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Performance of Different Onion (*Allium cepa* L.) Genotypes in *Rabi* Season under Short Day Conditions of West Bengal

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ABSTRACT: Onion is a dominating vegetable in terms of overall production and exports among the vegetables, India has one of the lowest productivity rates when compared to the rest of the globe. To overcome this issue, extensive research is required to fill this gap. A field experiment was carried out at C' block farm Kalyani, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, to evaluate the performance of different onion genotypes under short day conditions during *Rabi*, 2020-21, in order to identify the best genotype (s) of onion for *Rabi* season in terms of growth and yield. The comprised of twenty seven genotypes replicated thrice in complete randomized block design with 2m × 2m plot size. Respective genotypes shown significantly better vegetative growth parameters *viz* plant height RVC20-22 (78.30cm), number of leaves plant^{-1} RVC20-22 (9.60) and neck thickness RVB20-10 (7.97mm) observed in among all the genotypes. Significant variation find for most of the bulb yield attributing parameters like polar diameter (34.9-48.5mm), equatorial diameter (43.13-51.87mm), average bulb weight (46.53-74.67g), marketable yield(12.06-26.03t ha^{-1}) and total yield (12.11-26.12t ha^{-1}). Significantly highest total and marketable bulb yield was recorded in genotype RVC20-22 followed by RVC20-29, RVC20-24. Quality and biotic stress tolerant parameters are significant variation among genotypes i.e., highest TSS was reported in RVA20-01, pyruvic acid in REB20-35, dry matter in REB20-37, reducing and total sugars in REB20-39 genotypes. Lowest incidence of stemphylium blight and thrips incidence was reported in REB20-39 and RVC20-24 genotypes respectively. Thus considering the overall performance of onion cultivars it was concluded that RVC20-22, RVC20-29 and RVC20-24 were suitable for commercial cultivation during the *Rabi* season under short day conditions of West Bengal for better growth and bulb yield in onion.

Keywords: Onion, Bulb diameter, Genotype evaluation, Yield.

INTRODUCTION

The onion (*Allium cepa*. L) is the most widely grown vegetable crop on the globe. In India, it is the second most important vegetable crop after potatoes in terms of production. Onion comes under bulb family Alliaceae. Onion is named as genus with *Allium* and species called as *cepa*. Genus Allium has more than 600 species (Hanelt, 1990). According to Mehta, (2017) onion is originated from Central Asia *i.e*. Afghanistan, Iran and Pakistan. It is a strictly cross pollinated crop. Onion called as '**Queen of Kitchen'** due to its flavor, aroma, medicinal properties and unique taste as part of many dishes (Selvaraj, 1976). The colour of the outer skin of onion bulbs is due to "quercetin" which has anti-bacterial properties. Watt and Merrill (1975) reported 11 amino acids in onion. Although the nutritive value of onion may differs with respect to varieties, in general, 100 g of raw onion bulb contains about 9 mg of ascorbic acid, 501 µg vitamin A, 0.04 mg of riboflavin, 0.03 mg of thiamine, 0.02 mg of niacin, and the rest is the carbohydrates that constitute the dry matter of the bulb. India occupies 14.34 Lakh hectares in area and 26.73 million tonnes of production (FAOSTAT, 2020). China ranks first in both area & production. India share to the world market is about 24.8%. There is a lot of demand of Indian Onion in the world, the country has exported 15,75,922.59 MT of fresh onion to the world for the worth of ₹ 2,821.99 crores/377.88 USD Millions during the year 2020-21 (APEDA, 2021). Bangladesh, Malaysia, UAE, Sri Lanka, Nepal and Indonesia

countries are the major markets of Indian onion. In India Maharashtra top most producing state its share about 32.6% to Indian onion industry, next followed by Madhya Pradesh (17.6%), Karnataka (14%), and Gujarat (9%) NHB, (2020). However, productivity of the crop is very low i.e. 14.21tons/ha as compared to USA (66.82), South Korea (65.68tons/ha), China (22.08tons/ha) (FAOSTAT, 2020) huge gap between production and productivity in India because of absence improved varieties, Improper agronomic practices and post harvest losses. A rigorous evaluation is required to identify the best performing genotypes in terms of production and quality aspects. To remain competitive, we must increase productivity by gearing up in research and development.

MATERIALS AND METHODS

The experiment was carried out in Bidhan Chandra Krishi Viswavidyalaya "C" Block Farm in Kalyani, Nadia, West Bengal. The farm lies quite close to the Tropic of Cancer, with latitude of 22.89°N and longitude of 88.45°E. The location is about 9.75 meters above sea level. The experimental material consists of twenty seven genotypes of onion (*Allium cepa* L.) in randomized block design with three replications, each with a plot size of 2m×2m and a spacing of 15cm (row-row) ×10cm (plant-plant) and the observations were recorded from ten randomly selected plants of each plot. ICAR-Directorate of Onion & Garlic Research, Rajgurunagar, Pune, Maharashtra, provided all twenty-seven genotypes. According Santra *et al.*, (2017) recommended package of operations comprised applying nitrogen, phosphorus, and potassium (N: P: K) at rates of 120: 50: 100 kg/ha. Half of the N dose, as well as the full doses of P and K, were supplied at the time of transplantation, and with the remaining N dose provided 30 and 45 days later.

Table 1: List of genotypes and source of collection.

Sr.No.	Genotypes	Source
1.	RVA20-01	ICAR-DOGR, Rajgurunagar, Pune
2.	RVA20-03	ICAR-DOGR, Rajgurunagar, Pune
3.	RVA20-05	ICAR-DOGR, Rajgurunagar, Pune
4.	RVA20-07	ICAR-DOGR, Rajgurunagar, Pune
5.	RVA20-09	ICAR-DOGR, Rajgurunagar, Pune
6.	RVA20-12	ICAR-DOGR, Rajgurunagar, Pune
7.	RVA20-14	ICAR-DOGR, Rajgurunagar, Pune
8.	RVA20-19	ICAR-DOGR, Rajgurunagar, Pune
9.	RVB20-02	ICAR-DOGR, Rajgurunagar, Pune
10.	RVB20-04	ICAR-DOGR, Rajgurunagar, Pune
11.	RVB20-06	ICAR-DOGR, Rajgurunagar, Pune
12.	RVB20-08	ICAR-DOGR, Rajgurunagar, Pune
13.	RVB20-10	ICAR-DOGR, Rajgurunagar, Pune
14.	RVB20-11	ICAR-DOGR, Rajgurunagar, Pune
15.	RVB20-13	ICAR-DOGR, Rajgurunagar, Pune
16.	RVB20-15	ICAR-DOGR, Rajgurunagar, Pune
17.	RVB20-17	ICAR-DOGR, Rajgurunagar, Pune
18.	RVC20-20	ICAR-DOGR, Rajgurunagar, Pune
19.	RVC20-22	ICAR-DOGR, Rajgurunagar, Pune
20.	RVC20-24	ICAR-DOGR, Rajgurunagar, Pune
21.	RVC20-26	ICAR-DOGR, Rajgurunagar, Pune
22.	RVC20-29	ICAR-DOGR, Rajgurunagar, Pune
23.	REB20-31	ICAR-DOGR, Rajgurunagar, Pune
24.	REB20-33	ICAR-DOGR, Rajgurunagar, Pune
25.	REB20-35	ICAR-DOGR, Rajgurunagar, Pune
26.	REB20-37	ICAR-DOGR, Rajgurunagar, Pune
27.	REB20-39	ICAR-DOGR, Rajgurunagar, Pune

Sixteen observations were recorded during research study they are like growth parameters i.e. plant height and number of leaves was taken at 75DAT and days to maturity are counted that number days taken for maturity of the bulb. Yield and quality observations i.e. neck diameter, polar diameter, equatorial diameter, average bulb weight, double bulbs, marketable yield (t ha^{-1}), total yield (t ha^{-1}), Total soluble solids (TSS) were assessed using a hand refractometer model-PAL-3 and expressed in degree of BRIX (°B), reducing sugars (%) assessed according to Ranganna, (1986), total sugars (%) was determined by according to Dubois *et al.*, (1956), pyruvic acid (µ $mole^{-1}$) was estimated according to Anthon and Barrett, (2003) and The dry matter of the bulbs was measured and represented in percentages according to Nieuwhof *et al.* (1973) with a few modifications. Disease and pest screening i.e. according to Hashemi *et al.* (2005b) stemphylium blight (0-9scale) and according to Feyissa Begna (2019) thrips (0-5scale) incidence perceived at 90DAT. The stastical analysis done by using of R-studio software.

**Screening for pest and diseases for stemphylium blight 0-9 scale used. '0'means no disease symptoms and '9'means highest disease incidence*

**Screening for Thrips incidence 0-5scale used. '0' no thrips infestation and '5' means highest level of thrips infestation.*

Table 2: Analysis of variance.

Sr.No.	Characters	Source of variation with degrees of freedom		
		Replication(2)	Genotypes(26)	Error(52)
1.	Plant height (cm)	38.397	103.029	24.992
2.	Number of leaves	0.783	1.452	0.296
3.	Days to Maturity (days)	0.111	29.341	0.11111
4.	Neck Diameter (mm)	5.315	3.701	1.829
5.	Polar diameter (mm)	17.227	26.882	6.216
6.	Equatorial diameter (mm)	3.952	13.69842	7.887329
7.	Average Bulb Weight (gm)	164.677	195.1406	77.7479
8.	Thrips Incidence (%)	112.790	482.0209	141.867
9.	Stemphylium blight (%)	65.504	246.015	38.79476
10.	TSS (ºBrix)	0.179	5.780855	0.200798
11.	Reducing Sugar (%)	0.0005	1.228	0.026093
12.	Total Sugar (%)	0.019	0.898	0.340405
13.	Pyruvic Acid (µ mole g^{-1})	0.005	2.606	0.00587
14.	Dry matter (%)	0.0416	20.598	0.800802
15.	Marketable yield (t ha^{-1})	4.523	4533.907	5.35031
16.	Total yield (t ha^{-1})	9.391	4594.556	6.019335

RESULTS AND DISCUSSION

The mean performance of the genotypes for individual character is an essential criterion for excluding undesired types in any selection approach. This suggests that genetic research may serve as a viable source and provide opportunities for the selection of high yielding genotypes with suitable horticultural traits. The mean performance of 27 onion genotypes in terms of different yield and yield components is detailed parameter wise below.

Plant height (cm). The plant height of various genotypes given in Table 3. It shown as significantly variation among genotypes. Highest plant height was recorded in genotype RVC20-22 (78.30cm) followed by RVC20-29 (75.43 cm) and RVB20-02 (73.73 cm) and minimum were observed in RVC20-20 (56.67 cm) and REB20-37 (56.83 cm). The general mean for this character was 65.50 cm within the range of 56.67 cm to 78.30 cm. Similar results also find by SA Ganie *et al.* (2019).

Number of leaves per plant. Data on number of leaves are represented in Table 3. Number of leaves per plant varied from 6.70 to 9.60 with a total mean of 7.83. Maximum number of leaves was observed in genotype RVC20-22 (9.6) followed by RVC20-29 (8.9) and RVC20-24 (8.73) and minimum were observed in RVB20-02 (6.7) and RVC20-20 (6.97). Menon *et al.* (2016) also reported similar results.

Days to maturity (days). The days to maturity was recorded at 75 per cent of neck fall observed. There was significant variation seen among the genotypes. The general mean for days to maturity was 103.63 days and it ranged from 96-108 days. REB20-35 and REB20-39 (96days) requires minimum number of days to maturity followed by RVB20-04, while RVC20-20 and RVC20-22 (108days) required maximum number of day's maturity.

Neck Diameter (mm). Neck diameter varied from to 7.97 (mm) with an overall mean 4.97 (mm). The maximum neck diameter was recorded in genotype RVB20-10 (7.97 mm) followed by RVB20-02 (6.84 mm), RVA20-09 (6.56 mm) and RVB20-08& RVC20 22 (6.22 mm) while, the minimum neck diameter was recorded in genotype RVB20-04 (3.63mm) and RVB20-11 (3.74mm). Dewangan, *et al.,* (2012) also find the same results.

Polar Diameter (mm). Polar diameter variedfrom 34.9 to 48.5 (mm) with an overall mean 43.69 (mm). The maximum polar diameter was recorded in genotype RVA20-09 (48.5 mm) followed by RVC20-22 (48.2 mm), RVC20-29 (47.2 mm) and RVC20-24 (46.53 mm) while, the minimum polar diameter was recorded in genotype RVB20-04 (34.9 mm) followed by RVB20-10 (37.87 mm) and RVB20-02 (39.93 mm). Khusboo *et al.,* (2018) observed also similar results.

Equatorial Diameter (mm). Equatorial diameter varied from 43.13 mm-51.87 mm with an overall mean 46.89 mm. The maximum equatorial diameter was recorded in genotype RVC20-22 (51.87mm) followed by RVC20-29 (50.97 mm), RVC20-26 (50.37 mm) and RVC20-24 (49.13 mm) while, the minimum polar diameter was recorded in genotype RVB20-10 (43.13 mm) followed by RVB20-06 (43.3 mm) and RVA20-19 (43.87 mm). Khusboo *et al.* (2018) observed also similar results.

Average Bulb Weight (gm). The range and general mean for average bulb weight was recorded 46.53-74.6g and 58.37g respectively. Highest average bulb weight found highest in the variety RVC20-22 (74.6 g) followed by RVA20-14 (72.7 g), RVC20-29 (70.8 g) and RVA20-12 (69.47 g) and lowest in RVB20-04 (46.53 g). Kasera *et al.* (2019) also reported similar results.

Marketable yield (t ha^{-1}). For marketable yield, there was significant variation reported among genotypes. The average marketable yield was 18.46t ha^{-1}. RVC20-22 had the highest marketable yield (26.04 t ha^{-1}) and was followed by RVC20-29 (25.12 t ha^{-1}) and RVC20-24 (24.72 t ha^{-1}) while RVB20-02 had the lowest yield (12.06 t ha^{-1}) and was followed by RVB20-04 (13.07 t ha^{-1}) and RVA20-07 (13.65 t ha^{-1}). RVC20-29 recorded significantly higher yield compare to other genotypes due to the production significantly larger size bulbs with more length, diameter and weight.

Table 3: Mean table of twenty-seven genotypes' growth and yield characteristics.

Genotypes	PH(cm)	NOL	DTM	ND(mm)	PD(mm)	ED(mm)	ABW(gm)	MY(t ha^{-1})	TY(t ha^{-1})
RVA20-01	66.27	7.97	103.00	4.17	43.57	46.60	57.17	16.81	16.87
RVA20-03	66.53	8.47	102.00	3.90	44.50	46.70	60.57	20.64	20.74
RVA20-05	69.20	8.43	105.00	5.36	44.33	46.80	58.10	17.86	17.96
RVA20-07	62.63	7.50	102.00	3.93	42.73	44.47	51.17	13.65	13.71
RVA20-09	58.50	7.90	106.00	6.56	48.50	46.50	64.10	16.41	16.57
RVA20-12	66.40	8.63	102.00	3.92	42.60	48.77	69.47	21.74	21.79
RVA20-14	61.83	8.67	104.00	5.05	45.57	48.36	72.70	23.44	23.48
RVA20-19	62.87	8.10	102.00	3.65	44.23	43.87	49.03	14.65	14.72
RVB20-02	73.73	6.70	105.00	6.84	39.93	44.97	53.40	12.06	12.11
RVB20-04	63.53	7.37	97.00	3.63	34.90	47.10	46.53	13.06	13.29
RVB20-06	72.13	7.23	103.00	5.91	40.67	43.30	52.17	14.72	14.76
RVB20-08	70.23	7.10	105.00	6.22	42.30	46.87	51.60	16.31	16.33
RVB20-10	59.17	7.43	104.00	7.97	37.87	43.13	48.47	16.70	16.76
RVB20-11	71.20	7.90	105.00	3.74	44.03	46.37	65.87	20.94	21.02
RVB20-13	67.50	7.73	104.00	4.46	44.73	45.87	48.43	15.24	15.32
RVB20-15	65.53	7.90	104.00	4.38	44.27	47.05	58.67	17.31	17.36
RVB20-17	59.37	7.63	104.00	4.39	41.23	45.53	51.87	17.04	17.35
RVC20-20	56.67	6.97	108.00	5.42	43.67	48.37	55.23	18.39	18.47
RVC20-22	78.30	9.60	108.00	6.22	48.23	51.87	74.60	26.04	26.11
RVC20-24	72.87	8.73	106.00	4.98	46.53	49.13	63.30	24.71	24.82
RVC20-26	60.23	7.20	106.00	4.60	44.83	50.37	65.50	24.19	24.26
RVC20-29	75.43	8.90	107.00	4.26	47.20	50.97	70.80	25.12	25.52
REB20-31	59.87	7.33	106.00	5.63	46.50	47.77	63.50	18.18	18.25
REB20-33	63.47	7.03	105.00	5.70	44.27	45.80	59.53	16.87	16.91
REB20-35	66.30	7.17	96.00	4.66	45.57	46.03	48.67	21.48	21.82
REB20-37	56.83	8.10	103.00	4.33	41.93	47.20	60.40	15.34	15.41
REB20-39	61.93	7.63	96.00	4.18	45.00	46.30	55.03	19.37	19.64
Mean	**65.50**	**7.83**	**103.63**	**4.97**	**43.69**	**46.89**	**58.37**	**18.46**	**18.57**
SE(m)±	**2.886**	**0.314**	**0.192**	**0.781**	**1.440**	**1.621**	**5.091**	**1.335**	**1.416**
CD	**8.19**	**0.89**	**0.55**	**2.22**	**4.09**	**4.60**	**14.45**	**3.79**	**4.02**
CV	**7.63**	**6.95**	**0.32**	**27.24**	**5.71**	**5.99**	**15.11**	**1.25**	**1.32**

PH=Plant height, NOL=Number of leaves, DTM=Days to maturity, ND=Neck diameter, PD=Polar diameter, ED=Equatorial diameter, ABW=Average bulb weight, MY=Marketable yield and TY=Total yield

Table 4: Mean table for Disease, Pest screening and quality parameters of twenty seven genotypes.

Genotypes	Stemphylium blight (%)	Thrips Incidence (%)	TSS (^{o}B)	RS (%)	TS (%)	PA(µ mole g^{-1})	DM (%)
RVA20-01	29.21	27.33	14.20	2.75	2.95	1.91	14.22
RVA20-03	32.56	33.33	10.80	2.73	2.82	1.86	15.19
RVA20-05	34.77	32.67	13.20	2.43	2.88	3.01	9.53
RVA20-07	39.59	30.00	11.50	2.81	2.90	1.82	10.82
RVA20-09	21.09	34.67	13.20	2.42	2.50	3.84	15.31
RVA20-12	17.76	27.33	10.20	3.25	3.35	3.89	14.48
RVA20-14	19.98	23.33	11.60	2.83	3.26	3.35	11.39
RVA20-19	20.70	41.33	10.60	2.17	2.29	4.23	16.03
RVB20-02	29.59	35.33	11.80	3.11	3.25	3.61	9.77
RVB20-04	49.95	48.00	9.00	3.44	3.56	3.75	15.42
RVB20-06	27.01	40.67	12.70	1.86	2.28	1.36	13.43
RVB20-08	29.23	46.67	10.20	2.92	3.05	3.48	13.51
RVB20-10	38.48	46.67	9.70	2.51	2.60	2.03	15.03
RVB20-11	35.89	38.67	12.90	2.43	2.51	1.56	11.07
RVB20-13	29.58	34.00	9.80	2.71	2.99	2.24	14.09
RVB20-15	35.89	50.00	12.10	2.23	2.89	2.53	10.02
RVB20-17	28.47	55.33	13.70	2.13	3.00	4.18	13.34
RVC20-20	24.79	18.67	10.10	3.10	3.67	3.71	13.92
RVC20-22	25.90	18.00	11.10	2.52	3.47	3.79	13.03
RVC20-24	17.39	12.67	11.70	3.98	4.45	3.85	12.59
RVC20-26	20.70	18.00	11.10	3.57	3.81	3.41	12.73
RVC20-29	21.83	16.00	12.80	3.25	3.36	3.51	10.58
REB20-31	16.28	16.67	11.60	3.92	4.24	3.32	8.22
REB20-33	14.80	14.00	12.60	2.18	3.10	1.98	7.63
REB20-35	13.69	18.67	12.10	2.79	2.89	4.35	14.62
REB20-37	28.47	17.33	10.20	3.70	4.01	3.38	18.24
REB20-39	11.84	17.33	9.50	4.34	4.82	4.23	16.57
Mean	**26.50**	**30.10**	**11.48**	**2.90**	**3.20**	**3.12**	**12.99**
SE(m)±	**3.596**	**6.877**	**0.259**	**0.093**	**0.291**	**0.044**	**0.517**
CD	**10.20**	**19.51**	**0.73**	**0.26**	**0.83**	**0.13**	**1.47**
CV	**23.51**	**39.57**	**3.90**	**5.57**	**15.78**	**2.46**	**6.89**

TSS=Total Soluble Solids, RS=Reducing sugar, TS=Total sugar, PA=Pyruvic acid and DM=Dry matter

Bulb photographs of twenty seven onion genotypes

General view of experimental field at 30 Days after transplanting
Location: C'block, Kalyani, Nadia, West Bengal
Lattitude & Longitude: 22°58′59.99″N 88°28′59.99″E

Total Yield (t ha^{-1}). In terms of total yield, there was substantial heterogeneity among genotypes. The general mean for total yield was 18.57t ha^{-1} and it ranged from 12.11 to 26.11t ha^{-1}. The highest marketable yield was recorded in RVC20-22 (26.11t ha^{-1}) and followed by RVC20-29 (25.53t ha^{-1}), RVC20-24 (24.82t ha^{-1}) while the minimum yield was observed in RVB20-02 (12.11t ha^{-1}) and followed by RVB20-04 (13.29t ha^{-1}) and RVA20-07 (13.71t ha^{-1}). Maximum average bulb weight and size results to give maximum total yield (t ha^{-1}).

Total Soluble Solids (^{o}Brix). Maximum Total Soluble Solids was observed in genotype RVA20-01 (14.0^{o}B) followed by RVB20-17 (13.70^{o}B), RVA20-05&09 (13.20 ^{o}B) and minimum were observed in RVB20-04 (9.0^{o}B) followed by REB20-39 (9.5^{o}B) and RVB20-10 (9.7 ^{o}B). TSS showed a range from 9.00 to 14.00^{o}B with a general mean of 11.48^{o}B. Ganiger *et al*. (2018) found similar results.

Reducing sugar (%). Reducing sugar varied from 1.86 to 4.34 percent, with a mean value of 2.90 percent. The highest reducing sugar was found in REB20-39 (4.34 Per cent), followed by RVC20-24 (3.98 Per cent) and REB20-31 (3.92 Per cent), while the lowest was found in RVB20-06 (1.86 Per cent), and followed by RVA20-19 (2.29 Per cent), RVA20-09 (2.50 Per cent).

Total sugar (%). The total sugar content ranged from 2.28 to 4.82 percent, with a mean value of 3.20 percent. Highest total sugar content was observed in REB20-39 (4.82 Per cent) followed by RVC20-24 (4.45 Per cent) and REB20-31(4.24 Per cent) while minimum was observed in RVB20-06 (2.28Per cent) followed by RVB20-17(2.13 Per cent) and RVA20-19 (2.17 Per cent). Bal, *et al.*, (2020) also reported similar results.

Pyruvic acid (µmole g^{-1}). Highly significant variation observed in pyruvic acid content results show ranges from 1.36 to 4.35 µmole/g. REB20-35 (4.35 µmole g^{-1}) had showed that the highest pyruvic acid content followed by RVA20-19 (4.23 µmole g^{-1}) and REB20-39 (4.23 µmole g^{-1}). RVB20-06(1.36 µmole g^{-1}.) found as lowest pyruvic acid content among the genotypes followed by RVB20-11 (1.56 µmole g^{-1}) and RVA20-

07 (1.82 µmole g^{-1}). Manjunathagowda, *et al.* (2019) observed similar results.

Dry matter content (%). The dry matter content ranged from 7.63 to 18.24 percent, with a mean of 12.99 percent. The maximum dry matter content was recorded in genotype REB20-37 (18.24%) followed by REB20-39 (16.57 Per cent) and RVA20-19 (16.03 Per cent) while, the minimum dry matter content was recorded in genotype REB20-33 (7.63 Per cent) followed by REB20-31 (8.22 Per cent). Singh *et al.* (2013) reported that the similar results.

Stemphylium blight (%). Percentage of stemphylium blight varied from 11.84-49.95 Per cent with an overall mean 26.50 Per cent. The maximum Stemphylium blight incidence was recorded in genotype RVB20-04 (49.95 Per cent) while, the minimum Stemphylium blight was recorded in genotype REB20- 39 (11.84 Per cent) followed by REB20-35 (13.69 Per cent) and REB20-33 (14.80 Per cent).

Thrips incidence (%). Percentage of thrips incidence varied from 12.67-55.33 Per cent with an overall mean 30.10 Per cent.Maximum percentage of thrips incidence was recorded in genotype RVB20-17 (55.33 Per cent) while, the minimum thrips infestation was recorded in genotype RVC20-24 (12.67 Per cent) followed by REB20- 33 (14.00 Per cent) and RVC20-29 (16.0 Per cent).

CONCLUSION

Based on the overall performance of onion cultivars, it can be concluded that RVC20-22 (26.04 t ha-1) was suitable for commercial cultivation during the *Rabi* season under West Bengal's short day conditions for better growth, bulb yield, minimal pest and disease infestation observed and followed by RVC20-29 (25.12 t ha-1) and RVC20-24 (24.72 t ha-1) are also similar in a row.

FUTURE SCOPE

The most varied and excellent genotypes found might be used in breeding programmes to improve and broaden the genetic base of onion genotypes. Superior trait genotypes might be used for simultaneous transfer of multiple characteristics in crop improvement.

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Conflict of Interest. None.

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