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Use of fertilizers in Agri-sector of Odisha: A profile study

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Abstract

Fertilizer, the essential source of nutrients for better growth of plants, is a kingpin in enhancing crop production and productivity and plays a great role in securing and maintaining of food security. Adequate fertilizer consumption will make the production able to feed the fast growing population in world especially in India. This review paper analyses the present scenario of fertilizer use in the state of Odisha and has identified a number of stakeholders and agents involved in marketing and distribution of fertilizer in the state. It is found that Odisha is a low fertilizer consuming state with average of 57.11 kg/ha. Against the national average of 157.5 Kg/ha. The highest per ha consumption is in Nabarangpur district, i.e, 154.20 kg/ha, followed by Baragarh (109.87 kg/ha), while Kandhamal is the lowest consuming district with 9.85kg/ha. Unavailability, lack of knowledge, awareness, and rigorous occurrence of natural calamities are the major reasons behind the low fertilizer consumption average in Odisha. Also, this paper focuses on the various drawbacks in the fertilizer production, distribution and utilization by the farming community and proposed various suggestions in fertilizer use in the state Odisha for better production and better agriculture.

Keywords: agriculture, average consumption, fertilizer, food security

Introduction

A soil amendment that guarantees the minimum percentages of nutrients (at least the minimum percentage of nitrogen, phosphate, and potash) is known as a “fertilizer”. It refers to any material of either natural or synthetic origin (other than liming materials) applied to soils or to plant tissues (usually leaves) in order to provide one or more nutrients that are essential for plant growth. The growth of plants is augmented by the use of fertilizers in two important ways ^[1] First by the traditional manner, i.e, additives to provide nutrition and second, enhancing the effectiveness of the soil by altering its aeration and water retention ^[2]. Fertilizer plays a crucial role in intensifying the agriculture that ensures past, current and future food security.

The global demand for fertilizers is quite strong and high. Fertilizer consumption will continue and increase for a growing population with a strong desire and means to improve their livelihood ^[3]. It is impossible to meet the escalating food requirements of the mankind without the use of fertilizers. In the absence of fertilizer use the world produce would go down as much as half of the present and more of the forested lands would have to be put in production. The undermining principles of fertilizer use are the 4R’s – Right source, Right rate, Right time and Right place ^[4]. For ensuring optimum productivity, these principles must be adopted in any kind of a cropping system.

Intentionally the fertilizers are provided for promoting the growth of plants. It may either be applied via soil be taken up by plant roots or may be applied as foliar spray to be taken through leaves. Fertilizers may be either organic (having organic matter - carbon source) or inorganic (comprising simple, inorganic chemicals) in nature. However, considering all the things, inorganic fertilizer plays a more important role in food security worldwide, nevertheless it cannot be ignored the highest yields in many of the cropping systems are the result of a combination of both organic and inorganic sources ^[5]. Higher crop yields have been much scrutinized due to the amount and level of fertilizers required to produce such yields because of the notion and reality of the potential impacts on the environment. However, new technologies and intensified farming and management are required along with the use of fertilizers for maintaining and meeting the growing food requirements. So, with the increasing population and mushrooming urbanization, especially in a country like India which needs to cater for

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billions, “fertilizer serves to be one of the most important components of agriculture”.

For the state of Odisha, in particular, the consumption of fertilizer has been very meager since independence. Till date the consumption is very much below the National average. So, it is very important to understand the present scenario of fertilizer use in the state in order to increase the crop production and productivity.

The fertilizer use situation in Odisha

The role of chemical fertilizers is quite significant in the development of agricultural sector. In spite of improvement in the use of fertilizers, the rate of fertilizer use in Odisha

remains far below the national average. There is an uneven and fluctuating trend in the use of fertilizers in the state. During the year 2008-09 there was about 534.87 Thousand Metric Ton (TMT) of fertilizer consumption in Odisha with per ha consumption of 62.0 kg, which came down to 487.14 TMT and 57.11 kg/ha by the end 2013-14 (Table 1). There is a wide variation in the use of fertilizers in the various districts of our state. Out of 30 districts, during 2013-14, only 10 were above the State average consumption of 57.11 kg/ha. The highest per ha consumption is in Nabarangpur district, i.e., 154.20 kg/ha, followed by Baragarh (109.87 kg/ha), while Kandhamal is the lowest consuming district with 9.85 kg/ha (Table 2).

Table 1: Fertilizer Consumption in Odisha (In Thousand MT)

Year	Nitrogen (N)	Phosphorous (P)	Potash(K)	Total	Kg/ha
1961-62	4.38	0.49	-	4.87	0.76
1971-72	37.43	8.38	4.01	49.82	7.25
1981-82	54.16	17.92	9.91	81.99	9.68
1991-92	126.22	41.52	28.29	196.03	19.96
2001-02	221.17	71.94	51.55	344.66	41.00
2002-03	185.41	62.86	42.29	290.56	39.00
2003-04	210.07	66.64	40.5	317.21	39.00
2004-05	223.54	77.99	53.77	355.3	43.00
2005-06	243.21	91.05	60.63	394.89	46.00
2006-07	256.54	92.77	53.57	402.88	47.00
2007-08	272.1	116.77	63.03	451.9	52.00
2008-09	297.77	147.93	89.17	534.87	62.00
2009-10	292.29	148.59	78.46	519.34	59.78
2010-11	294.72	153.97	89.16	537.85	62.85
2011-12	323.40	135.48	55.80	514.68	62.25
2012-13	315.04	124.19	50.97	490.20	58.74
2013-14	312.99	117.70	56.45	487.14	57.11

(Source: Directorate of agriculture and food production, Odisha)

Table 2: District wise fertilizer consumption (2013-14)

Name of the District	Nitrogenous (N) (in MT)	Phosphatic (P) (in MT)	Potassium (K) (in MT)	Consumption (Kg/ha)
Angul	4368	1991	579	25.03
Balangir	14374	4085	3165	45.83
Balasore	19586	8359	3624	101.76
Bargarh	30687	13846	6687	109.87
Bhadrak	11557	6748	2048	90.06
Boudh	4628	1532	403	49.43
Cuttack	11588	3292	2109	58.64
Deogarh	2375	1258	476	40.53
Dhenkanal	3756	1996	865	27.93
Gajapati	3258	1349	513	38.50
Ganjam	29711	5853	2467	56.41
Jagatsinghpur	4756	2021	705	43.80
Jaipur	9351	3741	1818	54.90
Jharsuguda	3637	1702	611	78.53
Kalahandi	21811	8136	3584	56.04
Kandhamal	761	428	455	9.85
Kendrapada	4939	2116	476	29.30
Keonjhar	8030	4197	919	35.49
Khurdha	6330	2181	1083	51.14
Koraput	10110	4345	3040	49.06
Malkangiri	3675	1307	619	28.13
Mayurbhanj	14227	5274	1748	46.14
Nuapada	6335	2780	959	35.88
Nayagarh	3831	922	473	23.46
Nabarangpur	26833	8200	6523	154.20
Puri	10178	3232	2659	69.05
Rayagada	10137	3295	1453	59.77
Sambalpur	16182	6766	3930	105.94
Sonepur	7087	2801	1221	49.87
Sundargarh	8892	3950	1232	38.50
Odisha	312990	117703	56444	57.11

(Source: Directorate of agriculture and food production, Odisha, 2013-14)

The major stake holders in fertilizer production and supply for farming community in Odisha

IFFCO Ltd, Pradeep

The fertilizer unit of Oswals Chemicals and Fertilizer Plant that was commissioned in April 2000 in Paradeep, Odisha has

been acquired by IFFCO. Being the world's largest grassroots Di-ammonium phosphate(DAP) plant, IFFCO has a capacity to produce 2 million tones of fertilizer per annum that amounts to 0.8 million tones of P₂O₅ and 0.325 million tonnes of N of nutrients every year.

Table 3: Production in IFFCO

Sl. No.	Plant	Capacity	Technology/supplier
1.	Sulfuric Acid Plant	23,10,000 MTPA	M/s Lurgy GmbH, Germany.
2.	Phosphoric Acid Plant	8,75,000 MTPA	M/s Jacobs Engg. Group Inc. USA.
3.	DAP Plant	19,20,000 MTPA	M/s Jacobs Engg. Group Inc. USA.
4.	Turbo Generator sets for power generation	2 sets having 55 MW capacity each	M/s LMZ, Russia.
5.	Coal fired steam generation plant	2 steams having 110TPH capacity each	M/s Thermax, India
6.	Various utilities/ offsite facilities	Sufficient to cater the need of all main plants	Various suppliers

(Source: IFFCO, Paradeep^[6])

Coromandel fertilizers

Coromandel has marked its position as one of the most important manufacturers of phosphatic fertilizers not only in other parts of India but also in Odisha with its wide range of fertilizers. Its products are widely marketed in the trade name "GROMOR". It targets at achieving balanced nutrition to the plants not only by promoting primary nutrients but also checking the deficiency of other secondary and micronutrients.

Nagarjuna fertilizers and chemicals limited (NFCL)

It augments the farming community to increase the output both qualitatively and quantitatively to the maximum extent. It is one of the major stake holders of fertilizers in Odisha. Urea, anhydrous ammonia, DAP (18-46-0), MOP, Zinc Sulphate Heptahydrate, Zinc Sulphate Monohydrate and other wide range of fertilizers are manufactured here.

Dhanuka agritech limited

A wide range of agro chemicals including herbicides, fungicides, insecticides, miticides, plant growth regulators, fertilizers, etc in various forms like liquid, dust, powder, granules, etc are manufactured here. Increasing farm income, enhancing awareness about cost-benefit tradeoff of agro-chemicals are its major aims. They stand out because of their diverse product range with solutions for almost all problems relating to crops and innovative strategies of marketing and effective international tie-ups. It keeps itself updated by adding newer products via various collaborations for helping the farmers in better crop production.

Paradeep phosphates limited (PPL)

It is not only one of the most important and leading fertilizer company in the state of Odisha but has marked its place all over India. It a joint venture of Adventz Group that was established in 1981. It manufactures and markets some of the complex phosphatic fertilizers along with some intermediate products like Phosphoric Acid and Sulphuric Acid as well. PPL caters to the needs of almost all of the agricultural applications in Odisha.

Indian potash limited (IPL)

During the early 1950s the use of Postash in Odisha and few other states was quite insignificant as potash was not known to most of the farmers. But with the establishment of IPL, the use of potash became familiar amongst the farming community, which brought its balanced use as a fertilizer into effect. The IPL was incorporated under the Indian Companies Act.

The government policies on fertilizers in Odisha

It is necessary that the chemical fertilizers as well as organic fertilizers should be used adequately and in a well balanced manner for increasing agricultural production. Presently the fertilizer consumption of Odisha is about 60 kg/ha^[7] which is very much below the national average (140 kg/ha)^[8]. So, there is an immense scope of increasing the consumption of fertilizers in the state of Odisha. While appropriate measures will be taken to increase fertilizer consumption in Odisha, emphasis will be laid on "balanced fertilization". It is defined as an accurate application of fertilizer equal to the need of the plant considering the soil nutrient status. To achieve balanced nutrition for sustainable crop production, Integrated Nutrient Management (INM) is an important concept. The aim of this INM is to integrate the use of all natural and manmade sources of plant nutrients required for a bumper agricultural productivity besides ensuring a sound soil health. The state will venture to promote INM practices through suitable programs and incentives^[9]. Overuse and prolonged use of chemical fertilizers on soil results in deterioration of soil health, hazards to human health and environmental pollution^[10]. Therefore, it is important to switch over to an alternate source of nutrient supply to crops which is ecologically protective to the farming community. Odisha will promote the use of Bio-fertilizers through proper incentives and effective extension. The State will take appropriate steps to have necessary infrastructure to enable the direct transfer of fertilizer subsidy to the farmers. Using IT, the State will also take measures to monitor the sale of fertilizers so that it is not diverted for illegal purposes. The farmers of Odisha will be able to learn about the stock position of the dealers in a transparent manner.

The major drawbacks in the fertilizer production, distribution and utilisation by the farming community

1. Unavailability and insufficient supply of the fertilizers to the farming community in one of the most important constraints.
2. The total potash required for the state in completely imported.
3. Lack of education of the farmers is a major problem in the fertilizer use in Odisha.
4. Due to indiscriminate use of fertilizers, there is boom of excessive cropland weeds.
5. The appropriate ratio of NPK is 4:2:1 but this ratio is seldom maintained during application.
6. In the interior tribal areas there is very few or no use of fertilizers at all.

7. Recommended dose, method and proper interval of fertilizer application is hardly followed in the state.
 8. Lack of knowledge of the farmers about the new and efficient methods of application of fertilizer; so they mostly follow broadcasting method which leads to much wastage and irregular distribution of fertilizers in the soil.
 9. There is unawareness about soil testing due to which the soil nutrient status is not known to the farmers and they blindly apply almost same amount of fertilizers to the various types of soils across the state.
 10. Balanced fertilization and integrated approach is yet not followed full fledgedly across the state.
 11. Government policy and implementation is not reaching to farming community properly.
 12. SSP as a straight fertilizer is not used due to its improper availability in Odisha condition.
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Recommendations and suggestions

1. Adequate information can be provided to the farmers on fertilizers so that they get alerted on the quantity of the fertilizer used and its supply chain.
2. To make the farmers acquainted with the Government schemes implemented in the state.
3. Recommendations should be given on the soil test results and reduce the indiscriminate use of fertilizers on soil and soil testing should be well strengthened.
4. Latest technology and efficient methods of fertilizer application for improved productivity.
5. Facilitation and promotion of Integrated Nutrient Management (INM) through judicious use of chemical fertilizers along with the use of secondary nutrients and micro-nutrients in conjunction with organic fertilizers and bio-fertilizers.
6. The fertilizer use efficiency should be increased as there is a lot of scope for increasing its consumption because our fertilizer consumption is much below the national average.
7. SSP as a straight fertilizer should be used because besides supplying adequate quantities of Phosphorous, it also supplies considerable quantities of Calcium and Sulphur which are required for good crop production.

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