

THE STUDY OF MORPHOLOGY APUAPU (*Pistiastratiotes*)  
AND KIAMBANG (*Salviniamolesta*)

Muhammad Rijal

Religious Institute State Islamic Ambon, TarmiziTaherstreet, Molucas 97128

FatchurRochman

Malang University, Semarang 5 street, East Java

YaniKamsurya

UniversitasDarusalam Ambon, Tulehustreet km 24, Molucas 97582

**Abstract:** *Pistiastratiotes* and *Salviniamolesta* are biennial plants having habitus and habitat of the same so that is still difficult distinguished as a plant which is different. The results of the study of morphology and studies literature, obtained of the difference between them namely: *Pistiastratiotes* is herbs who enters into a division of magnoliophyte, while *S. molesta* is pteridophyte. *P. stratiotes* having no apparent stem, its leaves are arranged in a rosette, a single leaf, the end rounded leaves, the base of sharp-pointed leaves, the edge of notched and covered with thick hair and soft. Long narrow leaves 2 - 10 cm, wide leaves 2 - 6 cm, parallel, pertulangan leaves the fruit of bunny, in a rounded shape and ruby-colored, with size of 5 to 8 cm. Globular, while seeds black, and a small seeds 2 mm, with size the root of the white, long tassels that hangs below a rosette of floating freely along the waterways and having stolon. *S. molesta* having unbranched stems growing laterally, have nodus, overgrown with feathers and its length can reach 30 cm leaves which floats oval-shaped, alterna with long no more than 3 cm a short stalk covered many feathers and green colored of leaves which grow on the water surface shaped somewhat circular lobe, colored chlorophyll so green type leaves both grow in the water shaped very similar roots not have chlorophyll and serves catch disturbances from the water like roots do not produce flowers because entrance ferns, groups spatially heterospor, having two spores namely type makrospore that will grow into prothallus females and microspores that will grow into prothallus male

**Keywords:** *Pistiastratiotes*, *Salviniamolesta*

### Introduction, Background

Indonesia included in territorial monsoon climate Asia. Generally this mechanism marked with high rainfall throughout the year accompanied a cyclone, a storm and the whirlwind rare except in the island far east island Indonesia as the island of Timor. The mechanism of this climate determined by the movement of convergence zone inter-tropical (ITCZ) together with the movement of the season and the meeting of upholstery wind that inflict succulence. Overall the climate Indonesia classified as hot and humid all year with the temperature of the air which remains not exceed 27 °C. Besides, Indonesia lies on both sides of the equator, so that Indonesia has some different climate in west side of the island, tending to tropical climate and damp spring while on the east climate is summer [1]

The climate strongly influenced the types of plants that live in an area. Different types of plants live in different climates. For example, the rain forest grows in the hot and wet areas around the equator, whereas conifer forests (conifers) grew up in the cold area in the North. Further to the North, the temperature even colder again, only mosses and small flower plants can survive. This also applies also on the development of various type plants in the region of Indonesia which tropics. A

result of tropical climates that are found on Indonesian territory the then Indonesia having type plants that typical with tropical climate, namely herbs having ability in adaptation, morphologically, physiological and mannerisms to life on dry conditions and humid, with have water and temperature that is not too extreme [2]

In general, many plants capable of living in the tropical regions. Therefore creating the tropical rain forest characterized by abundance of the diversity of species of plants of low levels up to the highest degree. Now therefore Indonesia has wetlands covers more than 38 million acres or 21 % of the land area, and is country with wetlands widest in Asia. Wetlands include lakes, mangrove forest, peat swamp forests, swamp forests and doing stuff that majority can exist in low-lying alluvial and valleys river, mouth of the river and coastal regions in Sumatra, Kalimantan and Irian Jaya. Wetlands have the potential and diversity on many kinds of aquatic herbs to the peculiarities of owned every its kind [3]

Study the morphology of plants has been much practiced by the botanist, but there is some kinds of plant in a morphological manner is still difficult to distinguished, it is caused by having habitus and habitats that are the same. Plants which are normally causes misperception is *P. stratiotes* with *S. molesta* that is still difficult to be distinguished as a plant different. Until now, still there are much public education often level this, both plants even say that the plant is the same. To avoid any second misperception about the plant, should be conducted a study of morphology that aims to see the extent to which both, similarities and differences so that a grouping of both plants were more directed and clear

## Methods

The method used in the survey which is meant to represent and deskriptif morphology *P. stratiotes* and *S. molesta*. The plant was acquired Arbes taken in by river as purposive, and sampling later identified with the label and morphology made in form and characteristics of the botanist herbarium IAIN Ambon Institute. The results obtained from plants (determined by the flora vanteenis)

## Results and discussion

### 1. KayuApu (*P. stratiotes*)

*Pistiastratiotes* often called lettuce cabbage water or water. The distribution of the original uncertain, but perhaps in regions pantropical. First, taken from the Nile river near Lake Victoria in Africa. Now naturally have found in almost all fresh subtropical regions and tropical. Is a plant remains green monocotyledon thick, with fronds soft forming a sculptured as the form of roses. Its leaves can be reached 14 centimeters and don't have a trunk. Hairs its roots forming a structure shaped like a basket and surrounded an air bubble, so as to increase buoyancy of this plant. Interest rate hidden in the middle of the leaves of plants in between. This plant can also be experienced reproduction vegetative. *P. stratiotes* can merchantable to place a sale on the beach. Derived from the water with a herbicide also can also use. These plants often used in aquariums tropical to protect small fish

**a. Their classification and general description**

Regnum	: Plantae
Sub Regnum	: Tracheobionta
Superdivision	: Spermatophyta
Division	: Magnoliophyta
Class	: Liliopsida
Subclass	: Arecidae
Order	: Arales
Family	: Araceae
Genus	: Pistia
Species	: <i>Pistiastratiotes</i> L. [4]

Their classification and the general description of herbs is known with water lettuce in English which means lettuce cabbage water or water. Is herbs that originated in Africa or South America, growing naturally or it could be taken by human beings. The spread of hydrophyte widely during the tropical climate. In South America, subsist on a Peninsula Florida and headed for western and Texas. In Florida, in document along lake, the flow of rivers, the beach, lake that are superficial and the community in which rough. A specimen herbarium collected from 39 region of such a district Bay in the Panhandle through Peninsula South to Collier and regent Miami-Dade. The population was also reported from the region natural in Okaloosa, Gadsen, Madison, Osceola, and Monroe. Also found on the Peninsula of South Carolina. But have now spread to temperate regions of tropical and subtropical, including Asia. This plant is herbs floating on the water surface, herbaceous plants with stoloniferous and ordinary found in a puddle as ponds and streams through India to a height of 1000 meters. The leaves are frequently used for treatment. In Gambia, this plant used as anodyne to wash the eye [5]. Reproduction walk quickly with vegetative is stolon. The affect the density of roset, namely less than 100 per m<sup>2</sup> up to more than 1,000 per m<sup>2</sup> in South Florida. There is no tolerance by low-temperature or cold. But can survive for long period of time on the poop moist, its edges, and the rim of sand the river.

**b. Morphology**

Approach morphology is a system whereby a sample observations in analyzing its properties and habitude possessed of samples can be easily identified for visible to the eye and it is clear. This plant is herbaceous plants that live afloat on the surface of calm water or water flowing but with its flow slowly. According to the names of plants is watercress (in Indonesian language), then as a whole this plant similar to lettuces however small, float and open up. This plant is herbs stay green that is herbs monocotyledone. This plant tending to expand and trace and form large colonies that can be covering the entire surface that is available to them. Herbs this is more like it in place and got bright light of the sun freely. But also can live in shady place but still exposed to the light of the sun in partial [6]. Habitus of these plants, can be seen from figure the following:



Figure 1 Habitus *P. stratiotes*

Water lettuce (*P. stratiotes*) having no apparent stem and even not having a stem. Its leaves are composed in a rosette close by root, so called a rosette root. Leaves are single leaf. End rounded leaves but the sharp-pointed leaves. Edge notched leaves and covered with thick hair and soft. Long leaves around 2 to 10 cm wide leaves while about 2 to 6 cm. The leaves thick and soft form a sculptured like a crown roses and little spongy. Costa leaves parallel, where the sparse foliage and veiled. Leaves are bluish green sometimes if is old somewhat yellow. Petiole very short hardly any. Flowers are in the center a rosette and grow white but not so clear. Flowers are the type flowers spatha and lies in the armpit in the middle of a rosette of leaves. Interest is flowers monœcious. Long flower more or less 1 cm, having hair and protected by spatha, and flowers skulk so it does not it is clear. Of reproduction in which besides generative, also could happen in vegetative, done by producing stolon. The lining membrane of flowers separate between the male flowers and female flowers. The fruit of a flower apu-apu (*P. stratiotes*) is the fruit of bunny. Globular fruit and ruby-colored, with size of 5 to 8 cm. While the seeds of plants, this round in shape black, and small in size. The size of the seeds of 2 mm with a side longitudinal and tapered ends. The root of the white, long tassels that hangs below a rosette of floating freely in tract along the water. The root has stolon, hairs its roots forming a structure shaped like a basket and surrounded an air bubble, so as to increase buoyancy of this plant. Roots may grow long to reach 80 cm [7]

Water lettuce is plants that can breed not only in generative is through pollination at interest, but also in vegetative. Breeding vegetative can be achieved because capable of forming stolon. Stolon it can be cut off at the ends and will be detached and grow into a new individual. Hence this plant can rapidly, because it can done in a generative and also vegetative by using stolon. So that by the presence of the ability of the hence this plant can grow and can expand and trace and form large colonies that can be covering the entire surface that is available to them. The root of which is possessed of this plant roots and fibers forming a structure shaped like a basket and surrounded an air bubble, so as to increase buoyancy of this plant. It showed form physiological adaption done herbs water lettuce to capable of living in the area waters and remain receive sunlight and air to process of photosynthesis. Besides, the leaves of roset and a leaf shape that tends dilated help this plant to be floating on the water surface because broad contact with water broader, and leaves wide help these plants to do evaporation of water in excess. According to Landprotection (2006), leaves water lettuce herbs having hollow structure, and when viewed in histological techniques, then seems that there are empty cavity in tissue mesofil called tissue aerenkim. This shows the way water lettuce to adapt to environmental his life is aquatic or wet, land which aims to float on the water.

Plants that have a lot of air cavities will be increasingly easy to float because the network constituting not dense and heavy [9]

## 2. Kiambang (*Salviniamolesta*)

Kiambang (*Salviniamolesta*), found the first time and studied at the University of Colombo, Ceylon. Kiambang native of South America and introduced on the island of Java through the Botanical Gardens Bogor. Based on the Botanical Garden Bogor, kiambang introduced on 12 december 1950 of Botanical Garden Montreal, Canada. Kiambang native of South America and is of water plants who is described as one of a weed which is injurious in the world. Besides, kiambang weed is a plant rice but not decreasing the production of rice so the plant such including weed that there is no disadvantage to other plants.

Kiambang is water plant which is much found in the fields, the pond. The river, puddle of water, lake payau, and water channel. And sometimes it is very much up to the surface of the water or flow slowly. Kiambang a free floating aquatic plants that live at the surface of the water the development and rapid growth is to cover the surface of the water. Kiambang can be seen from the low altitude of 1,800 m above the surface of the sea, in Indonesia there were a lot of Sumatera, Java and Kalimantan [10]

### a. Their classification and general description

*Salviniamolesta* look from biology classifications included in family the salvinaceae and genus salvinia. This plant discussed in England called kariba weed, in discuss sundanese called kayambang, lukut, lukutcai and eyes lele, language Java called kiambang, while in discuss (Indonesia, Singapore and Malaysia ) called kiambang. *Salviniamolesta* first found in united states and learned in Colombo University. This plant placed to Indonesia from the garden botany Montreal Canada 1950 to add collection of Bogor Botanical Garden [11]. Classifications *S. molesta* according to USDA (2002) is as follows:

Regnum	: Plantae
Sub Regnum	: Tracheobionta
Division	: Pteridophyta
Class	: Filicopsida
Order	: Hidropteridales
Family	: Salviniaceae
Genus	: Salvinia
Spesies	: <i>Salviniamolesta</i> L

Currently *S. molesta* spread to every parts of Indonesia. The spread main done by man because beautiful as coaching plant aquarium. *Salvinia* can spread in natural with wind and stream of water or carried away because vessel, snagging tools fishing and other appliances always used human. The spread of one waters in marine others can also due for cows or bulls who drink water from the the infected. *S. molesta* lived in a puddle or shallow water with a slow stream; like a standing pool,

brackish lakes, irrigation canals and lake, sometimes very much and covering the surface of water who dwell or flow that is slow. *S.molesta* develop through cleavage have the ability and increase itself over a wide area in a short time, in its growth affected by the density of populations, the more solid populations and slows. If the condition of ideal *S.molesta* can grow two times that in two time two days. Besides growth, *S.molesta* affected by the depth of water at the depth of 15 cm give growth better than the depth of 2 cm, it showed that the condition of water normal growth will accelerate [12].

*Salviniamolesta* could be found of the lowlands until 1800 m altitude, in Indonesia mostly located in Sumatra, Java and Kalimantan. Short that the spread *S.molesta* influenced by factors among other: a) ability increase itself in vegetative the swift; b) can grow of a piece of small part plants; c) population fast steady because not subject to the multiplication sexual; d) growth morphology more producing parts that photosynthesis proces so that its surface water quickly covered; and e) true independence growth to condition a substrate and fluctuates of the water. There are three phase growth *S.molesta*: on first phase flat leaves in diameter 10 mm, both phases leaves growing with long 25 mm, wide and fold up, at phase third leaves undersized 38 x 25 mm, compact, nearly upright and folded. Third this phase it develops upon environmental conditions under optimal and occurring during two-three weekend [13].

#### **b. Morphology**

*S.molesta* have stems, leaves, and roots. Branched stems growing horizontally, have nodus and internodus, overgrown and its length can reach 30 cm. On each book contained a pair of leaves that float and a leaf that sinks [14]. The leaves are oval-shaped floats, alterna with a length of not more than 3 cm, short stalks covered in feathers, and lots of green. Submerged leaves hang with long reach 8 cm, hooves and divided and downy. A cursory appearance similar to roots, but actually leaves a changed form and functions as the root [15]. Habitus *S.molestac* can be seen in the following figure 2:



Figure 2. Habitus *S. molesta*

Kiambang have two types leaves that are very different. Of leaves which grow on the water surface in the form of a circular, the tip of the somewhat have chlorophyll so green, and its surface covered with hair white somewhat transparent. Hairs it prevents leaves become wet and also helps kiambang afloat. Leaves type both grow in water shaped root, very similar not chlorophyll and serves catch nutrition of the water like a root. Kiambang does not bear flowers because it

division pteridophyte. As a nail water (e.g. semanggi water and azolla). Kiambang also is heterospor, having two types of spore: makrospora that will grow into prothallus females and mikrospores that will grow into prothallus male 16.

### Conclusion

After discussion of morphology in plants *P. stratiotes* and *S. molesta* seen many differences as follows: *P. stratiotes* having no apparent stem, its leaves are arranged in a rosette, a single leaf, the end rounded leaves, the base of sharp-pointed leaves, the edge of notched and covered with thick hair and soft. Long narrow leaves 2 - 10 cm, wide leaves 2 - 6 cm. Costa parallel where the bones of a thin leaf and cloaking, leaves are bluish green sometimes, if somewhat colored yellow, is old the leaf stalks of very short hardly any. Flowers are at the center of a rosette and grow white but it is unclear, flowers are the type flowers spatha and lies in the armpit leaves, monœcious, long flower more or less 1 cm, having hair and protected by spatha, and flowers skulk so it does not it is clear. The fruit of bunnj, in a rounded shape and ruby-colored, with size of 5 to 8 cm. While the seeds of this plant shaped round colored black and small-sized with size seeds 2 mm, with longitudinal side and tapered ends. Long roots of colored white that hangs below a rosette of floating free along waterways and having stolon. Kiambang having unbranched stems growing laterally, have nodus and internodus, overgrown with feathers and its length can reach 30 cm on any book there is a pair of leaves which floats and a leaf who drowned. Leaves which floats oval-shaped, alterna with long no more than 3 cm a short stalk covered many feathers and green colored of leaves which grow on the water surface shaped somewhat circular lobe, colored chlorophyll so green and its surface covered with hair white somewhat colorless transparent. Leaves type both grow in water shaped root, very similar not have chlorophyll and serves catch hara of the water like a root, does not bear flowers because it division pteridophyte. Kiambang also is heterospore, having two types of spore: makrospora that will grow into prothallus females and mikrospores that will grow into prothallus male.

### Recommendation

*P. Stratiotes* and *S. molesta* is freshwater plants having many differences, both in terms of taxonomic and in terms of morphology. Besides, second plant is said to be functioned as agents fitoremediasi to cesium waste. Rests from the morphological about structure and capacities fitoremediasi, as the agent do we need to study more deeply about the *P. stratiotes* and *S. molestato* remediation in some as metal heavy, detergent, and coliform.

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