

Collaborative Platform for Multicultural Herbal Information Creation

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ABSTRACT

Traditional knowledge about herbal medicine can be contributed from several cultures. With conventional techniques, it is hard to find a way in which experts can build a self-sustainable community for exchanging their knowledge. To alleviate the problem of gathering intellectual herbal information based on different cultures, the Knowledge Unifying Initiator for Herbal Information (KUIHerb) is used as a platform for building a web community for collecting the intercultural herbal knowledge. KUIHerb provides a capability for the expression of information about images, local names, parts used, indications, methods for preparation, precautions including toxicity and additional information. In cases where multiple opinions are provided, the popular vote will select the most preferable term, used in the community. Herb identification, herbal vocabulary, a list of experts in herbal medicine and multicultural knowledge can be collected from this system.

Author Keywords

Herbal information, collective intelligence, KUI, KUIHerb.

ACM Classification Keywords

H.5.m. Information interfaces and presentation: Miscellaneous.

H.3.5. Information storage and retrieval: On-line information services.

INTRODUCTION

Many of Thai traditional medical treatments have been derived the origins in India. They have their roots in ancient Indian Ayurvedic practices. The derivation has been diversified throughout many cultures since then [9]. For example, herb names and their medicinal usages are gradually spread out into communities resulting in distinction from each other according to their cultural

background. Some are named differently and hardly indicate a relationship between each other. Some show complementary knowledge of their usages. The study on the development of intercultural herbal information will not only form a cross cultural community of the knowledge but also encourage the discovery of new herbal knowledge. Furthermore, the lack of knowledge about local plants consequently hinders local communities from appreciating, using, or conserving them. For efficiently collecting herbal information, a large community group should be considered for exchanging information. It needs to find tools which enable users to publish useful information, share knowledge, and discussing until to find the good answer for the question. Due to the large collaboration, the Internet, especially World Wide Web, is useful for connecting the large group of people.

The second phase in the Web's evolution so-called Web 2.0, is attractive. Unlike the first phase, Web 1.0, which only allows users access to a Web site and contribute their information to it, Web 2.0 keeps up with a site's content even without visiting the actual Web document. Web 2.0 has a more interactive and collaborative manner, emphasizing social interaction, and collective intelligence of users. Collective intelligence is the combination of individual intelligence. It can be considered as a complex adaptive system. As the adaptive agents act individually and mutually, collective intelligence gradually emerges [16]. In Web 2.0, it is abundance of information. However, it contributes little to the control of information. The opinions on the discussion topic are usually collected from general Internet users. This causes controversy. The new generation of Web technology, Web 3.0, should be better for creating new accurate and reliable knowledge. It can be considered as semantic Web. It provides some mechanisms for less controversy of the opinions and more control of information [5].

In this paper, we address the problem of collecting herbal information on many topics. One of the difficulties in constructing a knowledge base for different cultures is the development of a communication tool for realizing a self-sustainable community. To alleviate this problem, the Knowledge Unifying Initiator for Herbal Information (KUIHerb) is used as a platform for building a web

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community for the collection of intercultural herbal knowledge. It should be implemented with the concept of Web 3.0. KUIHerb provides not only a feature for developing a medicinal herb terminology but also a capability for expressing the information about parts of herbs in usages, indications, methods for preparation, precaution and toxicity. For medicinal herb identity, we use the scientific name and its images for common understanding. In case of multiple opinions are provided, the popular vote will select the preferred opinions used in the community.

In the rest of this paper, the concepts of Web 2.0 and Web 3.0 systems are described in Section 2. Section 3 gives a detail of herbal information. Section 4 presents the collecting herbal information with the aspects that we describe above. The aims and components of KUIHerb is given in Section 5. The experimental result is described in Section 6. A conclusion and future works is made in Section 7.

WEB 2.0 AND WEB 3.0 SYSTEMS

The global buildup of the Internet connectivity and growing availability of less expensive computing and communication devices have made the World Wide Web, an important media for exchanging information among users around the world. Anyone with a computer and the Internet access can now participate, build or abandon any Web community at anytime. In the Web 2.0 era, the Internet users easily share opinions and resources. Consequently, users can collectively contribute to the Web community and generate large content behind their virtual collaboration [8]. As suggested by Gruber T., the true collective intelligence can be considered if the data collected from all those participants is aggregated and recombined to create new knowledge and new ways of learning that individual humans cannot do by themselves [6].

In order to make this situation true, Web 2.0 system should be simple, scalable, and sensible. Due to the fact that the user is considered to be the most important component in Web 2.0, providing friendly tools for user participation in content creation, consumption and distribution has been the key to success of the system. Another key to success is technology which makes Web sites more scalable. For a system with collective intelligence, implementing scalability can indeed be challenging, but sensibility comes at variable sophistication levels. Several approaches deal with the sensibility e.g., user feedback, recommender systems, search engine, and mashups. For user feedback, hit counters can be represented by Web sites' relative popularity, while the volume of contents which users contribute to the system provides a measure of user participation. The recommender system utilizes some technologies such as filtering technologies to point users to objects of interest. In Web 2.0 sites, they usually include search engines to help users find content which the

members in the community have created. The new version of search engine utilizes a combination of data content (term and document statistics), data context (URL with a filename), and the number of incoming links. Mashups are a simple and powerful content creation technology that allows users to integrate information from multiple sources to provide an enriched experience. Web 2.0 brings Internet users together in a more interesting, interactive space. Information from practitioners such as health team professionals is connected. With this environment, knowledge exchange is not limited by private interests [4]. In Web 2.0, a large group of Internet users can be collaborated. However, it provides only little on control of information.

Nowadays, we are going to the new generation of Web technology i.e., Web 3.0. It is also called the semantic Web. Although it has already received quite a number of various definitions, some useful features of Web 3.0 have been introduced. In Web 3.0, it can be considered as "The data Web" instead of "The document Web" as in Web 2.0. The control of sharing information is better. The decision for the opinions which are provided in Web 3.0, is more accurate. The intelligence Web is a new important feature in Web 3.0 while in Web 2.0, it is only the social Web [5]. Unlike Web 2.0 which participants are usually general Internet users, wisdom of the expert is essential for constructing more valuable knowledge. From these features of Web 3.0, it should be a better platform for creating knowledge, especially medical knowledge, and herbal knowledge should be no exception.

HERBAL INFORMATION

Herbal information is a special type of information dealing with medicinal herbs. Herbal medicine information consists of two main types. One is scientific data such as chemicals composition and pharmacological properties. The other is traditional medicine data such as ethnobotanical study. Currently, information on these herbs both scientific and traditional is published on the Internet. In Thailand, at least 2500 species of flora have been used as herbal medicine [7]. In case of traditional medicine, most plants have more than one name (local name) such as *Dracaena loureiri* Gagnep. We use its hard wood for fever and call it Chan dang. Some time we call this plant in other names up to the area of country, e.g., Chan pha (northern part) and Lakka chan (central part) [11]. Besides the several local names in the same language, the names in other languages are also important. Two languages are usually used in Thailand i.e., Thai and English. The name with different languages is very useful, at least for finding herbal information. In cases of information on the herb cannot be found by Thai keywords, it is possible to find information with English keywords. Some other languages are still popular in Thailand. For example, Chaozhou dialect, the native dialect for Chinese people in north eastern Guangdong province. Some common herbs in Thailand borrow the names from this dialect. The relationship between herbs and their names

is many to many i.e., an herb is called by various names while a name may represent several herbs. Herb identification, a task for finding the real herb, is a valuable task. Several traditional herb formulas compose of unidentified herbs. A medicinal herb composes of several parts. There are some parts which can be used for medicinal proposes. However, their indications may be different. It depends on different cultures, location and methods for preparation. There is evidence that some herbs have toxicity. The precautions for applying herbs, is an important topic for sharing experiences. The detail of these topics is given in the next section.

COLLECTING HERBAL INFORMATION

To design a Web 3.0 model for collecting herbal information from multicultural community, some intellectual outputs should be considered. In the first version, four intellectual topics are taken into account i.e., herb identification, vocabulary collection, intercultural usage and precaution (including toxicity). The detail for each topic is described as follow.

Herb Identification

Herbal medicine has been used for a long time. However, some problems still remain such as name identification and their medicinal uses which may be different among cultures. For instance, the same species of herb may be known by different names in different areas. On the other hand, a certain herbal name may mean one thing in one area but something completely different in another. Lack of information about native herbs has made them more difficult for applying. The systematic collection of herbal information among cultures is valuable for the development of both traditional and modern herbal medicines. A professional can find information of an herb from a standard monograph. It is a type of monographs usually found in a pharmacopoeia. It deals with information to determine the proper identity of a plant genus or genus and species. This includes the taxonomy and nomenclature of the plant (according to the Linnean system of botanical classification and nomenclature, including all synonyms), botanical description of the whole plant and plant parts, microscopic descriptions of cellular structures of various plant parts, and various chemical assays to determine identity and purity. However, information from these sources is limited. In the case of the herb does not appear in the pharmacopoeia, it is hard to seek accurately information about the herb. The images of an herb are excellent for sharing knowledge about herb identity. From the images, the users can discuss which species (including variety) it should be. The scientific name of an herb and its images are used for common understanding. Furthermore, the users can discuss which herb should be identified as the real herb (exact species) that appears in traditional herbal formulas. The images for each part which can be applied for medicinal uses, should be added to the system.

Vocabulary Collection

Wiki is a well-known social software, was introduced in Web 2.0. It is a simple with powerful Web-based collaborative system for creating, accumulating and editing content from anyone on the Internet. Wikipedia is a kind of wiki that is used as an open encyclopedia. Wikipedia defines mashup as a Web site which combines content from participants into an integrated experience [10]. It is the forming of a stable explanation for vocabulary. This situation can be considered as a content management for a term. As an opposite direction, vocabulary collection is a list of terms for the same object which is expressed with vocabulary management from the content. In the herbal world, the content is usually the scientific name and its pictures which can be used for identification. As a result, the herbal vocabulary will be applied in information retrieval and mining system, which are crucial in the area of ethnopharmacology and modern pharmacology. For example, *Aloe vera* (L.) Burm.f. (Figure 1), a famous herb, has been traditionally used for burn healing. There are several synonyms for a scientific name such as *Aloe barbadensis* Mill. Moreover, an herb has several names due to multi-languages and local names for each language. Examples of names both common and local for *Aloe vera* (L.) Burm.f., are shown in Table 1, in several languages.



Figure 1. *Aloe vera* (L.) Burm.f., a famous herb for burn healing.

Language	Local Name
AFRIKAANS	Aalwee, Aalwyn.
ARABIC	الألوه نبات , الألوه
BENGALI	Ghrita kumari, Kumari.
CHINESE	龙舌兰.
DANISH	Lægealoe.
DUTCH	Aloë.
ENGLISH	Barbados aloe, Coastal aloe, Curaçao aloe, Indian aloe, Jaffarabad aloe, Medicinal aloe, Mediterranean aloe, Star cactus, True aloe, West Indian aloe.
FINNISH	Lääkealoe.
FRENCH	Aloès, Aloès vulgaire.
GERMAN	Echte Aloe.
THAI	ว่านหางจระเข้ (Wan hang chora khe), หางตะเข้ (Hang ta khe), ว่านไฟไหม้ (Wan fai mai).
TURKISH	Ödagaçı., Sarısabır, Sarýsabyr.
VIETNAMESE	Cây aloe vera, Cây Lô Hội, Cây Nha Đam.

Table 1. An example of names for *Aloe vera* (L.) Burm.f. in some languages.

In Thailand, *Aloe vera* (L.) Burm.f. is usually called ว่านหางจระเข้ (Wan hang chora khe). However, it is recognized as หางตะเข้ (Hang ta khe) for the north part and ว่านไฟไหม้ (Wan fai mai) for the central part. Name confusion may cause several serious problems. For example, in 1993 in Belgium, a formula created by medical doctors including some Chinese herbs for weight loss, was applied. One herb (*Stephania tetrandra* S. Moore) was swapped for another (*Aristolochia fangchi* Y. C. Wu) whose name in Chinese was extremely similar but which contained higher levels of a renal toxin, aristolochic acid; this resulted in 105 cases of kidney damage [14, 15].

It is a non trivial work for collecting the names (common and local names) of an herb in each language. From these problems, the collective intelligence on the Internet can be used as an excellent tool for gathering multi-lingual terms from people all over the world.

Intercultural Usages

Medicinal uses may be different among cultures. Clinicians need to be aware of the herbal healing traditions of a diverse patient population. For example, ginger root is widely used for culinary as a spice or food additive around the world. Ginger is fried and eaten plain, and used in curry pastes and other sauces in India. In Indonesia, it is grilled and used to flavor fish and meats or for making ginger tea. Fresh ginger rubbed on the affected area is a folk remedy for vitiligo. In Japan, it is used to baste chicken or eaten as pickled ginger and served with sushi, and used in Jamaica to make Jamaican jerk paste. A ginger extract with carbonated water makes the popular drink we call ginger ale. In term of medicinal usages, there are a variety of uses

suggested for ginger [3, 18]. Tea brewed from ginger is a folk remedy for colds. Ginger ale and ginger beer have been recommended as "stomach settlers" for generations in countries where the beverages are made and ginger water was commonly used to avoid heat cramps in the US. Ginger has also been used historically to treat inflammation which several scientific studies support, though one arthritis trial showed ginger to be no better than a placebo or ibuprofen [1]. Research on rats suggests that ginger may be useful for treating diabetes [17].

Simultaneously, the increasing popularity of complementary and alternative therapies means that clinicians need evidence based information on the herbal supplements taken by all patients. In herbal medicine, a therapeutic monograph usually provides a definition of the plant drug (i.e., plant part, nomenclature, etc.), a listing of key chemical compounds, indications, contraindications (i.e., what conditions may be present to preclude use of the herb), side effects, dosage (including per unit and total daily intake), form of administration (i.e., the dosage in powder, tea, tablet or capsule, liquid extract, etc.), duration of use, interactions with other medications, and so on. Information about each topic should be discussed from contributors in community. A contributor can post an opinion on the selected topic. Opinions can be different but majority votes will decide the belief of the communities. These features naturally realize the online collaborative works to create the knowledge communities.

Precautions and Toxicity

Although several herbs are frequently used, they may cause some problems. Some herbs may have toxicity in different situations. For example, some patients are more sensitive to certain herbs and some have more tolerance for some other herbs. For example, *Ginkgo biloba* L. is very toxic to young children. Small children of few years old have died from taking just less than ten pieces of *Ginkgo biloba* L. seeds [12]. Adults are rarely affected by its toxicity but this does not mean it will not happen. Some problems occur from the method of preparation. For example, dried exudate from the *Aloe vera* (L.) Burm.f. leaf (not gel of its leaves) also contains anthranoids and is used as a laxative. *Aloe vera* gel, found within the leaves, is used topically for burns and cuts, and is sometimes recommended by herbalists for internal ingestion to treat ulcers and other disorders. The gel (or juice made from the gel) does not contain anthranoids, but some oral preparations are contaminated by the laxative portion [2]. Some people may have these problems. It would be better to share their experiences on the Internet. This is very useful for other people who would like to use the herb.

THE AIMS AND COMPONENTS OF KUIHERB

KUIHerb is designed using the concept of Knowledge Unifying Initiator (KUI) which enables connection and collaboration among individual intelligence in order to accomplish a goal. KUI is a platform to unify the various

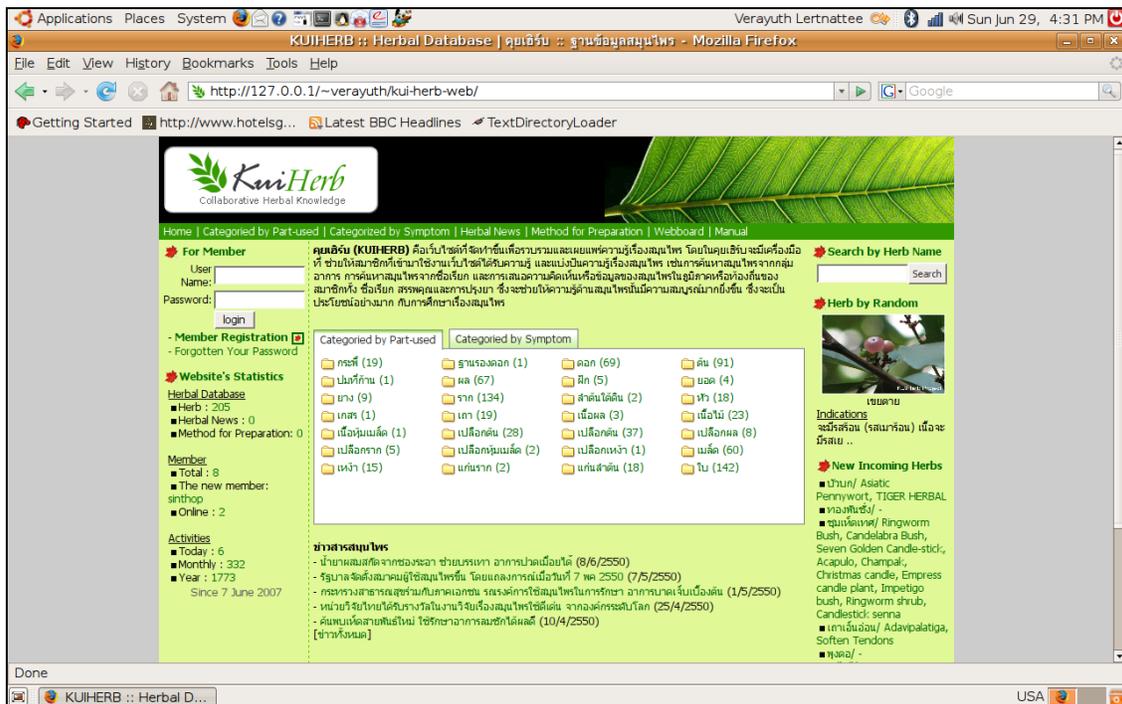


Figure 2. The main page of KUIHerb represents the four components.

opinions to the selected topics. It provides a web interface accessible for pre-registered members [13]. A member or visitor can comfortably move around in the virtual space from desk to desk to participate in a particular task. From this concept, a knowledge community can be formed. The domain knowledge is efficiently created through the features provided by KUI. These features fulfill the process of human thought to record the knowledge. The original of KUI, is available at <http://www.tcllab.org/kui>. However, it has been modified for collecting herbal information so-called KUI for Herbal Information (KUIHerb for short). It is available at <http://inf.pharm.su.ac.th/~kuiherb>. In the first version, user interface is represented in Thai. However, the English version has already constructed. The aims of KUIHerb and its components are described below:

THE AIMS OF KUIHERB

- Gathering herbal information from multicultural environments
- Identifying a real herb in traditional herbal formulas
- Identifying new applications of the well-known herbs such as
- Pharmaceutical products and traditional medicine
 - Indications
 - How to apply
 - Side effects and toxicity
 - Initiator for pharmaceutical products

- Natural color for painting and cooking New methods for cooking
- Collecting a list of experts in traditional medicine Collecting technical terms for constructing an herbal terminology

Components in KUIHerb

Four components are implemented in the KUIHerb i.e., sharing and collecting information, providing information, searching information and Web site statistics. The figure of the home page of the KUIHerb is shown in Figure 2. The detail of each component is described as follow.

Sharing and Collecting Information

For the first version of KUIHerb, six topics are taken into account for sharing and discussing knowledge about herbs i.e., general characteristics, images, herb names, parts used and their indications, precautions including toxicity and additional information. Among these topics, a poll-based system is implemented on herb name, part used including indications. With this system, a contributor may choose to work individually by posting his/her opinions about the topics. Any opinions or suggestions are committed to voting. While opinions may be different, majority votes determine the view of the communities. These features naturally realize the online collaborative works to create the knowledge communities. The weighting system for each opinion can be calculated by the formula

$$Wsum_{ik} = \sum_j w_{ijk}$$

Here, $Wsum_{ik}$ is defined as the total weight of the i th opinion of the k th topic. The w_{ijk} is the weight of the i th opinion which is given by the j th member who would like to vote in this opinion for the k th topic. The value of w depends on the priority and agreeeness of the member. The weight from the member, who contributes more accurate information for a long period, should be higher than the new one. The w is needed to update from a period of time. Furthermore, if the member agrees with the opinion, the value is positive and vice versa. A set of higher weight opinions for each topic, tends to be more believable.

Providing Information

In the first version of KUIHerb, two approaches are available for providing herbal information. The first approach is the current news about herbal information by Web links. The administrator of the KUIHerb usually adds news about herbs and it is easy to link to the source of information. In other approach, information of an herb is randomly selected from the KUIHerb database when users visit the homepage of the Web site. It also provides a list of new herbs added to the database.

Searching Information

Information of an herb can be reached by two methods i.e., keyword search and directory search. KUIHerb provides the ability to keyword search facility by using a Thai common name, a Thai local name, an English name and a scientific name of an herb. It also provides the ability to browse categories of part uses and indications.

Web Site Statistics

In order to know what is happening and up-to-the-minute data to make the right decisions that affect the growth of

the KUIHerb community. Three set of statistics are created for these proposes. The first set is for the herbal database which provides information on the number of herbs, news and topics in Web board. The second set provides community membership details including the members of the community i.e., the number of members, the newest member, the number of active members at that particular time. The last statistical set reports the total activities in a period of day, month and year.

RESULT

KUIHerb has been implemented using all open source software components. The scripting language is PHP. The data is stored in a database which is constructed with MySQL. With the Web 3.0 concept, the system has been designed for general users who would like to participate. Figure 2 shows the Web page for searching information by a directory and keyword. Web links to the current news and information of an herb is provided for users. To create accurate and reliable herbal information from users, three levels of access are defined i.e., 1) View Only - everyone may view the content of the Web site 2) Member - a group of users who get right for adding, changing and deleting his/her own information and 3) Admin - a group of users who get right for modifying all information.

Conceptual Model for Herbal Information

In Figure 3, a conceptual model of the herbal information in KUIHerb is represented. It was designed for creating knowledge on herbal identification, vocabulary collection of herb names, global and local usages, precautions and additional information.

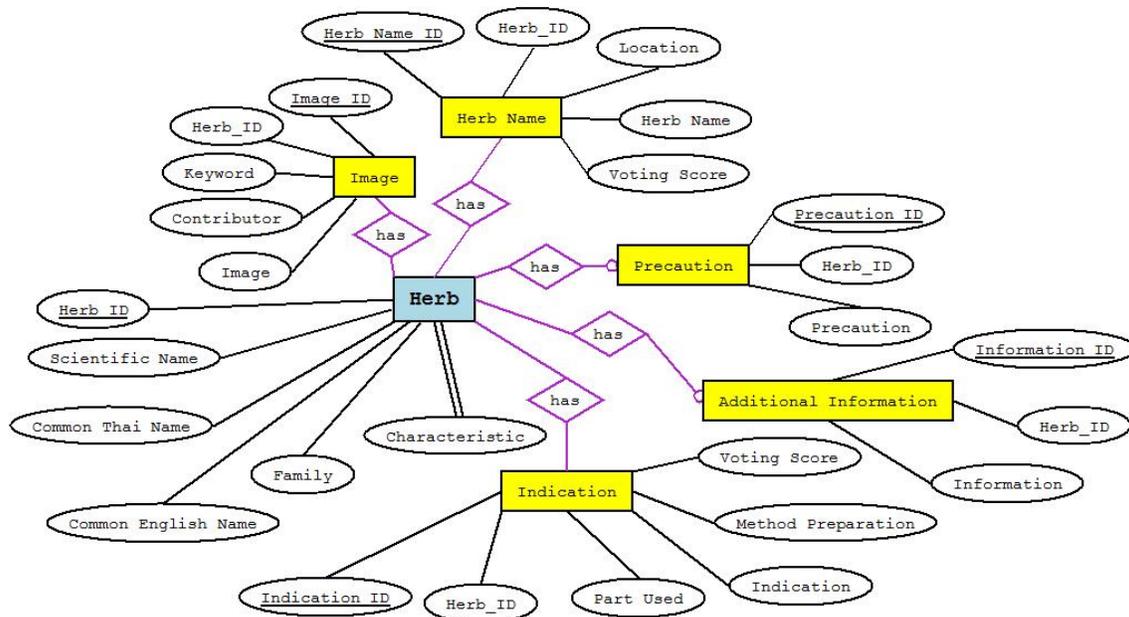


Figure 3. Conceptual model of the KUIHerb.

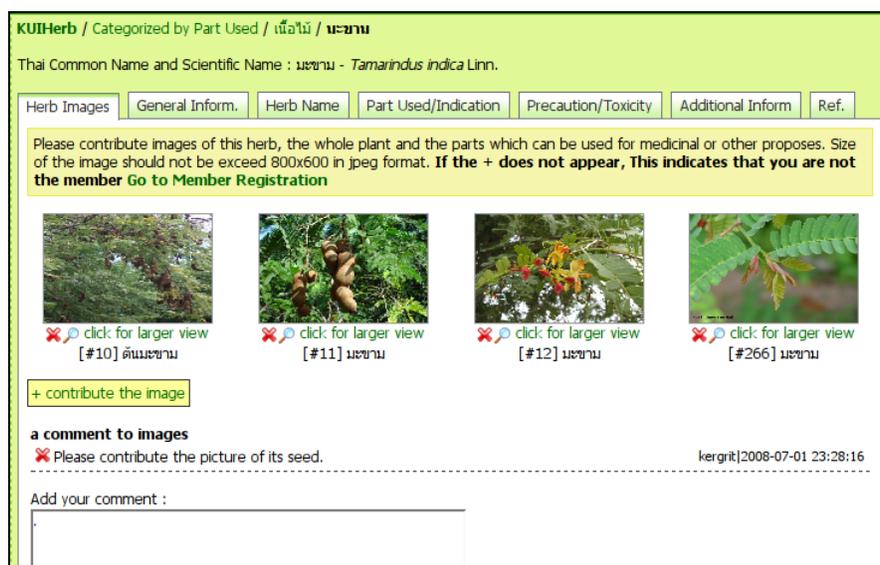


Figure 4. Collecting images with their keywords.

Collective Intelligence in KUIHerb

Herbal Identification

The scientific name of an herb and its images are used for common understanding. In this platform, not only can the text content be shared among members but also images of an herb can be uploaded to the system. This is very important for herbs whose part used rarely appear. The images described should relate to the whole plant. The parts which have medicinal usage such as leaves, roots, flowers, seeds, resin, root bark, inner bark (cambium), berries and sometimes the pericarp or other portions. They should be in both fresh and dry forms. The keywords and names of contributors can be provided to the system. When the pointing device is moved over a picture, the name of contributor for that picture will appear. Images and their keywords are shown in Figure 4.

Voting for Vocabulary Collection of Herb Names

In this topic, local names of herbs are suggested by members. Multi-lingual names can also be applied. Furthermore, the location or the language which uses the name may be given. A majority voting is applied on a given name and location. With this method, we can summarize that the herb name is used in the levels of a city, province or larger area. In this version, all members are given equal weight. If users agree with the opinion, a simple click on the button "Vote" will increase the score by one. Each member has only one vote for an opinion. The opinion with the higher score will be moved to the upper part of the window. In cases of multiple opinions, the popular vote will select more preferred opinions used in the community.

Multi-lingual names and local names of *Tamarindus indica* Linn., are shown in Figure 5.

Voting for Global and Local Usages

This topic may be the most attractive in KUIHerb information on parts used of the plant, its indications, and how to apply, are given (Figure 6). A list of predefined parts which may be used for treatments is provided. A member may select the part and suggest its indications. The method for preparation can be suggested. In the case of a part with several indications and several methods for preparation, the opinion should separate the indications and methods of preparation for each part used. A majority voting is also applied for this topic. For common understanding, English should be applied as much as possible. However, several herbal specialists may not be familiar with English. Local languages can be applied in KUIHerb. This feature is useful for native contributors who would like to share their opinions with their languages.

Precautions and Additional Information

Two topics are separated from the others. These are precautions (including toxicity) and additional information. These two topics are free text without the majority voting. For a precaution, any suggestions will be kept for warning when someone would like to use the herb (Figure 7). Although the voting system does not apply to the opinion, nonetheless different opinions can be given to the KUIHerb. For additional information, other valuable information such as cultivation may also be given. This space can be applied for suggesting references for an opinion in order to make the opinion more reliable.

KUIHerb / Categorized by Part Used / ผล/fruit / มะขาม

Thai Common Name and Scientific Name : มะขาม - *Tamarindus indica* Linn.

Herb Images | General Inform. | **Herb Name** | Part Used/Indication | Precaution/Toxicity | Additional Inform | Ref.

Thai Names : มะขาม
 English Names : Tamarind, Indian date
 Sci. Names : *Tamarindus indica* Linn.
 Families : CAESALPINIACEAE, FABACEAE, LEGUMINOSAE

Please contribute names of this herb in your local language. If possible, please contribute the location where the herb is called. Click VOTE for voting the names in a list OR Click +Contribute Other Names for the new name. **If the + does not appear, This indicates that you are not the member, please click Go to Member Registration**

Other Names List All (12) | Back 1 - 12 Next

	Local Name	Location	Score
VOTE	มะขามไทย		2
VOTE	تمر هندي		2
VOTE	大瑪琳	China	2
VOTE	สามอกล	กะเหรี่ยง-แม่ฮ่องสอน	1
VOTE	มะขามกะดาน		1

Figure 5. Sharing and voting the names of an herb.

KUIHerb / Categorized by Part Used / ผล/fruit / มะขาม

Thai Common Name and Scientific Name : มะขาม - *Tamarindus indica* Linn.

Herb Images | General Inform. | Herb Name | **Part Used/Indication** | Precaution/Toxicity | Additional Inform | Ref.

Please contribute your opinions about part used, indications on both folk and modern medicine and methods for preparation. Click VOTE for voting the opinions in a list OR Click +Contribute your opinions for the medicinal uses. **If the + does not appear, This indicates that you are not the member, please click Go to Member Registration**

Suggested Medicinal Uses List All (9) | Back 1 - 9 Next

	Part Used	Indication	Method for Preparation	Score
VOTE	เนื้อหุ้มเมล็ด/ari, pulp	To treat sore throats	mixed with salt and used as a gargle	2
VOTE	เนื้อไม้/wood	เป็นยาแก้ไอ แก้โรคบิด ขับเสมหะในลำไส้ แก้หวัดคัดจมูกได้ หรือใช้น้ำที่ต้ม ให้สตรีหลังคลอดอาบและใช้ช้อนไอน้ำ		1
VOTE	ผล/fruit	เป็นยาแก้อาการท้องผูก เป็นยารักษา แก้ไอ ขับเสมหะ ช่วยลดอุณหภูมิในร่างกาย ลดการกระหายน้ำ เป็นยาขับเลือดขับลม แก้ส้นเท้าคุดหน้าเพลิง ใช้เป็นยาถ่าย และยาแก้ไอคัดเสมหะที่เหนียวข้น เนื่องจากมีกรดอินทรีย์ เช่น กรด trataric และกรด citric		1
VOTE	เปลือกต้น/bark	แก้โรคเรื้อรังและงูสวัดได้โดยเฉพาะในช่วงที่กำลังอักเสบ ผลกำลังปวดแสบปวดร้อน	ให้นำน้ำที่ฝนจากเปลือกมาทาช่วยแก้การอักเสบได้	1

Figure 6. Sharing and voting the names of parts used, indications and methods for preparation.

KUIHerb / Categorized by Part Used / ผล/fruit / มะขาม

Thai Common Name and Scientific Name : มะขาม - *Tamarindus indica* Linn.

Herb Images | General Inform. | Herb Name | Part Used/Indication | **Precaution/Toxicity** | Additional Inform | Ref.

Please click the + symbol to contribute your opinions about precautions and/or toxicity for this herb **If the + does not appear, This indicates that you are not the member, please click Go to Member Registration**

#1 According to one survey, dust exposure to tamarind flours may induced chronic changes in lung function

[+Contribute your opinions](#)

Figure 7. Sharing precautions and toxicity of an herb.

CONCLUSION AND FUTURE WORKS

In this work, we addressed the problem of collecting herbal information from a multicultural community. To alleviate this problem, the KUIHerb was used as a platform for building a web community for collecting the intercultural herbal knowledge based on Web 2.0 and Web 3.0 concepts. For an herb, a scientific name and its images were used for common understanding. KUIHerb provided not only a feature for developing an herbal vocabulary but also a capability for expressing the information about parts used, indications, methods for preparation, precautions and toxicity. In cases of multiple opinions are provided, the popular vote selected more preferred opinions used in the community. Furthermore, a list of experts in traditional medicine could be discovered and could be built a network for exchanging information. Multi-language opinions can be shared to create a global knowledge. Knowledge collected from the KUIHerb could be applied in herbal information retrieval and data mining system, which are crucial in the area of herbal medicine.

In this version of KUIHerb, majority voting with equal weight for the members were used for selecting the best opinion. The member who has made a more valuable contribution to the system should be given greater weight. Furthermore, members may give negative weight to an opinion which they expect that it should be incorrect. These issues are left for our future works.

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