UNIVERSITI TEKNOLOGI MARA

EFFECT OF PROCESSING PARAMETER ON CHEMICAL COMPOSITION OF *CUCURBITA MOSCHATA EXTRACT*

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Abstract

Pumpkin (*Cucurbita Moschata*) is a vital tropical vegetable that grows fully-fledged in everyplace around the world. This tropical pumpkin (*C.moschata*) goes to the Cucurbitaceous family. *C.moschata* is frequently used in traditional medications since the seed has a high source of energy such as protein, potassium, phosphorus, iron and b-carotene and possesses a wide range of therapeutic activities such as anthelmintic, antioxidant and antibacterial. The extraction that involves different processing parameters are crucial to obtain bioactive compounds from *C.moschata.* Therefore, this current research study the effect of different parameters towards the extraction yield of bioactive compounds. Parameters that are involved are between types of solvent, temperature and method of detection; drying method, time and detection method; temperature and method of detection. These parameters were assessed by using the Taguchi method. The highest delta in S/N ratio indicates the most influence factor towards the extraction yield of bioactive compounds. The result obtained showed that temperature is the most influential factor as compared to the types of solvent and method of detection. While the time is more influenced compared with the detection method. Other than that, temperature has the most influence when compared with the detection method. Temperature and time were statistically significant which have a value of $P<0.05$ as compared to the other parameters. Hence, it can be concluded that time and temperature have significant effects toward the extraction yield of bioactive compounds in *Cucurbita Moschata.*

1.0 Background of Study

The yellow pumpkin (*Cucurbita Moschata*) includes the type of plant spreading from the famed *Cucurbitaceae* family in the country. There are three most famous types of pumpkin in the world: *Cucurbita moschata, Cucurbita maxima and Cucurbita pepo*. Yellow pumpkin is one type of pumpkin that is quite popular in Indonesia although this fruit comes from Central Mexico and spread to the Americas. Yellow pumpkin can grow in tropical and subtropical regions. The major pumpkin plants in Asia are Indonesia, Japan, Philippines, Taiwan, Thailand, and Malaysia. Pumpkin was grown in Asia around the mid-19th century. In Malaysia, there are 2 varieties that are grown, namely the Chinese variety and Taiwan variety. The Chinese variant pumpkin has large yellow-sized fillings while the Taiwanese variant pumpkin has orange and small rounded contents. Most of the pumpkin is commercially grown in the East Coast of Peninsular Malaysia. The pumpkin is suitable for planting in sandy loam, inorganic clay, peat or brice soil. The appropriate Ph is 5.5 to 6.8 and the conclusion should be done at 3 to 5 tonnes / ha for mineral soil and 3 to 7.5 ton / ha for peat soil. It also requires hot weather and a good irrigation system. Temperatures range from 25 to 35 degrees Celsius in the daytime and 18 to 22 degrees Celsius at night.

Pumpkin (*Cucurbita maxima*) seeds have significant nutritional content providing high quality oil and proteins (*Mahasneh and El-Oqlah, 1999; Montesano et al., 2018*). The oil content in pumpkin seeds has been reported to be 37.8-45.4% (*Lazos, 1986*) and 47.03% with some variations based on species and genetic diversity (*Younis et al., 2000*). *C. maxima* seeds produce good quality oil and are excellent sources of proteins in the range of 25.2-37% (*Lazos, 1986; Kim et al., 2012*). Meanwhile, pumpkin seed refers to the edible seed of a pumpkin, containing some bioactive compounds frequently used as herbal medicines and functional foods. Pumpkin seeds are also commonly used in culinary practices mainly in Southeast Asian countries. In Indonesia, pumpkin is one of the popular vegetables consumed and considered as functional food due to the extraordinary rich sources of bioactive compounds having beneficial health effects (*Montesano et al., 2018*). In addition, pumpkin seed oil (PSO) has gained great attention in the fats and oils industry not only as edible oil but also as a potential nutraceutical (*Rezig et al., 2012*). The world production of pumpkins was 27 million tonnes, and China led the total production accounting of 29%.

PSO has been reported to contain phytosterols, phenolic compounds, antioxidants, tocopherols, and small levels of carotenoids responsible to some biological activities which are beneficial to human health *(Cuco et al., 2019)* including prevention of gastric, breast, colorectal and lung cancers (*Elfiky et al., 2012*), retardation of hypertension progression, antihypertensive (*Zuhair et al.,2000*), prevention of prostate disease, mitigation of hypercholesterolemia and arthritis, alleviation of diabetes mellitus by enhancing hypoglycemic activity, reduction of bladder and urethral pressure (*Fruhwirth et al., 2003; Fu et al., 2006*), improving bladder compliance and urinary disorder in human overactive bladder (*Nishimura et al., 2014*), and offering good antioxidant sources (*Nawirska-Olszańska et al., 2013; Naziri et al., 2016*).

1.1 Literature

1.1.1 The different types of temperature

Temperature is also important to find the amount of chemical composition in *Cucurbita Moschata* extract. Through this method, it is also an effective way to use and it will be analyzed by the GCMS or HPLC. Temperature chosen for this experiment on the Taguchi method is from 40°C until 70°C. There is a need to for in depth extensive studies on the amount of the bioactive compound through the process. The drying method is related to the temperature chosen as the experiment needs to be matched with the method and the right temperature. As in the pumpkin (*Cucurbita Moschata*), it contains many kinds of compounds such as tocopherols, carotenoids, lutein and many others. The extraction yield and biological activity of the resulting extract is not only affected by the extraction technique but also by the temperature used in the experiment. Many temperatures can be used in this experiment in order to get the higher value of the chemical composition. It has been used for the extraction of bioactive compounds from plant material. Due to the variety of the bioactive compound it will be influenced by the temperature. It exists in the natural all-trans form, as high temperature causes extensive isomerization and some parts of all trans form are converted into various cis-isomers and the Isomerization can occur in provitamin A carotenoids at temperatures above 35°C.

1.1.2 The different types of drying method

The method of drying is the oldest way used since times of yore to preserve food. This method is typically used to remove water from fruits, herbs and more (*OHIO et al, 2015*). Air-flow drying (AD), hot-air drying (HAD), freeze drying (FD) and microwave drying (MD) are examples of drying methods. Most yellow and dark green vegetables such as pumpkin contain high nutrition since vitamin A is retained during drying because it is light sensitive (*Gonzalez et al., 2001*). It is also high in fibre, carbohydrates and low in fat that can make consumers keep healthy. FD is a dehydration process that is used to preserve an untreated material or make the material more suitable for transport. While for the MD method, it is much faster to dry since the process is the same way as eating food in a microwave, where the microwaves are converted into heat (*Strålsäkerhetsmyndigheten et al., 2017*). HAD method is one of the frequently used in the manufacturing. The process happens when the heat is transferred from the hot air to the product by convection, and the evaporated water is also transferred to the air by convection. AD method basically used to avoid rusting and corrosion that can be caused by redundant moisture. Uses of additives in the materials can allow the absorption of oxygen from the air that results in unstructured polymerization.

1.1.3 The different types of solvents extraction

One of the most important factors affecting the extraction efficiency of bioactive compounds from plant materials and their consequent health benefits is the extraction solvent. Extraction is the main process by which bioactive compounds may be obtained from biomass materials. The objective of the extraction process is to maximize the amount of target compounds and to obtain the highest biological activity of these extracts. The extraction yield and biological activity of the resulting extract is not only affected by the extraction technique but also by the extraction solvent. Many solvents, including methanol, ethanol, acetone, and water, have been used for extracting