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Evaluation of White Onion (*Allium cepa* L.) Genotypes for Growth, Yield, Quality and Resistance to Thrips and Purple Blotch Disease

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Onion (*Allium cepa* L.), belonging to the family Alliaceae with a chromosome number 2n=16, is an essential vegetable widely cultivated for both domestic consumption and export. This study aimed to evaluate various white onion genotypes for their growth, yield, quality and resistance to pests and

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diseases. The experiment was conducted at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, during the late *Kharif* season of 2023-24, using twenty-six genotypes arranged in a randomized complete block design. Data were collected on several growth and yield parameters, which were then analyzed. Significant variation was observed among genotypes for growth traits such as plant height, leaf length and neck diameter. The genotype 'Safed Ghavriyu' exhibited the highest plant height and number of leaves per plant, while 'Bhima Shubra' and 'Milky White' showed superior leaf length and neck diameter, respectively. Yield-related traits also varied significantly, with 'Bhima Shweta' recording the highest dry matter content and 'Safed Ghavriyu' demonstrating the highest fresh and dry weight per plant, single bulb weight and total yield per hectare. In terms of pest and disease resistance, notable differences were observed, with 'Safed Ghavriyu' showing the lowest incidence of thrips and purple blotch disease. Additionally, 'PWO-2' had the highest total soluble solids (TSS) content, while 'W-210' had the highest total sugar content. 'Milky White' exhibited the highest pyruvic acid content, contributing to its pungency. These findings underscore the significance of genetic variability and environmental influences in white onion growth and yield. The results offer valuable insights for the development of high-yielding, disease-resistant white onion varieties suited to various agro-climatic conditions in India.

Keywords: White onion; evaluation; genotypes; growth; yield characters.

1. INTRODUCTION

Onion (*Allium cepa* L.) is one of the important culinary vegetable belongs to family *Alliaceae,* having chromosome number 2n=16. It is a native of South West-Asia, from where it spread all over the world. The crop is mainly grown for local consumption and for export purposes. It is known by several vernacular names *viz.,* Pyaz in Hindi, Eerulli / Ullagaddi in Kannada, Venkayam in Tamil and Kanda in Marathi. It is indispensable item in every kitchen and used as vegetable, spice cum condiment due to its flavor, aroma, smell, taste and medicinal properties. It is being used to prepare salads, pickles, chutneys, curries, soups, sauces and for seasoning of various foods. Hence, it is popularly known as "**Queen of Kitchen''**. Among the cultivated *Alliums* in India onion is a prominent export-oriented vegetable and forms the world's second largest producer after China. In India, it is being cultivated in an area of 1.43 million hectares, producing 26.09 million tonnes with a productivity of 18.23 t/ha (Anonymous, 2021).

Onion is an herb, scapigerous, bulbous, shallow rooted, foetid and highly cross-pollinated crop. It is being grown as an annual crop for bulb production and as a biennial crop for seed production. Among the different types of onion, white onion is grown for variety of purposes from kitchen to factory made processed products/food such as rings, flakes, granules, powder, canned onion. The dried processed onion can be reconstituted by cooking in water during preparation of food. These dehydrated onions processed food are considered as a potential product in global trade and they are greater demand in European countries (Murthy DS and Subrahmanyam KV, 1999).

The processing industries are preferable demands for white onion which are having globose or round shaped bulb with high total soluble solid (TSS) (>18%) content. By comparing the major white onion producing countries, existing Indian white onion varieties are low productivity and low TSS (11-13 %) (Mahajan V and Pathak CS, 2014). The existing white onion genotypes shown wide variations in yielding ability when they are grown under varied agro-climatic conditions. In this regard, many SAU's, NHRDF and ICAR institutes have developed and released high yielding varieties for commercial cultivation based on the suitability of agro-climatic conditions. As India being a vast country with diversified agro climatic regions, single variety/genotype may not suitable for all the agro-climatic conditions. The production and productivity of any crop not only depends on cultural practices but also depends on genetic variability.

Keeping all these things in view, the present study on was conducted with the following objective: **"Evaluation of white onion (*Allium cepa* L.) genotypes for growth, yield, quality and resistance to thrips and purple blotch disease"**.

2. MATERIALS AND METHODS

The study entitled 'Evaluation of white onion (*Allium cepa* L.) genotypes for growth, yield, quality, pest and disease parameters' was conducted at Main Agricultural Research Station,

University of Agricultural Sciences, Dharwad during late *kharif* 2023-24. Twenty-six genotypes (Telagai local, Gadag local and Bailhongal local are the local genotypes) were collected from different institutions and geographical diverse locations and evaluated using randomized complete block design (RCBD) with three replications. Spacing adopted was 15 cm × 10 cm.

Five plants were selected randomly from each replication and data were recorded for the characters *viz.,* plant height at harvest (cm), number of leaves per plant at harvest, leaf length at harvest (cm), Bolting (%) , neck diameter of bulb (cm) using Vernier calipers, days to maturity, fresh weight of plant (g), dry weight of plant (g), dry matter content of plant (%), equatorial diameter (cm), polar diameter (cm), bulb index, doubles (%), ten bulb weight (g), average weight of bulb (g), total yield (kg/plot), total yield (t/ha), marketable yield (t/ha), harvest index (%), purple blotch incidence (%), thrips incidence, TSS (°Brix) estimated using digital refractometer, reducing sugar (%) was estimated by Dinitrosalicylic acid (DNSA) reagent method, non-reducing sugar (%) was obtained by subtracting the percentage of reducing sugar from the total sugar, total sugar (%) was estimated by Anthrone reagent method and pyruvic acid (µ moles/ g) estimated as per the procedure given by Anthon and Barrett (2003). The data were analyzed to find out the superior genotypes for development of good quality onion varieties suitable for Northern Transitional Zone of Karanataka.

Table 1. Pest rating scale for thrips incidence

Grade	Degree of leaf damage (%)
0	No damage
1	1-20
2	21- 40
3	41-60
4	61-80
5	81-100

Table 2. Disease rating scale for purple blotch

Grade	Degree of leaf infection
0	No disease symptoms
1	A few spots towards the tip covering less than 10% of leaf area
2	Several dark purplish brown patches covering less than 20% of leaf area
3	Several patches with paler outer zone covering up to 40% of leaf area
4	Long streak covering up to 75% of leaf area or breaking of the leaves from the center
5	Complete drying of the leaves or breaking of the leaves from the base

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of scales of all observations}}{\text{No.of observations} \times \text{Maximum scale value}} \times 100$$

2.1 Analysis of Variance

The differences between all genotypes for various characters were tested for significance by using analysis of variance as par the procedures given by Panse and Sukhatme (Panse VG and Sukhatme PV, 1961).

Table 3. The analysis of variance for each character was accomplished out as follows

Source of variation	Degree of freedom	Sum of squares	Mean sum of squares	F ratio
Replications	(r-l)	SSR	MSR	MSR/MSE
Genotypes	(t-l)	SST	MST	MST/MSE
Error	(r-l) (t-l)	SSE	MSE	-
Total	(rt-l)			

Where,

r = No. of replications
t = No. of genotypes
MSR = Mean sum of squares due to replications
MST = Mean sum of squares due to treatments
MSE = Mean sum of squares due to error
SSR = Sum of squares due to replication
SST = Sum of squares due to treatments
SSE = Sum of squares due to error

3. RESULTS AND DISCUSSION

Genotypes showed significant disparity for growth parameters. Among the genotypes at harvest, maximum plant height (64.44 cm) and number of leaves per plant (11.82.) were documented in Safed Ghavriyu. Higher leaf length (60.45 cm) and neck diameter of bulb (1.39 cm) was recorded in Bhima Shubra and Milky White genotype, respectively.

Among the genotypes assessed, nine genotypes did not show any bolting [White Deshi, Indus WG-4, Indus WG-6, W-125, W-498, PWO-2, Budhel Expert, Bailhongal Local and Agrifound White] and which were *on par* with Indus WG-2, Indus WG-5, W-210, W-398 (0.5 % each). Among the genotypes evaluated for days to maturity W-364, Milky White, Gadag Local genotypes took minimum days to maturity (95 days each) followed by W-125 (96 days) and Bhima Shubhra (98 days).

The variations in growth parameters were due an irreversible increase in size and shape of a plant and is influenced by the complex interaction between environmental factors, physiological processes and genetic constitution of the genotypes. Among the various factors affecting the plant growth, environmental factors play a vital role in the growth and development. Similar variations in growth parameter *w.r.t* white onion genotypes was noticed by Umamaheswarappa et al*.* (2018), Amarananjundeswara et al*.* (2020) and Singh et al*.* (2020).

The yield traits like dry matter, polar and equatorial diameter were significantly differed among the genotypes. The results revealed that, Bhima Shweta genotype accumulated maximum dry matter (15.26 %) content, followed by W-125 (15.02 %), Indus WG-2 (14.97 %), PWO-2 (14.61 %), Indus WG-4 (14.56 %) and Bailhongal Local (14.55 %). Such increased dry matter content of plant is mainly due to genotypic nature of plant. Polar diameter of bulb (5.58 cm) in Indus WG-1 and equatorial diameter of bulb (7.04 cm) in Safed Ghavriyu. The observed variations in enlargement of bulb diameter (equatorial and polar) might be due to varietal character, photosynthetic activity and translocation of photosynthates to bulb. Among genotypes evaluated, ten genotypes did not show any double bulb formation. However, maximum double bulb formation was observed in Milky White (1.70 %). Such formation of double bulb was mainly depended on the genotype, weather conditions and agronomic practices followed. The outcome of these results was in consistence with the works of Priyadarshani (2018), Yadav et al*.* (2010) and Devi et al. (2014).

The yield parameters such as fresh weight, dry weight, single bulb weight, ten bulb weight, bulb yield per plot, total bulb yields per hectare, marketable bulb yield per hectare and harvest index (%) were found significantly higher in genotypes Safed Ghavriyu (120.63 g/plant, 17.00 g/plant, 99.28 g, 990.90 g, 8.96 kg/plot 29.87 t/ha, 27.05 t/ha and 82.30 %) followed by Bhima Safed (117.68 g/plant, 16.60 g/plant, 95.08 g, 948.70 g, 8.69 Kg/plot, 28.97 t/ha, 26.85 t/ha and 80.80 %). Such variations were due to characteristics of the genotype, environmental factors, based on cultural practices adopted and nutrient availability to the plant might have directly influenced on bulb weight. These results were corroborated with the findings of Mahantesh et al*.* (2009), Yasmin (2009), Lakshmipathi (2017), Suhas (2016), Sahu et al. (2017) and Hulagannavar et al. (2023).

White onion genotypes shown significant differences with respect to thrips and purple blotch disease incidence. Among the genotypes assessed, none of the genotypes were immune to thrips and purple blotch incidence. While, Indus WG-5, Milky White and Safed Ghavriyu genotypes showed resistance to thrips incidence with a scale of one. For purple blotch disease incidence minimum purple blotch incidence was noticed in Safed Ghavriyu (11.16 %) followed by Milky White (13.55 %), Bhima Safed (13.97 %), Gadag Local (14.23 %) and Indus WG-5 (14.54 %) genotypes which performed better compared to rest of the genotypes. These variation in pest and disease incidence might be due to environmental factors such as temperature, wind velocity and sunshine hours. Similar findings were also reported by Suhas et al. (2016), Tripathy et al*.* (2016), Solanki et al. (2019) and Singh et al*.* (2020) in onion.

Maximum TSS (17.25 ° Brix) content was reported in PWO-2 followed by Indus WG-1 (16.25 ° Brix) and Indus WG-3 (15.76 ° Brix) genotypes. The observed disparity of TSS content in genotypes may be due to varietal character, physiological activity of plant and availability of nutrients. Whereas, W-210 genotype registered maximum reducing sugar (3.79 %) and total sugar (7.62 %) content. While,

Table 4. Mean performance of white onion genotype for growth, yield, quality, pest and disease parameters

Sl. No.	Genotype	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
1	Akola Safed	60.03	10.66	51.12	2.50	1.27	100.00	90.25	12.40	13.74	5.66	4.69	0.83	1.56
2	Bhima Shwetha	62.41	10.93	51.86	5.00	1.18	109.00	102.24	15.60	15.26	5.92	4.45	0.75	0.92
3	White Deshi	57.89	10.17	50.21	0.00	0.92	116.00	73.22	9.60	13.11	5.43	4.96	0.91	0.63
4	Telagi Local	61.37	10.68	58.46	10.50	1.21	104.00	80.32	10.20	12.70	5.96	5.00	0.84	1.08
5	Indus WG-Dhawal	62.43	11.23	55.38	1.50	1.21	122.00	93.47	11.10	12.58	5.94	5.03	0.85	0.76
6	Indus WG-1	61.12	11.04	55.13	4.50	1.14	115.00	101.32	13.90	13.72	6.53	5.58	0.85	0.51
7	Indus WG-2	62.13	11.18	53.64	0.50	1.09	119.00	81.52	12.20	14.97	6.09	5.01	0.82	0.00
8	Indus WG-3	57.35	10.54	53.81	3.50	1.28	107.00	104.98	13.50	12.86	6.75	5.56	0.82	0.00
9	Indus WG-4	51.64	9.47	45.35	0.00	0.97	122.00	79.66	11.60	14.56	6.19	5.10	0.82	0.67
10	Indus WG-5	61.23	10.26	54.59	0.50	1.17	112.00	105.32	14.10	13.39	6.89	5.49	0.80	0.00
11	Indus WG-6	60.98	10.84	53.83	0.00	0.89	119.00	68.28	9.20	13.47	5.16	4.23	0.82	0.00
12	W-125	60.70	10.89	54.96	0.00	1.09	96.00	80.54	12.10	15.02	6.15	4.60	0.75	0.58
13	W-210	58.71	10.90	52.91	0.50	1.18	105.00	77.92	10.00	12.83	5.92	5.07	0.86	0.00
14	W-398	60.15	10.57	53.08	0.50	1.15	100.00	69.32	9.40	13.56	4.67	4.29	0.92	1.18
15	W-364	58.68	10.22	51.62	1.00	1.26	95.00	71.60	9.20	12.85	4.29	3.56	0.83	0.00
16	W-498	58.27	10.28	51.14	0.00	1.10	110.00	50.12	7.10	14.16	4.13	3.38	0.82	0.28
17	Milky White	59.55	10.92	55.89	13.00	1.39	95.00	104.61	13.20	12.62	6.60	5.03	0.76	1.70
18	Alibaug Local	60.23	10.83	52.06	8.00	1.27	106.00	75.09	10.10	13.45	5.78	4.87	0.84	0.96
19	Bhima Shubhra	62.15	11.27	60.45	6.00	1.26	98.00	105.49	13.20	12.51	5.91	4.45	0.75	0.48
20	PWO-2	46.27	8.75	41.43	0.00	0.91	126.00	49.98	7.30	14.61	3.28	2.31	0.70	0.00
21	Budhel Expert	63.26	11.22	56.27	0.00	1.01	109.00	79.76	9.70	12.16	5.40	4.59	0.85	0.00
22	Gadag Local	62.06	11.15	57.45	16.00	1.31	95.00	107.69	14.40	13.37	6.14	5.53	0.90	1.22
23	Bailhongal Local	51.94	8.51	45.88	0.00	0.93	109.00	54.30	7.90	14.55	3.61	2.57	0.71	0.00
24	Safed Ghavriyu	64.44	11.82	57.42	9.50	1.26	115.00	120.63	17.00	14.09	7.04	5.23	0.74	1.26
25	Bhima Safed	57.13	10.86	56.27	5.50	1.23	109.00	117.68	16.60	14.11	6.88	5.52	0.80	0.33
26	Agrifound White (C)	57.48	10.88	51.13	0.00	1.13	113.00	85.72	11.50	13.42	5.31	4.19	0.79	0.00

Sl. No.	Genotype	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
Mean		59.22	10.62	53.13	3.40	1.15	-	85.81	11.62	13.60	5.68	4.63	0.81	0.54
S.Em. ±		1.93	0.29	1.80	0.21	0.03	-	3.79	0.53	0.31	0.21	0.10	0.02	0.03
C.D @ 5%		5.50	0.85	5.13	0.61	0.10	-	10.78	1.52	0.88	0.62	0.28	0.06	0.10

C- *Check*

Note:*X_1-Plant height at harvest (cm), X_2- No. of leaves per plant at harvest, X_3-Leaf length at harvest (cm), X_4-Bolting (%),X_5-Neck diameter of bulb (cm), X_6- Days to maturity, X_7-Fresh weight of plant (g), X_8-Dry weight of plant (g), X_9- Dry matter content of plant (%), X_{10}-Equatorial diameter (cm), X_{11}-Polar diameter (cm), X_{12}-Bulb index and X_{13}-Doubles (%)*

Table 4. Contd……..

Sl. No.	Genotype	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}
1	Akola Safed	629.90	63.78	5.29	17.63	13.10	70.67	3.0	28.49	14.85	2.42	2.48	5.12	3.54
2	Bhima Shwetha	789.20	79.23	7.65	25.50	23.46	77.49	3.0	18.54	12.98	2.74	2.61	5.58	4.08
3	White Deshi	501.00	50.50	3.96	13.20	10.68	68.97	3.0	38.17	13.25	2.83	2.15	5.17	2.39
4	Telagi Local	639.10	64.50	5.60	18.67	16.87	80.30	3.0	19.67	13.75	2.29	2.62	5.14	4.98
5	Indus WG-Dhawal	705.50	70.96	6.52	21.73	20.65	75.92	3.0	19.79	13.28	2.68	2.71	5.63	3.76
6	Indus WG-1	766.00	77.01	7.14	23.80	22.84	76.01	2.0	17.69	16.25	3.00	3.01	6.27	2.40
7	Indus WG-2	595.40	59.83	4.90	16.33	15.31	73.39	4.0	25.49	15.23	3.23	3.62	7.16	4.23
8	Indus WG-3	817.50	82.14	7.67	25.57	23.19	78.24	3.0	16.54	15.76	3.17	3.78	7.28	3.26
9	Indus WG-4	583.40	58.63	5.09	16.97	14.81	73.60	3.0	29.50	12.30	3.29	2.61	6.13	3.50
10	Indus WG-5	838.70	84.18	7.88	26.27	23.69	79.93	1.0	14.54	14.95	3.09	3.10	6.45	3.78
11	Indus WG-6	490.50	49.36	4.17	13.90	12.54	72.29	3.0	30.96	14.25	3.18	2.95	6.39	2.98
12	W-125	606.80	60.89	5.62	18.73	17.25	75.60	3.0	21.49	10.88	2.44	2.82	5.51	4.86
13	W-210	551.40	55.55	5.13	17.10	15.72	71.29	3.0	23.34	13.20	3.79	3.52	7.62	2.78
14	W-398	532.70	53.56	4.90	16.33	14.59	77.26	2.0	25.69	14.13	2.88	2.43	5.52	4.06
15	W-364	546.60	55.05	4.74	15.80	13.68	76.89	3.0	28.01	12.30	2.24	3.02	5.52	4.50
16	W-498	343.60	34.77	3.10	10.33	5.45	69.37	4.0	39.18	10.34	2.47	2.43	5.11	3.88
17	Milky White	835.20	83.83	7.63	25.43	23.50	80.14	1.0	13.55	12.10	2.35	3.07	5.69	5.02
18	Alibaug Local	532.00	53.59	4.85	16.17	15.43	71.37	3.0	22.49	12.12	2.78	3.28	6.34	4.18
19	Bhima Shubhra	858.30	86.14	7.60	25.33	23.03	81.66	2.0	16.83	12.78	2.52	2.82	5.58	4.08
20	PWO-2	312.00	31.69	2.24	7.47	4.18	63.41	2.0	23.75	17.25	2.33	3.39	6.02	3.09
21	Budhel Expert	570.90	57.47	4.63	15.43	13.30	72.05	3.0	29.86	14.26	2.51	2.52	5.25	4.90

Sl. No.	Genotype	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}
22	Gadag Local	866.80	86.69	7.76	25.87	22.92	80.50	2.0	14.23	12.23	2.95	3.20	6.43	4.90
23	Bailhongal Local	386.30	39.03	3.08	10.27	9.35	71.88	4.0	38.57	12.34	2.65	2.37	5.23	4.60
24	Safed Ghavriyu	990.90	99.28	8.96	29.87	27.05	82.30	1.0	11.16	12.80	3.68	2.72	6.64	4.35
25	Bhima Safed	948.70	95.08	8.69	28.97	26.85	80.80	2.0	13.97	13.80	2.65	2.96	5.87	3.56
26	Agrifound White (C)	637.00	63.83	4.97	16.57	14.05	74.46	3.0	22.69	13.38	3.10	3.05	6.41	3.67
Mean		649.05	65.25	5.76	19.20	17.06	75.22	2.65	23.24	13.49	2.82	2.89	5.96	3.90
S.Em. ±		30.37	3.01	0.27	0.90	0.78	1.87	-	1.13	0.62	0.13	0.13	0.27	0.17
C.D @ 5%		86.27	8.55	0.77	2.56	2.24	5.32	-	3.22	1.78	0.38	0.38	0.77	0.50

C- *Check*

Note: *X_{14}- Ten bulb weight (g), X_{15}-Average bulb weight, X_{16}-Total yield (kg/plot), X_{17}-Total yield (t/ha), X_{18}-Marketable yield (t/ha), X_{19}-Harvest index (%), X_{20}-Thrips incidence, X_{21}-Purple blotch severity (%), X_{22}- TSS (°Brix), X_{23}-Reducing sugar (%), X_{24}-Non-reducing sugar (%), X_{25}-Total sugar (%) and X_{26}-Pyruvic acid (µ moles/g).*

Indus WG-3 genotype documented maximum non-reducing sugar (3.78 %) content. The observed variations for reducing, non-reducing and total sugar content in genotype may be due to genetic constitution of genotypes. These outcomes of results are consistent with the works of Umamaheswarappa et al. (2018), Sachin et al. (2015), Lakshmipathi et al. (2017), Singh et al. (2020) and Solanki et al. (2020).

Among the genotypes studied, the Milky White genotype had registered maximum pyruvic acid (5.02 µ moles/g) content followed by Telagi Local (4.98 µ moles/g), Budhel Expert, Gadag Local (4.90 µ moles/g each), W-125 (4.86 µ moles/g) and Bailhongal Local (4.60 µ moles/g). While, White Deshi genotype exhibited minimum pyruvic acid (2.39 µ moles/g) content. The content of pyruvic acid influences the pungency as well as storage period of bulb. This may be due to high temperature during growth and sulphur fertilizer lead to increased synthesis of volatile sulphur compounds, resulting in more pungency in onions. These results are in line with the reports of Gallina et al. (2012), Abedi et al. (2013), Dhumal et al. (2007) and Solanki et al. (2020,2015).

5. CONCLUSION

The study revealed significant disparities among white onion genotypes in growth parameters, yield traits, pest and disease resistance and quality traits, primarily attributed to genetic differences, environmental factors and agronomic practices. Notably, Safed Ghavriyu excelled in plant height, yield parameters and resistance to purple blotch, while Bhima Shubra and Milky White showed superior leaf length and neck diameter, respectively. Genotypes like Bhima Shweta and PWO-2 stood out in dry matter and TSS content, respectively. These findings underscore the evaluation of white onion genotypes for growth, yield, quality and pest and disease parameters provides valuable insights for developing improved onion varieties tailored to specific agricultural conditions. By leveraging genetic variability and environmental factors, breeders and farmers can work towards cultivating onions with enhanced traits that meet consumer demands and ensure sustainable production practices.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Abedi, M., Biat, F., & Nosrati, A. E. (2013). Evaluation of agronomical traits and pyruvic acid content in Hamedan garlic (*Allium sativum* L.) ecotypes. *European Journal of Experimental Biology, 3*(2), 541–544.

Amarananjundeswara, H., Priyadarshini, G., Doddabasappa, B., Vasudeva, K. R., Anjanappa, M., Prasad, P. S., & Veeregowda, R. (2020). Evaluation of white onion (*Allium cepa* L.) genotypes for growth, yield and yield attributing characters. *Journal of Pharmacognosy and Phytochemistry, 9*(5), 477–480.

Anonymous. (2021). Area, production and productivity of onion. Retrieved from www.nhrdf.com

Devi, P. A., Kale, V. S., Patil, R., & Singh, M. S. (2014). Performance of different rabi onion varieties under Akola conditions. *International Research Journal of Natural and Applied Sciences, 1*(6), 124–131.

Dhumal, K., Datir, S., & Pandey, R. (2007). Assessment of bulb pungency level in different Indian cultivars of onion (*Allium cepa* L.). *Food Chemistry, 100*(4), 1328–1330.

Gallina, P. M., Cabassi, G., Maggioni, A., Natalini, A., & Ferrante, A. (2012). Changes in the pyruvic acid content correlates with phenotype traits in onion clones. *Australian Journal of Crop Science, 6*(1), 36–40.

Hulagannavar, P., Patil, B., Gunnaiah, R., & Cholin, S. (2023). Estimates of variability, heritability, genetic advance for yield and its quality traits in onion (*Allium cepa* L.) genotypes. *International Journal of Environment and Climate Change, 13*(10), 1758–1770.

Lakshmipathi, N., Amarananjundeswara, H., Gowda, R. V., Reddy, M. T. B., & Karthik, D. (2017). Evaluation of onion landraces (*Allium cepa* L.) of Karnataka for yield and quality parameters during rabi season.

International Journal of Pure and Applied Bioscience, 5(6), 838–843.

Mahajan, V., & Pathak, C. S. (2014). Target, progress and constraints in onion breeding. In *Souvenir of brain storming session on crop improvement and seed production of onion* (pp. 69–91). Directorate of Onion and Garlic Research (DOGR) & National Horticultural Research and Development Foundation (NHRDF), Nasik.

Mahanthesh, B., Sanjjan, M. R., & Harshavardhan, M. (2009). Yield and storage qualities as influenced by onion genotypes in kharif season under rainfed situation. *Mysore Journal of Agricultural Sciences, 43*(1), 32–37.

Murthy, D. S., & Subrahmanyam, K. V. (1999). Onion exports markets and their stability for increasing India's exports: Markov chain approach. *Agricultural Economics Research Review, 12*(2), 118–128.

Panse, V. G., & Sukhatme, P. V. (1961). *Statistical method of agricultural workers*. ICAR Publication.

Priyadarshani. (2018). *Evaluation of white onion (Allium cepa L.) genotypes for bulb yield, quality and processing* (M. Sc. [Hort.] thesis). University of Horticultural Sciences, Bagalkot, Karnataka, India.

Sachin, U., Anjanappa, M., Kale, S. M., & Mahesh, B. (2015). Influence of different onion cultivars on storage life under central dry zone of Karnataka. *International Journal of Processing and Post-Harvest Technology, 6*(1), 36–40.

Sahu, K., Sharma, P. K., Dixit, A., & Nair, S. K. (2017). Correlation and path coefficient analysis in kharif onion (*Allium cepa* L.) genotypes for Chhattisgarh plains condition. *International Journal of Current Microbiology and Applied Sciences, 6*, 256–263.

Singh, R. K., Singh, S. K., & Tailor, A. K. (2020). The performance studies on storage of white onion for good keeping quality onion varieties under ordinary condition. *Journal of Agriculture Research, 7*(2), 86–92.

Solanki, B., Maity, T. K., & Maji, A. (2020). Evaluation of onion genotypes for growth, yield and quality traits under Gangetic-alluvial plains of West Bengal. *International Journal of Chemical Studies, 8*(4), 2157–2162.

Solanki, B., Maity, T. K., Sharangi, A. B., & Maji, A. (2019). Screening of onion (*Allium cepa* L.) germplasm against purple blotch disease. *Journal of Pharmacognosy and Phytochemistry, 8*(6), 546–548.

Suhas, Y. H. (2016). *Studies on performance of varieties, F1 hybrids and synthetics of onion in eastern dry zone of Karnataka* (M. Sc. [Hort.] thesis). University of Horticultural Sciences, Bagalkot, Karnataka, India.

Tripathy, P., Sahoo, B. B., & Dash, D. K. (2016). Evaluation of rabi onion genotypes under western zone of Odisha. *International Journal of Farm Sciences, 6*(3), 216–222.

Umamaheswarappa, P., Chandrappa, D., & Chandravamshi, P. (2018). Performance of onion (*Allium cepa* L.) varieties for growth and yield parameters under central dry zone of Karnataka. *Journal of Pharmacognosy and Phytochemistry, 5*(3), 344–346.

Umamaheswarappa, P., Naik, A. H., & Nataraja, M. (2015). Evaluation of onion genotypes for growth, yield and quality parameters under central dry zone of Karnataka. *Environment and Ecology, 33*(2), 992–995.

Yadav, S. S., Khan, B. H., & Yadav, N. (2010). Studies of onion varieties in kharif season. *Bhartiya Krishi Anusandhan Patrika, 24*(3), 38–40.

Yasmin, N. (2009). *Morphological characterization and genetic diversity of onion (Allium cepa L.)* (M. Sc. [Agri.] thesis). Sher-e-Bangla Agricultural University, Dhaka, Bangladesh.

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