

CHAPTER III

MATERIALS AND METHODS

3.1 Materials

Fifteen samples of date fruits were purchased from different branches of the local supermarkets in Kajang as labeled in Table 1. Hydrochloric acid (HCL) 6M, nitric acid (HNO₃) 0.1M and AAS solutions standard with analytical grade for potassium(k), magnesium (Mg), manganese (Mn), ferum (Fe), copper (Cu) , zinc (Zn) and calcium (Ca). All metals standards were purchased from Fisher Scientific.

TABLE 1: The 15 different brands of dates using in the study

Brand	Label No.
Sedaghat	1
Sultan	2
Sajad	3
Royl	4
Shamim	5
Paradisa	6
Alsafa	7
Meera	8
Sun Fruit	9
Ajwa	10
Sugary	11
Rashodei	12
Sun seed	13
Sodat	14
Sultana	15

3.2 Instrument

Atomic Absorption Spectroscopy (AAS) A Perkin Elmer A Analyst 800 model with an air acetylene burner (USA), muffle furnace and oven Binder brand.

3.3 Methods

3.3.1 Physical Measurement

Physical aspects of the fruit such as the length and width were measured by using ruler centimeters, the date palm fruit was weighed in grams by an analytical balance.

3.3.2 Preparing Date Palm Fruits for Analysis

All the date palm fruit samples were washed and pitted. The fruit pulps were blended using an electric blender to homogenize the samples.

3.3.3 Determination of Minerals Content by Atomic Absorption Spectroscopy

2 g of sample was dried in oven at 105 °C for 1 hour. After that, sample was ashed in muffle furnace at 550 °C for 4 hours. The ashed samples were placed at room temperature for cooling process. Then, 5 ml of acid HCL 6M was added to the crucible. The acid solution was evaporated on a hot plate. Then, the residue was dissolved with 20 ml of nitric acid HNO_3 and the solution was diluted with deionized water to 50 ml marking volumetric flask. The solution was poured into a plastic bottle before performing AAS.

The mineral compositions of dates were analyzed by using Atomic Absorption Spectroscopy (AAS), AAS was used to identify seven minerals K, Mg, Mn, Fe, Cu, Zn and Ca in the different date brands.

Blank solution of 20 ml of HNO₃ 0.1 M was mixed with deionized water to final volume of 50 ml in the volumetric flask. Calibration curve using 4 standards at different concentrations of each metal was prepared as displayed in Table 2.

TABLE 2: Calibration Standard for 7 Minerals.

No.	Metal	Std1	Std2	Std3	Std4	R ²
1	Zn	0.2	0.5	1.0	1.5	0.993
2	Cu	0.3	0.6	1.0	3.0	0.999
3	Fe	0.2	0.5	1.0	2.0	0.997
4	Mn	0.2	0.5	1.0	1.5	0.998
5	Mg	0.2	0.5	1.0	2.0	0.996
6	k	0.2	0.5	1.0	1.5	0.992
7	Ca	1.0	2.0	4.0	5.0	0.999

Whereas

R²= coefficient

Std =standard of metal

The concentration (C) of the metal in the test sample was then calculated by using the following formula (AOAC, 2005):-

$$C = \frac{(a-b) \times v}{m}$$

Where C means concentration of metal in the test sample (mg/kg),

a = concentration in the experiment solution (mg/ml),

b = mean concentration in the blank solutions (mg/ml),

v = volume of the experiment solution (ml)

m = weight of the test portion.

3.4 Statistical Analysis

Multivariate data of mineral composition in dates was standardized by using Microsoft Excel software 2007. Principal components analysis and *k* mean cluster

were performed on physical characteristics data and standardized minerals composition data by using Unscramble (x10.3) (Dahimi et al., 2014).



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