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Prospects of Fruit and Vegetable Processing in Rajasthan

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ABSTRACT: *Rajasthan is rich in raw material for agro-processing industries. Production of fruits and vegetables in Rajasthan was 676 million tonnes and 800 million tonnes respectively in 2009-10. In the decade 1990-2000, the area under fruits grew at the rate of 2.21 per cent, production at 4.37 per cent and productivity at 1.98 per cent. However, during the decade 2001-2010, the ACGRs of fruits jumped to 2.97, 5.49 and 2.32 per cent per annum for area, production and productively respectively. The similar trend was observed in case of vegetables too. In rural and urban area in 2004-05, the income elasticity of demand for fruits was 1.65 and 1.24 percent respectively indicating elastic demand in both areas. It shows that fruit consumption increased by 1.65 percent in rural areas and by 1.24 percent in urban regions due to one per cent increase in income. In the case of vegetables, the income elasticity of demand was 0.51 in rural areas and 0.57 in urban areas indicating relatively inelastic demand in both areas. The income elasticity of demand for fruits has increased over the years and reached 1.79 in rural and 1.68 in urban areas in 2009-10 (66th round). As regards vegetables, there has not been much increase in income elasticities (0.62 in rural and 0.68 in urban regions) during this period.*

INTRODUCTION

Rajasthan has geographical area of 3.42 lakhs sq km. It has attained the status of being the largest state of India. The state represents 10.4% land surface area with 6% population of India. Almost 66% population is dependent on agricultural for their livelihood. The diverse agro-ecological conditions prevailing in State is amenable for growing fruits, vegetables, spices, flowers, root and tuber crops, medicinal and aromatic crops. Out of the net cultivated area of about 165 lakh ha in Rajasthan, horticultural crops are grown in an area of about 10 lakh hectares with an annual production of about 14 lakh MT. Rajasthan has favorable climate for production of quality seed spices, Ber, Mandarin, Kinnow, Pomegranate, Aonla, kharif Onion and Pea. Marketing, processing, production, farm supplies, research, extension, government policies and programs are important areas for agri-business. The focus in this paper is on status and growth in processing of fruit and vegetable. Processing refers to deliberate activity, which changes a commodity into a more useable form with value addition. Among the agro- processing industries, food processing is the dominant one. Processed food products can be classified into major product groups such as cereal products, fruit and vegetables, dairy, meat, and marine products. Due to diverse agro-climatic conditions, Rajasthan is rich in raw material for agro-processing industries. Production of fruit and vegetable in Rajasthan is 676 million tonnes and 800 million tonnes in 2009-10 respectively. Due to lack of post-harvest handling and processing facilities, nearly 30 percent of fruit and vegetables are lost or damaged. Fruit and vegetables are highly perishable in nature, and processing assumes paramount importance for exploiting the economic potential by creating time, form and space utilities. The demand for processed fruit and vegetable products is bound to rise with increased real income and improvement in the standard of living, modern life style, urbanization and contribution of women to household income. Keeping in view the above facts, this paper explores the consumption pattern of fruit and vegetables in Rajasthan using NSSO data and potential of growth for the fruit and vegetable processing industry.

METHODOLOGY

Data on area and production of fruits and vegetables, number of processing units, installed capacity,

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capacity utilization and related parameters were collected from published sources i.e. Annual Reports of the Ministry of Food Processing Industry, Government of India; Directorate of Economics and Statistics, Rajasthan, Economic Survey of India, etc. To study the consumption pattern of fruit and vegetables, data on Monthly Per Capita Expenditure was collected from National Sample Survey Organization (NSSO). To determine changes in demand for fruit and vegetable products, the income elasticity of demand was calculated. The following formula was used to work out income elasticity;

$Y = aX^{b}*Ui$

Log Y = Log a + b Log X +Log Ui

Where:

Y = consumption expenditure on fruit /vegetable products (in rupees)

X = total consumption expenditure on all food and nonfood products (in rupees)

b = regression coefficient (income elasticity)

To determine growth rates (ACGR), the following exponential function was used

$Y = ab^{t}*Ut$

Log Y = Log a + t Log b+ Log Ut

Where,

Y = Area/Production of fruits and vegetables,

a = Constant,

b = Regression coefficient,

t = Time

Compound growth rate = (Anti log b – 1)*100

RESULTS AND DISCUSSION

Potential of Horticultural Crops in Rajasthan

Rajasthan with its huge geographical area and diverse agro-climatic conditions favors growing of large number of horticultural crops like fruits vegetable, spices, flowers and medicinal & aromatic plants. The State is one of the biggest producer of Coriander, Cumin, Fenugreek, Isabagol and Mehndi in the country. The state also produces variety of other horticultural crops like Oranges, Kinnow, Lime, Aonla, Chillies, Garlic, Ajowain, Suwa, Onion, Tomato, Pea, Cucurbitaceous vegetable and Medicinal & Aromatic Crops like Sonamukhi and Ashwangdha providing surplus produce for processing and export. The climatic conditions of Rajasthan allow growing various types of seed spices. Rajasthan is having prominent position in production of seed spices in the country. The contribution of State to national production of horticultural crops is as under; 66.51% of Coriander, 33% of Cumin, 82% of its Fenugreek, 14% of Garlic, 6% of Fennel, 100% Psyllium Husk (Isabgol), 100% of Mehndi, 100% of Ajwain, 7% of Mandarin, producing export quality Kinnow and is one of the largest producers of Aonla. Rajasthan offers excellent horticultural development potential inspite of several biophysical as well as developmental constraints. The endeavors over the past decade for planned and systematic development of horticulture in the state have now started yielding results. This is a beginning and the huge untapped potentials are yet to be utilized for the betterment of state. The varied agro climatic conditions of the State favor growing of a large number of crops. This diversity in climatic conditions creates scope to develop following belts of horticultural crops in the State; Mandarin in Warm humid areas of Jhalawar, Kinnow in Dry and cool climate of Ganganagar and Hanumangarh, Pomegranate in arid irrigated parts of State, Ber in Western parts of the State, Aonla in Central semi arid parts, Papaya in Central parts of the state, Mango in Southern humid parts, Cumin in Barmer, Jalore, Pali, Jodhpur, Nagaur, Coriander in Kota, Baran, Jhalawar, Bundi, Chittorgarh, Fennel in Sirohi, Tonk, Garlic in Jodhpur, Chittorgarh, Baran, Jhalawar, Kota, Isabgol in Barmer, Jalore and Mehandi in Pali.

Important horticultural crops in the State are given in Table 1. The area under horticultural crops increased from 9.39 lakh ha in 2007-08 to 7.86 lakh ha in 2010-11 and production of horticultural crops increased from 20.42 lakh tonnes to 22.48 lakh tonnes.

Growth Rates: Compound growth rates in area, production and productivity of fruit and vegetable in Rajasthan state have been presented in Table 2. The table reveals that in the decade 1990-2000, the area under fruits grew at the rate of 2.21 per cent, production at 4.37 per cent and productivity at 1.98 per cent. However, during the decade 2001-2010, the ACGRs of fruits jumped to 2.97, 5.49 and 2.32 per cent per annum for area, production and productively respectively. The similar trend was observed in case of vegetables too.

State-level Patterns of Food Consumption: The changes in the monthly per capita expenditure on high value food products (milk and milk products, meat, eggs & fish, and fruits and vegetables) over three time periods (2001-02, 2007-08 and 2010-11) in

Table 1
Area and Production of different Horticultural Crops in Rajasthan

(Area in lakh ha & Prod. lakh tonnes)

Croup group	*2007-08*		*2008-09*		*2009-10*		*2010-11*	
	Area	*Production*	*Area*	*Production*	*Area*	*Production*	*Area*	*Production*
Fruits	0.28	5.62	0.3	5.95	0.71	6.32	0.74	6.83
Vegetable	1.43	8.53	1.25	7.37	1.33	7.98	1.46	8.49
Spices	5.67	5.29	5.37	5.36	2.46	4.01	2.94	5.35
Flower	0.03	0.04	0.03	0.04	0.03	0.04	0.05	0.09
Medicinal & Aromatic plant	1.98	0.94	2.26	1.06	2.67	1.6	2.67	1.72
Total	9.39	20.42	9.21	19.78	6.87	19.95	7.86	22.48

Source: Indian Horticulture Database 2012, National Horticulture Board

Table 2
ACGRs of fruit and vegetables in Rajasthan over time (per cent/annum)

	Area		*Production*		*Productivity*	
Year	*Fruit*	*Vegetable*	*Fruit*	*Vegetable*	*Fruit*	*Vegetable*
1990-2000	2.21	4.01	4.37	5.38	1.98	0.87
2001-2010	2.97	4.47	5.49	6.00	2.32	1.29

rural and urban areas in state was worked out and the same are presented in Table 3. The share of expenditure on fruits and vegetables has increased in the State between 2001-02 and 2010-11 in rural and urban areas. It was 8.5 per cent in rural areas in 2001-02 and it increased to 16.3 per cent in 2010-11. In case of urban areas, it was 13.2 per cent in 2001-02 and it increased to 16.3 per cent in 2010-11. The per cent share of expenditure on cereals has gone down and for non-food items, it has gone up.

Income elasticity: The income elasticity of demand for fruits and vegetables has been computed for the rural and urban areas for 2004-05 (61st round) and 2009-10 (66th round) based on the data collected from NSSO rounds (Table 4). In rural and urban area in 2004-05, the income elasticity of demand for fruits was 1.65 and 1.24 percent respectively indicating elastic demand in both areas. It shows that fruit consumption increased by 1.65 percent in rural areas and by 1.24 percent in urban regions due to one per cent increase in income. In the case of vegetables, the income elasticity of demand was 0.51 in rural areas and 0.57 in urban areas indicating relatively inelastic demand in both areas in 2004-05. The income elasticity of demand for fruits has increased over the years and reached 1.79 in rural and 1.68 in urban areas in 2009-10 (66th round). As regards vegetables, there has not been much increase in income elasticities (0.62 in rural and 0.68 in urban regions) during this period.

Table 3
Per cent share of expenditure on food and high value commodities in Rajasthan

Year	*Cereals*	*Pulses*	*Milk and milk products*	*Meat, fish and eggs*	*Fruits & Vegetables*	*Total food*	*Non-food*
			Rural				
2001-02	28.9	4.5	35.1	1.2	8.5	62.3	37.7
2007-08	27.0	3.9	30.4	1.2	11.8	53.9	46.1
2010-11	28.5	4.1	32.4	1.4	12.2	58.4	48.5
			Urban				
2001-02	22.4	4.6	29.9	2.2	13.2	56.7	43.3
2007-08	23.2	0.2	29.4	2.0	15.0	42.4	57.6
2010-11	24.2	1.2	30.4	2.4	16.3	45.7	58.5

Source: Computed from NSSO Report Household Consumer Expenditure in India, 2011-12

Table 4
Income elasticity of fruits and vegetables

Year	*Fruits*	*Vegetables*
	Rural	
2004-05	1.65	0.51
2009-10	1.79	0.62
	Urban	
2004-05	1.24	0.57
2009-10	1.68	0.68

Status of Fruit and Vegetable Processing Industry

There are not too many large-scale processing industries in the state. Most of the industries are small scale. In Rajasthan, Kinnow and Mandarin have market linkages and have strong demand. Aonla has strong potential for processing in high value added products as well as industrial applications in pharmaceutical industry. Ber is peculiar to Rajasthan and caters to the demand of other states as well. The number of State-wise processing industries in India is presented in Table 5. The table reveals that highest numbers of processing industries are in Andhra Pradesh followed by Tamil Nadu and Uttar Pradesh. Rajasthan has only 515 processing industries.

Table 6 reveals growth in the processed fruits and vegetables sector in Rajasthan. It shows that production of processed fruits and vegetables has increased from 1.23 lakh tonnes in 2001-03 to 3.45 lakh tonnes in 2007-09. However, production of processed fruit and vegetables is much less than the installed capacity of fruit and vegetable processing units reflecting low capacity utilization. Fruit and vegetable processing industry capacity has increased from 3.78 lakh tonnes in 2001-03 to 6.43 lakh tonnes in 2007-09. As regards capacity utilization, this was only 32.53 percent in 2001-03. Capacity utilization slowly increased and reached 53.65 percent in 2007-09.

Table 5
State-wise Processing Industry in India

Sr No.	*State*	*No. of units*
1	Andhra Pradesh	10,183
2	Assam	734
3	Bihar	433
4	Chandigarh	36
5	Daman & Diu	5
6	Delhi	125
7	Pondicherry	42
8	Goa	34
9	Gujarat	1,270
10	Haryana	600
11	Himachal Pradesh	46
12	Jammu & Kashmir	69
13	Karnataka	1,221
14	Kerala	1,110
15	Madhya Pradesh	1,302
16	Maharashtra	2,420
17	Manipur	9
18	Meghalaya	3
19	Nagaland	5
20	Orissa	425
21	Punjab	1,196
22	**Rajasthan**	**515**
23	Tamil Nadu	3,792
24	Tripura	22
25	Uttar Pradesh	2,652
26	West Bengal	1,089
27	Others	9
	Total	29,407

Source: Agricultural Statistics at a Glance 2010 and previous issues, Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, New Delhi.

Table 6
Growth in the processed fruits and vegetables sector in Rajasthan

Year	*Production of processed fruit and vegetable products (lakh tonnes)*	*Installed capacity of fruit and vegetables processing (lakh tonnes)*	*Capacity utilization of fruit and vegetables processing (percent)*
2001-03	1.23	3.78	32.53
2004-06	2.10	4.78	43.93
2007-09	3.45	6.43	53.65

Source: Agricultural Statistics at a Glance 2010 and previous issues, Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, New Delhi.

Constraints faced by the Fruit and Vegetable processing industry: It is estimated that in Rajasthan, 30-40 percent of the total harvest goes waste and only 2 percent of total production is processed. Constraints inhibiting the growth of the fruit and vegetable processing industry include:

1. Fruit and vegetables are highly perishable and require cold storage facilities and refrigerated transportation system. The lack of these facilities causes huge annual wastage.
2. Production is concentrated mainly in unorganized and tiny sectors where an economy of scale is not possible. Attainment of international acceptable quality products in these small units is difficult.
3. The high cost of raw material, machinery and packaging material; poor technology in processing, packaging and distribution; inadequate and expensive transportation facilities, also inhibit the growth of this industry.

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