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## Studies the physicochemical profile of onion varieties for dehydration

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#### Abstract

An experiment entitled "Studies on evaluation of different varieties of onion for dehydration." was conducted during year 2020-21 at Horticulture Research Scheme (Vegetable), Department of Horticulture, VNMKV, Parbhani. The experiment was laid out in Randomized Block Design for field research experiment and Completely Randomized Design for laboratory experiment with three replications and twelve varieties viz. Bhima kiran, Bhima Super, Bhima Dark Red, Bhima Light Red, Bhima Safed, Bhima Raj, Bhima Shakti, Bhima Shweta, BhimaShubhra, Bhima Red, N-2-4-1, Phule Samarth. Analysis of variance revealed significant differences among the varieties in all characters. In respect of dehydration highest TSS was found in Bhima Shakti (15.80%) and Bhima Kiran (17.94%) of fresh and dried onion, respectively. Ascorbic Acid of fresh onion observed maximum in variety Bhima Kiran (20.21 mg/g) while the minimum recorded in variety Bhima Super (10.60 mg/g). The data showed that significantly maximum total sugars of fresh onion was recorded in variety Bhima Shewata (6.41%) followed by in Bhima Kiran (6.34%) and Bhima Safed (6.20%) which were at par with each other. However, minimum was recorded in variety Phule Samarth (5.32%).

**Keywords:** Onion, Bhima, Phule, minimum, maximum

#### Introduction

Onion (*Allium cepa* L.) is the most important underground bulbous vegetable crops grown in India. It grows well in mild climate without extreme heat or cold or excessive rainfall. It is widely cultivated for internal consumption as well as for the export. Processed and value added products are gaining importance in the worldwide markets. Dehydrated onions are considered as a potential product in world trade and India is the second largest producer of dehydrated onions in the world. There is a large demand of dehydrated onion in the European countries only (Murthy and Subramanyam, 1999) [4]

Dried onion products are more preferred than fresh onion bulbs due to its simplicity for use and greater shelf stability (Mazza and Lemaguer, 1980) [3]. Drying of onion bulb is performed by applying heat energy on onion slice does not only remove moisture content, it also influence the nutrient and may distract volatile and bioactive component. Major drying methods of agricultural products are open air and hot air drying techniques. Open air drying methods mainly practiced in rural areas while hot air drying techniques mainly used in urban areas. Both drying method have their own merits and demerits on nutritional values, bioactive component loss, colour, shrinkage and other organoleptic properties of the agricultural produces (Mazza and Lemaguer, 1980) [3]. Keeping in view the need to identify suitable varieties, the study was conducted to investigate the drying behaviour of onion varieties and their suitability for dehydration.

#### Material and Method

An experiment entitled "studies on evaluation of different varieties of onion for dehydration" was conducted at experimental Farm, Horticulture Research Scheme (vegetable), Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. (M.S.). This chapter outlines are specifics of the material used and procedures to be followed during the process of the investigations.

#### Total soluble solids (TSS)

Total soluble solids were measured by digital hand refractometer.

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### Titrateable Acidity

Titrateable acidity was determined according to the AOAC official method 942.15 (AOAC 2000). Five gram of onion juice diluted in 25 ml of distilled water and titrated by 0.1N sodium hydroxide (NaOH) to pH 8.1. The titrateable acidity was expressed as g citric acid/kg tomato, according to the following equation:

Titrateable acidity (g citric acid/kg tomato) =  $(V \times 0.1 \times 1000 \times 0.064) / m$  Where: 0.1 is normality of NaOH (N), 0.064 is conversion factor of citric acid, V is the volume of NaOH required (ml) and m is mass of tomato juice sample used (g).

### Ascorbic acid

Determination of ascorbic acid was done by 2,6 dichlorophenol indophenols dye method as described by Ranganna (1977) [7]. A known quantity of onion juice or powder with 3% metaphosphoric acid (HPO<sub>3</sub>) to make the final volume of 100 ml and then filtered. A known quantity of aliquot was titrated against 0.025% 2, 6 dichlorophenol indophenols dye to a pink colour end point. The ascorbic acid content of the sample was calculated taking into consideration the dye factor and expressed as mg ascorbic acid per 100 g juice extract.

$$\text{Dye factor} = \frac{0.5}{\text{Titrate reading}}$$

$$\text{Ascorbic acid (mg/100 gm)} = \frac{\text{Titrate} \times \text{Dye factor} \times \text{Vol. made up reading}}{\text{Aliquot extract} \times \text{weight of sample taken for estimation}} \times 100$$

### Total Sugars (%)

Total sugars were determined by adding the value of reducing and non reducing sugars. It was expressed in per cent.

#### a) Reducing sugar

Reducing sugar of juice were determined by method described by Ranganna (1986) [8]. The percentage of reducing sugar was calculated according to following formula.

$$\text{Reducing Sugar} = \frac{\text{Glucose equivalent} \times \text{Total volume made up}}{\text{Titrate value} \times \text{weight of sample}} \times 100$$

#### b) Non-Reducing Sugars

Non Reducing sugars content was determined by using Benedict's method. It was expressed in percent.

## Result and discussion

### 1. Total soluble solids (TSS) ascorbic acid and Total Sugar content in fresh harvested different varieties of onion.

#### TSS

Data in respect of Total soluble solids (TSS) showed significant differences in different onion varieties presented in Table No.1. Significantly highest TSS of fresh onion observed in variety Bhima Shakti (15.80%) which were at par with variety Bhima Kiran (14.59%) while the lowest TSS was recorded in variety Phule Samarth (11.25%), Bhima Drak Red (11.29%), Bhima Shubhra (12.29%), Bhima Safed (12.37%), Bhima Light Red (12.45%) which are at par with each other.

### Ascorbic Acid (mg/g)

Data on Ascorbic Acid of fresh onion observed significantly maximum in variety Bhima Kiran (20.21 mg/g) which were at par with variety Bhima Shubhra (19.84 mg/g) while the minimum ascorbic acid was recorded in variety Bhima Super (10.60 mg/g), Bhima Light Red (10.9 mg/g), N-2-4-1 which are at par with each other. These results of TSS are in close conformity with the results obtained by Pardeshi and Waskar (2012) [5] showed that the maximum TSS observed in variety Arka Niketan (13.00%) and minimum TSS in Sel.-383 (10.15%) variety of onion. Genetic potential and climatic condition adopted by the variety during its growth impact on TSS of onion.

### Total Sugars (%)

The data showed that significantly maximum total sugars of fresh onion was recorded in variety Bhima Shewata (6.41%) followed by in Bhima Kiran (6.34%) and Bhima Safed (6.20%) which were at par with each other. However, minimum was recorded in variety Phule Samarth (5.32%). These results are in close conformity with results obtained by Galeev *et al.*, (2018) [1]. Mention that the highest total sugar in Bennito F1 (10.3%) and lowest total sugar was observed in variant Borodkovsky (10%). Total sugar increased due to effect of growth regulators like Argon, Albite, Novosil and Zicron. Kandoliya *et al.*, (2015) [2] revealed that JDRO-07-13 of red variety and GWO-1 of white nutritionally found better due to its lower reducing sugar (2.21 mg/g).

## 2. Dehydration of different onion varieties

### Effect of drying on Total soluble solids (TSS), Ascorbic acid and Total sugar content in different varieties of onion

Data presented in Table No.1 showed that the effect of drying on Total soluble solids (TSS), Ascorbic acid and total sugar content in different varieties of onion.

#### TSS

The data showed that significantly maximum TSS of dehydrated onion was observed in variety Bhima Kiran (17.94%) which was at par with variety Bhima Shakti (17.82%) while the minimum TSS was recorded in variety Bhima Raj (13.11%).

#### Ascorbic Acid

The data in respect of ascorbic acid content showed significantly maximum ascorbic acid of dehydrated onion in variety Bhima Kiran (17.93 mg/100 g) which was at par with the variety Bhima Safed (17.75 mg/100 g) and Bhima Shubhra (16.74 mg/100 g). The minimum ascorbic acid content was found in variety Bhima Light Red (11.49 mg/100 g). Patil *et al.*, (2015) [6] result showed that ascorbic acid was observed 5.1 to 9.3 (mg/100 g). Highest ascorbic acid was noticed at 70 °C temperature, 50 min cut-off time and tempering period 40 min. Ascorbic acid of onion decreased with increasing drying temperature, this is due the effect of different drying condition like temperature, cut-off time and temperature period on nutritional quality of onion.

#### Total Sugar

Data in respect of total sugars of dehydrated onion showed significant difference among varieties. Significantly highest total sugars of dehydrated onion was recorded in variety Bhima Kiran (27.76%) which was at par with Bhima Raj

(25.87%), Bhima Safed (25.83%), Bhima Shubhra (25.50%), and Bhima Light Red (25.14%). However, lowest total sugars were recorded in variety Bhima Dark Red (19.09%). These results are in close conformity with results obtained by Patil *et*

*al.*, (2015) [6]. Result showed that total sugar ranged between 33.60 to 44.97% and reducing sugar ranging between 12.20 to 24.51%. This is because of effect of drying method, sugar percentage affected by drying parameters.

**Table 1:** Total soluble solids (TSS) ascorbic acid and Total Sugar content in fresh and dehydrated onion.

Treatments Symbol	Variety	Fresh onion			Dehydrated onion		
		TSS (%)	Ascorbic acid (mg/100 g)	Total sugars (%)	TSS (%)	Ascorbic acid (mg/100 g)	Total sugars (%)
T <sub>1</sub>	Bhima kiran	14.59	20.21	6.34	17.94	17.93	27.76
T <sub>2</sub>	Bhima super	12.86	10.60	5.44	15.07	11.57	23.30
T <sub>3</sub>	Bhima Dark Red	11.29	13.20	5.33	16.02	12.14	19.09
T <sub>4</sub>	Bhima Light Red	12.45	10.97	5.70	14.82	11.49	25.14
T <sub>5</sub>	Bhima Safed	12.37	17.08	6.20	13.93	17.75	25.83
T <sub>6</sub>	Bhima Raj	13.25	15.92	5.97	13.11	14.91	25.87
T <sub>7</sub>	Bhima Shakti	15.80	15.51	5.88	17.82	14.61	23.03
T <sub>8</sub>	Bhima Shweta	13.63	16.22	6.41	13.85	14.88	24.90
T <sub>9</sub>	Bhima Shubhra	12.29	19.84	5.56	15.49	16.74	25.50
T <sub>10</sub>	Bhima Red	13.66	15.51	6.09	16.08	15.70	23.11
T <sub>11</sub>	N-2-4-1	13.23	11.55	5.47	15.74	13.06	20.16
T <sub>12</sub>	Phule Samarth	11.25	16.22	5.32	13.36	15.70	19.59
SE ±		0.54	0.53	0.13	0.33	0.49	0.68
CD @ 5%		1.61	1.55	0.38	0.96	1.44	2.00

## Conclusion

In respect of quality parameters of fresh onion, highest TSS was found in variety Bhima Shakti (15.80%) and lowest in Phule Samarth (11.25%), maximum acidity was recorded in variety Bhima Super (1.97) and minimum in Bhima Shweta (1.01%), highest ascorbic acid content was found in variety Bhima Kiran (20.21 mg/100 g) and lowest in Bhima Super (10.60 mg/100 g), maximum total sugars was recorded in variety Bhima shweta (6.41%) and minimum in Phule Samarth (5.32%). In respect of quality parameters of dehydrated onion, highest TSS percent was found in variety Bhima Kiran (17.94%) and lowest in Bhima Raj (13.11%), maximum acidity was recorded in variety N-2-4-1 (25.03%) and minimum in Bhima Kiran (14.57%), highest ascorbic acid content was found in variety Bhima Kiran (17.93 mg/100 g) and lowest in Bhima Light Red (11.49 mg/100 g). While maximum total sugars of dehydrated onion was recorded in Bhima Kiran (27.76%) and minimum in variety Bhima Dark Red (19.09%) and lowest browning index was recorded in variety Bhima Shubhra (7.54 mg/g) while maximum browning index was found in variety Bhima Raj (12.38 mg/g).

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