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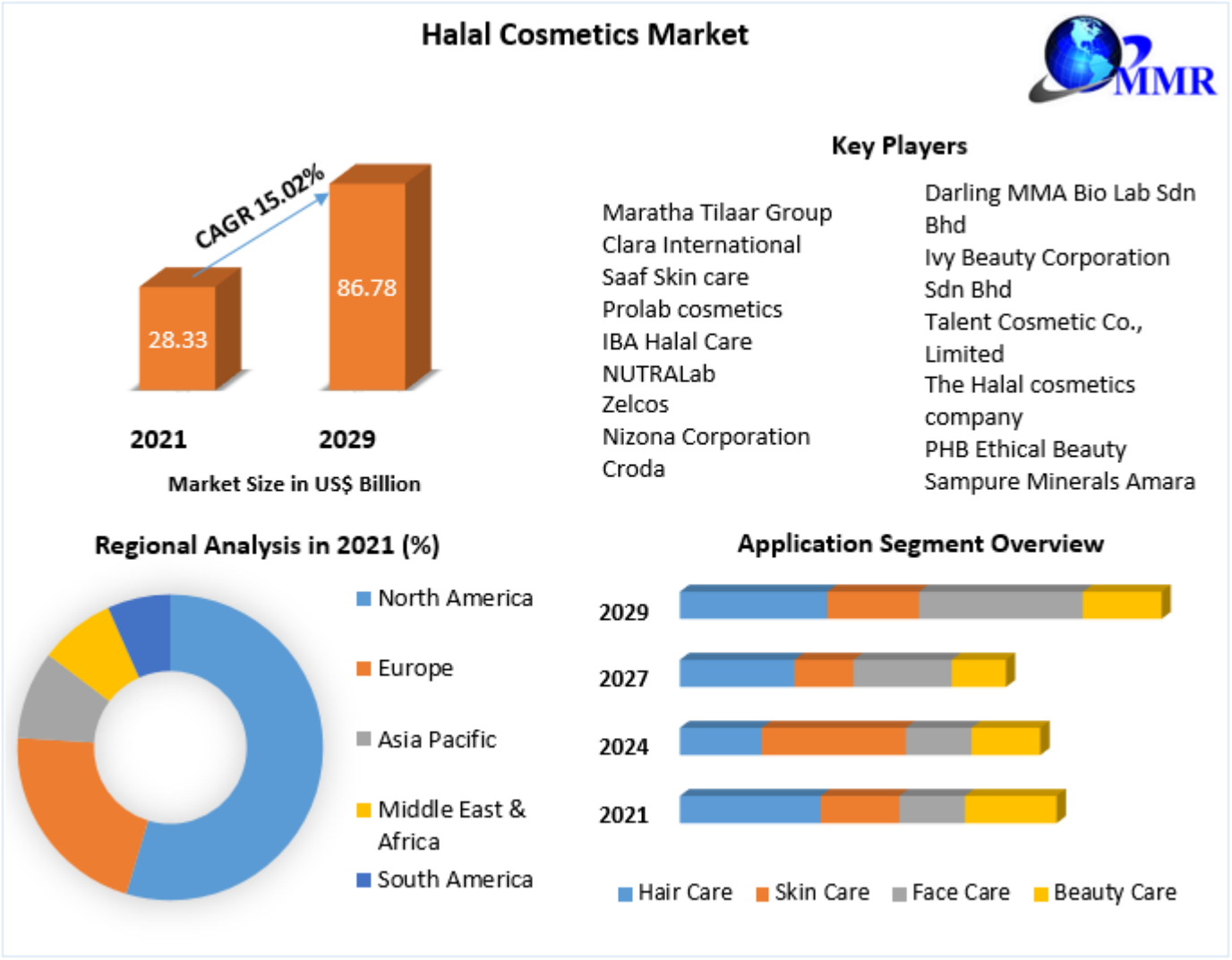
Exploring Halal Cosmetics: *Morus Nigra* As An Alternative To Halal Coloring In Lipstick And Antimicrobial Cream Formulations

Halal Cosmetic

- Halal cosmetics refer to personal care products that meet the dietary and lifestyle standards of Muslims, adhering to the principles of Shariah law. These products do not contain any animal-derived ingredients, alcohol, or other non-halal substances.
- The halal cosmetics industry in is experiencing significant growth, supported by robust certification standards and increasing consumer demand.
- The global halal cosmetics market was valued at USD 47.76 billion in 2024 and is projected to reach USD 115.03 billion by 2032.



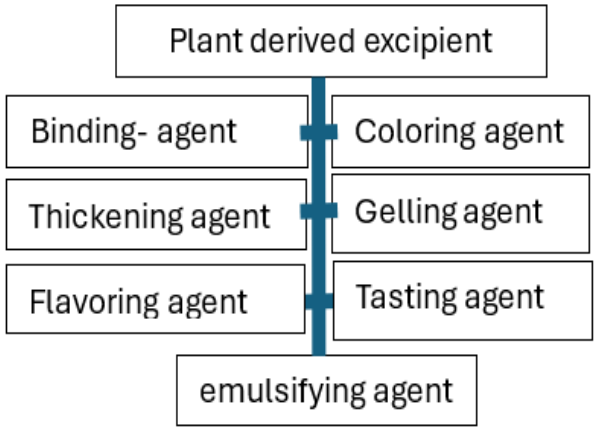
Halal Cosmetic

- This expansion reflects increasing demand for halal-certified products worldwide, driven by a growing Muslim population and heightened awareness of ethical and sustainable consumer goods.
- In Malaysia, **JAKIM** is the authority responsible for halal certification**.**
  - **Manual Procedure for Malaysia Halal Certification (MPPHM) 2020** & **Malaysian Standard MS 2634:2019 (Halal Cosmetics)**.

Halal Coloring

- Halal colouring agents are pigments or dyes used in cosmetic products that are **free from non-halal sources** and are **processed according to Islamic guidelines**.

- Beyond halal compliance, plant-based excipients are gaining popularity in the cosmetic industry as natural, green, safer and sustainable alternatives to traditional excipients.



Halal-Certified Pigments and Dyes		
Ingredient	**Sources**	**Uses**
Synthetic Organic Dyes	These lab-produced pigments are free from non-Halal sources like insects. e.g Azo Dyes, Anthraquinone Dyes, Xanthene Dyes	colorants are used in a variety of cosmetic products, such as makeup, skincare, and hair care.
Mineral-Based Colorants	Examples include iron oxides and titanium dioxide, which are naturally Halal and safe for use. e.g Iron Oxides, Titanium Dioxide, Zinc Oxide, Mica	colorants commonly used in foundations, blushes, eyeshadows, sunscreen and lipsticks.
Plant-Based Extracts	Such as Henna, beetroot, Hibiscus Extract, spirulina provide natural and Halal alternatives for coloring.	Used in eyeshadows, blushes, and foundations, not only as coloring agent but offers benefits such as anti-inflammatory and antioxidant, moisturizing properties, antibacterial.

Morus nigra

- mulberry (Morus spp., Moraceae family)
- black mulberry (*M. nigra* L.)
- Its color comes from its high content of anthocyanins, which are natural pigments found the dark fruits.
- useful as both a natural coloring agent and a bioactive compound in cosmetics as skin brightening and UV protection
- Health benefits such as anti-inflammatory, antimicrobial, anti-melanogenic, antidiabetic, anti-obesity, anti-hyperlipidemic, and anticancer activities.

(Lim and Choi, 2019)

Objectives

- To extract and formulate halal lipstick and cream containing *M nigra*
- To evaluate characteristics of halal formulated lipstick and cream
- To evaluate the antioxidant, antimicrobial and UV protective effect of halal formulated lipstick and cream

Methodology

Halal cert, INCI, CoA, MSDS

Organoleptic Characteristics, DPPH, FRAP, disk diffusion test

Identification and purchase of halal ingredients from halal supplier company,

Preparation of *Morus Nigra* Fruit

Extraction of *Morus Nigra* fruits using maceration process

Formulation of lipstick and cream

Evaluation of physical properties, antioxidant, antimicrobial activity

	General formula	Cream with Morus nigra extract (5%)	Cream with Morus nigra extract (10%)	Cream with Morus nigra extract (15%)	Cream without Morus nigra extract (Blank cream)
Components	% w/w		Amount (g)		
Oily phase (A):					
Stearic acid	2.5	1.000	1.000	1.000	1.000
White beeswax	1.5	0.600	0.600	0.600	0.600
Stearyl alcohol	5.0	2.000	2.000	2.000	2.000
Cetyl alcohol	6.5	2.600	2.600	2.600	2.600
Mineral oil	5.0	2.000	2.000	2.000	2.000
Aqueous phase (B):					
Propylene glycol	5.0	2.000	2.000	2.000	2.000
Triethanolamine	2.0	0.800	0.800	0.800	0.800
Methyl paraben	0.01	0.004	0.004	0.004	0.004
Propyl paraben	0.04	0.016	0.016	0.016	0.016
Morus nigra extract	5.0	2.0	4.0	6.0	0.0
Water	Up to 100%	26.98	24.98	22.98	28.98

Ingredients	Quantity (%w/w)	Importance of Ingredients
White beeswax	25	Waxes, provide hardness, creaminess, glossiness, and lubrication
White soft paraffin	44	
Olive oil	25	Blending agent, alter the rheological properties of lipstick
Glycerin	5	Surfactant, stabilize dispersion of insoluble pigments in lipstick
Methylparaben	0.5	Preservative
Propylparaben	0.5	Preservative

Formulation of Cream and Lipstick

Table 2.2 Function of Oily Phase Components

Oily Phase:		
Components	Physical Description	Function
Stearic acid	White, waxy, flaky crystals, white hard masses or white or yellowish-white powder.	Excipient, emulsifying agent, and solubilizing agent.
White beeswax	White, yellowish-white pieces or plates, translucent when thin, with a fine-grained, matte, and non-crystalline fracture; when warm in the hand they become soft and malleable. It is tasteless and does not stick to the teeth.	Excipient, controlled-release vehicle, stabilizing agent and stiffening agent.
Stearyl alcohol	White, unctuous flakes, granules, or mass.	Excipient and stiffening agent.
Cetyl alcohol	White, unctuous mass, powder, flakes, or granules.	Excipient, coating agent, emulsifying agent, and stiffening agent.
Mineral oil	Colourless, transparent, oily liquid, free from fluorescence in daylight. It is practically tasteless and odourless.	Excipient, emollient, lubricant, oleaginous vehicle, and solvent.

Table 2.3 Function of Aqueous Phase Components

Aqueous Phase:		
Components	Physical Description	Function
Propylene glycol	A viscous, clear, colourless, hygroscopic liquid, miscible with water and with ethanol (96 per cent).	Excipient, humectants, solvent, stabilizer for vitamins and water-miscible co-solvent.
Triethanolamine	Clear, viscous, colourless or slightly yellow liquid, very hygroscopic.	Alkalizing agent and emulsifying agent.
Methyl paraben	Colourless crystals or white crystalline powder. It is odourless and has a slight burning taste.	Antimicrobial preservatives.
Propyl paraben	White crystals powder. It is odourless and tasteless.	Antimicrobial preservatives.
Morus nigra extract	Dark and deep purple, sticky liquid. It has a fruity and berry-like smell.	Active ingredient.
Water	Clear and colourless liquid.	Solvent.

Result & Discussion

	Weight (g)	Yield Percentage (%)
Morus nigra Extract	93.47	48.52

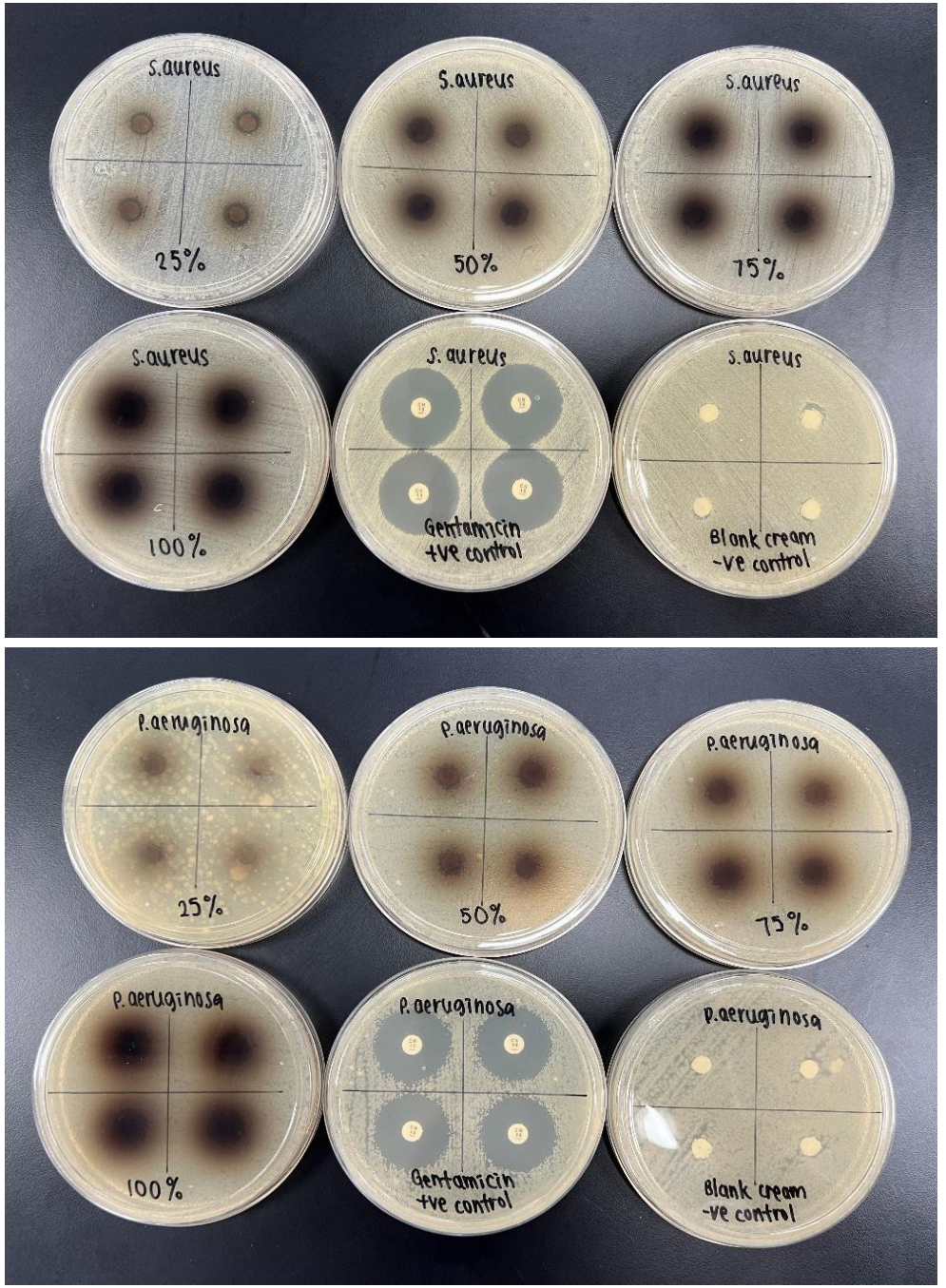
- Study reported that *Morus nigra* contain 1.4–704 mg of anthocyanins per 100 grams. Anthocyanins also provide strong antioxidant activity and are considered safer alternatives to synthetic dyes in food, cosmetics, and pharmaceuticals.
- 80% methanol gave the highest extract yield during extraction due to solubility of active ingredients, which have polar character.
- methanol can be used as a **halal solvent** in extraction, need to fully removed during processing and not derived from fermentation.

Physical Appearance of Cream Formulations of oil in water (O/W) emulsion with Different amount of *Morus nigra* Extract

Formulations	Colour	Odour	Texture	Phase separation	Hom	Immediate skin
Blank cream	White	Odourless	Smooth	No	H	
Cream with 2 g *Morus nigra* extract	Light mulberry purple	Slightly berry smell	Smooth	No	H	
Cream with 4 g *Morus nigra* extract	Mulberry purple	Mild berry smell	Smooth	No	H	
Cream with 6 g *Morus nigra* extract	Dark mulberry purple	Fruity berry smell	Smooth	No	Homogenous	Moisturising, no grittiness, light, not greasy

A study conducted by Aswal et al. (2013) on polyherbal cosmetic cream indicated that a stable formulation has almost constant pH, homogenous, emollient, non-greasy and easily removed after application.

Formulations	Zone of Inhibition (mm) (mean ± SD)
Blank cream	0[b, c, d, e, f]
25% *M nigra* extract	6.55±0.06[a, c, d, e, f]
50% *M nigra* extract	7.18±0.10[a, b, d, e, f]
75% *M nigra* extract	9.35±0.06[a, b, c, e, f]
100% *M nigra* extract	10.73±0.10[a, b, c, d, f]
Gentamicin 10 µg	28.78±0.05[a, b, c, d, e]

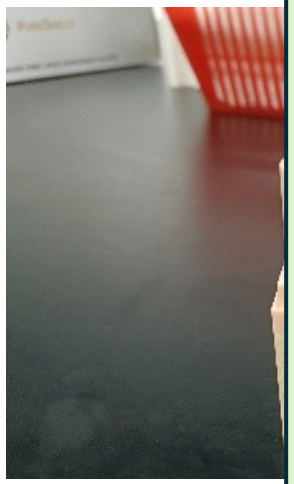


Disk Diffusion Test for Different Concentrations of *Morus nigra* Extract against *Staphylococcus aureus (A), Pseudomoas aeruginosa (B)*

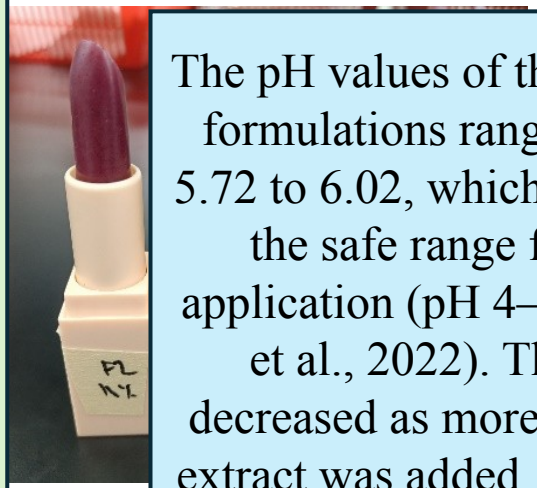
M nigra extract possessed antimicrobial activity against *S. aureus*, but there was no activity recorded against *P. aeruginosa*.

This may due to different variations in the performance of the tests, such as different sizes of bacterial inoculum, volume, and type of agar, well size, disc size, incubation period and type of extraction Melo et al., (2022).

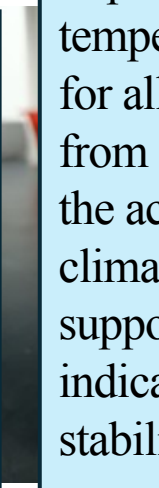
	Formula	Weight (g)	Base Weight (g)	Total Weight (g)
F1	*M.nigra* 5%	2	38	40
F2	*M.nigra* 10%	4	36	
F3	*M.nigra* 15%	6	34	



No physical changes at room temperature was observed in all formulation after 30 days. The colour and odour of all formulations remained purplish red and emitted a fruity smell, consistent with Susmiatun et al. (2018), indicating good product durability.



The pH values of the lipstick formulations ranged from 5.72 to 6.02, which is within the safe range for lip application (pH 4–7) (Saeid et al., 2022). The pH decreased as more *M nigra* extract was added, due to its acidic nature, as supported by Okatan et al. (2016)



Spreadability remained good at room te impaired temperatu for all for from 52.3 the accep climates (supported indicating stability.

The higher amount of extract, reduced the hardness of the lipstick. According to Chee et al., (2018), a higher percentage of base content results in a harder lipstick with a greater breaking point.

Figure 3.1(a) Fo **3.1(b)** Fo **1(c)** Form

Formulation	Colour	Odour		y	Melting point	Breaking point
F1	Light purplish red	Fruity	6.02	Smooth uniformity	57.9	133.33
F2	Purplish red	Fruity	5.77	Smooth uniformity	56.3	86.67
F3	Dark purplish red	Fruity	5.72	Smooth uniformity	54.9	70

Lipsticks	SPF Test (UV Protection)	FRAP Value (Mmol Fe(ii)/G)	DPPH (%)
Formula 1	32.22%	0.282	10.56
Formula 2	35.38%	0.322	11.40
Formula 3	37.07%	0.379	12.38

Nareswari et. al. (2019) uses crude palm oil as an active ingredient to produce natural lip balm with 5 formulations (15, 12.5, 10, 7.5, 5 % b/b). The study found that the higher active ingredients are used, the higher the percentage of UV protection produced.

The results indicated a dose-dependent relationship, where increasing extract concentration led to higher antioxidant effects. These findings align with research conducted by Pamungkas et al., (2013), which also demonstrated a similar pattern in lipstick formulated with 8g of mangosteen rind extract had the highest antioxidant activity compared to lower concentration of extract.

Conclusion

- This study successfully formulated two halal-compliant cosmetic products, lipstick and cream using *M nigra* fruit extract that demonstrated desirable physical and functional properties.
- The use of *M nigra* addresses the need for halal-certified natural colorants in cosmetics.
- Its incorporation into lipstick not only meets aesthetic needs but also fulfills halal requirements for safe, clean, and ethical product development.
- Thus, *M nigra* presents a promising multifunctional ingredient offering natural colour, antioxidant and antimicrobial benefits, and compliance with halal cosmetic standards aligning with growing consumer demand for Shariah-compliant, plant-derived cosmetic ingredients.

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