

## Original Research Article

# Preparation and Sensory Evaluation of Drumstick Leaves Powder

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## ABSTRACT

### Keywords

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Drumstick leaves (*Moringa oleifera*) powder was studied for its sensory evaluation. Studies were done by different chemical treatments under cabinet and solar drying of drumstick leaves. In case of drying methods, cabinet drying found superior in organoleptic qualities as it scored highest in respect of colour, texture, flavour and overall acceptability. The drumstick leaves when pretreated with MgO (0.1%) + KMS (0.5%) + NaHCO<sub>3</sub> (0.1%) followed by cabinet drying was found superior in organoleptic qualities. On this basis of organoleptic qualities pre-treatment with MgO (0.1%) + KMS (0.5%) + NaHCO<sub>3</sub> (0.1%) followed by cabinet drying exhibited the best results.

## Introduction

Green leafy vegetables offer a cheap but rich source of a number of micronutrients and other phytochemicals having antioxidant properties. Green vegetables are one of most important and vital ingredient that we need to include in our diet (Mamta *et al.*, 2017). *Moringa oleifera* leaves have been used successfully in its dried state or powdered form to augment and make delicious meals and porridge diets for pregnant expectant mothers, nursing mothers, infants and young children as well as adults of all age groups. Therefore, it is necessary to increase the utilization of *Moringa* leaves consumption by the different communities. It should be consumed either fresh or dry (Mishra *et al.*, 2012).

Pre-treatments are the necessary pre-requisites for successful dehydration process, to minimize drying losses various pretreatment are used. Pre-treatments check the undesirable physico-chemical and other qualitative changes that may occur during drying process and subsequent storage and to extend keeping quality of dried products. Blanching is one of the pretreatment given to minimize the microbial load and deactivate the enzymatic activity to prevent the browning reaction, also reduced the greenness degradation of the product.

There are many varieties of green leafy vegetables, which are rich and natural source of iron and other essential micronutrients, Drumstick leaves (*Moringa oleifera*) is one

of them, which is available at no cost and is very rich in all the micronutrients. Dehydration result in concentration of nutrients. It is one of the most possible strategy for preservation of green leafy vegetable which are highly seasonable and perishable too. In the process of drying or dehydration, sufficient moisture is removed and thus the product is ensured against spoilage (Kakade and Neeha, 2014).

To achieve the target of feeding the increasing population as well as meeting the requirements of the raw material for processing industry and export trade, only increase in area and productivity of crops are not enough. Much attention needs to be given on post-harvest management and value addition of these perishable vegetable crops.

### **Materials and Methods**

The study was conducted in post-harvest technology Laboratory at University Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during 2017-2018.

Fresh tender, diseased free drumstick leaves (variety PKM-1) were washed in clean tap water. Then subjected to various treatments viz., steeping solution of different concentration of MgO, KMS and NaHCO<sub>3</sub>, blanching was carried out in boiling water for 2 minute (Kalaskar *et al.*, 2012).

The leaves were then subjected to drying in cabinet and solar dryer for 6 to 6½ hours hrs at 60°C. After that obtained dehydrated leaves were grinded with the help of mixer to prepared fine powder.

Drumstick leaves powder sample were immediately packed in 200 gauge polyethylene bags, sealed and stored at ambient storage. The observations of

organoleptic parameters were recorded at 30 days interval up to 180 days of storage. Observations on organoleptic evaluation for sensory qualities viz. colour, flavor, texture and over all acceptability were recorded by 9-Point Hedonic scale.

### **Drying methods**

D<sub>1</sub>: Cabinet drying (60 ± 2 °c).

D<sub>2</sub>: Solar drying (60 ± 2 °c).

### **Results and Discussion**

The data in Table 2 revealed that, colour, flavour, texture and overall acceptability of drumstick leaves powder as influenced by pre-treatments and drying methods.

Overall acceptability of drumstick leaves powder depends upon colour, flavor, texture as per remarks of the evaluator. There were 10 judges for evaluating the colour, flavour, texture and retention of powder. The hedonic scale has range in between 1 to 9. The score from 1 to 4 indicates poor in quality, from 6 to 8 indicates good quality of commodity and finally range from 8 to 9 indicates excellent quality of product.

Cabinet dried drumstick leaves powder secured higher (95.56%) overall acceptability score for colour, flavour and texture, while lower (93.17%) was registered for solar drying in respect of colour, flavour and texture on 1<sup>st</sup> day of storage.

The scored depicted in Table 1 revealed that, treatment combinations T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + cabinet drying) recorded higher score for colour (9.0, 8.4, and 7.5 respectively) throughout the storage period at 1<sup>st</sup>, 90<sup>th</sup>, and 180<sup>th</sup> day, while lower was registered for T<sub>1</sub>D<sub>2</sub> (control + solar drying) (7.8, 7.1, and 6.3

respectively). The maximum score obtained in treatment combination T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + cabinet drying) presented in Table 1 indicated that on 1<sup>st</sup>, 90<sup>th</sup>, and 180<sup>th</sup> day of storage, T<sub>2</sub>D<sub>1</sub> found superior over rest of the treatment combinations for flavour (9.0, 8.6, and 8.1 respectively) while minimum score were recorded in treatment combination T<sub>1</sub>D<sub>2</sub> (control + solar) (7.6, 7.3, and 6.7 respectively). The score recorded in respect of texture of drumstick leaves powder, depicted in Table 1 showed that treatment combinations T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + cabinet drying) recorded higher score for texture (9.0, 8.4, and 7.8 respectively) throughout the storage period at 1<sup>st</sup>, 90<sup>th</sup>, and 180<sup>th</sup> day, while lower was

registered for T<sub>1</sub>D<sub>2</sub> (control + solar) (7.8, 7.4, and 6.8 respectively).

The score depicted in Table 1 revealed that on 1<sup>st</sup>, 90<sup>th</sup>, and 180<sup>th</sup> day of storage, T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + cabinet drying) found for overall acceptability (9.0, 8.5, and 7.5 respectively) while minimum score were recorded in treatment combination T<sub>1</sub>D<sub>2</sub> (7.7, 7.3, and 6.3 respectively).

The sensory score decreased continuously with increase in storage period. This might be due to degradation of chemical constituents during storage and also might be due to browning and non-enzymatic browning reaction (Crapiste, 1997).

**Table.1** Details of the pretreatment and drying methods are given below

Treatment No.	Pre-treatment details
T <sub>1</sub> -	Blanching in water for 2 minutes (Control).
T <sub>2</sub> -	Blanching in water + steeping in 0.1 % MgO + 0.5% KMS + 0.1% NaHCO <sub>3</sub> for 2 minute.
T <sub>3</sub> -	Blanching in water + steeping in 0.2% MgO + 0.5% KMS + 0.1% NaHCO <sub>3</sub> for 2 minute.
T <sub>4</sub> -	Blanching in water + steeping in 0.1% MgO + 1.0% KMS + 0.1% NaHCO <sub>3</sub> for 2 minutes.
T <sub>5</sub> -	Blanching in water + steeping in 0.2% MgO + 1.0% KMS + 0.15% NaHCO <sub>3</sub> for 2 minutes.
T <sub>6</sub> -	Blanching in water + steeping in 0.1% MgO + 1.5% KMS + 0.15% NaHCO <sub>3</sub> for 2 minutes.
T <sub>7</sub> -	Blanching in water + steeping in 0.2% MgO +1.5% KMS + 0.15% NaHCO <sub>3</sub> for 2 minutes.

**Table.2** Sensory evaluation of drumstick leaves powder as influence by pre-treatments and drying methods

Treatment Combinations	1 <sup>st</sup> DAY				90 <sup>th</sup> Day				180 <sup>th</sup> Day			
	Col.	Flav.	Text.	Over Accpt.	Col.	Flav.	Text.	Over Accpt.	Col.	Flav.	Text.	Over Accpt.
T1D1	7.7	7.8	7.9	7.8	7.5	7.4	7.4	7.4	6.3	6.5	6.2	6.3
T2D1	9	9	9	9.0	8.4	8.6	8.4	8.5	7.5	8	7.8	7.8
T3D1	8.9	8.7	8.9	8.8	8.4	8.4	8.4	8.4	7.3	7.8	7.4	7.5
T4D1	8.7	8.6	8.7	8.7	8.1	8.2	8.4	8.2	7.2	7.6	7.3	7.4
T5D1	8.6	8.5	8.6	8.6	8	8.1	8.3	8.1	7.3	7.3	7.1	7.2
T6D1	8.5	8.7	8.8	8.7	8.3	8.2	8.5	8.3	7.2	7.4	7.7	7.4
T7D1	8.6	8.5	8.7	8.6	8.3	8.4	8.2	8.3	7.1	7	7.7	7.3
T1D2	7.8	7.6	7.8	7.7	7.1	7.3	7.4	7.3	6.2	6.7	6.8	6.6
T2D2	8.5	8.8	8.6	8.6	7.9	8.1	7.9	8.0	7	7.4	7.4	7.3
T3D2	8.5	8.4	8.4	8.4	8.1	8	8.1	8.1	7.2	7.6	7.5	7.4
T4D2	8.6	8.4	8.5	8.5	8.2	8.2	8.1	8.2	7.2	7.5	7.2	7.3
T5D2	8.5	8.7	8.6	8.6	7.8	8.2	8.4	8.1	6.8	7.5	7.5	7.3
T6D2	8.6	8.5	8.2	8.4	8.1	8	8	8.0	7	7.4	7.3	7.2
T7D2	8.8	8.4	8.2	8.5	8.1	8.1	8.1	8.1	7.1	7.3	7.4	7.3

The merits of any product depend upon the consumer acceptability. Sensory evaluation is an important tool to know the consumer acceptability. In the present investigation, the organoleptic parameters like colour, flavour, texture and overall acceptability were evaluated with the help of panel of judges. Significantly higher score recorded in T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + cabinet drying).

This may be due to prevention of loss in moisture content (Kalaskar *et al.*, 2012 for dried fenugreek leaves, and Premavalli *et al.*, 2001 for dehydrated fenugreek leaves) and comparatively minimum loss in nutritive value of the drumstick leaves powder. T<sub>2</sub>D<sub>1</sub> (MgO 0.1% + KMS 0.5% + NaHCO<sub>3</sub> 0.1% + Cabinet drying) was found to be best as it gives green colour and smooth texture. Cabinet drying found superior in organoleptic qualities as it scored highest in respect of colour, texture, flavour and overall

acceptability. The drumstick leaves when pretreated with MgO (0.1%) + KMS (0.5%) + NaHCO<sub>3</sub> (0.1%) followed by cabinet drying was found superior in organoleptic parameters. On this basis of organoleptic parameters pre-treatment with MgO (0.1%) + KMS (0.5%) + NaHCO<sub>3</sub> (0.1%) followed by cabinet drying exhibited the best results.

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