

Demand and supply estimation for oilseeds in Karnataka

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(Received: July, 2016 ; Accepted: March, 2017)

Abstract: The present study was conducted with objectives to assess the growth and instability in supply and demand and to project demand and supply for oilseeds in Karnataka. The time series data on production of oilseeds in Karnataka, population and per capita income for 18 years were collected from the Directorate of Economics and Statistics, Bangalore. The National Sample Survey Organisation of India (NSSO) statistical data on consumer expenditure was also used. There was a declining growth in supply of total oilseeds (-2.58 %) with high instability (19.40 %) during the study period. The demand for total oilseeds increased at a rate of 4.94 per cent with low instability (0.94%) in Karnataka. The projected supply and demand for edible oilseeds would be 8.11 lakh tonnes and 24.01 lakh tonnes respectively by 2020 with a supply-demand gap of 15.89 lakh tonnes. Thus, the supply of oilseeds would be far below the requirement.

Key words: Demand, Growth rate, Instability, Projection, Supply

Introduction

Oilseeds are among the major crops that are grown in India apart from cereals and pulses. India is the largest producer of oilseeds in the world contributing seven per cent of the global vegetable oils production with 14 per cent share in the area (Jha *et al.*, 2012) and the oilseeds sector occupies an important position in the agricultural economy of the country. Oilseeds are generally grown in energy starved conditions with hardly about 25 per cent of the area under irrigation. This has subjected oilseeds production to the vagaries of monsoons resulting in the low yields. National Council on Applied Economic Research (NCAER) predicted that in the year 2015, the demand for edible oil in India would be 20 million tonnes per annum. Indian imports of vegetable oils have surged in 2013-14 oil year and the country has imported 11.82 million tons to meet its growing domestic consumption. In 2014-15 also imports grew by 15.99 per cent when compared with last year and touched a new record of 12.31 million tons (Anon, 2015). The per capita consumption of edible oil is likely to increase from about 14.4kg in 2013-14 to about 15 kg in 2014-15. To meet the increasing demand for oilseeds, the Technology Mission on Oilseeds was introduced in the country. Karnataka is one of the major oilseeds producing states and it is one of the project states covered under the oilseeds development programmes. Nine districts of the state namely Belagavi, Bellary, Bidar, Vijayapura, Chitradurga, Dharwad, Kalaburgi, Raichur and Tumkur were selected as lead districts for concentrating research and development activities. With the introduction of the Technology Mission on Oilseeds in the state, the total area under oilseeds has increased but productivity of oilseeds has not improved to the desired level and the level of instability is reported to be increasing over years (Saraswathi *et al.*, 2012). Hence, the present study was conducted in Karnataka with the objectives to estimate supply and demand for oilseeds and project supply and demand for oilseeds in the next five years.

Material and methods

The present study was conducted in Karnataka state as it

is one of the considering major oilseeds growing state. The time series data on area, yield and production of groundnut, sunflower, safflower, sesamum and soybean in the state for the period from 1995-96 to 2012-2013 were collected from the Directorate of Economics and Statistics, Bangalore. The total production of oilseeds taken as proxy for total supply. Compound growth rates in supply of major oilseeds were estimated using the $Y_t = ab^t e^u$ model (Saraswathi *et al.*, 2012). Y_t = dependent variable (production), a = intercept term, $b = (1+r)$ and ' r ' is the compound growth rate, t = time trend and u = error term. Instability index was estimated by using Cuddy-Della Valle Index [$C.V.^* (1 - R^2)$] (Sihmar, 2014) to analyze instability in supply and demand.

The supply projections formula ($S_t = S_0 * (1+S_g)^t$) as provided by Kumar *et al.* (2010) and Sundar *et al.* (2011) was used to project the supply of oil seeds (S_t) up to 2020 by considering the base year supply (S_0) and predicted supply growth (S_g).

The demand for edible oilseeds was projected based on parameters like per capita consumption of edible oil, growth in per capita income, expenditure elasticity and population growth. The per capita consumption multiplied by population was aggregated by rural and urban to obtain the demand projections for the state as a whole. The growth rate in per capita income was worked out by dividing the growth of population from income growth and used in predicting the consumption of edible oil.

The formula ($D_t = d_0 * N_t (1+Y*e)^t$) as provided by Sekhon (2008) and Kumar *et al.* (2011) was used to estimate the projected demand (D_t) for edible oil by considering the per capita demand for edible oil in the base year (d_0), growth in per capita income (Y), the expenditure elasticity of demand (e), the projected population in year t (N_t). For the estimation of the demand for edible oilseeds 3.32 factors was multiplied with estimates of edible oil (Kumar *et al.*, 2010). For calculation of income elasticity, the log inverse function $\log Y_i = a + b/X_i + U_i$ was used. Where $e_p = -b/X_i$, Y_i is the monthly per capita expenditure on i^{th} commodity, X_i is the per capita total monthly expenditure on

all commodities, U_i =error term and a, b are parameters to be estimated. Because of the non availability of the data on income, total expenditure as provided by NSSO was used as a proxy for income. For population projection, growth rate of population was calculated using logarithmic trend equation $\log \beta = (\log P_t - \log P_0)/t$. P_t is the Population in period t, P_0 is the population in base period and 'r' growth rate was computed as $r = (\text{Antilog } \hat{\alpha} - 1) \times 100$. The estimated population growth rate up to the year 2011 worked out to 1.5 per cent and hence for projecting population up to 2020, population growth rate was assumed to be at 1.5 per cent. To bifurcate the projected population into rural and urban, the percentages share of rural and urban population in total population were worked out to be 66 per cent and 34 per cent respectively (Economic Survey of Karnataka 2005) and the same proportion was considered to project rural and urban population up to 2020. The Demand and supply gap of total oilseeds were computed as the difference between the two.

Results and discussion

Table 1 depicted the extent of growth and instability in supply of major oilseeds in Karnataka during the year 1995-96 to 2012-13. More than eight oilseeds are grown in the state, among them five are most important. Ground and sunflower are the two major oilseeds grown in the state. These two crops together share about 84.14 per cent of the total oilseeds supply in the state. The average annual supply of total oilseeds was 10.80 lakh tonnes in the state in which groundnut supply was the highest (56.14%) and sesamum supply was least (3.14%) among all oilseeds. Most of the oilseeds registered a declining growth in supply except soybean which showed a positive growth of 9.40 per cent per annum. The increase in growth in supply of soybean was due to combined effect of growth in area (11.33 % per annum) and productivity (1.41% per annum) in the state. The ground nut supply significantly declined at a rate of 5.64 per cent due to combined effect of reduction in area (1.42% pa) and productivity (2.38% pa). The supply of sesamum registered a declining growth during the entire period at the state level with -2.62 per cent per annum. This was in conformity with findings of Saraswathi *et al.* (2012) who reported that production of sesamum in Karnataka decreased at 3.04 per cent due to significant decrease in area. Sunflower supply growth

was noticed to be declined marginally (-0.53 %). In the case of instability in supply of oilseeds, sunflower was having the highest variation in supply (38.18%) while safflower (22.18%) recorded the least variation in the state. These variations in supply of sunflower and safflower were reflected from decline in area at -1.88 per cent and -3.84 per cent per annum respectively. Total oilseeds witnessed 19.07 per cent of instability in supply over the time periods in Karnataka. In general it was noticed that the supply of selected oilseeds was declining with high instability during the study periods. The decrease in supply of oilseeds and high instability was attributed to decrease in area and productivity because most of the oilseeds crop area has been switched to cash crops like sugarcane, cotton *etc.* According to Season and Crop report of Karnataka, 2007-08 (Anon., 2008) the decrease in supply of safflower was attributed to decline in area, which was due to higher income from competing crops such as sorghum and bengal gram.

The supply projections of oilseeds are presented in Table 2. The projected supply of total oilseeds was 8.01 lakh tonnes in 2015 and would decrease to 7.74 lakh tonnes by 2020. The supply of soybean was projected to increase from 1.70 lakh tonnes in 2015 to 2.36 lakh tonnes by 2020 with 38.59 percentage changes. The increase in supply is due to positive supply growth performance of soybean. The supply of total oilseeds would likely to decline by 3.37 per cent from 2015 to 2020. The reason for this was the shrinkage in area under total oilseeds at the rate of 2.83 per cent per annum. The area under oilseeds has been shifted to crops like maize, sugar cane and cotton. The droughts and insufficient monsoon rains also affected the production and productivity of oilseeds in Karnataka. The decline in supply was also due to cultivation of oilseed crops in marginal lands by resource-poor farmers, predominantly growing under rain fed conditions (75%) and intermittent drought, low plant stand due to low seed rate, lack of practice of seed treatment leading to seed-borne diseases, inadequate availability of critical inputs, bio-fertilizers, *etc.*, high incidence of diseases and insect pests and non-availability of labour-saving implements as reported by Jha *et al.* (2012).

The average annual demand for total oilseeds was 20.54 lakh tonnes in Karnataka (Table 3). Rural and urban Karnataka registered positive growth rate of 4.54 per cent and

Table 1. Growth and instability in supply of oilseeds in Karnataka (1995-96 to 2012-13)

Particulars	Groundnut	Sunflower	Soybean	Safflower	Sesamum	Total
Supply	6.08(56.14)	3.05(28.40)	0.73(6.88)	0.55(5.17)	0.37(3.41)	10.80(100.00)
CGR (%)	-5.64*	-0.53	9.40	-4.83*	-2.62	-3.06**
Instability (%)	26.56	38.18	26.48	22.18	37.17	19.07

Note: Supply in lakh tonnes; * significance at 1 per cent level ** significance at 5 per cent level

Figures in parentheses are percentage to total

Table 2. Supply projections of oilseeds for different years in Karnataka

Year	Groundnut	Sunflower	Soybean	Safflower	Sesamum	Total
2015-16	2.88	2.68	1.70	0.29	0.25	8.01
2016-17	2.72	2.67	1.96	0.28	0.24	7.89
2017-18	2.57	2.66	2.14	0.26	0.24	7.88
2018-19	2.42	2.64	2.24	0.25	0.23	7.79
2019-20	2.28	2.63	2.36	0.24	0.22	7.74

(in lakh tonnes)

Demand and supply estimation for

5.23 per cent respectively and the state has registered a growth rate of 4.94 per cent. Higher variation in demand for edible oilseeds (1.04%) in urban Karnataka was noticed than that in rural Karnataka (0.97%). The state as a whole witnessed slight variation in demand for oilseeds (0.94 %). In rural Karnataka demand was higher than that in urban Karnataka. The per capita consumption of edible oil in rural area was more than that in urban area. In urban area due to change in life style, the shifting consumer preference in edible oil to oils such as palm oil and coconut oil. The demand for edible oilseeds is increasing with change in life style, level of income and standard of living.

The demand for oilseeds in the state were projected to be 19.73 lakh tonnes for 2015-16, in which the share of rural area would be

Table 3. Growth and instability in demand for oilseeds in Karnataka (1995-96 to 2012-13)

Particular	Rural	Urban	Karnataka
Demand (lakh tones)	15.53	5.01	20.54
CGR (%)	4.54	5.23	4.94
Instability Index (%)	0.97	1.04	0.94

Table 4. Demand projections for edible oilseeds for different years in Karnataka (In lakh tonnes)

Year	Urban	Rural	Karnataka
2015-16	7.42(36.75)	12.31(62.25)	19.73(100.00)
2016-17	7.76(38.21)	12.59(61.79)	20.37(100.00)
2017-18	8.09(38.55)	12.90(61.45)	20.99(100.00)
2018-19	8.41(38.82)	13.23(61.18)	21.66(100.00)
2019-20	8.76(37.07)	15.22 (62.93)	24.01(100.00)

Note: Figures in parentheses are percentage to total

Table 5. Supply and demand projections for oilseeds in Karnataka (In lakh tonnes)

Years	Total Supply	Total demand	Supply-demand Gap
2015-16	8.01	19.73	-11.72
2016-17	7.89	20.37	-12.48
2017-18	7.88	20.99	-13.11
2018-19	7.79	21.66	-13.87
2019-20	7.74	24.01	-16.27

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62.25 per cent and that of urban area would be 36.75 per cent. (Table 4) The demand for edible oilseeds would likely to be increase by 62.93 per cent in rural areas and by 37.07 per cent in urban areas; the overall demand for edible oilseeds in the state would be 24.01 lakh tonnes by 2020. In Karnataka the demand for edible oilseeds would likely to increase at a rate of 21.69 per cent per annum with passing of time. This was due to population growth and increase in per capita income, particularly in the lower and upper middle class. Price is another important factor affecting the demand as reported by Jha *et al.* (2012) and Kumar *et al.* (2009).

The projected supply-demand gap for oilseeds are presented in Table 4.5. The results showed that the supply and demand gap would increase in the years to come due to increase in the demand for total oilseeds. The gap between demand and supply was projected to be 16.27 lakh tonnes in 2019-20.

Conclusion

The supply of groundnut, sunflower safflower and sesamum in the state witnessed a declining growth rate varying from - 2.62 per cent to -5.64 per cent. The instability index for supply was also high. The average supply of total oilseeds was 10.80 lakh tonnes in the state. In the state, the oil seeds supply was estimated to decrease from 8.01 lakh tones in 2015-16 to 7.74 lakh tones in 2019-20. The average annual demand for oilseeds was 20.54 lakh tonnes in Karnataka and had registered a growth rate of 4.94 per cent. The demand for total oilseeds in the state was projected to be 19.73 lakh tones for 2015-16 and would go up to 24.016 lakh tones by 2019-20. The supply and demand gap would increase in the years to come due to increase in the projected demand for total oilseeds. The gap between demand and supply was projected to be 11.72 lakh tones in 2015-16 and would widen to 16.27 lakh tones by 2019-20. The policy that emerges from study is that there is an immediate need to take appropriate yield increasing measures for sustained production of oilseeds in the state by evolving high yielding or hybrid varieties in oilseeds. The projection of supply of and demand for oilseeds revealed that there will be net deficit of supply (16.27 lakh tones by 2019-20) of oilseeds to meet the demand.