Mangrove Ecosystem Conservation Manual

A focus on Kenya

FSPI Mikoko Conservation and resilience of Kenyan mangrove forest - 2021

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KENYA
Forest Service

REPUBLIC OF KENYA

Institut de Recherche pour le Développement
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Taasisi ya Ufaransa ya Utafiti kwa Maendeleo

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2 Mangrove Plant identification tool

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2.1 Introduction

Identifying a plant, that is giving it a name and distinguishing it from others plants, maybe complicated. It is however, its identity that you will have to start with if you want to know more about the plant; for example to know where and how it grows, if its fruits are edible, if the leaves, roots or stems have medicinal properties, and if so how to use them. Knowing the plant name, we can find a lot of information useful to our lives.

Plant identification generally requires basic scientific knowledge, because it is necessary to know what to observe in a plant in order to identify it.
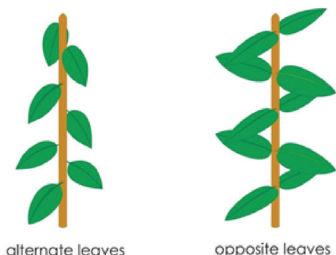
One of the easiest characteristics to observe and acquire useful information for identification is the arrangement of the leaves on the stem; whether they are alternate (one leaf per node) or opposite (two leaves per node).

alternate leaves   opposite leaves

Botanical expertise is being lost, in part because of the lack of academic training. In addition, the traditional methods of identifying plants (eg. Dichotomous keys) are not flexible to allow multiple options, which may lead to errors. They also mainly emphasize the use of flowers more than others plant organs, but the flowers are not always present or if they are, they can be inaccecessible (high in the tree tops). Finally, the use of technical terms in identification process poses a challenge for non-specialists.

It is in this view that a team in CIRAD has been working for several years on Plant Identification System named IDAO (French acronym: Identification Assistée par Ordinateur) to address challenges encountered in plants identification.

The originality of this software lies mainly in the use of an **identikit[1]** (user graphic interface) which reconstructs the plant using simple graphic representations. A specific identikit for mangrove plant identification was developed.

In the framework of *Mikoko* project, an Internet-based application was developed to facilitate identification of about 50 mangrove species. This application is also available for use in mobile devices like smart telephones or tablets.

The navigation page contains simple drawings representing a theoretical plant (the Identikit) and a menu with different functionalities on the right side of the screen.

The Mangrove Identikit is organized around 3 main zones (or drawings) where the user can interact with the app; they represent different botanical characters (Figure 1): the tree with roots on the left of the interface, the stem with leaves in the center and a detail of the leaf on the right side of the interface. The drawings are simple to facilitate the understanding of the users and theoretical enough to evoke a given organ without corresponding it to a particular species.
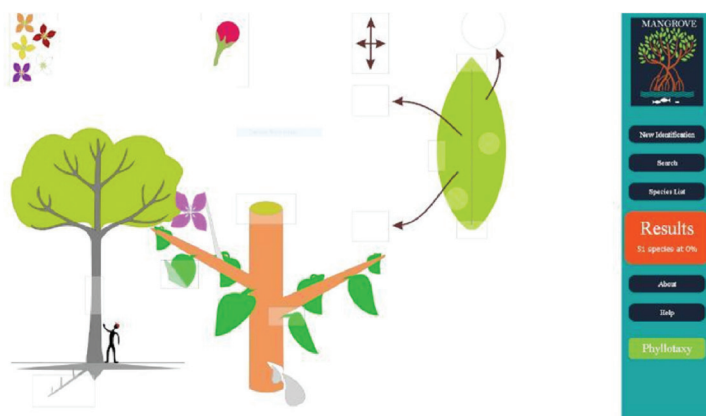

Figure1: Mangrove Identikit or user graphic interface.

[1]Identikit: because at each click the interface will be modified in order to represent the plant the user is looking for.

The user can choose any plant character (eg. type of roots, leaf type, type of fruit, color of the flowers) to start the identification process. Then by a simple click on the frames of the identikit, or on the different drawings, the user can choose the botanical characters available in the software that match with the plant under observation.

When the user slides the cursor on one of the drawings or frames, a window appears the name of the botanical character.

2.2 The identification process

To start the identification the user can choose any kind of botanical character, i.e. it is a multi-entry application.

It is preferable to choose a small number of characters, of which you are sure. Remember that quality of the identification depends on keenness of your observation.

As the user goes through the identification, the orange "Results" button shows you how many species match the choices made by the user.

Example 1: Identification with few characters
Some characters common to only a few species (e.g., spiny leaf margin, particular berry fruit) can quickly give the identification (1 species at 100%).

1. Choose "Margin of the lamina"
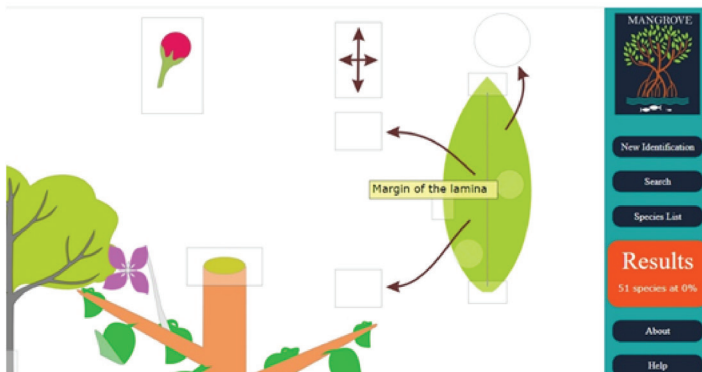
2 The orange "Results" button shows 1 species at 100%. The user arrives at the identification! Click on "Result" button and in this case is *Acanthus ilicifolius*.
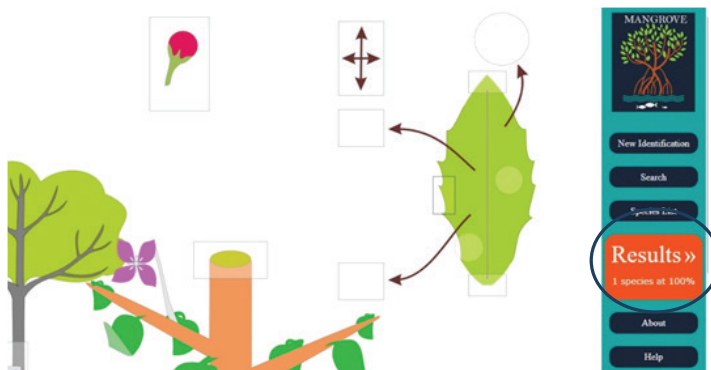
A new window appears with the description of this *Acanthus*.

Example 2: Identification with many characters

1) Choose **shape of the plant** by clicking on the whole plant; choose a **tree**. Remark the following changes:

- The chosen type of plant appears in the identikit interface and

- The number of species (orange button) pass from 51 to 29 species.

2. Then select another character, for example type of **leaf**; choose a **simple leaf;** then 25 species are trees with simple leaves. The number of species pass from 51 to 25 species.

3. Select type of **pneumatophore**; choose **knee pneumatophore;** then only 7 species are trees with simple leaves and knee pneumatophores.

4. Select type of **fruit**; chose propagule with red calyx

The user gets the identification of 1 species at 100%, in this case *Bruguiera gymnorhiza*. This implies that only one species matches with the combination of the characters chosen. By clicking on the results button, the user accesses the list of species ordered by a decreasing percentage of similarity, being *B. gymnorhiza* at the top of the list.

Bruguiera gymnorrhiza (L.) Savigny - *RHIZOPHORACEAE* - Dicotyledon

Common name in Tamil : Sigapukokandam
Common name in Telugu : Thuddu ponna
Common name in Singhalese : Sirikanda

Diagnostic characters Botany & morphology Regeneration Reproductive biology Ecology Distribution Uses

Diagnostic characters :

Large trees up to 30 m tall with short buttresses; bark black, rough, fissured in a regular checkered pattern; knee-roots prominent. Leaves are crowded at the ends of branches; often reddish beneath. Flowers red to scarlet; fruits cigar shaped with red calyx cap.

Botany & morphology :

Leaves simple, entire, opposite, elliptic-oblong, bluntly pointed at apex, cuneate at base, glossy green on the upper surface and reddish below, 8 - 22 x 5 – 10 cm, coriaceous; stipules and petioles reddish; petiole up to 4 cm long.

Flowers solitary, large, up to 3.5 cm long, regular, red to scarlet; calyx campanulate, 12 - 16 lobed; petals as many as calyx lobes, ciliate toward base; stamens enclosed in pairs by petals; style slender, filiform with 3 or 4 stigmatic lobes.

When this percentage does not reach 100%, it means that the combination of characters chosen does not exactly correspond to any species listed in the application.

2.3 What can we learn from the identification of a species?

When the user arrives at 1 species at 100%, and clicks on the "Results" button, a new window gives the following information:

- The scientific name of the species along with family name,
- The list of synonyms and the common names in other languages
- The pictures of different plant organs,
- A detailed botanical descriptions,
- The major aspects of the species biology, ecology, distribution, uses,
- And the list of accessible bibliographical references on mangrove species.

2.4 Other functionalities of the Mangrove App

The « New Identification » button. This button serves to initiate a new identification; it puts the user interface at zero.

The **"Search" button.** The "Search" button may help the user to differentiate two similar species. If not able to differentiate the two species the software allows further search using different botanical characters until the user gets to one species at 100%.

The **"Species list" button.** If the user does not want to identify, he can directly access the species list by

- Scientific names listed in alphabetical order
- Plant family's names
- Plant common names
- Graphical View of Species (Listed in Alphabetical order)
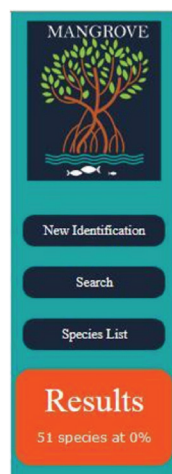
These different options can be very useful when you want
to quickly get more information for a species that you already know the identity.
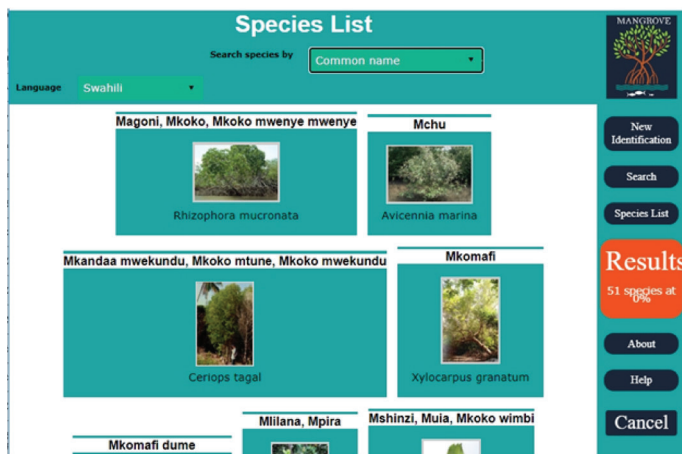
This digital application offers a "trip" into the vegetal world of mangroves through an interactive approach. Without any knowledge of botany, you will be able to identify mangrove species of the Indian Ocean.