

Fertilizer subsidies in India: an insight to distribution and equity issues

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ABSTRACT

Use of fertilizers in India are promoted primarily by means of subsidies. Subsidies are however blamed for increasing fiscal burden and distorting soil nutrient ratio. An attempt is made here to study fertilizer subsidies in India and equity in its distribution. Fertilizer consumption and corresponding subsidy distribution across crops, states and farmer classes are studied. Impact of Nutrient Based Subsidy scheme on subsidies as well as on nutrient use ratio is also attempted. Analysis indicated fertilizer subsidy distribution to be biased in favour of some crops and states, contrary to fair degree of equity that existed in inter-class distribution. Nutrient based subsidy scheme, implemented to control mounting subsidies and to ensure soil nutrient balance could not achieve its targets so far. Indications on extent of inequity in fertilizer subsidy distribution emerging out of this study could help in re-targeting the subsidies to the deserving crops, regions and farm categories.

Keywords : Equity in subsidy distribution, fertilizer subsidy, nutrient balance, nutrient based subsidy

Given a relatively inelastic supply of fertile land available for cultivation (Prasad, 2012), the agricultural systems are compelled to undertake strategies for maintaining or improving food production (Pretty, 2008). Adoption of an integrated package of high yielding variety (HYV) seeds, better irrigation and higher use of chemical fertilizers has enabled India to behold self-sufficiency in foodgrain production (Halmandage and Munde, 2010). Higher use of fertilizers are credited for about 50 to 60 per cent increase in food grain production in India (Praveen, 2014). The introduction of subsidies to chemical fertilizers was decisive in making them available at affordable rates to farmers (Gulati and Banerjee, 2015) and hence a key instrument for improving food production (Singh, 2004). Fertiliser subsidies (input subsidies in general) are provided in majority of the countries to correct input market imperfections, achieve equitable distribution and to boost food production despite making it available at affordable prices. Experience of many developing countries also indicate that fertiliser subsidies become patronage of political parties and are often very difficult to remove/replace. The impact of subsidies are well visible in the consumption of fertilizers and production of foodgrains (Wiggins and Brooks, 2010). Fertilizer consumption, which was 65.6 thousand tonnes in 1950-51, increased to 26,400 thousand tonnes in 2009-10, whereas the foodgrain production increased from 51.9 million tonnes to 218.2 million tonnes during the same period (Mujeri *et al.*, 2012). Thus, subsidies to fertilizers are supported citing the economic benefits to the farmers through better yields from their farm (World Bank, 2008). Fertilizer consumption reached its peak in the year 2010-11 when it was 28122.2 thousand tonnes and then receded to 25576.1 thousand tonnes in 2014-15. Food grain production during the same period however increased

from 244.48 million tonnes to 252.68 million tonnes (Fertilizer Association of India, 2015).

Literature, on the other hand, also provide evidences on the negative externalities of unscientific and indiscriminate use of fertilizers (especially the heavily subsidised ones). The crop response to the fertilizers fell continuously from about 25 kg of grain kg⁻¹ fertilizer during 1960's to 8 kg during 1990's (Kapur, 2011). The indiscriminate use of fertilizers (and other subsidised agricultural inputs) without considering the nutrient requirements of the soil affects the long term sustainability of the environment (Tiwari 2010; Sharma and Thaker, 2009). The ever mounting fiscal burden due to subsidies is also a cause of concern (Gulati and Banerjee, 2015; Chand and Pandey, 2008), for example, the fertilizer subsidy rose from about 60 crores in the year 1976-77 to more than 72000 crores in 2010-11 (Fertilizer Association of India, 2015). The biggest concern, however, is regarding targeting of subsidies towards its end beneficiaries. Subsidies are often criticised to have benefitted the fertilizer companies rather than the farmers (Gulati and Narayanan, 2003). It is also being blamed for crowding out investment on infrastructure and agriculture research and education (Wiggins and Brooks, 2010). As fertilizers will continue to play vital role for future food security, it is important to analyse the fertilizer consumption and equity in distribution of fertilizer subsidies across crops, states and farm size classes. Equitable distribution of fertilizer subsidy will mean that small and marginal farmers, who form the bulk of the cultivators, have equal access to fertilizers compared to their counterpart. Similarly, equitable distribution of fertilizer subsidies across states will ensure that input intensification of agriculture is not just confined to traditional green revolution belt. Such analysis will provide policy input for formulating future

fertilizer policies to harness the potential of diversified crop groups across states through sustainable intensification. The study assumes greater significance as Indian fertilizer policy is at crossroads, with the government trying to bring fertilizer subsidy under ambit of direct cash transfer.

MATERIALS AND METHODS

Data on fertilizer consumption, subsidies, fertilizer prices and soil nutrient ratios are compiled from various issues of fertilizer statistics. Data pertaining to soil nutrient ratio was collected for the period 1990 to 2013. Crop-wise and state-wise share in fertilizer subsidies are calculated based on their respective share in fertilizer consumption using the data for the years 2011-12 and 2013-14 respectively. It is assumed here that the subsidies are distributed across these categories in proportion to their total fertilizer usage. The data on farm category wise and crop wise fertilizer consumption, gross cropped area and area treated with one or more fertilizers were also collected for the years 2006-07 and 2011-12 from the input survey of the Government of India. Other secondary data sources like agricultural statistics at a glance, and cost of cultivation data of Government of India are also referred for the study. The tables in this paper are constructed based on the following calculations:

- ✓ Subsidy received by i^{th} crop = Share of i^{th} crop in total fertilizer use * Total fertilizer subsidy received by all crops in that particular year
- ✓ Subsidy received by i^{th} state = Fertilizer consumption of i^{th} state (tonnes) * Subsidy distributed per tonne of fertilizers (Rs.)
- ✓ Subsidy distributed per tonne of fertilizers = Total fertilizer subsidy distributed (Rs.) / Total fertilizer consumption (tonnes)
- ✓ Subsidy received by i^{th} farm category = Fertilizer consumption of i^{th} farm category * Fertilizer subsidy distributed per kg in that year

RESULTS AND DISCUSSION

Trends in central subsidies

The amount of fertilizer subsidies before 1970s did not create much burden on the central budget. The oil price shock of the early 70s and the retention price scheme, which the government implemented during the late 70s, triggered the hike in fertilizer subsidies (Gulati and Narayanan, 2003). The subsidy amount in constant 2011-12 prices of 760 crores in 1976-77 increased to 37061 crores in 2006-07 and to 62191 crores in 2013-14 (Table 1). Its share in total subsidies increased from 6.34 per cent to 27.89 per cent during the same period. At one point, during the late 90s fertilizer subsidy even reached almost half of the total subsidies of the central

government. As per cent of GDP, the fertilizer subsidy increased manifold from 0.06 per cent in 1976-77 to 0.63 per cent in 2013-14. Analysis of growth rates of subsidies revealed that the fertilizer subsidy is growing at a faster rate than the total subsidies. The growth of fertilizer subsidies, which was 29.66 per cent during the 1980s, decreased to 12.85 per cent in 1990s. This was due to the measures taken by the government to scale down the fiscal deficit in the early 1990s. The latter half of the decade, however, showed the tendency to return to the higher subsidy rates with a growth of 15.31 per cent during 1995-00, and 19.31 per cent during 2001-14. Available statistics show the total fertilizer subsidy is to the tune of Rs. 2070 crores in 2014-15 (revised estimate) and Rs. 72969 crores in 2015-16 (budget estimate). The trend in major types of subsidies (Table 2) prove the prominence of subsidies towards fertilizer and food in India. Except the petroleum subsidy, which moved slightly downwards after 2012-13, no other subsidies showed signs of receding. In fact, the growth was picking up again in fertilizer and food subsidies after 2011-12. In the year 2014-15, the share of food and fertilizer subsidies in total subsidies was about 44 and 24 per cent respectively. Within the fertilizer subsidies, indigenous urea fertilizer has received the highest share, followed by decontrolled fertilizers and imported urea.

Crop wise fertilizer subsidy distribution

Crops receive subsidies in proportion to their respective volume of fertilizer consumption. In India nitrogenous fertilizers are consumed more than phosphatic and potassic fertilizers (Table 3). A total of 24 million tonnes of fertilizers are consumed in India in the year 2011-12. Per hectare fertilizer usage is highest in sugarcane, followed by wheat, cotton and paddy. Paddy and wheat are the crops that receive the highest share in fertilizer subsidy. These two crops together account for about half of the total subsidy distributed for fertilizers in the country. The complementarity of the fertilizer use with other technological improvements like high yielding varieties and irrigation are prime reasons for concentration of subsidies in these crops. Foodgrains in total receive about 67 per cent of the subsidy distributed. Cotton and sugarcane are other crops that receive a significant share in subsidies. Sugarcane, wheat, cotton and paddy are again the crops that benefit the most from fertilizer subsidy received per hectare crop area. Pulses, the crop group that is in the limelight in recent periods due to surge in prices, receive Rs. 2308 as subsidy ha^{-1} , which is the lowest among all crop groups. The intensity of fertilizer use, and hence the incidence of subsidy however varies across the states for the same crop (Table 4). Paddy, wheat, sugarcane and cotton are thus the crops that benefit most from the fertilizer subsidies. The share of fertilizer cost in total

Table 1: Trend in fertilizer subsidies and growth in major subsidies (1976 till 2013)

Year	Amount (crores) and share of fertilizer subsidy			Year	Growth in central subsidies (%)		
	Subsidy in constant 2011 prices (crores)	Total subsidy (%)	GDP (%)		Food subsidy	Fertilizer subsidy	Total subsidies
1976-77	760.71	6.34	0.06	1980-90	18.67	29.66	21.06
1986-87	10717.85	34.80	0.59	1990-00	16.91	12.85	9.45
1996-97	17159.79	48.89	0.53	1991-95	23.74	4.28	-15.17
2006-07	37061.79	45.90	0.61	1995-00	10.78	15.31	12.95
2013-14	62191.45	27.89	0.63	2001-14	15.76	19.31	16.45

Table 2: Share of major subsidies in India (2004 till 2014)

Year	Share in total fertilizer subsidy (%)			Share in total subsidies (%)			
	Indigenous urea	Imported urea	Decontrolled	Total Fertilizer	Food	Petroleum	Other
2004-2005	64.51	3.11	32.38	34.55	56.14	6.43	2.62
2005-2006	57.71	6.56	35.73	38.85	48.56	5.65	6.40
2006-2007	48.24	12.49	39.27	45.90	42.04	4.72	6.35
2007-2008	39.86	20.33	39.81	46.40	44.74	4.03	4.90
2008-2009	23.46	13.16	63.39	59.06	33.73	2.20	4.72
2009-2010	28.70	7.51	63.79	43.34	41.35	10.58	4.13
2010-2011	24.21	10.36	65.43	35.92	36.81	22.13	5.08
2011-2012	28.86	19.59	51.55	32.12	33.41	31.42	3.04
2012-2013	30.31	23.34	46.35	25.61	32.99	37.60	3.77
2013-2014	38.99	17.72	43.29	26.60	36.01	33.45	3.94
2014-2015	49.34	16.86	33.81	27.99	44.12	24.33	3.55

Source: Fertilizer Association of India, 2015

Table 3: Crop wise fertilizer consumption and subsidy distribution (2011-12)

Crop	Fertilizer used ('000 tonnes)				Fertilizer used per ha GCA (kg ha ⁻¹)	Fertilizer subsidy received (crores)	Share in fertilizer subsidy (%)	Fertilizer subsidy ha ⁻¹ GCA
	N	P	K	Total				
Paddy	4413.45	1946.71	907.93	7268.09	149.34	20516.54	29.30	4215.58
Wheat	3533.01	1472.32	268.56	5273.90	177.96	14887.28	21.26	5023.40
Jowar	333.00	165.17	49.45	547.62	87.54	1545.83	2.21	2471.23
Bajra	257.78	104.33	32.15	394.26	49.31	1112.93	1.59	1391.91
Maize	735.22	335.60	130.48	1201.31	112.23	3391.08	4.84	3167.99
Groundnut	157.81	130.18	50.85	338.84	102.05	956.48	1.37	2880.70
Sugarcane	762.59	411.21	221.13	1394.92	319.55	3937.62	5.62	9020.31
Cotton	1403.81	534.21	213.86	2151.88	153.43	6074.39	8.68	4331.04
Total foodgrains	10494.95	4592.98	1543.30	16631.23	130.85	46947.03	67.05	3693.69
Total pulses	993.89	437.49	107.57	1538.95	81.85	4340.81	6.20	2308.58
Total oilseeds	1374.19	797.63	204.41	2376.24	92.60	6707.70	9.58	2614.02
Total fruits	230.87	154.34	118.24	503.45	177.90	1421.14	2.03	5021.70
Total vegetables	373.17	251.94	146.91	772.01	197.72	2179.26	3.11	5581.24
Total spices and condiments	142.10	93.03	47.17	282.31	144.07	796.90	1.14	4066.85
All crops	15150.66	7051.84	2599.96	24802.47	130.71	70013.00	100.00	3689.67

Source : Input survey, 2011-12

Table 4: Consumption and cost of fertilizers in selected states (2013-14)

State	Fertilizer consumption	Share of fertilizer in operational	Fertilizer consumption	Share of fertilizer in operational	Fertilizer consumption	Share of fertilizer in operational	Fertilizer consumption	Share of fertilizer in operational
	ha ⁻¹ (kg)	cost (%)						
	Paddy		Wheat		Sugarcane		Cotton	
Andhra Pradesh	239.24	14.01	–	14.02	148.51	6.77	268.79	13.55
Gujarat	153.69	11.50	186.67	12.80	–	–	217.99	10.73
Haryana	207.83	12.07	202.18	–	255.35	10.03	135.58	7.19
Karnataka	260.65	17.68	–	11.97	338.29	13.22	170.25	14.33
Madhya Pradesh	105.66	11.24	100.44	13.31	–	–	84.08	10.80
Maharashtra	143.48	8.00	192.26	21.87	643.98	16.64	257.40	14.42
Punjab	209.11	11.87	251.12	9.96	–	–	191.75	9.19
Rajasthan	–	–	131.39	–	–	–	129.26	6.75
Tamil Nadu	240.19	12.00	–	15.62	458.50	10.16	172.73	10.41
Uttar Pradesh	156.80	12.87	173.57	–	192.69	7.92	–	–

Source: GoI, 2017

Table 5: Share of major states in fertilizer subsidy (2014-15)

State	Fertilizer consumption ('000 tonnes)	Fertilizer subsidy (crores)	Share of states in fertilizer subsidy (%)	Share in GCA (%)	Subsidy per ha GCA
Assam	286.44	807.15	1.12	2.16	1923.16
Bihar	1346.19	3793.38	5.26	4.00	4877.69
Jharkhand	114.62	322.98	0.45	0.85	1949.21
Odisha	499.54	1407.64	1.95	2.61	2776.95
West Bengal	1466.91	4133.55	5.74	4.81	4419.49
Haryana	1303.15	3672.10	5.10	3.28	5760.15
Himachal Pradesh	53.06	149.52	0.21	0.49	1578.84
Jammu& Kashmir	110.07	310.16	0.43	0.60	2669.21
Punjab	1717.75	4840.38	6.72	4.05	6150.42
Uttar Pradesh	4271.64	12036.90	16.70	13.28	4661.67
Uttarakhand	170.37	480.08	0.67	0.58	4271.17
Andhra Pradesh	1738.83	4899.78	6.80	4.09	6155.51
Telangana	1177.57	3318.23	4.60	2.93	5831.69
Karnataka	1831.97	5162.24	7.16	6.04	4394.14
Kerala	209.50	590.34	0.82	1.33	2277.56
Tamil Nadu	1014.80	2859.57	3.97	2.64	5563.36
Gujarat	1684.00	4745.28	6.58	6.48	3766.10
Madhya Pradesh	1796.94	5063.53	7.03	11.90	2189.16
Chattisgarh	605.40	1705.93	2.37	2.93	2997.60
Maharashtra	2814.66	7931.33	11.01	11.25	3625.91
Rajasthan	1298.98	3660.35	5.08	12.32	1528.07
All India	25576.12	72070.00	100.00	100.00	3707.32

Source: Fertilizer Association of India, 2015

Fertilizer subsidy in India

Table 6: Farm size wise incidence of fertilizer subsidy

Year	Particulars	Farm size categories					
		Marginal	Small	Semi medium	Medium	Large	All farm groups
2006-07	Fertilizer consumption kg ha ⁻¹	139.7	128.3	108.3	95.1	67.6	112.8
	Fertilizer subsidy ha ⁻¹ (Rs.)	4065.68	3733.91	3151.85	2767.69	1967.36	3282.81
	Ratio of subsidies to all farm groups	1.23	1.13	0.96	0.84	0.59	1.00
	Share in cropped area (%)	23.42	20.94	22.95	22.45	10.21	100.00
	Share in fertilizer consumption (%)	29.02	23.84	22.06	18.95	6.13	100.00
	Share in number of holdings applying one or more fertilizers (%)	61.65	20.04	12.02	5.46	0.84	100.00
2011-12	Fertilizer consumption kg ha ⁻¹	188.65	130.64	113.63	99.4	84.74	130.71
	Fertilizer subsidy ha ⁻¹ (Rs.)	5612.64	3886.87	3380.63	2957.42	2521.1	3888.77
	Ratio of subsidies to all farm groups	1.44	0.99	0.86	0.76	0.64	1.00
	Share in cropped area (%)	24.84	22.46	23.55	20.69	8.44	100.00
	Share in fertilizer consumption (%)	35.86	22.46	20.48	15.73	5.47	100.00
	Share in number of holdings applying one or more fertilizers (%)	65.22	19.12	10.70	4.33	0.62	100.00

Table 7: Consumption of major fertilizer grades in India from 2005-06 to 2014-15 ('000 tonnes)

Year	DAP	TSP	MOP	16-20-0-13	20-20-0-13	Urea
2005-06	6763.92		2731.26	175.24	2081.63	22297.51
2006-07	7381		2585.61	164.21	2210.11	24337.66
2007-08	7496.61		2880.69	166.55	1723.37	25963.15
2008-09	9231.21	206.54	4077.33	162.12	2492.75	26649.21
2009-10	10491.83	84.2	4634.06	210.34	3466.52	26673.44
2010-11	10869.9	86.65	3931.62	427.07	3576.43	28112.53
2011-12	10191.19	78.13	3028.93	523.58	5416.95	29565.32
2012-13	9154.08	39.56	2211.02	272.84	3703.17	30002.2
2013-14	7357.42	3.59	2280.41	163.71	3336.82	30600.48
2014-15	7625.56	1.84	2853.35	135.7	3801.89	30609.97

Source: Fertilizer Association of India, 2015



Fig. 1: Fertilizer subsidy as percentage of gross value of output

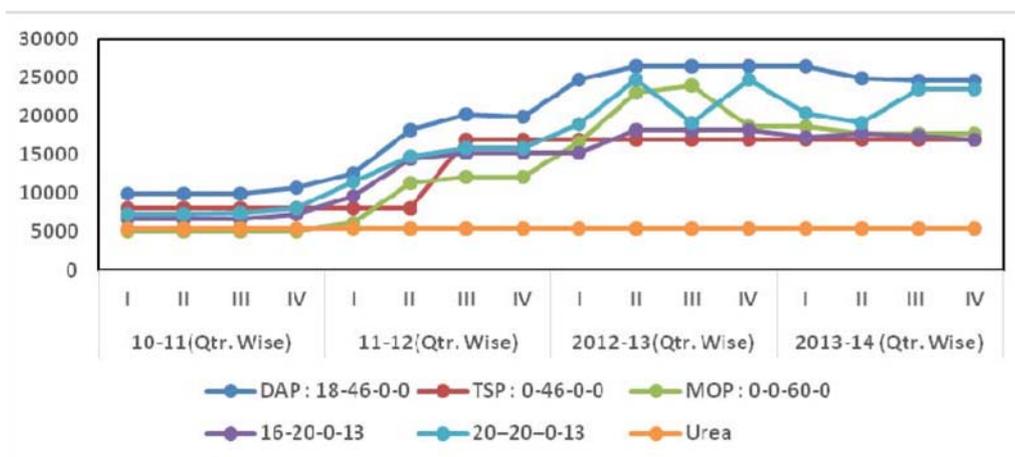


Fig. 2: Retail prices (₹ T⁻¹) of major fertilizer grades in India after nutrient based subsidy (Quarter wise from 2010-11 to 2013-14)

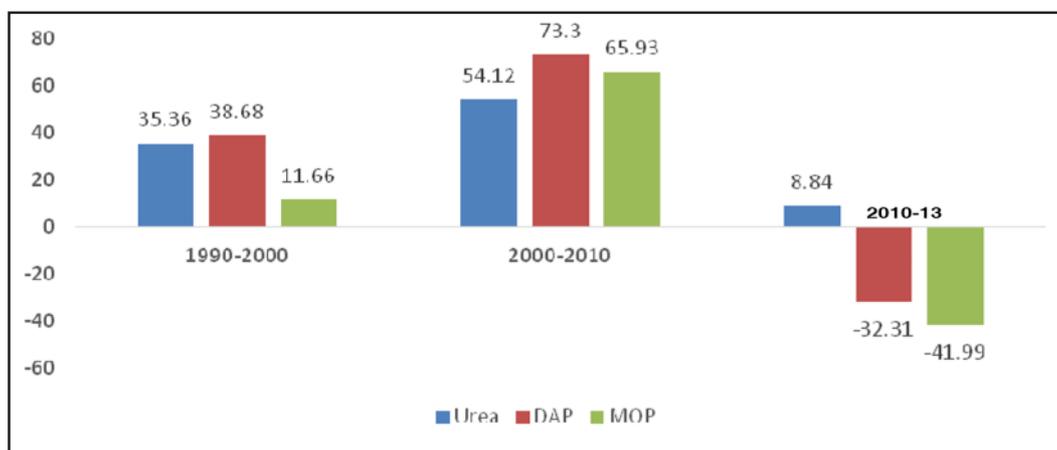


Fig. 3: Percentage change in all India consumption of selected fertilizers

operational cost are also high in these crops in major producing states. For example, fertilizer cost contributed about 17.68, 14.01 and 12.87 per cent respectively to the total operational cost of paddy in the states of Karnataka, Andhra Pradesh and Uttar Pradesh. Similarly, its share is as high as 21.87, 16.64 and 14.42 per cent respectively for wheat, sugarcane and cotton in Maharashtra. Subsidy on fertilizer amounts to about 5.20 per cent to 10.07 per cent of gross value of output per ha in sugarcane, wheat, cotton and paddy (Fig. 1) which indicates the importance of subsidy on the economy of farmers growing these crops. The cause of concern, however, is extremely low fertilizer use in case of total pulses and coarse cereals like bajra and jowar. This also offers ample scope for increasing production through promoting use of fertilizers at recommended doses.

State wise fertilizer subsidy distribution

The nature and status of agriculture among various Indian states are different, owing to the agro-climatic

diversity of the country and gross cropped area available in each state. The diverse climate and soil fertility facilitates cultivation of different crops with varying nutrient requirements. Understanding these fully, and also the fact that the fertilizer consumption is bound to vary according to several other factors, still it is worthwhile to inquire the equity in subsidy distribution across states. At present, the fertilizer subsidies in India is concentrated in seven of its states. Uttar Pradesh (16.70%) and Maharashtra (11.01%) leads the table, followed by Karnataka (7.16%), Madhya Pradesh (7.03%), Andhra Pradesh (6.80%), Punjab (6.72%) and Gujarat (6.58%). These seven states holding 57.09 per cent of the GCA of the country together receives 62 per cent of the total fertilizer subsidy distributed. It is also worth mentioning that these states are dominated by the fertilizer intensive crops like paddy, wheat, sugarcane and cotton. The states of Assam, Jharkhand, Chattisgarh, Odisha, Himachal Pradesh and Jammu and Kashmir,

Uttarakhand, Kerala and Tamil Nadu together receives a share of less than 12 per cent in comparison to their 15 per cent share in GCA. The states in disadvantageous position however are the ones like Rajasthan and Madhya Pradesh since they receive much lesser share in subsidy in comparison to their share in GCA. In contrast to this Uttar Pradesh, Andhra Pradesh, Punjab, Haryana and Telangana benefits through greater subsidy share than share in GCA. Most other states receive subsidy almost equal to their share in GCA. Subsidy incidence ha^{-1} GCA is highest in the states of Andhra Pradesh, Punjab, Telangana and Haryana, and lowest in Rajasthan, Maharashtra, Chhattisgarh and Madhya Pradesh. Whereas, Rajasthan, Jharkhand, Assam and Madhya Pradesh has very less fertilizer subsidy ha^{-1} of cropped area compared to other states. Similar result was reported by (Chand and Pandey, 2008). While formulating new fertilizer policy, emphasis to be given to achieve convergence in fertilizer subsidy across states, so that production potential of these areas are harnessed to greater extent.

Farm size wise fertilizer subsidy distribution

A comparison of incidence of fertilizer subsidy on different farm categories for the years 2006-07 and 2011-12 are presented in the table 6. Subsidy amount of Rs. 12.11 distributed for a kilogram of fertilizers in the year 2006-07 increased to about Rs. 29.75 in the year 2011-12. These figures were attained from the values of total fertilizer subsidy distributed and total fertilizer consumption in the respective years. Similarly, the subsidy ha^{-1} increased from Rs.3282.81 to Rs.3888.77 during the same period for all farm groups taken together. The ratio of subsidies to all farm groups and the per ha fertilizer subsidy received by different farm groups indicated better values for marginal and small farmers compared to the larger ones. Share in total fertilizer consumption and fertilizer subsidy ha^{-1} is inversely related to the farm size (Sharma and Thaker, 2009). Between 2006-07 and 2011-12 even though the per ha subsidy increase for all the farm categories, marginal farmers able to improve the ratio of subsidies received per ha to all farm groups from 1.23 to 1.44. The above figures provide evidence of existence of fair degree of equity among farm categories.

Nutrient based subsidy

Nutrient Based Subsidy (NBS) Scheme was introduced in the year 2010 to hold the rising central subsidy for fertilizers and to ensure the balanced application of fertilizers. As per this policy (which was applicable for decontrolled P and K fertilizers), the fertilizers namely DAP, MOP, NPKS complexes, MOP, TSP, Ammonium Sulphate (AS) and Single Super

Phosphate (SSP) are provided to the farmers at subsidized rates based on the nutrients (N, P, K and S) contained in these fertilizers. Additional subsidy is also provided for the fertilizers fortified with secondary and micronutrients as per the Fertilizer Control Order such as Boron and Zinc. Urea however still remains as a statutorily controlled fertilizer and the price is fixed by government. The subsidy in respect of non-urea fertilizers under NBS are fixed on annual basis based on their nutrient content.

Even though the NBS is a relatively new scheme, and its impact will only show up in a longer time period, it could not show any hint regarding curtailing subsidies towards fertilizers. Fertilizer subsidy which was Rs. 640.3 billion in 2009-10 before the introduction of NBS, reached Rs. 658.4 billion in 2010-11 on the year of its introduction. It further increased to Rs. 705.9 billion in 2012-13, Rs. 712.5 billion in 2013-14 and Rs. 729 billion in 2015-16 (budget estimate). Effect of the scheme was also visible in fertilizer prices, with the price of DAP increasing from 10000 tonne^{-1} to 22000 tonne^{-1} between 2010 and 2013 (Fig. 2). Price of MOP increased from Rs. 5000 tonne^{-1} to 16000 tonne^{-1} . Price of urea remained unaffected (since it is controlled). Consumption of P and K fertilizers reduced after the implementation of NBS (Table 7). Between 2010 and 2013, consumption of urea increased by 9 per cent, whereas that of DAP and MOP decreased by 32 per cent and 42 per cent respectively (Fig. 3). Overall consumption of fertilizers which had reached the peak in 2010-11 with a value of 28 million tonnes decreased continuously to reach 24 million tonnes in 2013-14. The nutrient imbalance in soil also got worsened after the implementation of Nutrient Based Subsidy. The N:P:K ratio which was 4.7:2.3:1 in 2010-11 worsened to 8.2: 3.2:1 in 2012-13 and 8.0: 2.7:1 in 2013-14 (Fertilizer Association of India, 2015). Similar results were also reported by (Chand and Pavithra, 2015)

From the above study, it can be concluded that, fertilizer subsidy is growing at a faster rate (19.31%) than the total subsidy (16.45%) of the Central government (during 2001-2014). Our study indicated high inequality in crop wise and state wise distribution of fertilizer subsidy in India. Paddy and wheat receive more than half of the fertilizer subsidy. Farmers growing paddy, wheat, cotton and sugarcane are the prime beneficiaries of subsidy since these crops show high fertilizer intensity and fertilizer cost constitutes a major item in total operational cost of these crops. Major share in fertilizer subsidy (62%) goes to seven states: Uttar Pradesh, Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, Punjab and Gujarat. In terms of per hectare fertilizer use, the main beneficiaries of fertilizer subsidy turn out to be the states of Punjab, Haryana,

Telangana, and Andhra Pradesh, where the fertilizer consumption per hectare is more than national average. Regions and states specializing in crops like paddy, wheat, cotton and sugarcane gets larger share in subsidies. Crop-wise and state/region wise inequality in fertilizer subsidy is mainly due to the availability of better technology (improved varieties having better response to fertilizers) supported by favourable climate. Fair degree of equity prevails among farmer classes (marginal, small, semi-medium, medium, large).

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