

Chapter 5

Conclusion

This project developed lime powder utilizing drying agent and the high shear homogenization to entrap bioactive compounds inside the particle in use for spray-drying technology.

5.1 Conclusion

The average amount of fresh lime juice per kilogram of lime was 582.6 mL or 0.5532 kg. Nutritional value of lime juice per 100 g was carbohydrate 10.5 g (sugar 1.7 grams + dietary fiber 2.8 g), fat 0.2 g, protein 0.7 g, vitamins (Thiamine, B1 0.03 mg (3%), Riboflavin, B2 0.02 mg (2%), Niacin, B3 0.2 mg (1%), Pantothenic acid, B5 0.217 mg (4%), vitamin B6 0.046 mg (4%), folate, B9 8 mg (2%), and vitamin C 29.1 mg (35%)), minerals and water (88.3 g). The total soluble solids (TSS) of lime juice was 8% Brix. A low pH of lime juice was 2.1, which referred to low acid juice inhibiting microbial growth.

The average particle size of the homogenized lime powder had lead to formation of smaller particles. The surface morphology between the powders with and without homogenization showed differences in shapes and size, which was smaller when applied homogenization than untreated powder. A reduced size of particles resulted in lower moisture content due to faster diffusion rates. Both lime powders had a whitish color, which homogenized lime powder was significantly lighter compared to that of non-homogenized powder. Low moisture content and high solubility percentage were observed in the homogenized powder, which referred to better powder quality during storage. The smaller particles also have contributed to increased solubility. In addition, the hygroscopicity showed similar trend for both powders with and without homogenization. The antioxidant activity derived from total phytochemical compounds in the powder samples had higher capacity when

powder was homogenized before spray drying which related to the contents of phytochemical compounds. Thus applying encapsulating agent combined with high shear homogenization was a promised procedure to improve phytochemical compounds loss against thermal degradation during spray drying processing.

5.2 Recommendation

The production of spray-dried lime powder utilizing a combination of maltodextrin/gum Arabic and homogenization was confirmed by preventing phytochemical compounds related to antioxidant potential from thermal degradation after spray drying. However, storage condition study should be performed to assess the use of this procedure towards the quality change of spray dried powder in the long term.