáticos de mercados potenciales.

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1. INTRODUCTION AND SPREAD OF THE POTATO

The potato is generally considered to be exotic to India. The precise dates of its introduction and spread to different parts of the country are difficult to determine since proper information is not available in the published literature. Only a few references to potato are found in historical accounts and correspondence. The first mention of potatoes is in Terry's description of a banquet at Ajmer given by Asaph Chan to Sir Thomas Roe in 1615.¹ The potato was probably brought to India by the Portuguese, who conducted trade between Europe and India.² Presumably, it was introduced in Surat (nearly 250 km north of Bombay) on the West Coast of India in the early 17th century. Judging from the name "Batata Surrata" (i.e., Potato of Surat), by which the potato is called in Goa, it may be concluded that it reached Goa from Surat.³ In his 1675 description of gardens of Karnataka, Fryer mentions potatoes among the vegetable crops grown, indicating that within a sixty year period potatoes had spread in the western part of India from Ajmer (in the north) to Karnataka (in the south). However, in India's southernmost State of Tamil Nadu (Madras) it was introduced only in 1882.⁴

The sequence of introduction of the potato in the northern parts of the country is rather obscure. It is generally held that it was introduced in the hill areas of Dehradun in Uttar Pradesh (U.P.) by Major Young in the early 19th century. From there it spread to the adjoining hill areas of the Punjab. By 1828 many households were cultivating small strips under potatoes in the Simla hills, and by 1839 potato cultivation had become a profitable source of income in remote hill areas. The potato spread from northern hills to the plains, and by the end of the 19th century its cultivation reached the whole of northern India.⁵ In Madhya Pradesh (Central India) the Desi or Mulki variety was introduced by Capt. Montgomery around 1820.

So far as the eastern part of the country is concerned, the available information indicates that potatoes were introduced by David Scott in Assam in 1830.⁶ The earliest reference to potatoes in West Bengal occurs in the offer of a piece of land by a British resident of Darjeeling in 1879 for establishing a botanical garden and his having obtained a selection of seed potatoes from England. However, since Assam is in the easternmost part of the country, it seems likely to assume that the route of potato to this part was through West Bengal.

No information is currently available to the author regarding other states, particularly about Bihar--a major producing state.

¹ Commercial Products of India. Watt, Sir George (John Murray, Albermarle Street, W. London 1908).

² Potato in India, Pushkarnath (Indian Council of Agricultural Research, New Delhi 1969).

³ The History of Social Influence of the Potato. Salaman Radcliffe N. 1970.

⁴ Potato in Sub-tropics, Pushkarnath (Orient Longman Ltd., New Delhi 1976).

⁵ Potato in India. Op. Cit.

⁶ Commercial Products of India. Op. Cit.

It is interesting to note that while it is usually maintained that potato is foreign to India, "Agriculture in Ancient India"¹ mentions that one of the verses of the old Sanskrit book ("Vraksayurveda" written by Surapala) states that "Alu" (potato or Arum Campanulatus) are grown from tubers.

II. SOCIOECONOMIC SETTING

Some writers have mentioned that initially potato was a taboo among orthodox Hindus, who considered it a sin even to touch it.² Gradually, potatoes gained popularity among better class Muslims who welcomed them as a desirable addition to their ordinary articles of diet.³ With the passage of time religious sanctions against potato were relaxed and then vanished. Now the potato has gained so much acceptability that it can be taken even on the days of religious feasts. However, the potato has continued to be used only as a side item of diet, as a vegetable preparation. Even now it is not an important or main dish for Indian families. Some educated people still have the notion that potatoes are fattening.

III. PRODUCTION ZONES

At present, potatoes are cultivated in almost all parts of India. The only areas where its cultivation is almost negligible are Kerala, Arunachal Pradesh, Dadra and Nagar Haveli, Goa, Daman and Diu, Andaman and Nicobar Islands, Chandigarh and Pondicherry. Due to the extensive area of the country, with varying topographical conditions, potatoes are cultivated in several agro-climatic zones:

1. Temperate Hill Zone
2. Sub-Tropical Zones
 - Short-Duration Two-Crop Zone
 - Long-Duration One-Crop Zone
 - Short-Duration One-Crop Zone
3. Tropical Zones
 - Three-Crop Hill Zone
 - Two-Crop Plateau Zone

IV. AREA, PRODUCTION AND YIELDS

Compilation of agricultural statistics started in 1885, but up to 1949 data relating to area and production of potatoes were merged in the category "Fruits and Vegetables". Hence, the importance and spread of the crop in

¹ Agriculture in Ancient India. Indian Council of Agricultural Research, New Delhi, 1964.

² Alu Ki Kheti (in Hindi). Joshi, Shankar Rao, 1955.

³ Commercial Products of India. Op. Cit.

various parts of the country cannot be documented prior to independence. Compared to 1949 the area under potatoes in India has increased nearly three-fold. Nevertheless, even now it accounts for less than 0.4% of the gross cropped area in the country. Since potato yields are quite high, relative to foodgrain yields, the share of this crop in the total volume of production is considerably larger 6.5% in 1975-76.

Table 1. Area, Production and Yield of Potatoes in India

Year	Area		Production (000 t)	Yield (t/ha)
	000 ha	% Total Cropland		
1949	205	0.18	1,285	6.3
1959-60	357	0.23	2,766	7.8
1965	431	0.28	3,668	8.5
1966	480	0.31	4,060	8.5
1967	473	0.30	3,522	7.4
1968	501	0.31	4,232	8.4
1969	524	0.33	4,726	9.0
1970	496	0.31	3,913	7.9
1971	482	0.31	4,807	10.0
1972	492	0.30	4,826	9.8
1973	505	0.31	4,451	8.8
1974	543	0.32	4,861	8.9
1975	587	0.36	6,225	10.6
1976	622	0.37	7,306	11.7
1977	620	0.36	7,171	11.6
1978	664	0.38	8,153	12.3
1979	790	n.a.	10,125	12.8

n.a. = Not available.

Source: Estimates of Area and Production of Principal Crops in India.

In respect to varying climatic conditions, the crop is grown (a) in summer under the relatively long day conditions of the northern hills; (b) during spring in the northern mid-elevation, low hills and north-western plains; (c) in autumn or winter under shorter day conditions on the plains; (d) in winter as well as rainy season in the plateau areas; and (e) in summer, autumn and winter in the southern hills. The crop is mostly rainfed in the hills and is almost entirely irrigated on the plains. While the crop season covers all twelve months of the year in one part of the country or the other, potato cultivation is more concentrated in the sub-tropical northern zone than on the warmer southern plains.

After the attainment of independence (1947) the administrative set up of the country was subject to several changes, and the boundaries of many states were revised. As a consequence, comparable serial data on potatoes are not readily available for various states before 1963. Table 2 shows the area under potato in various states since that time.

Of the total area under potatoes in 1977-78, the state of Uttar Pradesh accounted for nearly one-third and the states of Bihar and West Bengal roughly one-fifth each. The share of Assam, Madhya Pradesh and Punjab ranged from 3-5% and the share of other states was below 3%. All the southern states together accounted for only 3.5% of the total area under the crop.

Compared to 1963-64 the area under potato in 1977-78 was higher in all but five states (Andhra Pradesh, Assam, Maharashtra, Orissa and Tripura). The most significant decline was in Orissa where the area under the crop declined from 29,400 ha in 1963-64 to 6,600 ha in 1977-78.

Since 1963-64 the area under potatoes has increased by 92% in West Bengal, 75% in Uttar Pradesh, 73% in Bihar and 52% in Madhya Pradesh. The states of Haryana and Punjab were reorganized in 1966. Since then the area under potatoes has increased more than three-fold in Haryana and by one and a half times in Punjab. No studies of the reasons for increasing or declining production in the various states have been made to date.

The relative importance of potatoes in the agricultural economy of various states can be judged by the proportion of total cropped area under potatoes. Table 3, which presents figures for 1963-64, 1968-69 and 1975-76, indicates that potatoes have gained popularity in almost all the states. Assam, Orissa and Himachal Pradesh are the states with the most noticeable decline in the importance of the potato crop.

V. POTATO DEVELOPMENT PROGRAMMES

No special attention was devoted to potato development in India during the first two Five Year Plans (1951-52 to 1960-61). It was only towards the end of the Third Plan (1961-62 to 1965-66) that production and development of the potato was taken up in an organized manner. No detailed published accounts are available regarding the programme. However, it seems that the main motivating factor was chronic food shortage. The potato crop was considered to be particularly suited to Indian conditions and to enjoy a wide range of seasonal adaptability and flexibility in harvesting. Above all it produced more food per unit area and time than any other crop, and, therefore, was thought of as an answer to the food problems. The main constraint in extending potato cultivation was considered to be the non-availability of adequate quantity of healthy seeds and varieties suitable for the agro-climatic conditions of various parts of the country.¹ Main responsibility for varietal improvement was placed on the Central Potato Research Institute (CPRI). The Institute's programme covered not only development of improved potato varieties, but other aspects, such as production of nucleus disease-free seeds, determination of manurial requirements and control of diseases. A National Potato Seed Committee was appointed to

¹ Report of the National Commission on Agriculture. (Manager of Publications, Civil Lines, Delhi).

monitor seed production and to outline a production programme for breeder's foundation Stage I and Stage II and certified seeds by different organizations and states of the country. ¹

During the Fifth Plan the production strategy included motivational campaigns for increasing the area and potato yields. It included the use of healthy seeds and better irrigation, fertilizer use and plant protection measures.² No information is readily available regarding the implementing agency for this programme and its strategy of motivation. Since agriculture falls within the state sphere the programme is apparently being handled by the State Agriculture or Horticulture Departments through the Extension Staff. An evaluation study of the working of the Small and Marginal Farmers Development Agencies in the country conducted by the Planning Commission indicated that the extension machinery has not been able to play as efficient a role as was envisaged. This aspect, therefore, may merit investigation.

The main thrust of the potato development programme during the Sixth Five Year Plan, as presently envisaged, is to continue raising the area and crop yields. It is proposed to increase the area under the crop by 100,000 hectares during the plan period. The Central Agriculture Department's yield estimate of 116 quintals/ha (at the beginning of the Plan) is proposed to be raised to 125. On this basis it is planned to increase production by 1.2 million tons and attain a total production target of 3.5 million tons by the end of the plan period (1982-83).³ Special motivational campaigns will continue to be a major tool of the potato production strategy. Inferior, non-descript and poor yielding varieties are to be progressively replaced by superior high-yielding varieties, such as "Kufri Chandramukhi". Other measures to be adopted are better management practices, greater use of balanced fertilizers, intensification of plant protection measures, ensuring remunerative price to growers (especially prevention of price crashes) and enlarging cold storage capacity. There is no Central Sector Scheme for potato development.⁴ Therefore, measures adopted for implementing the above programme would need to be studied at the level of the state governments.

The Union Department of Agriculture, Horticulture Departments and the National Seeds Corporation (NSC) take responsibility for coordinating the seed production programme. The NSC, state certification agencies, seed corporations and agricultural universities assume special responsibility for multiplication and certification of seed. State governments are expected to continue the supply of seed, arrange credit facilities for seed and other inputs and step up production campaigns. A Potato Development Council has been constituted at the national level to guide the potato development programme.

¹ Problems and Progress of Potato Improvement in India, Mukhtar Singh (Prospects of Potato in the Developing World, International Potato Center, Lima, Peru).

² Agenda Notes for the First Meeting of the Indian Potato Development Council, June, 1978.

³ It may be mentioned that the production during the year 1978-79 has already exceeded this target.

⁴ Report of the National Commission on Agriculture, Op. Cit.

Table 2. Area Under Potato by States

State	1963-64		1968-69		1973-74		1977-78	
	000 ha	% Total						
Andhra Pradesh	1.1	0.26	0.6	0.11	0.5	0.09	0.3	0.05
Assam	36.2	8.72	39.8	7.59	28.8	5.30	33.3	5.01
Bihar	82.2	19.80	109.3	20.85	106.2	19.54	142.0	21.37
Gujarat	2.3	0.55	3.8	0.72	3.6	0.66	7.5	1.13
Haryana	-	-	4.3	0.82	8.1	1.49	9.9	1.49
Himachal Pradesh	12.6	3.04	16.0	3.05	14.7	2.71	13.7	2.06
Jammu & Kashmir	0.7	0.17	1.4	0.27	1.7	0.31	2.5	0.38
Karnataka	7.7	1.86	8.3	1.58	11.5	2.12	11.5	1.73
Madhya Pradesh	13.3	3.20	18.4	3.51	18.6	3.42	20.2	3.04
Maharashtra	14.9	3.59	12.6	2.40	13.1	2.41	10.9	1.64
Manipur	-	-	-	-	2.3	0.42	1.5	0.23
Meghalaya	-	-	-	-	16.9	3.11	17.6	2.65
Nagaland	-	-	-	-	3.5	0.64	3.7	0.56
Orissa	29.4	7.08	28.7	5.48	5.3	0.98	6.6	0.99
Punjab	16.1	3.88	11.0	2.10	23.1	4.25	27.0	4.06
Rajasthan	1.7	0.41	1.9	0.36	2.4	0.44	2.4	0.36
Tamil Nadu	6.4	1.54	12.6	2.40	12.3	2.26	11.8	1.78
Tripura	2.4	0.58	2.8	0.53	2.8	0.52	2.1	0.32
Uttar Pradesh	122.2	29.45	173.8	33.14	187.0	34.41	213.4	32.12
West Bengal	65.6	15.81	78.6	15.03	80.5	14.82	125.8	18.93
Delhi	0.2	0.06	0.3	0.06	0.3	0.06	0.2	0.03
Mizoram	-	-	-	-	0.2	0.04	0.5	0.07
INDIA	415.0	100.00	524.2	100.00	543.4	100.00	664.4	100.00

Source: Estimates of Area and Production of Principal Crops in India.

Table 3. Percent Total Cropland Under Potato

State	1963-64	1968-69	1973-74	1975-76
Andhra Pradesh	-	-	-	-
Assam	1.32	1.46	0.94	0.89
Bihar	0.74	1.00	0.99	1.26
Gujarat	0.02	0.04	0.03	0.05
Haryana	-	0.11	0.16	0.19
Himachal Pradesh	2.81	1.77	1.62	1.63
Jammu & Kashmir	0.08	0.16	0.19	0.23
Karnataka	0.07	0.08	0.11	0.11
Madhya Pradesh	0.07	0.09	0.09	0.10
Maharashtra	0.08	0.06	0.07	0.07
Manipur	-	-	3.27	3.16
Meghalaya	-	-	8.32	8.82
Nagaland	-	-	3.27	3.16
Orissa	0.41	0.36	0.07	0.09
Punjab	0.16	0.21	0.38	0.44
Rajasthan	0.01	0.01	0.01	0.01
Tamil Nadu	0.09	0.18	0.16	0.17
Tripura	0.89	n.a.	0.74	0.73
Uttar Pradesh	0.55	0.78	0.81	0.87
West Bengal	1.01	1.71	1.08	1.42
Delhi	0.17	0.30	0.27	0.33
Mizoram	-	-	0.28	0.29
INDIA	0.26	0.33	0.32	0.37

n.a. = Not available.

Source: Agricultural Statistics of India.

All India Coordinated Potato Improvement Project is at present in operation. In this project the CPRI with its Regional Centres/Stations and Agricultural Universities/Colleges or Research Stations of State Departments of Agriculture collaborate to implement the following programme of work:

1. Breeding and selection of improved potato varieties suited to different regions.
2. Research on cultural and fertilizer requirements of the improved varieties of potatoes in the different regions for the production of seed and ware potatoes.
3. Study of plant development under varying agro-climatic conditions.
4. Cropping patterns in relation to potato and their economies.
5. Survey of pests and diseases affecting potatoes in the field and stores in the different regions and evolving methods of controlling them.
6. Survey for the build up of aphid population in potato crop in the principal growing regions in the country, to locate the areas suitable for producing disease free stock.

It has not been possible to obtain full details of this project, its operation and accomplishments. However, an article of Dr. M. S. Swaminathan outlines the findings of a study under the All India Coordinated Agronomic Research Project of the Indian Council of Agricultural Research.¹ The study shows that in the North-Western Region a 3-crop sequence (maize-potato-potato and rice-potato-potato) had labour requirements of 396 and 450 man-days respectively. A 4-crop sequence (maize-potato-potato-green gram (moong)) had a labour requirement of 488 man-days in Ludhiana. This sequence yielded 59 quintals of grain and 384 quintals of potato per hectare. In the Northeastern Region, a 3-crop sequence (maize-potato-wheat) had the maximum labour requirement (341 man-days) among the various rotations tried. A 4-crop sequence (maize-potato-wheat-cowpea (fodder) and rice-potato-wheat-cowpea) increased the labour requirement to 411 and 465 man-days respectively. In the Eastern Region (rice-potato-rice) at Chiplima involved a labour requirement of 420 man-days.

These findings are of great significance in view of the prevailing high rates of unemployment and low income in India. An appraisal of the extent to which growers have started multiple cropping, and their consequent impact on incomes and employment would require careful analysis.

As a result of the development programme, there has been a steady increase both in potato area and yield since 1963-64. By 1977-78 the area had increased by 60% and production had increased three fold (from 2.6 million tons in 1963-64 to 8.2 million in 1977-78). As mentioned earlier, 1978-79 production is reported to be over 10 million tons. This increase is attributable in large part to yield improvements. Since 1963-64 yields almost doubled (from 6.2 t/ha to 12.3 in 1977-78).

¹ Potato has Great Potential in India. Swaminathan, M.S. (Agricultural Situation in India, December 1978).

The relative importance of states in national potato production had shifted since 1963-64 (Table 4). In 1963-64 Bihar was the top producing state (26.1%)¹ followed by Uttar Pradesh (21.6%), West Bengal (20.6%), Punjab (9.4%) and Madhya Pradesh (4.8%). By 1977-78 Uttar Pradesh had emerged as the biggest producing state (39.3%), followed by West Bengal (23.4%), Bihar (14.2%) and Punjab (7.1%); share of other states was less than 3%.

Yields vary widely between states (in 1977-78 from 1 t/ha in Andhra Pradesh to 23.9 in Gujarat). With few exceptions the states have recorded steady yield improvements since 1963-64.

VI. AGRARIAN STRUCTURE

Agrarian reform was one of the first tasks to which the Central and State Governments addressed themselves after independence. During the British regime many landlords (Zamindars) owned large stretches of land (at times complete villages), which were rented out in parcels to farmers. These landlords acted as agents of the British Government for purposes of collection of land revenue and had freedom in matters of land rental and rent fixing. Apart from the exploitation, which this system created, there was uncertainty in matters of tenancy rights, which, in turn, discouraged investments and land improvement and intensified agriculture. Another serious malady was sub-division and fragmentation of holdings under the prevailing laws of inheritance. Agriculture comes under the state sphere, and agrarian reform laws have been enacted by the states at different points of time. These probably have had some important impact on potato cultivation. It is understood that reports relating to Agricultural Census conducted in 1971 brought out by the State Governments contain an account of land reforms in the respective state.

The Agricultural Census report of the Government of Uttar Pradesh shows that after the abolition of the Zamindari system a new type of system has been introduced, giving security of tenure and ending exploitation by middlemen. Various types of tenancies in the state have been grouped into three classes of tenures having right or interest in land (Bhumidars, Sirdars and Asami). The interest of Bhumidars is heritable and transferable, while that of Sirdar or Asami is heritable but not transferable. In order to check creation of uneconomic holdings, a ban has been imposed on further sub-division of holdings having an area not exceeding 3,125 acres. To check the re-emergence of big landlords a ceiling was placed on the size of holdings by the Uttar Pradesh Imposition of Ceiling on Land Holdings Act, 1960, under which no holding can exceed 7.30 hectares of irrigated land.²

The above mentioned State Agricultural Census Reports contain valuable district level information regarding size and nature of holdings (irrigated or unirrigated, ownership or tenancy, etc.) for important crops. Unfortunately data relating to the potato have been merged in the broad category "Vegetables". Therefore, details for potato cultivation are not available in the published reports. However, the relevant details would be available in the department of the states concerned with the census. Such data for the State of Uttar Pradesh have been compiled (Table 5).

¹ Figures in brackets are percentages of national production.

² Report of Agricultural Census in Uttar Pradesh, 1971 (Government of Uttar Pradesh, Lucknow).

Table 4. Potato Production and Yields by State

State	1963-64		1968-69		1973-74		1977-78	
	Production (000 t)	Yield (t/ha)						
Andhra Pradesh	3.9	3.5	2.3	3.8	0.9	1.8	0.3	1.0
Assam	106.5	2.9	236.7	6.0	93.2	3.2	135.6	4.1
Bihar	678.8	8.3	1,117.1	10.2	840.2	7.9	1,153.5	8.1
Gujarat	28.7	12.5	81.8	21.5	89.6	24.9	179.2	23.9
Haryana	(a)	(a)	60.1	14.0	136.1	16.8	183.8	18.6
Himachal Pradesh	29.6(b)	2.4	71.8	4.5	72.6	4.9	72.4	5.3
Jammu & Kashmir	1.6	2.3	4.2	3.0	4.3	2.5	6.8	2.7
Karnataka	33.6	4.4	40.3	4.7	103.1	9.3	107.0	9.3
Madhya Pradesh	124.7	9.4	191.9	10.4	185.7	10.0	232.0	11.5
Maharashtra	69.3	4.6	53.9	4.3	56.3	4.3	50.2	4.6
Manipur	-	-	-	-	11.6	5.0	6.4	4.3
Meghalaya	-	-	-	-	74.2	4.4	80.8	4.6
Nagaland	-	-	-	-	14.0	4.0	20.0	5.4
Orissa	109.2	3.7	338.0	11.8	41.2	7.8	46.2	7.0
Punjab	245.1(b)	15.2(b)	133.0	12.1	316.6	13.7	580.0	21.5
Rajasthan	5.8	3.4	2.8	1.5	7.1	3.0	4.0	1.7
Tamil Nadu	44.9	7.0	97.9	7.8	105.3	8.6	153.8	13.0
Tripura	15.0	6.2	71.8	6.4	19.3	6.9	26.0	12.4
Uttar Pradesh	559.9	4.6	1,631.5	3.4	1,720.8	9.2	3,204.8	15.0
West Bengal	535.1	8.2	642.6	8.2	965.3	12.0	1,308.3	15.2
Delhi	1.6	8.0	1.8	6.0	2.5	8.3	1.8	9.0
Mizoram	-	-	-	-	1.2	6.0	0.3	6.0
INDIA	2,593.3	6.2	4,725.5	9.0	4,861.1	8.9	8,153.2	12.3

(a) Included in Punjab.

(b) Relates to area before reorganization of Punjab in 1966.

Source: Agricultural Statistics of India.

Table 5. Size Distribution and Irrigated Area of Holdings Under Potatoes in Uttar Pradesh in 1971

Size-Class (in hectares)	Total Number of Holdings		Holdings Under Potato					
	Number (000)	Area (000 ha)	Number (000)	% Distri- bution	Area		Total	
					Irrigated (000 ha)	Unirrigated (000 ha)	(000 ha)	(%)
Below 0.25	200.0	675.0	224.8	18.4	13.2	0.8	14.0	8.3
0.25 - 0.50	3,239.3	1,187.2	182.3	14.9	15.2	2.0	17.2	10.2
0.50 - 1.00	3,329.1	2,399.8	234.7	19.2	25.7	1.9	27.6	16.3
1.00 - 2.00	2,779.8	3,852.5	246.6	20.2	34.7	4.7	39.4	23.2
2.00 - 3.00	1,095	2,629.4	144.2	11.8	23.1	1.8	24.9	14.7
3.00 - 4.00	529.2	1,803.4	77.9	6.4	13.7	1.2	14.9	8.8
4.00 - 5.00	301.5	1,329.0	42.9	3.5	10.7	0.8	11.5	6.8
5.00 - 7.50	298.4	1,776.1	41.7	3.4	10.3	0.9	11.2	6.6
7.50 - 10.00	102.9	869.6	15.8	1.3	3.8	0.4	4.2	2.5
10.00 - 20.00	74.0	948.3	9.4	0.8	3.0	0.4	3.4	2.0
20.00 - 30.00	7.6	176.2	1.2	0.1	0.4	0.1	0.5	0.3
30.00 - 40.00	1.9	63.7	0.1	-	0.1	-	0.1	0.1
40.00 - 50.00	0.6	26.4	-	-	0.1	-	0.1	-
50.00 and above	0.7	68.0	0.1	-	0.2	-	0.2	0.1
Total	16,961.1	17,804.6	1,221.7	100.0	154.2	15.0	169.2	100.0

Source: Census Department, Government of Uttar Pradesh.

It is generally maintained that the potato is a rich farmers' crop. The data in Table 5 cast doubt on this view, at least in Uttar Pradesh, which accounts for nearly one-third of the area under the crop and approximately 40% of the total production in the country. More than half the state's potato growers in 1971 were marginal farmers with holdings of less than one hectare, and another one-fifth were small farmers with holdings of one to two hectares. These together accounted for over 70% of the farmers and nearly 60% of the area under potato in the state. If the situation of other states is similar to that of Uttar Pradesh, potato production is now largely in the hands of small and marginal farmers with a poor resource base, who can hardly afford the heavy investments required for inputs and withstand the shocks of frequent crashes in potato prices. If adequate measures are not taken, it may be difficult to sustain the tempo of production efforts or even maintain the existing level. Unfortunately, very few studies are readily available on the technologies employed by the various types of potato growers in different production zones on the use of credit and extension facilities. Such studies could help throw light on the intensity of input used and type of farming technology being adopted, and thereby may cast light on the issue of relatively low yield rates.

VII. MARKETING AND DISTRIBUTION

The prevailing marketing and distribution system seems to be the Achilles heel of potato development in India. From available information it appears that the potato programme has addressed itself mainly to technological aspects of cultivation, ignoring almost completely the economic aspects of distribution and utilization. It seems to have been presumed that the benefits of increased production would automatically flow to growers, consumers and society at large.

A nation-wide potato marketing survey was conducted in 1962-63 by the Directorate of Marketing and Inspection, Government of India. However, the report has not yet become available to the author. The report on a similar national survey conducted in 1956 is available,¹ as also a report on a State Government of Madras Survey (1967).² In addition a few research institutes and scholars have conducted small studies on a local basis.³

¹ Report on the Marketing of Potato in India. Directorate of Marketing and Inspection, Ministry of Food and Agriculture, Government of India (1956).

² Report on Marketing of Potato in Madras State. Sitaram, K. and Balasubramanian, S. (1967).

³ a) Agricultural Marketing in India and Abroad. Srivastava, R.S. (Vohra and Co., Publishers Private Ltd., Bombay, 1960).

b) Inter-Relationship Between Production, Prices and Marketable Surplus in Bihar. Shashtri, G. P. (Agricultural Situation in India, April 1963).

c) Principles and Practices of Marketing in India. Madoria, C. B. and Johri, R. L. (1968).

d) Marketing of Vegetables in Varanasi. Bhalerao, M. M. and Kalicharan (Agricultural Situation in India, April, 1967).

e) Marketing of Vegetables and Fruits in Varanasi City. Dwivedi, D. N. and Mishra, S. D. (Agricultural Situation in India, December, 1969).

f) Potato Cycles in Ahmedabad Market - A Harmonic Analysis. George, B. S. and Govindan, A. (Agricultural Situation in India, November, 1975).

The picture which emerges from the available literature is that the marketing system suffers from numerous defects, to the detriment of both growers and consumers. Assembly and distribution are largely in the hands of private traders. Only at some limited centres have institutional agencies been playing some role and their share is by and large very limited.

Since grower's holdings are small and scattered, and in view of the fact that large producing centres lie at a considerable distance from consuming markets, it is not possible for growers and consumers to arrange transactions directly. Two broad categories of potato wholesalers are reported to be functioning as the connecting link. The first set operates mainly in producing areas and is primarily engaged in buying potatoes from growers and arranging despatches to consuming centres. The other set operates in consuming areas and provides distribution to retail traders. The wholesalers have developed their own system of market intelligence. Merchants in the producing centres often visit production areas to get an idea of the expected crop, and they also keep in touch with merchants in the consuming markets and with fellow traders. Similarly, merchants in consuming markets keep in touch with producing areas by post, telegram or even telephone, regarding the state of the crop, arrivals and prices. Such market intelligence is not available to growers. The Union Department of Agriculture and some state governments have begun disseminating prices through their periodicals, and at times through radio. But the information is often late, imprecise and inaccurate. Hence it is of little use to growers and they are by and large at the mercy of private traders.

As far as is known, market surveys have not been carried out to ascertain the quantum of demand in various important consuming markets at different points in time. Nor do adequate arrangements exist for disseminating information on arrivals in such markets and prices by varieties and grades. Therefore, regulation or organizing of the flow of stocks to markets, and thereby ensuring some temporal or spatial equilibrium in prices, is not possible. The average Indian farmer has very low holding capacity. Many depend on village merchants for credit or input supplies and their crop is frequently pledged. Thus, they have no alternative to disposal of their crop soon after harvest, to pay off credit or meet their immediate needs. All these factors lead to glut conditions in producing centres and low prices during the peak marketing periods, while in distant consuming markets high prices rule due to scarcities. This is illustrated in the following wholesale price data for important producing and consuming markets. This pattern is not a peculiar feature of 1978-79, but occurs quite often.

Table 6. Monthly Wholesale Potato Prices in Selected Markets 1978-79
(Rs. per quintal)

	<u>Eastern India</u>		<u>Northern India</u>		<u>South India</u>
	Patna*	Calcutta**	Farrukhabad*	Delhi**	Mettupalayam*
<u>1978, end of month</u>					
September	90	125	100	95	98
October	110	130	120	100	109
November	130	95	70	105	100
December	60	70	36	50	104
<u>1979, end of month</u>					
January	60	53	26	50	104
February	45	50	35	48	118
March	50	45	14	38	96
April	40	50	30	40	104
May	40	90	24	48	122
June	65	95	35	70	133
July	80	93	65	80	156
August	75	90	60	70	133

Source: Directorate of Economics and Statistics, Government of India.

* Producing area.

** Consuming Center.

A. Storage Arrangements

Inadequate potato storage arrangements pose a major handicap in spreading the marketing period, regulating the flow of supply, preventing losses and ensuring stability of prices. Recent information on cold storage is not readily available, but must be secured from the Directorate of Marketing and Inspection, Government of India, and from state governments. Published data for 1975 show 1,608 cold storages with a total installed capacity of 2.0 million tons. Of these, 1,026 (64%) with a total capacity of 1.7 million tons (89%) were for potato.¹ Considering the total potato production of 6.2 million tons in 1974-75, the storage capacity was not adequate for even one-third of the total crop. Knowledgeable sources feel that the above figures relate to registered stores, some of which were not actually functioning. Moreover, many cold stores are utilized mainly for seed potatoes. Therefore, the actual capacity available for ware potatoes is far less. Besides capacity, another important aspect is the location of cold stores. It is understood that most cold stores are located in producing areas. Potatoes in India have to be moved from producing areas to distant consuming centres. Potatoes suffer from quick deterioration once taken out from cold stores, the shortage of

¹ Report on Price Policy for Potatoes for the 1976-77 Season, Agricultural Prices Commission, Government of India.

adequate arrangements for cold storage generally resulted in high losses. In addition, the absence of adequate cold storage facilities and the fact that most (80%) are in the private sector, is a major obstacle in the adoption of price support policy for potatoes.

To supplement cold storages, there seems to be a need for cheap cool stores near farms to obviate the necessity of immediate disposal of harvest by farmers at low prices and secure better prices by spreading out the marketing period. Such cool stores could also reduce losses which farmers incur in storage of their seed. According to a Report on Marketing of Potatoes in India (1956) losses in Uttar Pradesh, Bihar and West Bengal generally ranged from 50 to 65%, and sometimes were as high as 60-80%; in some cases the entire quantity stored was lost. It is generally held that seeds account for nearly 50% of the cost of cultivation. Hence, the importance of adequate seed storage is obvious.

B. Grading and Seed Certification

Another major lacuna which exists in the current marketing system is the absence of proper arrangements for grading and seed certification. As far as is known, there is no ISI standard for seed potatoes, and states have yet to make systematic arrangements for certification. Even where a certification system has been introduced it is generally by broad varieties and sizes. It is understood that no system exists to date for checking stored seed potatoes for viruses and other diseases, which makes purchase of seed quite hazardous for growers.

By and large, potatoes continue to be sold by lots in assembling markets with little or no regard paid to quality. This is a great disincentive for quality production. No comprehensive study has been made of losses suffered by growers due to sale of ungraded produce. However, a 1973 study of seed potato marketing in the Upper Simla area, Himachal Pradesh, shows that while growers received Rs. 256 per ton of ungraded seed potatoes, the value realized by wholesalers for the same lot, after grading was Rs. 650.¹ Besides loss to growers, the absence of grading by variety is a great handicap for developing a proper market intelligence system, since there is no certainty about the comparability of prices over time and place.

C. Marketing Charges

The available information indicates that most markets are unregulated with no control over the market practices. Since distribution trade is almost entirely in the hands of private traders, the chain of intermediaries between growers and consumers extracts heavy charges for their services. These factors lead to a considerable disparity between the price received by growers and that paid by the consumers. No recent data are available on the subject, but some idea of the share of middlemen can be inferred from Table 7.

¹ Marketing of Himachal's Seed Potato - A Study in Minimizing Transportation Cost and Augmenting Farmer's Share. Raghubanshi, C. S. and Tiwari, R. N. (Agro-Economic Research Centre, Himachal Pradesh University).

Table 7. Distribution of Consumer's Rupee Spent on Potatoes

Share	Northern Markets (a)			Southern Markets (b)		
	Cuttack	Jullunder	Calcutta	Tiruchirapalli	Coimbatore	Salem
Grower's Share	60.0	54.1	64.5	76.0	71.9	74.8
Wholesaler's Share	15.0	0.6	8.1	1.8	7.5	3.0
Retailer's Share	20.0	39.7	14.1	17.2	10.6	16.4
Other Charges*	5.0	5.6	13.3	5.0	10.0	5.8

* e.g., transport, packing, octroi and sales tax.

Source: (a) Report on Marketing of Potato in India (1956)
(b) Report on Marketing of Potato in Madras State (1967)

Due to time gap between the data of markets in the north (1956) and in the south (1967) there is no strict comparability. Nevertheless, the grower's share in South Indian markets was higher apparently because marketing was in the hands of Growers' Cooperative Society.

VIII. TRANSPORT AND HANDLING

There has been an awareness of produce losses from improper packing, handling and transportation, but until now almost no studies have been done in this area.

IX. PRICES

A. Price Data

A variety of price data is available. The Directorate of Economics and Statistics of the Department of Agriculture, Government of India, collects and publishes every year farm harvest potato prices for each state. In addition, it has collected week-end wholesale prices from several important potato markets in various states since 1950, and is publishing data for 12 markets. The Directorate also collects retail potato prices from nearly 15 consuming markets, but publishes them for only five important markets. While a separate publication is brought out on farm harvest prices, wholesale and retail prices are published in the Weekly Bulletin of Agricultural Prices. It is understood that all important potato growing states have regular arrangements for collecting wholesale and retail potato prices from important producing and consuming centres, and those are published in their periodicals. Arrangements for their collection and dissemination, however, need to be

examined. Due to the absence of proper specification of varieties and qualities, the reported prices may lack comparability both over space and time. There is also a considerable time lag before their release; and hence, they are not of much use from the point of view of market intelligence. Even the Agricultural Prices Commission, in a Report on Price Policy for Potatoes for the 1976-77 Season, observed that the data base on potato prices is rather inadequate and weak.

B. Price Policy

Till recently there has been no policy in regard to potato prices, either at the state or national level. Only in 1975-76 was the question of establishing a price policy for potatoes referred, for the first time, to the Agricultural Prices Commission. In its Report on Price Policy for Potatoes for the 1975-76 Season, the Commission did not favour potato price support, since it felt that adoption of such a scheme for a semi-perishable commodity would encounter numerous difficulties. The primary difficulty mentioned was the inadequacy of cold storages, and particularly the limited capacity in the hands of public sector organizations, which would have to operate a price support scheme. The Commission also felt that marketing costs (including storage and transport charges) would be so heavy that financial losses would be incurred. Consequently, a price support scheme, involving a commitment to buy all supplies offered at a given price, would be difficult to operate. For moderating price fluctuations it suggested open market purchase and sale by a public sector agency. The Commission also suggested that a programme should be drawn up for expansion of cold storage capacity, particularly in the public and the cooperative sectors, with emphasis on consuming areas. For improving transportation of potatoes it was suggested that railways should run potato specials, introduce Quick Transit Services and use specially designed (CA-type) wagons on a large scale.¹

In its 1976-77 Season the Agricultural Prices Commission maintained the same view about the price support scheme. However, in order to provide indirect support and moderating price fluctuations, it suggested purchases by the National Agricultural Cooperative Marketing Federation (NAFED) both for export and for domestic market release through cooperative retail outlets in major metropolitan areas. For increasing marketing efficiency it recommended that state governments give priority to regulation of markets. It also suggested that the Central Food Technological Research Institute should be requested to carry out a feasibility study for potato processing plants.²

Subsequent reports of the Commission have not been released, but its views on potato price supports are understood to have remained the same.

Among the state governments only the Himachal Pradesh Government is known to have adopted a price support policy, on an ad hoc basis in the 1972-73 season to provide some financial relief for potato growers due to

¹ Report on Price Policy for Potatoes for the 1975-76 Season, Agricultural Prices Commission, Government of India.

² Report on Price Policy for Potatoes for the 1976-77 Season, Agricultural Prices Commission, Government of India.

a sudden collapse in prices. The support price was not based on realistic cost data. In fact, as far as could be ascertained, no comprehensive scientific study of potato cultivation cost has been conducted in any state to date. There have, however, been some isolated studies. The Union Department of Agriculture has a scheme of cultivation cost studies for important crops, but so far potato has not come within its purview. With the concept of a "fair return" remaining vague, the extent of benefit received by growers by ad hoc entry of public agencies in times of market distress requires attention. Such a study seems especially necessary, since it appears that most potato growers are now small and marginal farmers with little capacity to absorb losses. Unless they can count on an assured market return for their produce it is doubtful that they can maintain interest in potato cultivation. A report on potato marketing in Madras State (1967) mentions the successful working of a "Price Guarantee Scheme" operated by the Nilgiri Potato Growers' Cooperative Marketing Society, under which members are guaranteed at the outset of the season a reasonable price for their potatoes. In case potatoes are sold at a lower price the society provides compensation from a price fluctuation fund created for the purpose. On the other hand if higher prices are obtained, the excess is paid to the members.¹

X. UTILIZATION

The basis for estimates of potato utilization is not entirely clear. The Directorate of Marketing and Inspection estimates that nearly 17% of the total annual supply is used as seed and 11% is wasted in storage and handling. But the accuracy of their estimate is not proven. After making adjustments for imports and exports the resultant figure is divided by the estimated population of the country to arrive at the estimate of per capita consumption. The Directorate of Marketing and Inspection and other informed sources maintain that there is little or no use of potatoes for animal feed in the country.

One basic impetus to the potato development programme in the country was the belief that it could help resolve the food problem. Therefore, trends in potato consumption are of great interest. Since the available consumption figures, explained above, are based on only assumptions, they may not be reliable indicators of the correct position. Survey data on consumption patterns are available from the Labour Bureau of the Union Ministry of Labour and Employment, for industrial and rural working families and from the Central Statistical Organization, Government of India, for middle income group. During the course of the present preliminary study the Labour Bureau data for industrial working class were examined.² This scrutiny revealed that potatoes continue to be used mainly as a side dish, as the most important vegetable. A quick compilation of data on the proportion of families consuming potatoes and per capita consumption levels among industrial working families in 1958-59 and 1970-71 was done. (Table 8). These figures indicated that, for India as a whole, there was a fair increase in per capita consumption between 1958-59 and 1970-71. The data show that per capita consumption of potato was highest in northern states (Bihar, Delhi, Haryana, Punjab and Uttar Pradesh), ranging from 1.2 to 1.9 kg per month. On the other hand, it was the lowest

¹ Report on Marketing of Potato in Madras State. Op. Cit.

² Reports on Family Living Surveys of Industrial Working Class Families in 50 Centres in 1958-59 and 60 Centres in 1970-71, Labour Bureau, Ministry of Labour and Employment, Government of India, Simla.

Table 8. Potato Consumption in Working Class Families 1958-59 and 1970-71

Consuming Centre	State	Percent Families Reporting Consumption		Average Per Capita Monthly Consumption (kg)		
		1958-59	1970-71	1958-59	1970-71	% Change
Rangapara	Assam	98.1	92.9	1.02	0.64	- 37.3
Hyderabad	Andhra Pradesh	72.2	72.1	0.26	0.38	+ 46.2
Jamshedpur	Bihar	95.0	97.4	1.39	1.73	+ 24.5
Delhi	Delhi	93.0	93.9	1.23	1.58	+ 28.5
Ahmedabad	Gujarat	88.0	89.2	0.73	0.91	+ 24.7
Yamunanagar	Haryana	92.9	95.3	0.97	1.27	+ 30.9
Srinagar	Jammu & Kashmir	71.2	80.5	0.48	0.46	- 4.2
Bangalore	Karnataka	95.7	82.3	0.42	0.47	+ 11.9
Indore	Madhya Pradesh	90.2	94.4	0.42	0.56	+ 33.3
Bombay	Maharashtra	64.5	74.2	0.60	0.63	+ 5.0
Barbil	Orissa	72.5	69.2	0.55	1.84	+234.5
Amritsar	Punjab	90.9	89.6	0.76	1.20	+ 57.9
Jaipur	Rajasthan	94.6	91.9	0.50	0.72	+ 44.0
Mundakayam	Kerala	87.4	82.4	0.26	0.34	+ 30.8
Madras	Tamil Nadu	88.1	88.7	0.38	0.33	- 13.2
Kanpur	Uttar Pradesh	94.7	97.1	1.29	1.88	+ 45.7
Calcutta	West Bengal	82.7	81.1	1.86	1.38	- 25.8

Source: Labour Bureau, Ministry of Labour and Employment.

in southern states (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) ranging from 0.3 to 0.5 kg per month. It seems likely that easy availability of potatoes at relatively lower price in the northern states, which account for the bulk of production, leads to higher consumption. However, no study of relative price changes for potatoes and other main food items are readily available.

A survey of the export potential for potatoes conducted by the Indian Institute of Foreign Trade¹ over a decade back indicated good export prospects for both seed and table potatoes. However, this potential had not been realized.

Table 9. Indian Potato Exports (quantity in metric tons, value in thousand Rupees)

Year*	Seed Potatoes		Ware Potatoes		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
1957	1,766	1,031	437	1,233	2,203	2,264
1962	6,817	3,548	235	100	7,052	3,648
1967	11	20	910	553	921	573
1972	120	107	2,977	1,792	3,097	1,899
1973	15	12	3,149	2,087	3,164	2,099
1974	28	33	3,785	2,356	3,813	2,389
1975	800	1,412	9,356	6,867	10,156	8,279
1976	44	110	29,828	34,817	29,872	34,927
1977	181	382	44,671	58,515	44,852	58,897
1978	116	333	105	138	221	471

* From 1962 onwards financial year ending March.

Source: Monthly Statistics of Foreign Trade of India.

Wide fluctuations in exports from year to year (Table 9) reflect the absence of any firm policy or determined efforts to export potatoes. The sharp fall in exports in 1977-78 was due to the imposition of a ban on exports on account of high prices in the internal market. This ban was relaxed in October 1978 and completely lifted in February 1979. India is geographically well placed to meet the demand for ware potatoes in the Middle-East and for seed potatoes in South-East Asian countries. But so far as ware potatoes are concerned, it is understood that until present no proper study has been made of consumer preferences and requirements. Other constraints to exportation seem to be inadequate production of the required varieties, inadequate storage facilities at producing centres and especially at ports and absence of refrigerated wagons and ships for transportation.

A suggestion very often made, particularly in years of good production when prices are depressed, is utilization of excess potatoes for processing. Considering the high cost of processed potato products and the very low

¹ Survey of India's Export Potential of Fresh and Processed Fruits and Vegetables (1968), Indian Institute of Foreign Trade, Nehru Place, New Delhi.

income of the Indian population, the proposal hardly seems to be feasible so far as the domestic food market is concerned. As for production of such products as starch and alcohol, potatoes are far too costly to compete with other sources, such as maize and sugarcane. Available information indicates that even the existing potato processing units are much under-utilized and facing difficulty in marketing their products. Informed sources maintain that not more than two thousand tons of potatoes are processed annually for India. As for the export of processed potatoes, the feasibility needs to be examined in the light of consumers' requirements and the ability of Indian plants to compete with the sophisticated plants of other countries. In addition, a processing industry can hardly be viable if it operates only in years of glut, as often envisaged. Production of potatoes would need to be planned to ensure a regular supply of desired varieties and qualities to the processing centres.