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Survey of yield and Bulb Quantitative and Qualititative Traits in Iranian Onion Morphotypes.

[1]Mehdi Manbachi, [2]Mohsen Khodadadi, [3]Vahid Abdoosi, [4]Amirhossein Rahmatizadeh and [5]Sahar Majdi

[1,3]Horticulture Dept., Science and Research Branch, Tehran, Islamic Azad University, Tehran, Iran

[2] Horticulture Dept., Seed and Plant Improvement Institute, Karaj, Iran

[4] Natural Resourses Dept., Tehran University, Tehran, Iran

[5] Biochemistry Dept., Science and Research Branch, Tehran, Islamic Azad University, Tehran, Iran

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ABSTRACT:
For evaluation of Iranian onion morphotypes potentials and application of them in breeding programes, seeds of 23 Iranian onion morphotypeswere collected from East Azarbaijan (Red Azarshahrmorphotypes), Tehran (Red Rey morphotypes), Razavi Khorasan (Red Neyshaboor morphotypes) and Zanjan (Gholyghese morphotypes). These onion morphotypes were planted in RCBD design in four replications in Seed and Plant Improvement Institute fromearly April 2010. Results showed high variation in studing traits among morphotypes.Red Rey2, Azar Gokan2, Red Rey4 and local Neyshaboor2 morphotypes had the highest yield and marketing traits, but hadno difference among morphotypes at tissue firmness. All morphotypes had low bulb dry matter and were not suitable for processing. Results of cluster analysis among morphotypesshowed that 23 morphotypes were clustered at 3 groups. In each cluster morphological traits of morphotypes was adjust with their collecting location.

Keywords: Onion, Morphotypes, Yield, Tissue Firmness, Dry Matter.

INTRODUCTION

Onion (*Alliums cepa*L.), origins of Asia, areas between Palestine and India. This vegetable has high nutritional and health value (Brewster, 1994).

Total onion cultivation area in the world is about 3.64 milha, and Iran with 47000 ha, is in the 15th ranked (Anonymous, 2009).

Onion total production is73.23 milt (Anonymous, 2009).

Also Iran with 1.5 milt onion production is in the 8th ranked in the world (Anonymous, 2009).

Onion quality is dependent to its biological value. Meanwhile marketable traits as bulb shape, bulb size, bulbfirmness and bulb disease free (Rabinowitch and Brewster, 1990).

Releasing of new onion varieties was done by genetic diversity of different onion masses and these masses are as important gene pool in breeding of crops.

Moosavizadeh*et al.,* (2006) by surveying of morphological diversity in 20 Iranian onion masses reported that these masses were too much diverse in genetic traits.

MoadabShabestari*et al.,* (2009) by evaluation of RedAzarshahrmorphotypes reported very diversity at agronomic traits.

Azimi*et al.,* (1998) in surveying of 16 onion masses in Iran, reported that masses had very diversity in all traits except bulb dry matter, doubled bulbs and bulb diameter.

Dehdari*et al.,* (2001) by evaluation of morphological and Agronomic traits reported high diversity in studing traits.

Dennequin*et al.,* (1997) in surveying of genetic relations in 41 onion genotypes reported high diversity in some traits as:leaf No, bulb diameter, bulb FW, bulb DM, neck diameter and planting to bulbing duration (days).

Eultai*et al.,* (1996) clustered 60 onion genotypes by cluster analysis in 4 groups in base of geographical origins of them in traits as: plant height, leaf length and leaf diameter, bulb height and bulb diameter, bulb weight and bulb yield.

Rouamba*et al.,* (1996) in surveying of 14 West African onion masses reported high diversity in agronomic traits.

Bradeen and Havey (1995) grouped 6 onion genotypes and their hybrids basis DNA markers. In this research cluster analysis can't clusteredstuding genotypes.

RostamForoodi(2005) in evaluation of Iranian onion masses in desired traits as yield, neck diameter, bulb Size, bulb shape, bulb layers No, Storability, bulb DM, TSS and bulb firmness reported that was high diversity among masses.

In Iran many onion masses that have high diversity in morphological and quality traits were cultivated. Evaluation of plant and bulb traits diversity for breeding programes is necessary. So this research was conducted for evaluation of some morphological and quality traits on 23 Iranian onion masses for application of elitemasses in onion breeding program.

MATERIALS AND METHODS

This research was conducted during first 8 month of 2010 in Seed and Plant Improvement Institute Farm in Karaj, Iran.

In this research seeds of 23 long day onion morphotypes of 4 masses that were collected from East Azarbaijan (Red Azarshahr), RazaviKhorasan (Red Neyshaboor), Zanjan (Gholyghese) and Tehran (Red Rey) important onion production provinces were planted in RCBD design with four replications. Each plot had four rows with four meters lengths. Distance between rows and plants were 30 cm and 7 cm respectively.

Table 1: Onion morphotypes name and their collection province.

Zanjan Province	Tehran Province	KhorasanRazavi Province	East Azarbaijan Province
Gholyghese 87 (17)	Red Rey1 (12)	Red Neyshaboor1 (9)	Azarshahr-Gokan1 (1)
GholygheseSofla (18)	Red Rey2 (13)	Local Neyshaboor (10)	Azarshahr-Gokan2 (2)
GholygheseNikpey (19)	Red Rey3 (14)	Yellow	Azarshahr-Gokan3 (3)
GholygheseKonavand	Red Rey4 (15)	Neyshaboor(11)	Azarshahr-Gokan4 (4)
(20)	Red Rey5 (16)	---	Azar-Shabestar5 (5)
Gholyghese 88 (21)	---	---	Azarshahr-ilkhechi6
GholygheseShenat (22)	---	---	(6)
GholygheseChapachap	---	---	Azarshahr-Bonab7 (7)
(23)		---	Azarshahr8 (8)

In experimental farm, a combined soil sample was taken and in base of soil analysis, 120 kg/ha superphosphate triple and potassium sulfate fertilizers were added to experimental farm. Before and after transplanting 400 kg/ha ammonium nitrate were added to soil in 30 days intervals. Cultivation operation as irrigation and weed control were done regularly in different stages of growth.

Harvesting of plots was done in 15th October by harvesting of bulb in 2 median lines. Bulb traits as yield, marketable yield, bulb weight, bulb diameter, bulb layers No, bulb multikiness, bulb DM percentage and bulb firmness were recorded by common methods. Analysis of Variance and mean comparisons (by multi rangeDuncans test) and cluster analysis by WARD method was done by SAS and SPSS softwares.

RESULTS AND DISCUSSION

Variance analysis results of traits is shown in Table 2.

Table2: Variance analysis results of Yield and Quantitative and Qualititative onion traits

MS									df	SOV
	Bulb Firmness kg/cm^2	Bulb DM %	Multi center No	Bulb Layers No	Bulb Diameter cm	Bulb Weight gr	Marketable Yield t/ha	Yield t/ha		
	$^{ns}0.5973$	$^{ns}0.2489$	$^{ns}0.0397$	$^{ns}0.2753$	$^{ns}0.3382$	$^{ns}334.45$	$^{ns}0.3384$	$^{ns}0.3763$	3	Block
	0.7461^{ns}	0.3515^{**}	0.0986^{**}	0.3913^{ns}	0.597^{**}	820.46^{**}	1.7524^{**}	1.7218^{**}	22	Onion bulk
	1.0263	0.1914	0.0494	0.3662	0.1895	229.61	0.2086	0.1823	66	Error
									91	Total
	16.57	15.67	18.71	9.97	7.40	21.19	5.79	5.26		Coefficient of Variation (%)

* , ** , ns : Significant at %5 & %1 and not significant difference respectively.

Results of table2 showed that replications are not-significantly different in studied traits.

Onion morphotypes were significantly different in all traits except bulb firmness and bulb layers No.

Mean comparisons of yield and marketable yield showed that Red Rey2, Azarshahr Gokan2, Red Rey4 and local Neyshaboor2 had the highest yield and marketable yield (42.12 t/ha and 38.44 t/ha respectively) (Table 3).

Table3: Mean comparisons of 23 onion morphotypes yield and bulb qualititative traits

Bulb Firmness (kg/cm^2)			Bulb DM (%)			Marketable Yield (t/ha)			Yield (t/ha)		
Rank	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**
a	6.90	5	a	13	19	a	74.57	2	a	78.46	13
a	6.87	14	ab	12.6	14	a	74.49	13	a	78.32	2
a	6.80	23	ab	12.5	17	a	73.27	15	ab	76.91	15
a	6.72	7	ab	12.4	23	a	72.76	5	ab	75.16	10
a	6.60	19	ab	12.4	13	a	72.25	10	ab	74.99	5
a	6.40	21	abc	11.9	12	ab	70.72	1	ab	74.30	14
a	6.30	11	a-d	11.8	2	abc	69.88	12	ab	73.96	1
a	6.17	8	a-d	11.8	22	abc	69.38	14	ab	73.27	12
a	6.12	22	a-d	11.8	16	abc	68.06	9	ab	72.76	7
a	6.12	3	a-d	11.7	18	abc	67.13	11	abc	71.40	9
a	6.10	1	a-d	11.5	15	abc	67.24	7	abc	70	11
a	6.10	13	a-d	11.5	20	a-d	65.44	8	abc	69.88	6
a	6.02	15	a-d	11.4	21	a-d	64.96	6	abc	69	8
a	6	20	a-d	11.2	10	a-e	62.88	3	bcd	65.28	3
a	5.87	12	a-d	11.1	3	b-f	59.44	4	bcd	65.12	4
a	5.85	6	a-d	10.8	7	c-f	57.76	16	cde	60.84	16
a	5.82	16	a-d	10.4	11	d-g	55.05	21	def	57.15	17
a	5.77	4	bcd	9.9	5	d-g	54.31	17	def	56.55	21
a	5.75	17	bcd	9.8	8	efg	51.84	20	ef	54.46	20
a	5.72	10	bcd	9.8	4	fg	50.69	19	ef	54.31	19
a	5.57	2	bcd	9.6	9	gh	46.1	23	fg	49.84	23
a	5.50	18	cd	9.1	1	gh	45.96	18	fg	48.72	18
a	5.47	9	d	8.8	6	h	38.44	22	g	42.12	22

Bulb diameter was the highest in AzarshahrShabestar5 and Red Rey2, but this trait was the least in GholygheseShenat (4.94 cm) (Table4).

So it's concluded that by increasing of bulb diameter the yield is increased. This Subject had reported with moadabShabestari*et al.*, (2009) and Rouamba*et al.*, (1996).

High yield morphotypes, had more bulb layers number too (Table4).

Table4: Mean comparisons of 23 onion morphotypes in bulb Quantitative traits.

Bulb layers no			Multi center			Bulb diameter (cm)			Bulb weight (g)		
Rank	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**	**Rank**	**Mean**	**Variety**
a	6.50	5	a	1.4142	16	a	6.45	5	a	100.7	2
a	6.50	10	a	1.3901	9	a	6.45	13	ab	91.87	13
a	6.50	15	a	1.3901	19	ab	6.30	15	abc	89.37	15
ab	6.25	6	a	1.3901	18	ab	6.24	9	abc	88.58	1
ab	6.25	1	a	1.3901	11	ab	6.21	16	a-d	80.94	9
ab	6.25	2	ab	1.3660	14	abc	6.17	2	a-d	80.88	5
ab	6.25	19	ab	1.3107	5	a-d	6.14	4	a-e	79.57	12
ab	6.25	18	ab	1.3107	12	a-d	6.13	1	a-f	79.29	8
ab	6.25	9	ab	1.3107	13	a-d	6.08	18	a-g	76.77	11
ab	6.25	23	ab	1.2071	15	a-d	6.08	3	b-g	75.26	10
ab	6.25	13	ab	1.1830	10	a-d	6.07	14	b-g	74.16	4
ab	6	4	ab	1.1381	22	a-d	5.88	8	b-g	73.9	6
ab	6	8	ab	1.1036	7	a-d	5.78	10	b-g	70.77	16
ab	6	12	ab	1.1036	3	a-d	5.74	12	b-h	68.08	14
ab	6	3	ab	1.1036	2	a-d	5.73	11	b-h	67.86	7
ab	6	16	ab	1.1036	6	bcd	5.68	6	c-h	65.5	3
ab	6	7	b	1	1	bcd	5.65	21	d-h	61.22	18
ab	6	20	b	1	17	b-e	5.57	23	d-h	57.55	23
ab	5.75	17	b	1	8	b-e	5.56	17	d-h	56.99	20
ab	5.75	21	b	1	21	cde	5.45	7	fgh	54.47	17
ab	5.75	11	b	1	20	de	5.39	19	fgh	53.64	19
ab	5.5	14	b	1	4	de	5.39	20	gh	52.47	21
b	5.25	22	b	1	23	e	4.94	22	h	44.43	22

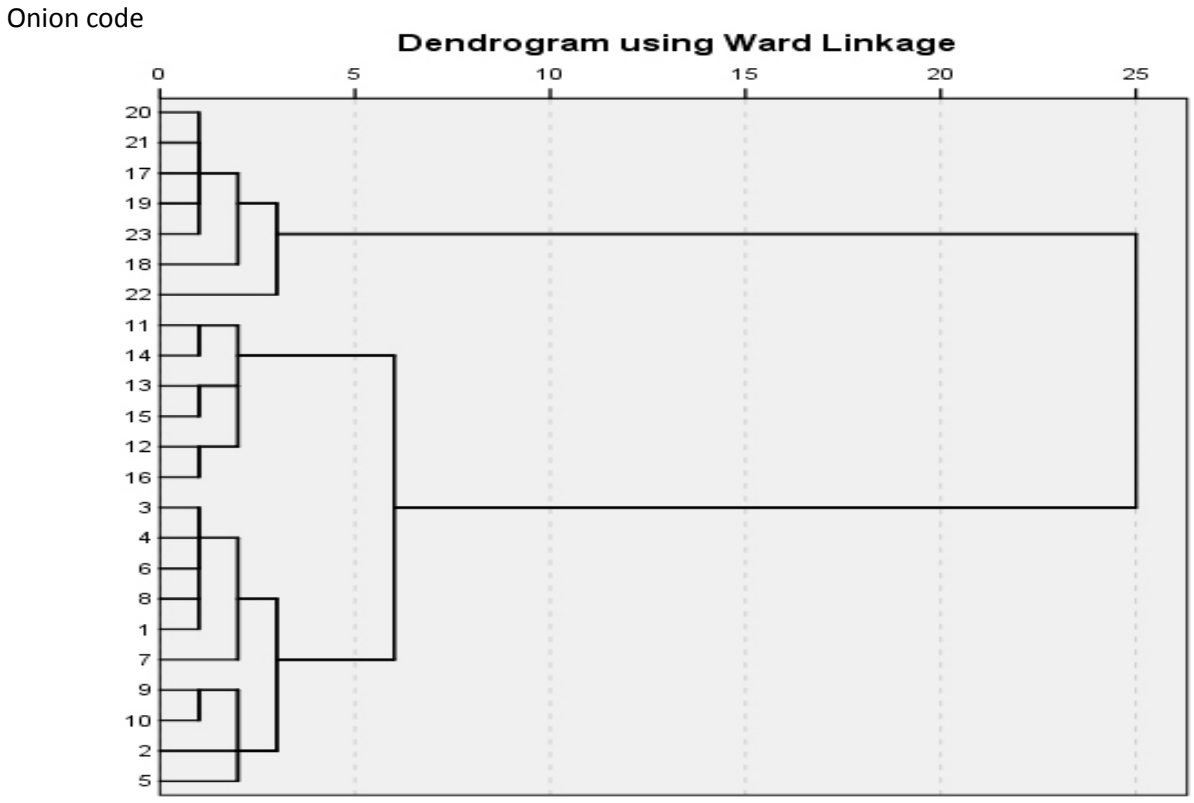

Figure 1: Cluster analysis of 23 onion morphotypes

Morphotypes were classified in three groups after performing cluster analysis with WARD method, as seen in figure 1. More intervals between ranks, more hyterosis will be expected. In order to create more hyterosis in best states, we can choose one parent from Gholyghese genotype and choose the other parent from other genotypes.

This dendrogram indicates that testing mass ecotypes grouping have a high precise and ecotypes of each mass were related to its mass correctly. Some of this issues like placing Red Neyshaboor1 and Neyshaboor2 in Azar masses group indicate proximity between these masses, means Azarshahr onion has been transferred to the other cultivating regions like Neyshaboor and main origin of Red Neyshaboor masses is the same Azarshahr mass.

Some morphotypes as GholygheseChapachap, Azar4 and GholygheseKonavand had low bulb multikiness. Mosavizadeh*et al.,* (2006) reported that Azar1 and Azar2 and GholygheseChapachap are Suitable for this trait.

Bulb dry matter was the high in GholygheseNikpey but Azar6 had the least bulb DM.

Totally studing genotypes in this research had low bulb DM and are not suitable for processing.

Bulb tissue firmness had not difference among genotypes.

In results of cluster analysis grouping by morphological traits had high adaptability with geographical grouping (Fig1). MosaviZadeh*et al.,* (2006) and Denniquin *et al.,* (1997) reported non adaptation in genetic diversity with geographical diversity.

Genetic diversity of Gholyghesemorphotypes with other genotypes was low.

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