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RESEARCH ARTICLE

DRYING CHARACTERISTICS OF MORINGA LEAVES

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ABSTRACT

Green leafy vegetables are rich in micronutrients but are not consumed often by human beings. One such green leafy vegetable is Moringa leaves which is rich in nutrients. The scientific name of Moringa is Moringa olifera. It is commonly known as Drumstick, Murungai, Horse radish etc. Our study is based on the drying characteristics of Moringa leaves which is dried in Hot air oven and fluidized bed drier at 60^{o}celsius and the efficiency of both the driers has been determined.

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INTRODUCTION

Moringa olifera is mostly cultivated species of the genus Moringa. It belongs to the family Moringaceae. It is cultivated in tropical and sub-tropical areas. Rainfall required is 250-3000mm. Irrigation is needed for leaf production if rainfall is lesser than 800mm.the pH of the soil must be 5-9. Its young pods and leaves are used as vegetables. The leaves are the source of B Vitamins, Vitamin C, provitamin A, vitamin K. it is also the source of many essential nutrients. The dried leaves have longer shelf life than the fresh leaves. The fresh leaves are cooked and consumed as spinach and the dried Moringa leaf powders are used in soups and sauces.

MATERIALS

A. Apparatus Used

- Hot air oven
- Fluidized bed drier

B. Sample Preparation

The fresh Moringa leaves are harvested from the plant and it is washed thoroughly to remove the dirt and impurities from the leaves. Then the leaves are dried using the hot air oven and fluidized bed drier to get the dehydrated leaves.

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METHODS OF DRYING

A. Hot Air Oven

Description: *It is an electrical device that uses dry heat. It* consists of trays made up of steel. They can be operated from 50^{o}C to 300^{o}C. Thermostat is used to control the temperature. It is double walled, inner layer is a poor conductor and the outer layer is metallic. It is insulated to prevent heat loss and conserves energy. The principle of hot air oven is based on the fine gravity air convection.

Procedure: The temperature of the hot air oven is setup to 60^{o}C. The washed leaves are weighed and it is spread over the plate and kept inside the hot air oven. After every 15 minutes the sample is taken out and weighed. The weight is noted. This process is continued until the weight reaches the concordant value.

B. Fluidized Bed Drier

Description: The fluidized bed drier has an air flow chamber, control panel, blower and heater. The air is blown from the bottom of the chamber by the blower and it is heated by the heater. The material to be dried is fed through the opening at the top of the chamber. The temperature can be controlled by the control panel.

Procedure: The temperature is set to 60^{o}C. The washed leaves are weighed and fed in the top of the chamber and the blower

is switched on. After every 15 minutes the leaves are taken out and weighed. This procedure is continued until the weight reaches the concordant value.

Fig.1. Moringa Leaves are Kept in the Hot Air Oven

Fig. 2. Fluidized Bed Drier

Fig. 3. Dried Moringa Leaves

Fluidized Bed Drier

Table 1. Observations from fluidised bed drier

Time (min)	Moisture Removed (g)	Moisture Content (%db)	Drying Rate (kg/hr)	Moisture Ratio
15	3	42.857	0.012	0
30	2	39.997	0.008	0.666
45	1	25	0.004	0.5
60	1	33.333	0.004	1
75	1	49.2537	0.004	1
90	0	0	0	0
105	0	0	0	0

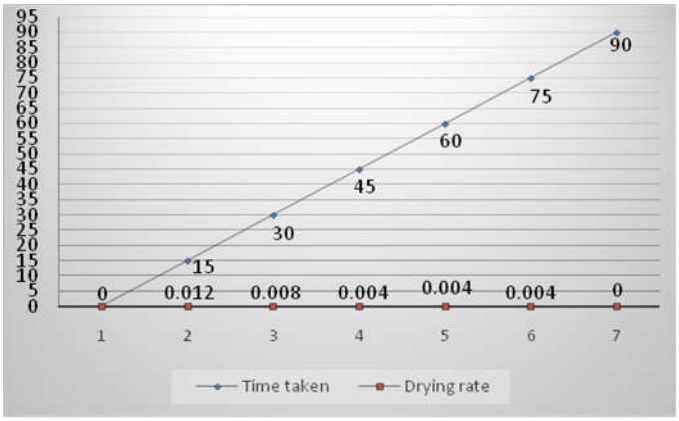

Fig. 4. Time Taken Vs Drying Rate

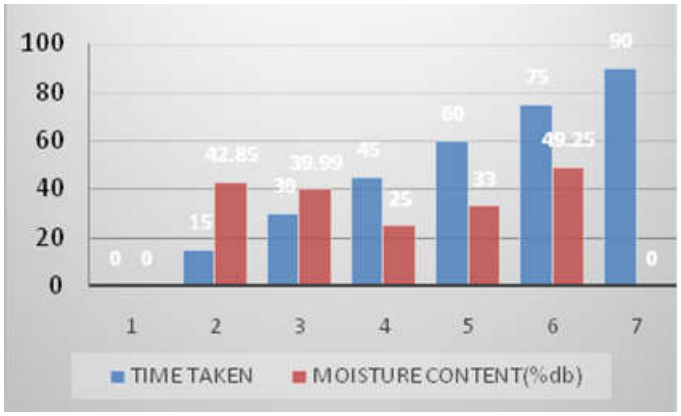

Fig. 5. Time Taken Vs Moisture Content

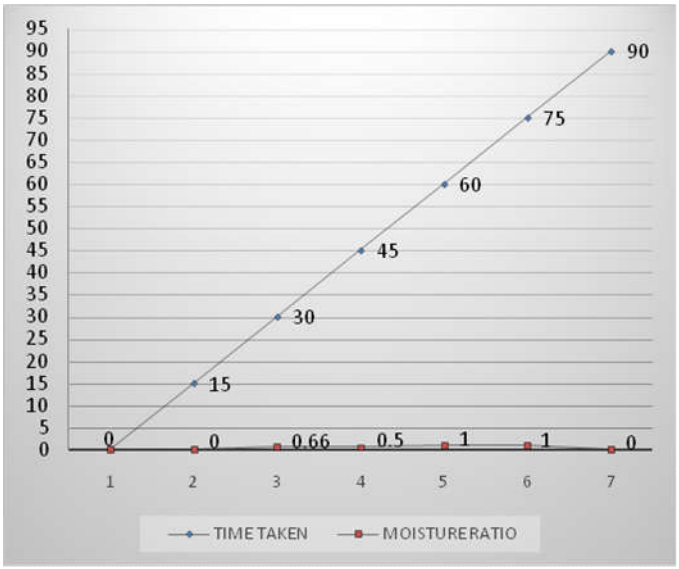

Fig. 6. Time Taken Vs Moisture Ratio

Discussion

Fig 4 indicates that when the time increases, the drying rate decreases. Fig 6 indicates that when the time increases the moisture ratio increases.

Hot air oven

Table 2. Observations from hot air oven

Time (min)	Moisture Removed (g)	Moisture Content (%db)	Drying Rate(kg/hr)	Moisture Ratio
15	2	25	0.008	0
30	1	14.2857	0.004	0.5714
45	1	16.66	0.004	1.1666
60	1	19.99	0.004	1.1999
75	1	25	0.004	1.2500
90	1	33.333	0.004	1.3333
105	0	0	0	0
120	0	0	0	0

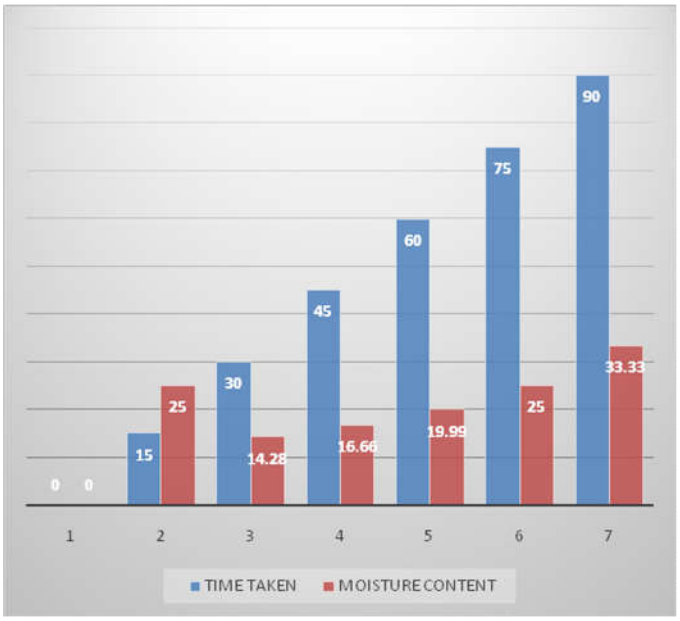

Fig. 7. Time Taken Vs Moisture Content

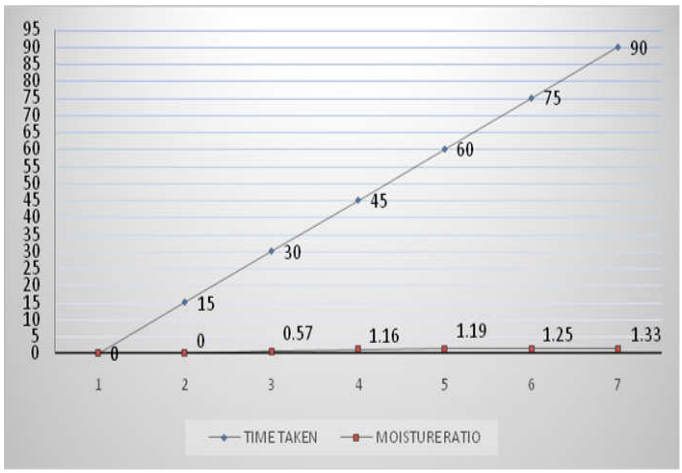

Fig. 8. Time Taken Vs Moisture Ratio

Discussion

Fig 8 indicates that when the time increases the moisture ratio increases. Fig 9 indicates that when the time increases the drying rate decreases.

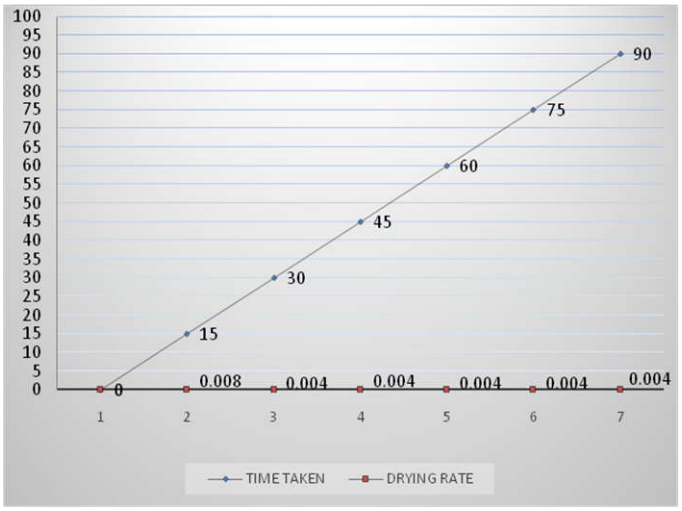

Fig. 9. Time TakenVs Drying Rate

Conclusion

In this study we conclude that as the time increases the moisture content of the sample decreases. We can also compare the efficiency of the hot air oven and fluidized bed drier. After drying the leaves can be used for many purpose.

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