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Trends and growth rate of pesticide use in Indian agriculture-An economic analysis

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Abstract

Mahatma Gandhi believed that, India lives in villages and agriculture is the soul of Indian economy. These words still ring true today. Because agriculture brings home the bread to nearly half of all households and supplies it to the remainder. Indian agriculture has come a long way since independence, with chronic food scarcity giving way to grain self-sufficiency, despite a two and half fold increase in population. This made Indian agriculture transform from Subsistence farming to modern farming. Modern agriculture depends on the four main factors, viz: water, fertilizer, seed and pesticides. Pesticides are the integral part of modern agriculture. The per capita consumption of pesticides in India is 0.5 Kg/ha which is lowest compared to other countries. The main reason for low per capita consumption of pesticides in India is low purchasing power and small land holdings. The majority of agricultural farm land belongs to marginal farmers, but maximum contribution to the produce is also from marginal farmers. As a result the large scale farming is growing and therefore, there is a good scope for increase in per capita consumption of pesticides in India. Against this background an attempt is made to analyse trends and growth rate of pesticide use in Indian agriculture.

Keywords: Trends, growth rate, pesticide, Indian agriculture, economic analysis

Introduction

Pesticides though not desirable are inevitable to prevent pre-harvest and post-harvest losses which have assumed significance during recent times in agriculture. The growing popularity of synthetic pesticides in agriculture has over shadowed the traditional methods of plant protection which occur due to insect, pest, diseases & weeds. Undoubtedly pesticides is said to have contributed to the food security by the way of avoidance of post-harvest losses. However there is a growing awareness about the ill-effect of pesticides on human & animal health, environment, natural resources and sustainability of agriculture production. Pesticides like all other inputs play an important role in increasing agricultural production. It is estimated that about 30 percent of global output is lost due to insect pests, disease and weeds. India ranks 10th in the world in pesticide consumption as its total consumption amounts to about 500 million tonnes. India is presently the largest manufacturer of basic pesticides among the South Asian and African countries, with an exception of Japan. The Indian pesticides market is the 12th largest in the world with a value of US\$ 0.6 billion. India uses a low amount of 0.5kg/hectare pesticide compared to 7.0kg/hectare in USA, 2.5kg/hectare in Europe, 12kg/hectare in Japan and 6.6kg/hectare in Korea. (Economic Survey 2015-16). Pesticides together with fertilizer & high yielding varieties have helped Indian farmers to achieve significant increase in crop productivity since mid-1960s.

Trends and Growth Rate of Pesticide Use in India

The trends and growth rate of pesticide use in India has been studied region wise (southern, northern and all India level) for the periods 1990-1999 (period1), 2000-2014(period2), and1990-2014 (whole period). The results are presented in Table 1. From the table it can be seen that pesticide use in the southern states has been declining at the rate of 5 per cent per annum. Whereas in the northern states it has been stagnant at around 1.5 per cent per annum. For the country as a whole it is declining at around 2 per cent per annum. In all the regions there is a perceptible decline in period 1 (1990-1999) which is largely reduced in period 2 (2000-2014). This indicates that, in southern region due to increased awareness about the negative externalities among the farmers declining trend was observed. whereas, in northern

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region the trend in stagnant primarily because of green revolution region. As a result of this overall trend is

observed to be slightly decreasing as for as pesticide consumption is concerned.

Table 1: Trend and Growth rates of Pesticide Consumption of South India, North India and All India.

Sl. No.	Region	Period	a-Intercept	b-slope	R ²	Growth rate
1	Southern region	1990-2014	1422456.8	-704.1*** (5.777)	0.592	-5.05%
2	Southern region	1990-1999	3620317.0	-1805.4 *** (13.09)	0.9554	-10.03%
3	Southern region	2000-2014	-321092.0	164.3 (1.014)	0.07324	1.50%
4	Northern region	1999-2014	915319.56	-437.91 *** (4.447)	0.4623	1.50%
5	Northern region	1990-1999	2008443.1	-985.4 ** (4.393)	0.707	-2.30%
6	Northern region	2000-2014	-385720.0	210.0 (1.302)	0.1154	0.55%
7	All india	1990-2014	2611421.3	-1276.6 *** (5.304)	0.5502	-2.16%
8	All india	1990-1999	5896414.5	-2922.2*** (12.16)	0.9487	-4.38%
9	All india	2000-2014	-906740.2	475.4 (1.314)	0.1173	0.94%

Trends in pesticide consumption in southern India

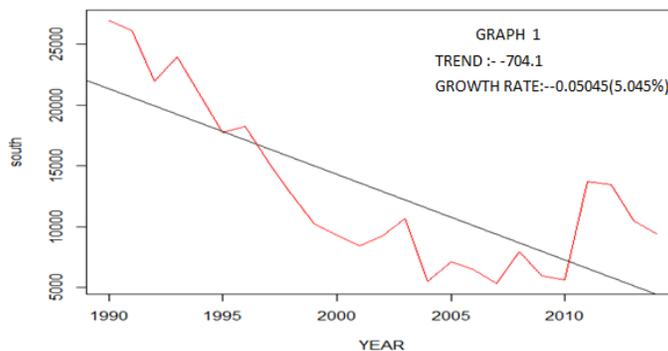
The trends and growth rate of pesticide use in southern India has been studied for the period 1990-2014 and the results are presented in Table 2. From the table it can be seen that pesticide use in period 1(1990-1999) has been declining at the rate of 10 per cent per annum, mainly due to the adoption of Integrated Pest management practices and rationalization of subsidy (which was 2.4 percent in 1990-91 declined to 1.2 percent in 1998-99) by the government in

most of the states of south. Whereas, in the period II (2000-2014) it has been stagnant at around 1.5 per cent per annum due to the area under pesticide consumption increased gradually and growing demand for food products. For the southern region as a whole (1990-14) it is declining at around 5per cent per annum. In all the regions there is a perceptible decline in period 1(1999-2000) which is largely reduced in period 2(2000-14).

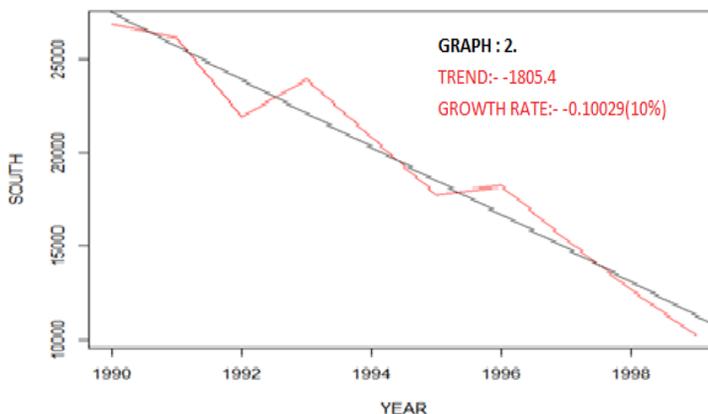
Table 2: Trend and Growth rates of Pesticide Consumption of Southern region of India.

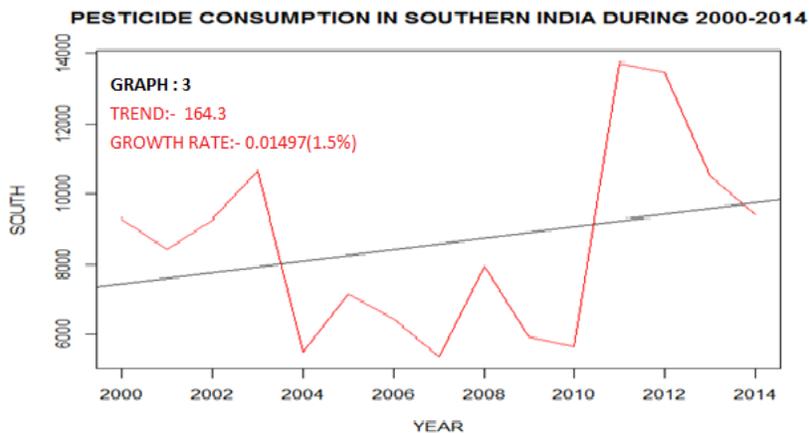
Sl. No.	Region	Period	A-Intercept	b-slope	R ²	Growth Rate
1	Southern Region (Whole Period)	1990-2014	1422456.8	-704.1*** (5.777)	0.592	-5.045%
2	Southern Region (Period 1)	1990-1999	3620317.0	-1805.4 *** (13.09)	0.9554	-10.029%
3	Southern Region (Period 2)	2000-2014	-321092.0	164.3 (1.014)	0.07324	1.497%

PESTICIDE CONSUMPTION IN SOUTHERN INDIA DURING 1990-2014



PESTICIDE CONSUMPTION IN SOUTHERN INDIA DURING 1990-1999





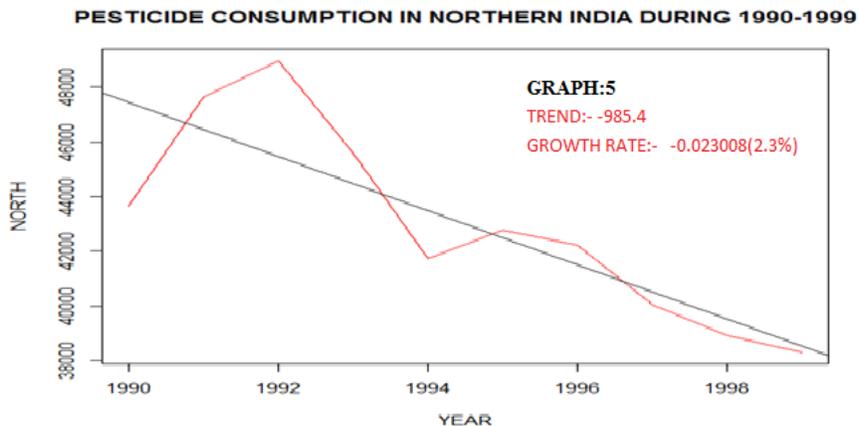
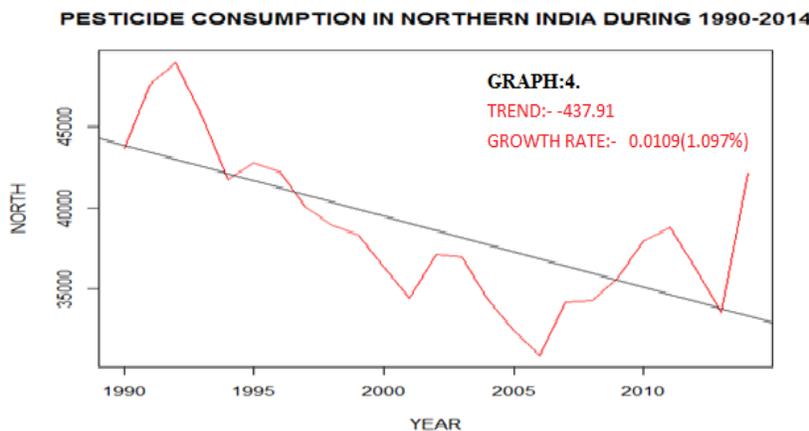
Pesticide consumption in Northern India

The trends and growth rate of pesticide use in northern India has been studied for the period 1990-2014 and the results are presented in Table 3. From the table it can be seen that pesticide use in period 1(1990-1999) has been declining at the rate of 2.3 per cent per annum because, there was a slowdown in the spiral effect of green revolution. Whereas

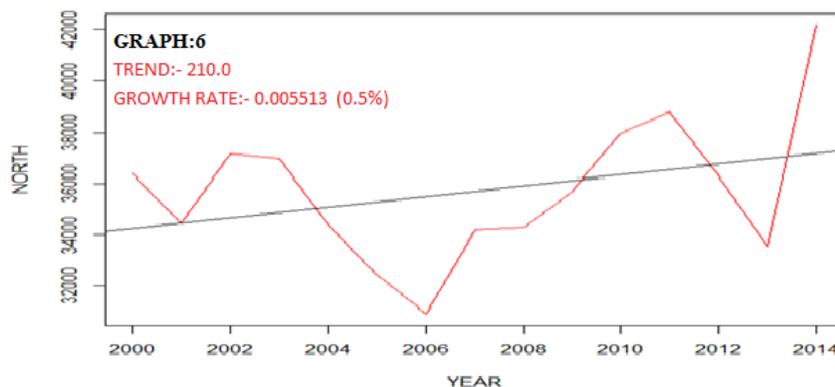
in the period II (2000-2014) it has been stagnant at around 0.5 per cent per annum mainly because of the shift from subsistence farming to market oriented farming system and also due to growing area under pesticide consumption. In all the regions there is a perceptible decline in period I(1990-1999) which is largely reduced in period 2(2000-2014).

Table 3: Trend and Growth Rate of Pesticide Consumption of Northern Region of India.

Sl. No.	Region	Period	A-Intercept	b-slope	R ²	Growth Rate
1	Northern Region (Whole Period)	1999-2014	915319.56	-437.91 *** (4.447)	0.4623	1.407%
2	Northern Region (Period 1)	1990-1999	2008443.1	-985.4 ** (4.393)	0.707	-2.3008%
3	Northern Region (Period 2)	2000-2014	-385720.0	210.0 (1.302)	0.1154	0.5513%



PESTICIDE CONSUMPTION IN NORTHERN INDIA DURING 2000-2014



Trends and Growth of Pesticide consumption at all India level

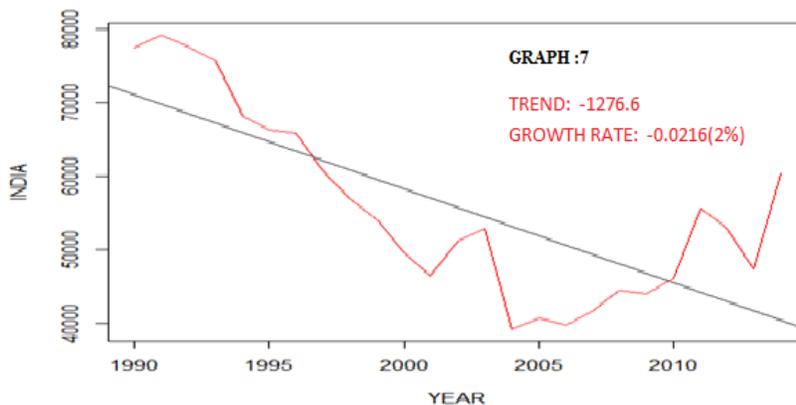
The trends and growth rate of pesticide use at all India level has been studied for the years 1990-2014 and the results are presented in Table 4. From the table it can be seen that pesticide use in period 1(1990-1999) has been declining at the rate of 4.4 per cent per annum because, a drastic declining tendency observed in south Indian states in

pesticide consumption as against northern states. Whereas in the period II (2000-2014) it has been stagnant at around 1 per cent per annum because of the trend was more or less stagnant in both the regions in pesticide consumption. Consequently, for the all India as a whole period it is declining at around 2 per cent per annum. In all the regions there is a perceptible decline in period 1(1990-1999) which is largely reduced in period 2(2000-2014).

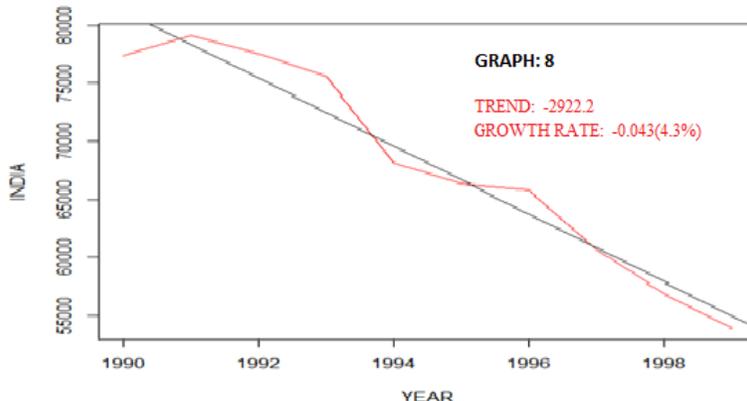
Table 4: Trend and Growth Rate of Pesticide Consumption of All India.

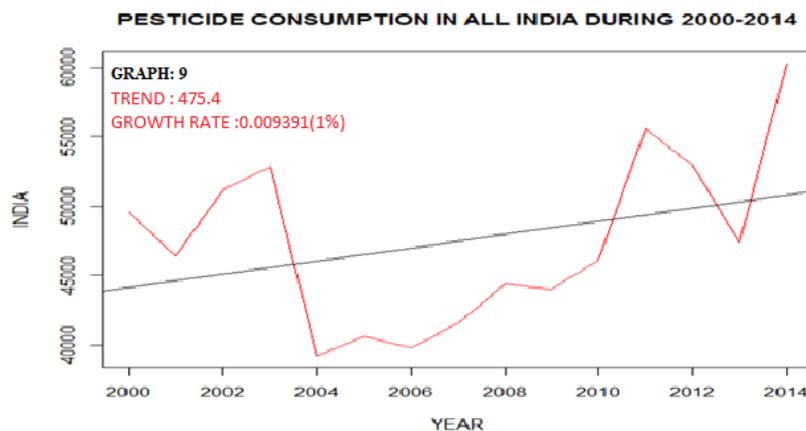
Sl. No.	Region	Period	A-Intercept	b-slope	R ²	Growth Rate
1	All India	1990-2014	2611421.3	-1276.6 *** (5.304)	0.5502	-2.1605%
2	All India	1990-1999	5896414.5	-2922.2*** (12.16)	0.9487	-4.3797%
3	All India	2000-2014	-906740.2	475.4 (1.314)	0.1173	0.9391%

PESTICIDE CONSUMPTION IN ALL INDIA DURING 1990-2014



PESTICIDE CONSUMPTION IN ALL INDIA DURING 1990-1999





Conclusion

From the above discussion, it is evident that, pesticide consumption in southern region during 2014 is 9406 Metric tons and in northern region it is as high as 42163 Metric tons and it is 60282 Metric tons in the country as whole as for as pesticide consumption is concerned. It shows that, though there is a slight declining trend observed in southern region, pesticide consumption is mounting in northern region contributing to the tune of about 60000 Metric tons to the total pesticide consumption of the country. The declining trend in southern region is due to recent advances in the science and environment have paved the way for restricting the use of harmful practices in agriculture and going for alternative farming methods which are more sustainable. However, there are apprehensions as to whether this decline is yielding the desired outcome or is it a replacement of the present ones with more potent, toxic and persistent ones which needs to be addressed. Whereas increasing trend observed in northern region is due to the increase in the area under pesticide consumption and also emerging agricultural scenario is in favour of agribusiness is likely to increase the use of pesticides further and the resultant environmental and human health problems thereof.

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