

CHAPTER I

INTRODUCTION

1.1 Introduction

Legume seeds are the most important sources of macronutrients, which are protein, carbohydrates and dietary fiber, for the diet of many populations, especially in developing countries. One of these legumes is the Bambara groundnut. Bambara groundnut (*Vigna subterranea*) is a leguminous crop, which is a drought tolerance (Poulter, 1981). There are seven types of BG based on their seed coat color. In addition, they are difference in shape and size. Bambara groundnut is one of the five most important food crops in Africa, which is normally found in Nigeria, and also found in Indonesia, Malaysia, Philippines, and the South of Thailand (Gwala et al., 2019). This legume has low fat , high essential amino acids and high protein; thus, it is often referred to a complete food (Minka & Bruneteau, 2000) (Oyeyinka & Oyeyinka, 2018). Normally, Bambara groundnut is used in many kinds of product, for example snack (kangu), vegetable milk, low fat yoghurt, and puddings (Brough, Azam-Ali, & Taylor, 1993), (Falade, Ogundele, Ogunshe, Fayemi, & Ocloo, 2015).

The composition of Bambara groundnut flour may vary with the botanical origin and variety of the grains that consists of approximately 7% lipids, 15-20% protein, 56-67% carbohydrates, and 20-33% amylose (Afolabi, Opara, Kareem, & Oladoyinbo, 2018; Piyarat, 2008). From its composition, not only high protein but also a good source of starch (18 and 45%); thereby, Bambara groundnut would become an alternative starch source for the food industry.

In Thailand, Bambara groundnut has been planted mostly in the south of Thailand, Na Khon Si Thammarat, Narathiwat, and Songkhla provinces. A new variety of Bambara groundnut, Songkhla 1, was developed by the Songkhla Field Crop Research Center, Department of Agriculture, Ministry of Agriculture and Cooperatives. Its yield is higher than the local varieties and always used for intercropping in the young coconut, oil palm and rubber plantations (Paranee, Pengnoo, Suwanprasert, & Mana, 2007).

Nowadays, Bambara groundnut was planted in the Northeastern of Thailand for intercropping, due to its drought tolerance. Therefore, to promote the utilization of Bambara groundnut apart from traditional usage and to improve its economic value, it is important to modify Bambara groundnut flour to contain lower rapidly digestible starch for low glycemic index (GI) food.

Flour is an excellent source of protein, vitamins, fiber and complex carbohydrates. It is used as the basis ingredient for many cereal food products including bread, biscuits, pasta, pastries and cakes. As mentioned above, several studies have conducted on physicochemical properties of Bambara groundnut starch. There is no report on the modification of Bambara groundnut flour. To promote the application of Bambara groundnut flour for the low GI foods, the objective of this study is to investigate the hydrolysis of endogenous lipids of BG flour into fatty acids, then forming complex with amylose, to study factors affecting amylose-lipid complex formation, and study the properties of modified flour that increases in SDS and RS fraction.

1.2 Research objectives

The objectives of this research were:

1.2.1 To study the effect of hydrolyzed Bambara Groundnut oil on amylose-lipid complex formation of Bambara Groundnut flour.

1.2.2 To study the effect of lipid complexation on digestibility of Bambara groundnut flour

1.2.3 To investigate the physico-chemical properties of the modified Bambara groundnut flour.

1.3 Research hypothesis

Fatty acids derived from Bambara groundnut oil can form complexation with amylose. The content of fatty acids affects the complexation ability of Bambara groundnut flour. This complex can reduce the digestion of starch.

1.4 Scope on this study

This research investigates the effect of fatty acids from the Bambara groundnut flour on complexation with amylose. The modified Bambara groundnut were produced by complex formation between amylose and hydrolyzed endogenous lipids for Bambara groundnut flour and starch; Physical properties and digestibility is also investigated for the modified Bambara groundnut.

1.5 Expected results

Results from this research will lead to a better understanding on properties of modified Bambara groundnut flour by amylose complexation.

1.6 References

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