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Impacts of Fertilizer and Pesticide consumptions on Natural resources of India

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ABSTRACT

The present study discusses about present scenario of pesticide and fertilizer consumptions. The pesticide consumption and fertilizer consumption were observed in tonnes. The data of fertilizer consumption observed from 1950 to 2018 and pesticide consumption observed from 1950 to 2018 years. The variable pesticide and fertilizer consumption observed every year. The consumption ranges of Urea 55.0-16,999.3 tonnes, DAP 8.8-6854.4 tonnes and MOP 6.6-2779.7 tonnes were observed from 1955 to 2018 years. The urea consumption of 16,959.3 tonnes, DAP of 6,978. 8 tonnes and MOP of 2,979.7 tonnes were observed in 2017-18 years. The consumption ranges of pesticides from 2,353 -75,033 tonnes in 1955-2016 years and 213-217 metric tonnes in 2017-2019 years. The pesticide consumption of 75,033 tonnes was observed in 1990-91 year followed by 217 metric tonnes was recorded in 2019-20 year. The sustainable applications of agrochemical lead to decline of the soil health and crop yield. The application of agrochemical causes destruction the micro flora and micro fauna of soil environment and imbalances in soil ecosystem. The sustainable applications of agrochemicals promotes toxic soil, produces new microbes, pest, early falling of crop and human problems. The government should encourage organic farming applications instead of agrochemicals applications for smart agriculture.

Key words: *Trends, Pesticide, Fertilizer, Consumption, Natural resources, India*

Introduction

Fertilizer is a synthetic chemical that improves the nutrient content of the soil and degenerates revenue & employment to the country. The average consumptions of fertilizer is 128 kg/ha in India. The highest fertilizer consumption states is Uttar Pradesh (Chanda, 2013). In the world, the fertilizer consumption countries are Qatar, Singapore, Seychelles and Malaysia (World facts, 2013). The advantages of application are to improve soil properties and crop productivity. The objective of studied to observe the present scenario of fertilizer or pesticide consumption and evaluate soil status of India. Rahul and Anil (2016) discussed fertilizer consumption year wise and soil properties on India.

Najibullah (2013) studied fertilizer consumption year wise as well as soil status of India. Yadhishter *et al*. (2018) observed trend and pattern in fertilizer consumption and impacts in soil. Endale (2011) studied fertilizer consumption in Ethiopia and analysed data of fertilizer use with correlation coefficient. Punith and Indira (2017) observed fertilizer consumption year wise and analyzed figure with correlation coefficient.

Pesticide prepares healthy crop populations and prevents the attack of pests. The pests, weeds and disease destroy 40% crops and 4-7% after harvest. The pesticide consumption in world is about 2 million tonnes per year in that 3.75% pesticide consumption in India. The more pesticide consumption countries are USA, Japan, China and India. India is 12^{th} position at pesticide industry in Asia and 4^{th} position in pesticide export (Indira *et al*., 2017). The objective of studied to evaluate the pesticide consumption in India and impacts in present soil. Khondanram *et al*. (2013) prepared bulletin of compendium on pesticide use in vegetable and mentioned year wise pesticide application or its impact on soil. Rajendran (2003) mention that excessive pesticide application damages agriculture as well as environment and tabulated year wise pesticide applications. The central chemical department reported pesticide applications year wise in the booklet (NIPHM, 2018). Dileep and Narasimha (2017) discussed high pesticide application impacts on agriculture, environment and ecosystem. With this background, the following objectives taken for observation i.e.,

i) To discuss Nitrogen, Phosphorus and Potassium consumptions in tonnes per year
ii) To discuss Pesticide consumptions in tonnes per year

Materials and Methods

The figures were collected from various departmental institutions. The data of fertilizer use tabulated from 1955-2018 years and pesticide from 1950-2019 years. Multiple variations were reported in fertilizer and pesticide consumption. The data was analyzed with correlation coefficient.

Results and Discussion

Consumption of Urea, DAP and MOP in India

The data of fertilizer use showed in Table 1 and Fig.

Table 1. Fertilizer Consumptions of India

ALL INDIA CONSUMPTION OF N, P_2O_5& K_2O (1950-51 to 2018-19) (0,00 tonnes)				
YEARS	UREA	DAP	MOP	Total
1950-51	55.0	8.8	6.0	69.8
1951-52	58.7	6.9		65.6
1952-53	57.8	4.6	3.3	65.7
1953-54	89.3	8.3	7.5	105.0
1954-55	94.8	15.0	11.1	120.9
1955-56	107.5	13.0	10.3	130.8
1956-57	123.1	15.9	14.8	153.7
1957-58	149.0	21.9	12.8	183.7
1958-59	172.0	29.5	22.4	223.8
1959-60	229.3	53.9	21.3	304.6
1960-61	211.7	53.1	29.0	293.8
1961-62	249.8	60.5	28.0	338.3
1962-63	333.0	82.8	36.4	452.2
1963-64	376.1	116.5	50.6	543.2
1964-65	555.2	148.7	69.3	773.2
1965-66	574.8	132.5	77.3	784.6
1966-67	737.8	248.6	114.2	1,100.6
1967-68	1,034.6	334.8	169.6	1,539.0
1968-69	1,208.6	382.1	170.0	1,760.7
1969-70	1,356.0	416.0	210.0	1,982.0
1970-71	1,479.3	541.0	236.3	2,256.6
1971-72	1,798.0	558.2	300.6	2,656.8
1972-73	1,839.0	581.3	347.6	2,767.9
1973-74	1,829.0	649.7	359.8	2,838.6
1974-75	1,765.7	471.5	336.1	2,573.3
1975-76	2,148.6	466.8	278.3	2,893.7
1976-77	2,456.9	634.7	319.2	3,410.9
1977-78	2,913.0	866.6	506.2	4,285.8
1978-79	3,419.5	1,106.0	591.5	5,116.9
1979-80	3,498.1	1,150.9	606.4	5,255.4
1980-81	3,678.1	1,213.6	623.9	5,515.6
1981-82	4,068.7	1,322.3	676.2	6,067.2
1982-83	4,224.2	1,435.9	726.5	6,386.6
1982-83	4,242.5	1,432.7	726.3	6,401.4
1983-84	5,204.4	1,730.3	775.4	7,710.1
1984-85	5,486.1	1,886.4	838.5	8,211.0
1985-86	5,660.8	2,005.2	808.1	8,474.1
1986-87	5,716.0	2,078.9	850.0	8,644.9
1987-88	5,716.8	2,187.1	880.5	8,784.3
1988-89	7,251.0	2,720.7	1,068.4	11,040.1
1989-90	7,385.9	3,014.2	1,168.0	11,568.2
1990-91	7,997.2	3,221.0	1,328.0	12,546.2
1991-92	8,046.3	3,321.2	1,360.6	12,728.0
1992-93	8,426.8	2,843.8	883.9	12,154.5
1993-94	8,788.3	2,669.3	908.7	12,366.3
1994-95	9,507.1	2,931.7	1,124.8	13,563.6
1995-96	9,822.8	2,897.5	1,155.8	13,876.2
1996-97	10,301.8	2,976.8	1,029.6	14,308.1
1997-98	10,901.8	3,913.6	1,372.5	16,187.8
1998-99	11,353.8	4,112.2	1,331.5	16,797.5
1999-20	11,592.5	4,797.9	1,678.4	18,068.9

Table 1. *Continued ...*

ALL INDIA CONSUMPTION OF N, P_2O_5& K_2O (1950-51 to 2018-19) (0,00 tonnes)				
YEARS	UREA	DAP	MOP	Total
2000-01	10,920.2	4,214.6	1,567.5	16,702.3
2001-02	11,310.2	4,382.4	1,667.1	17,359.7
2002-03	10,474.1	4,018.8	1,601.2	16,094.1
2003-04	11,077.0	4,124.3	1,597.9	16,799.1
2004-05	11,713.9	4,623.8	2,060.7	18,398.4
2005-06	12,723.3	5,203.7	2,413.3	20,340.3
2006-07	13,772.9	5,543.3	2,334.8	21,651.0
2007-08	14,419.1	5,514.7	2,636.3	22,570.1
2008-09	15,090.5	6,506.2	3,312.6	24,909.3
2009-10	15,580.0	7,274.0	3,632.4	26,486.4
2010-11	16,558.2	8,049.7	3,514.3	28,122.2
2011-12	17,300.3	7,914.3	2,575.5	27,790.0
2012-13	16,820.9	6,653.4	2,061.8	25,536.2
2013-14	16,750.1	5,633.5	2,098.9	24,482.4
2014-15	16,949.6	6,098.9	2,532.9	25,581.3
2015-16	17,372.3	6,978.8	2,401.5	26,752.6
2016-17	16,735.9	6,705.5	2,508.5	25,949.9
2017-18	16,959.3	6,854.4	2,779.7	26,593.4
2018-19	17,637.8	6,910.2	2.680.3	27.228.2

Source: Fertilizer Association of India

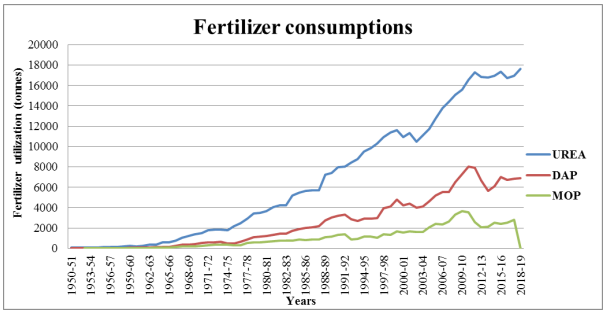

Fig. 1. Utilization of fertilizers in India

1. The ranges of Urea consumption of 55.0-17,637.8 tonnes were reported from 1950-2018 years. The urea utilization was increased after 1950-51 year. The urea consumption of 1000 tonnes was crossed after 1966-67 year. The urea consumption 10000 tonnes crossed gigantically after 1955-56 year. The urea consumption of 17,637.8tonnes was recorded in 2018-19 year.

The range of DAP consumption 8.8-6,910.2tonnes was reported from 1950-2018 years. The application of DAP was increased each year for crop production. The consumption of DAP was crossed 1000 tonnes after 1978-79 year. The DAP consumption of 6,910.2 tonnes was reported in 2018 year.

The range of MOP consumption 6.6-2,779.7 tonnes was reported from 1950-2018 years. The application of MOP was increased each year for crop production. The application of MOP was crossed 1000 tonnes after 1988-89 year. The MOP consumption of 2,779.7 tonnes was reported in 2017-18 year.

In comparative studies, the consumption of urea and DAP were high compare of MOP in India. The overutilization of fertilizers are destroyed the soil properties and soil nutrition. Vibha (2015) suggested that unscientific application of Nitrogen and Phosphorus declines crop yield and soil nutrient. Chris (2018) suggested that overutilization of fertilizers causes root burn and environmental pollution. The group of scientist worked on Nitrogen assessment

Table 2. Consumption of Pesticides in India

Year	Pesticide Consumption (tonnes t/ metric tonnes MT)
1955-56	2353
1965-66	14,630
1975-76	45,613
1985-86	61,881
1990-91	75,033
1991-92	72, 133
1992-93	70,794
1993-94	63,651
1994-95	61,360
1995-96	61,260
1996-97	56,114
1997-98	52,240
1998-99	49,160
1999-00	46,200
2000-01	43,584
2001-02	47,020
2002-03	48,300
2003-04	41,000
2004-05	40,672
2005-06	39773
2006-07	41515
2007-08	43630
2008-09	43860
2009-10	41882
2010-11	55540
2011-12	52980
2012-13	45619
2013-14	60282
2014-15	57353
2015-16	54,121
2016-17	57,000
2017-18	214 MT
2018-19	213 MT
2019-20	217 MT

Source:Indiastat.com, ICAR Bulletin, 2013, States/UTs Zonal Conference on inputs Plant Protection

and found that the average consumption of urea was 6000 kg. 33% urea utilized by plant and 67% remained in the soil, water and environment. The overuse of Nitrogen and Phosphorus reduces carbon content and nutrient of the soil (Vrinda, 2018).

Consumption of Pesticide in India

The figures of pesticide consumption depicted in Table 2. The pesticide consumption was increased successively every year. The application of pesticide was increased 1955-56 year. The first time pesticide consumption was reached above 50000 tonnes in 1985-86 year after that the pesticide consumption was never below 40000 tonnes. The pesticide consumption of 217metric tonnes was recorded in 2019-20 year. The over use of pesticide consumption destroys properties of soil, yield and nutrient content. Subhash *et al*. (2017) studied that the pesticide use in Indian Agriculture and discussed the pesticide from 2000- 2016-17 years. The pesticide consumption of 2010, 2014 and 2016 was reported more than 50000 tonnes. Rajendra *et al*. (2016) studied the pesticide consumption of India from 1990-2014 years. The USDA department stated that the presence of pesticide in soil can adversely impact animals, plants and soil organisms (NRCS, 1998). Sanjay *et al*. (2019) suggested that indiscriminate use of chemical pesticide disturbs the soil environment and affects the flora, fauna or soil properties. Tri *et al*. (2017) experimented on pesticide usage in the soil quality and discussed that soil degradation might occur after the large application of pesticides continuously. 85.5% responders said that soil become hard, 81.8% stated that earthworm biomass was not found 76.4% responders admitted that the ground colour changed to brown-white.

Conclusion

The application of fertilizer and pesticide are badly effect the soil physical and chemical property and crop yield. It mitigates the nutritional content of crop yield and soil nutrient. The sustainable agrochemical applications imbalances crop ecosystem and impacts in crop yield and quality. The sustainable application of fertilizer and pesticide disturbs the natural process of soil, declines the beneficial microbes from soil, and increases the weed populations. The overutilization of agrochemicals appears into the natural foods that impact human and animal health. Further, this sustainable applications promotes toxic soil, produces new microbes, pest, early falling of crop and human problems. The government should form organic farming practices instead of agrochemicals applications for smart agriculture.

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