

# Herbal Remedies from Aquatic and Semi-aquatic Plants Conserved at Siddha Medicinal Plants Garden (CCRS), Mettur Dam, Salem District, Tamil Nadu

M Manokari, M Padma Sorna Subramanian\*

Siddha Medicinal Plants Garden (Central Council for Research in Siddha, Ministry of AYUSH, Govt. of India), Mettur Dam, Salem district – 636401, Tamil Nadu, India.

\*Correspondence: mpssmanian@gmail.com

## ABSTRACT

**Introduction:** This paper reports on aquatic/semi-aquatic plants from the Siddha Medicinal Plants Garden (SMPG), Mettur Dam, Salem district of Tamil Nadu, which are used to cure various diseases in Siddha system of medicine. **Materials and Methods:** In the present review, information on Siddha formulations of the plants and medicinal properties along with their taxonomy, habit and habitat were presented by citing authentic publications. **Results:** Thirty-three aquatic/semi-aquatic plant species used in herbal remedies are being presented in this paper along with their description, medicinal uses as single drug or in combination. At SMPG, aquatic, semi-aquatic and marshy plants are being maintained at model herbal gardens I and II, petaloid pond, poly green house and arboretum. Among these aquatic species, some plants are sold in the market and directly used by the AYUSH practitioners due to their medicinal values, viz., *Alternanthera sessilis* (L.) R.Br. ex DC (*Ponnankanni*), *Bacopa monnieri* Penn. (*Brahmi*), *Centella asiatica* (L.) Urban (*Vallarai*), *Eclipta prostrata* L. (*Vellaikarisalai*), *Phyllanthus nodiflorus* Greene. (*Poduthalai*), *Sphagneticola calendulacea* (L.) Pruski (*Manjalkarisalai*), *Spilanthes acmella* DC. (*Palvalipoondu*) etc. Some of the species were explored enormously and their formulated herbal products are available in the global market. **Conclusion:** Aquatic plants have been widely used in traditional medicine with a long Indian history. They are reputed for treating a number of ailments. Thus far, many studies are significant in aquatic plants but limited to the level of clinical uses, conservation and cultivation.

**KEY WORDS:** Aquatic, Semi-aquatic, Siddha, Medicinal Plants, SMPG.

## 1. INTRODUCTION

### 1.1 Aquatic flora in Herbal medicine

Aquatic/semi aquatic plants unquestionably play momentous ecological roles as the dominant primary producer component of swallow water ecosystems. They are also referred to as hydrophytes or macrophytes and offers great economic importance to mankind<sup>[1]</sup>. Aquatic flora directly serves as the major source of energy for greater diversity of biota besides conserving

the aquatic habitat. In India, however, aquatic plants have been extensively used for a diversity of purposes since historical times, and are used (often cultivated) even today particularly for food, fodder, fibre and medicine<sup>[2]</sup>. Though the aquatic ecosystem is rich repositories of various plant species, not much work has been undertaken to enumerate their medicinal uses. The economic importance, ethno-medicinal uses, edible aspects of aquatic, semi aquatic and marshy

flora were discussed by some researchers<sup>[3-6]</sup>. Aquatic plants have many unique biological features and are potential for their agricultural, horticultural, nutraceutical, ornamental and medicinal importance<sup>[7]</sup>. Many plant species under aquatic origin were reported to have valuable folklore utilization in traditional medicine and used in phytoremediation<sup>[8,9]</sup>.

### 1.2 Siddha Medicinal Plants Garden

The Siddha Medicinal Plants Garden (SMPG), Mettur Dam (11° 52' N, 77° 50' E), Salem dt, Tamil Nadu functions under Central Council for Research in Siddha, Ministry of AYUSH, Govt. of India. In SMPG, aquatic and semi-aquatic plants are maintained and cultivated at herbal gardens, Poly-greenhouse and in arboretum. Particularly, Model herbal garden II was established with a petaloid pond with aquatic and marshy plants.

The present work reviews the taxonomy, medicinal uses, plant parts explored in Siddha system of medicine with Siddha formulations of selected aquatic and semi aquatic plants maintained at Siddha Medicinal Plants Garden, Mettur dam, Salem district, Tamil Nadu with the help of authentic publications.

## 2. MATERIAL AND METHODS

The plants were recorded and maintained year-round at the garden. In the present review, information on Siddha formulations of the plants and medicinal properties along with their taxonomy, habit

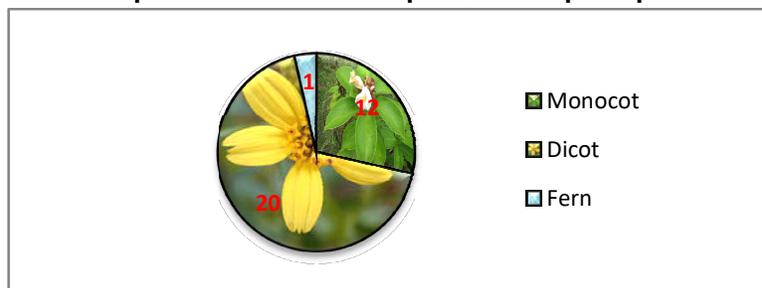
and habitat state were presented by citing authentic publications.

## 3. RESULTS AND DISCUSSION

Siddha Medicinal Plants Garden covered a number of different species like aquatic, semi aquatic or marshy plants. The present study highlights the medicinal potential of some selected aquatic and semi aquatic plant species maintained/cultivated at Siddha Medicinal Plants Garden, Mettur Dam, Salem District, Tamil Nadu. A total of 33 plant species belonging to 21 families distributed in 29 genera have been documented. The medicinal uses of the selected aquatic/semi aquatic plants were enumerated alphabetically by binomial name of species with its respective family, vernacular names (Siddha), Siddha formulations in which, some of the listed plants are used as a single / compound drug also given in table (Table 1).

Among the 33 species selected for study, 20 species were dicotyledons from 15 families, 12 species were monocotyledons from 6 families and one species represents fern (Pteridophyte) (Figure 1). Some selected aquatic species were presented in Figure 2. In dicots, the family Asteraceae was dominated and shows higher number<sup>[6]</sup> of species. Monocots in aquatic habitats have been emphasized by a number of workers<sup>[10,11]</sup> and dominance of dicots over the monocots in aquatic habitats have been highlighted by Saini et al.<sup>[12]</sup> and Niroula and Singh.<sup>[13]</sup>

Figure 1. Group wise distribution of aquatic/semi aquatic plants at SMPG



Drugs of natural origin play a significant role in the public health care system of any nation. Indian Materia Medica includes describes about 2000 drugs of natural origin, among which 400 drugs are mineral and animal origin and the remaining drugs are explored in Ayurveda, Siddha and Unani systems<sup>[14,15]</sup>. The World Health Organization (1980) has also

recommended the evaluation of the effectiveness of plants in conditions where there is lack of safe synthetic drugs. Aquatic/ semi aquatic species are also the sources for the medicinal significance<sup>[6]</sup>. Since, the propagation of those species is possible by controlled environments, further exploration is advisable.

**Table 1: Aquatic/semi aquatic plants and their medicinal uses**

Sl.No.	Species Name & Family	Habit& Habitat <sup>[16-18]</sup>	Medicinal uses <sup>[18, 19]</sup>	Single drug/ compound drug <sup>[20-22]</sup>	Parts used in Siddha formulations <sup>[20-22]</sup>
1.	<i>Acorus calamus</i> L. F: Araceae VN: Vasampu	Aromatic, marshy herb with stout rhizome and distichous leaves. Flowers small, yellowish green arranged in spadix. Berries green and angled.	Rhizomes are sedative and analgesic, used in epilepsy and other mental ailments, chronic diarrhoea, dysentery, glandular and abdominal tumours.	Compound drug	Fresh rhizome –Piraminey; Dried rhizome Meghanathakuligai; Ulunduthailam; Churned rhizome Pooramathirai.
2.	<i>Alocasia macrorrhiza</i> (L.) G. Don F: Araceae VN: Aanaichembu	Succulent perennial herb with horizontal stem. Leaves ovate and acute. Peduncle long, stout; spathe constricted at middle, yellowish green; spadix cylindrical.	Root and leaves are diuretic and rubefacient, used to treat skin diseases, scorpion sting, gout and rheumatism <sup>[23]</sup> .	-	-
3.	<i>Alternanthera sessilis</i> (L.) R. Br.	Prostrate herb with fleshy leaves and white flowers. Found in the margins of invading in ponds,	Whole plant is used to treat night blindness, leprosy, fever, diseases of <i>pitta</i> and <i>kapha</i> , haemorrhage	Single/ Compound drug	Whole plant - Kanatthilam, Ponnankannithailam, Puliyarainey.

F: Amaranthaceae	rivers, streams, canals, ditches, and rejuvenator <sup>[24]</sup> .			
VN: Ponnankanni, Koduppai	invading in flood plain wetlands, reservoirs, marshes, swamps, wet low-lying ground, ephemeral pools and damp forest.			
4. <i>Ammannia baccifera</i> L.	Glabrous erect annual herb with opposite or alternate leaves. Flowers pinkish, in clusters or in cymes. Found in marshes, swamps, rice fields and water courses at low elevations.	Leaves bruised and used against ringworm and other parasitic skin infections. Whole plant is used in glandular swellings, leucorrhoea, snake-bite poisoning, abscess, intermittent fever, ulcers, polyuria and diseases of vatam <sup>[25]</sup> .	Single drug	-
F: Lythraceae				
VN: Neermelneruppu, Kallurvi, Erisalai				
5. <i>Bacopa monnieri</i> (L.) Penn.	Annual, decumbent or creeping herb rooting at nodes. Flowers solitary, bluish. It grows gregariously and often forms dense mats in marshy places, the banks of pools and along streams and ditches. It can tolerate brackish water.	Whole plant is used against dysuria, convulsion, cough, constipation, inflammations, diseases of pittam, venereal diseases and eye diseases <sup>[27]</sup> .	Single/Compound drug	Whole plant - Piraminey, Meghanathathailam.
F: Scrophulariaceae				
VN: Neerbrahmi, Brahmi,				
6. <i>Biophytum sensitivum</i> (L.) DC.	Erect annual herb with pinnately compound leaves. Flowers yellow. Found in wetlands and plains.	Herbal tonic used in chest complaints, convulsions, cramps and inflammatory tumours. Ash mixed with lime juice given in stomach ache. Leaves and roots styptic. Decoction of leaves given in diabetes, asthma and phthisis. Powdered seeds applied to	Single drug	-
F: Oxalidaceae				
VN: Jalapushpam				

			abscesses to promote suppuration.		
7.	<i>Canna indica</i> L. (Syn. <i>Canna orientalis</i> Roscoe)	Erect rhizomatous pantropical herb. Flowers arranged in terminal panicles; yellow, orange to red. Flowering throughout the year.	Roots diuretic and diaphoretic. Rhizomes and seeds are used to treat anaemia, ulcers and earache.	Single/ Compound drug	-
	F: Cannaceae				
	VN: Kalvazhai				
8.	<i>Centella asiatica</i> (L.) Urban	It is a prostrate, perennial, aromatic herb growing wild along stream sides, paddy fields and other wet places; stem reddish, leaves in rosettes, inflorescence single and axillary umbel.	Plant is diuretic and used to treat leprosy. Leaves are used in digestive disorders, urinary diseases, cough, dyspnoea, fever, vomiting, mental retardation and fainting.	Single/ Compound drug	Vallaraimathirai, Vallarainey
	F: Apiaceae				
	VN: Vallarai				
9.	<i>Costus igneus</i> Nak  (syn. <i>Costus pictus</i> D. Don, <i>Costus mexicanus</i> Liebm ex Petersen, <i>Costus congenitus</i> Rowle)	It is a perennial sub-shrub found in fertile soil and ample moisture. Leaves are simple, alternate with parallel venation and spirally arranged around stem.	Leaves are used to treat renal diseases and diabetes. The rhizome used to treat fever, rashes, asthma, intestinal worms, ailments of eyes, stomach, neck, jaws, tongue and mouth, fever, edema, wheezing (dyspnoea), haemorrhoids, spermaturia <sup>[28]</sup> .	Single drug	-
	F: Costaceae				
	VN: --				
10.	<i>Costus speciosus</i> (Koen.) J.E. Sm.	Perennial rhizomatous shrub. Leaves white, and pubescent beneath. Bracts bright red.	Rhizome used as purgative, anthelmintic, fever, diseases of vatam, piles, snake-bite and rat-	Single drug	-

	F: Costaceae	Flowers white; lip yellowish at centre. It prefers moist fertile soils and partial sun.	bite poisonings, urinary diseases, diseases of eye, mental disorders and skin diseases.		
11.	VN: Nattukottam, Kottam <i>Cryptocoryne spiralis</i> Fisch.	Aquatic herb with long greenish spathe. Occurs mostly in streams and rivers with not too rapidly flowing water, in lowland forest.	Rhizome is used in abdominal complaints, diarrhoea, cough and vomiting in infants.	Single drug	-
	F: Araceae				
12.	VN: Aartuathividayam <i>Eclipta prostrata</i> L. (Syn. <i>Eclipta alba</i> )	Diffuse or ascending herb, stem and leaves sparsely strigose with bulbous based hairs and the head is white. Leaves linear-oblong, sessile. Flowers white in solitary or paired heads. Found along the edges of pools, tanks, canals, ditches and rice fields.	Whole plant is used to treat jaundice, skin diseases, anaemia, inflammation, dental diseases, cough, dropsy, diseases of ear, eye, liver and spleen, hair fall.	Single/ Compound drug	Whole plant - Naagaparpam, Lohamandooram, Karisalailakam, Appiracchunduram, Ayabringrajakarpam, Seenthilchooranam, Parangipattaipathangam, Peeneesathialm, Ponnankannithailam, Naga parpam. Leaves - Sanjeevimathirai, Soolaikoodaram, Kaiyanthailam, Talakakkattu, Ematantakkuligai
	F: Asteraceae				
	VN: Karisalankanni, Karippan				
13.	<i>Hydrilla verticillata</i> (L.f.) Royle	Slender, submerged, perennial herb, branching at nodes, leaves whorled, flowers tiny, red in axial or terminal panicles. Roots are turion <sup>[29]</sup> .	Helps in digestion, blood circulation, gastrointestinal function, cardiovascular, antitumour, antibacterial activities <sup>[30]</sup> .	Single drug/ Compound drug	-
	F: Hydrocharitaceae				
	VN: Camiranam				
14.	<i>Hygrophila auriculata</i>	It is a spiny, stout, annual herb,	Flowers, seeds and whole plant	Compound	Whole plant - Nerunjilkudineer,

(Schum.) Heine  (Syn. <i>Asteracantha longifolia</i> (L.) Nees)  F: Acanthaceae  VN: Neermulli	common in water logged places. Leaves sessile, lanceolate, arranged in whorls. Flowers blue arranged in axillary whorls, encircled by yellowish brown thorns.	are used to treat anaemia, dropsy, oliguria, eye diseases, constipation, urinary calculi, piles and aphrodisiac <sup>[26]</sup> .	drug	Mandoorathyadai-kudineer, Rasaganthimilagu, Seeds Gandagarasayanam, Neermullithailam.	-
15. <i>Kaemferia galangal</i> L.  F: Zingiberaceae  VN: Katcholam	Tuberous herb with 2 orbicular to round-ovate leaves adpressed to the ground, found on the plains under shady places. Flowers white, in between the leaves. Lip with purple blotch, deeply 2-lobed, longer than the corolla-tube.	Rhizome stimulant, expectorant, carminative, diuretic, used in cough and pectoral affections. Roasted rhizomes used for festering tumours.	Single drug	-	-
16. <i>Kaemferia rotunda</i> L.  F: Zingiberaceae  VN: Senkzhuneer	Tuberous herb. Leaves few, oblong, erect, green above and purplish-red beneath. Flowers purple or white, fragrant, appearing before the leaves, in a dense spike. Lip 2-fid, purple or lilac.	Rhizome stomachic, used in gastric complaints, help to remove blood clots and other purulent matter in the body. Mumps, swellings, skin diseases, piles, tumours, cough, oedema, dyspepsia, fever, epilepsy, dyspnoea, tonic, worm infestation.	Single/ Compound drug	-	-
17. <i>Limnanthemum indicum</i> (L.) Thw.  F: Menyanthaceae	An aquatic floating herb with horizontal rhizome, petiole like branches producing nodes, from which starts tuft of roots, a cluster of flowers, a single	Hepatoprotective. It is traditionally used as bitter, febrifuge and antiscorbutic. It is used as a substitute for <i>Swertia chirata</i> for the treatment of fever and	Single/ Compound drug	-	-

VN: Neythal	floating leaf orbicular and cordate. Flowers are white coloured with a yellow centre	jaundice <sup>[31]</sup> .		
18. <i>Ludwigia perennis</i> L. (Syn. <i>Ludwigia parviflora</i> Roxb.) F: Onagraceae VN: Musalkathilai	Aquatic floating herb found in wet swampy places, ponds and ditches. Stem prostrate or ascending, bearing silver- white, spongy, spindle- shaped pneumatophores. Flowers solitary in leaf axils, creamy white, but yellowish near the base.	The Whole plant paste is applied against ulcers and skin diseases. Leaves are used to cure dropsy, pain and swelling, deobstruent <sup>[32]</sup> .	Single drug	-
19. <i>Marsilea quadrifolia</i> L. F: Marsileaceae VN: Aarai	An aquatic fern which anchors itself to the muddy bottoms of quiet, shallow lakes and streams. The plant roots both at the nodes and internodes of the rhizome. The slender petioles are usually glabrous. It is also rooted in the bottom of clayey soil in submerged water.	It is used as nerve relaxant, to relieve hypertension, sleep disorders and headache, cough, respiratory troubles, migraine, diarrhoea and rheumatism <sup>[33]</sup> .	Single/ Compound drug	-
20. <i>Nelumbo nucifera</i> Gaertn. F: Nelumbonaceae VN: Thamarai	Aquatic free floating rhizomatous herb with stout, creeping rhizome, leaves peltate, glaucous, petioles long, smooth or with small prickles, flowers large, white or rosy.	Rhizomes used in diarrhoea, dysentery, bleeding piles, cardiac diseases, aphrodisiac, diarrhea, dysentery, haemorrhoids, dizziness, vomiting, uterine bleeding disorders, promoting conception, improving the skin condition,	Compound drug	Leaves - Thambachendooram, Stamens - Mahaeladikuligai, Stem and tubers - Ilakuchandanathythailam, Dharatchadichooranam, Nasiroganaasathailam,

			controlling burning sensation, against infections, cough, hypertension, fever, urinary problems, haematemesis, epistaxis, haemoptysis and haematuria <sup>[34]</sup> .		Parangipattairasayanam.
21. <i>Nymphaea pubescens</i> Willd.	Aquatic rhizomatous herb. Leaf blades green above, brownish or purplish below, lower surface pubescent, flowers white to pink or deep red. Seeds almost black with a white aril.	Whole plant is used in dyspepsia, diarrhoea, piles, urinary tract ailments, palpitation, diabetes mellitus, snake bites, cystitis, haematuria, nephritis, enteritis, fevers, insomnia, jaundice, haemorrhoids, anorexia, vomiting and epilepsy <sup>[32]</sup> .	Single/Compound drug	-	
F: Nymphaeaceae					
VN: Alli					
22. <i>Nymphoides hydrophylla</i> (Lour.) O Kuntze.	An aquatic herb with floating leaves and long stem bearing tuft of roots at the nodes. Leaves 5-10 cm broad, orbicular, deeply cordate, purplish with green veins. Flowers densely fascicled at the nodes, corolla white, yellow towards the base.	Used against jaundice, dysentery, fever, jaundice, bilious headache, scabies, rheumatism, tonsillitis, skin ulcers, scorpion poison and ophthalmic diseases <sup>[35]</sup> .	Single drug	-	
F: Menyanthaceae					
VN: Neythal					
23. <i>Ottelia alismoides</i> (L.) Pers.	Aquatic free floating succulent herbs. Floating leaves ovate-reniform, submerged, narrow or oblong. Flowers white and solitary.	It is used as medicinal plant for treating diseases like cancer, asthma, diabetes, tuberculosis, haemorrhoids, febrifuge and rubifacient <sup>[36]</sup> .	Single drug	-	
F: Pontederiaceae					
VN: Nirkkuliri					

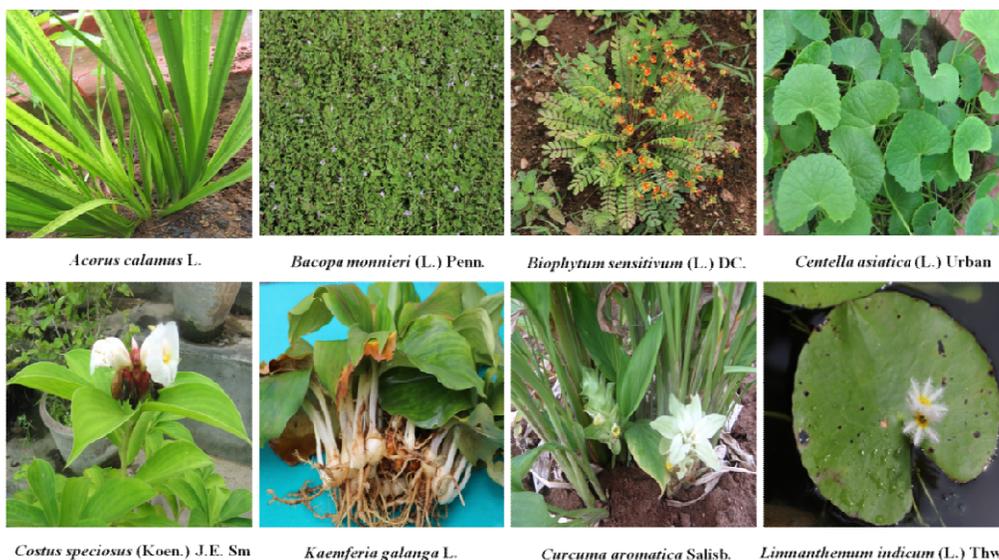
24. <i>Pandanus fascicularis</i> Lam. F: Pandanaceae VN: Thazhai	A tropical shrub found growing along seashores, banks of rivers, ponds and canals. The species vary in size from small shrubs to medium-sized trees. The trunk is stout, wide-branching, and ringed with many leaf scars.	Used in the treatment of headache, rheumatism, spasm, cold/flu, epilepsy, wounds, boils, scabies, leucoderma, ulcers, colic, hepatitis, smallpox, leprosy, syphilis, and cancer <sup>[37]</sup> .	Compound drug	Flowers – Talampoomathirai, Talampoosharbat, Talampoo teenier.
25. <i>Phyla nudiflora</i> Greene. F: Verbenaceae VN: Poduthalai	Perennial aquatic herb. Leaves are toothed at the tip and narrow towards the petiole. Stem is purple and roots arise from leaf axils along stems. Flowers are axillary, white to purple produced in heads on long peduncles.	Aided in treating skin diseases, hair fall, dandruff, respiratory disorders, diabetes, gastrointestinal infections, fungal infections, jaundice, and cardiovascular diseases.	Compound drug	Karisalaiilakam, Astapairavan, Parangipattaipatangam, Meganaathathailam
26. <i>Pistia stratiotes</i> L. F: Araceae VN: Akayathamarai	Free floating stoloniferous herb with rosette sessile leaves. Densely pubescent, flowers creamy white, minute and sessile on a spadix.	Leaves antiseptic, antidysentric, used in eczema, leprosy, ulcers, urinary disorders, piles and syphilis, skin diseases and ear complaints. The ashes are used to treat ring worm in the scalp.	Single/Compound drug	Uppuchenduram, Sanguparpam
27. <i>Polygonum glabrum</i> Willd. F: Polygonaceae VN: Aartualari	Annual glabrous herb, leaves alternate, stipulate, node swollen, flowers bisexual and at terminal spikes.	Roots are used against snake bite, jaundice and piles. Leaves are antimalarial, cardiotoxic, anthelmintic, stem is used for rheumatism <sup>[38]</sup> .	Single drug	-
28. <i>Sphaeranthus amaranthoides</i> L.	Annual, erect, fragrant herb with woody stem found in moist places particularly in the rice	It is known for the treatment of eczema, blood disorders and helminthiasis, stomachce, Eczema,	Single/Compound drug	Thalakukattu, Bhogamunivar Karpam 300 (Mudaliar, 2008)

F: Asteraceae VN: Sivakarathai	fields. Leaves linear-oblong. Stem erect and glabrous. Flower heads reddish, in clusters, ovoid, tips of bracts spinescent, subsessile on common receptacle.	vomiting, abdominal discomfort. It increases the semen consistency <sup>[39]</sup> .			
29. <i>Sphaeranthus indicus</i> L. F: Asteraceae VN: Karanthai	An aromatic prostrate or ascending herb, stems with toothed wings. Leaves ovate to obovate, serrate-dentate. Flowers in heads and purple in color.	Seeds and root powder are anthelmintic, aphrodisiac. Aerial parts are used in toothache. Root, leaves, flower, seeds are used in treating eczema, skin diseases, worm infestation, diseases of vatam, piles and aphrodisiac, filariasis, jaundice, scrofula <sup>[40]</sup> .	Single/ Compound drug	-	
30. <i>Sphagneticola calendulacea</i> (L.) Pruski (Syn. <i>Wedeliachinensis</i> (Osborn) Merr., <i>W. calendulacea</i> Less.) F: Asteraceae VN: Manjalkarisalai	A procumbent hairy herb rooting at nodes. Leaves opposite, subsessile, lanceolate-oblong, entire. Heads solitary, bright yellow on long axillary peduncles. Achenes acute and pubescent.	Leaves used in cephalgia and alopecia. Decoction used in menorrhagia and uterine haemorrhage. Jaundice, skin diseases <sup>[41]</sup> .	Single/ Compound drug	Astapairavam, Karisalaiilakam	Kanattthailam,
31. <i>Sphagneticolatrilobata</i> (L.) Pruski (Syn: <i>Wedelia trilobata</i> (L.)	A perennial herb with creeping habit. Leaves are simple, bright green, fleshy and subsessile. Heads solitary, bright yellow on	Aerial parts are used in liver disorders, bronchitis, abdominal pains, dysmenorrhea, muscle cramps, rheumatism,	Single/ Compound drug	Astapairavam, Karisalaiilakam	Kanattthailam,

Hitchc.)	long axillary peduncles.	stubborn wounds, sores and swellings,		
F: Asteraceae		arthritic painful joints, snakebite, purge and amenorrhea <sup>[42]</sup> .		
VN: Manjalkarisalai				
32. <i>Spilanthes alva</i> DC. (Syn. <i>Spilanthes cmella</i> auct. non (L.) Murr.)	Perennial erect herb prefers to grow in the shade and nutrient rich soil. Leaves broadly ovate, sparsely pubescent beneath. Heads conical in terminal and axillary panicles. Florets pale yellow to white.	Flowers and roots used to cure throat infections and paralysis of tongue, dysentery, scabies, psoriasis, toothache, flu, cough, rabies, tuberculosis and leucorrhoea.	Single drug	-
F: Asteraceae				
VN: Palvalipoondu				
33. <i>Vallisneria natans</i> (Lour.) Hara (Syn: <i>V. spiralis</i> auct.)	Submerged stoloniferous aquatic herbs. Leaves radical, strap shaped. Flowers unisexuals, female flowers coiled and solitary. Male flowers minute and white.	Whole plant contains polysaccharide, iron, phosphorous and calcium. Used to treat Stomache and leucorrhoea.	-	-
F: Hydrocharitaceae				
VN: --				

\*Note: F- Family, VN- Vernacular Name, Syn.- Synonym

**Figure 2. Selected aquatic/ semi aquatic plants cultivated at SMPG**



#### 4. CONCLUSION

From phytodiversity point of view, many aquatic and semi aquatic plants still remain unexplored. It is concluded that the quantitative and qualitative floristic survey, constant monitoring and protection of aquatic and semi-aquatic bodies are the need of the hour in order to save the aquatic flora and to maintain the wild progenitors as well as to explore the richness of aquatic flora in the field of drug discovery.

#### 5. ACKNOWLEDGEMENT

We, the authors would like to express our sincere gratitude to the Director General, CCRS for providing necessary facilities to carry out the study.

#### REFERENCES

- Bornette F, Puijalon S. Response of aquatic plants to abiotic factors: a review. *AquatSci* 2011; 73: 1-14.
- Anonymous. *Wealth of India (Raw Materials) Vol.1-11* CSIR Publication. New Delhi, 1976.
- Maya S, Menon SV, Nair SG. Economic importance of river vegetation of Kerala – A case study. *J Econ Taxon Bot* 2003; 27: 796- 803.
- Jain A, Roshnibala S, Kanjilal PB, Singh PB, Singh HB. Aquatic/semi-aquatic plants used in herbal remedies in the wetlands of Manipur, Northeastern India. *Indian J Trad Knowled* 2007; 6: 346-51.
- Swapna MM, Prakashkumar R, Anoop KP, Manju CN, Rajith NP. A review on the medicinal and edible aspects of aquatic and wetland plants of India. *J Med Plants Res* 2011; 5: 7163-76.
- Pareek A, Kumar A. Aquatic plants of Rajasthan, India with medicinal value. *J Ethnobi Trad Med* 2013; 119: 434-8.
- Krishnasamy J, Arumugam R, Ariyan S. Ornamental aquatic and semi-aquatic plants in Coimbatore district. *Biolife* 2014; 2: 557-71.
- Dhir B, Sharmila P, Parthasaradhi P. Potential of Aquatic Macrophytes for Removing Contaminants from the Environment. *Critical Rev Env Sci Tech* 2009; 39: 754-81.
- Saravanakumar K, Prabhakaran J. Aquatic floral populations in Veeranamlake command area, Tamil Nadu, India. *Int J Currbiotecn* 2013; 1: 18-26.
- Burlakoti C, Karmacharya SB. Quantitative analysis of macrophytes of Beeshazar Tal, Chitwan, Nepal. *Him J Sci* 2004; 2: 37-41.
- Manhas RK, Gautam MK, Kumar D. Plant diversity of fresh water swamp of Doon Valley, India. *J Amer Sci* 2009, 5: 1-7.
- Saini DC, Singh SK, Raj K. Biodiversity of aquatic and semi aquatic plants of Uttar Pradesh (with special reference to Eastern Uttar Pradesh). 2010; 479.
- Niroula B, Singh KLB. Contribution to aquatic macrophytes of Biratnagar and adjoining areas, Eastern Nepal. *Ecoprint* 2010; 17: 23-4.
- Abdullah I H, Khan H, Khan L, Khan MI, Hassan S, Khan MA. In vitro biological activity of decoction of Joshanda. *Pak J Pharma Sci* 2014; 27: 239-43.

15. Singh A, Navneet. A review on medicinal plants and herbs of Uttarakhand (India): its traditional, ethnomedicinal and antimicrobial potential. *Nature Sci* 2016; 14: 90-107.
16. Gamble JS. Flora of the presidency of Madras. *Bot. Surv. India: Calcutta*; 1976.
17. Mathew KM. The flora of Tamil Nadu Carnatic. Tiruchirapalli; 1983.
18. Yoganarasimhan SN. Medicinal Plants of India. Tamil Nadu; 2000.
19. Nadkarni KM. Indian Materia Medica. Popular Prakashan: Bombay; 1976.
20. The Siddha Pharmacopoeia of India. Government of India, Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH); 2008.
21. The Siddha Pharmacopoeia of India. Government of India, Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH); 2011.
22. The Siddha Formulary of India (SFI). Dept. AYUSH, Govt. of India: New Delhi; 2011.
23. Joshi A, Karnawat BS, Narayan JP, Sharma V. *Alocasia macrorrhiza*: A decorative but dangerous plant. *Int J Sci Study* 2015; 3: 221-3.
24. Debnath B, Debnath A, Paul C. Diversity of invasive alien weeds in the major roadside areas of Tripura and their effect and uses. *J Chem Biol PhySci* 2015; 5: 3091-102.
25. Kumar RK, Mishra SS. Use of Agnikuarni (*Ammannia baccifera* L.) in ringworm by some of the villagers of Birmaharajpurblock (Sonapur Dt.). *J Pharma Sci Inn* 2012; 1: 37-8.
26. Hussain MS, Fareed S, Ali M. *Hygrophila auriculata* (K. Schum) Heine: Ethnobotany, phytochemistry and pharmacology. *Asian J Trad Med* 2010; 5: 122-31.
27. Rai K, Gupta N, Dharamdasani L, Nair P, Bodhankar P. *Bacopa monnieri*: A wonder drug changing fortune of people. *Int J Appl Sci Biotech* 2017; 5: 127-32.
28. Hegde PL, Rao HA, Rao PN. A review on insuling plant (*Costus igneus* Nak). *Phcog Rev* 2014; 8: 67-72.
29. Pal DK, Nimse SB. Little knowm uses of common aquatic plant *Hydrilla verticillata* (Linn. f.) Royle. *Nat Prod Rad* 2006; 5: 108-11.
30. Pal DK, Padhiri AK, Otta M, Khatun S, Sanigrahi S, Mandal M. Studies on antibacterial activity of *Hydrilla verticillata*, 16<sup>th</sup> Annual Conference of the PSI, Paschim Medinipur, 2004; 77.
31. Khare CP. Indian Medicinal Plants-An Illustrated Dictionary. Springer (India) Pvt. Ltd: New Delhi; 2007.
32. Panda A, Mishra MK. Ethnomedicinal survey of some wetland plants of South Orissa and their conservation. *Indian J Trad Med Knowled* 2011; 10: 296-303.
33. Soni P, Singh L. *Marsilea quadrifolia* Linn. – A valuable culinary and remedial fern in Jaduguda, Jharkhand, India. *Int J Life Sci Pharm Res* 2012; 2: L99-104.
34. Sheikh SA. Ethno-medicinal uses and pharmacological activities of lotus (*Nelumbo nucifera*). *J Med Plant Studies* 2014; 2:42-6.
35. Fathima SN, Vasudevamurthy S, Rajkumar N. A review on phytoextracts with antiepileptic property. *J Pharm Sci Res* 2015; 7: 994-1003.
36. Sumithira G, Kavya V, Ashma A, Kavinkumar MC. A review of ethnobotanical and phytopharmacology of *Ottelia alismoides*(L.) Pers. *Int J Res Pharmacol Pharmatherap* 2017; 6: 302-11.
37. Adkar PP, Bhaskar VH. *Pandanus odoratissimus* (Kewda): A Review on Ethnopharmacology, Phytochemistry, and Nutritional Aspects. *AdvPharmacolSci* 2014; <http://dx.doi.org/10.1155/2014/120895>.
38. Raja S, Ramya I. A comprehensive review on *Polygonumglabrum*. *Int J Phytomed* 2016; 8: 457-67.
39. Mudaliar MKS. Siddha Gunapadam, Beshen Singh &Mahandra Pal Singh, Dehra Dun., 2008; 228-229.
40. Galani VJ, Patel BG, Rana DG. *Sphaeranthus indicus*Linn.: A phytopharmacological review. *Int J Ayur Res* 2010; 1: 247-53.
41. Koul S, Pandurangan A, Khosa R. *Wedelia chinensis* (Asteraceae) – An overview. *Asian Pac J Trop Biomed* 2012; 2: S1169-75.
42. Balekar N, Katkam GN, Nakpheng T, Jehtae K, Srichana T. Evaluation of the wound healing potential of *Wedelia trilobata* (L.) leaves. *J Ethnopharmacol* 2012; 141: 817-24.