

**RESEARCH ARTICLE :****Trends in fertilizer consumption in Maharashtra**■ **P.M. Dahiwade, A.V. Gavali and A.R. Kulkarni****ARTICLE CHRONICLE :****Received :**
03.09.2018;**Revised :**
25.09.2018;**Accepted :**
10.10.2018

SUMMARY : The regionwise compound growth rates were estimated for the time periods *i.e.* pre-WTO period (1960-61 to 1994-95), post-WTO period (1995-96 to 2012-13) and overall period (1960-61 to 2012-13). During the pre-WTO period the rates of compound growth in consumption of N, P and K at the overall level of Maharashtra were 6.06, 7.11 and 5.87 per cent per annum, respectively. The highest consumption of nitrogenous fertilizers was observed in Marathwada region (10.38 %) while highest consumption of phosphatic (10.38 %) and potassic (9.92 %) fertilizers were observed in western Maharashtra. During post-WTO period the consumption of nitrogenous, phosphatic and potassic fertilizers was lowest in Konkan region with the rate of growth of 0.99 per cent, 1.67 per cent and 2.02 per cent per annum, respectively. For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among all the regions in Maharashtra. The annual compound growth rates in phosphorus and nitrogenous consumption were substantially higher during pre-WTO period as compared to overall period and post-WTO period in Maharashtra State. Wide variations in NPK consumption in various regions was observed may due to variations in soil type, nature of cropping pattern, availability of irrigation, rainfed nature of crops and varied stages of agro-economic development.

KEY WORDS:

Fertilizer, Fertilizer consumption, Compound growth rates

How to cite this article : Dahiwade, P.M., Gavali, A.V. and Kulkarni, A.R. (2018). Trends in fertilizer consumption in Maharashtra. *Agric. Update*, 13(4): 422-428; DOI : 10.15740/HAS/AU/13.4/422-428. Copyright©2018: Hind Agri-Horticultural Society.

BACKGROUND AND OBJECTIVES

India was facing the problem of food shortages during the period of independence and imported foodgrains from the other countries. However, with focused efforts, the country could attain self-sufficiency and agriculture production has increased considerably. The total foodgrain production in India was 52 MMT during 1951-52, and it has increased to 264 MMT in 2013-14. This was attained through the agricultural policy and government's interventions of providing agricultural inputs like credit, seeds and

fertilizers at subsidized rates.

Considerable increase in the usage of chemical fertilizers started with the introduction of green revolution in 1960s. The green revolution is a technology package and it contains improved varieties of seeds, chemical fertilizers, pesticides and irrigation. The high yielding varieties demanded more usage of fertilizers and it is supported by the subsidy policy on fertilizers. In the early 1980s, India introduced New Economic Policy (NEP) which has opened up the economy to privatization and globalization. In the globalized

Author for correspondence :

A.R. Kulkarni
Department of
Agricultural Economics,
Mahatma Phule Krishi
Vidyapeeth, Rahuri,
Ahmednagar (M.S.) India
Email: akhileshkulkarni412@gmail.com

See end of the article for authors' affiliations

economy agricultural sector became more commercial and production is oriented to export market. This also led to increase in fertilizer consumption. Chemical fertilizers are major inputs of scientific agriculture. India is one of the major countries in the production and consumption of fertilizers. The usage of chemical fertilizers with high yield varieties of seeds and irrigation, increases the agricultural production and it helps to achieving the self sufficiency of food grains (Department of Fertilizer GOI, 2013)

Fertilizer is one of the major inputs in the agricultural production. Fertilizer is defined as any organic or inorganic substance, natural or artificial in nature supplying one or more of the chemical elements/nutrients required for plant growth. World fertilizer nutrient ($N+P_2O_5+K_2O$) consumption is estimated to reach 186.6 million tonnes in 2015, up by 1.1 per cent over 2014. World demand for total fertilizer nutrients is estimated to grow at 1.6 per cent per annum from 2015 to 2019. The demand forecast for nitrogen, phosphate and potash is to grow annually by 1.2, 2.0 and 2.5 per cent, respectively, during the period. Over the next five years, the global capacity of fertilizer products, intermediates and raw materials will increase further (Jaga and Patel, 2012). The global total nutrient capacity ($N+P_2O_5+K_2O$) was 284 million tonnes in 2014, out of which the total supply was 240 million tonnes. During 2015, the total capacity is expected to increase by 2.9 per cent and supply would grow by 1.6 per cent (Source: Current world fertilizer trends and outlook, 2015). Over the next five years, global capacity and production of fertilizers would increase further.

India is the second largest consumer of fertilizers in the world after China, consuming about 26.5 million tonnes. However, average intensity of fertilizer use in India remains much lower than most countries in the world but is highly skewed, with wide inter regional, inter-state and inter-district variations. In India fertilizer consumption is highly concentrated in certain areas and larger areas receive very little fertilizer. Out of 626 districts in India, 25 per cent of total fertilizer is consumed only in 38 districts. The nitrogenous fertilizers account for more than 60 per cent of the total fertilizer consumption. The share of potassic fertilizers was increased from 9.6 per cent in 2001-02 to 11.8 per cent in 2005-06. Per hectare fertilizer application was quite high in Punjab, Haryana, Andhra Pradesh and Tamil Nadu, but quite low in Rajasthan, Orissa and Madhya Pradesh apart from states in the North Eastern region.

The all India average consumption of fertilizer per hectare was up at 140 kg in 2010-11 from 113.42 kg in 2006-07 (Ministry of Chemicals and Fertilizers, 2013). So, there is a greater untapped potential and its exploitation requires an area wise constraint analysis to overcome highly skewed fertilizer use pattern.

Maharashtra is the third largest fertilizer consuming state in the country next to Uttar Pradesh and Andhra Pradesh. Nutrient consumption in Maharashtra in the past decade declined by 12.5 per cent, from 2.47 million MT during 2012-13 to 2.78 million MT during 2013-14. Total nutrient consumption increased by 3 per cent in *Kharif* 2013 and 26.7 per cent in *Rabi* 2013-14 over the respective seasons in the previous year. *Kharif* and *Rabi* season share in total consumption changed from 60:40 in 2012-13 to 55:45 during 2013-14.

The consumption of N at 1.5 million MT, P_2O_5 at 0.77 million MT and K_2O at 0.42 million MT in 2013-14 registered increase of 15.9 per cent, 7.9 per cent and 9.3 per cent, respectively, over 2012-13. NPK use ratio changed from 3.5:1.8:1 during 2012-13 to 3.7:1.8:1 during 2013-14. The per hectare consumption of total fertilizer nutrients reduced to 112.8 kg from 127 kg during the period (Source: Crop production and fertilizer use data are retrieved from Fertilizer Statistics, 2013-14, The Fertilizer Association of India, New Delhi).

Objective :

– To study the trends in fertilizer consumption in Maharashtra.

RESOURCES AND METHODS

The secondary data for the period of 1960-61 to 2012-13 was collected for growth rate analysis. In order to analyze the compound growth rate in fertilizer consumption in the state as a whole, compound growth rates was computed by using the following form of the relationship.

$$Y = ab^t$$

where,

Y = Fertilizer consumption

a = Constant

b = Regression co-efficient

t = Time period in years

$$CGR (\%) = (\text{Antilog } b-1) \times 100$$

The compound growth rates were estimated for the time periods *i.e.*, pre-WTO period (1960-61 to 1994-95),

post-WTO period (1995-96 to 2012-13) and overall period (1960-61 to 2012-13). The significance of the estimated compound growth rates was tested with the help of student "t" test.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Regionwise growth performance of fertilizer consumption :

The data on district-wise annual rates of compound growth in consumption of N, P and K fertilizers during the period I (1960-61 to 1994-95), Period-II (1995-66 to 2012-13) and overall period-III (1960-61 to 2012-13) for Konkan, western Maharashtra, Marathwada, Vidarbha and Maharashtra State as a whole are presented as below.

Konkan region :

It can be noted from the Table 1 during the pre-WTO period the rates of compound growth in consumption of N, P and K at the regional level of Konkan were 6.53, 3.21 and 2.95 per cent per annum, respectively. The highest consumption of N, P and K was observed in Sindhudurg district at the rate of 10.30 per cent, 12.20 per cent and 17.00 per cent per annum, respectively. During post-WTO period the rate of growth in the consumption of nitrogenous fertilizers was highest in Thane district *i.e.* 2.03 per cent per annum. The consumption of phosphatic fertilizer has increased at the rate of 2.95 per cent per annum for Sindhudurg district. The consumption of potassic fertilizer has increased at the highest rate of (2.97 % per annum) in Sindhudurg district and it was lowest *i.e.*, (1.36 % per annum) in Raigad district.

For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among the districts in Konkan region. However, the rate of growth in consumption of total fertilizers was a bit higher for Thane and Raigad districts in comparison with other districts in Konkan region. The annual compound growth rates in nitrogenous consumption were substantially higher during the overall period as compared to phosphatic and potassic fertilizers. The consumption of N, P and K in overall period has significantly increased in Konkan region at the rate of 4.25, 2.31 and 2.15 per cent per annum, respectively (1960-61 to 2012-13).

Western Maharashtra region :

District-wise and period-wise annual compound growth rates in consumption of NPK fertilizers in western Maharashtra region is presented in Table 2. During the pre-WTO period the rates of compound growth in consumption of N, P and K at the regional level of western Maharashtra region were 9.73, 10.38 and 9.92 per cent per annum, respectively. The highest consumption of N, P and K was observed in Jalgaon district at the rate of 11.57 per cent, 11.84 per cent and 12.44 per cent per annum, respectively. During post-WTO period the rate of growth in the consumption of nitrogenous fertilizers was highest in Nandurbar district *i.e.* 9.70 per cent per annum. The consumption of phosphatic fertilizer has increased with the rate of 12.46 per cent per annum for Nandurbar district. The consumption of potassic fertilizer has increased at the highest rate of (12.40 % per annum) in Nandurbar district and it was lowest *i.e.*, (1.78 % per annum) in Kolhapur district. For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among the districts in western Maharashtra. The annual compound growth rates in phosphorus and potash consumption were substantially higher during pre-WTO

Table 1 : Districtwise and periodwise annual compound growth rates in consumption of NPK fertilizers in Konkan region (%)

Sr. No.	Districts	Period-I (1960-61 to 1994-95)			Period-II (1995-96 to 2012-13)			Overall (1960-61 to 2012-13)		
		N	P	K	N	P	K	N	P	K
1.	Ratnagiri	3.4***	-0.92	0.11	-0.09	2.99**	3.36***	2.8***	0.33	0.61
2.	Raigad	6.97***	2.27	1.83	0.16	-0.21	1.36	3.58***	1.2*	0.88
3.	Thane	6.44***	2.93**	2.54**	2.03***	1.56**	1.92**	5***	2.25***	2.15***
4.	Sindhudurg	10.3***	12.2***	17***	1.33	2.95 *	2.97**	2.62*	3.91***	4.18***
	Konkan	6.53***	3.21***	2.95***	0.99***	1.67**	2.02**	4.25***	2.31***	2.15***

*, ** and *** indicate that significance of value at P=0.10, 0.05 and 0.01, respectively

period as compared to overall period and post-WTO period in Western Maharashtra region. The consumption of phosphatic fertilizer has significantly increased as compared to potassic and nitrogenous fertilizers in western Maharashtra.

However, the rate of growth in consumption of total fertilizers was a bit higher for Jalgaon, Nandurbar, Sangli and Nashik districts in comparison with other districts in western Maharashtra. The consumption of N, P and K in overall period has significantly increased in Western Maharashtra region at the rate of 6.06, 7.02 and 6.49 per cent per annum, respectively (1960-61 to 2012-13).

Marathwada region :

It can be revealed from the Table 3 during the pre-WTO period the rates of compound growth in consumption of N, P and K at the regional level of Marathwada were 10.38, 10.21 and 8.00 per cent per

annum, respectively. The highest consumption of N, P and K was observed in Latur, Jalna and Nanded district at the rate of 13.95 per cent, 16.15 per cent and 11.66 per cent per annum, respectively. During post-WTO period the rate of growth in the consumption of nitrogenous and phosphatic fertilizers was highest in Hingoli district with the rate of 7.14 per cent and 9.83 per cent per annum. The consumption of potassic fertilizer was highest in Jalna district *i.e.* 15.05 per cent per annum, respectively and it was lowest *i.e.*, (5.07 % per annum) in Latur district. For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among the districts in Marathwada.

However, the rate of growth in consumption of total fertilizers was a bit higher for Jalna, Latur, Nanded and Parbhani in comparison with other districts in Marathwada. The annual compound growth rates in potassic consumption were substantially higher during

Table 2 : Districtwise and periodwise annual compound growth rates in consumption of NPK fertilizers in western Maharashtra region (%)

Sr. No.	Districts	Period-I (1960-61 to 1994-95)			Period-II (1995-96 to 2012-13)			Overall (1960-61 to 2012-13)		
		N	P	K	N	P	K	N	P	K
1.	Ahmednagar	9.37***	10.64***	7.98***	2.43***	5.84***	7.52***	5.89***	7.43***	6.25***
2.	Dhule	8.17***	8.61***	6.12***	-0.35	5.07*	5.26***	4.2***	4.27***	3.29***
3.	Jalgaon	11.57***	11.84***	12.44***	2.63***	4.03***	7.32***	6.28***	7.07***	7.94***
4.	Kolhapur	9.73***	10.12***	11.15***	0.32	2.53**	1.78*	4.74***	5.38***	5.45***
5.	Nandurbar	--	--	--	9.7***	12.46***	12.4***	9.7***	12.46***	12.4***
6.	Nashik	10.11***	11.46***	8.32***	2.95***	5.89***	8.69***	6.74***	8.52***	5.87***
7.	Pune	8.7***	9.99***	8.77***	3.92***	6.71***	9.29***	6.34***	7.54***	6.68***
8.	Sangli	10.62***	10.73***	12.44***	3.3***	5.53***	4.4***	6.72***	7.62***	8.04***
9.	Satara	9.9***	9.9***	9.53***	2.08**	5.03***	5.73***	5.5***	6.4***	6.02***
10.	Solapur	9.91***	10.29***	10.84***	4.13***	7.01***	9.36***	7.49***	8.34***	7.85***
	Western Maharashtra	9.73***	10.38***	9.92***	2.86***	5.43***	6.69***	6.06***	7.02***	6.49***

*, ** and *** indicate that significance of value at P=0.10, 0.05 and 0.01, respectively

Table 3 : Districtwise and periodwise annual compound growth rates in consumption of NPK fertilizers in Marathwada (%)

Sr. No.	Districts	Period-I (1960-61 to 1994-95)			Period-II (1995-96 to 2012-13)			Overall (1960-61 to 2012-13)		
		N	P	K	N	P	K	N	P	K
1.	Aurangabad	8.01***	7.18***	5.25***	6.22***	8.06***	13.6***	6.75***	7.49***	6.48***
2.	Beed	7.67***	6.55***	3.42**	5.39***	6.97***	9.42***	7.84***	8.41***	6.75***
3.	Hingoli	--	--	--	7.14***	9.83***	9.97***	7.14***	9.83***	9.97***
4.	Jalna	12.86***	16.15***	9.94**	5.83***	8.23***	15.05***	7.62***	9.4***	8.69***
5.	Latur	13.95**	15.53***	7.66	2.45	4.42**	5.07*	5.02***	7.25***	5.61***
6.	Nanded	13.06***	13.09***	11.66***	2.05***	6.18***	6.51***	8.36***	9.71***	8.13***
7.	Osmanabad	2.69**	3.08**	0.93	4.64***	6.63***	5.78**	4.09***	5.6***	3.92***
8.	Parbhani	9.13***	8.44***	6.15***	0.44	3.08***	5.25***	6***	7.1***	5.57***
	Marathwada	10.38***	10.21***	8***	4.18***	6.68***	8.87***	7.84***	8.98***	7.38***

*, ** and *** indicate that significance of values at P=0.10, 0.05 and 0.01, respectively

post-WTO period as compared to overall period and pre-WTO period in Marathwada region. The annual compound growth rates in phosphatic and potassic fertilizers consumption were substantially higher during the overall period as compared to nitrogenous fertilizers. The consumption of N, P and K in overall period has significantly increased in Marathwada at the rate of 7.84, 8.98 and 7.38 per cent per annum, respectively (1960-61 to 2012-13).

Vidarbha region :

It can be revealed from the Table 4 during the pre-WTO period the rates of compound growth in consumption of N, P and K at the regional level of Vidarbha were 8.92, 9.14 and 4.67 per cent per annum, respectively. The highest consumption of N at the rate of 10.03 per cent in Buldhana district, P at the rate of 10.5 per cent in Akola district and K at the rate of 7.17 per cent per annum in Yavatmal district. During post-WTO period the rate of growth in the consumption of nitrogenous fertilizers was highest that is 5.35 per cent per annum for Washim district. The consumption of phosphatic fertilizer has increased with the rate of 8.15 per cent per annum for Wardha district. The consumption of potassic fertilizer has increased at the highest rate of (10.19 % per annum) in Buldana district and it was lowest *i.e.*, (2.96 % per annum) in Akola district. For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among the districts in Vidarbha region. However, the rate of growth in consumption of total

fertilizers was a bit higher for Yavatmal, Buldhana and Washim districts in comparison with other districts in Vidarbha region. The annual compound growth rates in phosphatic consumption were substantially higher during the overall period as compared to nitrogenous and potassic fertilizers.

Maharashtra :

Regionwise and periodwise annual compound growth rates in consumption of NPK fertilizers in Maharashtra is depicted in Table 5.

The Table 5 reveals that, during the pre-WTO period the rates of compound growth in consumption of N, P and K at the overall level of Maharashtra were 6.06, 7.11 and 5.87 per cent per annum, respectively. The highest consumption of nitrogenous fertilizers was observed in Marathwada region (10.38 %) while highest consumption of phosphatic (10.38 %) and potassic (9.92 %) fertilizers were observed in western Maharashtra. During post-WTO period the consumption of nitrogenous, phosphatic and potassic fertilizers was highest in Marathwada region with the rate of growth of 4.18 per cent, 6.68 per cent and 8.87 per cent per annum, respectively.

During post-WTO period the consumption of nitrogenous, phosphatic and potassic fertilizers was lowest in Konkan region with the rate of growth of 0.99 per cent, 1.67 per cent and 2.02 per cent per annum, respectively. For the overall period (1960-61 to 2012-13), the consumption pattern of total fertilizers exhibits variation among all the regions in Maharashtra. However,

Sr. No.	Districts	Period-I (1960-61 to 1994-95)			Period-II (1995-96 to 2012-13)			Overall (1960-61 to 2012-13)		
		N	P	K	N	P	K	N	P	K
		1.	Akola	9.91***	10.5***	6.23***	-3.31**	-0.15	2.96*	4.98***
2.	Amravati	9.28***	10.13***	6.02***	0.98	4.13***	5.9***	5.26***	6.8***	4.32***
3.	Bhandara	8.61***	6.85***	2.03**	-2.32*	0.34	-0.49	4.44***	4.59***	1.03**
4.	Buldhana	10.03***	9.76***	3.79***	3.45***	6.43***	10.19***	6.6***	7.98***	4.46***
5.	Chandrapur	5.75***	4.99***	1.24	2.59***	5.42***	7.96**	5.67***	6.83***	2.8***
6.	Gadchiroli	3.63	1.65	-9.53*	4.83***	5.85***	6*	5.45***	6.38***	3.63**
7.	Gondia	--	--	--	2.86***	3.59**	-2.26	2.86***	3.59**	-2.26
8.	Nagpur	6.97***	9.44***	2.86***	2.85***	4.52***	9.31***	5.05***	7.3***	2.72***
9.	Wardha	7.95***	8.61***	7.06***	3.23**	8.15***	7.49***	4.74***	6.13***	5.7***
10.	Washim	--	--	--	5.35***	5.34***	8.59***	5.35***	5.34***	8.59***
11.	Yavatmal	9.75***	8.98***	7.17***	3.77***	5.7***	7.11***	6.7***	8.07***	5.98***
	Vidarbha	8.92***	9.14***	4.67***	1.9**	4.29***	6.38***	5.95***	7.33***	4.26***

*, ** and *** indicate that significance of values at P=0.10, 0.05 and 0.01, respectively

Table 5 : Regionwise and periodwise annual compound growth rates in consumption of NPK fertilizers in Maharashtra (%)

Sr. No.	Districts	Period-I (1960-61 to 1994-95)			Period-II (1995-96 to 2012-13)			Overall (1960-61 to 2012-13)		
		N	P	K	N	P	K	N	P	K
		1.	Konkan	6.53***	3.21***	2.95***	0.99***	1.67**	2.02**	4.25***
2.	Western Maharashtra	9.73***	10.38***	9.92***	2.86***	5.43***	6.69***	6.06***	7.02***	6.49***
3.	Marathwada	10.38***	10.21***	8***	4.18***	6.68***	8.87***	7.84***	8.98***	7.38***
4.	Vidarbha	8.92***	9.14***	4.67***	1.9**	4.29***	6.38***	5.95***	7.33***	4.26***
	Maharashtra	9.44***	9.65***	8.12***	1.69*	4.14***	6.17***	6.06***	7.11***	5.87***

*, ** and *** indicate that significance of values at P=0.10, 0.05 and 0.01, respectively

the rate of growth in consumption of total fertilizers was a bit higher for Marathwada and western Maharashtra wherein sugarcane crop area expanding as also diversified crops undertaken. It was noted that the annual compound growth rates in fertilizer consumption were highly significant in pre-WTO period due to green revolution as compared to post-WTO period and overall period in all regions of Maharashtra. It might be so reflected the increased fertilizer consumption during green revolution in pre-WTO period. In post-WTO period, N consumption rates were on lower side compared to other periods.

The annual compound growth rates in phosphorus and nitrogenous consumption were substantially higher during pre-WTO period as compared to overall period and post-WTO period in Maharashtra State. Wide variations in NPK consumption in various regions was observed may due to variations in soil type, nature of cropping pattern, availability of irrigation, rainfed nature of crops and varied stages of agro-economic development. Jha and Sarin (1980); Kumar (2017); Mala (2013); Singh (2015) and Umesha (2011) also studied on the related topic and the results found were more or less similar to the present investigation.

Conclusion:

The consumption of total N, P and K in the Thane districts of Konkan region has significantly increased. The annual compound growth rates in fertilizer consumption were highly significant in pre-WTO period as compared to post-WTO period in all districts of Konkan region of Maharashtra. Growth rates in nitrogen (N) consumption were higher than phosphorus (P) and (K) potash consumption in overall period in Konkan region.

The annual compound growth rates in fertilizer consumption were highly significant in pre-WTO period

as compared to post-WTO period in all districts of Western Maharashtra region and Marathwada region. The consumption of potassic fertilizer has been significantly increased as compared to phosphatic and nitrogenous fertilizers during the post-WTO period in Marathwada region.

Overall in Marathwada region the consumption N, P and K has significantly increased at 7.84, 8.98 and 7.38 per cent, respectively. The consumption pattern of total fertilizers exhibits variation among the districts in Vidarbha region. However, the rate of growth in consumption of total fertilizers was a bit higher for Yavatmal, Buldhana and Washim districts in comparison with other districts in Vidarbha region. The annual compound growth rates in phosphatic consumption in Vidarbha region were substantially higher during the overall period as compared to nitrogenous and potassic fertilizers.

At overall period (1960-61 to 2012-13), the annual compound growth rate of N, P and K was highest in Marathwada region and lowest in Konkan region, respectively. The consumption of N, P and K has significantly increased in overall period (1960-61 to 2012-13) of Maharashtra. It was observed that the annual compound growth rates in fertilizer consumption were highly significant in pre-WTO period due to green revolution as compared to post-WTO period and overall period in all regions of Maharashtra. The annual compound growth rates in phosphorus and nitrogenous consumption were substantially higher during pre-WTO period as compared to overall period and post-WTO period in Maharashtra State.

Authors' affiliations :

P.M. Dahiwade and A.V. Gavali, Department of Agricultural Economics, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar (M.S.) India

REFERENCES

GOI (2013). Indian fertilizer

Jaga, P.K. and Patel, Y. (2012). An overview of fertilizers consumption in India: Determinants and Outlook for 2020-A Review. *Internat. J. Scientific Engg. & Technol.*, **1**(6): 285-291.

Jha, D. and Sarin, R. (1980). Fertilizer consumption and growth in semi-arid tropical India. A district level analysis. Progress report, ICRISAT, Patancheru, Andhra Pradesh, India, No. 10: 24.

Kumar, S. (2017). Growth and pattern of fertilizer consumption in Haryana. *Internat. J. Res. Econ. & Soc. Sci.*, **7** (4):138-148.

Mala, P. (2013). Fertilizer Scenario in India. *Internat. J. Soc. Sci. & Interdisciplinary Res.*, **2**(1):62-72.

Singh, J. (2015). Fertilizer's consumption in Haryana: An analytical study. *Internat. J. Mgmt. Res.*, **3**(12): 15-29.

Umesha, G.K. (2011). Study of fertilizer consumption pattern in Prakasam and Nellore districts of Andhra Pradesh. M.Sc. Thesis, Acharya N.G. Ranga Agricultural University.

WEBLIOGRAPHY

GOI (2013). Indian Fertilizer Scenario 2013, Department of Fertilizers, Ministry of Chemicals and Fertilizer. Govt. of India. www.fao.org/3/a-av252e.

★ ★ ★ ★ ★ **13th** Year of Excellence ★ ★ ★ ★ ★