

Tajul Muluk: A Traditional Malay Text of Ethnobotany and Ethnomedicine

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ABSTRACT

Ethnobotanical and ethnomedical knowledge of the Malays could be known either through oral sources or documented sources. The traditional sources of Malay medicine are useful for traditional and modern pharmaceuticals development in Malaysia and for conservation of biodiversity. This study aims to extract and categorise the ethnobotanical and ethnomedical contents documented in the medical chapter of *Tajul Muluk*, in the Malay ancient text. Transliteration and data extraction were carried out in order to identify and classify the information in the text. The manuscript has 292 medical interventions for 56 different diseases such as cough, fever, and mental health issues. There are descriptions available for different medical formulations using 209 plant-based materials, 12 animal-based materials and 40 other types. Many of the name and use of the materials are now rare or not well-known in modern today's society. Medical descriptions listed in *Tajul Muluk* will be a documented proof of herbs used by local Malay population utilised as ethnobotanical and ethnomedical resources. Hence retrieving useful ancient documental knowledge should be explored in finding useful cures and alternatives therapeutics for various diseases.

Keywords: Ethnobotany, ethnomedicine, Malay, traditional medicine, *Tajul Muluk*

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INTRODUCTION

The term Malay medicine refers to comprehensive knowledge that covers all the theoretical, philosophical and practical aspects of how the Malays manage their health and illness. This scientific knowledge has been passed down verbally or practically from teachers or senior family members to apprentices and the next generation (Mohd Maidin, 2020). Malay medical knowledge has also been published and documented from time to time in the form of manuscripts on paper, wood or even palm leaves. In these manuscripts, Malay physicians have documented various ways of curing and healing diseases. Predominantly, correction to the diseased state was achieved using ethnobotanical and ethnomedical knowledge. Natural ingredients include mainly plants, animal parts, and minerals that are believed to be effective based on observations and experiences. Method of preparation, scales and measurements, time references and method of applications are also listed in these manuscripts, serving as evidence of the wisdom and scientific practices of ancient Malay medical

practitioners in their methods and treatments (Mat Piah, 2019).

Traditional medical texts may serve as valuable references in research into natural resources for pharmaceutical development. This role is not restricted to guide in selecting herbal plants for prospective screening only, but also in determining the extraction methods, applications, and formulations to be used (Nik Musa'adah *et al.*, 2020). Youyou Tu, a Nobel Prize winner in Medicine in 2015 for her remarkable discovery of artemisinin as an antimalarial drug, is a great example of an achievement based on the exploration of documentation of important herbal formulations used in ancient times. This therapeutic compound was isolated from *Artemisia* spp. which is a Chinese herbal formulation to treat malarial symptoms and was mentioned in Ge Hong's manuscript entitled *Zhou Hou Bei Ji Fang*, "A Handbook of Prescriptions for Emergencies" written around 284 – 346 CE (Tu, 2011). Several ancient records may be of high applied value due to a recent shift in paradigm in which modern and traditional medicine

knowledge work hand-in-hand in an integrative approach to solve several unresolved medical problems (WHO, 2013).

Of the several hundred documents and texts available containing Malay medicine, one text, *Tajul Muluk* is of particular interest. *Tajul Muluk* is actually a compilation of herbal formulations on various subjects in one volume. *Tajul Muluk* was assembled by Shaykh Isma'il al-'Asyi, an Achehnese scholar of high repute. It was published as a lithographic print by Mathba'ah al-Miriyah al-Ka'inah, Mecca in 1311H/1893AD. The print edition of *Tajul Muluk* predates two other early printed Malay medical texts, *Rumah Ubat di Pulau Penyengat* (Mohd Shafri, 2018) and *Tayyib al-Ihsan* (Mohd Shafri, 2017). *Tajul Muluk* remains popular today, as evidenced by the continued availability in Southern Thailand, the Malay Peninsula, Sumatera, Java, Kalimantan and the Philippines (Jumala, 2019). This text is not to be confused with *Hikayat Tajul Muluk*, a literary text from Aceh (Harun, 1982), or *Fal Tajul Muluk* by Ali Zulfakar, a text on divination, or *Ikhtisar Tajul Muluk*, a modern text with some entries on medicine.

Ethnobotanical and Ethnomedical Importance of *Tajul Muluk*

Several works in relation to the medical part of *Tajul Muluk* have been published by Awang (2006), Wardani (2010) and Mat Piah (2015). Wardani (2010) and Mat Piah (2015) discussed a very limited explanation on the medical content of *Tajul Muluk*, providing only a cursory and partial listing of the types of disease and materials used. Awang (2006) covered most of the contents of *Tajul Muluk* but there was no full description of the contents. Our study made full use of the available materials on Malay medical manuscripts or *Kitab Tib* which had surfaced in recent years, in particular the manuscript *Ramuan Obat*, which is available online (<https://eap.bl.uk/archive-file/EAP153-9-4>) and has been previously studied (Mohd Shafri, 2021a). The evaluation of *Ramuan Obat*'s content shows that it is not simply similar to *Tajul Muluk*, but also a clearer version of *Tajul Muluk*. Thus, we can say with certainty that the printed version of *Tajul Muluk* contains a lot of printing errors that requires careful reading be performed to verify its content. *Ramuan Obat* shed more light on the correct reading of *Tajul*

Muluk and possible printing errors. Other formulations in *Tajul Muluk* have also been found to be identical to individual formulation in texts like MSS2515 (Mat Piah & Baba, 2014), which again enables verification of content to be carried out. In this paper, we present the list of ethnobotany and ethnomedical *materia medica* in *Tajul Muluk* accompanied by their identified scientific names. We also include a list of ethnobotanical materials which remain unidentifiable due to printing errors.

MATERIALS AND METHODS

Selection of Manuscript

Tajul Muluk has been selected for study following a screening process using the Index of Manuscript Selection (iMS) which is part of the Index of Scientific Analysis of Kitab Tib Melayu (SAKTI) developed recently (Mohd Shafri, 2021b). SAKTI has been developed specifically for Malay medical manuscripts study but in practice, it could also be adapted to other types of manuscript. The iMS in SAKTI (SAKTI-iMS) provides some guidelines for grading a text in a more objective manner by looking at details such as author's profile, integrity and legibility of text, and breadth and depth of medical content.

The screening using SAKTI-iMS tool was performed only on the medical section of *Tajul Muluk*, presuming that this section was independent from other sections in *Tajul Muluk* and has no known author. The list provided in the beginning of the section was compared to the actual entry and two chapters (*bab*) were found missing. The text still scores one mark for integrity as the completeness is still more than 80%. Although there is a significant amount of printing errors that could be identified, the legibility of the text is still good, and the text could still score a point for the legibility. In terms of the medical content, the section scores were satisfyingly high, as the amount of physical treatment, used as the index's benchmark, made up more than 80% of the treatment options listed. According to SAKTI Index, the text being analysed was given a score according to the four major criteria. The final score, Σx , was between 0 – 6. The score will enable grading to be made to A ($\Sigma x = 5-6$), B ($\Sigma x = 3-4$), C ($\Sigma x = 1 - 2$) or D ($\Sigma x = 0$). Grade A indicates a strong candidate, or of high priority for inclusion in research; whereas B indicates medium or intermediate

priority; C denotes low priority; and D indicates very low priority. The total score for *Tajul Muluk* was 5, which means that the text was considered to have a strong value to be evaluated further (Table 1). An additional mark was scored by the text for having a high number of pages containing medical knowledge i.e. more than 30

pages in total. What is more, its widespread distribution across the Malay world and its continued use, unlike other Malay medical manuscripts, means that there would be practical benefits to studying and clarifying the medical sections of *Tajul Muluk*.

Table 1. Analysis of *Tajul Muluk* using Index of Manuscript Selection in SAKTI-iMS

Name of Manuscript	Author's profile (x=score)		Integrity of text (x=score)		Legibility of text (x=score)		Medical content (physical treatment) (x=score)				Σ x Score	Grade	Additional values	Priority for research
	Unknown (0)	Known (1)	Incomplete (0)	Complete >80% (1)	Illegible (0)	Legibility >80% (1)	<5% (0)	5-50% (1)	50-80% (2)	>80% (3)				
Tajul Muluk	✓			✓		✓				✓	5	A	>20 pages, continued use	High

For this study, we initially used the printed copies from *Dar Ihya' al-Kutub al-'Arabiyah* (Egypt) and *al-Haramayn* (Singapore-Jeddah-Indonesia). As it turned out, there is no difference in term of the quality and content between the two printed editions. Another copy by another Egyptian printing house, *Mustafa al-Babi al-Halabi wa Awladih*, is available on-line at <https://eap.bl.uk/archive-file/EAP153-5-9> and has also been referred to as a comparison. This copy is also similar to the other two versions mentioned earlier with all the same errors; the only difference is the pagination.

Data Extraction

The ethnobotanical and ethnomedical data in *Tajul Muluk* were first extracted by performing a transliteration process, changing the Jawi script into Romanised Malay. Diseases and *materia medica* were identified and verified by cross-checking entries in *Pusat Rujukan Persuratan Melayu* (PRPM) on-line database (www.prpm.dbp.gov.my), and *Kamus Besar Bahasa Indonesia* (KKBI). More importantly, cross-references were also made to botanical and medical dictionaries, in particular, A Dictionary of Malayan Medicine by Gimlette (1939) and the

online database, Malaysian Biodiversity Information System (MyBIS) accessible at <https://www.mybis.gov.my/one/>.

RESULTS

List of Diseases

The medical sections in *Tajul Muluk* are further divided into more than 50 chapters which contain discussions of treatments for various illnesses. The diseases discussed include headache, eye diseases, ear problems, cough, breathing difficulty, toothache, syncope, seizures, gastrointestinal problems, hernia, kidney stones, fever, back pain, mouth ulcer, tumour, broken bones, sprains, amenorrhea and many more. In general, the arrangement does not follow the conventional head to toe arrangement common to Malay medical manuscripts. As an example, two presentations of leprosy, namely '*badam*' and '*kusta*' were placed in separate places, instead of being grouped together. A total of 61 physical diseases are mentioned in the manuscript, five of which cannot be identified (Figure 1). In addition, there are two diseases that were classified as non-physical illnesses related to mental health.

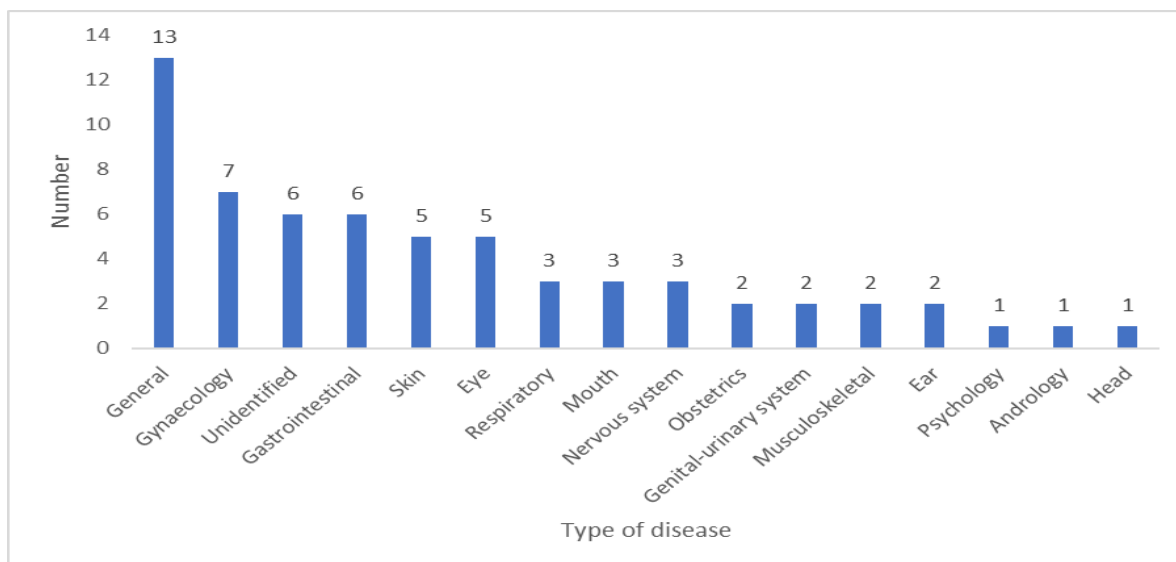


Figure 1. Type of diseases mentioned in *Tajul Muluk* according to bodily system.

Methods of Treatment

The methods of treatment used in the manuscript can be divided into the following three types: (1) treatment that uses medical formulation; (2) spiritual-based treatment using *wafak* (letters, numerals, and diagrams) and prayers; and (3) treatment that combines the use of medical formulation and spiritual elements. The combination of these three types of treatment resulted in a total of 330 methods of intervention. Of these, 292 are medical formulations, 27 are non-formulation interventions (such as prayer), while 11 are combination of formulation and non-formulation interventions (e.g. pharmaceutical formulations used together with prayers) (Figure 2).

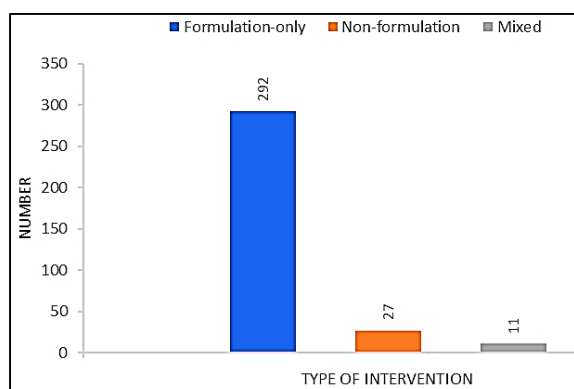


Figure 2. The number of traditional formulations, non-formulation interventions and mixed interventions in *Tajul Muluk*

With regards to the medical formulations, 87% or 265 of them are of the mixed ingredients type, whereas 13% or 38 of them are of the single ingredient types (Figure 3).

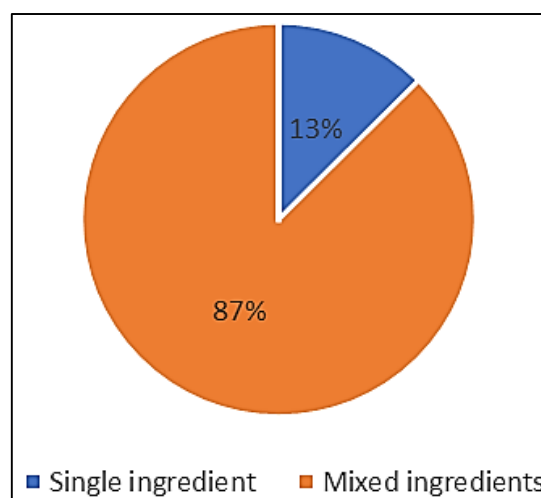


Figure 3. Percentage of single and mixed formulations in *Tajul Muluk*

List of *Materia Medica*

In terms of medicinal ingredients, a majority are local, with only a few relying on external ingredients. The ingredients used in medical formulation can be classified into (1) plant-based ingredients; (2) animal-based ingredients; and (3) miscellaneous sources (Figure 4).

Medicinal materials derived from plants are the most commonly used ingredients in the formulation, consisting of 210 plants (or 65%) (Table S1) and 12 species of animals (Table 2). A total of 40 other ingredients that were neither plant nor animals; most of them were of the mineral type such as silver and borax, natural products such as milk and oil, or unknown materials. A total of 63 (or 19%) materials remain unidentifiable due to printing errors (Table S2). However, for these unidentifiable plant-based materials, there is a total 42 ingredients that can be classified as plant-based materials because the parts of the plants used in the treatments were mentioned in the formulation, such as leaf, root, flower, fruit and bark.

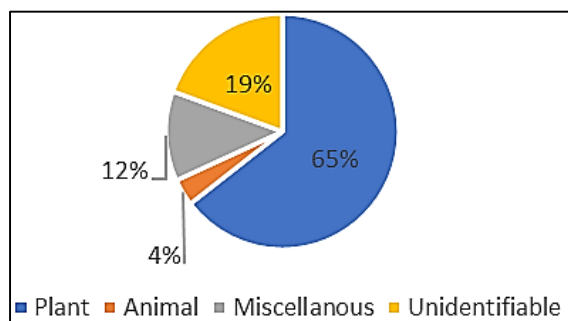


Figure 4. Percentage of plants, animals and miscellaneous ingredients in *Tajul Muluk*

For plant-based ingredients, there are 12 species of plants that have more than one vernacular name stated in the text, namely; (1) *Oryza sativa* (i.e. *beras, padi, nasi, lemukut*); (2) *Cocos*

nucifera (i.e. *kelapa, kelambir, kerambil, nyiur*); (3) *Myristica fragrans* (*basbas, pala*); (4) *Kaempferia galanga* (i.e. *cekur, kencur*); (5) *Eclipta alba* (i.e. *keremak betina, urang-aring*); (6) *Gendarussa vulgaris* (i.e. *gandarusa, daun rusa*); (7) *Dryobalanops lanceolata* or *Dryobalanops aromatica* (i.e. *kapur, kapur baru, paji*); (8) *Tamarindus indica* (i.e. *asam celagi, buah mil*); (9) *Piper longum* (i.e. *cabai, campli*); (10) *Alpinia galanga* (i.e. *lengkuas, khulanjan*); (11) *Ageraratum conyzoides* (i.e. *rumpun tahi babi, rumput putih*) and (12) *Aquilaria malaccensis* (i.e. *gaharu, karas, khulambak*). In addition, there are 9 plants that can only be identified by their genus name. This is because the author did not specifically mention the names of the plants in the text, such as *limau* (*Citrus* spp.), *pisang* (*Musa* spp.), and *keladi* (*Colocasia* spp.).

Regarding the animal-based materials, there are 10 species of animals that were utilized as ingredients in the treatment. These parts are most commonly eggs, milk, blood, fat and bezoar.

The most commonly used miscellaneous ingredients in the medical formulation were vinegar, honey, salt, charcoal, borax (sodium borate), and breast milk (Table 3). These ingredients are likely to act as adjuvants in the drug formulation, such as balancing the pH, stabilizing the formulation, enhancing the effect of the active ingredients and making the medicine more palatable.

Table 2. Animal-based ingredients as stated in *Tajul Muluk*

No.	Vernacular Name	Scientific Name	Parts Used
1.	Ayam	<i>Gallus gallus domesticus</i>	Egg, blood, fat, meat, gall, saliva
2.	Biri-biri	<i>Ovis aries</i>	Fat
3.	Cengkadak	<i>Mantis religiosa</i>	Tail / head
4.	Gagak	<i>Corvus</i> spp.	Gall
5.	Kambing	<i>Capra aegagrus hircus</i>	Bezoar
6.	Katak	<i>Kaloula</i> spp.	Blood
7.	Kerbau	<i>Bubalus bubalis</i>	Milk, Ghee
8.	Lembu	<i>Bos</i> spp.	Gall
9.	Lintah	<i>Hirudinea</i> spp.	Whole body
10.	Pelanduk	<i>Tragulus</i> spp.	Bezoar, gall
11.	Sapi	<i>Bos</i> spp.	Bezoar, Ghee
12.	Titir	<i>Geopelia striata</i>	Blood

Table 3. Miscellaneous ingredients as stated in *Tajul Muluk*

No.	Vernacular Name	English Name
1.	'Anbar	Tree resin
2.	Abu dapur	Wood ash
3.	Air hujan	Rainwater
4.	Air susu ibu	Mother's milk
5.	Arang / bara tempurung	Charcoal from coconut shell
6.	Batu celak	Black-coloured stone used as an eyeliner
7.	Belacan	Shrimp paste
8.	Cuka debunga	Cannot be identified
9.	Cuka masam	Vinegar / acetic acid
10.	Dadih	Curd
11.	Garam bangsa/bukit	Rock salt
12.	Garam Hormuz	Persian rock salt
13.	Garam Siam	Siamese salt
14.	Hartal	Yellow powder that has a fragrant smell
15.	Kanji	Starch
16.	Kapur kerang	White powder made by burning shells
17.	Kemih	Urine
18.	Kertas china	Cannot be identified
19.	Kesturi	Fragrant material obtained from musk-stag, <i>Moschus moschiferus</i> .
20.	Manisan	Sugar / sweets; commonly honey is used or referred to as manisan in Malay medicine
21.	Madu	Honey
22.	Manjakani	<i>Quercus infectoria</i>
23.	Minyak	Oil
24.	Minyak sempelah	The leftover of the coconut milk starch that results from the process of making coconut oil from coconut milk.
25.	Minyak tanah	Kerosene
26.	Nabat misri	Egyptian rock sugar
27.	Napal merah	Edible clay
28.	Pijar	Borax, Sodium borate
29.	Sakar / sukkar / sukkar batu / sukkar merah	Sugar / brown sugar
30.	Sarang angkut-angkut	<i>Eumenes spp.</i> nest which is made from mud soil
31.	Sekam	Rice husk
32.	Sembilu	Bamboo splinter
33.	Sidalinggam	Cinnabar, mercury (II) sulphide
34.	Tahi	Faeces
35.	Tahi perak	Silver
36.	Tahi telinga	Earwax
37.	Tanah	Soil
38.	Tanah cempaga	Coarse sulfur
39.	Tawas	Alum
40.	Terusi	Copper sulphate

DISCUSSION

Our study enables a clearer view of the medical content from *Tajul Muluk*, a text which must not be overlooked when studying traditional documentation of Malay medicine due to its age

and long-standing use to this day. The amount of data is significantly deep and rich, providing information on diseases that the Malays commonly encountered in the late 19th century when the text was compiled and printed. The terminologies used by the Malays are both

original or adopted from other civilisations that criss-crossed the land and waters of the Malay Archipelago. Hence, there are loan words such as the Arabic *balgham* (phlegm) being used in the overwhelmingly Malay text. These loan words are often found in other Malay medical texts and understood by the Malays in general until today and used despite the availability of Malay words such as *lendir*, *kahak* dan *dahak*.

The cosmopolitan nature of Malay medicine is also reflected in the list of *materia medica* where there are mentioned several materials imported from China (such as *lengkuas Cina*, *kulit manis Cina*, and *kertas Cina*), Indian and Arabic nations (such as *inggu*, *kedelai*, and *garam Hormuz*). These materials were brought into the Malay World through trades mostly in the forms of dried seed, barks or resin and received good demand from the Malays who used them as spices and medicine. The number of imported materials is not very high at about 20 materials, or 6.5% from the total of about 320 materials mentioned in *Tajul Muluk*. A majority of the *materia medica* are local plants. The three types of ginger (*Zingiber officinale*) traditionally planted by the Malays – common *halia*, *halia bara/merah* (red ginger) and *halia padi* (small-leaf ginger) are used. Likewise, the materials that are synonymous with the Malay World such as *pala* (*Myristica fragrans*), *cengkih* (*Syzygium aromaticum*), *asam celagi* or *asam jawa* (*Tamarindus indicus*) and *bunga lawang* (*Illicium verum*) are also mentioned. Most other types of plants are plants that are not usually traded to outsiders and can only be found in the region. Therefore, their use as medicine originated purely from the interactions and experiences of the Malays.

In using these *materia medica*, the experiences of the Malays have shaped their methods of use, influencing dosage form and dosing regimen. It is the way that these medications were formulated by the Malays that are interesting to be learnt and tested. Thus, *ganja* (*Cannabis sativum*) for example is used by the Malays with caution as they understood its effect. In *Tajul Muluk*, it is found only in combination with other materials, which are mixed to dampened its effect. The resulting formulation is also recommended to be taken only in low amount so as to avoid its strong and negative effect to cognitive functions. Another instance is *halia bara* (*Z. officinale* var. *rubrum*

Theilade), which in Malay tradition is typically reserved for topical application and not prescribed orally as a single material (Gimlette, 1939) as the material is inflammatory in nature. In *Tajul Muluk*, *halia bara* is prepared as a mixed formulation. In one formulation, juice is extracted from the mixture and taken as a drink to relieve phlegm. Another anti-phlegmatic treatment involves drying the mixture of *halia bara* and other materials before these are then smoked and inhaled. The use of *halia bara* as anti-phlegmatic treatment is frequently found in scores of other Malay medical manuscripts, but this potential has not been explored much by contemporary researchers.

CONCLUSION

Local Malay knowledge of ethnobotany and ethnomedicine is lost at an unprecedented rate as the terminologies and plant names are no longer well-known. Fortunately, there are old texts of Malay medicine such as *Tajul Muluk* that are still extant and have recently gained scholarly attention. The high number of remedies and the variety of diseases discovered within the pages of *Tajul Muluk* reflects the richness of this text in terms of Malay ethnobotany and ethnomedical knowledge, making it an invaluable resource for understanding the interactions of Malays with the natural resources available around them.

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Supplementary Materials

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Table S1. Pant-based ingredients according to vernacular names stated in *Tajul Muluk*.

No.	Vernacular Name	Scientific Name	Parts Used
1.	Adas manis	<i>Anethum graveolens</i>	Seed
2.	Adas pedas	<i>Foeniculum vulgare</i>	Seed
3.	Afyun	<i>Papaver somniferum</i>	Normally seed
4.	Akar kara/ aqarqaraha	<i>Anacyclus pyrethum</i>	Root
4.	Ambin buah	<i>Phyllanthus niruri</i>	Not stated
5.	Anjan-anjan putih	<i>Memecyclon umbellatum</i>	Fruit, leaf, root
6.	Ara	<i>Ficus</i> spp.	Leaf
7.	Arang para	<i>Eryoglossum edule/ Nephelium mutabile / Nephelium hamulatum</i>	Not stated
8.	Asam celagi/ Mil	<i>Tamarindus indica</i>	Fruit, leaf
9.	Aur gading	<i>Bambusa vulgaris</i>	Root
10.	Bakawali	<i>Epiphyllum oxypetalum</i>	Fruit
11.	Balik sumpah/sembah	<i>Aglaia argentea</i>	Not stated
12.	Basbas/ Pala	<i>Myristica fragrans</i>	Fruit
13.	Batu-batu	<i>Byttneria maingayi</i>	Leaf, root
14.	Bawang merah	<i>Allium cepa</i>	Bulb
15.	Bawang putih	<i>Allium sativum</i>	Bulb
16.	Bawang tunggal	<i>Allium sativum</i>	Bulb
17.	Bayam	<i>Amaranthus</i> spp.	Seed
18.	Bayam merah	<i>Amaranthus gangeticus</i>	Not stated
19.	Bayam rusa	<i>Cyathula prostrata</i>	Root
20.	Belimbing besar	<i>Averrhoa carambola</i>	Juice from fruit
21.	Belu	<i>Entada phaseoloides</i>	Root
22.	Beras-beras	<i>Aporusa prainiana</i>	Root
23.	Beras Kedah/ Siam	<i>Oryza sativa</i>	Grain
24.	Beras lekit	<i>Oryza sativa</i> var. <i>glutinosa</i>	Grain
25.	Beremi	<i>Limnophila aromatica</i>	Leaf
26.	Bidara	<i>Zizyphus jujube</i>	Leaf
27.	Bilang-bilang	<i>Euphorbia thymifolia</i>	Leaf
28.	Bonglai	<i>Zingiber cassumunar</i>	Root, rhizome
29.	Bulangan	<i>Gmelina asiatica</i>	Fruit, leaf
30.	Bunga lawang	<i>Illicium verum</i>	Flower
31.	Buta-buta	<i>Excoecaria agallocha</i>	Leaf, root
32.	Cabai	<i>Piper longum</i>	Fruit
33.	Campli/ Cabai putar	<i>Piper retrofractum</i>	Leaf
34.	Cangkuk	<i>Schima noronhae</i>	Not stated
35.	Capa	<i>Blumea balsamifera</i>	Root
36.	Cekur/ cengkur	<i>Kaempferia galanga</i>	Leaf
37.	Cendana	<i>Santalum album</i>	Wood extract
38.	Cendawan lar	<i>Cordyceps sinensis</i>	Not stated
39.	Cenderu	<i>Diplanthera bancana</i>	Not stated
40.	Cengkih	<i>Eugenia aromatica</i>	Flower
41.	Cucuran/ hujung atap	<i>Beackea frustecens</i>	Not stated
42.	Dalu-dalu/ dedalu	<i>Salix tetrasperma</i>	Root
43.	Daun rusa	<i>Gendarussa vulgaris</i>	Leaf
44.	Dedap	<i>Erythrina variegata</i>	Root
45.	Delima	<i>Punica granatum</i>	Leaf
46.	Derapah kerbau	<i>Desmodium heterocarpum</i>	Not stated
47.	Duduk/ dudok	<i>Melastoma malabathricum</i>	Leaf, shoot
48.	Gaharu tenggelam	<i>Aquilaria malaccencis</i>	Heartwood
49.	Gandarokam	<i>Colophonium</i> spp.	Not stated
50.	Gandarusa	<i>Gendarussa vulgaris</i>	Leaf
51.	Gandum	<i>Triticum</i> spp.	Grain
52.	Ganja	<i>Cannabis sativum</i>	Seed, flower, leaf
53.	Geli-geli	<i>Lasia spinosa</i>	Leaf

Table S1. Continued

No.	Vernacular Name	Scientific Name	Parts Used
54.	Gorek	<i>Caesalpinia bonducella</i>	Fruit, root
55.	Halia	<i>Zingiber officinale</i>	Rhizome
56.	Halia bara	<i>Zingiber officinale</i> var. <i>rubrum</i> <i>Theilade</i>	Rhizome
57.	Halia merah	<i>Zingiber officinale</i> var. <i>rubrum</i> <i>Theilade</i>	Leaf
58.	Halia padi	<i>Zingiber officinalis</i>	Rhizome
59.	Hempedu dendang	<i>Trichosanthes wallichiana</i>	Not stated
60.	Hempedu tanah	<i>Andrographis paniculata</i>	Not stated
61.	Hentimun	<i>Cucumis sativus</i>	Not stated
62.	Hentimun tikus	<i>Zehneria marginata</i>	Not stated
63.	Hijjalah (putat)	<i>Barringtonia acutangula</i>	Leaf
64.	Hinggu/ inggu	<i>Foerula asafoetida</i>	Not stated
65.	Inai	<i>Lawsonia inermis</i>	Leaf
66.	Jahakeling/ majakeling & Jahalawi/ majalawi	<i>Terminalia chebulia</i> (<i>majakeling</i> = dried, immature fruit; <i>majalawi</i> = dried, mature fruit)	Fruit
67.	Jambu	<i>Eugenia aquea</i>	Peel, leaf
68.	Jaran	<i>Lannea coromandelica</i>	Not stated
69.	Jeduayah (= seduayah)	<i>Woodfordia floribunda</i>	Not stated
70.	Jemuju	<i>Eryngium foetidum</i>	Seed
71.	Jerangau	<i>Acorus calamus</i>	Not stated
72.	Jeruju	<i>Acanthus ebracteatus</i>	Not stated
73.	Jintan hitam/ jira hitam	<i>Nigella sativa</i>	Seed
74.	Jintan putih	<i>Cuminum cyminum</i>	Seed
75.	Kacang hijau barat	<i>Vigna radiata</i>	Seed
76.	Kacang hitam	<i>Phaseolus vulgaris</i>	Seed
77.	Kachu	<i>Acacia catechu</i>	Seed
78.	Kancing baju	<i>Biden pilosa</i>	Root, leaf
79.	Kapas	<i>Gossypium hirsutum</i>	Seed, leaf
80.	Kapur/ kapur baru/ paji	<i>Dryobalanops lanceolata</i> or <i>Dryobalanops aromatica</i>	Powder
81.	Kapur cina	<i>Cinnamomum camphora</i>	Powder
82.	Karas	<i>Aquilaria malaccensis</i>	Leaf
83.	Kedekai	<i>Terminalia chebulia</i>	Fruit
84.	Kedelai/ kedelai keling	<i>Glycine max</i> L. Merr	Not stated
85.	Keladi	<i>Colocasia</i> spp.	Leaf
86.	Kelapa/ kelambir/ kerambil / nyiur/ nyiur hijau	<i>Cocos nucifera</i>	Fruit, root, oil
87.	Kelemoyang	<i>Homalomena rostrata</i>	Not stated
88.	Kelumpang	<i>Sterculia foetida</i>	Fruit
89.	Kemahang	<i>Alcasia ovalifolia</i>	Leaf
90.	Kemboja	<i>Plumeria</i> spp.	Root
91.	Kemenyan putih/ Mani kemenyan	<i>Styrax benzoin</i>	Not stated
92.	Kemukus	<i>Piper cubeba</i>	Not stated
93.	Kemuning	<i>Murraya paniculata</i>	Resin
94.	Kencur	<i>Kaempferia galanga</i>	Leaf
95.	Kenidai	<i>Bridelia insulana</i>	Leaf
96.	Kepulaga	<i>Amomum cardamomum</i>	Not stated. Normally seed.
97.	Keremak betina	<i>Eclipta alba</i> hassk	Not stated

Table S1. Continued

No.	Vernacular Name	Scientific Name	Parts Used
98.	Kerutu	<i>Bauhinia calycina</i>	Root
99.	Kesimbukan	<i>Paederia foetida</i>	Leaf
100.	Ketapang	<i>Terminalia catappa</i>	Leaf, fruit
101.	Ketiak	<i>Acronychia laurifolia</i>	Not stated
102.	Ketola	<i>Luffa acutangula</i>	Root, leaf
103.	Ketumbar	<i>Coriandrum sativum</i>	Leaf
104.	Khalambak	<i>Aquilaria malaccensis</i>	Heartwood
105.	Khulanjan	<i>Alpinia galanga</i>	Not stated
106.	Kuca	<i>Allium tuberosum</i>	Leaf
107.	Kulit manis	<i>Cinnamomum verum</i>	Inner bark
108.	Kulit manis cina	<i>Glycyrrhiza glabra</i>	Inner bark
109.	Kumkuma	<i>Crocus sativus</i> L.	Dried stigma
110.	Kundur	<i>Benincasa hispida</i>	Not stated
111.	Kunyit	<i>Curcuma longa</i> / <i>Curcuma domestica</i>	Rhizome, rhizome extract, bud, powder
112.	Kunyit keling	<i>Curcuma aeruginosa</i>	Not stated
113.	Labu manis	<i>Cucurbita pepo</i>	Stalk
114.	Labu air	<i>Lagenaria</i> spp.	Fruit
115.	Lada/ lada sulah	<i>Piper nigrum</i>	Seed
116.	Lakum	<i>Vitis repens</i>	Leaf. Shoot
117.	Lapang	<i>Bauhinia comifolia</i>	Leaf
118.	Lempoyang	<i>Zingiber zerumbet</i>	Normally rhizome
119.	Lemukut/ melukut	<i>Oryza sativa</i>	Grain
120.	Lenga/ bijan	<i>Sesamum indicum</i>	Oil, flower, seed
121.	Lengkuas/ lengkuas putih/ Lengkuas Cina	<i>Alpinia galanga</i>	Leaf, shoot, rhizome
122.	Limau/ limau mengkal	<i>Citrus</i> spp.	Juice from fruit, leaf
123.	Limau besar	<i>Citrus grandis</i> L.	Fruit, leaf
124.	Limau kapas	<i>Citrus medica</i>	Leaf, juice from fruit
125.	Limau nipis	<i>Citrus aurantifolia</i>	Juice from fruit
126.	Maja	<i>Aegle marmelos</i>	Resin
127.	Mali-mali hitam	<i>Leea indica</i>	Leaf
128.	Malu	<i>Mimosa pudica</i>	Not stated
129.	Maman	<i>Cleome gynandra</i> or <i>Gynandropsis gynandra</i>	Leaf, root
130.	Maman hitam	<i>Cleome speciosa</i>	Not stated
131.	Mambu	<i>Melia indica</i> or <i>Azadirachta indica</i>	Leaf
132.	Manggusta	<i>Garcinia mangostana</i>	Leaf
133.	Mawar	<i>Rosa</i> spp.	Flower extract
134.	Melaka	<i>Phyllanthus emblica</i>	Fruit
135.	Melur	<i>Jasminum sambac</i>	Flower, leaf, root
136.	Meriku	<i>Memecyclon umbellatum</i>	Resin, root
137.	Mota/ Muta	<i>Cyperus rotundus</i>	Seed
138.	Mula	<i>Raphanus sativus</i>	Leaf
139.	Mumbang	<i>Cocos nucifera</i>	Shoot
140.	Munggal	<i>Naclea maingayi</i> or <i>Anthocephalus cadamba</i>	Root
141.	Munggur	<i>Enterolobium saman</i>	Not stated
142.	Mur	<i>Citrullus colocynthis</i>	Not stated
143.	Mustaki	<i>Pistacia lentiscus</i>	Resin
144.	Nanas	<i>Ananas sativus</i>	Thorn/spike
145.	Nangka	<i>Artocarpus heterophyllus</i>	Resin
146.	Nasi dingin	<i>Xerospermum</i> spp.	Not stated
147.	Nipah	<i>Nipa fruticans</i>	Vinegar

Table S1. Continued

No.	Vernacular Name	Scientific Name	Parts Used
148.	Nyarang songsang	<i>Achyranthes aspera</i>	Leaf
149.	Pa	<i>Engelhardtia roxburghiana</i>	Root
150.	Padi/ Beras/ Nasi	<i>Oryza sativa</i>	Grain
151.	Pegaga	<i>Centella asiatica</i>	Leaf
152.	Pekan	<i>Brunsfelsia latifolia</i>	Flower
153.	Penaga	<i>Mesua grandis</i>	Leaf
154.	Peria	<i>Momordica charanthia</i>	Root
155.	Peria hutan	<i>Vitis mollissima</i>	Leaf
156.	Perupok	<i>Lophopetalum multinervium</i>	Root, flower
157.	Pinang	<i>Areca catechu</i> L.	Fruit, root
158.	Pinggu/ pianggu	<i>Horsfieldia irya</i>	Leaf, peel
159.	Pisang	<i>Musa</i> spp.	Fruit, juice from fruit, leaf, root
160.	Pisang susu	<i>Musa acuminata</i>	Fruit
161.	Pulut-pulut	<i>Urena lobata</i>	Root
162.	Rambai padang	<i>Baccaurea motleyana</i>	Leaf
163.	Rambutan	<i>Nephelium lappaceum</i>	Fruit peel
164.	Rempenai	<i>Ardisia humalis</i>	Leaf
165.	Remunggai/ murung	<i>Moringa oleifera</i>	Root, leaf
166.	Ribu	<i>Lygodium scandens</i>	Shoot
167.	Rotan semambu	<i>Calamus scipionum</i> Lour.	Root
168.	Rukam	<i>Flacourtia rukam</i>	Leaf
169.	Rumia	<i>Bouea macrophylla</i>	Bark
170.	Rumput kelurut	<i>Lophatherum gracile</i>	Not stated
171.	Rumput tahi babi/ rumput putih	<i>Ageraratum conyzoides</i>	Not stated
172.	Rusa	<i>Justicia gendarussa</i>	Leaf
173.	Saga/ Saga kenderi	<i>Adenantha pavonina</i>	Leaf
174.	Saga kenderi	<i>Abrus precatorius</i>	
175.	Sambau	<i>Eleusine indica</i>	Root
176.	Sarang satong/ sarang semut	<i>Hydnophytum formicarum</i>	Leaf, fruit
177.	Sari kelapa/ Susun kelapa	<i>Tabernaemontana divaricata</i>	Flower, root
178.	Sawi	<i>Brassica juncea</i>	Seed
179.	Sejuk	<i>Kalanchoe laciniata</i>	Leaf
180.	Sena	<i>Pterocarpus indicus</i>	Resin, leaf
181.	Senamaki/ Maki	<i>Cassia angustifolia</i>	Root
182.	Senduri	<i>Sida rhombifolia</i>	Not stated
183.	Sepang	<i>Caesalpinia sappan</i>	Not stated
184.	Serahit/ serait	<i>Nephelium maingayi</i>	Leaf
185.	Serai	<i>Cymbopogon citratus</i>	Leaf
186.	Serapat	<i>Salacia flavescens</i>	Bark
187.	Sesawi	<i>Brassica napus</i>	Seed
188.	Setol	<i>Elaeocarpus robustus</i>	Leaf
189.	Sirih/ kerakap	<i>Piper betle</i>	Leaf
190.	Songsang	<i>Gloriosa superba</i>	Leaf, root
191.	Sudu-sudu	<i>Euphorbia antiquorum</i> or <i>Euphorbia nerifolia</i>	Leaf, stem
192.	Susu babi	<i>Adenostemma lavenia</i>	Leaf, root
193.	Susu kambing	<i>Euphorbia hirta</i>	Root
194.	Tampal besi	<i>Callicarpa longifolia</i>	Not stated
195.	Tanduk rusa	<i>Platyserium ridleyi</i>	Not stated
196.	Tanjung	<i>Mimusops elengi</i>	Root, leaf
197.	Tasbih	<i>Canna indica</i>	Seed
198.	Tebing ayu	<i>Leonurus sibiricus</i>	Root

Table S1. Continued

No.	Vernacular Name	Scientific Name	Parts Used
199.	Tebu hitam	<i>Saccharum officinarum</i>	Not stated (most likely cane).
200.	Teki	<i>Cyperus rotundus</i>	Not stated
201.	Telinga kerbau	<i>Blumea balsamifera</i>	Leaf
202.	Tembaga suasa	<i>Smilax calophylla</i>	Leaf
203.	Tembikai	<i>Citrullus vulgaris</i>	Leaf
204.	Tempuras	<i>Ardisia oxyphylla</i>	Not stated
205.	Tengar	<i>Ceriops tagal</i>	Peel extract
206.	Terung asam	<i>Solanum ferox</i>	Root
207.	Terung perat	<i>Solanum nigrum</i>	Root, fruit, leaf, seed
208.	Terung pengar	<i>Datura fastuosa</i> or <i>Datura metel</i>	Fruit
209.	Tinggir bangau	<i>Ludwigia adscendens</i>	Leaf
210.	Urang-arang	<i>Eclipta alba</i>	Leaf

Table S2. Unidentified plants/materials in *Tajul Muluk*

No	Spelling in Text	Part Used	Possible Reading
1.	أب ٢	Leaf	-
2.	أسف داما	Leaf	-
3.	بفكوتوجهات	Leaf	-
4.	باس	Not stated	-
5.	بانغ برق	Bark	-
6.	بايم نوربر	Root	-
7.	باز ٢	Shoot	-
8.	دادا كنم	Leaf	-
9.	داتغ بكت	Not stated	-
10.	هالو	Root	-
11.	جيب مانه	Not stated	-
12.	جنق	Not stated	-
13.	جشا	Fruit	-
14.	جر مبع	Not stated	Possibly, jerenang (<i>Daemonorops</i> spp.)
15.	جر مولى	Seed	-
16.	جوال	Not stated	-
17.	بجنجت هايم	Root	-
18.	كاجنغ بارت	Leaf	-
19.	كاجنغ لبت	Leaf	-
20.	كب	Not stated	Kasai (<i>Pometia pinnata</i>)
21.	كاييا	Root	-
22.	كيات جينا	Not stated	-
23.	كيايا برسس	Not stated	-
24.	كرتف	Leaf	Keremak (<i>Hygrophila quadrivalvis</i>) / Kereman (<i>Alternanthera sessilis</i>) / Kerenan (<i>Bridelia stipularis</i>)
25.	كروكن	Not stated	-

Table S2. Continued

No	Spelling in Text	Part Used	Possible Reading
26.	كررت فاسر	Root	-
27.	كورن	Not stated	-
28.	كورغ ٢ فاسر	Root	Garing-garing pasir (<i>Cnestis ramiflora</i>)
29.	اللور	Not stated	-
30.	القى ٢٠	Leaf	Api-api (<i>Avicenna</i> spp.)
31.	لمبر لمب	Leaf	Lembar lembe (<i>Cucurlogo latifolia</i>)
32.	مادن	Leaf	-
33.	مادن كلباك	Leaf	-
34.	بالبري	Root	-
35.	مفل	Fruit	-
36.	ماروانى	Juice extract	-
37.	منت ٢	Root	-
38.	موجى	Leaf	-
39.	نارن	Not stated	-
40.	نايم توبا	Not stated	-
41.	فنج	Leaf	-
42.	فنجلف	Not stated	-
43.	قانو بات	Not stated	-
44.	قانو قبتغ	Not stated	-
45.	فكولاجفكى	Peel	-
46.	فريغ اوزرة	Flower	-
47.	فبك برساك	Leaf	Paku bersegi
48.	ر دست	Not stated	-
49.	رساك برين	Root	-
50.	سارغ	Fruit	-

Table S2. Continued

No	Spelling in Text	Part Used	Possible Reading
51.	سجف	Leaf	-
52.	سفت	Not stated	-
53.	سورغ بلوغ	Not stated	-
54.	سار ۲	Bark, root	-
55.	سر مینی	Fruit	-
55.	نال نین	Leaf	-
56.	تم	Not stated	Tamtam (A creeping plant with no known scientific name)
57.	تمور	Not stated	-
58.	أورت بلوغ	Leaf	-
59.	أورا ۲	Leaf	-
60.	ینغ	Root	Lenga
61.	Keruping	Leaf	-
62.	Daun silan	Leaf	-
63.	Jemelaga	Fruit, fruit peel, leaf, root	-