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AGRICULTURE • INNOVATION • LIFE

## **PROGRESS REPORT**

### **Analysis of *Monopterus albus* pure powder**

for

**Pelasari Aquamarine Sdn. Bhd.**

Date : 28<sup>th</sup> April 2021

# PRESENTATION OUTLINE



SCOPE OF ANALYSIS

RESULTS & DISCUSSION

CONCLUSION

# Scope of Analysis

The *Monopterus albus* pure powder sample was analyzed for:

1. Proximate composition

- total ash
- moisture
- total fat,
- protein
- carbohydrate
- energy

To determine the nutritional values and quality of the *Monopterus albus* pure powder as these may have changed throughout the processing of the raw fish into the powder.

2. Vitamin C

3. Vitamin E

4. Fatty acid

- Saturated fat
- Monounsaturated fat
- Polyunsaturated fat

To determine the vitamins and fatty acid values in the *Monopterus albus* pure powder

# Analysis results – Proximate composition

- As *Monopterus albus* is processed into powder, the **moisture is lost >70%** and therefore, it becomes concentrated and it is evident that the **extracted pure powder is rich with protein and high in energy** (WHO recommends approximately 84-119 grams for active men and 66-94 grams for active women daily)
- The **total fat is low** and the pure powder can be classified as low-fat food as the raw fish itself contains low fat.
- The **moisture content of the powder is low**. Yet, in order to guarantee the safety of powder from the microbial growth, it is recommended that **the moisture content and water activity of the powder is further reduced below 10% and 0.60–0.65**.

Parameter, Unit	Pure powder	Body	Waste (head+tail)
Protein, g/100g	76.5	18.2	18.3
Total fat, g/100g	2.3	0.3	0.2
Moisture, g/100g	12.2	78.1	75.6
Ash, g/100g	9.0	2.8	4.5
Energy, kcal/100g	327 (1368 kJ)	78 (328 kJ)	81 (340 kJ)
Total carbohydrate, g/100g	0.0	0.6	1.4

# Analysis results – Vitamin C and E

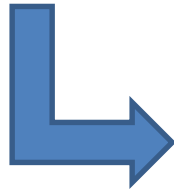
- The pure powder **has low Vitamin C contents** since the raw *Monopterus albus* itself contains low Vitamin C (Wijayanti & Susilo, 2017).
- Although both capsule and juice samples showed high Vitamin C contents, they are known to contain other ingredients such as *Cantella asiatica* (pennywort), *Labisia pumila* (*Kacip Fatimah*) and *Hibiscus sabdariffa* (Roselle) which are rich in Vitamin C.
- On the other hand, the pure powder **shows high Vitamin E content** since the *Monopterus albus* itself was reported as one of aquatic biotas that is rich in Vitamin E (Wijayanti & Susilo, 2017).
- This shows the potential for the pure powder to be **a reliable ingredient source of Vitamin E that act as an antioxidant** to scavenge “free radicals” that can damage cells.

Types of vitamins	Pure powder	Juice	Capsule
Vitamin C (mg/100g)	0.09	6.40	9.84
Vitamin E (mg/100g)	5.74	0.014	0.17

# Analysis results – Fatty acids profiling

- The total content of fatty acid in the *Monopterus albus* pure powder when measured using high-performance liquid chromatography (HPLC) technique was found to be **3.11g/100g** sample → **The low total fat** content is advantageous as the general recommendation total fat intake is about 55-77g/day which is normally can be fulfilled by our daily diet.
- This total fat content is composed
  - **saturated fat : 44.02% or 1369 mg/100g** → Consumption should be minimize, yet this amount is still considered low
  - **monounsaturated fat : 38.65% or 1201 mg/100g**
  - **polyunsaturated fat :17.33%: or 539 mg/100g**

} Healthy fat



Essential fat i.e. omega-3 and omega-6 that cannot be produced by our body

# Analysis results – Fatty acids (saturated)

Fatty acid methyl ester	Percentage in fat (%)		
	Pure powder (in 3.11g)	Juice (in 0.18 g)	Capsule (in 1.76g)
<b>SATURATED FAT</b>			
Butyric	0.05	0.00	0.00
Caproic	0.04	0.27	0.00
Caprylic	0.06	3.69	0.06
Capric	0.09	3.11	0.06
Undecanoic	0.02	0.05	0.00
Lauric	0.06	38.16	0.88
Tridecanoic	0.09	0.06	0.05
Myristic	1.94	12.15	1.52
Pentadecanoic	1.13	0.12	0.77
<b>Palmitic</b>	<b>24.58</b>	11.85	22.36
Heptadecanoic	1.52	0.15	1.16
<b>Stearic</b>	<b>9.14</b>	22.43	9.04
Arachidic	0.32	0.20	0.38
Henicosanoic	0.18	0.13	0.27
Behenic	0.68	0.00	0.00
Tricosanoic	3.57	0.37	4.79
Lignoceric	0.00	0.43	0.36
<b>Total</b>	<b>38.65</b>	<b>93.13</b>	<b>41.69</b>

- **Palmitic acid (24.58%) and stearic acid (9.14%) are the dominant saturated fatty acid** in the powder
- The consumption of **palmitic should be minimized** since it is usually associated with the risk of **cardiovascular disease.**
- **Stearic acid is considered a healthy saturated fat** and does not raise the risk of heart disease and can be converted to healthy fat in our body.
- Although the percentage of palmitic and stearic acid are high in its total fat, **the actual values of 765 mg/100g and 284 mg/100g respectively are still low when compared to other fatty food.**

# Analysis results – Fatty acids (monounsaturated)

- **Oleic acid (27.55%)** is the dominant monounsaturated fatty acid in the *Monopterus albus* powder. With the actual value of 857 mg/100g, this amount is considered moderate when compared to other oleic-rich food.
- It is known to **reduce bad cholesterol** and therefore, provides **protection against heart disease and blood-pressure**.
- Other health benefits: antioxidants , help in fighting Alzheimer disease, reduce Type 2 diabetes risk, treat rheumatoid arthritis and has antibacterial properties.

Fatty acid methyl ester	Percentage in fat (%)		
	Pure powder (in 3.11g)	Juice (in 0.18 g)	Capsule (in 1.76g)
<b>MONOUNSATURATED FAT</b>			
Myristoleic	0.04	0.06	0.81
Cis-10-Pentadecanoic	1.12	0.10	0.87
Palmitoleic	4.04	0.62	2.48
Cis-10-Heptadecanoic	0.81	0.00	0.75
<b>Oleic</b>	<b>27.55</b>	3.52	27.13
Cis-11-Eicosenoic	3.62	0.00	2.82
Erucic	0.69	0.00	0.00
Nervonic	0.78	0.00	0.00
<b>Total</b>	<b>38.65</b>	<b>4.29</b>	<b>34.85</b>



# Analysis results – Fatty acids (polyunsaturated)

- Both omega-3 and omega 6 fatty acids were found in the powder and their total amount in the powder is about 539 mg/100g which is considered moderate
- A balance intake of omega-3 and omega 6 fatty acids provides protection against fatal heart disease and other coronary events.

Fatty acid methyl ester	Percentage in fat (%)			
	Pure powder (in 3.11g)	Juice (in 0.18 g)	Capsule (in 1.76g)	
<b>POLYUNSATURATED FAT (Omega-3 and Omega-6 fatty acids)</b>				
Linoleic (Cis)	9.34	1.53	11.75	} Omega-6
γ-Linoleic (GLA)	0.57	0.00	0.72	
Arachidonic (AA)	0.36	0.00	0.25	
Cis-11,14-Eicosadienoic	0.76	0.00	0.93	
α-Linoleic (ALA)	0.91	0.62	1.13	} Omega-3
Cis-8,11,14- Eicosatrienoic	1.03	0.00	1.06	
Cis-8,11,17- Eicosatrienoic	2.29	0.27	4.82	
Cis-5,8,11,14,17- Eicosapentaenoic (EPA)	0.41	0.17	0.51	
Cis-13,16-Docosahexaenoic (DHA)	0.00	0.00	0.00	
Cis-4,7,10,13,16,19-Docosahexaenoic (DHA)	1.67	0.00	2.33	
<b>Total</b>	<b>17.33</b>	<b>2.59</b>	<b>23.48</b>	

# Conclusion

- The results show that the *Monopterus albus* pure powder is a **rich source of protein** with the main health function to build and repair tissues, including muscles, bones, and skin as well as to restore energy when digested.
- The powder was also found to contain **high amount of Vitamin E** with the primary role is to act as an antioxidant and scavenge loose electron or so-called “free radicals” that can damage cells.
- The powder has **low fat content** which is advantageous for a well-balanced diet with low fat amount and **provides healthy fat such as monounsaturated and polyunsaturated fat**. In this study, the powders was found to have high amount **of oleic acid (monounsaturated) and total omega-3 and omega-6 acid (polyunsaturated)**.
- **The processing of the powder can be improved in order to achieve lower moisture content and water activity as to provide more stability to the powder. Improvement of processes may also give additional nutritional values for the vitamin E, protein and healthy fats.**



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