

## Analysis of Demand and Supply Gap of Di-Ammonium Phosphate (Dap) in Rangareddy District of Telangana

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(Received: 10 July 2023; Revised: 15 August 2023; Accepted: 10 September 2023; Published: 15 October 2023)

(Published by Research Trend)

**ABSTRACT:** This study was carried out in Rangareddy district in Telangana as according to Ministry of Agriculture, Telangana state is one of the major fertilizer consumer in India, which is in top five position consistently from 2016 to 2021. This study was conducted to know if there exists any demand and supply gap of DAP fertilizer in Rangareddy district. A sample of 108 farmers and 12 dealers were surveyed about DAP fertilizer usage pattern and their demand in fertilizer on paddy, maize, cotton and redgram crops as these are the main cultivated crops in Rangareddy district. By using graphical, percentage and t test methods, total DAP demand was calculated which is about 28345.74 MT in entire Rangareddy district and supply was 10452.61 MT (Agricultural office, Rangareddy district) and there exists a gap about 17893.13 MT and it discussed about demand and supply gap in sample area.

**Keywords:** Fertilizer demand, fertilizer supply, demand and supply gap, DAP fertilizer.

### INTRODUCTION

Fertilizers had a crucial role in the success of India's green revolution and subsequent independence in the production of food grains. Marketers in the private, governmental, and cooperative sectors are establishing the standard to guarantee that the right consumers have access to the right products at the right time and place for their needs. The increase in fertilizer consumption has made it more easier for the country to grow food grains in a sustainable way. Due to this, the demand for fertilizers has experienced double-digit growth rates over the previous few years.

India is currently both the second-largest producer and consumer of fertilizers in the world. The Indian fertilizer market is heavily reliant on imports from other nations, particularly potash fertilizers from Canada, the United States, Russia, etc. Due to the nation's dependence on imports due to a shortage of domestic raw resources, the cost of fertilizer varies. However, it is hoped that the new regulations will help to lower raw material costs in the ensuing years (Fertilizer Association of India, 2020).

In many regions of the world, the COVID-19 outbreak has had a significant negative impact on the fertilizer industry (Farias *et al.*, 2020). Due to a labour shortage and the closure of a few fertilizer factories located in integrated chemical complexes, exports during the early lockdown were hampered. China's exports, which

constitute the majority of world exports and were the pandemic's epicentre, suffered greatly. Later, the situation in the nation stabilised. According to industry estimates, unless Chinese export restrictions are lifted earlier than anticipated, DAP prices would likely remain high in the first half of 2022 due to supply constraints, whereas urea prices may slightly decline in 2022 due to low feed stock cost. Hence, the overall effect of COVID-19 on the fertilizer industry in India was huge. (Ilinova, 2020). According to iFMS data, DAP fertiliser sales in India are increasing year over year, with consumption reaching to 119.13 lakh tonnes in 2020-21, representing a 19.3 percentage increase over the previous five years. DAP production reached 38 lakh tonnes, a 13.6 percent decrease in production over the previous five years, while imports reached 58 lakh tonnes, a 31.8 percent increase over the previous five years. International pricing variations, raw material prices, forex volatility, agro-climatic hazards, and the retail price disparity of P&K fertilizers, which are still needed to balance the use of nutrients, are the variables that are causing this scenario (Fertilizer India (2021)).

The Central Government imported the fertilizer late which resulted in its shortage. The country had no option but to import DAP. With word of shortage spreading among farmers, farmers rushed to outlets to buy fertilizer not only for the running season but also for the next cycle of crops. Some traders also started

black marketing activities taking advantage of the situation.

According to the Ministry of Agriculture, Telangana state is one of the major fertilizer consumer in India, which is in top five position consistently from 2016 to 2021. And excess use of fertilizer by farmers is seen mostly in Telangana State. As there is high demand for fertilizer and prices of DAP was increased, it created a pressure among farmers, so there is a need to study supply demand gap in Telangana and in Rangareddy district major crops are grown like paddy, cotton, maize and redgram so, it is selected as study area.

## MATERIAL AND METHODS

The present study was conducted in selected rural areas of Rangareddy District where farmers and fertilizer dealers are located. For the purpose of study, total sample size of 120 was taken. A combination of purposive and simple random sampling method was adopted for selection of farmers and dealers, three mandals based on crops cultivated that is paddy, maize, cotton and redgram as these crops are majorly grown in Rangareddy district. Shabad, Yacharam and Madgul were selected through purposive sampling as these mandals are top in growing paddy, maize, cotton and redgram. From each mandal three villages were selected and from each village 12 farmers were selected. Apart from 108 farmers, 12 input dealers were selected by simple random sampling technique in the district. Farmers and dealers were interviewed regarding fertilizer usage pattern, demand, etc. The collected data was analysed using graphical method, percentage and t test methods. T test is used to analyse the demand and supply gap.

## RESULTS AND DISCUSSION

### A. Demand and Supply Gap of DAP Fertilizer in Paddy, Cotton, Maize and Redgram in Rangareddy District

Demand and supply gap of DAP fertilizer is calculated by subtracting total DAP supply from total DAP demand. As paddy, maize, cotton and redgram are the major crops grown in Rangareddy district, demand and supply gap is calculated for these crops below.

Total DAP fertilizer demand / potential is calculated by multiplying total cropped area of paddy, maize, cotton and redgram with recommended DAP fertilizer. Table 1 shows total cropped areas in Rangareddy district.

Table 2 shows market potential of urea, DAP and MOP of paddy, maize, cotton and redgram. For paddy market potential of urea, DAP and MOP is 17957.49MT, 8978.74MT and 4662.04MT respectively, for maize market potential of urea, DAP and MOP is 6415.01MT, 2138.33MT and 1649.57MT respectively, for cotton market potential of urea and MOP is 28421.13MT and 10931.2MT and for redgram market potential of urea and DAP is 1193.2MT and 3018.11MT.

**Table 1: Total cropped area of paddy, maize, cotton and redgram.**

Crop	Cropped area (ha)
Paddy	69067.29
Maize	12219.07
Cotton	109312.06
Redgram	28075.47
<b>Total</b>	<b>218673.89</b>

**Table 2: Market potential of urea, DAP and MOP of paddy, maize, cotton and redgram in Rangareddy district.**

Crop	Nutrient	Recommended dosage (kg/ha)	Area (ha)	Market potential (MT)
Paddy	N (46% N)	260	69067.29	17957.49
	P (18:46:00)	130		8978.74
	K (60% K)	67.5		4662.04
Maize	N (46% N)	525	12219.07	6415.01
	P (18:46:00)	175		2138.33
	K (60% K)	135		1649.57
Cotton	N (46% N)	260	109312.06	28421.13
	P (18:46:00)	130		14210.567
	K (60% K)	100		10931.2
Red gram	N (46% N)	42.5	28075.47	1193.20
	P (18:46:00)	107.5		3018.11

**Table 3: Total DAP supply in Rangareddy district.**

Crop	Supply (MT)
Paddy	3301.41
Maize	584.07
Cotton	5225.11
Redgram	1342.02
<b>Total</b>	<b>10452.61</b>

Source: Agricultural office, Rangareddy district.

Tables 3, 4 indicates total DAP supply in Rangareddy district during the year 2021-2022.

**Table 4: DAP fertilizer demand and supply for paddy, maize and redgram ( from table 2, 3).**

Crop	DAP demanded (MT)	DAP Supply (MT)
Paddy	8978.74	3301.41
Maize	2138.33	584.07
Cotton	14210.56	5225.11
Redgram	3018.11	1342.02
<b>Total</b>	<b>28345.74</b>	<b>10452.61</b>

Therefore, total DAP demanded in Rangareddy district for paddy, maize and redgram is **28345.74 MT** and total DAP fertilizer supply in Rangareddy is **10452.61MT**.

Demand and supply gap of DAP fertilizer = total DAP demanded- total DAP supplied  
 =**28345.74- 10452.61**  
 = **17893.13 MT**

It resulted that there is a gap of **17893.13 MT** of DAP in Rangareddy district.

**Two sample paired t test for demand and supply gap analysis in Total Rangareddy district**

It is a statistical procedure used to determine whether the mean difference between two sets of observations is zero. It is used to analyse difference/ gap between demand and supply.

Hypothesis formulation

H<sub>0</sub>: there demand is equal to supply  $\mu_d=0$

H<sub>1</sub>: there is difference / gap between demand and supply  $\mu_d \neq 0$

Values of the two sample paired t test

	Demand	Supply
Mean	7086.43	2613.15
Observations	4	4
Df	3	
t stat	2.50	
P value	0.08	

If, p value is less than 0.05, accept null hypothesis H<sub>0</sub>  
 If, p value is greater than 0.05, reject null hypothesis H<sub>0</sub>  
 As, we got p value equal to 0.08, we reject the H<sub>0</sub>. This implies that demand is not equal to supply there exit a gap between them.

*B. Demand and Supply GAP Analysis Sample Taken in Rangareddy District.*

In Rangareddy district, mostly paddy, maize, cotton and redgram are grown in large area. So, top three mandals where these crops are grown were selected i.e, Madgul, Yacharam and Shabad mandals. And three villages from each mandals were studied about market potential and total cropped area from each village by sample is given in Table 5.

**Table 5: Total cropped area (ha) (Paddy, Maize, Cotton, Redgram) from selected sample in Rangareddy district.**

Mandals	Villages (12 farmers from each village) Cropped Area (ha)		Total cropped area (ha) (Paddy, Maize, Cotton, Redgram)	
Madgul	Irwin	Cotton	10.5	28.6
		Paddy	10.1	
		Maize	4	
		Redgram	4	
	Nagilla	Cotton	10.5	27.8
		Paddy	9.7	
		Maize	4	
		Redgram	3.6	
Brahmanapalle	Cotton	10.1	25.4	
	Paddy	9.3		
	Maize	3.2		
	Redgram	2.8		
Yacharam	Yacharam	Cotton	7.8	23.1
		Paddy	8.5	
		Maize	3.6	
		Redgram	3.2	
	Chowderpalle	Cotton	10.1	
		Paddy	9.7	

	Kothapalle	Maize	4.5	28.3
		Redgram	4	
		Cotton	4.6	10.6
		Paddy	2.8	
		Maize	2	
Shabad	Shabad	Redgram	1.2	37.6
		Cotton	13	
		Paddy	11.3	
		Maize	7.3	
	Kakloor	Redgram	6	32.3
		Cotton	11.3	
		Paddy	11	
		Maize	6	
	Kesavaram	Redgram	4	37.6
		Cotton	13.3	
		Paddy	11.3	
		Maize	7	
		Redgram	6	

**Table 6: Demand and supply gap of DAP in Rangareddy district in a sample area.**

Crops	Sample area	Demand (MT)	Supply (MT)	Demand supply gap (MT)
Paddy	Madgul (29.1ha)	3.78	1.37	2.41
	Yacharam (21 ha)	2.73	0.99	1.74
	Shabad (33.6ha)	4.36	1.58	2.78
Cotton	Madgul (31.1 ha)	4.04	1.46	2.58
	Yacharam (22.5ha)	2.92	1.06	1.86
	Shabad (37.6ha)	4.88	1.77	3.11
Maize	Madgul (11.2ha)	1.96	0.52	1.44
	Yacharam (10.1ha)	1.76	0.47	1.29
	Shabad (20.3ha)	3.55	0.95	2.6
Red gram	Madgul (10.4 ha)	1.11	0.49	0.62
	Yacharam (8.4ha)	0.90	0.39	0.51
	Shabad (16ha)	1.70	0.75	0.95

In Rangareddy district, mostly paddy, maize, cotton and redgram are grown in large area. So, top three mandals where these crops are grown were selected purposively i.e, Madgul, Yacharam and Shabad mandals. And three villages from each mandals were studied about market potential and gap analysis is done for DAP fertilizer demand and supply. Paddy is grown under 29.1ha from Madgul, 21ha from Yacharam and 33.6ha from Shabad mandal, DAP demanded from these mandals are 3.78MT, 2.73MT and 4.36MT respectively and DAP supply is 1.37MT, 0.99MT and 1.58MT respectively. And the gap between demand and supply is 2.41MT, 1.74MT and 2.78 MT respectively.

Cotton is grown under 31.1ha from Madgul, 22.5ha from Yacharam and 37.6ha from Shabad mandal, DAP demanded from these mandals are 4.04MT, 2.92MT and 4.88MT respectively and DAP supply is 1.46MT, 1.06MT and 1.77 MT respectively. And the gap between demand and supply is 2.58MT, 1.86MT and 3.11MT respectively. Maize is grown under 11.2ha from Madgul, 10.1ha from Yacharam and 20.3ha from Shabad mandal, DAP demanded from these mandals are 1.96MT, 1.76MT and 3.55MT respectively and DAP supply is 0.52MT, 0.47MT and 0.95MT respectively. And the gap between demand and supply is 1.44MT, 1.29MT and 2.6MT respectively.

Redgram is grown under 10.4ha from Madgul, 8.4ha from Yacharam and 16ha from Shabad mandal, DAP demanded from these mandals are 1.11MT, 0.90MT and 1.70MT respectively and DAP supply is 0.49MT, 0.39MT and 0.75MT respectively. And the gap between demand and supply is 0.62MT, 0.51MT and 0.95MT respectively.

### Demand and supply gap analysis by two sample paired t test in a sample taken in Rangareddy district

Hypothesis formulation

H<sub>0</sub>: there is no difference between demand and supply, demand is equal to supply  $\mu_d=0$

H<sub>1</sub>: there is difference / gap between demand and supply  $\mu_d \neq 0$

Values of the two sample paired t test

	Demand	Supply
Mean	2.39	1.32
Observations	9	9
Df	8	
t stat	9.92	
P value	8.96	

If, p value is less than 0.05, accept null hypothesis H<sub>0</sub>

If, p value is greater than 0.05, reject null hypothesis H<sub>0</sub>

As, we got p value equal to 8.96 which is higher, we reject the H<sub>0</sub>. This implies that demand is not equal to supply there exist a large gap between them.

### CONCLUSION

The current study revealed that there exists a gap in demand and supply of DAP in Rangareddy district because of pandemic effect on fertilizer production and imports in India. So, there is a need to provide sufficient fertilizer supply and also to increase fertilizer production mainly DAP fertilizer.

### FUTURE SCOPE

As the above study resulted that there exists a demand and supply gap, companies should increase the fertilizer production from 100 percentage to 120 percentage and government should increase imports of raw materials, finished products (fertilizers) and establishing new fertilizer producing units( mainly DAP).

Corporates should promote fertilizer sales through online marketing for easy distributions and to provide farmers right fertilizer at right time as needed for crop production measures. And government should also support online marketing of fertilizer with necessary measures to avoid black marketing, etc.,

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**How to cite this article:** Satya Sri Kusuma, T. Sudhakar Reddy, D. Srinivasa Reddy and K. Supriya (2023). Analysis of Demand and Supply Gap of Di-Ammonium Phosphate (Dap) in Rangareddy District of Telangana. *Biological Forum – An International Journal*, 15(10): 09-13.