Assessment of Quality Status of Zinc Sulfate (hepta hydrate) Fertilizers Available in the Markets of Jessore Sadar Upazila

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Abstract

An experiment was conducted in the Department of Soil Science, Bangladesh Agricultural University, Mymensingh during January to December, 2012 to see the quality status of Zinc Sulfate (hepta hydrate) fertilizers available in the markets of Jessore sadar upazila. For this purposes Zinc Sulfate (hepta hydrate) fertilizer samples were randomly collected from all union of the upazila. Fifteen unions and a pourashava in this upazila were included the experiment. Three composite samples were collected from each of the unions. Therefore, 48 composite samples were ready for 16 unions including pourashava. In this study 79% Zinc Sulfate (heptahydrate) fertilizer was adulterated and 21% was qualified according to government specification. 40% of them were ten to fifty percent of required Zn content and 2% of them were same level of S content. Only 21% of total fertilizers contained hundred percent of required Zn. Whereas, 96% fertilizers contained the same level of required S and only four percent of the fertilizers was found as sulfur deficient. The highest nutrient value of S and Zn were 17.75% and 23.03% respectively. On the other hand, the lowest value of them was 5.2% and 1.30%. Further 27% of them contained above eighty percent of required Zn. No unique relation between sulfur and zinc content of those fertilizers was found.

Key words: Fertilizer, Jessore, Soil quality, Sulfur, Zinc

Introduction

Bangladesh is one of the most densely populated countries in the world. Its population is increasing geometrically. As a result, to satisfy the increasing population new roads, building construction decrease the cultivable lands. Besides this cultivable land has come down drastically due to salinity. More than two lac hectares of land in the south have lost potential for agriculture due to increasing salt content over the four decades (Anonymous, 2014). In this critical moment, intensive cropping and cultivation of hybrid and HYV is essential to meet up the food demand for increasing population. At this circumstance, soil resource is showing deficiency of plant nutrients due to intensive and modern cultivation on limited agricultural land. One or more chemical and organic fertilizers are applied for proper nutrient supply to the soil. However, at present chemical fertilizers are essential components in modern agriculture. As well as the supply of quality fertilizer is very important. But it is a matter of great regret and alarming that the tendency to adulteration of fertilizer in the domestic market is increasing day by day (Anonymous, 2012). Our farmers are swindled economically and on the other hand crop yield reduces drastically due to use of adulterated fertilizers. It creates a negative impact on our national economy and environment. Use of adulterated fertilizer deteriorates our soil health that may push our soil resource to a great risk. Heavy metal may enter in our body through food chain if heavy metal containing fertilizers are applied to the soil and it may damage our heart, kidney, liver and other important internal organs. So it is very emergency to ensure the supply of quality fertilizers for the overall development of agriculture. Till now, according to Fertilizer (management) Act-2006, at least 109 types of fertilizers are approved by the Government of Bangladesh (Anonymous, 2012). To fulfill the domestic need of these fertilizers, few numbers of Government and non-government factories are present in the country. Major portion of this fertilizer needed is imported by the Government and non-government importer agencies. It is very important to know the quality status of imported and locally manufactured fertilizers. On the other hand, fertilizer recommendation will not be fruit full if adulterated fertilizers are used in the research works and the findings from research will fail the nation to give a unique and correct direction. Therefore, present study was formulated to find the quality status of Zinc Sulfate (heptahydrate) fertilizer available in the market of Sadar upazila under Jessore district.

Materials and Methods

Zinc sulfate (hepta hydrate) fertilizer samples were randomly collected from different market of fifteen unions and a pourashava under Jessore sadar upazila. Three composite samples were collected from each of the unions. Therefore, 48 composite samples were ready for 16 unions including pourashava. Five primary samples of same brand were taken for each composite sample. These primary samples were taken from randomly selected five different fertilizer dealers and retailers who sold the fertilizer of that brand in a particular union or pourashava. Individual composite sample was ground and mixed thoroughly. Then they were minimized by proper way and kept sufficient amount as working sample for analysis with proper tag. All samples were analyzed for total zinc and total SO_4-sulfur in the fertilizer testing laboratory,

SRDI, Jessore. Zinc was determined following standard hydrochloric acid digestion method by atomic absorption spectrophotometer (SHIMADZU; AA-7000) and sulfur was determined following turbid metric method by spectrophotometer (HITACHI, U-2900) at the wave length of 420 nm. Here, barium chloride was used to develop turbid. Both total zinc and sulfur was determined at ppm level, then they were converted in to percentages as the specification of zinc sulfate (hepta hydrate) approved by the Government is total zinc by weight (minimum): 21% and total SO_4-sulfure by weight (minimum): 10.5%. Depending on their existing nutrient content all sample were classified in to five grades viz. G-I, G-II, G-III, G-IV and G-V that were included by considering each of zinc and sulfur content. G-I, G-II, G-III, G-IV and G-V included the samples that showed 100%, 80 to below 100%, 50 to below 80%, 10 to below 50% and 0 to below 10% nutrient coverage of Government specification, respectively. Nutrient values of the samples under different grade (G-I to G-V) are presented in Table 1.

Table 1. Nutrient value of S and Zn under different grade considered

Grading			
Grade name	Nutrient coverage Range	Range of nutrient value (as percent in fertilizer) for S	Range of nutrient value (as percent in fertilizer) for Zn
G-I	100% and above	10.5 and above	21 and above
G-II	80 to below 100%	8.4-10.49	16.8-20.99
G-III	50 to below 80%	5.25-8.39	10.5-16.79
G-IV	10 to below 50%	1.05-5.24	2.1-10.49
G-V	0 to below 10%	0-1.04	0-2.09

Results and Discussion

Table2 shows that the highest and Lowest nutrient value of S and Zn in the samples under different grades. The highest nutrient value of Zn and S were 23.03% and 17.75% in G-1. The lowest nutrient value of Zn was 1.30% in G-V and that of S was 5.2% in G-IV. Only one sample was under both G-III and G-IV for S. Again, no sample was included under G-II and G-V for S content.

Table 2. Highest and Lowest nutrient value of S and Zn in the samples under different grades

Grade name	Nutrient value for Zn (%)		Nutrient value for S (%)	
	Highest value	Lowest value	Highest value	Lowest value
G-I	23.04	21.00	17.75	11.34
G-II	20.98	17.74	-	-
G-III	16.10	12.21	6.66	6.66
G-IV	10.47	3.53	5.20	5.20
G-V	1.65	1.30	-	-

Zinc status of Zinc Sulfate (hepta)

The numbers of samples for zinc content in different grade are presented in Table 3. The highest number of sample was 40 percent in G-IV and the lowest (4%) from G-V. 21, 27 and 8% samples are included in G-I, G-II and G-III, respectively.

Table 3. Number and percentage of Zinc Sulfate (hepta) samples under different grades (considering Zn content)

Grade	**Number of samples**	**%**
G-I	10	21
G-II	13	27
G-III	4	8
G-IV	19	40
G-V	2	4
Total	**48**	**100**

This indicated that twenty one percent fertilizers of Jessore sadar upazila were in the highest quality which fulfilled 100% and above zinc requirement as approved by the government specification. Forty percent (highest) fertilizers contained 10 to below 50% of Zn requirement and 4% (lowest) fertilizers contained zero to below 10% of Zn requirement. Except G-I (21%), rest 79% fertilizers of the upazilas were non-standard from the aspect of Zn content. Again, eight percent fertilizers contained 50 to below 80% zinc nutrient.

Sulfur status of Zinc Sulfate (hepta)

The number of samples for sulfur content in different grade are presented in Table4.The highest number of sample was 96 percent in G-I and the lowest (0%) from both G-II and G-V. Only 2 percent included under each of G-III and G-IV. This indicated that ninety six percent fertilizers of Jessore sadar upazila were in the highest quality which fulfilled 100% and above sulfur requirement as approved by the Government specification. But among the samples of this grade, only 10 samples (21% of total) contained that amount (100% and above of the requirement) of zinc and that was why that 21% samples were considered as qualified (Table3).4%of the fertilizers were found as sulfur deficient. There was no fertilizer under the grade containing the sulfur of zero to below 10% and 80 to below 100%.

Table 4. Number and percentage of Zinc Sulfate (hepta) samples under different grades (considering S content)

Grade	Number of samples	%
G-I	46	96
G-II	0	0
G-III	1	2
G-IV	1	2
G-V	0	0
Total	**48**	**100**

Considering both Zn and S content, most of the fertilizers were sulfur rich even contained much more amount (up to 69% more than requirement) of S. All qualified Zn content fertilizers were found as qualified S content but qualified S content fertilizers were found as qualified or deficient of Zn content. There was no unique relation between the sulfur and zinc content of them.

Table 5. Overall quality according to Fertilizer (management) act, 2006

Grade	Number of samples	%
Quality	10	21
Adulterated	38	79
Total	**48**	**100**

The overall quality of Zinc sulfate (hepta) is presented in Table5. The quality sample was found only from 10 samples out of 48 samples. The adulterated sample was 38 out of 48 samples. Results revealed that only 21% of Zinc sulfate (hepta) fertilizers are qualified and 79% of them are adulterated. According to" Fertilizer (management) act, 2006, "the good quality Zinc sulfate (hepta hydrate) contains 21% zinc and 10.5% sulfur as well as may be crystalline or granular form (Fertilizer Recommendation Guide, 2012).

Conclusions

From this study it may be concluded that 79% of zinc sulfate (hepta hydrate) fertilizers were adulterated. Government should take emergency steps to protect this terrific and unwanted situation. Public and farmer awareness as well as intensive supervision and monitoring in the market is mandatory now. Effective activities should be taken to strengthen the fertilizer quality control scheme and thus all kinds of fertilizer businessman such as manufacturer, importer, dealer, whole seller and retailers to be taken under regulation. Further study is needed to assess the heavy metal content of these fertilizers available in the market of Jessore district.

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