

**LITERATURE REVIEW OF *SCAVOLA TACCADA*****Sutar N. G.<sup>1\*</sup>, Ajay Kulkarni<sup>2</sup> and Arangale K. B.<sup>3</sup>**

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**ABSTRACT**

The plant *Scavola taccada* is a dense, spreading shrub that forms rounded mounds from 1 to 3.5 m tall in coastal locations of the Indo-Pacific areas. It has been traditionally used as an antiviral, Liquid from the leaves is used to treat weakness after childbirth, the roots are used to treat stomach ache, bark and leaves are used to treat a relapse after an illness. The juice from the bark is used in treating ringworm. The roots are used to treat beriberi, syphilis and dysentery. The leaves of the plant revealed the uses of digestive, carminative, antitumor, anti-inflammatory, treatment of coughs, tuberculosis and stings from the stingray.

**KEYWORDS:** *Scavola taccada*.**INTRODUCTION**

*S. taccada* is a dense, spreading shrub that forms rounded mounds from 1 to 3.5 m tall. According to the Global Compendium of Weeds (Randall, 2012). *Scaevola taccada*, also known as beach cabbage, sea lettuce, beach naupaka, *naupaka*. *S. taccada*, a flowering plant belongs to the family Goodeniaceae. It is found in coastal locations of the Indo-Pacific areas. It is a common beach shrub throughout the Arabian Sea, Indian Ocean and the tropical Pacific Islands.

It is a large bush attaining a height up to about 4 meter, characteristic of littoral zones where it grows very close to the sea exposed to the salt spray, generally on sandy or pebbly soils. Leaves are slightly succulent, about 20 cm long, closely alternate and crowded at the stem

tips. They are glabrous with a fleshy-look and have a yellowish green color. The fruits and flowers are white. Blades are elongated and rounded at the tips, 5 to 20 cm long and 5 to 7 cm wide. Flowers are white, often with purple streaks, 8-12 mm long, and have a pleasant fragrance. They have an irregular shape with all 5 petals on one side of the flower making it appear to have been torn in half. Flowers grow in small clusters from the leaf axils near the ends of the stems. Fruits are white fleshy berries about 1 cm long. Seeds are beige, corky, and ridged (Wagner et al., 1990). *Scaevola taccada* blooms the whole year round and the flowers have a fan-like shape which gives them the name fan flower or half flower. The fruits float in sea water and are propagated by ocean currents, in tropical areas this bush is being one of the pioneer plants in new sandbanks.

### **Biology and Ecology**

#### **Genetics**

This species have 16 number of chromosomes with a ploidy level =  $2n$  (Guerra, 2000).

#### **Reproductive Biology**

Protandry is characteristic of flowers within the family Goodeniaceae. The stamens deposit the pollen into a cup at the top of the style while the flower is still in bud (Leins and Erbar, 1990). When the flowers open, the stigmatic tissue pushes the pollen out, thus the flower is in its “male phase.” After all the pollen has been presented, the stigma is exerted and receptive for pollen. Consequently, species within this family require outcrossing in order to set fruits. In the case of *S. taccada*, the species are xenogamous but it also has the potential for self-pollination. Flowers open during both day and night for approximately 5 days and are visited and pollinated by insects, mainly bees. In this species, the prevalence of outcrossing and self-pollination may have evolved as an adaption to persist on a changing island environment (Liao, 2008).

#### **Physiology and Phenology**

*S. taccada* plants can reproduce within their first or second year and produce flowers and fruits repetitively over the year (Lockhart, 2012).



Photograph of plant *Scaevola taccada*

### Preferred Scientific Name

*Scaevola taccada* (Gaertn.) Roxb.

### Other Scientific Names

- ❖ *Lobelia frutescens* Mill.
- ❖ *Lobelia taccada* Gaertn.
- ❖ *Scaevola billardieri* Dieter.
- ❖ *Scaevola chlorantha* de Vriese
- ❖ *Scaevola frutescens* Krause
- ❖ *Scaevola koenigii* Vahl
- ❖ *Scaevola lambertiana* de Vriese
- ❖ *Scaevola latevaga* Hance ex Walp
- ❖ *Scaevola leschenaultii* A. DC.
- ❖ *Scaevola macrocalyx* de Vriese
- ❖ *Scaevola piliplena* Miq.
- ❖ *Scaevola plumerioides* Nutt.
- ❖ *Scaevola sericea* Vahl.

### International Common Names

- ❖ **English:** beach cabbage; half-flower; naupaka; sea lettuce.

### Local Common Names

- ❖ **Australia:** beach cabbage; beach scaevola; carwell cabbage; pipetree
- ❖ **Bahamas:** Asian Scaevola; Hawaiian seagrape; white inkberry
- ❖ **Cuba:** Sevola
- ❖ **Fiji:** Veveda
- ❖ **French Polynesia:** Naupata

- ❖ **Guam:** Nanasu
- ❖ **Hawaii:** Naupaka kahakai
- ❖ **Samoa:** to`ito`i
- ❖ **Tonga:** ngahu

#### **Taxonomic of plant *Scaevola taccada***

Domain:	Eukaryota
Kingdom:	Plantae
Phylum:	Spermatophyta
Subphylum:	Angiospermae
Class:	Dicotyledonae
Order:	Goodeniales
Family:	Goodeniaceae
Genus:	<i>Scaevola</i>
Species:	<i>Scaevola taccada</i> (Randall, 2012)

#### **Taxonomy and Nomenclature**

Family Goodeniaceae contain 12 genera and 430 species which are distributed mostly in Australia, except for the genus *Scaevola*, which is pantropical (Stevens, 2012). In this family some species are common in arid and semi-arid climates. The genus *Scaevola* includes about 100 species. *S. taccada* is native to eastern Africa, southeastern Asia, Australia and the Pacific Islands, including Hawaii. The name of this species comes from the Greek word “*scaevus*”, which means “left-handed” or “awkward”, describing the floral characteristic (Wagner et al., 1990). In earlier times, this species were subdivided into two varieties: *S. taccada* var. *sericea* occurring throughout the Pacific and Indian oceans and with silky plant hairs on it and *S. taccada* var. *Taccada* occurring along the Atlantic coasts in tropical America and Africa are lacking hairs (Kaufman and Kaufman, 2007). However, these two varieties are no longer accepted and current classifications include both as *S. taccada*.

Picture	Title	Caption
	Habit	<i>Scaevola taccada</i> (naupaka); habit at Kekepa, Oahu.
	Habit	<i>Scaevola taccada</i> (naupaka); invasive habit at Inland, Kure Atoll. Ma
	Flowers	<i>Scaevola taccada</i> (naupaka); flowering at Kahului, Maui.
	Fruits	<i>Scaevola taccada</i> (naupaka); fruit at Waianapanapa, Maui.
	Seedlings	<i>Scaevola taccada</i> (naupaka); seedlings at North Beach Sand Island
	Prostrate habit	<i>Scaevola taccada</i> (naupaka); prostrate habit at Waihee Pt, Maui
	Leaf damage	<i>Scaevola taccada</i> ; leaf damage by the larvae of <i>Udea litorea</i>

### Physiology and Phenology

Within their first or second year plant *S. taccada* can reproduce and produce flowers in addition to fruits repetitively in the year (Lockhart, 2012).

### Cultivation condition

For cultivation of *S. taccada*, tropical rain forest climate is proffered; it should be more than 60mm whereas tropical monsoon climate is less than 60 mm for precipitation driest month and more than 100 total annual precipitation, temperature in the range of 19 to 32<sup>0</sup>C, annual rain fall in the range of 500 to 2500 mm. Soil drainage must be free and seasonally water logged. The pH of soil must be alkaline or neutral and soil has a texture of light to medium as well as tolerances saline to shallow.

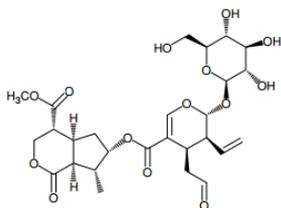
A fungal pathogen *Mycosphaerella scaevolae*, that causes leaf spot disease in *Scaevola* species. The host plant in *S. taccada* and other *Scaevola* species including *S. chamissoniana*, *S. glabra*, and *S. mollis*. *M. scaevolae* through natural openings present in the leaves (stomata) is affected which has been found in Australia in *S. taccada*, and in Hawaii. Spores of the fungus are then produced on the lower surface of leaves and can be spread by wind, water droplets or by movement of infected material (i.e., cuttings). Infection results in large

yellow (chlorotic) spots on leaves, which develop a brown, necrotic centre with age (Daly and Hennessy, 2007).

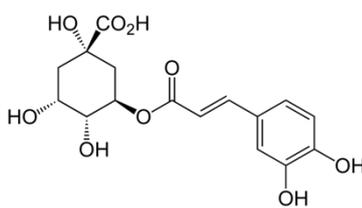
Causes of pathway in *S taccada* are erosion control/dune stabilization, landscape improvement/ landscaping industry, ornamental purposes (Kaufman & Kaufman, 2007) and medicinal use (USDA-ARS, 2012). Pathway vectors are floating vegetation/debris, Soil, sand, gravel and water (ISSG, 2012)

### Chemical constituent

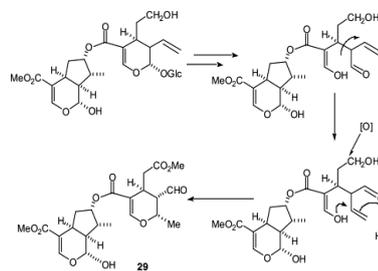
The Plant *Scaevola taccada* Roxb is reported to have Chemical constituents of scaevolaside, chlorogenic acid, Saponins, glycosides, lipids and alkaloids. The study shows the presence of the loganin, sylvestroside-III, dimethyl acetal, cantleyoside and its dimethyl acetal compounds in aerial part of the plant.



**Scaevolaside**



**Chlorogenic acid**



**Saponins glycosides**

### Uses

Antiviral activity of extract of *Scaevola taccada* against human immunodeficiency Virus Type-1 (HIV-1) Christopher *et al.*, (1996). Liquid from the leaves is used to treat weakness after childbirth which leads to pneumonia. The roots are used to treat stomachache. A decoction of the bark and leaves is used to treat a relapse after an illness. The juice from the bark is used in treating ringworm. The roots are used to treat beri-beri, syphilis and dysentery. Parts of the plant are used to treat coughs, tuberculosis and stings from the stingray. The leaves of the plant revealed the uses of digestive, carminative, antitumour, anti-inflammatory, treatment of coughs, tuberculosis and stings from the stingray. A decoction of the leaves and the bark was reported to combat tachycardia, one of the principal symptoms of beriberi The drug reduces the frequency of heart beat, slow down the pulse rate and stimulates the heart for normal contraction. It exhibits diuretic property by increasing the tension in the renal arteries without causing irritation of the kidney parenchyma and is used for dropsy. Liquid from the leaves is used to treat weakness after childbirth which leads to pneumonia. The roots

are used to treat stomachache. A decoction of the bark and leaves is used to treat a relapse after an illness [Prajapati N.D., 2003].

Traditionally in Hawaii and the Pacific Islands, the pleasingly fragrant flowers as well as the seeds of *S. taccada* are used for making leis (traditional garlands). *S. taccada* is used to prevent coastal erosion as well as for beach landscaping in some islands of the Pacific. It is also planted on beach crests to protect other ornamental and cultivated plants from salt spray. In Polynesian and Asian traditional medicine *S. taccada* is used as an antidiabetic, antipyretic, anti-inflammatory, anticoagulant and as a skeletal muscle relaxant. Extracts have shown selective anti-viral activity against Herpes Simplex Virus-1 and 2 and Vesicular Stomatitis Virus *in vitro* (Locher et al., 1995).

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