

*Short Communication*

## **Production of instant ‘nasi lemak’ flavour ingredient from palm olein**

(Penghasilan ramuan perisa segera nasi lemak daripada olein sawit)

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**Key words:** instant ‘nasi lemak’ flavour ingredient, palm olein, *Pandanus amaryllifolius* leaf

### **Abstrak**

Ramuan perisa segera nasi lemak telah disediakan melalui kaedah mikropengkapsulan olein sawit dan perisa daun pandan. Serbuk berperisa pandan ini diperoleh setelah dilakukan pengeringan secara semburan menggunakan bahan penyalut maltodekstrin (DE15) dan natrium kaseinat. Analisis menunjukkan serbuk ini mempunyai lembapan, kandungan minyak dan peratus minyak permukaan luaran masing-masing 2.17%, 68.1% dan 20.5%. Analisis kromatografi gas mendapati sebanyak 78.57% perisa pandan tersalut di dalam serbuk ramuan ini.

### **Abstract**

Instant ‘nasi lemak’ flavour ingredient was prepared by microencapsulation of palm olein and pandan leaf flavour. The pandan-flavoured encapsulated powder was obtained after spray drying using maltodextrin (DE15) and sodium caseinate as wall materials. Analysis of the encapsulated powder indicated that the moisture, oil and surface oil content were 2.17%, 68.1% and 20.5% respectively. Gas chromatographic analysis revealed that 78.57% pandan flavour was encapsulated in the powder.

### **Introduction**

‘Nasi lemak’ or rice cooked with coconut milk is a popular breakfast menu among Malaysian. It is traditionally prepared by cooking the rice with coconut milk (‘santan’) and pandan (*Pandanus amaryllifolius*) leaf. However, the traditional procedure is time consuming and always requires fresh ‘santan’ in order to avoid rancidity due to prolonged storage of coconut milk. The menu also requires fresh

pandan leaf to enhance the aroma/flavour of cooked rice. As the trend now is towards a more stable and convenient form of food product, the production of instant ‘nasi lemak’ flavour ingredient will provide a better alternative for preparing a ready to serve ‘nasi lemak’.

Spray-dryings of flavour constituents in vegetable oils have been extensively studied (Kim Ha and Reineccius 1988; Muhammad Nor 1992; Muhammad Nor 1993;

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Muhammad Nor and Noni Sohaila 2002). The technique can be applied to produce the encapsulated powder suitable for flavouring ice cream, yoghurt, soup and cakes. Thus, instant 'nasi lemak' flavour can be prepared by spray drying of palm olein and pandan flavour using maltodextrin and sodium caseinate as wall materials.

*Pandanus amaryllifolius* or pandan (Burkill 1966) is a popular scented plant which is used to flavour 'nasi lemak' (Muhammad Nor and Noni Sohaila 2002). The pandan-flavoured rice is said to have similar characteristics to Basmati rice (Buttery et al. 1983). In order to make the cooking easy, this article will highlight the production of an instant 'nasi lemak' ingredient from palm olein.

## Materials and methods

### Material

RBD palm olein was obtained from local supermarket; maltodextrin DE15 from Goodman, NSW, Australia; sodium caseinate from Ajax Chemical, Australia. *Pandanus amaryllifolius* leaves were collected from UKM-MPOB Research Station, Bangi, Selangor.

### Production of instant 'nasi lemak' flavour ingredient

Spray drying technique was applied to produce dry ingredient. An emulsion (~40% solid) containing 387.5 g/kg palm olein was emulsified into the wall materials of maltodextrin and sodium caseinate, in the ratio 85:15, according to Noor Lida et al. (1996). *Pandanus amaryllifolius* leaves (100 g) were chopped and blended with distilled water (250 mL) in a high speed blender. The water extract containing pandan flavour was then filtered through a Buchner funnel. The pandan flavour extract and the wall materials (i.e. maltodextrin and sodium caseinate) were emulsified to a coarse emulsion using a laboratory mixer-emulsifier (Silverson L2R, UK) followed by homogenisation using a single stage homogenizer (Armfield FT9-A, UK). The

emulsion was spray dried using a spray dryer (Lab Plant SD-04, Huddersfield, UK) with inlet and outlet temperatures of 170 °C and 90 °C respectively. The encapsulated powder containing *P. amaryllifolius* flavour was collected at the bottom of the cyclone.

### Analysis of encapsulated powder

**Moisture determination** The moisture content was determined using the method previously reported (AACC 1983). Five grammes of the encapsulated powder was dried at 105 °C ( $\pm 2$  °C) for 24 h in an oven.

**Oil content measurement** Oil content was determined by using the reported method (AOCS 1987). Five grammes of the encapsulated powder was analysed to determine the oil content by soxhlett extraction. Petroleum ether was used as solvent and the sample was extracted for 24 h. The solvent extract was dehydrated over anhydrous sodium sulphate and then was distilled off using a rotary evaporator at 40 °C under vacuum.

**Surface oil determination** Surface oil content was determined according to methods previously reported (Sankarikutty et al. 1988; Noor Lida et al. 1996; Zaida et al. 1997). Five grammes of the encapsulated powder was stirred for 10 min with petroleum ether and the residue was dried in an oven. The surface oil content was measured on the weight difference of the powder before and after washing with the solvent.

### Fatty acid composition and flavour

**analysis** One gramme of the encapsulated powder was extracted with hexane (100 mL) for 6 h using a soxhlet extractor. The solvent containing palm olein and pandan flavour was esterified using methanolic sodium hydroxide and catalytic amount of boron trifluoride (PORIM Test Method 1995). The mixture was heated (40 °C) for 1 min and the hexane layer was separated. The solvent was dehydrated over anhydrous sodium

sulphate and concentrated *in vacuo* using a rotary evaporator. The concentrate was kept in an airtight vial prior to gas chromatographic (GC) analysis.

Alternatively, the pandan flavour in the emulsions was also analysed. Ten grammes of emulsions were extracted with three portions of 100 mL hexane. The hexane layer was esterified according to the above procedure.

The solvent containing esterified palm olein and flavour constituents was dehydrated over anhydrous sodium sulphate and concentrated *in vacuo*. The concentrate was kept in an airtight vial prior to GC analysis. For GC analysis, 1 µL hexane concentrate containing esterified palm olein and *P. amaryllifolius* flavours was injected into HP5890 GC (Hewlett-Packard, USA) equipped with a fused-silica capillary column (DB-1, J & W, USA; 60 m x 0.25 mm x 0.25 µm) and FID detector. Carrier gas He at a flowrate of 0.5 mL/min was used. Injector and detector temperatures were 220 °C and 250 °C respectively. Oven temperature was programmed from 70–220 °C at 4 °C/min. The amount of flavour component was calculated according to reported method (Muhammad Nor and Noni Sohaila 2002)

## Results and discussion

Preparation of an instant ‘nasi lemak’ flavour ingredient was carried out according to formulation as follows:

<b>Ingredient</b>	<b>g/kg</b>
Palm olein	387.5
Maltodextrin, DE15	510.0
Sodium caseinate	90.0
Pandan extract	12.5

Moisture content of the ingredient was 2.17% and slightly higher than the moisture content in an ordinary palm-based powder (1.63%) (Zaida et al. 1997). Higher moisture is good for inhibiting fat oxidation in the powder (Sims 1989; Noor Lida et al. 1996).

The encapsulated powder also showed higher oil (68.10%) and surface oil contents (20.50%) comparable to the ordinary palm-based powder (oil content: 61.18%; surface oil content: 25.37%). This is in agreement with the previous report (Zaida et al. 1997) which stated that the higher the oil content the more surface oil content of the encapsulated powder.

The encapsulated powder contained high amount of palmitic acid (42.5%) and oleic acid (40.7%) but low in stearic acid (4.4%) and linoleic acid (10.2%). The balanced composition between saturated and unsaturated fatty acids has made this powder more nutritious than the commercial product which was high in saturated fatty acids (lauric 48.7%, myristic 17.7% and palmitic 7.7%) (Zaida et al. 1997).

Gas chromatographic analysis (Figure 1) showed that 78.57% of the total natural pandan flavour had been retained in the powder (Table 1). Kim Ha and Reineccius (1988) also obtained a similar

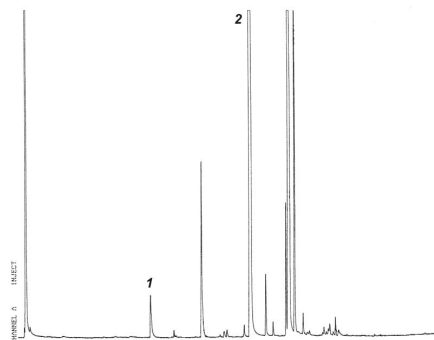


Figure 1. Gas chromatographic analysis of pandan flavour in the emulsion; (peak 1) 2-acetyl-1-pyrroline (peak 2) methyl palmitate

Table 1. GC peak area ratios of 2-acetyl-1-pyrroline to methyl palmitate

	Emulsion	Microcapsule
$A_f / A_p$	0.0434	0.0341

$A_f / A_p$  = Peak area of 2-acetyl-1-pyrroline / Peak area of methyl palmitate  
 % flavour encapsulated =  $(0.0341/0.0434) \times 100\%$   
 = 78.57%

result when using vegetable oil to encapsulate artificial flavours. The incomplete encapsulation of flavour constituent might be due to the difference in the ratio of maltodextrin and sodium caseinate which, according to Noor Lida et al. (1996); the optimum ratio of the wall materials should be 80:20.

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### References

- AACC (1983). *Approved Methods of the American Association of Cereal Chemists*, AACC, St Paul, MN, USA. Method 44–15A
- AOCS (1987). *Official Methods and Recommended Practices of the American Oil Chemists' Society*, 3rd ed., vol 1, (Walker, R.C., ed.), AOCS, Champaign, IL Method Ab 3–49
- Burkill, I.H. (1966). *A Dictionary of the Economic Products of the Malay Peninsular* Vol II. 2244 p. Kuala Lumpur: Ministry of Agriculture and Co-operative
- Buttery, R.G., Juliano, B.O. and Ling, L.C. (1983). Identification of rice aroma compound 2-acetyl-1-pyrroline in pandan leaves. *Chem. Ind.*: 478
- Kim Ha, J.K. and Reineccius, G.A. (1988). Spray drying of food flavors-IV. The influence of flavor solvent on retention of volatile flavors. *Perf. & Flav.* **13**: 1–4
- Muhammad Nor, O. 1992. Characterization and microencapsulation of *Citrus hystrix* flavour. (ADB Attachment Report submitted to the University of Ghent, Belgium)
- (1993). Utilization of palm oil in flavour encapsulation by spray drying. Paper presented at IFEAT International Conference on Essential Oils, Fragrances and Flavours, 31 Oct.–4 Nov 1993, Kuala Lumpur, Malaysia. Organizer: EFFA Malaysia and IFEAT
- Muhammad Nor, O. and Noni Sohaila, I. (2002). Utilization of palm olein in microencapsulation of *Pandanus amaryllifolius* flavour. *Pertanika J. Trop. Agric. Sci.* (In print)
- Noor Lida Habi, M.D., Nor'aini, S. and Mohd. Suria Affandi, Y. (1996). Characteristic of microencapsulated palm-based oil as affected by type of wall materials. *J. Sci. Food Agric.* **70**: 422–426
- PORIM Test Method (1995). *Methods of Tests for Palm Oil and Palm Oil Products*, PORIM, Bangi, Malaysia, Method PORIM p. 3.4
- Sankarikutty, B., Sreekumar, M.M., Narayan, C.S. and Mathew, A.G. (1988). Studies on microencapsulation of cardamon oil by spray drying technique. *J. Food Sci. Technol.* **25**: 353–5
- Sims, R. J. (1989). Spray dried emulsion. *Develop Food Sci.* **19**: 495–509
- Zaida, Z., Mohd. Suria Affandi, Y., Noor Lida Habi, M.D. and Muhammad Nor, O. (1997). Formulated Palm Oil-based 'Santan' Powder. *Proc. 1997 PORIM Technology Transfer Seminar*. TT No.45A. p. 9–19. Bandar Baru Bangi: PORIM