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Floristic analysis of wetlands of Agastheeswaram Taluk, Kanyakumari District, Tamilnadu, Southern India.

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Abstract- **Wetland ecosystem forms an important environment for aquatic, semi- aquatic and moisture loving floral and faunal associations. From phytodiversity point of view, many aquatic and semi aquatic plants still remain unexplored. It is therefore necessary to record and to assess the diversity of these wetland plant communities. In the present study, floristic surveys were carriedout during 2014- 2016 in the wetlands of Agastheeswaram Taluk, Kanyakumari district, Tamilnadu.A total of 103 angiosperm taxa belonging to 35 families, 73 genera, and 16 orders under 10 clades /groups were documented. The major clades were Commelinids (42 species) followed byLamiids (18 species), Malvids (17 species), Fabids (10 species).Families with maximum number of species include Cyperaceae with 18 species followed by Poaceae (17 species). Habit wise herbs dominant having (95 species) followed by shrubs (6 species) and climbers (2 species) have been documented. The dominant genera were Cyperus(8 species) followed byFimbristylis (6 species). This study provides new baseline information on the floral diversity of wetland plants that will be useful for managing and or controlling plant species.**

Keywords: Wetland, Floristic analysis, Hydrophytes, Agastheeswaram Taluk.

INTRODUCTION

Wetlands represent interface between land and water, and therefore support a wide range of floral and faunal diversity to form the most productive ecosystem in the world (Smith 1980). And it occupies 4-6% of the earth's land. Wetlands in India occupies by 58.2 million hectares (Sukumaran and Jeeva 2011). Wetlands are important for biodiversity conservation as some of the most endangered species survive on them. Wetlands are also vital for the maintenance of ground water at an optimum level. Unfortunately most of the wetlands and water bodies are under increasing threats as they are drying rapidly due to various man-made impacts (Taft and Haig 2005). Many of the wetlands are now transformed into other land forms, such as paddy fields human settlements and sites for developmental projects (Jain et al. 2011).If the present situation continues it will lead to the end of the pond ecosystem. The present work gave importance to pond plants and to their conservation.

In India several workers have reported floristic analysis of wetland plants (Vardhana 2010; Panda andMisra 2011; Misraet al. 2012; Singh and Narain 2013; Varma and Khan 2014; Misra 2015; Dekaand Devi 2015 and Subhadarsini et al. 2016). There are very little literature is available about the wetland flora in Tamilnadu(Krishnasamy et al. 2014 and Raja et al. 2015).Different workers have discussed the wetland plants of the different places in Kanykumari district (SathyaGeetha 2015; Meena et al. 2010; Sukumaran andJeeva2011; Maridass 2014; Ramarajan2015).For the first time we present a checklist of aquatic angiosperms in the select ponds ofAgastheeswaram Taluk, Kanyakumari district, Tamilnadu.

MATERIALS AND METHODS

Study area

The Kanyakumari district region is blessed with a good number of fresh water ponds and dams harbouring a great variety of aquatic macrophytes. The present survey was carried out in select ponds of Agastheeswaram Taluk in Kanyakumari District, Tamil Nadu, India. This district lies between 77°07'- 77°35' E, 08°05'- 08°35' N, and it occupies an area of about 1672 sq. km. In Agastheeswaram Taluk 183 ponds were located; Out of these only 21 ponds of Agastheeswaram Taluk were selected for the study area. The name of the ponds are Thalakulam, Chenkulam, Melakarunkulam, Piranthenerikulam, Valasoundarikulam, Vaariyoorkulam, Kadaankulam, Narikulama, Nachimarkulam, Devakulam, Puthanarkulam, Ramasamutherakulam, Nullikulam, Thathayarkulam, Suchintheramkulam, Parakkaisouthkulam, Andarkulam, Maankulam, Therookulam and Kothandaramankulam

Preservation and identification of plant materials

Frequent field trips were carried out from Oct 2014 to Oct 2016 to collect different aquatic and semi – aquatic plants found in select wetlands of Agastheeswaram Taluk. Plants were collected carefully with hand or hook and identified with the help of various published monographs, taxonomic revisions and floras (Gamble and Fischer 1915- 1935; Nair and Henry 1983; Henry et al. 1989; Mathew 1993; Kabeer and Nair 2009)and by using the field keys devised by Subramanyam (1962). Species diversity of the wetland plants was adapted by Sukumaran and Jeeva(2011).

Authentication of the identity of plant species were confirmed by specimens deposited in Botanical Survey of

India, Southern Circle, Coimbatore, Jawaharlal Nehru Tropical Botanical Garden and Research Institute (JNTBGRD) Palode, Trivandrum, Kerala and Botany Department of Scott Christian College, Nagercoil.APG III system of classification (2009) was followed to clarify the species were verified with IPNI. The voucher specimens collected from the field were prepared the herbarium and were deposited in the P.G. & Research Department of Botany, S.T. Hindu College, Nagercoil.

RESULTS AND DISCUSSION

A total of 103 species belonging to 73 genera distributed in 35 families from16 orders and 10 Clades / groups according to Angiosperm Phylogeny Group III Classification were recorded during the present studyfrom wetlands of Agastheeswaram Taluk. These taxa are represented in Table 1.

Table 1: List of wetland angiosperms from select ponds of Agastheeswaramtaluk in Kanyakumari district, Tamilnadu

S.No	Class/ Clade/Order	Botanical name	Life form	Habit	Exotic	STHCH No.
	ANA GRADE					
	Nymphaeales	**Nymphaeaceae**				
1		*Nymphaea pubescens*Willd.	FLAH	H		4093
	MONOCOTS					
	Alismatales	**Aponogetonaceae**				
2		*Aponogetonnatans*(L.) Engl.&K.Krause	FLAH	H		4345
		Araceae				
3		*Lemnaperpusilla*Torr.	FFH	H		4135
4		*Pistia stratiotes* L.	FFH	H	TAM	4089
		Hydrocharitaceae				
5		*Hydrillaverticillata*(L.f.) Royle	SAH	H		4502
6		*Najasgraminea*Delile	SAH	H	E	4494
7		*Otteliaalismoides* (L.) Pers.	SAH	H	NAM	4016
8		*Vallisneria spiralis* L.	SAH	H		4070
		Potamogetonaceae				
9		*Potamogetonnodosus*Poir.	SAH	H	NAM	4353
		COMMELINIDS				
	Commelinales	**Commelinaceae**				
10		*Commelinapaludosa Blume*	EAH	H		4444
11		*Cyanotisaxillaris* (L.) D.Don.ex Sweet	EAH	H		4329
12		*C. cristata* (L.) D.Don	EAH	H		4448
		Pontederiaceae				
13		*Eichhorniacrassipes* (Mart.) Solms.	FFH	H		4130
14		*Monochoria vaginalis* (Burm.f.) C.Presl	EAH	H	TAM	4015
	Poales	**Eriocaulaceae**				
15		*Eriocaulonthwaitesii*	EAH	H		4175
		Cyperaceae				
16		*Cyperusarenarius* Retz	EAH	H		4406
17		*C. articulatus*L.	EAH	H		3966
18		*C. bulbosus*Vahl	EAH	H		4522
19		*C. compressus*L.	EAH	H		4525
20		*C. exaltatus*Retz	EAH	H		4474
21		*C. iria* L.	EAH	H		4239
22		*C. rotundus* L.	EAH	H		4512
23		*C. squarrosus* L.	EAH	H		4564
24		*Eleocharisgeniculata* (L.) Roem.&Schult.	EAH	H		4354

25		*Fimbristylisaestivalis*Vahl.	EAH	H		4524
26		*F. argentea* (Rottb.) Vahl.	EAH	H		4242
27		*F. cymosa*R.Br.	EAH	H		4565
28		*F. dipsacea*(Rottb.). C.B.Clarke	EAH	H		4248
29		*F. ferruginea*(L.) Vahl	EAH	H		4566
30		*F. quinquangularis* (Vahl) Kunth	EAH	H		4356
31		*Pycreusflavescens*(L.) P.Beauv. ex Rchb	EAH	H		4518
32		*Rhynchosporacorymbosa*(L.) Britton	EAH	H		4000
33		*Schoenoplectiellaarticulata* (L.) Lye	EAH	H		4030
		Poaceae				
34		*Apludamutica* L.	EAH	H		4403
35		*Aristidaadscensionis* L.	EAH	H		3946
36		*Chloris barbata*Sw.	EAH	H		4526
37		*Dactylocteniumaegyptium* (L.) Willd.	EAH	H		4001
38		*Echinochloacolona* (L.) Link	EAH	H	TSA	4529
39		*Eragrostispilosa*(L.) P.Beauv.	EAH	H		4217
40		*E. riparia*(Willd.) Nees	EAH	H		4387
41		*Eriochloaprocera*(Retz.) C.E.Hubb.	EAH	H		4060
42		*Leptochloapanicea (Retz.)Ohwi*	EAH	H		4410
43		*Oryzarufipogon*Griff.	EAH	H		3990
44		*O. sativa* L.	EAH	H		4459
45		*Panicum maximum* Jacq.	EAH	H	TAM	3976
46		*Paspalidiumflavidium*(Retz.) A.Camus	EAH	H		4378
47		*PaspalumdistichumL.*	EAH	H		4054
48		*Saccharumspontaneum*L.	EAH	H	TWA	4542
49		*Sacciolepisindica*(L.) Chase	EAH	H		3962
50		*Sporobolusindicus*(L.) Rr.	EAH	H		4537
		Typhaceae				
51		*Typhaangustifolia* L.	EAH	H	TAM	4205
	PROBABALE SISTER OF EUDICOTS					
	Ceratophyllales	**Ceratophyllaceae**				
52		*Ceratophyllumdemersum* L.	SSH	H		4083
	EUDICOTS					
	Proteales	**Nelumbonaceae**				
53		*Nelumbonucifera*Gaertn.	FSAH	H		4022
	FABIDS					
	Malpighiales	**Elatinaceae**				
54		*Bergiacapensis* L.	EAH	H		4232
		Euphorbiaceae				
55		*Euphorbia thymifolia*L.	EAH	H		4363
	Fabales	**Fabaceae**				
56		*Aeschynomeneaspera* L.	EAH	S		4235
57		*A. indica* L.	EAH	H		4256
58		*Neptuniaoleracea*Lour.	FFH	H	SAM	4344
59		*Parkinsoniaaculeata* L.	EAH	S		4213

60		*Rhynchosia minima* (L.) DC.	EAH	C		4011
61		*Senna uniflora* (Mill.) H.S.Irwin&Barneby	EAH	H		4069
		Polygalaceae				
62		*Polygala arvensis*Willd.	EAH	H		4296
63		*P. javana* DC.	EAH	H		4134
	MALVIDS					
	Myrtales	**Lythraceae**				
64		*Ammanniabaccifera*L.	EAH	H		4068
65		*A. multiflora*Roxb.	EAH	H		4057
66		*A. octandra*L.f.	EAH	H		4577
67		*Trapanatans* L.	FSAH	H	E	4156
		Onagraceae				
68		*Ludwigiaadscendens* (L.) H.Hara.	FSAH	H	TAM	4290
69		*L. octavalis (Jacq.) P.H.Raven*	FLAH	H	TAF	3968
70		*L. perennis* L.	EAH	H	TAM	4025
	Malvales	**Malvaceae**				
71		*Corchorusaestuans* L.	EAH	H		4120
72		*Sidaspinosa* L.	EAH	S		4552
73		*Waltheriaindica*L.	EAH	H	TAM	4549
	Caryophyllales	**Amaranthaceae**				
74		*Achyranthesaspera*L.	EAH	H		3986
75		*Alternantheraparonychoides* A.st-Hil.	EAH	H	TAM	4099
76		*A. philoxeroides* (Mart.)Griseb.	EAH	H	TAM	4485
77		*Gomphrenacelosioides* Mart.	EAH	H		3991
78		*Suaedamaritima* (L.) Dumort.	EAH	S		4279
		Polygonaceae				
79		*Persicariabarbata* (L.) H.Hara	EAH	H		4058
80		*Polygonumplebeium* R.Br.	EAH	H		4247
	ASTERIDS					
	Ericales	**Balsaminaceae**				
81		*Hydroceratriflora*(L.) Wight&Arn.	EAH	H		4236
	LAMIIDS					
	No order	**Boraginaceae**				
82		*Heliotropiumcurassavicum*L.	EAH	H		4280
	Gentianales	**Rubiaceae**				
83		*Oldenlandiacorymbosa*L.	EAH	H		4503
84		*O. umbellata* L.	EAH	H		3960
		Gentianaceae				
85		*Enicostemaaxillare*(Poir.ex Lam.) A.Raynal.	EAH	H		4154
	Lamiales	**Acanthaceae**				
86		*Hygrophilaauriculata* (Schumach.) Heine	EAH	H		4007
		Lamiaceae				
87		*Hyptissuaveolens*(L.) Poit.	EAH	S	TAM	3949
		Linderniaceae				
88		*Linderniaantipoda* (L.) Alston	EAH	H		4233

89		*L. crustacea* (L.) F.Muell	EAH	H		4208
90		*L. hyssopoides* (L.) Haines	EAH	H		4500
		Lentibulariaceae				
91		*Utricularia aurea*Lour.	SSH	H		4081
92		*U. stellaris*L.f.	SSH			4335
		Orobanchaceae				
93		*Sopubia delphinifolia*G.Don.	EAH	H		4322
		Plantaginaceae				
94		*Limnophila heterophylla* (Roxb.) Benth.	SSH	H		4334
95		*L.indica*(L.) Druce.	EAH	H		4067
96		*Scoparia dulcis* L.	EAH	H		4189
	Solanales	**Convolvulaceae**				
97		*Ipomoea aquatica*Forssk.	FSAH	H	TAS	4166
98		*I. carnea* Jacq	EAH	S	SAM	4092
99		*I. obscura*(L.) Ker Gawl.	FLAH	C	TAM	4161
		CAMPANULIDS				
	Asterales	**Asteraceae**				
100		*Acmella paniculata*(Wall.ex.DC.) R.K.Jansen	EAH	H		4416
101		*Centratherum intermedium*Less.	EAH	H		4567
		Menyanthaceae				
102		*Nymphoides hydrophylla* (Lour.) Kuntze	FSAH	H		4109
103		*N.indica* (L.) Kuntze	FSAH	H		4560

Life form: EAH- Emergent amphibious hydrophytes, FLAH- Floating leaved anchored hydrophytes, FSAH- Floating submerged anchored hydrophytes, FFH- Free floating hydrophytes, SAH- Submerged anchored hydrophytes, SSH- Submerged suspended hydrophytes; Habit: C- Climber, H- Herb, S-Shrub; Exotic:E- Europe, NAM- North America, SAM-South America, TSA- Tropical South America, TAF- Tropical Africa, TAM-Tropical America, TAS- Tropical Asia, TWA- Tropical West Asia.

Commelinids (42 species), Lamiids (18 species), Malvids (17 species), Fabids (10 species), Monocots (8 species), Campanulids (4 species) are the major clades/ groups representing a total of 103 taxa that constitute 96% of the flora. Of the recorded species in the wetlands, Dicotyledons (53 species) belonging from 38 genera and 25 families was the largest number of plant groups followed by Monocotyledons (50 species) belonging from 35 genera and 10 families.An analysis of the floristic diversity denotes that the family Cyperaceae dominates the flora with 18 species followed by Poaceaewith 17 species,Fabaceaewith 6 species, Amaranthaceaewith5 species, Lythraceae and Hydrocharitaceae4 species each, Commelinaceae, Convolvulaceae, Linderniaceae, Malvaceae, Onagraceae, Plantaginaceae (3 species each).The dominant genera of the flora are Cyperuswith 8 species is the largest genus in the present study area followed byFimbristylis (6 species), Ipomoea, Lindernia, Ludwigia (3 species each). The life - form composition analysis shows that herbs dominant having (95 species) followed by shrubs (6 species) and climbers (2 species).

Further the aquatic macrophytes classified in morphological groups viz., emergent amphibious hydrophytes (80 species) followed by floating submerged anchored hydrophytes (6 species), submerged anchored hydrophytes (5 species), free floating hydrophytes, floating leaved anchored hydrophytes and submerged suspended hydrophytes (4 species each).Twenty one plant species were exotic species in the present study area. A large number of invasive alien species were also present due to suitable and diverse habitats and other conditions in this unique geographic area where different climatic zones merge with one another (Misra and Sharma 2010).Significant phytosocial associations have been recorded among different aquatic macrophytes like Hydrillaverticillata, Vallisneria spiralis. Similarly Najasgraminea, Potamogetonnodosus, Certaphyllumdemersum, Otteliaallismoides, Limnophilaindica were also found to be in associated with each other.

CONCLUSION

Aquatic ecosystems are threatened globally due to their widespread resources which are utilized for human use. Now days increase in habitat loss is due to growth of human population leading to development of human activities into affected natural system. Immediate steps are to be taken for their conservation and sustainable utilization.Present study reveals that the plants in ponds which is becoming serious

weeds in the water bodies of the Agatheeswaram Taluk. Data provided here may be helpful for the preparation of comprehensive flora of the Kanyakumari district and also contribute to the floristic documentation of the state.

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