IDENTIFICATION OF SUPERIOR GENOTYPES FOR YIELD AND QUALITY IN MULTIPLIER ONION

ABSTRACT

Background: Multiplier onion is one of the most important crops of Tamil Nadu. It is having lot of health benefits like anti-inflammatory, anti cholesterol, anticancer and antioxidant properties, lowering the toxigenicity of oils. It also shows chemo preventive effects and lowers down the risk of effect on gastric cancer. Considering the importance of multiplier onion an attempt was made to evaluate the multiplier onion genotypes to identify the best yielding genotype.

Methods: Seven genotypes of multiplier onion (*Allium cepa* var *aggregatum*) were evaluated under Northern transitional zone of Karnataka at University of Agricultural Sciences, Dharwad both during *Kharif* and *Rabi* for yield and quality parameters.

Results: The outcome of the experiment revealed that over the seasons, the genotype MP16-24 was registered highest total yield (167.86 q/ha), marketable yield (160.41q/ha), TSS (15.41), average bulb weight (4.64g)and less number of bolters, low infestation of thrips (7.83) and purple blotch (7.66). Therefore, the genotype MP 16-24 can be commercially grown under Dharwad conditions during both *Kharif* and *Rabi* because of its favorable characters.

Keywords: Multiplier onion, Genotype, Kharif, Rabi, Quality, Yield

INTRODUCTION

Onion is one of the major export oriented crops grown widely throughout India. It is also known as common onion or bulb onion. Onions are cultivated and used around the world. As a food item, they are usually served cooked, as a vegetable, can also be eaten raw or used to make pickles and chutneys. *Allium cepa* is the most widely cultivated species of the genus *Allium*. Its close relatives include garlic, shallot, leek, chive, chinese onion *etc.*,

Apart from *Allium cepa*, now a days one more species is gaining lot of importance and is the most remunerative crop of South East Asia i.e., Multiplier onion (*Allium cepa* L. *var. aggregatum* Don.). Aggregatum onion is mainly produced in southern states of India *viz.,* Tamil Nadu, Andhra Pradesh and South Karnataka and small parts of Orissa and Kerala. Tamil Nadu accounted for five per cent of country's area under commononion and more than 70 per cent of the area under multiplier onion (*A. cepa* var. *aggregatum*). Around 90 per cent of country's small onion is produced from Tamil Nadu and 10 per cent from Karnataka& other states. The bulblets of aggregatum onion are smaller than bulbs of common onion (*Allium cepa* L). Sometimes the flowers are formed in aggregatum onion but cultivation is extensively by vegetative means (bulblets) in contrast to common onion. It is famous for its pungency and reproduces primarily by division of bulbs rather than by seed.

Like common onion it also contributes significantly to nutritional value in human diet, due to its medicinal properties. It is primarily consumed for its unique flavor or its ability to enhance the flavor of food items because it contains compound known as Allyl-propyl disulphide. It stimulates the apetite. It is often used raw, sliced, mixed with soy sauce and eaten with roasted meat. It can be mixed with other ingredients and after grinding used as a spice for meat or fish. It is used for pickling, cooking and frying.A cultivar performs differently under different agro-climatic conditions and various cultivars of the same species grown even in the same environment give different yields as the performance of a cultivar mainly depends on the interaction of genetic makeup and environment (Boukary *et al.,* 2012 and Ijoyah *et al.,*2008).Considering the importance of multiplier onion, an experiment was conducted during 2017-18 in both *Kharif* and *Rabi* to evaluate multiplier onion genotypes for yield and quality parameters.

MATERIAL AND METHODS

An experiment on evaluation of multiplier onion genotypes was conducted at Main Agriculture Research station, University of Agricultural Sciences, Dharwad under All India Co Ordinated Network Research Project On Onion and Garlic during *Kharif* and *Rabi* seasons of 2017-18. The material was collected from Directorate of Onion and Garlic,Rajagurunagar, Pune. The experiment was laid out in vertisols *i.e.,* black soils with pH of 7.1. Soil belongs to clay texture with good amount of nutrient in it. The rainfall during experimentation period ranging

from 0-76.8mm.The experiment contains seven genotypes replicated thrice and spacing followed was15 cm x 10 cm in a plot size of 4 m x 1.2 m and sowing was done on during *Kharif* 2017 and *Rabi* 2018.All the package of practices are carried out during the experimentation as per the recommendations of Directorate of Onion and Garlic, Rajagurunagar, Pune.

For thrips and purple blotch incidence the scale followed was

List 1 Thrips incidence based on scale

Grade (Rating)	Disease Severity (%)
1	1 - 20 % foliage damage,
2	21-40 % foliage damage
3	41 - 60 % foliage damage
4	61 - 80 % foliage damage
5	81-100% foliage damage

List 2 Disease intensity for purple blotch

Grade (Rating)	Disease Severity (%)
0	No disease
1	1-10
2	11-20
3	21-30
4	31-50
5	51-100

RESULTS AND DISCUSSION

The results of the experiment are presented as follows. The genotype MP 16-18 produced the bulbs with highest bulb polar diameter of1.65 cm (during *Kharif*), 2.13 cm (during *Rabi*) and pooled mean (1.89 cm) and also highest equatorial bulb diameter of 1.51 cm (*Kharif*), 1.78 cm (*Rabi*) and 1.64cm (pooled mean) and was followed by the genotype MP16-21with bulb polar diameter of 1.42cm, 1.79cm and 1.60cmand equatorial bulb diameter of 1.63cm 1.45cm and 1.54 cm, respectively during *Kharif*, *Rabi*& over the seasons while it was lowest in MP16-29 (polar diameter of 1.14cm, 1.47cm and 1.30cm and equatorial diameter of 1.18cm, 1.20cm and 1.19cm, respectively during *Kharif*, *Rabi*& over the seasons) (Table -1). Significantly highest values were

obtained in the genotype MP16-24 for Weight of the bulb(23.07g, 22.38g and 22.72g), average bulb weight (4.69g, 4.48g and 4.64g), highest total yield (165.12, 170.6 and 167.86 q/ha),marketable yield (157.02, 163.81 and 160.41q/ha) and total soluble solids (15.91, 14.92 and 15.41), respectively during *Kharif, Rabi*& over the seasons and was followed by the genotype MP 16-18 (total yield of 141.48, 149.66and 145.57 q/ha, marketable yield of 135.24, 144.61 and 139.92 q/ha and total soluble solids of 13.47, 14.34 and 13.90 per cent , respectively during *Kharif, Rabi*& over the seasons).The bolters are also less in the same genotype which is desirable (0.1 and 0.5) (Table 2 and 3).

The genotype MP 16-13 found to be early variety which took least number of days for harvesting (95days). Thrips (8, 7.67 & 7.83) and purple blotch incidence (8, 7.33 &7.66) was lowest in MP16-24.This might be due to the performance of genotypes under different climatic conditions and due to genetic character of that particular genotype. The results are in conformity with the results of Binduand Podikunju 2015 and Thingalmaniyan *et al.* (2017). Bulb diameter is important character which influences the storage quality, thinner bulbs store well compared to thicker once; these results are in agreement with the results of the study conducted by Gautam *et al.* (2006). Tesfay *et al.* (2011) conducted an evaluation trial of three onion cultivars and concluded that onion cultivar performed differently and Parachinar local variety resulted in higher yield. Yield is a composite character and is dependent on many constituent traits. Any change in these constituent traits would reflect on total yield similar findings were observed by Boukary *et al.* (2012) and Azoom *et al. (*2014).The findings of Deen and Mosleh (2008) supported the results of this investigation. Increased yield may be because of difference in yield components as bulb volume, average weight of the bulbs and crop stand. Increase in bulb yield was mainly attributed to positive association between yield and yield contributing parameters like bulb weight and size in terms of equatorial and polar diameters of the bulb. Thickness of neck is one of the important characters which indicate vigour of the plant (Manna, 2013).

CONCLUSION

From the above results it can be concluded that the genotype MP16-24 is suitable with respect to yield, quality and resistance characters in northern transitional zone of Karnataka. It must be further evaluated in the subsequent season to justify its performance.

REFERENCES

Azoom, K.Z. Hannachi, C. Performance of eight varieties of onion (*Allium cepa* L.) cultivated under open field in Tunisia. (2014). *Notulae Scientific Biologicae.* 2: 220-224.

Bindu B. Podikunju. Performance evaluation of onion (*Allium cepa* L. *var. cepa*) varieties for their suitability in Kollam District. (2010). *International Journal of Research Studies in Agricultur*e. 11:18-20.

Boukary, H. Haougui, A. Barage, M. Adam, T. Roumba, A. Saadou, M. Evaluation agro-morphology of onion varieties under ecotypes of Nigeria. (2012). *International Journal of Biological and Chemical Science.* 6: 3098-3106.

Deen, U. D. and Mosleh, M.D. (2008). Effect of mother bulb size and planting time on growth, bulb and seed yield of onion. *Bangladesh Journal of Agricultural Research.* 33(3):531-537.

Gautam, I.P. Khatri, B. Govinda, P. Paudel. Evaluation of different varieties of onion and their transplanting times for off-season production in mid hills of Nepal. (2006). *Nepal Agricultural Research Journal.* 7: 21-26.

Ijoyah, M. O. Rakotomavo, H. Naiken, M.V. Yield performance of four onions (*Allium cepa* L.) varieties compared with the local variety under open field conditions. (2008). *Journal of Science and Technology*. 3: 28-33.

Manna, D (2013). Growth yield and bulb quality of onion (*Allium ce*pa.L) in response to foliar application of boron and zinc. *SAARC J ournal of Agriculture* 11(1):149-153.

Tesfay, S. Z. Bertling, I. Odindo, A.O. Greenfield, P. L. Workneh, T.S. Growth responses tropical onion cultivars to photoperiod and temperature based on growing degree days. (2011). *African Journal of Biotechnology* 71: 15875-15882.

Thingalmaniyan, K.S. Rohini, N. Arumugam, T. Performance evaluation of aggregatum onion genotypes (*Allium cepa* var. *aggregatum*) for yield, quality and resistance characters. (2014). *International Journal of Current Microbiology and Applied Science.* 6: 634-642.

Table 1: Polar Diameter (PD) and Equatorial Diameter (ED) of bulbs in different multiplier onion genotypes

Acc No.	BP (cm)		Pooled (over the seasons)	BE (cm)		Pooled (over the seasons)
	Kharif	***Rabi***		***Kharif***	***Rabi***	
MP16-13	1.35	1.84	1.59	1.26	1.25	1.25
MP16-15	1.32	1.65	1.48	1.39	1.44	1.41
MP16-18	1.65	2.13	1.89	1.51	1.78	1.64
MP16-21	1.42	1.79	1.60	1.63	1.45	1.54
MP16-24	1.41	1.84	1.62	1.54	1.39	1.46
MP16-27	1.35	1.76	1.55	1.26	1.37	1.31
MP16-29	1.14	1.47	1.30	1.18	1.2	1.19
SEm±	**0.26**	**0.05**	**0.03**	**0.08**	**0.06**	**0.08**
CD @5%	**0.77**	**0.16**	**0.11**	**0.27**	**0.20**	**0.27**

cm- centimeter

Table 2: Weight of bulb(WOB), Average bulb weight (ABW) and Days taken for harvest(DTH)as influenced by different multiplier onion genotypes

Genotypes	WOB		Pooled	ABW		Pooled	DTH		Pooled	% Bolters		Pooled
	***Kharif* 2017**	***Rabi* 2018**		***Kharif* 2017**	***Rabi* 2018**		***Kharif* 2017**	***Rabi* 2018**		***Kharif* 2017**	***Rabi* 2018**	
MP16-13	19.17	20.47	19.82	3.79	4.09	3.94	95	95	95	0	0	0
MP16-15	18.47	18.79	18.63	3.74	3.76	3.75	96	95	95	1	1	1
MP16-18	17.9	16.59	17.24	3.6	5.32	4.46	96	96	96	1	2.5	1.75
MP16-21	22.27	21.27	21.77	4.52	4.25	4.61	98	99	98	1	1.2	1.1
MP16-24	23.07	22.38	22.72	4.69	4.48	4.64	99	96	97	0	1	0.5
MP16-27	20.87	19.73	20.3	4.18	3.95	4.06	98	98	98	1	0	0.5
MP16-29	20.14	20.9	20.52	4.04	4.18	4.11	96	98	97	2	5	3.5
SEm±	0.46	0.534	0.52	0.03	0.01	0.33	-	-	-	-		-
CD @5%	1.42	1.64	1.79	0.09	0.02	1.13	-	-	-	-		-

Table 3: Total yield (TY), Marketable yield (MY) and Total Soluble Solids (TSS) as influenced by multiplier onion genotypes.

Genotypes	TY (q/ha)		Pooled	MY (q/ha)		Pooled	TSS (%)		Pooled
	Kharif	***Rabi***		***Kharif***	***Rabi***		***Kharif***	***Rabi***	
MP16-13	138.60	149.26	143.93	131.5	142.41	136.95	12.31	13.36	12.83
MP16-15	34.52	40.54	37.53	28.21	36.41	32.31	12.82	14.3	13.56
MP16-18	141.48	149.66	145.57	135.24	144.61	139.92	13.47	14.34	13.90
MP16-21	30.14	36.7	33.42	26.37	33.94	30.155	12.48	14.61	13.54
MP16-24	165.12	170.6	167.86	157.02	163.81	160.41	15.91	14.92	15.41
MP16-27	92.76	98.98	95.87	85.96	93.31	89.63	13.41	14.73	14.07
MP16-29	31	36.61	33.80	25.22	31.89	28.55	13.07	14.21	13.64
SEm±	0.75	0.69	0.92	1.2	0.35	0.77	0.32	0.16	0.48
CD @5%	2.32	2.12	3.22	3.6	3.31	2.65	1.00	0.50	1.67

Table 4: Incidence of purple blotch and thrips in different multiplier onion genotypes.

Genotypes	Purple blotch		Pooled	Thrips		Pooled
	Kharif	***Rabi***		***Kharif***	***Rabi***	
MP16-13	13.00	9.33	11.17	9.00	9.67	9.33
MP16-15	12.67	12.67	12.63	10.00	9.00	9.50
MP16-18	13.33	34.33	23.83	8.67	14.00	11.33
MP16-21	14.00	14.33	14.17	8.33	15.00	11.67
MP16-24	8.00	7.33	7.66	8.00	7.67	7.83
MP16-27	8.33	8.67	8.50	18.00	14.00	16.00
MP16-29	26.33	23.67	25.00	9.67	18.67	14.16
SEm±	0.81	0.60	4.24	0.30	0.44	2.36
CD @5%	2.50	1.86	14.67	0.94	1.34	8.16

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