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## Study on boron fertilizer in markets of Monirampur upazila, Jashore, Bangladesh

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### ABSTRACT

*A study was conducted in Monirampur upazila under Jashore district from July to December 2017 to collect information on comparative availability of different boron fertilizers in order to aid the assessment of nutrient status for quality. For this purpose, information was collected from 54 randomly selected fertilizer shops (20 BCIC fertilizer dealers and 34 retailers) through questionnaire interview. Total 37 nature (19 Solubor, 16 Boric acid and 2 Fertibor) of boron fertilizer marketed by 33 companies were found in the upazila. A few marketed boron was found higher in the shop, availability is not adequate. Five percent of Solubor and six percent of Boric acid mentioned no registration number. Twenty six percent solubor brands were in both 100 gram and 500 gram packet where same registration number was used for both sized packed of an individual sample studied. There was a significant difference between highest and lowest MRP of imported Solubor for both 100 and 500 gram packet as well as supplied and imported type of Boric acid.*

**Key Words:** Jashore, Boron fertilizers, Random sample test, Availability and Quality

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## I. Introduction

Sustainable agricultural productivity might be achieved through wise use of integrated nutrient management (Aulakh and Grant, 2008; Bhuiyan, 1994) and fertilizer recommendation (Sultana et al. 2015) to avoid soil fertility degradation (Siddique et al. 2017; Siddique et al. 2014; Halim et al. 2014). Integrated use of chemical fertilizers and organic manure is necessary for crop production as well as maintaining soil fertility (Ali et al. 2009). Thus, chemical fertilizers have been the part of modern agriculture to meet up the food demand especially for ever-growing population of Bangladesh. With the increased use of fertilizer, it is very much important to provide quality fertilizer to the end user

(farmers) at affordable cost. But adulteration of chemical fertilizer is being a great problem with time since the agricultural intensification in Bangladesh (SRDI, 2012). SRDI (2014) also reported that about forty percent urea and non-urea fertilizers available in Bangladesh's market is adulterated and contains highest level of heavy metal that can cause serious health hazards to the people and affect food production and soil fertility in the long run. Moreover, by applying such contaminated fertilizers, farmers are cheated and consequently production suffers in many ways. Seventy-nine percent Zinc Sulfate (hepta hydrate) fertilizers are adulterated in Jashore region (Islam et al. 2015a). Islam et al. (2016a) stated that cent percent zinc sulfate (mono-hydrate) fertilizers collected from Jashore, Jhenaidah and Chuadanga district were adulterated. Till now, at least 109 types of chemical and organic fertilizers are approved by the Government of Bangladesh. Among them twenty-four types are open for all and rests are assigned to particular private and non-government organizations for importing and manufacturing (BARC, 2006). BADC (2012) and BCIC (2013) reported that China, Qatar, Soudiarab and Deshi types of Urea fertilizer, Cargil, Australia, China, Morocco and Deshi types of DAP, China, Tunisia, Morocco, Lebanon, Bulgeria and Deshi types of TSP and Canada and Belarush types of MOP are available in our domestic market. In case of micro nutrient fertilizers, three categories of Zinc fertilizer viz. Zinc Sulfate (hepta hydrate), Zinc Sulfate (mono hydrate) and Chelated Zinc and three categories of Boron fertilizer viz. Boric acid, Solubor and Fertibor are approved by the Government (DAE, 2014). Many brand names of each of those categories are available in the market. More than 80 brands [41 Zinc sulfate (mono), 22 Zinc sulfate (hepta) and 17 Chelated zinc] of zinc fertilizer are available in Chuadanga region among which Grogin, Topaz, Zinc Sulfate, Mukta Plus, Zingsul, Hay Zinc+ of Zinc sulfate (mono) brands, Topaz and Petro zinc of Zinc sulfate (hepta) brands and Brexil, Field Marshal, Topaz of Chelated zinc brands (total eleven) are most available (Islam et al. 2015b). More than 42 brands (23 Solubor, 15 Boric acid and 4 Fertibor) of boron fertilizer are available in Chuadanga region among which Bingo, Solubor and Bor-Fa plus of Solubor boron brands, Mitrika boron and Alfa boron of Boric acid brands and Bor-Fa 15 of Fertibor (total six) brands are most available (Islam et al. 2016b). More than 77 brands [41 Zinc sulfate (mono), 11 Zinc sulfate (hepta) and 25 Chelated zinc] of zinc fertilizer are available in Jashore region among which Zingsul, Mim zinc, Grogin, Bumper mono zinc, Eon zinc and Geel mono of Zinc sulfate (mono) brands, Current Bumper of Zinc sulfate (hepta) brands and Mim zinc gold of Chelated zinc brands (total eight) are most available (Islam et al. 2017). It is necessary to know the comparative availability as well as the individual nutrient status for quality of different brands of three categories of boron fertilizer in order to take all types of fertilizer enterprises (manufacturer, supplier and importer) under quality control scheme to ensure the supply of quality fertilizers. But there is no sufficient information about the definite number and type of Boron fertilizers available in a particular area of the country. Therefore, present study was conducted to find out how many of boron fertilizer are available in the markets of Monirampur upazila, Jashore region and to compare the availability in order to aid the assessment of nutrient status for quality.

## II. Materials and Methods

The present study was carried out in Monirampur upazila under Jashore district during the period from July to December, 2017 to collect the information on the availability of different categories of Boron fertilizer viz. Solubor, Boric acid and Fertibor. For this purpose, investigations were conducted in eighteen points throughout the upazila that were considered as main bazar of seventeen union sadar and one pourashava. Information was collected from different fertilizer shops situated on those bazar points and surrounding the points. Three shops were randomly selected from each union and pourashava. Thus 54 fertilizer shops were taken under the study. There were twenty dealership of Bangladesh Chemical Industries Corporation (BCIC) distributed in the upazila. All BCIC fertilizer dealers were included in the study. Information on boron fertilizer of each category were recorded from each of fifty-four shops by individual interview. Manufacturer's or supplier's name, Government registration number, maximum retail price (MRP) and date of expiry (DOE) of each sample collected were also recorded during interview. Data were collected through questionnaire interview. The questionnaire prepared in Bengali was designed with both closed and open form of questions. The collected data were coded and summarized. Qualitative data were converted into quantitative forms by means of suitable scoring technique whenever necessary. Tabular technique was applied for the analysis of data by using simple statistical tools like averages and percentages. Selected 54 shops were assumed as 54 attendances for each brand. One mark (score point) was given for each attendance in a shop against a brand and total score point (TSP) was calculated with the aggregate of the score points for the individual (i. e. TSP 2 means the brand was present in 2 shops out of 54 shops). TSP of a brand represented its

degree of presence, which was treated as its availability. Then they were tabulated gradually from highest to lowest depending on their TSP. Finally, they were classified into following three classes (Table 01) depending on the availability.

**Table 01. Availability class and their range of total score points (TSP) of different categories of Boron fertilizer**

Availability Class	Total score point (TSP) Obtained by different boron fertilizer		
	Solubor	Boric Acid	Fertibor
Most available: Class-I	>4	>4	Not applicable
Moderately available: Class-II	3-4	3-4	Not applicable
Less available: Class-III	<3	<3	1

### III. Results and Discussion

#### Availability of boron fertilizers

Total 37 marketed boron fertilizers (19 of Solubor, 16 of Boric Acid and 2 of Fertibor) were found in the market of Monirampur upazila which were manufactured or marketed by 33 individual companies. The names of different categories of boron fertilizer with sample number including their availability class were shown in Table 02. In case of Solubor, two sample included class-I among which only one sample obtained the total score point (TSP) 17 and another obtained 8 points. This indicated that above mentioned two sample of solubor were most available in the market. Five samples included class-II among which brands three sample obtained 4 points and another two sample obtained 3 points. These 5 samples were moderately available in the market. The rest 12 samples under class-III obtained 1 score point that were considered as less available.

In case of Boric Acid, only one sample was included class-I which obtained 10 points. This indicated that this sample was the most available. Subsequently, two sample obtaining 4 points and one sample obtaining 3 points under class-II were moderately available. Another eleven sample under class-III were considered as less available. Furthermore, in case of fertibor, no sample was under class-I and class-II in the upazila. Only two sample of fertibor under class-III obtaining 1 score point might be considered as less available brands of fertibor fertilizer. Therefore, three sample (2 of Solubor and 1 of Boric Acid) were most available, eight sample were moderately available, and rest twenty-six sample were less available in the market of Monirampur upazila. Now it is very important to analyze their quality for desired soil fertility and crop productivity.

**Table 02. Different categories of boron fertilizer including their availability class**

Category of boron fertilizer	Availability class	TSP	Samples	Numbers
Solubor	Class-I	17	Sample 1	01
		8	Sample 2	01
	Class-II	4	Sample 3, 4, 5	03
		3	Sample 6, 7	02
		1	Sample 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	12
Boric Acid	Class-I	10	Sample 20	01
	Class-II	4	Sample 21, 22	02
		3	Sample 23	01
	Class-III	2	Sample 24	01
		1	Sample 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35	11
Fertibor	Class-I	N/A	N/A	-
	Class-II	N/A	N/A	-
	Class-III	1	Sample 36, 37	02

#### Maximum retail price (MRP)

Maximum retail price (MRP) of imported Solubor fertilizer varied from TK.250 (Gurhpukur; IMP-3840) to 530 (Ibrar; IMP-3033) Kg<sup>-1</sup> for 500 gram packet and TK.350 (E-Solubor; IMP-1700) to 550 (Librel boron; IPM-834, Power boron; IMP-1761, Ready boron; IMP-4199 and Borosol; IMP-4052) Kg<sup>-1</sup> for 100 gram packet. All three categories of boron fertilizer mentioned their MRP. Different brands of Boric acid ranged from TK.100 (Mrittika boron) to 314 (Alfa boron) Kg<sup>-1</sup> in their MRP among which imported and supplied fertilizer varied from TK.100 (Mrittika boron; IMP-79) to 314 (Alfa boron; IMP-30) and 260

(Solit boron; S-265) to 290 (Altime boron; S-400) Kg<sup>-1</sup> respectively. In case of Fertibor, both two fertilizers (Bumper fertibor and Fertibor) were imported item with same registration number (IMP-1539). Their MRP was TK.240 Kg<sup>-1</sup> fertilizer. This prices are mentioned as found during survey, not definitive but competitive.

There was a wide difference between highest and lowest MRP of imported Solubor for both 100 and 500 gram packet (Figure 01). The highest price was 112% more for 500 gram packet and 57% more for 100 gram packet than their respective lowest price. Lower MRP of same type of product might result adulteration. In case of Boric Acid, a mentionable difference was observed between the highest and the lowest MRP of imported type (the highest was 214% more than the lowest). But least difference (the highest was 12% more than the lowest) between them was found in supplied type (Figure 02). Further, no difference was observed in the highest and the lowest MRP of Fertibor boron fertilizer (Figure 03). According to Government specification of fertilizer, Solubor, Boric acid and Fertibor fertilizer must have minimum 20, 17 and 15 percent total boron (B) respectively (BARC, 2012). The comparative average MRP of different types (imported, supplied and manufactured) of Solubor, Boric acid and Fertibor fertilizer were depicted in Figure 04. In case of Solubor committed to have 20% B, average MRP was 394 taka Kg<sup>-1</sup> for 500 gram packet and 495 taka Kg<sup>-1</sup> for 100 gram packet. On the other hand, in case of Boric acid committed to have 17% B, average MRP of imported and supplied type were 225 and 333 taka Kg<sup>-1</sup> respectively. But that price of Fertibor was 240 taka Kg<sup>-1</sup>. Such higher price of Solubor boron perhaps might be for its distinction. Therefore, their chemical analysis for quality is very important to see the actual scenario.

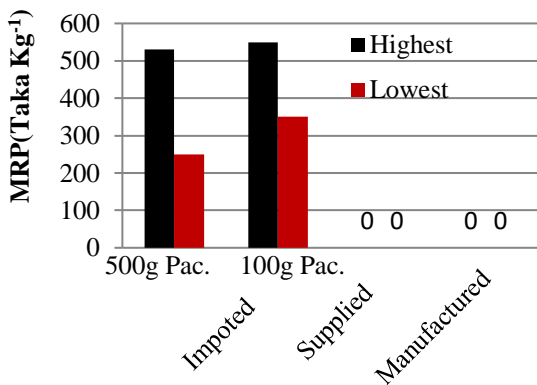


Figure 01. Highest and lowest MRP of Solubor.

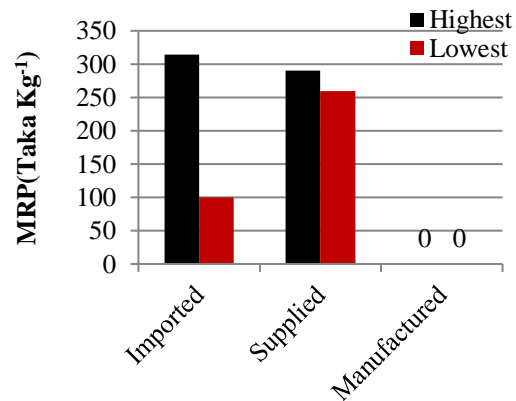


Figure 02. Highest and lowest MRP of Boric Acid.

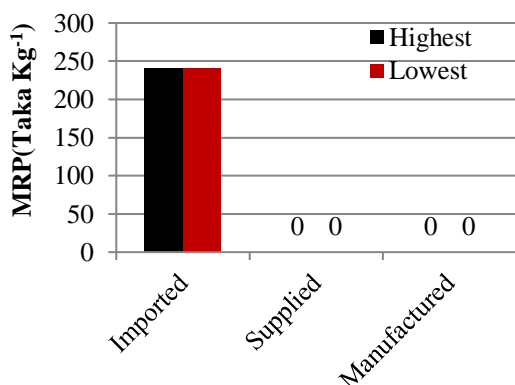


Figure 03. Highest and lowest MRP of Fertibor Boron.

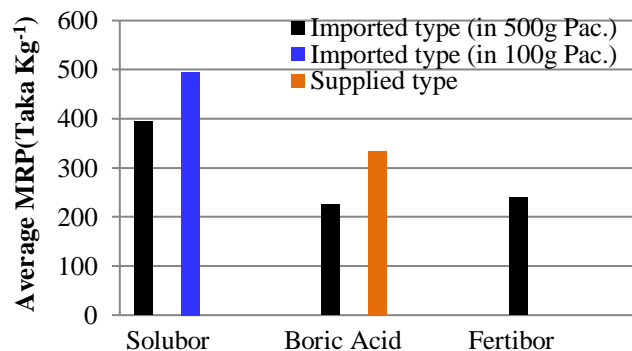


Figure 04. Comparative average MRP of different types of Solubor, Boric acid and Fertibor

### Registration

Total 37 brands of boron fertilizer were found in the upazila. Three types of registration number were observed against the brands mentioned on their packets. They were namely “IMP”, “S” and “M” type. According to DAE (Department of Agriculture Extension), report IMP means imported from aboard, S means supplied by purchasing from importer or manufacturer and M means manufactured locally in

their own factory. Five percent (1 sample out of 19) of Solubor and six percent (1 sample out of 16) of Boric acid mentioned no registration number (Table 03). All the brands of fertibor mentioned their registration numbers. Fertibor brands were 100% imported type (Table 03). In case of solubor, 95% were imported but in case of Boric acid brand, 60%, 20% and 13% were imported, supplied and manufactured types respectively. All fertibor brands bore the same imported type registration number which were imported from aboard (DAE, 2014).

Twenty-six percent solubor brands were in both 100 gram and 500 gram packet where same registration number was used for both sized packed of an individual brand. But 74% was in single type of packet among which 37% was in 100 gram and another 37% was in 500 gram packet. They were different in their price for same product but different sized packet. In case of boric acid and fertibor, all brands were in 500 gram packet. The brands without any registration number should not be marketed because it may be adulterated. Therefore, all categories of boron fertilizer have to be taken under quality analysis.

**Table 03. Relative proportion of different types of registration number in Solubor, Boric acid and Fertibor**

Category of Boron fertilizer	Relative proportion of registration type (%)			
	Imported (IMP) type	Supplied (S) type	Manufactured (M) type	Registration less
Solubor	95	0	0	5
Boric acid	82	12	0	6
Fertibor	100	0	0	0

#### Company characteristics

Thirty-two companies marketed thirty-seven brands of boron fertilizer. Nineteen brands of Solubor boron, sixteen brands of boric acid and two brands of fertibor were marketed by 18, 16 and 1 company respectively. In case of boric acid, additional thirteen companies were found over solubor boron companies. Further, additional one company was found over thirty-one of Solubor and Boric acid companies in case of Fertibor. All the companies were of two types depending on their address. Ninety four percent companies were of Dhaka based and six percent were of out of Dhaka based ownership. Among the companies, 91% marketed only one category of boron fertilizer (47% companies provided only Solubor, 41% companies provided only Boric acid and 3% companies provided only Fertibor). On the other hand, 9% companies marketed two categories (Solubor and Boric acid) and no company marketed three categories of boron fertilizer in Monirampur upazila.

#### IV. Conclusion

Total thirty-seven boron fertilizer brands manufactured or marketed by thirty-three individual companies were found in the market of Monirampur upazila among which three brands (2 of Solubor and 1 of Boric Acid) were most available, eight brands were moderately available, and rest twenty-six brands were less available. According to Fertilizer (management) Act-2006 of Government of Bangladesh, the product without registration number and MRP on their packet is not allowed to market. But this study found five percent of Solubor and six percent of Boric acid fertilizer brands were no registration number in the market. We observed that two companies use same registration number. This should be addressed by proper authority so that this misleading practice does not exist in the market. The brand name without any registration number might be adulterated, further investigation suggested. Remarkable variation was observed among the MRP of the brands of Solubor and Boric acid. On the other hand, average MRP of Solubor was too much higher than Boric acid and Fertibor. Beside this, a wide difference (112% for 500 gram packet and 57% for 100 gram packet) was conspicuously observed in the highest and the lowest MRP of Solubor. Lower MRP of same type of product might cause adulteration also. Thus, quantitative analysis of all categories of boron fertilizer is very much important to see the actual scenario. However, the study suggests that (a) companies which are not following fertilizer production and marketing regulations should be under supervision by relevant authority and (b) further study is needed to assess more deliberately the individual quality status of all three categories of boron fertilizer obtained in this study.

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### Author's contribution

G. M. Mesbahul Islam and Sushanto Kumar Tarafder collected the information from the study sites. G. M. Mesbahul Islam developed the methodology, processed the data and prepared the manuscript. S. M. Ashik Iqbal and Md. Abu Talha edited the manuscript and G. M. Mostafizur Rahman proofread through the manuscript. The authors agree and fully are responsible for the finding of this study.

### Competing Interest

The authors declare no competing interest; neither no definitive conclusion should be made by anybody about status/quality of a sample studied. Further extensive study suggested from many other sources by proper/relevant authority to make any conclusion on a boron sample under this study. If anybody need further information, contact the corresponding author of this article.

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#### **APA**

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#### **Chicago**

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#### **Vancouver**

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