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## **SURVEY ON TECHNICAL EFFICACY OF THE FARMERS AND THEIR SATISFACTION LEVEL FOR THE PRODUCTION OF ONION SEEDS IN BAGMARA UPAZILA, RAJSHAHI DISTRICT**

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### **ABSTRACT**

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Onion seed production is not exactly same as the cultivation of the onion as a crop. Due to lack of recommended standard cultural practices, an onion seed producer in Bangladesh is facing different levels of difficulties. To address this issue, the present study has been undertaken for generating farm level information on the production and input use pattern in the onion seed cultivation. Using semi structured questionnaire, a total of 50 onion farmers is randomly selected from Bagmara upazila, Rajshahi district for the interview. The results indicate that there were so many constraints on onion seeds production such as unavailability of high yielding varieties, shortage of information about recommended fertilizer doses, bulb size, planting space, setting of planting time, etc. At the same time, farmers are also fronting problem regarding paucity of separated land, absence of specialized onion cold storages. Considering the above- mentioned problems, the results showed that 70% of the farmers are not satisfied with the onion seeds yield. The study suggested that distribution system of the quality onion seeds has to be improved coupled with the onion research in Bangladesh has to govern by the dynamics of seed grower's quality preferences and their socio- eco- climatic infrastructure. Furthermore, it is indispensable to introduce training programs for the farmers for improving their knowledge about management practices as seed production required highly skill person.

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## INTRODUCTION

Onion (*Allium cepa* L.) is one of the most demanding daily uses spices in Bangladesh. In recent year, Bangladesh has been experiencing a huge shortage of onion due to less production coupled with the export ban by neighboring country. According to Bangladesh Bureau of Statistic (BBS), in 2018 annual onion production in Bangladesh is 17 lakh tones which cultivated in the total area of 1.74 lakh hectares whereas annual demand is 22 lakh tones (BBS 2018). To solve above national onion crises, we have to increase our domestic production of onion by ourselves. It is globally recognized that timely distribution of seeds at farmer's level is a vital factor for ensuring high production and availability of crops including onion. In Bangladesh, BADC (Bangladesh Agricultural Development Corporation) is a sole government agency which distributes quality seeds to the farmers over the country but it is quite impossible to satisfy the high demand of quality seeds by BADC alone. Furthermore, our climatic conditions are unfavorable to cultivation of high yielding exotic onion varieties. So, considering the aforementioned difficulties, the governments of Bangladesh declared its new national seed policy in 1991 where in provisions are made to involve private sectors in the research, production, processing and distribution of quality seeds to the farmers. Alongside these formal sectors, an informal system like farmer saved seeds is till now considered as one of the main sources of seeds for small farmers in Bangladesh which is mostly adulterate and having low germination rate.

Factually, production of quality onion seeds is significantly influenced on genotype, locality, cultivation season and methods of intercultural operations (Brewster, 1994). In Bangladesh, it is reported that the farm level yield of onion is very low compared to their recommended yield (Awal et al., 2004; Saha and Elias, 1990). Aforesaid, low production of onion could be attributed to the limited availability of quality seeds, lack of hybrid, associated production technologies used, and adverse climate, etc. Furthermore, farmers of Bangladesh usually followed different levels of management depending upon their infrastructural facility and socio-economic conditions which ultimately results variability in yields. For addressing above mentioned problems the objectives of this study are to analysis and understand of farmer's preferences, critical bottlenecks, and generate farm level information on production and input use pattern in onion seeds cultivation. The information will help to select priority research areas in onion breeding programs for developing new varieties for overcoming our national onion shortage.

## METHODOLOGY

### Study area

In Bangladesh, onion is mainly produced in the winter season. It is grown almost all parts of the country such as Faridpur, Dhaka, Mymensingh, Pabna, Comilla, Rajshahi, Jessore and Rangpur Districts (BBS, 2017). Our study area is shown in Figure 1 Baghmara upazila under Rajshahi district is one of the important onion seeds producing area in Bangladesh. Geographically, the zone lies between 24°22 to 24°26N latitude and 88°36 to 88°40 E longitude with an annual average rainfall of 1211 to 1516 mm and the annual mean temperature ranges between 10.2 to 33.5°C. According to DAE (Department of Agricultural Extension), in this Upazila, in total of 100 farmers have cultivated onions for seeds production among them fifty (50) farmers were randomly selected for personal interviewing with closed questionnaire. The survey was carried out during 17 February to 25 March 2018.

### Data collection procedures and analysis

An open-ended questions administered in a semi-structured questionnaire was developed by incorporating a number of questions tested in several national and international studies and adapted to personal data including age, sex, education, farming experiences, amount of land, cultural practices such as fertilizer application, raw to raw distance, bulb to bulb distance, bulb size, planting time, storage technique and farmers satisfaction level. Qualitative data were converted to the numerical data by means of suitable scoring techniques and transferred to a master sheet to facilitate tabulation. Local units were also converted into the standard units. The MS excel and SPSS programs were used to perform the analyses of data.



**Figure 1.** Location of the Study Area Baghmara Upazila, Rajshahi District (Source: Local Government and Engineering Department)

### Sampling Procedure

Age and sex composition are the major demographic features used to characterize the respondents. Although efforts were made to account for gender representation, but no woman respondent in this study because the attempts were made to interview the household head in the presence of his spouse so that the responses account for the views of the women. Since all of the respondents are heads of households, it is safe to conclude that onion seeds production in the study areas are male dominated. The gender distribution in favor of males (78.1%) is not surprising as agriculture in the world is male dominated activity (FAO, 2013). The ages of the respondents were measured in terms of year. Based on age, the respondents were classified into three categories as young (upto 30years), middle-aged (31-45years) and old-aged (>45years). Formal education is considered as a level of education of a respondent. It was scored by assigned for each year of schooling. For example, if a respondent passed the final examination of class VIII in the school, his educational score was 8. The experience in onion seeds production was measured in terms of year. The area under onion seed cultivation was first recorded in the local unit and then converted to acre. Farmers were categorized as the small farm size with less than 0.30 acre of land, medium size with land between 0.30-1.46 acre and large farm with land size more than 1.46 acre. The amount of fertilizers applied for onion seeds production by a respondent was estimated in kg/acre. The respondents were classified into three groups based on the average of the uses of fertilizers. The categories of the application of chemical fertilizers were low 30-47 kg/acre , 60-72 kg/acre , 3-6 kg/acre and 3-4 kg/acre, medium 48-80 kg/acre , 73-104 kg/acre , 7-10 kg/acre, 5-6 kg/acre and high doses 200-225 kg/acre , 262.5-300 kg/acre , 27.5-30 kg/acre , 15-17.5 kg/acre urea, MOP, Zn and boron fertilizers respectively. The yield of onion seeds were estimated in kg/ac. The respondents were classified into low yield 222.30-518.70 kg/acre, medium yield 521.17-815.10 kg/acre and high yield 815.10-839.80 kg/acre.

## RESULTS AND DISCUSSIONS

Agricultural farming is a labor intensive system. It has been reported that in many parts of the world including China, is facing an aging workforce which could negatively impact in their industries as well as agricultural systems (Guo, 2015). So farmer's age is a crucial demographic factor. In our study the respondent's age is ranged from 25 to 62 with a mean of 36.82 years and the standard deviation of 7.858. It is

found that the highest number of farmers (74%) is counted in middle-aged group while 20% are young and only 3% are old-aged that constituted 94 % of the respondents in young and middle-aged groups (Table 1). The result is revealed that the economically active groups are involved in onion seeds production that is a good sign in agricultural farming in Bangladesh. Education is an important tool to boost agricultural productivity effectively as it helps to gain and share experiences of modern technology and socio-climatic changes that has direct influences in the improvement of farmer's operational skill and decision making capacity including disease and pest management, as well as product marketing policy (Eric et.al., 2014). Our study has presented that 48 % of the farmers are educated at the secondary level, 22% the primary level, 20 % at higher secondary and above, while the rest (10 %) are illiterate that is indicating that nearly half of the farmers (48%) received formal education at the secondary level (Table 1). The World Bank survey report showed that farmers with basic education were 8.7% more productive than farmers with no education in low income countries, (Gasperini, 2000).The significant positive correlation ( $r = 0.387^{**}$ ) between yield of onion seed and farmer education level also corroborate the same trends. Furthermore, the study is also disclosed that there are no farmer has university or diploma in agriculture degree in the study area; this could be an indication of lack of interest in agricultural farming by university graduates in Bangladesh. Our present study is also documented the same finding that lack of technical education is one of important draw back in quality seed production in Bangladesh as cultivation practices for onion seeds production require more attention and special skills compared to field crops (Shimeles, 2000). Regarding farmers experiences in onion seed production, there are positive correlation ( $r = 0.012$ ) between yield and farming experiences (Table 6). In the study, about two-thirds (82%) of farmers has moderate experience 7-16 years, 10% farmers has less than 7 years and 8% farmers has above 16 years experiences ( Table 1).

**Table 1.** Distribution of the Respondents According to Age, Education and Experiences in Onion Seeds Production

Characteristics (Measuring unit)	Range	Respondents		Mean	Std. Dev.	
	Observed	Category	No.			%
Age (Year)	25-62	Young (up to 30)	10	20	36.82	7.858
		Mid-aged (31-45)	37	74		
		Old aged (> 45)	3	6		
		Illiterate (0)	5	10		
Education (Year of schooling)	0-15	Primary (1-5)	11	22	8.14	4.536
		Secondary (6-12)	24	48		
		Higher (above12)	10	20		
Experience in onion seed production (Year)	4-40	Low (Up to 6)	5		11.44	5.585
		Moderate (7-16)	41			
		High (Above 16)	4			

**Table 2.** Categorization of the Farmers Depend on Yield Attributes of Onion Seeds

Parameters (Measuring unit)	Range	Farmers		Mean	Std. Dev.	
	Observed	Categories	No.			%
Bulb size (g)	10-16	Small (10-12)	5	10	14.34	1.303
		Medium (13-15)	43	86		
		Large (above 15)	2	4		
Row to row distance (cm)	50-60	Low (50 cm)	10	20	56.30	3.887
		Medium (55 cm)	17	34		
		Long (60 cm)	23	46		
Bulb to bulb distance (cm)	14-20	Low (Up to 14)	1	2	16.18	2.173
		Medium (15-18)	37	74		
		Long (above 18)	12	24		

**Table 3.** Doses of Fertilizers Used by Farmers of the Study Area

Fertilizers used (Measuring unit)	Range Observed	Respondents			Mean	Std. Dev.
		Categories	No.	%		
Urea (kg/acre)	30-90	Low (30-47)	11	22	63.90	16.546
		Medium (48-80)	31	62		
		High (80-90)	8	16		
MOP (kg/acre)	60-120	Low (60-72)	4	8	88.50	16.107
		Medium (73-104)	30	60		
		High (105-120)	16	32		
Zn-fertilizer (kg/acre)	3-12	Low ( 3-6 )	14	28	8.100	1.893
		Medium (7-10)	28	56		
		High (11-12)	8	16		
Boron-fertilizer (kg/acre)	3-7.5	Low ( 3-4 )	15	30	5.190	1.491
		Medium (5-6)	32	64		
		High (6-7.5)	3	6		

Std. Dev.= standard deviation

**Table 4.** Farmer's Information Based on Area Cultivated and the Yields of Onion Seeds

Characteristics (Measuring units)	Range Observed	Respondents			Mean	Std. Dev.
		Categories	No.	%		
Area under onion seeds cultivation (Acre)	0.08-2.33	Small (Up to 0.30)	6	12	0.88	0.574
		Medium (0.30-1.46)	35	70		
		Large (Above 1.46)	9	18		
Yield of onion seeds (kg/acre)	90-340	Low (90-210)	8	16	271.28	59.723
		Medium (211-330)	40	80		
		High (330-340)		2		

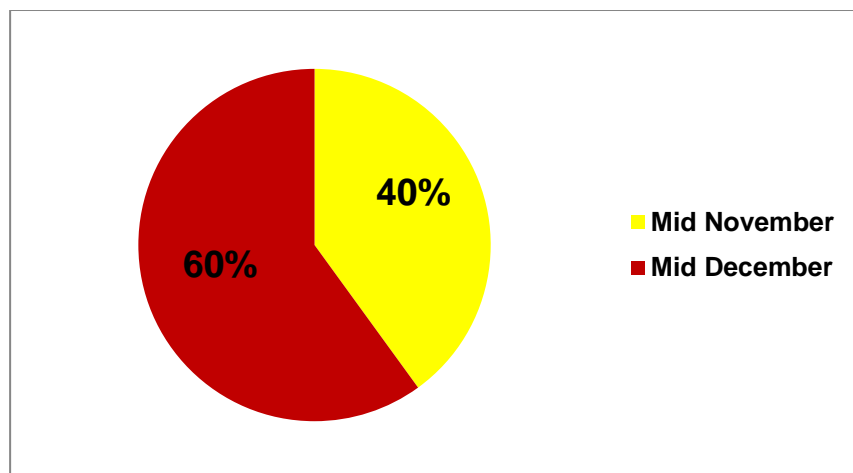
Std. Dev.= standard deviation

**Table 5.** Onion Seed Preservation Techniques followed by the Farmers

Seed preservation methods	Respondents	
	Number	Percentage
Polythene bag	2	4
Tin container	9	18
Earthen pot	1	2
Temperature-moisture controlled room	0	0
Polythene bag + Tin container	25	50
Tin container + Earthen pot	2	4
Earthen pot + Polyethylene bag	11	22

Std. Dev.= standard deviation

In the study area, all the respondents are cultivated single bulb type variety Taherpuri for the production of onion seeds (data not shown). Although the yield of this variety is not high but farmers prefer it due to it has long shelf life under ordinary storage condition. So, lack of high yielding variety is another limiting factor of onion seeds production in Bangladesh. Usually, there are two methods are widely used for onion seeds production such as seed to seed and bulb to seed method. Onion seeds production in the study area is mostly accomplished via the bulb to seed system. Ideally, bulbs for the bulb-to-seed system are planted in single rows on beds and spaced as close as possible in furrows sufficiently deep for a soil cover of approximately 2.5 cm. In Bangladesh, several studies reported that the yield of onion seeds (Taherpuri cultivar) has significantly influenced by the mutual effects of bulb size and plant spacing including row to row distance and plant to plant distance. It has also reported that large size of bulb ( $15\pm 2g$ ) with closest spacing ( $25\times 15cm$ ) resulted in the highest seed yield per unit area (Asaduzzaman *et al.* 2012). In our study data are showed that the highest proportion (86%) of the farmers used medium (13-15 gm.) sized bulb as the planting materials and 46 % of the farmers are considered 60 cm as the row to row distance and more than two-thirds (74%) of the farmers are considered 15-18 cm as the bulb to bulb distance for the onion seeds production (Table 2). The effect of planting time on onion seeds production and its significant effects on both productivity and quality was studied and reported by several researchers in different parts of the world. Onion can be grown both in winter and summer although the summer output is almost negligible in Bangladesh. In our country, winter season is very short hence adjustment of planting time in onion seeds production is very important. In the study area, majority (60%) of the farmers are used Mid-December as the planting time while 40 % are followed around Mid-November for onion seeds production (Figure 2). Uddeen *et al.* (2008) recommended as October 30<sup>th</sup> is the best planting date for onion seeds cultivation. Likewise, Mollah *et al.* (2015) suggested November 15<sup>th</sup> is the best planting date for onion seeds production on Borga region of Bangladesh. It is stated that if bulb for seeds production is planted in the month of November and December then seeds yield is reduced dramatically (Islam *et al.*, 2005)



**Figure 2.** Planting Time of Onion Seeds Followed by the Farmers

Onions required nitrogen, phosphorus, and potassium fertilization according to needs indicated by soil tests and the previous year's crop. Fertilizer practices for the onion seeds vary widely among soil types and variety used. However, in Bangladesh there is no fertilizers recommendation for onion seeds production and hence, most seed growers are used fertilizers rates recommended for bulb production. In the present study, the highest proportion (62%) of the farmers are applied the medium dose of urea. Similar trends also observed in MOP, Zn, and boron applications, majority of the farmers are added the medium doses of MOP (73-104 kg/acre), Zn (7-10 kg/acre) and boron (5-6 kg/acre) in their onion seeds fields (Table 3). Onion is a cross pollinated crop and to maintain varietal purity seeds field should be isolated from other flowering type of onions. In Table 4, it is mentioned that the area cultivation for onion seeds is not sufficient only 18% of farmers are used more than 1.46 acre land. In the study there is no information has been collected regarding field isolation.

**Table 6.** Correlation matrix for the independent and dependent variables (N = 50 farmers)

	Age	Edu	CA	Exp	BS	R-R distance	B-B distance	PT	Urea	MOP	Zn	Boron	Yield
Age	1												
Edu	-.177	1											
CA	.105	.027	1										
Exp	.485**	.010	.173	1									
BS	.012	-.001	.172	-.010	1								
R-R distance	-.173	-.080	-.333*	-.036	-.190	1							
B-B distance	-.228	.097	-.210	-.123	-.116	.467**	1						
PT	.154	.025	.022	-.068	-.038	-.095	-.121	1					
Urea	-.331*	.294*	.276	-.261	.235	.015	.159	-.217	1				
MOP	-.326*	.212	.119	-.061	.156	-.042	.358*	-.307*	.539**	1			
Zn	-.124	.072	.078	.050	.027	.121	.338*	-.196	.290*	.587**	1		
Boron	.016	.035	-.126	-.048	.318*	.265	.065	.216	-.037	.082	.192	1	
Yield	-.143	.387**	.097	.012	.152	.120	.020	-.073	.326*	.351*	.304*	.057	1

\*\* Significant at the 0.01 level (2-tailed), \* Significant at the 0.05 level (2-tailed).

Edu: Education, CA : Cultivated area, Exp: Experiences, BS: Bulb size, R-R distance : Row to row distance, B-B distance : Bulb to bulb distance, PT : Planting Time  
Unit: Age, Education, Experience in year, Cultivation area in Acre, Bulb Size in gram, Distance in cm, Fertilizer in kg/acre, Yield in kg/acre



Onion seeds are the most sensitive to storage conditions. In the study, farmers are practiced very primitive methods for storing of seeds like polythene bag, tin container and earthen pot. Data presented that 50% of respondents are used polythene bag plus tin container for the storage of their own seeds (Table 5). In Bangladesh, there is no specialized cold storage for onion at farmer's level. Thus, when selecting a variety for seeds production trait for high shelf life together with high yield potentiality of the variety should also be taken in to account. The highest percent of farmers (80%) are recorded in the group of medium yield (211-330kg/acre) (Table 4). Likewise, the maximum no. 70% of farmers are unhappy with the yields of onion seeds in their plots displayed in figure 3.

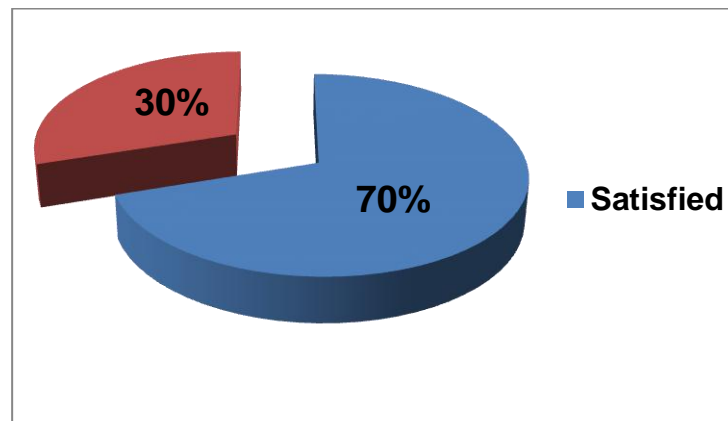


Figure 3. Growers Perception Regarding the Yield of Onion Seeds in their Field

#### Correlation analysis between onion seed yield with demographic factors and different yield attributes

Pearson's Product Moment Coefficient of Correlation ( $r$ ) was used to explore the relationships between onion seed yield and different socio-economic factors and yield attributes are depicted in Table 6. The values are Farmer age ( $r = -0.143$ ), farmer education level ( $r = 0.387^{**}$ ), farming experiences ( $r = 0.012$ ), farm size ( $r = 0.097$ ), bulb size ( $r = 0.152$ ), bulb to bulb distance ( $r = 0.120$ ), row to row distance ( $r = 0.120$ ), planting time ( $r = 0.120$ ), fertilizer application: Urea ( $r = 0.326$ ), MOP ( $r = 0.351^{\dagger}$ ) Zinc ( $r = 0.304^{\dagger}$ ) Borax ( $r = 0.057$ )

## CONCLUSION AND RECOMMENDATION

The finding showed that the onion seeds production in the study area is not at satisfactory level. There are so many reasons like as lack of high yielding varieties, minimum experiences and poor knowledge regarding modern mechanical farming, and absent of the modern storage facilities etc,. To solve the above problems, the respondents suggested that action should be taken to ensure the supply of high quality seeds in time, providing training facilities to the farmers, and built modern storage facility.

## CONFLICT OF INTEREST

There is no conflict of research interest.



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