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## Analysis of Agriculture Input Consumption by Indian Farmers

Ankit Pathania\*, Rashmi Chaudhary, Krishan Kumar

Dr. Yashwant Singh Parmar University of Horticulture &amp; Forestry, Nauni, Solan, H.P. (173 230), India

### Corresponding Author

Ankit Pathania

e-mail: [ankitpathania6067@gmail.com](mailto:ankitpathania6067@gmail.com)

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### Abstract

Agriculture has always been a lifeline of the Indian economy as it provides livelihood and employment to more than 54% of the population. It also contributes around 13.9% to the gross domestic product of the country. The backbone of any agricultural revolution is the access of farmers to modern agricultural inputs. These agricultural inputs range from improved seeds, fertilizers and crop protection chemicals to machinery, irrigation and knowledge etc. Keeping this in the background, the present study was carried out to make an analysis of agricultural inputs usages by the Indian farmers. The data for the present study were mainly sourced from various government published reports like agriculture statistical at a glance, 2018 and agricultural research data book, 2018. The analysis of the information was performed using annual growth rate, percentage and compound annual growth rate from 2001-02 to 2017-18. The study resulted in that input-consumption in the agriculture sector has expanded to a large extent during the study period and showing an increasing trend in the consumption-status of most of the agricultural inputs like certified/quality seeds, fertilizers, pesticides, farm machinery and electricity. Furthermore, it can be suggested that agricultural inputs have a huge potential to scale-up and maximizing agricultural productivity in the country.

**Keywords:** Agriculture, agricultural input, consumption, farmers

### **1. Introduction**

Agriculture has always been a lifeline of the Indian economy as it provides livelihood and employment to more than 54% of the population and contributes around 13.9% to the gross domestic product of the country. The agriculture and allied sector continue to be pivotal to the sustainable growth and development of the Indian economy. Not only does it meet the food and nutritional requirements of 1.3 billion Indians, but it also contributes significantly to production, employment and demand generation through various backward and forward linkages. Moreover, the role of the agricultural sector in alleviating poverty and in ensuring the sustainable development of the economy is well established (Ganesan and Pushpavalli, 2017). The backbone of any agricultural revolution is the access of farmers to modern agricultural inputs. These agricultural inputs range from improved seeds, fertilizers and crop protection chemicals to machinery, irrigation and knowledge etc (Sahel, 2014). Agricultural inputs are classified into different categories. Dogra and Ghuman (2007), Dharni and Singh (2011) classified the agricultural inputs broadly into consumable and durables. The consumable inputs comprise seeds, fertilizers, pesticides, etc. which are required for the farming season after season. Whereas the durable capital

inputs comprise tractors, harvesters, threshers, pump sets, and like which are purchased by the farmers once in the life-time. Classification based on the frequency of purchase puts agricultural inputs into routinely purchased and infrequently purchased categories (Kool et al., 1997; Kumar and Kapoor, 2015). Assael (1998) studied the decision-making process by adding one more factor, namely level of involvement to classify inputs. Agricultural inputs are important for small farmers in terms of yield enhancement, cost-cutting, and better quality production for better price realization. The availability, accessibility, quality and price have been a major issue in this sector from the farmer perspective. There are issues of lack of availability of major consumable inputs especially in seed and crop protection products in adequate quantity on time and reliable quality. Therefore, the present study was carried out to analyze agricultural inputs consumption of the Indian farmers during 2001-02 to 2017-18.

### **2. Materials and Methods**

The data for the present study were sourced from various government published reports. The data on the crop-wise distribution of seeds, fertilizers consumption, and pesticides consumption were collected from the Agriculture Statistical



at a Glance- 2018 and ICAR- Agricultural Research Data Book, 2018. Besides, data on the use of agricultural engineering inputs in India was collected from tractors association of India. The paper covers the information related to agricultural inputs from 2001-02 to 2017-2018. As far as the statistical tool for analysis is concerned, the annual growth rate and percentage were used to find out the growth performance of selected agriculture inputs over the years. The compound annual growth rate was also estimated from 2001-02 to 2017-18 to determine the overall performance of agriculture input sector in India.

### 3. Results and Discussion

#### 3.1. Certified/quality seeds

A seed is a basic input and the most important catalyst for other inputs to be cost-effective. Therefore, it assumes primary importance in agricultural inputs. It is evident from Table 1 that during the study period there has been an increasing trend in the usage of certified/quality seeds. In 2001-02, total seeds consumption was 91.80 lakh quintals and which increased to 352.01 lakh quintals in 2017-18 with CAGR of 8.23%. However, it can be concluded that throughout the

Table 1: Crop-wise distribution of certified/quality seeds (lakh qtls) in India and its growth rate during 2001-02 to 2017-18

Year	Cereals (lakh qtls)	Pulses (lakh qtls)	Oilseeds (lakh qtls)	Fibres (lakh qtls)	Potato (lakh qtls)	Others (lakh qtls)	Total (lakh qtls)	Growth rate (%)
2001-02	65.56	4.69	12.10	2.89	6.33	0.23	91.80	-
2002-03	66.97	6.60	13.36	2.74	7.16	0.21	97.04	5.71
2003-04	77.82	8.01	19.39	2.78	7.01	0.23	108.40	11.71
2004-05	81.41	7.40	23.42	2.76	5.05	0.22	120.26	10.94
2005-06	86.73	7.37	24.35	2.89	5.08	0.33	126.75	5.40
2006-07	109.87	9.63	27.00	3.05	5.12	0.34	155.01	22.30
2007-08	123.80	12.57	34.33	2.63	5.35	0.37	179.05	15.51
2008-09	147.43	14.48	39.92	2.58	10.55	0.85	215.81	20.53
2009-10	165.15	19.69	50.71	2.65	18.68	0.23	257.11	19.14
2010-11	182.62	20.83	50.61	2.64	20.08	0.55	277.34	7.87
2011-12	189.96	22.26	61.49	3.09	16.68	1.64	294.85	6.31
2012-13	204.37	24.51	58.41	2.95	21.47	1.73	313.44	6.30
2013-14	183.03	27.80	61.09	2.87	24.63	1.97	301.39	-3.84
2014-15	203.20	24.77	43.03	3.86	28.12	0.14	303.12	0.57
2015-16	194.95	22.71	47.44	2.49	33.88	2.57	304.04	0.30
2016-17	NA	NA	NA	NA	NA	NA	348.58	14.65
2017-18	NA	NA	NA	NA	NA	NA	352.01	0.98
CAGR (%)	7.54	11.09	9.54	-0.99	11.83	17.50	8.23	

Source: ICAR Agricultural Research Data Book, 2018

study period, the total consumption of all types of certified/quality seeds has shown the positive growth rate over the respective years except during 2013-14.

#### 3.2. Fertilizers

Fertilizer is another important agricultural input consists of three major elements nitrogen, phosphorus, and potash known as NPK and with the development of scientific agriculture and introduction of modern technology the importance of chemical fertilizer has increased. It can be depicted from Table 2 that the study shows moderate growth in fertilizers consumption during the study period. In 2001-02, total fertilizer consumption was 17359.7 thousand tonnes (in terms of NPK nutrients) and it raised to 26590.9 thousand tonnes in 2017-2018. The compound annual growth

for fertilizers consumption was worked out 2.54% during the study period. Further, it can be observed that there has been negative growth in the consumption of total fertilizers in six years during the study period i.e., 2002-03, 2010-11, 2011-12, 2012-13 and 2013-14 and 2016-17.

#### 3.3. Pesticides

Pesticides are the other major chemical input used in agriculture which reduces the losses in terms of both quantity and quality of farm produce from various weeds, insects, pests and diseases. From Table 3 it can be observed that the total pesticides consumption recorded in the year 2001-02 was about 47.03 tonnes and it dropped to 41.82 tonnes in 2009-10 and then increased to 55.54 tonnes in 2010-11. It shows the highest consumption in the year 2013-14 i.e. 60.28 tonnes



Table 2: Consumption-status of fertilizers (N, P, K) in India and its annual growth rate during 2001-02 to 2017-18

Year	N (Thou- sand tonnes)	P (Thou- sand tonnes)	K (Thou- sand tonnes)	Total (Thou- sand tonnes)	Growth Rate (%)
2001-02	11310.2	4382.4	1667.1	17359.7	-
2002-03	10474.1	4018.8	1601.2	16094.1	-7.29
2003-04	11077.0	4124.3	1597.9	16799.2	4.38
2004-05	11713.9	4623.8	2060.6	18398.3	9.52
2005-06	12723.3	5203.7	2413.5	20340.5	10.56
2006-07	13772.9	5543.3	2334.8	21651.0	6.44
2007-08	14419.1	5514.7	2636.3	22570.1	4.25
2008-09	15090.5	6506.2	3312.6	24909.3	10.36
2009-10	15580.0	7274.0	3632.4	26486.4	6.33
2010-11	16558.2	8049.7	3514.3	28122.2	6.18
2011-12	17300.3	7914.3	2575.5	27790.0	-1.18
2012-13	16820.9	6653.4	2061.8	25536.2	-8.11
2013-14	16750.1	5633.5	2098.9	24482.4	-4.13
2014-15	16945.4	6098.4	2532.3	25576.1	4.47
2015-16	17372.3	6978.8	2401.5	26752.6	4.60
2016-17	16735.4	6705.4	2508.3	25949.2	-3.00
2017-18	16958.0	6854.1	2778.8	26590.9	2.47
CAGR (%)	2.41	2.67	3.05	2.54	

Source: ICAR Agricultural Research Data Book, 2018

with a growth rate of 32.14%. The CAGR for the pesticides consumption was worked out 1.26% from 2001-02 to 2017-18.

### 3.4. Electricity

Modern agriculture requires an energy input at all stages of agricultural production such as direct use of energy in farm machinery, water management, irrigation, cultivation and

Table 3: Consumption-status of pesticides (Technical Grade) in India and its annual growth rate during 2001-02 to 2017-18

Year	Total consumption of pesticides (Technical grade material) in tonnes	Growth rate (%)
2001-02	47.02	-
2002-03	48.35	2.83
2003-04	41.02	-15.16
2004-05	40.67	-0.85
2005-06	39.77	-2.21
2006-07	43.41	9.15
2007-08	41.64	-4.08
2008-09	43.86	5.33
2009-10	41.82	-4.65
2010-11	55.54	32.81
2011-12	52.98	-4.61
2012-13	45.62	-13.89
2013-14	60.28	32.14
2014-15	56.12	-6.90
2015-16	54.12	-3.56
2016-17	52.75	-2.53
2017-18	58.16	10.26
CAGR (%)	1.26	

Source: ICAR Agricultural Research Data Book, 2018

harvesting. Post-harvest energy use includes energy for food processing, storage and transport to markets. The information on the consumption status of electricity in agricultural sector presented in table 4 indicates that the growth rate of electricity for agricultural purposes was highest during 2001-02. The data shows that the share of agricultural consumption to total consumption is decreasing over the study period which is reported 20.91% in 2017-18 as 25.33% in 2001-02.

Table 4: Consumption-status of electricity for agricultural purposes and its share in total electricity consumption in India during 2001-02 to 2016-17

Year	Consumption for agricultural purposes (GWh)	Total consumption (GWh)	Share of agricultural consumption to total consumption (%)	Rate of change in percentage of agricultural consumption to total consumption
2001-02	81673	322459	25.33	-
2002-03	84486	339598	24.88	-1.78
2003-04	87089	360937	24.13	-3.01
2004-05	88555	386134	22.93	-4.97
2005-06	90292	411887	21.92	-4.40
2006-07	99023	455748	21.73	-0.87
2007-08	104182	501977	20.75	-4.51

Table 4: Continue...



Year	Consumption for agricultural purposes (GWh)	Total consumption (GWh)	Share of agricultural consumption to total consumption (%)	Rate of change in percentage of agricultural consumption to total consumption
2008-09	107776	527564	20.43	-1.54
2009-10	119492	569718	20.98	-2.69
2010-11	126377	616969	20.48	-2.38
2011-12	140960	672933	20.95	2.29
2012-13	147462	708843	20.80	-0.72
2013-14	152744	751908	20.31	-2.36
2014-15	168913	814250	20.74	2.12
2015-16	173185	863364	20.06	-3.28
2016-17	191151	914093	20.91	4.24
CAGR (%)	5.46	6.73		

Source: Agricultural statistics at a glance, 2018

### 3.5. Agricultural engineering inputs

The sale of tractors and power tillers was considered to depict the growth in agricultural machinery. The sales data presented in table 5 shows that this industry had experienced robust growth during the latter half of the 2000s. In 2000-01,

Table 5: Sale-status of agricultural engineering inputs in India and its annual growth rate during 2001-02 to 2017-18

Year	No. of Tractors sold and exported	Growth rate (%)	Number of Power tiller sold	Growth rate (%)
2001-02	217456	-	13563	-
2002-03	168182	-22.66	14613	7.74
2003-04	189518	12.69	15665	7.20
2004-05	246469	30.05	17481	11.60
2005-06	291680	18.34	23030	31.74
2006-07	352827	20.96	24791	7.64
2007-08	346501	-1.79	26135	5.42
2008-09	347010	0.15	35331	35.18
2009-10	440331	26.89	43464	23.01
2010-11	545109	23.80	51414	18.30
2011-12	607658	11.47	57232	11.31
2012-13	590672	-2.80	51237	-10.47
2013-14	696828	17.97	53927	5.25
2014-15	626839	-10.04	NA	-
2015-16	571249	-8.87	NA	-
2016-17	777914	36.18	NA	-
2017-18	796873	2.44	NA	-
CAGR (%)	7.94		11.2	

Source: ICAR Agricultural Research Data Book, 2018

the machinery sales were about 270 thousand and it raised to 347 thousand in 2008-09, and since then it has nearly doubled reaching about 700 thousand by the end of 2013-14. Whereas in case of power tillers, it was 13 thousand in 2001-02 and raised to four times i.e. 54 thousand in the year 2017-18. The compound annual growth rate for tractors and power tiller were worked out 7.94 and 11.2% respectively for the study period.

### 4. Conclusion

It has been noticed from the study that input-use has expanded to a large extent during the study period and showing an increasing trend in the consumption of most of the agricultural inputs like certified/quality seeds, fertilizers, pesticides, farm machinery and electricity consumption. Furthermore, it can be suggested from the study that agricultural inputs have a huge potential to scale-up and maximizing agricultural productivity in the country.

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