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DEMAND FOR POTATO IN KARNATAKA: POLICY ALTERNATIVES*

Potato is one of the important vegetables occupying nearly 11 per cent of the total area under vegetables in Karnataka State.[1] From 1955-56 to 1973-74, production of potato in the State increased by 3.9 per cent (compound) per year more on account of growth in area (3.2 per cent) than in productivity (0.7 per cent).[2] With rise in incomes and population in the State, the demand for potato is expected to increase in the coming years. Further, since the per hectare food value (calorie-protein) of potato is very high,[3] it can widen the food supply base and thus can reduce the excessive dependence on too few crops for subsistence. For these reasons, it is essential to frame policies and pursue programmes for larger production of potato in the State in the coming years. To formulate suitable production and distribution policy, information on not only the level of current but also future consumption of potato is necessary.

This study is an attempt to (*i*) estimate the income elasticity of demand for potato in Karnataka, (*ii*) project the demand for potato in the terminal years of Sixth (1983) and Seventh (1988) Five Year Plans of the State, (*iii*) project the supply through domestic production during 1983 and 1988, (*iv*) determine the order of surpluses or deficits and (*v*) discuss policy alternatives to manage the surpluses or deficits.

The data for the study are obtained from the original rural and urban household schedules of the 25th Round (1970-71) of the National Sample Survey of Karnataka. The sample included 509 households (105 cultivators, 67 wage earning and 337 urban) from all over the State.[4]

METHODOLOGY

The per capita quantity consumed of potato is estimated by dividing the household potato consumption by the size of family. The size of the family is expressed in adult units by a weighting system in which children are given half the weights of adults.

The income elasticity of demand is obtained direct from best fitting[5] log-linear demand curves by regressing the per capita quantity consumed of

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1. Government of Karnataka, Department of Horticulture, Bangalore, 1975-76.
2. The fitted growth equations are of the type $P = AB^t$ where P = area/production/productivity, (B — 1) = rate of growth and t = time in years. The fitted equations are $P_a = (5888 \cdot 43)\ (1 \cdot 032)^t$, $P_n = (27542 \cdot 28)\ (1 \cdot 039)^t$, and $P_y = (4570 \cdot 88)\ (1 \cdot 007)^t$ where P_a = area, P_n = production and P_y = productivity.
3. M. S. Swaminathan, "Potato has Great Potential in India", *Agricultural Situation in India*, Vol. XXXIII, No. 9, December 1978, p. 583.
4. For details, see Mruthyunjaya, K. V. Subrahmanyam and V. R. Srinivasan: An Economic Analysis of Demand for Vegetables in Karnataka, *op. cit.*
5. Linear, log-linear, hyperbolic, log-inverse and semi-log functional forms are tried.

potato with the per capita total consumption expenditure of the households in the sample.

Demand projections are based on estimated income (expenditure) elasticity, per capita income and user population[6] in the projected years. The estimated compound rate of growth of per capita income is 1.9 per cent.[7] Based on this rate of growth, the per capita income during 1983 and 1988 would be Rs. 383 and Rs. 421 respectively. However, if a 7 per cent growth rate for the State is assumed,[8] the per capita income would be Rs. 1,432 and Rs. 2,008 in 1983 and 1988 respectively. Based on the past growth rate of population,[9] the population in 1983 and 1988 is estimated. Taking the user population in 1970-71 and its rate of growth (assumed to be equal to the rate of growth of urban population), the user population in 1983 and 1988 is determined. Population estimates which take care of health and family welfare programmes, education, etc., are also available from the State Planning Department for these years and we felt that their estimates may also be made use of. Our estimates based on historical figures will be called hereafter as case I and that of the State Planning Department as case II. The user population under case I and case II for 1983 and 1988 would be:

(thousand)

	1983	1988
Case I	9,416	11,283
Case II	9,028	10,386

For projecting the per capita demand, we have made use of the NCAER[10] model. The model was of the type:

$Q_t = Q_0 \left(1 + \frac{Y_t - Y_0}{Y_0}\right)^n$ where Q_t = per capita quantity demanded in the projected year (t), Q_0 = per capita quantity consumed in the base year (0), Y_t = per capita income in the projected year (t), Y_0 = per capita income in the base year (0), and n = income elasticity of demand. The current (1971) level of consumption of potato is estimated by multiplying the average per capita consumption of 1971 with the user population in 1971. Taking the nature of potato into account, the demand for non-human consumption is also estimated as a certain percentage (34 per cent) of the gross production.[11]

6. In this study, we have confined our analysis to only users of potato though we are aware that such a procedure may not be fully appropriate. Zero observations on the dependent variable (no consumption of potato) posed estimation problems.

7. The fitted equation for the period 1956-57 to 1975-76 is $P = (22 \cdot 5)\ (1 \cdot 019)^t$.

8. Government of Karnataka: Draft Five Year Plan, 1978-83, Planning Department, Bangalore, 1978.

9. The fitted equation for the period 1956-1971 is $P = (21 \cdot 33)\ (1 \cdot 021)^t$.

10. National Council of Applied Economic Research: Long-Term Projections of Demand and Supply of Selected Agricultural Commodities, 1960-61 to 1975-76, New Delhi, 1962.

11. It consists of 16·5 per cent for seed, 17 per cent for wastage and 0·5 per cent for processing/industrial uses.

The supply of potato is predicted on the basis of historical growth rates obtained from production figures of the past years.[12] Using the estimated compound growth rate, the base year (1955-56) production is 'puffed up' for the years 1983 and 1988. Visualising distortions in such supply estimates on account of influences of supply factors such as extent of land reclamation, scope for multiple cropping, government policies, etc., we have revised our estimates of supply as follows:

(*a*) High supply (projection I): Here the estimated historical production growth rates are blown up by 50 per cent for 1983 and by 75 per cent for 1988.

(*b*) Moderate supply (projection II): Here the estimated historical production growth rates are blown up by 25 per cent for 1983 and by 50 per cent for 1988.

(*c*) Low supply (projection III): Here the estimated historical production growth rates are themselves assumed to indicate low supply behaviour.

RESULTS AND DISCUSSIONS

(*i*) *Per capita consumption of potato:* According to the estimates, the per capita consumption of potato in Karnataka came to 5.10 kg per year during 1971.

(*ii*) *Income elasticity of demand for potato:* The estimated income elasticity of demand equation is as follows:

$$\log C = -1.41 + 0.5442^{**} \log X$$

($N = 509$, 't' value $= 10.58$, $r^2 = 0.4254$, **at 1 per cent level of significance), where C = per capita consumption of potato in kilogram during a month and X = per capita consumption expenditure in rupees during a month. The income elasticity of demand for potato is 0.5442.

(*iii*) *Demand projection:* (*a*) *Direct:* Based on the assumptions indicated earlier in respect of case I and II, the demand for direct (fresh) consumption of potato is arrived at as follows:

(*thousand tonnes*)

	1983	1988
Case I	63	80
Case II	124	172

(*b*) *Indirect:* Keeping 34 per cent of the production for demand like seed,[13] wastage and processing and assuming that this demand will grow at

12. The production data are obtained from Government of Karnataka: Area, Production and Productivity of Principal Crops in Karnataka, 1955-56 to 1973-74, Bureau of Economics and Statistics, Bangalore. Footnote 2 gives the supply equation.

13. If the seed potato is obtained from outside the State, then the indirect demand will be less by 16·5 per cent. Since it is planned to produce the seed in the State itself with the establishment of Central Potato Research Institute sub-station in Bangalore shortly, the need for correction may not arise.

a rate (simple) of 0.2 per cent per year in the projected periods, the indirect demand is estimated as follows:

(*tonnes*)

	Projection I	Projection II	Projection III
1983	34,571	26,716	20,540
1988	63,867	47,119	25,510

(*c*) *Aggregate:* Combining the direct and indirect estimates of demand, the aggregate demand is obtained and given below.

(*thousand tonnes*)

	1983			1988		
	Projection I	Projection II	Projection III	Projection I	Projection II	Projection III
Case I	98	90	84	144	127	105
Case II	159	151	145	236	219	198

(*iv*) *Demand-supply balances:* The gap between demand and supply under alternative conditions is measured and the situation under unfavourable (Situation I) and favourable (Situation II) conditions is appraised as follows.

(*thousand tonnes*)

	1983	1988
Situation I	(—)100	(—)165
Situation II	(+) 15	(+) 73

Note:—1. (—) Indicates deficit. (+) Indicates surplus.
2. Situation I refers to matching the lowest magnitude of supply with the highest estimate of demand. Situation II refers to matching the highest magnitude of supply with the lowest estimate of demand.

(*v*) *Policy alternatives:* The alternative situations in regard to the deficit of potato suggested that by 1983, the State would face a huge deficit of 100 thousand tonnes under situation I. Similarly during 1988, the deficits would be of the order of 165 thousand tonnes under situation II. Meeting such huge deficit through imports may not be feasible. Therefore, the deficits have to be met mainly from increase in the local production, on the one hand, and reduction in wastage, on the other. To meet the deficits only through increase in local production, the growth rates in production should be very high. Some alternatives to achieve higher growth rate in production are discussed below.

I. Increasing Local Production

(*a*) *Expansion of area:* If we look at the past for indications, nearly 80 per cent of the growth in production was from area expansion and the rest was from productivity increase. We feel that henceforth, it may be difficult to increase the area under potato as factors like durability, higher and stable prices, better marketing facilities, better technology may continue to attract more area under cereals, notwithstanding the fact that potato has higher food values per hectare than cereals. A policy of shift of area from cereals to potato under such circumstances may not be appreciated since in the traditional diet, the requirement of cereals is far more than the requirement of potato which is considered as a vegetable. Therefore, till such time when potato will also be considered as a cereal subsuitute, a meaningful solution must be thought of largely in terms of increasing gross cropped area by intensive cultivation. This could be possible if attempts can be made to fit the cultivation of potato into an intensive crop rotation in the major producing areas in Karnataka. Patil[14] proposed a cropping pattern of either potato-*ragi-ragi* or potato-*ragi*-groundnut under irrigated conditions for Hassan, Arkalgud and Holenarasipur taluks of Hassan district and the whole of Mysore district. Similarly, he proposed a cropping pattern of potato-*ragi* or potato-potato or hybrid maize-potato-groundnut under irrigated conditions and potato-*ragi* under dry conditions for Tumkur, Kunigal and Kortagere taluks of Tumkur district and for the whole of Bangalore and Kolar districts.

(*b*) *Elevating productivity:* The yield of potato in Karnataka is not only low (4 to 5 tonnes/ha.) but also highly variable. Chandrakanth[15] observed that the coefficient of variation of potato yields was of the order of 33 to 47 per cent in Hassan where it is largely grown as a rainfed crop. Large areas under rainfed conditions (nearly 80 per cent during 1972-73)[16] may be one of the reasons for low and unstable yields in the State. In view of the existence of a lot of untapped groundwater potential in Hassan and Chickmagalur districts (95 and 96 per cent[17] respectively), efforts may be made to tap this potential and make it available to grow profitable crops like potato. Irrigation facilities, it is hoped, will raise the current productivity in these districts (2,585 kg./ha.) to a level attained by irrigated districts like Bangalore and Kolar (8924 kg./ha.), besides stabilising yields. If all the recommended practices[18] are followed, besides irrigation, it is said that an yield of 15-20 tonnes/ha. is possible.

14. N. P. Patil, "Cropping Patterns in Mysore State", in Proceedings of the Symposium on Cropping Patterns in India, Indian Council of Agricultural Research, New Delhi, 1972, pp. 390-401.

15. M. G. Chandrakanth: A Feasibility Study of Crop Insurance for Potato in Hassan Taluk of Karnataka State, M.Sc. Thesis, University of Agricultural Sciences, Bangalore, 1976 (unpublished).

16. Government of Karnataka: Combined Annual Season and Crop Report, 1969 to 1973, Bureau of Economics and Statistics, Bangalore.

17. Government of Karnataka: Achievements in Minor Irrigation in Karnataka State for Two Decades (1956-57 to 1976-77), Minor Irrigation and Public Health Engineering, Bangalore, 1977.

18. University of Agricultural Sciences: Cultivation Practices for Vegetables, Bangalore, 1978.

(*c*) *Supply of good quality, disease free seeds:* In Karnataka, the potato farmers do not get good quality disease free seeds at right time. The farmers now get the seeds through National Seeds Corporation and other private agencies who procure them from Simla and other places. Sometimes, seed potatoes are cold stored and distributed. The farmers may be relieved of this problem if the proposed sub-station of the Central Potato Research Institute, Simla comes up in Bangalore and takes up seeds production and distribution.

(*d*) *Price stabilisation:* The wide fluctuation in potato prices is yet another factor to reckon with. Srivastava and Hari Kishore[19] pointed out wide fluctuations in potato prices from year to year, pronounced disparities in seasonal prices and almost complete dependence of potato growers on the mercy of middlemen. In one of our own studies,[20] the coefficient of variation of weekly prices of potato in Bangalore market was found to be about 20 per cent (January through December 1977). The study further indicated that the share of potato in the total quantities stored in cold stores in Bangalore city was around 9 per cent during 1975-77 and only 3 per cent during 1977-78. Poor economic position of farmers and fear over post-storage prices are said to be the main reasons for not storing much of the potatoes. For this, provision should be made for advancing loans either on pledge of produce in cold stores or on pledge of store receipts with the financial institutions. Since it would be difficult for individual producers to store and sell their produce when favourable prices prevail, these activities can be undertaken by the co-operatives.

II. Minimizing Loss in Storage and Wastage

In our study cited above, we found the spoilage in cold stores around 10 per cent though in some cases it was over 80 per cent. Minimizing such losses will go a long way in increasing the net availability of potatoes in future.

It is hoped that these suggestions will be considered while implementing the integrated plan for horticulture[21] and the Indo-Bulgarian Project[22] in Karnataka. It should be noted that such huge production required to be produced in future needs enormous facilities for handling, transportation and marketing which are quite inadequate even at the moment. A plan to develop such facilities should go hand in hand with efforts to increase production as otherwise the benefits of growth cannot be well distributed and will thus go waste.

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19. B. N. Srivastava and Hari Kishore, "Some Economic Aspects of Potato Production and Utilisation in India", *Seeds and Farms*, Vol. 5, No. 10, October 1979, pp. 27-32.

20. V. Mohandoss, Mruthyunjaya and K. V. Subrahmanyam: A Study of Fruits and Vegetables' Cold Stores Units in Bangalore City, Department Paper No. 3, Indian Institute of Horticultural Research, Bangalore, 1979.

21. Government of Karnataka: Project for Integrated Development of Horticulture in Karnataka (India), Planning Department, Bangalore, 1977.

22. Indian Institute of Horticultural Research: Rural Agro-Industrial Complex of Karnataka, Bangalore, 1976.

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