

m_{af} is air mass flow rate in kg/s
 h_1 is specific enthalpy of air at inlet in kJ/kg air; and
 h_2 is specific enthalpy of air at the drying temperature in kJ/ kg air.

The drying rate was determined by using the equation below as:

$$R = \left(\frac{dM}{dt} \right) = \frac{m_i - m_f}{t} \quad (6)$$

Where:

R is drying rate in g/h
 dM is change in mass in g
 dt is change in time in h
 t is total time in h
 m_i and m_f are the Initial and final mass of product respectively in g.

6.0 Results

The preliminary test result carried out after the fabrication of the multi-purpose dryer using two types of vegetables is as detailed below.

Table 1. Result of Preliminary Test

Vegetable	Drying Temp. (°C)	Drying airflow rate (M/S)	Drying Period (minute)	Initial Weight (g)	Weight At 1:00 hr (g)	Weight At 2:00 hr (g)	Weight At 2:40 hr (g)	Final Weight (g)	Initial Moisture (%)	Final Moisture (%)
Ugu leaf	60	1.1	160	200	110.9	55.0	42.1	42.1	83.23	5.07
Bitter leaf	60	1.1	160	200	110.3	66.4	37.7	37.7	79.38	5.28

It was found out that for Ugu leaf at initial moisture content of 83.23%, it was dried to a stable moisture content of 5.07% after a period of about 2 hours 40 minutes while bitter leaf, with initial moisture content of 79.38% was dried to a stable moisture content of 5.28% for a period of about 2 hours 40 minutes. It was also discovered that the vegetables did not change colour after drying to a stable moisture content.



Fresh Ugu Leaf



Dried Ugu Leaf



Fresh Bitter Leaf



Dried Bitter Leaf

The proximate analysis carried out is as reported in the table below.

Table 2. Proximate Analysis

Vegetable	Sample	Moisture (%)	Ash (%)	Fiber (%)	Fat (%)	Protein (%)	CHO (%)
Ugu leaf	Fresh	83.23	1.64	2.06	0.92	3.75	8.41
	Dried	5.07	18.26	13.08	6.43	21.45	35.71
Bitter leaf	Fresh	79.38	2.60	1.51	0.69	4.24	11.58
	Dried	5.28	14.02	4.54	2.39	25.07	48.70

Data is average of three replicates

Proximate analysis is based on the separation of food substances in to fractions in accordance with their nutritional values. The value fractions determined include Water/moisture, Ash, Crude fibre, crude fat, Crude protein and carbohydrate.

The proximate analysis was carried out according to the procedure of association of analytical chemist. Official method of analysis of AOAC International.19th Edition. Gaithersburg, MD, USA, Association of Analytical Communities; 2003.to determine the moisture content, crude

protein, crude fat, ash, crude fibre and carbohydrate extract of the fresh and dry samples. The proximate analysis of the samples was repeated three times.

7.0 Recommendation

An extensive evaluation of the multi-purse dryer should be carried out using other vegetables that have high moisture content and are susceptible to damage within a short period after harvest.

8.0 Conclusion

The NCAM Developed Multi-Crop dryer is a viable technology for drying crops. It is capable of drying any form of farm produce or foods, it is suitable for both domestic and industrial use.

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