Project ID: 345

Competitive Research Grant

Sub-Project Completion Report

on

Productivity Enhancement of Promising Vegetable Varieties during Winter and Summer in Sylhet Region

Project Duration
May 2017 to September 2018

Department of Horticulture
Sylhet Agricultural University, Sylhet-3100

Submitted to
Project Implementation Unit-BARC, NATP-2
Bangladesh Agricultural Research Council
Farmgate, Dhaka-1215

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Project Implementation Unit
National Agricultural Technology Program-Phase II Project (NATP-2)
Bangladesh Agricultural Research Council (BARC)
New Airport Road, Farmgate, Dhaka – 1215
Bangladesh

Edited and Published by:

Project Implementation Unit
National Agricultural Technology Program-Phase II Project (NATP-2)
Bangladesh Agricultural Research Council (BARC)
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Acknowledgement
The execution of CRG sub-project has successfully been completed by Department of Horticulture, Sylhet Agricultural University using the research grant of USAID Trust Fund and GoB through Ministry of Agriculture. We would like to thanks to the World Bank for arranging the grand fund and supervising the CRGs by BARC. It is worthwhile to mention the cooperation and quick responses of PIU-BARC, NATP 2, in respect of field implementation of the sub-project in multiple sites. Preparing the project completion report required to contact a number of persons for collection of information and processing of research data. Without the help of those persons, the preparation of this document could not be made possible. All of them, who made it possible, deserve thanks. Our thanks are due to the Director PIU-BARC, NATP 2 and his team who given their whole hearted support to prepare this document. We hope this publication would be helpful to the agricultural scientists of the country for designing their future research projects in order to technology generation as well as increasing production and productivity for sustainable food and nutrition security in Bangladesh. It would also assist the policy makers of the agricultural sub-sectors for setting their future research directions.

Published in September 2018

Printed by: [Name of press with full address]

Acronyms

BARI	:	Bangladesh Agricultural Research Institute
BARC		Bangladesh Agricultural Research Council
DAE	:	Department of Agricultural Extension
HRC	:	Horticulture Research Centre
Kg	:	Kilogram
SAU	:	Sylhet Agricultural University
RCB	:	Randomized Complete Block
Sikribi	:	Sylhet Krisi Vishabidhaloy
SAAO	:	Sub Assistant Agriculture Officer
t/ha	:	Ton per hectare
tk	:	Taka

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Executive Summary

With a view to enhancing productivity of promising vegetable varieties in Sylhet region, on station and on farm research activities for selected vegetable crops were designed and executed during summer 2017 and winter 2017-2018. For summer season, on station evaluation and on farm adaptation of summer tomato and summer country bean; seeds were collected and/or purchased from Horticulture Research centre of BARI and Siddikbazar, Dhaka. For on station evaluation of genotypes and production technologies, three different research activities including evaluation of photo-insensitive country bean genotypes under different support systems, evaluation of heat tolerant tomato hybrids and influence of grafting technology on summer tomato production were conducted in the experimental field of Sylhet Agricultural University. Among three photo-insensitive country bean genotypes, Sikribi sheem-1 was found very promising under trellis or staking support systems and yielded 41.0 kg - 45.0 kg/decimal. Tomato production during rainy summer was largely influenced by grafting system. Results revealed that grafted plants produced more than 50 tons of fruit per hectare while it was less than 30 tons per hectare for normal seedlings grown plant due to severe infection of bacterial wilt disease. For on farm adaptation research activities, twenty farmers from Moulavibazar and Habiganj Districts were selected with the help of DAE personnel. Selected farmers were given training on production technology of promising vegetable varieties on 2 August 2017 at Upazila Agriculture Office, Sreemongal. Selected farmers were also given seeds and grafted seedlings of summer tomato hybrids and summer country bean variety (Sikribi sheem-1) for establishing of adaptive trials. Necessary supports like polythene, fertilizer, bamboo, rope etc also given to the selected farmers for successful conduction of the adaptive trials. For winter 2017-2018, five different on station research activities of the targeted promising vegetable varieties (tomato, country bean, French bean, radish and broccoli) were completed in the experimental field of Sylhet Agricultural University. Among different vegetable varieties, BARI hybrid tomato-5 (94.0 t/ha), BARI sheem-1 (56.0 kg/decimal), BARI mula-1 (41.0 kg/decimal), Centarou of broccoli (109.0 kg/decimal) and French bean at October sowing (77.0 kg/decimal) and November sowing (75.0 kg/decimal) exhibited better yield performance. For on farm adaptation of the promising winter vegetable varieties, 20 farmers were selected from Moulavibazar, Sylhet and Habiganj districts with the help of DAE office and necessary supports were also given for the trials. Selected farmers completed their adaptive trials and yield of the tested vegetable varieties was found encouraging to the growers. In adaptive trial, yield of tomato (BARI hybrid tomato-5) ranged from 225 to 410 kg/decimal, BARI sheem-1 ranged from 45-85 kg/decimal, Broccoli (Green Crown) ranged from 56-115 kg/decimal, Radish (Tasaki) ranged 44-75 kg/decimal and BARI jhar sheem-1ranged from 58-83 kg/decimal.

CRG Sub-Project Completion Report (PCR)

A. Sub-project Description

1. Title of the CRG sub-project: **"Productivity Enhancement of Promising Vegetable Varieties during Winter and Summer in Sylhet Region**"
2. Implementing organization: Department of Horticulture, Sylhet Agricultural University, Sylhet-3100.
3. Name and full address with phone, cell and E-mail of PI/Co-PI (s):
   Principal Investigator (PI): Dr. Md. Shahidul Islam, Professor, Department of Horticulture, Sylhet Agricultural University, Sylhet. Cell: 01916662421, shahidulhrt@gmail.com
   Co-Principal Investigator (Co-PI): Dr. Mohammad Ashraful Islam, Professor, Department of Agricultural Extension Education, SAU, Sylhet, Cell: 01558333907, belaltcp@gmail.com
4. Sub-project budget (Tk):
   4.1 Total: 15,91,040/
   4.2 Revised (if any): None
5. Duration of the sub-project: May 2017 to September 2018
   5.1 Start date (based on LoA signed): 14 May 2017
   5.2 End date: 30 September 2018
6. Justification of undertaking the sub-project

   Sylhet is a special zone for agriculture and mostly famous for tea and citrus production. Total cultivable land of Sylhet division is about 7,98,528 ha. Among this, 2,28,980 ha in Rabi season, 2,16,453 ha in kharif-1 and 93,558 ha in Kharif-2 season remain fallow (Anonymous, 2012). People are not much interested in agriculture. Therefore, amount of cultivable fallow land in Sylhet region is the highest than any other part of the country. Although vegetable are the chief source of vitamins and minerals but its requirement in Sylhet region is mostly met from the supply of other parts of the country. The low production of vegetable in Sylhet region is mostly attributed due to tenant agriculture, less interest in agriculture, absence of suitable variety along with production technology, acidic soil, irrigation problem during Rabi season, lack of research on vegetable crops for Sylhet region etc. Tomato, country bean, radish, French bean (Jhar sheem), and broccoli are very nutritious and considered as high value vegetable crops. Production of these crops is not as much to meet the local requirements in Sylhet. These crops are mostly grown during winter season in Bangladesh besides, many farmers of Jessore, Pabna, Dinajpur, Comilla etc are involved tomato production during summer. Bangladesh Agricultural Research Institute (BARI) has developed several varieties of heat tolerant tomato hybrids, summer type country bean varieties which can be grown during summer season in Sylhet region too. BARI has also developed broccoli, radish and French bean variety and low cost production technology which can easily be adapted in Sylhet region provided quality seed, production technology etc are made available to the growers. The radish variety of Druti, Pinky/Tasaki and French bean are very quick growing and can be harvested with 65 days. Seed bed of boro rice in haor areas remain fallow after transplanting of seedling from the month of January. This fallow land (boro seedbed) can be taken for radish and jhar sheem cultivation and easily be harvested

before the flash flood appears in Sylhet region. Only 2100 ha, 4784 ha and 3109 ha of land are under cultivation of tomato, country bean and eggplant, respectively in Sylhet region (Anon, 2012) while very few farmers are initiated summer tomato, summer country bean and broccoli cultivation (Debnath, 2015). The low acreage and production of these vegetable crops in Sylhet region can easily be increased through appropriate intervention with variety and production technology. Since BARI and Sylhet Agricultural University have got some high yielding varieties along with production technologies for these vegetables (Ahmed *et al*., 2011; Halim and Islam, 2013; Islam *et al.,* 2014, Biswas *et al.,* 2015) and their evaluation and adaptation during winter and summer season can bring a breakthrough in Sylhet region.

7. Sub-project goal: Incorporation of promising vegetable varieties and technology in production system of Sylhet region as well to improve vegetable production round the year.

8. Sub-project objective (s):

a. To identify suitable vegetable variety(s) and production technologies for Sylhet region.

b. To popularize suitable vegetable variety(s) and production technologies in Sylhet region.

c. To improve knowledge and skill of farmers for vegetable production in Sylhet region

9. Implementing location (s): Sylhet, Moulavibazar and Habiganj district.

10. **Methodology in brief:**

Collection of seeds: For both on station and on farm evaluation of promising vegetable varieties of summer tomato and summer country bean for summer season of 2017 seeds of BARI hybrid tomato-4, BARI hybrid tomato-8 and BARI hybrid tomato-10 were collected from Olericulture division, Horticulture Research Centre, BARI, Gazipur. Seeds of summer country bean variety, Sikribi sheem-1 and Sikribi sheem-2 were collected from the Department of Horticulture, Sylhet Agricultural University.

On station evaluation: For on station evaluation of summer country bean and summer tomato research activities were made. These are:

a. Evaluation of photo-insensitive country bean genotypes under varied support systems:

The study was conducted in RCB design with three replications. In this study seeds of three photo-insensitive country bean genotypes viz., Sikribi sheem-1, Sikribi sheem-2 and SB003 were sown in two different support system viz., trellis and staking. Seeds were sown on 15 May 2017 in raise bed where plants were spaced at 1.0 m and 2.0 m distance between plant to plant and row to row, respectively. Data were recorded on growth and yield and compiled data were analyzed for interpretation of the results.

b. Influence of grafting on summer tomato production:

This experiment was conducted under RCB design with four replications in which three different types of tomato seedlings viz, normal seedling, grafted type 1 (tomato grafted

with the help of jute fibre in which scion was grafted on to *S.sysiimbrifolium*) and grafted type 2 (tomato grafted with the help of plastic tube) seedlings were evaluated at two different sowing dates of 25 July and 25 August in which 30 days old seedlings were transplanted on 25 August and 25 September, respectively at the experimental field of Horticulture Department, Sylhet Agricultural University. BARI hybrid tomato-8 was used in this study. Necessary data related to growth and yield and % bacterial infection of the seedlings are recorded carefully and analyzed statistically for report preparation.

c. Performance of heat tolerant tomato hybrids under Sylhet condition:

Three heat tolerant tomato hybrids, BARI hybrid tomato-4, BARI hybrid tomato-8 and BARI hybrid tomato-10 were considered in this study. Seeds were sown in 1 September 2017 and 25 days old normal seedlings were transplanted in the field. This study was completely damaged due to inundation of the field due to severe rainfall and followed by severe infection of bacterial wilt.

On farm adaptive trial: For on farm adaptive trial of summer tomato and summer country bean, twenty farmers from Moulavibazar and Habiganj districts were selected with the help of DAE personnel (Farmer's list was given in 1st quarterly report). Seeds and grafted seedlings of tomato of BARI hybrid tomato-8 and seeds of Sikribi sheem-1 were given to the selected farmers for establishment of adaptive trial. All the selected farmers initiated their trial from the month of July 2017. Necessary support including training, seeds, seedlings, polythene, nylon rope, fertilizers etc were given to the farmers for smooth conduction of the trial. For adaptive trial of each crop of each farmer 2-3 decimal of land was utilized. Trials were completed and necessary information also collected for preparation of report.

Training and workshop: Two farmer's training on production of high yielding vegetable varieties were organized at the Office of the Upazila Agriculture Officer, Sreemangal, Moulavibazar on 2 August 2017 in which 25 participants including selected farmers and SAAO were attended and at Sylhet Agricultural University Campus on 21 October 2017 in which 25 participants' attended.

Collection of data: Some necessary information regarding flowering, fruiting, yield, disease and insect reaction were collected from on station research activities and on farm adaptive trials. In this regard a pre organized data sheets were used.

Winter 2017-2018

Collection of seeds: For winter 2017-2018, seeds of tomato (eight genotypes), French bean (3 genotypes) radish (3 genotypes), country bean (7 genotypes), broccoli (3 genotypes) were collected/purchased from Olericulture division, HRC, BARI and from Siddikbazar, Dhaka.

On station study: On station research studies on targeted promising vegetable varieties were conducted in the experimental field of Sylhet Agricultural University. These are:

1. **Evaluation of promising country bean genotypes during winter under Sylhet condition:** In this study, seeds of seven promising genotypes including BARI sheem-1, BARI sheem-6, Sikribi sheem-1, Rupvan, Auto, Local (Goalgadda), Kanchon were sown in the field in the month of September 2017. This study was established in RCB design with three replications. Data on growth and pod yield were collected for statistical analysis and interpretation of the result.

2. **Production of French bean at different sowing dates**: In this study three French bean genotypes viz., BARI jhar sheem-1, BARI jhar sheem-2 and Local were considered for evaluation at four different sowing dates of 15 October, 15 November, 15 December and 15 January. This study was conducted in RCB design with three replications.

3. **Evaluation of tomato genotypes for winter season**: Eight tomato genotypes were taken in this study. Seeds of tomato genotypes were sown on 15 October 2017 and 28 days old seedlings were transplanted in the main field in RCB design with three replications.

4. **Evaluation of radish genotypes in Sylhet:** Three radish varieties viz., BARI mula-1 (Tasaki), BARI mula-2 (Pinky) and BAR mula-3 (Druti) were considered in this study. Seeds of these varieties were sown on 19 November 2017 under RCB design with four replications.

5. **Performance of broccoli genotypes under Sylhet condition**: Three broccoli genotypes are considered in this study. Seeds were sown on 25 October 2017 and 25 days old seedlings were transplanted in main field in RCB design with four replications at 60 X 50 cm planting geometry. Data on growth and yield were collected for interpretation of the result.

- **On Farm Adaptive trials:** For on farm adaptive trial of winter 2017-2018 for promising winter vegetable varieties (tomato, country bean, radish, French bean and broccoli), twenty farmers from Sylhet and Habiganj districts were selected with the help of DAE personnel. Seeds of the selected varieties were given to the selected farmers for establishment of adaptive trial. All the selected farmers initiated their trial from the month of October 2017. Necessary support including training, seeds, seedlings, polythene, nylon rope, fertilizers etc were given to the farmers for smooth conduction of the trial. For adaptive trial of each crop of each

farmer 2-3 decimal of land is utilized.

Analysis of the information /data (supported by tables, result & discussion, research achievements, highlights and photos):

11. Results and discussion:

Activity 1.1. Evaluation of photo-insensitive country bean genotypes under varied support system

Introduction

Country bean (*Lablab purpureus* L. Sweet) is popularly known as lablab bean. It is one of the major vegetables in Bangladesh and ranked top position among the legume vegetables (Rashid, 1999). Generally lablab bean is cultivated in winter season in Bangladesh although there are few off season varieties but their pod bearing potentiality is very poor due to severe flower and pod dropping tendency (Akter, 2015). Recently Bangladesh Agricultural Research Institute (BARI) and Sylhet Agricultural University have developed some photo-insensitive country bean variety which can be successfully grown during summer in Bangladesh (Roy, 2014; Bhowmick, 2014). The vine of lablab bean is thin and weak and prone to lodging when it grows more than 30 cm. Growth of the branches and yield is reduced significantly in absence of support (Rahman, 1988). Therefore, it is necessary to evaluate the newly developed photo-insensitive country bean genotypes at different support systems for increasing yield of lablab bean during summer season in Sylhet.

Materials and Methods

The study was conducted at the experimental field of Horticulture Department, Sylhet Agricultural University during summer season of 2017. Three photo-insensitive country bean genotypes viz., Sikribi sheem-1, Sikribi sheem-2 and SB003 were evaluated under two different support system viz, trellis and staking. Trellis was made with the help of bamboo and nylon rope while staking was given with branched bamboo head. The experiment was conducted in RCB design with three replications in which planting geometry was maintained at 2.0 m X 1.0 m between row to row and plant to plant distance, respectively. Three seeds of each genotype were sown in each pit on 15 May 2017. After complete germination one healthy plant was allowed to grow. The crop was fertilized with cow dung, urea, TSP and MP at the rate of 10 ton, 50 kg, 150 kg and 150 kg per hectare respectively (Rashid, 1999). Full doses of well decomposed cow dung and half of TSP were applied to the plots and incorporated to the soil during land preparation. The rest of TSP and entire amount of MP were applied in pits 7 days prior of seed sowing. Urea was applied in two installments at 20 and 40 day after sees sowing. Irrigation, drainage weeding etc were done as and when necessary. Data on different parameters were collected for pod yield and yield attributes. Collected data were analyzed using MSTAT software for interpretation of results.

Results and Discussion

Effect of genotype

Significant variations were observed among the genotypes on pod yield and yield attributes (Table 1.1.1). All the genotypes required around 50 days and 80 days to first flowering and first green pod harvest, respectively. Among the genotypes, Sikribi sheem-1 produced the maximum number of pods per plant (211.5) followed by SB003 (187.0) while it was the lowest for Sikribi sheem-2 (168.0). Individual pod weight of Sikribi sheem-1 (5.62 g) and SB003 (5.59 g) was significantly higher than that of Sikribi sheem -2 (4.09 g). Green pod yield of Sikribi sheem-1 (1.19 kg/plant) and SB003 (1.05 kg/plant) was significantly higher than that of Sikribi sheem-2 (0.69 kg/plant). Corresponding pod yield per decimal was also indicated that (Figure 1.1) Sikribi sheem-1, Sikribi sheem-2 and SB003 produced 42.8 kg, 24.8 kg and 37.8 kg of green pod, respectively during summer. Similar variation of pod yield during summer season was also reported by Akter (2015) when grown at different sowing dates during summer season.

Table 1.1.1. Effect of genotype on pod yield and yield attributes of summer country bean

Genotypes	Days to flower	Days to harvest	No of pods/ plant	Individual pod wt. (g)	Pod yield/plant (kg)	Pod length (cm)	Pod breadth (cm)	% borer infestation
Sikribi sheem-1	49.66a	79.5	211.5a	5.62a	1.19a	8.43a	2.30a	2.8
Sikribi sheem-2	47.50b	77.66	168.0c	4.09b	0.69b	7.16b	2.01a	3.7
SB003	50.00a	79.66	187.0b	5.59a	1.05a	8.5a	1.73b	3.4
F-test	*	Ns	**	**	**	**	**	NA
CV(%)	3.11	2.51	5.06	12.5	13.33	7.3	8.4	-

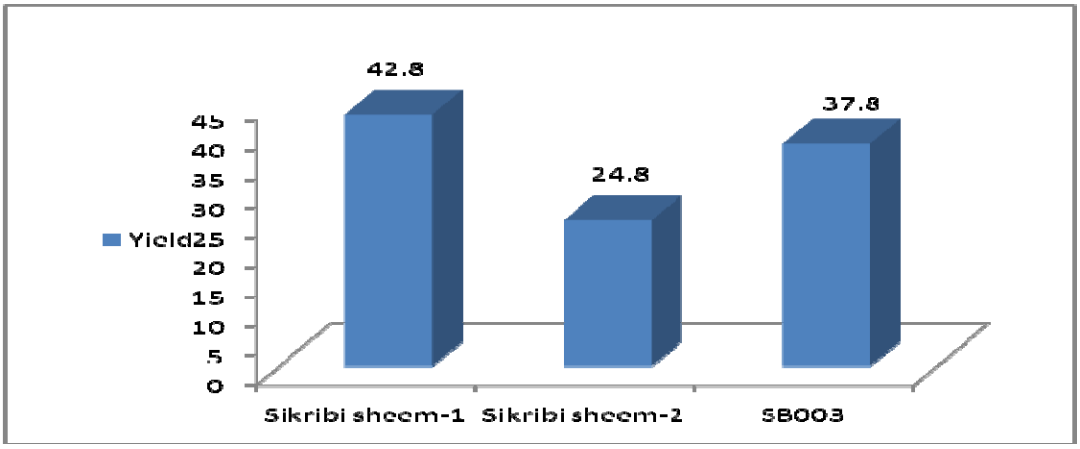

Figure 1.1.1. Pod yield (kg/decimal) of country bean genotypes

Effect of support system

Non significant variations in pod yield and yield attributes of summer country bean were observed when grown under two different support systems (Table 1.1.2). However, little higher number of pods per plant (194.55) was harvested from the plant grown under staking system than that of trellis system (183.11). Similar minor variation in pod yield per plant was also recorded for the both support systems (1.01 kg and 0.95 kg for staking and trellis, respectively). Similar result was also reported by Khan (2003) in which number of pods per cluster, number of pods per plant, pod yield per plant were slightly higher in staking support than in trellis support system while significantly higher than found in ring type support system. Figure 1.1.2 indicated that plants grown under staking support system produced 36.3 kg pods per decimal while it was 34.2 kg per decimal for trellis.

Table 1.1.2. Effect of support system on pod yield and yield attributes on summer country bean production

Genotypes	Days to flower	Days to harvest	No of pods/ plant	Individual pod wt. (g)	Pod yield/plant (kg)	Pod length (cm)	Pod breadth (cm)	% borer infestation
Trellis	49.00	78.33	183.11	5.15	0.95	7.95	2.04	2.9
Staking	49.11	79.55	194.55	5.06	1.01	8.11	1.98	3.7
F-test	Ns	Ns	*	Ns	Ns	Ns	Ns	NA
CV(%)	3.11	2.51	5.06	12.5	13.33	7.3	8.4	-

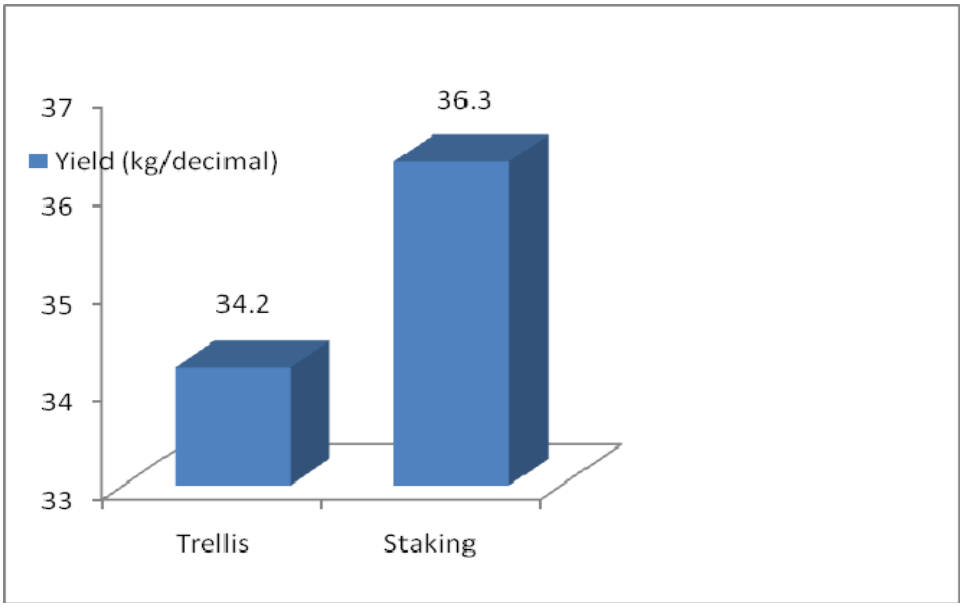

Figure 1.1.2. Pod yield (Kg/decimal) of summer country bean under different support system

Interaction effect

Interaction effect between genotypes and support systems was presented in Table 1.1.3. Most of the parameters were not significantly affected due to interaction between genotypes and support system except number of pods per plant and pod yield per plant. The highest number of pods per plant was recorded from the genotype Sikribi sheem-1 when grown under staking support system (220.0) while it was the lowest for Sikribi sheem-2 when grown in staking support system (155.66). The similar trend was also recorded for pod yield per plant. The genotype Sikribi sheem-1 produced the maximum pod yield per plant at staking support system (1.25 kg) which was identical to that of SB003 grown under staking support system (1.15 kg/plant). The lowest per plant yield (0.61 kg) was achieved from Sikribi sheem-2 grown under staking support system.

Table 1.1.3. Interaction effect between support system and genotype on growth and yield of summer country bean

Genotypes	Days to flower	Days to harvest	No of pods/ plant	Individual pod wt. (g)	Pod yield/plant (kg)	Pod length (cm)	Pod breadth (cm)	% borer infestation
S1V1	49.33	79.33	203.00ab	5.54	1.12ab	8.3	2.30	4.5
S1V2	47.33	77.00	180.33bc	4.26	0.78cd	7.16	2.13	6.0
S1V3	50.33	78.66	166.00c	5.64	0.95bc	8.40	1.70	7.0
S2V1	50.00	79.66	220.00a	5.69	1.25a	8.56	2.30	7.5
S2V2	47.66	78.33	155.66c	3.93	0.61d	7.16	1.90	8.0
S2V3	49.66	80.66	208.00a	5.55	1.15a	8.6	1.76	6.5
F-test	Ns	Ns	**	Ns	***	Ns	Ns	NA
CV(%)	3.11	3.92	5.06	12.5	13.33	7.3	8.4	-

S1= Trellis, S2= Staking, V1=Sikribi sheem-1, V2= Sikribi sheem-2, V3= SB003

Per decimal green pod yield at different treatment combinations are given in Figure 1.1.3. The maximum green pods were harvested from the plants of Sikribi sheem-1 (45.0 kg) followed by SB003 (41.4 kg) grown under staking support system. While it was only 22.0 kg/decimal for Sikribi sheem-2 when grown under staking support system.

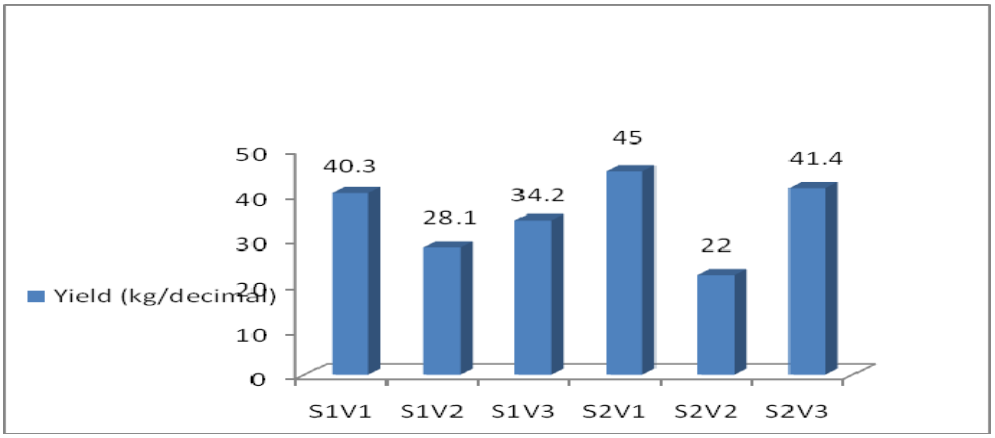

Figure 1.1.3. Pod yield (kg/decimal) of country bean genotypes under different planting System

Table 1.1. 4. Incidence of disease and insects in summer country bean genotypes

Insects/Diseases	Description
1. Aphid	All the genotypes were infested at 40 day after sowing. Hand destruction and application insecticide twice (admire @ 0.5 ml per litre of water) was found effective.
2. Pod borer	Pod infestation was found at later harvesting stage. Percent infestation was found very negligible (4.0-8.0%)
3. Bean common mosaic virus	Growing twigs of two plants of SB003 infected with virus at 55 day after sowing. Infected twigs were immediately pruned off and destroyed. No further infection was found in the field.
4. Cercospora leaf spot	Lower leaves of all genotypes were infected by cercospora leaf spot 80 days after sowing. Application of Bavistin (fungicide 2%) was found effective to reduce the incidence.

Economic analysis of summer country bean production is presented in Table 1.1.5. It was found that only bamboo is required for contruction of support system. In this study it was found that Sikribi sheem-1 producrd maximum pod yield. Therefore, the corresponding gross margin was 2424 taka/decimal. Hence, growers can ensure more profit (more than 2000/ taka per decimal) by cultivating Sikribi shemm-1 during summer season in Sylhet region followed by SB003. Some pictorial views are presented in Figure 1.1.4.

Table 1.1.5. Yield and yield attributes of country bean genotypes during summer

Genotype	Pod yield/ decimal (kg)	Cost (Tk/ decimal)	Return/ decimal (@ 80 Tk/ kg)	Gross margin	BCR
Sikribi sheem 1	42.8	1000/ (only bamboo sticks and rope are required)	3424	2424	3.40
Sikribi sheem-2	24.8		1984	984	1.98
SB003	37.8		3024	1624	3.02
Average	35.13		2810.6	1677.3	2.81
Range	24.8-42.8		1984-3424	984-2424	1.98-3.4

a. Aphid infested twig b. Bean common mosaic virus

Figure 1.1.4. Pictorial views of summer country bean evaluation

Activity 1.2. Influence of grafting on summer tomato production

Introduction

Tomato (*Solanum* l*ycopersicum)* is a winter season crop belongs to the genus *Lycopersicon* of the family Solanaceae. Production of tomato during summer season is gaining popularity in Bangladesh (Ahmed *et al*., 2011). Unfortunately production of tomato during summer is seriously constrained due to severe attacks of bacterial wilt disease caused by a bacterium *Ralstonia solanacearum.* In severe attacks, the entire crop may be damaged (Rashid *et al*., 2007). This disease is particularly prevalent during period of high temperature and high humid condition. There are some heat tolerant tomato varieties but none of them are resistant against bacterial wilt. Scientists proved that grafting tomato on wild eggplant as rootstock protect from this disease (Rashid *et al.,* 2007). Many farmers in Moulavibazar district are involved in grafted tomato seedling production and usually supplied/marketed to the other farmers of Sylhet division. They used various grafting techniques including use of grafting clip, plastic straw tube or jute made fine thread for uniting of rootstock and scion. Comparative performance of these types of grafted seedlings was not assessed against yield or bacterial wilt problem. Therefore, the experiment was, undertaken to observe the effect of grafted seedling types on the incidence of bacterial wilt and fruit yield of tomato during summer season in Sylhet.

Materials and methods

The experiment was carried out at the experimental field of Horticulture Department, Sylhet Agricultural University, Sylhet, Bangladesh during July 2017 to November 2017. The climate of the experimental area is characterized by high temperature, heavy rainfall, and high humidity. It belongs to the "Khadimnagar" soil series of Eastern Surma-Kushiara Floodplain under the Agro ecological Zones-20 (FAO, 1988). The pH of the soil is around 4.98, soil organic matter 1.79% and Soil EC is 0.47 ds/m. Three different types seedling of BARI hybrid tomato-8 viz., normal seedling (seedling grown in seedbed), grafted-1 (tomato grafted with the help of jute fibre) and grafted-2 seedling (seedling was grafted with the help of plastic tube) (Figure 1.2.1)

were evaluated under two different sowing dates of 25 July and 25 August 2017. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Normal seedlings of BARI hybrid tomato-8 were produced at the experimental field of Sylhet Agricultural University and seeds were sown on 25 July and 25 August 2017, while both types of grafted seedlings were collected from the summer tomato growers (those who are very familiar with grafted seedling production) of Kamalganj upazila, Moulavibazar. Almost 30 days old varied seedling types were transplanted in the main field on 25 August and 25 September 2017. The unit plot size was 2.3 m × 2.4 m having four rows per bed and 6 plants per row and 24 plants per plot. Plants were transplanted with spacing at 60 cm × 40 cm. The unit plots and blocks were separated by 50 cm and 75 cm, respectively. The land was acidic in nature hence, lime (Dolomite) was applied in the field @ 4 kg decimal^{-1}. Each plot was fertilized with well decomposed cowdung 15 ton, urea 300kg TSP 200 kg MOP 150 kg per ha, respectively (Ahmad et al., 2008). Half of the quantity of cow dung and the entire amount of TSP were applied during final land preparation. The remaining cow dung and half of MOP were applied 5 days before of planting. The whole of urea and remained half of MOP were applied in 3 equal splits as top dressing at 15, 30 and 50 days after transplanting. The crop was protected from rain providing polythene tunnel. Irrigation, pruning mulching weeding and other intercultural operations were done as and when necessary. Data were recorded and mean yield and yield attributing characters were measured for interpretation of the result.

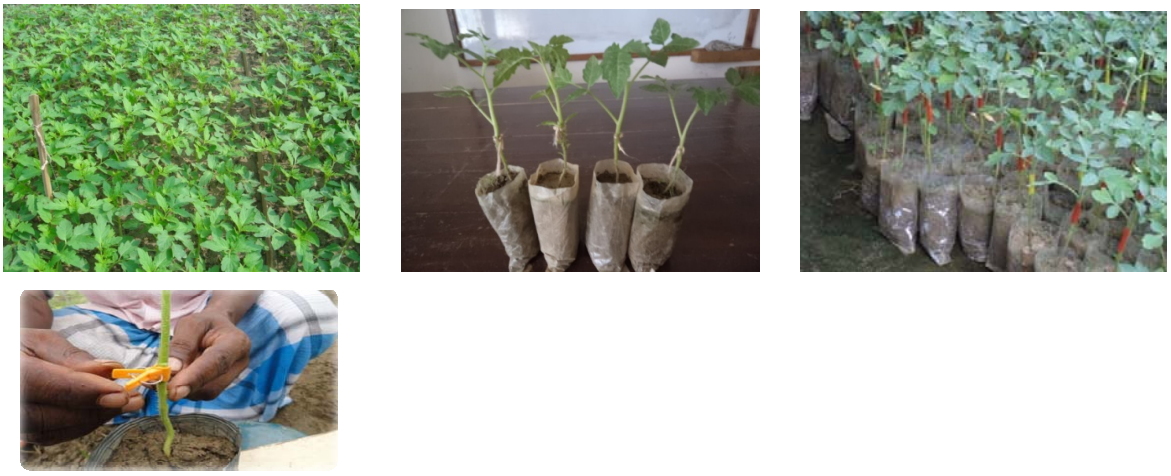

Figure 1.2.1. Different types of grafted tomato seedlings

Results and Discussion

Effect of seedling types

Growth parameters of tomato grown during summer season under varied seedling types were not much affected except number of fruits per plant (Table 1.2.1). The highest number of fruits per plant (29.83) was harvested from the plants grown from normal seedling. Individual fruit weight, fruit length, fruit breadth, TSS (%) etc remained statistically similar for all kind of seedling types. However, plants grown from different kind of seedling types were largely

affected with bacterial wilt infection. Around 60% plants grown from normal seedling were infected from bacterial wilt at 60 day after planting while it was only 5% - 8% for plants grown from grafted seedling (Table 1.2.2). Therefore, survivability of plants at 60 day after planting was more than 90% from grafted plants while it was only 40% for normal seedling grown plants. Therefore, the corresponding fruit yield (t/ha) was much higher in grafted plants (around 55 t/ha) than that of plants grown from normal seedling (28.5 t/ha). Though the fruit yield per plant was significantly higher in plants grown from normal seedling (2.05 kg/plant) than that of grafted seedling (1.79 kg/plant). This variation was attributed since most of the plants in normal seedling plot damaged due to bacterial wilt and some of survivor plant received more space and nutrition caused higher fruit yield plant (Figure 1.2.2). Similar variation in fruit yield per plant and per unit area was also reported by Hosain (2016) when tomato grown from normal seedling, polybag grown double transplanted seedling and grafted seedling during summer season in Sylhet region.

Table 1.2.1. Effect of seedling type on tomato production during summer

Seedling type	Days to flower	Days to harvest	No. of fruits/ plant	Individual fruit wt (g)	Fruit length (cm)	Fruit breadth (cm)	TSS (%)
Grafted-1 (Rope)	50.33b	89.83	26.83b	67.16	5.36	6.20	4.80
Grafted-2 (Tube)	53.50a	90.00	26.5b	66.83	5.28	6.30	4.75
Normal	47.16c	88.00	29.83a	68.83	5.00	6.35	4.75
F-test	*	ns	*	ns	Ns	ns	ns
CV%	4.29	2.96	9.14	3.74	8.79	5.34	5.85

Table 1.2.2. Effect of grafted seedling on tomato production during summer

Seedling type	BW at 30 DAT++	BW at 60 DAT++	Plant survivability at 60 DAT	Fruit yield/ plant (kg)	Fruit yield (t/ha)
Grafted-1 (Rope)	2.00b (5.04)	8.00b (15.51)	92.00	1.79b	54.74b
Grafted-2 (Tube)	1.34b (4.23)	5.33b (11.73)	94.67	1.77b	56.56a
Normal	27.33a (30.94)	58.66a (49.53)	41.34	2.05a	28.57c
F-test	**	**	NA	*	**
CV%	35.41	17.11		9.29	10.5

++: Figures within the parentheses in this column are the transformed values based on ArcSine transformation, NA: not analyzed

a. BW infected plant b. Infected (normal seedling) and non infected (grafted) plot

C. BW conformation test d. Bacterial ooz seen

Figure 1.2.2. Pictorial views of BW infected plant

Effect of sowing dates

Most of the growth and yield parameters except days to flower and number of fruits per plant were not significantly affected due to sowing dates of tomato production during summer in Sylhet region (Table 1.2.3). The maximum number of fruits per plant (29.22) was harvested from plants grown from 25 August sowing while it was 26.22 from plants of 25 July sowing (26.22). However, table 1.2.4 revealed that plants grown from 25 July sowing were largely affected due to bacterial wilt infection (35.11%) than that of 25 August sowing (12.89%). This might be caused since the plants grown from 25 July sowing experienced much rainfall, hot and humid conditions which favors the infection of bacterial wilt. Since the plants grown from 25 August sowing enjoyed more congenial environmental condition that of 25 July sowing ensured significantly higher fruit yield per plant (1.99 kg/plant) and as well fruit yield ton per hectare (58.26 t/ha).

Table 1.2.3. Effect of sowing dates on tomato production during summer

Sowing dates	Days to flower	Days to harvest	No. of fruits/ plant	Individual fruit wt (g)	Fruit length (cm)	Fruit breadth (cm)	TSS (%)
25 July	52.11	90.77	26.22	67.11	5.17	6.28	4.85
25 August	48.55	87.77	29.22	68.11	5.25	6.27	4.67
F-test	*	ns	*	ns	ns	ns	ns
CV%	4.29	2.96	9.14	3.74	8.79	5.34	5.85

Table 1.2.4. Effect of sowing dates on BW infection and yield of tomato

Sowing dates	BW at 30 DAT ++	BW at 60 DAT ++	Plant survivability at 60 DAT	Fruit yield/ plant (kg)	Fruit yield (t/ha)
25 July	15.11 (18.60)	35.11 (33.35)	64.89	1.75	38.08
25 August	5.34 (8.21)	12.89 (17.83)	87.11	1.99	58.86
F-test	**	**	NA	*	**
CV%	35.41	17.11		9.29	10.5

++: Figures within the parentheses in this column are the transformed values based on ArcSine transformation

Interaction effect

None of the parameters was significantly affected due to interaction between seedling types and sowing dates (Table 1.2.5). However, bacterial wilt infection and yield of tomato were significantly affected due to interaction between seedling types and sowing dates (Table 1.2.6). Bacterial wilt infection was very negligible for grafted plants irrespective of sowing

dates while 88% plants were infected with bacterial wilt for plants grown from normal seedling at 25 July sowing (Figure 1.2.3 a). Fruit yield per plant was not significantly affected due to interaction between seedling type and sowing dates and it was ranged from 1.65 kg to 2.21 kg/plant. The corresponding fruit yield per ton was largely varied among the treatment combinations. The highest fruit yield (61.68 t/ha) was recorded from grafted-2 type seedling grown plants followed by the plants grown from grafted -1 type seedling (59.44 t/ha) grown from 25 August sowing. Variation in tomato yield during summer was also reported by Ahmad *et al*., (2011) from 12 ton/ha to 48 t/ha among 12 tomato hybrid combinations under Gazipur condition when grown from May sowing. Hosain (2016) also reported yield variation among different seedling types for tomato production during summer in Sylhet condition.

Table 1.2.5. Interaction effect between grafting and sowing dates on tomato production during summer

Seedling type	Sowing dates	Days to flower	Days to harvest	No. of fruits/ plant	Individual fruit wt (g)	Fruit length (cm)	Fruit breadth (cm)	TSS (%)
Grafted-1	25 July	52.33	91.33	25.66	67.66	5.23	6.20	4.76
	25 August	48.33	88.33	28.00	66.6	5.50	6.20	4.83
Grafted-2	25 July	55.33	92.33	25.00	66.00	5.23	6.33	4.93
	25 August	51.66	87.66	28.00	67.66	5.33	6.26	4.56
Normal	25 July	48.66	88.66	28.00	67.66	5.06	6.33	4.86
	25 August	45.66	87.33	31.66	70.00	4.93	6.36	4.63
	F-test	ns	ns	ns	ns	ns	ns	ns
	CV%	4.29	2.96	9.14	3.74	8.79	5.34	5.85

Table 1.2.6. Interaction effect between seedling type and sowing dates on tomato production during summer

Seedling type	Sowing dates	BW at 30 DAT ++	BW at 60 DAT ++	Plant survivability (%) at 60 DAT	Fruit yield/ plant (kg)	Fruit yield (t/ha)
Grafted-1	25 July	4.00c (9.51)	10.66c (18.32)	89.34	1.73	52.34b
	25 August	0.00c (0.58)	5.33c (12.70)	94.67	1.86	59.44ab
Grafted-2	25 July	2.67c (7.88)	6.66c (14.28)	83.34	1.65	46.56bc
	25 August	0.00c (0.58)	4.00c (9.18)	96.00	1.89	61.68a
Normal	25 July	38.66a (38.41)	88.00a (67.46)	12.00	1.88	7.67c
	25 August	16.00b (23.47)	29.33b (31.60)	70.67	2.21	52.59b
F-test		**	**	NA	ns	**
CV%		35.41	17.11		9.29	11.5

++: Figures within the parentheses in this column are the transformed values based on ArcSine transformation, NA: Not analyzed

a. Severely affected with BW

b. Grafted-1 (Sutuli made)

C. Grafted-2 (plastic tube made)

d. Middle portion (normal seedling) affected with BW

e. Harvested tomato

f. Inner views of BARI hybrid tomato-8

Figure 1. 2.3. Pictorial views of tomato grown under varied seedling types

Activity 1.3. Performance of heat tolerant tomato hybrids under Sylhet condition

Three heat tolerant tomato hybrids, BARI hybrid tomato-4, BARI hybrid tomato-8 and BARI hybrid tomato-10 are considered in this study. Seeds were sown in 1 September 2017 and 25 days old normal seedlings were transplanted in the field. This study was completely damaged due to inundation of the field due to severe rainfall and followed by severe infection of bacterial wilt.

Activity 1.4. On farm adaptive trial of summer tomato and summer country bean

- For on farm adaptive trial of summer tomato and summer country bean, twenty farmers from Moulavibazar and Habiganj were selected with the help of DAE personnel. Seeds and grafted seedlings of tomato of BARI hybrid tomato-8 and seeds of Sikribi sheem-1 were given to the selected farmers for establishment of adaptive trial. All the selected farmers initiated their trial from the month of July 2017. Necessary support including training, seeds, seedlings, polythene, nylon rope, fertilizers etc were given to the farmers for smooth conduction of the trial. For adaptive trial of each crop of each farmer 2-3 decimal of land was utilized. Trials were completed and necessary information already collected for preparation of report. Some pictorial views of the adaptive trials are given in Figure 1.4.1.

a. Supports given b. Training c.Tomato adaptive trial d. Fruiting stage

e. Adaptive trials of summer tomato and summer country bean

Figure 1.4.1 Pictorial views of adaptive trials

Results and Discussion

Summer Tomato

Yield and yield attributes for tomato production during summer season at farmers field of Sylhet is given in Table 1.4.1. All the farmers planted grafted seedlings in the main field in August, 2017. Number of fruits per plant was largely varied from 20 to 45 among the farmers. Consequently fruit yield per plant as well as fruit yield per decimal also varied among the farmers. The average fruit yield per decimal among the farmers was 158.5 kg. A remarkable variation for tomato yield was noticed (106 kg to 206 kg/decimal) among the farmers and it was mostly attributed due to the differences of management practices offered by the farmers and infection of plants with yellow leaf curl virus. After harvest of the fruit, some portion was sold in the market and market price varied Taka 68.0 to 95.0 from place to place and time of harvesting. However one farmer sold tomato as high as 155 taka per kg prior to Eid Ul Azha at Kamalganj Upazila.

Among the 20 farmers, two farmers were not able to complete their trials. The trials were damaged due to stagnation of water as well as mismanagement rendered by the growers. Among the 20 farmers, 17 were from Moulavibazar and 3 from Habiganj district. No remarkable variations were noticed for performance between two districts.

Table 1.4.1 Adaptive Trial of Summer Tomato

Name of the Farmers	Date of Transplanting	Fruit yield kg/decimal	Market price (Tk/kg)	
			Highest	Lowest
1. Nikesh Gope	10.8.17	142	110	80
2. Md. Nazmul Hasan	12.8.17	106	125	75
3. Chayan Deb	12.8.17	146	110	65
4. Sajal Paul	16.8.17	140	120	50
5. Md. Toraj Mia	13.8.17	153	125	75
6. Rabindra Kumar	12.8.17	168	80	60
7. Md. Kalam	18.8.17	193	80	90
8. Braja Kumar	14.8.17	193	80	60
9. Kalidash Sharma	10.8.17	181	110	80
10. Manik Mia	07.8.17	206	90	75
11. Ranjan ingh	12.8.17	137	80	70
12. Monihar Adhikari	12.8.17	168	75	55
13. Brajendra Singh	5.7.17	206	155	70
14. Achinta Paul	20.8.17	150	80	60
15. Shamol Paul	20.8.17	165	80	60
16. Main uddin	18.8.17	156	70	85
17.Mehraj Hossain	25.8.17	131	75	60
18. Badal Mia	25.8.17	112	80	60
Average		158.50	95.83	68.33
Min		106	70	50
Max		206	155	90
Stdev		29.34	23.90	11.11

Summer Country bean

Production of country bean during summer was largely affected by the farmers. Pod yield per plant at different farmer's field was varied from 0.95 kg to 1.48 kg (Table 1.4.2). The corresponding pod yield per decimal was also varied from 38.0 kg to 59.39 kg. The variation of pod yield among different farmers might be attributed due to the variation of management practices and other factors like soil fertility, shady place etc. All farmers sold some portion of their produce in the market and market price of country bean during summer varied from 60 to 90 tk per kg depending upon harvesting time and location.

Again 15 farmers successfully completed their adaptive trials while 5 adaptive trials were damaged due to severe downpour and flash flood. Although project is over, this year (summer 2019) almost 40 enthusiastic farmers collected seeds of summer country bean from our university (SAU, Sylhet) of their own interest and initiated summer country bean cultivation from April 2019. Due to flash flood all plots of Gowainghat upazila were completely damaged in the first week of July.

Among the 20 farmers, 17 were from Moulavibazar and 3 from Habiganj district. No remarkable variations were noticed for performance between two districts.

Table 1.4.2 On farm adaptive trial of summer country bean

Name of the Farmers	No. of pods/ plant	Yield (kg per plant)	Yield (kg er Decimal	Market price
1. Kalidas Sharma	265	1.32	53.0	Price
2.Braja kishor	240	1.2	48.0	varied
3. Rabindra Kumar	260	1.3	52.0	from 60
4. Brajendra Singha	250	1.3	52.0	taka to 90
5. Manik Mia	280	1.4	56.0	taka
6. Monihar Adhikari	260	1.35	54.0	depending
7. Md. Kalam	255	1.27	50.8	on
8. Nikesh Gope	220	1.1	44.0	harvesting time and
9. Sajal Paul	200	1.0	40.4	location
10. Md. Nazmul Hasan	175	0.95	38.0	
11. Chyan Deb	198	1.02	40.8	
12. Toraj Mia	205	1.08	43.2	
13. Achinta Paul	215	1.07	42.8	
14. Shamol Paul	240	1.2	48.0	
15. Md. Samaj Ali	280	1.48	59.36	
Average	236.20	1.20	48.16	
Min	175	0.95	38.00	
Max	280	1.48	59.36	
Stdev	32.26	0.16	6.38	

Winter 2017-2018

Activity 2.1. Evaluation of radish genotypes in Sylhet

Radish is an important winter root vegetable in Bangladesh. It is rich in vitamin A and C. This is quick growing vegetable and can be adapted at any part of the country. The BARI has developed some improved radish varieties which are high yielding and easy to grow. In Sylhet region, in the near past no intervention was taken to evaluate or to adapt those varieties. Hence, the present study was undertaken to evaluate promising radish varieties in Sylhet.

Materials and Methods

The present study was conducted at the experimental field of Sylhet Agricultural University during winter season of 2017-2018. Three improved radish varieties viz., BARI Mula-1 (Taski), BARI mula-2 (Pinky) and BARI mula-3 (Druti) were evaluated under RCB design with four replications. Seeds of all genotypes were sown in raised bed on 19 November 2017 at a spacing of 40 cm X 30 cm between row to row and plant to plant, respectively. Initially seeds were sown in continuous and after complete emergence, single plant was allowed to grow. Fertilizer application, mulching, weeding, irrigation etc were done as and when necessary. Based on horticultural maturity of the genotypes, whole plants were harvested and ten randomly selected plants were selected from each replication for collection of data. Collected data were compiled and analyzed using MSTAT software for interpretation of the result.

Results and Discussion

Radish genotypes were not significantly differed in respect of days to harvest, number of leaves per plant, shoot height, root length, root diameter or foliage weight per plant. However, Table 2.1.1 clearly indicated that all the genotypes can be harvested within 40 to 45 day after sowing indicating this type of quick growing vegetable varieties would be very useful for Sylhet region where climatic conditions are unpredictable. Most of the growers in Sylhet region required less risk for their crop production. In this regard, short duration crop like radish might be an excellent alternative. Among the three radish genotypes, BARI mula-1 (Tasaki) had the highest individual root weight (108.33 g) followed by BARI mula-3 (Druti) (98.66 g). The corresponding calculated per decimal root yield was also the highest for Tasaki mula (41.16 kg) followed by druti (35.46 kg/decimal). Pictorial views of the study are shown in Figure 2.1.1.

The Investigator surprisingly observed such tiny root during harvest. Due to scarcity /absence of well developed research field, the study was conducted in such a place (beside a student dormitory) which was very compact, stony and acidic in nature. These are might be possible reasons for producing such small roots of radish. However, to generate reliable database in this regard, a Master's Student in the Department of Horticulture will conduct similar study in upcoming winter season.

Table 2.1.1. Growth and yield of radish genotype in Sylhet

Genotype	Days to harvest	No. of leaves/ plant	Shoot height (cm)	Root length (cm)	Root diameter (cm)	Foliage weight/plant	Individual root weight (g)	Root yield (kg/ decimal)
BARI mula-1	42.66	13.60	36.40	17.93	3.43	96.66	108.33 a	41.16 a
BARI mula-2	43.33	12.23	37.33	18.06	3.56	89.00	77.66 b	27.93 a
BARI mula-3	42.00	12.20	35.80	16.56	3.93	85.00	98.66 ab	35.46 a
F-test	NS	NS	NS	NS	NS	NS	*	*
CV	3.83	12.26	12.25	9.77	15.06	28.08	11.36	11.30

Figure 2.1.1 Radish genotypes (Tasaki, Pinky and Druti)

Activity 2.2. Performance of broccoli genotypes under Sylhet condition

Broccoli (*Brassica oleracea* var. *italica* L.) is a cole crop belonging to the family cruciferae. It is originated from West Europe (Prasad and Kumar, 1999). It is more nutritious than other cole crops such as cabbage, cauliflower and kohlrabi (Thompson and Kelly, 1985). It is an excellent source of vitamin C and dietary fibre. It is a good source of potassium and vitamin A. So it can contribute significantly to improve our diet. It is also fat and cholesterol free. It is now growing successfully in some areas of Bangladesh. Like other vegetable crops, production of broccoli was largely affected by genotype, sowing dates, fertilizer application etc. Again shelf life of broccoli is very short. After harvesting, head become unfit for consumption within a couple of days. To overcome this situation staggered planting may be the best option to make broccoli available for longer period in the market. Therefore, to increase broccoli production, selection of suitable genotype and suitable sowing dates for specific genotype is very much important. Keeping this view in mind the present investigation was made comprising three broccoli genotypes to select suitable variety.

Materials and Methods

This investigation was conducted during winter season of 2017-2018 at the experimental field of Sylhet Agricultural University. Three broccoli genotypes viz., BARI broccoli-1, Centarou and

Green crown were evaluated under RCB design with four replications. Seeds of broccoli genotypes were sown in seedbed on 25 October 2017. Twenty five days old seedlings of the broccoli genotypes were transplanted in the main field at 60 cm × 40 cm planting geometry. Before transplanting the land was prepared properly mixing with basal dose of cow dung, TSP and MP. Urea was applied as top dress at 15 and 25 day after transplanting. Irrigation, mulching, weeding etc were done as required. Data on growth and other yield parameter were collected and analyzed for preparation of results.

Results and Discussion

Significant variations were observed among the broccoli genotypes in respect of curd yield and yield attributes (Table 2.2.1). Days to first curd initiation (78.33) and days to first harvest (85.66) were the minimum for the genotype BARI broccoli-1 while both of these were the maximum for Centarou. The genotype Centarou had the highest individual curd weight (607.0 g) since the curd length (19.7 cm) were the maximum for this genotype. The genotype Centarou produced the maximum curd yield (109.2 kg/decimal) followed by Green crown (98.23 kg/decimal). Pictorial views of experimental field and curd are presented in Figure 2.2.1.

Table 2.2.1. Performance of broccoli genotypes under Sylhet condition

Genotype	Days to curd initiation	Days to harvest	Plant height at harvest (cm)	No. of leaves at harvest	Individual curd weight (g)	Curd yield/ decimal (kg)	Curd length (cm)	Curd width (cm)
BARI Broccoli-1	78.33	85.66	66.00	13.46	223.66 b	40.20 b	15.06 c	14.86
Centarou	81.66	91.33	68.00	14.66	607.00 a	109.2 a	19.70 a	15.26
Green crown	79.66	91.00	63.66	16.33	546.00 a	98.23 a	16.9 b	15.33
F- test	NS	NS	NS	NS	**	**	**	NS
CV (%)	3.09	2.66	4.32	7.49	7.54	7.54	2.55	5.56

Figure 2.2.1 Evaluation of broccoli genotypes

Activity 2.3: Production of French bean at different sowing dates

French bean (*Phaseolus vulgari L*.) is a pulse crop but used as vegetable in Bangladesh. It is ranked high as cheap sources of nourishing food, rich in protein, carbohydrate, minerals, vitamins etc. The immature pod tender and also dry beans of French bean has a possibility to meet up a good share of vegetable demand in Bangladesh (BARI, 2011). The crop is generally cultivated in Chittagong, Comilla and also some parts of Northern region in Bangladesh. In Sylhet, local variety is mostly cultivated by the growers. This crop is short duration in nature and harvesting duration is also very narrow (7-10 days) for its much synchronized flowering behavior. Like other vegetable crops, production of French bean was largely affected by genotype, sowing dates, fertilizer application etc. To improve French bean production in Sylhet region and to increase availability of green pods in the market genotypic evaluation with varying sowing dates can play vital role in this regard.

Materials and Methods

Three French bean genotypes viz., BARI jharsheem-1, BARI jharsheem-2 and a Local genotype comprising four different sowing dates (15^{th} of October, November, December and January) were evaluated under RCB Design with three replications at the experimental field of Sylhet Agricultural University. Seven days prior to each sowing date, land was well pulverized and soil was mixed with rotten cow dung, TSP and MP. Unit plot size was 1.2 m × 1.0 m. Seeds were directly sown in pits and two plants were allowed to grown in each pits. Spacing was given 30 cm between row and 25 cm between plants. Irrigation, mulching and other intercultural operations were done as and when necessary. Plant growth behavior, flowering, fruiting, pod yield behavior etc were recorded from each sowing plants. Collected data were analyzed using MSTAT software for interpretation of the results.

Results and Discussion

Main effect of sowing dates

Sowing dates had significant influence on growth and yield of French bean (Table 2.3.1). Both days to flower and days to first harvest were increasing in trend with delay in sowing from 15 October to 15 January sowing. The lowest number of days to flower (32 days) and days to harvest (49 days) were required for the plants grown from 15 October sowing while it was the highest for the plants grown from 15 January sowing (38 and 57 days, respectively). The highest number of pods per plant, pod yield per plant as well pod yield per decimal and pod length were the highest from the plants grown from 15 October and 15 November sowing. The growth and yield of French bean was drastically reduced in 15 December and 15 January sowing. The highest pod yield per plant (77.91g) was recorded from 15 October sowing which was at par with that of 15 November sowing (75.22). Similarly the highest pod yield per decimal (76.69 kg) was harvested from plants of 15 November sowing followed by 15 October sowing (72.36 kg). The yield of pod was as low as 26.39 kg and 14.24 kg per decimal at 15

December and 15 January sowings. Since the plants grown from October and November sowing experienced more congenial atmospheric conditions at vegetative growth stage which in turn ensure higher pod yield. While the plants raised from December and January sowings experienced much cooler condition just after emergence caused stunted plant growth and development and ultimately badly affected pod growth and yield.

Table 2.3.1. Effect of sowing date on pod yield of French bean

Sowing date	Days to flower	Days to harvest	No. of harvested pods/plant	Wt. of harvested pods/plant (g)	Pod length (cm)	Pod yield kg/decimal
15 October	32.33 d	49.0 b	12.99 a	77.91 a	13.06 ab	72.36 a
15 November	34.33 c	56.0 a	12.19 a	75.22 a	14.81 a	76.69 a
15 December	36.0 b	56.11 a	5.24 b	28.73 b	12.7 b	26.39 b
15 January	38.33 a	57.0 a	3.7 b	15.15 c	12.33 b	14.24 b
F-Test	**	**	**	**	**	**
CV%	1.44	4.22	17.14	14.29	4.73	14.87

Effect of genotypes

Genotype had significant influence on growth and yield of French bean (Table 2.3.2). Among the three genotypes, BARI jharsheem-1 produced the maximum number of pods per plant (10.06) followed by BARI jahrsheem-2 (8.02) while it was the lowest for Local (7.51). The highest pod yield per plant (68.24 g) and pod yield per decimal (68.63 kg) was harvested from the genotype BARI jahrsheem-1. The yield of BARI jharsheem-1 was far higher than those of other two genotypes hence, dissemination of BARI jharsheem-1 might be effective for Sylhet region.

Table 2.3.2. Effect of genotype on pod yield of French bean

Genotype	Days to flower	Days to harvest	No. of harvested pod/plant	Weight of harvested pod/plant	Pod length (cm)	Pod yield kg/decimal
BJS-1	37.25 b	53.0 b	10.06 a	68.24 a	13.82 a	68.63 a
BJS-2	36.5 c	54.92 ab	8.02 b	34.02 c	12.39 b	31.54 b
Local	39.5 a	55.67 a	7.51 b	45.53 b	13.47 a	42.08 b
F-Test	**	*	**	**	**	**
CV%	1.4	4.22	17.14	14.29	4.73	14.87

Interaction effect

Interaction effect between sowing dates and genotypes were significant for days to flower, number of pods per plant, pod yield per plant and pod yield per decimal (Table 2.3.3). The highest number of pods per plant were harvested from the BARI jharsheem-1 when grown from 15 October sowing (16.0) closely followed by BARI jharsheem-1 (14.2) and BARI jharsheem-2 (13.68) when grown from 15 November sowing. The corresponding highest pod yield per decimal was recorded from BARI jahrshem-1 (111.69 kg) at 15 November sowing which was identical to that of 15 October sowing (105.5 kg/decimal). All the genotypes exhibited very poor performance for growth and pod yield from December and January sowings.

Table 2.3.3. Interaction effect of sowing dates and genotypes on pod yield of French bean

Genotype	Days to flower	Days to harvest	No. of harvested pod/plant	Weight of harvested pod/plant	Pod length (cm)	Pod yield kg/decimal
T1V1	30.0 h	45.0	16.0 a	113.57 a	13.79	105.5 a
T1V2	31.33 g	51.0	11.33 bc	48.17 cd	12.33	44.61 bc
T1V3	35.67 e	51.0	11.63 bc	72.0 b	13.06	66.9 b
T2V1	34.0 f	56.0	14.2 ab	97.56 a	15.3	111.69 a
T2V2	34.0 f	56.0	13.68 ab	65.20 b	13.8	60.47 b
T2V3	35.0 ef	56.0	8.69 cd	62.90 bc	15.33	57.9 b
T3V1	37.0 b	54.0	6.81 de	44.33 d	12.88	40.77 b-d
T3V2	32.66 c	55.33	4.02 ef	14.11 ef	11.72	13.13 e
T3V3	38.33 a	59.0	4.9 ef	27.74 e	13.5	25.27 c-e
T4V1	38.0 d	57.0	3.25 f	17.39 ef	13.29	16.5 de
T4V2	38.0 d	57.33	3.04 f	8.59 f	11.72	7.96 e
T4V3	39.0 d	56.67	4.82 ef	19.47 ef	11.99	18.27 c-e
F-Test	**	NS	**	**	NS	**
CV%	1.44	4.22	17.14	14.29	4.73	14.87

Some pictorial views including experimental field, pods of different genotypes are presented in Figure 2.3.1.

Figure 2.3.1. French bean genotypes grown at varied sowing dates

Activity 2.4. Evaluation of tomato genotypes for winter season

Tomato (*Solanum lycopersicum L*.) is one of the most important vegetables in Bangladesh. It is good source of vitamin A and C and provides antioxidants element (Lycopene) which prevent cancer. It's per unit production in Bangladesh is very low compared to other tomato growing countries. This is due to absence of location specific suitable varieties/hybrids, absence of modern production technologies, adverse climatic conditions and pest attack. Now a day farmers are very inclined or fascinated to grow hybrid variety to get early harvest, good quality fruit along with better yield. In Sylhet region many tomato growers are used seeds of tomato hybrids marketed by several seed companies. Sometime, farmers are being cheated by purchasing F_1 seeds from market paying high price, of which, mostly are exported. While, BARI has developed several hybrids and open pollinated varieties of tomato, which, can be procured at lower price compared to other commercial varieties. Therefore, the present study was undertaken to evaluate commercial hybrids along with BARI released varieties in Sylhet condition.

Materials and Methods

The experiment was carried out at the experimental field of Sylhet Agricultural University during winter season of 2017-2018. Eight promising tomato genotypes were selected in this study. The genotypes were BARI tomato-19, WP010, Mangal Raja, BARI Tomato-15, BARI hybrid Tomato-5, BARI Tomato-16, Epoc and BARI Tomato-14. The seeds of above mentioned genotypes were sown in the seedbed on October 15, 2017. Thirty day old seedlings were transplanted in the main plot. The experiment was laid out in RCB design with three replications where plants were spaced at 60 cm × 40 cm between row to row and plant to plant, respectively. Plant protection, weeding, irrigation, fertilizer application etc were done as and when necessary. Data on yield and yield attributes were collected from five randomly selected plants from each replication. Collected data were compiled and analyzed using MSTAT software for interpretation of the results.

Results and discussion

The tomato genotypes were significantly differed in relation to days to flower, plant height and number of locule per fruit (Table 2.4.1). The genotype WP010 was the earliest (47.0 days) for first flower while the genotype BARI tomato16 was delay in nature for first flower among

the genotypes (54.66 days). The exotic hybrid Epoch produced the tallest plant at flower (70.33 cm) followed by BARI F_1 tomato-5 (64.00cm). Locule number per fruit was largely varied from 2.0 to 9.00 of which WP010 had the highest number of locule per fruit. All the genotypes had moderate amount of TSS and ranged from 4.43 to 5.46%. Although pericarp thickness was found non significant but some of the genotypes had more than 7.00 mm thickness. Pericarp thickness is closely related to storability of tomato.

Table 2.4.1. Plant and fruit characteristics of tomato genotypes

Genotype	Days to flower	Plant height at flower (cm)	No. of locule	TSS (%)	Pericarp thickness (mm)
BARI tomato-19	53.66ab	62.33 a-c	2.66 b	5.43	7.33
WP010	47.00d	57.66 b-d	9.00 a	5.46	5.00
Mangal Raja	48.00cd	47.00 ef	5.00 b	4.56	5.66
BARI tomato-15	51.33a-d	53.33 c-e	3.33 b	4.93	6.66
BARI F_1 tomato-5	52.33a-d	64.00 ab	4.66 b	4.43	6.66
BARI tomato-16	54.66a	50.33 d-f	3.33 b	4.86	7.66
Epoch	52.66a-c	70.33 a	2.00 b	5.13	7.33
BARI tomato-14	48.33b-d	42.00 f	4.66 b	5.33	7.00
F-test	**	**	**	NS	NS
CV	4.1	6.89	28.76	14.48	17.44

Fruit yield and yield attributes of tomato genotypes is presented in Table 2.4.2. Fruit yield was significantly affected by the genotypes. The highest number of fruits per plant was recorded from the genotype BARI F_1 tomato-5 (54.66) while it was the lowest for WP010 (29.33) but it produced the heaviest individual fruit weight (63.26 g) . The genotype BARI tomato-15 produced the second heaviest individual fruit weight (61.53 g). In respect of fruit yield per plant (2.76 kg) and per hectare (94.13 ton) was harvested from BARI hybrid tomato -5 closely followed by BARI tomato-14. In a grow out test made at HRC, BARI consisting 16 tomato hybrids (BARI released and exotic hybrids) in winter 2009-2010, BARI hybrid tomato was the top ranked in respect of fruit yield (Anonymous 2010). Therefore, it may be concluded that growers can be patronized for our own variety for commercial production because the price of seeds is much lower than that of exotic hybrids. Fruit shape, size, etc of different tomato genotypes are shown in Figure 2.4.1.

The experiences revealed that the individual fruit weight of BARI Tomato 15 on an average 70±2 g under Gazipur condition. In the present study it was 62 g. Again individual fruit weight of BARI Hybrid Toamto-5 was 74±2 g and number of fruits per plant was 28.0 when grown under Gazipur condition (Annual Report 2008-2009, Olericulture Division, HRC, BARI). In this study individual fruit weight of BARI Hybrid Tomato-5 was 52.33 g and corresponding number of fruit per plant was 54.66 which was satisfactorily high. Most probably higher number of fruits per plant caused lower individual fruit weight since number of fruits per plant is negatively correlated with individual fruit weight. Besides individual fruit weight, the other parameters like

number of fruits per plant, fruit yield per plant (Table 2.4.2) can also be taken for interpretation of actual findings.

In the farmer's field similar performance of BARI Hybrid Tomato-5 was found and very encouraging. Therefore, many farmers requested for seed for winter season of 2018-2019. Due to scarcity of seeds, only 50 g seeds was collected and from HRC and distributed to interested growers in Sylhet region. The investigator is pretty sure that the BARI hybrid tomato-5 can perform even better or equal to that of any foreign hybrid variety of tomato. So the breeders who evolved the variety deserve thanks. Right now availability of seeds of this variety is very much required.

Table 2.4.2. Yield of tomato genotypes grown during winter

Genotype	No. of fruits/ plant	Individual fruit weight (g)	Fruit yield/ plant (kg)	Yield (ton/ha)
BARI tomato-19	34.66 de	45.3 d	1.56 c	53.13 d
WP010	29.33 e	63.26 a	1.85 c	63.13 cd
Mangal Raja	37.00 c-e	52.63 b-d	1.94 bc	66.06 b-d
BARI tomato-15	41.33 b-d	61.53 a	2.51 a	85.53 ab
BARI F1 tomato-5	54.66 a	52.33 b-d	2.76 a	94.13 a
BARI tomato-16	46.66 a-c	53.56 bc	2.46 ab	83.46 a-c
Epoch	51.33 ab	47.9 cd	2.53 a	86.13 ab
BARI tomato-14	49.33 ab	56.43 ab	2.74 a	92.56 a
F-test	**	**	**	**
CV	10.11	5.71	10.49	10.57

Figure 2.4.1. Fruits of different tomato genotypes

Activity 2.5 Evaluation of promising country bean genotypes during winter in Sylhet

Lablab bean is popularly known as "country bean" or simply "sheem". It has many synonyms like Hyacinth bean, Indian bean, seam bean, Egyptian kidney bean etc. (Rashid, 1999; Purseglove, 1977). Botanically it is known as *Lablab purpureus* L. Sweet (Huq, 1986) that was formerly known as *Dolichos lablab* L. In Bangladesh its cultivation and use is so widespread that it would almost be impossible to find a homestead in rural areas which is lacking a bush of lablab bean in winter. Lablab bean is a nutritious vegetable. Its green pod provide good amount of protein in addition to vitamins and minerals (Gopalan *et al*., 1982). Cultivation of lablab bean is limited to winter season. In our country Jessore, Chittagong and Ishwardi are famous for lablab bean Production. It is a short day plant and the critical day length for those winter varieties is 12-13 hours (Chowdhury, 1989). Due to its photo and/or thermo-sensitive behavior, availability of lablab bean in our market is restricted during winter months. In Sylhet region, one popular local cultivar "Goalgadda" is commercially grown by the farmers. Meanwhile BARI has developed some popular country bean varietities which were not tested under Sylhet condition. In this present study, therefore, eight promising country bean genotypes were evaluated during winter season to find out comparative yield performance under Sylhet condition.

Materials and Methods

The experiment was conducted at the experimental field of Sylhet Agricultural University during winter season of 2017-2018 under RCB design with three replications. Seven country bean genotypes viz., BARI sheem-1, Kanchon, Goalgadda, Auto, Rupvan, BARI sheem-6 and Sikribi sheem-1 were included in this study. Seeds of all genotypes were sown on 21 September 2017 in raise bed keeping plant spacing 1.5 m X 1.5 m between plant to plant and row to row, respectively. Three seeds were sown in each pit and after complete germination of the seeds;

two healthy plants were kept to grow. Bamboo staking was given in each pit to creeping the plants. Weeding, mulching, fertilizer application and other intercultural operations were done as and when necessary. Data were collected from each replication and compiled data were used to estimate some simple statistical parameters like, mean, range, standard deviation for interpretation of the results.

Results and discussion

Pod yield and yield attributes of seven country bean genotypes grown during winter in Sylhet are presented in Table 2.5.1. The variety Sikribi sheem-1 required on 42 days to first flower while the other genotypes required almost two months to first flower. Sikribi sheem-1 is photo-insensitive in nature and did not wait for short day to flower. The winter grown country bean genotypes are photo-sensitive in nature and normally do not flower until last week of October or first week of November. Hence, the genotypes except Sikribi sheem-1 required much longer duration to first flower. Number of pods per plant was greatly varied from 91 to 290 of which Sikribi sheem-1 produced the highest number of pods per plant (290). The genotype "Goalgadda" had the highest individual pod weight (13.7 g) and its corresponding pod yield per plant (2.35 kg) and pod yield per decimal (94.0 kg) were the highest among the genotypes. The second highest yielder was Sikribi sheem-1 (1.79 kg/plant) followed by BARI sheem-1 (1.40 kg/plant). However, consumer preference was much higher to BARI sheem-1 for its non fibrous and fleshy in nature of the pod. The Goalgadda produced pod had the highest pod length (14.5 cm) and pod breadth (4.0 cm). Figure 2.5.1 exhibited the views of experimental field of winter country bean

Table 2.5.1 Yield and yield attributes of country bean genotypes

Genotype	Days to flower	No. pod/ plant	Individual pod wt(g)	Pod yield/ plant (kg)	Yield (kg/ decimal)	Pod length (cm)	Pod breadth (cm)
BARI Sheem-1	62	220.6	6.4	1.40	56.0	10.0	2.2
Kanchon	58	203.0	6.4	1.29	51.6	8.5	3.1
Goalgadda	59	172.2	13.7	2.35	94.0	14.5	4.0
Auto	56	91.0	10.1	0.91	36.4	11.5	2.8
Rupvan	58	155.0	7.8	1.2	48.0	10.5	2.1
BARI Sheem-6	62	126.0	8.0	1.0	40.0	18.5	1.7
Sikribi sheem-1	42	290.0	6.2	1.79	71.6	10.3	2.9
Mean	56.71	179.69	8.37	1.42	56.80	11.97	2.69
Range	42-62	91-290	6.2-13.7	0.91-2.35	36.4-94.0	8.5-18.5	1.7-4.0
Stdev	6.85	65.57	2.72	0.50	20.03	3.42	0.76

Figure 2.5.1. Country bean genotypes grown during winter

Activity 2.6: Adaptive trial of promising vegetable varieties during winter

For on farm adaptive trial of winter tomato, winter country bean, broccoli, radish and French bean, twenty farmers from Sylhet division were selected with the help of DAE personnel. Seeds BARI hybrid tomato-5, BARI sheem-1, Green crown for broccoli, Tasakisun of radish and BARI jhar sheem-1 for French bean were given to the selected farmers for establishment of adaptive trial. All the selected farmers initiated their trial from the month of October 2017. Necessary support including training, seeds, seedlings, polythene, nylon rope, fertilizers etc were given to the farmers for smooth conduction of the trial. For adaptive trial of each crop of each farmer 2-3 decimal of land used for conducting the activities.

Results and Discussion

Yield performances of selected promising vegetable varieties are presented in Table 2.6.1 and 2.6.2. Great variation was noticed in respect of per unit yield of tomato among the growers. Number of fruits per plant was greatly varied from 45 to 68 and corresponding fruit yield per decimal also varied from 225 kg to 410 kg. Standard deviation (60.22) and coefficient of variation (18.33%) also indicated that there was existed variation in yield performance. This variation was mostly attributing due to differences in management practices, location, differences of soil type etc. Hence, further yield improvement among the growers can be made through providing proper production technologies and management practices. Yield of BARI sheem-1 was ranged from 45 kg to 85 kg per decimal. Farmers opinion revealed that consumer preference is much higher to BARI sheem-1 for it was very fleshy, non-fibrous nature and taste.

Table 2.6.1 Performance of tomato and country bean variety at farm field (n=20)

Statistic	Tomato		Country bean	
	Number of fruit/plant	Fruit yield (kg/decimal)	Number of pod/ plant	Pod yield (kg/decimal)
Average	57.05	323.25	254.4	65.2
Min	45.0	225.0	225.0	45.0
Max	68.0	410.0	290.0	85.0
Stdev	7.96	60.22	18.94	11.06
CV(%)	13.95	18.63	7.44	16.97

Adaptive trial for broccoli in farmer's field was found satisfactory. Average individual curd weight was 0.83 kg while ranged from 0.58 kg to 1.2 kg. Per decimal curd yield was varied from 56.0 kg to 115.0 kg. The yield of broccoli was almost at par with that of yield from other part of the country. Farmers were very happy to grow broccoli since this crop is less infected with pests and market price was higher than any other crop grown in their field. Production of radish ranged from 44.0 kg to 75.0 kg per decimal. Although the yield of radish was not as high as it was but growers can harvested this crop with 45 to 50 days. Average yield of French bean was 70.9 kg per decimal and ranged from 58 kg to 83.0 kg. It was also a short durative crop and a growers can complete his production within 60-65 days hence, this crop would be useful for accommodating in the present cropping pattern of Sylhet region. Some pictorial views of winter adaptive trials on different promising vegetable varieties made at farmers field are presented in Figure 2.6.1. Success stories of the project activities published in national news papers are also enclosed in Annexure 1.

Table 2.6.2 Performance of broccoli, radish and French bean variety at farm field

Statistic	Broccoli		Radish		French bean	
	Individual curd wt. (kg)	Yield (kg/decimal	Individual root wt. (kg)	Yield (kg/ decimal)	No. pods/ plant	Yield (kg/ decimal)
Average	0.831	78.4	110.3	57.35	17.6	70.9
Min	0.58	56.0	85.0	44.0	12.0	58.0
Max	1.2	115.0	135.0	75.0	23.0	83.0
Stdev	0.18	14.72	11.39	9.02	3.10	7.06
CV(%)	21.55	18.78	10.33	15.73	17.62	9.95

Economic analysis

Comparison for yield and economic analysis among five vegetables grown in Sylhet division is given in Table 2.6.3. Noticeable variation in BCR was observed among the vegetables. The

highest market price of broccoli was achieved by the growers from the market and hence broccoli exhibited the highest BCR (4.68) followed by Country bean (3.39). Production of tomato was more than 300 kg per decimal and market price was vey dwindled and some time it has got down at 10 taka per kg. Considering 15 taka/kg of tomato, its BCR is 2.42. Radish (1.52) and French bean (2.1) exhibited moderate BCR.

Table 2.6.3. Economic return from different vegetable varieties

Crop	Yield kg/ decimal	Cost of Production Tk/ decimal	Unit price Tk/kg	Gross Return (Tk/ decimal)	Gross Margin (Tk/Decimal	BCR
Tomato	323	2000	15	4845	2845	2.42
Country bean	254	1500	20	5080	3580	3.39
Broccoli	78	1000	60	4680	3680	4.68
Radish*	57	750	10+10	1140	390	1.52
French bean	70	1000	30	2100	1100	2.1

*Radish, leaf as shak and root sold in the market

a. Tomato adaptive trial

b. Broccoli, radish, French bean adaptive trial

c. Broccoli and country bean adaptive trial

Figure 2.6.1. Adaptive trials of promising vegetable varieties

12. Research highlight/findings (Bullet point – max 10 nos.):

- For summer season country bean production, "Sikribi sheem-1" was found most suitable (40-50 kg/decimal) in Sylhet region
- Production of summer tomato in Sylhet region using grafted tomato seedling was more productive (55 t/ha) in compare to non grafted seedling (28 t/ha).
- BARI hybrid tomato-5 was found more productive (94 t/ha) in Sylhet region in comparison to other commercial variety
- Production of broccoli in Sylhet region was found effective (90-110 kg/decimal) and profitable.
- BARI jharsheem-1 was very productive at October (77.0 kg/decimal) and November (75.0 kg/decimal) sowing in comparison to other genotypes

B. Implementation Position

1. Procurement:

Description of equipment and capital items	PP Target		Achievement		Remarks
	Phy (#)	Fin (Tk)	Phy (#)	Fin (Tk)	
(a) Office equipment: Camera, UPS	1+1	25000+10000	1	24750	Instead of UPS some glassware were purchased
(b) Lab &field equipment: Desiccators, Glassware, sprayer, Steel rack	LS	15000+10000+20000	2 desiccators, 2 sprayers 1 steel rack	55244	
(c) Other capital items					

2. Establishment/renovation facilities: (Not Applicable)

Description of facilities	Newly established		Upgraded/refurbished		Remarks
	PP Target	Achievement	PP Target	Achievement	
None					

3. Training/study tour/ seminar/workshop/conference organized:

Description	Number of participant			Duration (Days/weeks/ months)	Remarks
	Male	Female	Total		
(a) Training: Two Farmer's Training	25+25	0	50	1 day + 1 day	Selected farmers and SAAO attended as participants.
(b) Workshop					

C. Financial and physical progress

Fig in Tk

Items of expenditure/activities	Total approved budget (FRP)	Fund received	Actual expenditure	Balance/ unspent	Physical progress (%)	Reasons for deviation
A. Contractual staff salary	452940	414076	317905	96171	76.77	CI also Pi of other NATP-project
B. Field research/lab expenses and supplies	635600	590233	727035	-136802	123.17	Negative balance as more activities were taken
C. Operating expenses	150000	139107.4	117272	21835.4	84.30	
D. Vehicle hire and fuel, oil & maintenance	90000	92876.7	74665	18211.7	80.4	
E. Training/workshop/seminar etc.	70000	66798.5	65500	1298.5	98.13	
F. Publications and printing	75000	77301.6	25000	52301.6	32.34	PCR not printed
G. Miscellaneous	37500	35595.3	19750	15845.3	55.48	
H. Capital expenses	80000	76140.5	79994	-3853.5	105.1	

D. Achievement of Sub-project by objectives: (Tangible form)

Specific objectives of the sub-project	Major technical activities performed in respect of the set objectives	Output (i.e. product obtained, visible, measurable)	Outcome(short term effect of the research)
To identify suitable vegetable variety(s) and production technologies for Sylhet region.	Completion of on station research activities of summer tomato and summer country bean during summer of 2017 and 2018. Completion of on station research activities for winter 2017-2018 for evaluation of promising vegetable varieties and production technologies	Sikribi sheem-1 (40 kg/decimal) and Grafted tomato plants (50 t/ha) performed better during summer season. BARI hybrid tomato -5, BARI jharsheem-1, BARI sheem-1 can be recommended for Sylhet region	Growers are coming to project office and shown their keen interest over the selected varieties.
To popularize suitable vegetable variety(s) and production technologies in Sylhet region.	Completed adaptive trials at farmer's field on summer tomato and summer country bean during summer of 2017. Completion of winter adaptive trials at farmer's field on promising vegetable varieties (tomato, country bean, French bean, radish and broccoli) initiated from October 2017.	8-10 growers started commercial production and few more shown keen interest to grow next year. BARI hybrid tomato-5, BARI sheem-1 and BARI jharsheem-1 and Broccoli yielded better. Success stories	Growers involved in summer tomato and summer country bean ensure more profit from their crops. New farmers from different parts of Sylhet division are interested to grow summer tomato,

		of adaptive trials are published in Daily News Paper (Annexure 1)	summer country bean, French bean, broccoli in their field
To improve knowledge and skill of farmers for vegetable production in Sylhet region	Organized two farmers's Training with in which relevant farmer's and SAAO attended. Conduction of adaptive trials at farm field of selected vegetable varieties.	Farmers are able to choose right variety of vegetable crops. Growers have clear cut knowledge on production technology	Participants present in the training are more interested to involve in the present project activities. Motivational tour organized by UAO/NGO/SUST by their own interest

E. Materials Development/Publication made under the Sub-project:

Publication	Number of publication		Remarks (e.g. paper title, name of journal, conference name, etc.)
	Under preparation	Completed and published	
Technology bulletin/ booklet/leaflet/flyer etc.			
Journal publication	Two		
Information development			
Other publications, if any		Success stories of adaptive trials are published in Daily News Paper (Annexure 1)	

F. Technology/Knowledge generation/Policy Support (as applied):

i. Generation of technology (Commodity & Non-commodity):

None

ii. **Generation of new knowledge that help in developing more technology in future :**

None

iii. Technology transferred that help increased agricultural productivity and farmers' income

- Cultivation of country bean during summer season where "Sikribi sheem-1" can be useful for higher productivity and profit during summer season
- Production of summer tomato in Sylhet region using grafted tomato seedling will ensure higher production of tomato as well as increased income in rainy summer in Sylhet region
- Production of broccoli in Sylhet region is getting popularity as it is profitable
- BARI jharsheem-1 is very productive at October (77.0 kg/decimal) and November (75.0 kg/decimal) sowing in comparison to other genotypes

iv. Policy Support

iv. Policy support

- Necessary strategies can be taken for production and supply of seeds of promising varieties like BARI hybrid tomato-4, BARI hybrid tomato-8, Sikribi sheem-1 among the growers.
- Training for grafted tomato seedling production

G. Information regarding Desk and Field Monitoring

i) **Desk Monitoring [description & output of consultation meeting, monitoring workshops/seminars etc.):**

As per comment/suggestion of Annual Review Workshop, compliances are –

- Farmers involved in project activities as well farmers outside of the project are very much interested to continue production of selected varieties (Sikribi sheem-1, BARI tomato-15, BARI hybrid tomato-4, BARI hybrid tomato-8, BARI jhar sheem-1 etc) and asking for seeds
- Although use of grafted seedling is costly but for its better survivability and can ensure high return caused many farmers around the region coming forward for growing summer tomato using grafted seedling.
- For availability of quality seeds of respective vegetable, project office (Department of Horticulture, SAU, Sylhet) keep in touch with that of Olericulture Division, BARI, Gazipur

ii) **Field Monitoring (time& No. of visit, Team visit and output):**

- Field monitoring was made on 8 April 2018 where monitoring team asked to incorporate more promising varieties like BARI tomato-17, BARI Hybrid toamto-10, BARI Sheem-7 etc.

Members of monitoring team have good idea about some tomato varieties released from BARI. Therefore, they advised to consider these varieties for Sylhet region for future research. That is why the name of these varieties came in this report.

I. Lesson Learned/Challenges (if any)

i) Proper selection of farmers for adaptive trials. Only farmers experienced in vegetable production performed better.
ii) Huge fallow land during Rabi season in Sylhet region can be considered for vegetable production
iii) Training along with adaptive trial in farm field would be more effective to disseminate technology in farmer's field.

J. Challenges (if any)

- Tenant and absentee farmer
- Unpredictable weather condition, absence of irrigation facilities in winter of quality
- Non-availability of quality seed and seedling

Signature of the Principal Investigator
Date …….

Seal

Counter signature of the Head of the organization/authorized representative
Date …….

Seal