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RESEARCH ARTICLE

NOTES ON AQUATIC AND MARSHLAND ANGIOSPERMS, SEMARA TAAL, SIDDHARTH NAGAR, UTTAR PRADESH, INDIA

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Abstract

The current study of the aquatic and marshland plants growing in thedistrict Semara Taal, Siddharth Nagar. A total no. of 94 species under 71 genera over 40 families such as Acanthaceae, Alismataceae, Amaranthaceae, Apiaceae, Aponogetonaceae, Araceae, Asteraceae, Brassicaceae, Boraginaceae, Ceratophyllaceae, Commelinaceae, Convolvulaceae, Cyperaceae, Elatinaceae, Gentianaceae, Holaragaceae, Hydrocharitaceae, Juncaceae, Lamiaceae, Lemnaceae, Lythraceae, Menyanthaceae, Mimosaceae, Nelumbonaceae, Nymphaeaceae, Onagraceae, Oxalidaceae, Poaceae, Polygonaceae, Pontaderiaceae, Portulacaceae, Potamogetonaceae, Primulaceae, Ranunculaceae, Rubiaceae, Scrophulariaceae, Sphenocleaceae, Trapaceae, Typhaceae and Verbinaceae including 58 dicots and 36 monocots of angiosperms.

Introduction:-

The wetland Semara Taal under exploration is situated in Shohratgarh tahsil of district Siddharth Nagar of Uttar Pradesh. This Taal is more than 3 Km. away from tahsil approximately 28 Km. from headquarter of Naugarh of Siddhartha Nagar. Taal have a total area of 466.66 acre. The Taal have a rich varietyof vegetation. It is perennial meander of Banganga River. It is situated between latitude 27.4025^0 N – 82.95 97 ^{0} E [15].

In wetlands water is playing crucial role which balancing the ecosystem at environmentally as well as for both flora & fauna. Now wetlands are shrinking rapidly due to organization of urbanization and industrialization. Due to urbanization and anthropogenic pressure most of the wetlands are succumbed to greater degree of biological active nutrient accumulation [14].

Marshlands are known as transition between terrestrial and aquatic ecosystem where the water able is usually at or near the surface or the land covered by shallow water [5].The submerged floating plants as well as aquatic in marshland occurred mainly in these areas. The water bodies in huge amount also helping for nourishing the macrophytes flora in this land.

Until any taxonomic studies have not been occurred in this wetland areas so far. Therefore present study dealing up to date accounting study which reporting these angiospermic flora.

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These study area giving contribution for healthy population for fauna especially migratory birds and other natural ecosystem. The macrophyte areherbs in nature and rarely shrubs.

Several authors have worked on various aspects and published their floristic works [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 13].

Material And Method:-

Present study based on field survey of Semara Taal under exploration is situated in Shohratgarh tahsil of district Siddharth Nagar of Uttar Pradesh (table 1). This Taal is dense aquatic areas. The specimens identification done by morphological, anatomical and floral characters as well as with help of floras, e-floras and herbarium.

Table 1:- Total explored and Studied Species.

S.N.	Botanical Name	Family	Phenology	Dicot/ Monocot	Fruit type
1.	*Alternanthera philoxeroides* (Mart.) Griseb	Amaranthaceae	May- Nov.	D	Capsule
2.	*Ammannia baccifera* L.	Lythraceae	Aug.-Dec.	D	Capsule
3.	*Anagallis arvensis* L.	Primulaceae	Sept.-Dec.	D	Capsule
4.	*Aponogeton undulates* Roxb**.**	Aponogetonaceae	July-Dec.	M	Follicle
5.	*A. natans* (L.) Engl. & K. Krause	Aponogetonaceae	Aug-Nov.	M	Follicle
6.	*Arundo donax* L.	Poaceae	Aug.- Nov.	M	Caryopsis
7.	*Bacopa monnieri* (L.) Pennell	Scrophulariaceae	July- Dec.	D	Capsule
8.	*Bergia texana* (Hook.) Seub. ex Walp.	Elatinaceae	June- Jan.	D	Capsule
9.	*Caesulia axillaris* Roxb.	Asteraceae	Nov.-March	D	Cypsela
10.	*Ceratophyllum demersum* L.	Ceratophyllaceae	Sept- Feb.	D	Nut
11.	*Centella asiatica* (L.) Urban	Apiaceae	Feb.- Nov.	D	Cremocarp
12.	*Centipeda minima* L.	Asteraceae	Nov.-Feb.	D	Cypsela
13.	*Commelina benghalensis* L.	Commelinaceae	July- Nov.	M	Capsule
14.	*Coronopus didymus* (L.) Sm Wallich ex C. B. Clarke	Brassicaceae	August- Feb.	D	Silicula
15.	*Cotula anthemoides* L.	Asteraceae	Jan.- April	D	Cypsela
16.	*C. hemisphaerica* (Roxb.) Wallich ex C. B. Clarke	Asteraceae	December-April	D	Cypsela
17.	*Chrysopogon zizanioides* (L.) Roberty	Poaceae	Aug.-Jan.	M	Caryopsis
18.	*Cynodon dactylon* (L.) Pers	Poaceae	March-Sept.	M	Caryopsis
19.	*Cynotis axillaris* (L.) D. Don ex. Sweet	Commelinaceae	Aug.-Nov.	M	Capsule
20.	*Cyperus compactus* Retz.	Cyperaceae	Sept.-Jan.	M	Nut
21.	*C. compressus* L.	Cyperaceae	Jul.-Dec.	M	Nut
22.	*C. corymbosus* Rottb.	Cyperaceae	Dec.-Jan.	M	Nut
23.	*C. difformis* L.	Cyperaceae	July-Apr.	M	Nut
24.	*C. iria* L.	Cyperaceae	Aug.-Feb.	M	Nut
25.	*C.* nutans Vahl	Cyperaceae	Jul.-Dec.	M	Nut
26.	*C.* rotundus L.	Cyperaceae	June-Feb.	M	Nut
27.	*Eclipta prostrata* (L). L.	Asteraceae	All year	D	Cypsela
28.	*Eichhornia crassipes* (Mart.) Solms	Pontaderiaceae	April- Nov.	M	Capsule
29.	*Echinochloa crus-galli* (L.) P. Beauv.	Poaceae	Aug.-Nov.	M	Caryopsis
30.	*Eleocharis acutangula* (Roxb.) Schult.	Cyperaceae	Aug.-Oct.	M	Nut
31.	*Fimbristylis dichotoma* (L.) Vahl	Cyperaceae	All Year	M	Nut
32.	*Gnaphalium luteo-album* L.	Asteraceae	Dec.- April	D	Cypsela
33.	*G. pensylvanicum* Willd.	Asteraceae	Dec.- April	D	Cypsela
34.	*G. polycaulon* Pers.	Asteraceae	Dec.-March	D	Cypsela
35.	*G. pulvinatum* Delile	Asteraceae	Dec.-March	D	Cypsela
36.	*Grangea maderaspatana* (L.) Poir.	Asteraceae	Dec.-April	D	Cypsela

37.	*Heliotropium indicum* L.	Boraginaceae	Dec.- April	D	Utricle
38.	*Hoppea dichotoma* B.Heyne ex Willd.	Gentianaceae	Dec.-March	D	Capsule
39.	*Hygrophila auriculata* (Schumach.) Heine	Acanthaceae	Dec.-March	D	Capsule
40.	*Hygroryza aristata* (Retz.) Nees ex Wight & Arn.	Poaceae	December-April	M	Caryopsis
41.	*Hydrilla verticillata* (L.f.) Royle	Hydrocharitaceae	Sept.- Dec.	M	Capsule
42.	*Ipomoea aquatica* Forssk.	Convolvulaceae	Sept.-Feb.	D	Capsule
43.	*I. carnea* Jacq.	Convolvulaceae	All Year	D	Capsule
44.	*Juncus bufonius* L.	Juncaceae	Octo-March	M	Capsule
45.	*Justicia diffusa* Willd.	Acanthaceae	July- March	D	Capsule
46.	*Lemna perpusilla* Torr.	Lemnaceae	Jun.-Nov.	M	Utricle
47.	*Lippia nodiflora* (L.) Michx.	Verbinaceae	All year	D	Nutlet
48.	*Lucas aspera* (Willd.) Link	Lamiaceae	Sep.-Feb.	D	Nutlet
49.	*Ludwigia adscendens* (L.) H.Hara	Onagaraceae	Oct.-Dec.	D	Capsule
50.	*L. hyssopifolia* (G.Don) Exell	Onagaraceae	All year	D	Capsule
51.	*L. octavalis* (Jacq.) Raven	Onagaraceae	All year	D	Capsule
52.	*L. perennis* L.	Onagaraceae	Nov.-Jan.	D	Capsule
53.	*L. prostrata* Roxb.	Onagaraceae	Nov.-March	D	Capsule
54.	*Limnophila aquatic* (Roxb.) Alston	Scrophulariaceae	Aug.-March	D	Capsule
55.	*Myriophyllum spicatum* L.	Holaragaceae	July-Sept.	D	Nutlet
56.	*Nymphaea alba* L.	Nymphaeaceae	Aug.- Nov.	D	Berry
57.	*Nelumbo nucifera* Gaertn.	Nelumbonaceae	Aug.-Jan.	D	Achene
58.	*Nymphoides hydrophylla* (Lour.) Kuntze	Menyanthaceae	July- Nov.	D	Capsule
59.	*Nechamandra alternifolia* (Roxb. ex Wight) Thwaites	Alismataceae	Sept.-Oct.	M	Berry
60.	*Neptunia oleracea* Lour.	Mimosaceae	Sept.- Feb.	D	Pod
61.	*Oldenlandia umbellata* L.	Rubiaceae	Sept.-Feb.	D	Capsule
62.	*Ottelia alismoides* (L.) Pers.	Hydrocharitaceae	Jul.-Nov.	M	Capsule
63.	*Oxalis corniculata* L.	Oxalidaceae	Jan.- Dec.	D	Capsule
64.	*O. corymbosa* DC.	Oxalidaceae	Apr.-June	D	Capsule
65.	*Persicaria glabra* (Willd.) M.Gómez	Polygonaceae	Oct.- March	D	Nut
66.	*Potamogeton nodosus* Poir.	Potamogetonaceae	Jan.- April	M	Drupe
67.	*Polypogon monspeliensis* (L.) Desf.	Poaceae	July- Dec.	M	Caryopsis
68.	*Portulaca oleracea* L.	Portulacaceae	All year	D	Capsule
69.	*Pistia stratiotes* L.	Araceae	Jan.-May	M	Berry
70.	*Ranunculus sceleratus* L.	Ranunculaceae	Jan.-April.	D	Achene
71.	*Rorippa indica* (L.) Hiern	Brassicaceae	Dec.-July	D	Siliqua
72.	*Rotala indica* (Willd.) Koeh.	Lythraceae	Oct.-Feb.	D	Capsule
73.	*Rottboellia exaltata* L.	Poaceae	Aug.-Nov.	M	Caryopsis
74.	*Rumex dentatus* L.	Polygonaceae	Jan.-July	D	Nut
75.	*Rungia repens* (L.) Nees	Acanthaceae	Sept- March	D	Capsule
76.	*Sagittaria trifolia* L.	Alismataceae	Dec.-May	M	Achene
77.	*Setaria italica* (L.) P. Beauv.	Poaceae	Jun.- Dec.	M	Caryopsis
78.	*Scirpus lacustris* L.	Cyperaceae	Dec.-Feb.	D	Nut
79.	*S. articulates* L.	Cyperaceae	Oct.-Dec.	D	Nut
80.	*S. maritimus* L.	Cyperaceae	Jun.-Oct.	D	Nut
81.	*Sphenoclea zeylanica* Gaertn.	Sphenocleaceae	Nov.-March	D	Capsule
82.	*Sphaeranthus indicus* L.	Asteraceae	Dec.-March	D	Cypsela
83.	*Spilanthes ciliata* Kunth	Asteraceae	Nov.- April	D	Cypsela
84.	*S. oleracea* L.	Asteraceae	Oct.–March	D	Cypsela
85.	*S. paniculata* Wall. ex DC.	Asteraceae	Oct.- March	D	Cypsela
86.	*S. radicans* Jacq.	Asteraceae	Oct.- March	D	Cypsela

87.	*Spirodela polyrhiza* (L.) Schleid.	Lemnaceae	July- Nov.	M	Utricle
88.	*Trapa natans* L.	Trapaceae	Sept.- Oct.	D	Drupe
89.	*Typha angustifolia* L.	Typhaceae	Oct.- April	M	Nut
90.	*T. domingensis* Pers.	Typhaceae	Nov.-April	M	Nut
91.	*Vallisneria spiralis* L.	Hydrocharitaceae	Dec.-March	M	Berry
92.	*Veronica anagallis-aquatica* L.	Scrophulariaceae	Jan.-April	D	Capsule
93.	*Wolffia globosa* (Roxb.) Hartog & Plas	Lemnaceae	July- Nov.	M	Utricle
94.	*Zannichellia palustris* L.	Potamogetonaceae	Feb.-March	M	Drupe

Result & Discussion:-

A total of 94 species documented belongs 71 genera & 40 families. As dicots having 58 species such as *Alternanthera philoxeroides, Ammannia baccifera, Anagalli sarvensis, Bacopa monnieri, Bergia texana, Caesulia axillaris, Ceratophyllum demersum, Centella asiatica, Centipeda minima, Coronopus didymus, Cotula anthemoides, C. hemisphaerica, Eclipta prostrata, Gnaphalium luteo-album, G. pensylvanicum, G. polycaulon, G. pulvinatum, Grangea maderaspatana, Heliotropium indicum, Hoppea dichotoma, Hygrophila auriculata, Ipomoea aquatica, I. carnea, Justicia diffusa, Lucas aspera, Ludwigia adscendens, L. hyssopifolia, L. octavalis, L. perennis, L. prostrata, Limnophila aquatica, Myriophyllum spicatum, Nymphaea alba, Nelumbo nucifera, Nymphoides hydrophylla, Neptunia oleracea, Oldenlandia umbellata, Oxalis corniculata, O. corymbosa, Lippia nodiflora, Persicaria glabra, Portulaca oleracea, Ranunculus sceleratus, Rorippaindica, Rotala indica, Rumex dentatus, Rungia repens, Scirpus lacustris, S. articulates, S. maritimus, Sphenoclea zeylanica, Sphaeranthus indicus, Spilanthes ciliata, S. oleracea, S. paniculata, S. radicans, Trapa natans* and *Veronica anagallis-aquatica*.

While as monocots having 36 species such as *Aponogeton undulates, A. natans, Arundo donax, Commelina benghalensis, Chrysopogon zizanioides, Cynodon dactylon, Cynotis axillaris, Cyperuscompactus, C. compressus, C. corymbosus, C. difformis, C. iria, C. nutans, C. rotundus, Eichhornia crassipes, Echinochloa crus-galli, Eleocharis acutangula, Fimbristylis dichotoma, Hygroryza aristata, Hydrilla verticillata, Juncus bufonius, Lemna perpusilla, Nechamandra alternifolia, Ottelia alismoides, Potamogeton nodosus, Polypogon monspeliensis, Pistia stratiotes, Rottboellia exaltata, Sagittaria trifolia, Setaria italica, Spirodela polyrhiza, Typha angustifolia, T. domingensis, Vallisneria spiralis, Wolffia globosa* and *Zannichellia palustris*.

There are 14 types of fruit studied viz. Capsule, Nut, Achene, Berry, Caryopsis, Cremocarp, Cysela, Drupe, Follicle, Nutlet, Pod, Silicula, Siliquaand Utricle. The capsule type of fruit having 32 species such as *Alternanthera philoxeroides, Ammannia baccifera, Anagalli sarvensis, Bacopa monnieri,Bergia texana, Commelina benghalensis, Cynotis axillaris, Eichhornia crassipes, Hoppea dichotoma, Hygrophila auriculata, Hydrilla verticillata, Ipomoea aquatica, I. carnea, Juncus bufonius, Justicia diffusa, Ludwigia adscendens, L. hyssopifolia, L. octavalis, L. perennis, L. prostrata, Limnophila aquatica, Nymphoides hydrophylla, Oldenlandia umbellata, Ottelia alismoides, Oxalis corniculata, O. corymbosa, Portulaca oleracea, Rotala indica, Rungia repens, Sphenoclea zeylanica* and *Veronica anagallis-aquatica*.

The nut type of fruit having 17 species such as *Ceratophyllum demersum, Cyperus compactus, C. compressus, C. corymbosus, C. difformis, C. iria, C. nutans, C. rotundus, Eleocharis acutangula, Fimbristylis dichotoma, Persicaria glabra, Rumex dentatus, Scirpus lacustris, S. articulates, S. maritimus, Typha angustifolia* and *T. domingensis*.

The cypsela fruit having 15 species such as *Caesulia axillaris, Centipeda minima, Cotula anthemoides, C. hemisphaerica, Eclipta prostrata, Gnaphalium luteo-album, G. pensylvanicum, G. polycaulon, G. pulvinatum, Grangea maderaspatana, Sphaeranthus indicus, Spilanthes ciliata, S. oleracea, S. paniculata* and *S. radicans.*

The caryopsis fruit having 8 species such as *Arundo donax, Chrysopogon zizanioides, Cynodon dactylon, Echinochloa crus-galli, Hygroryza aristata, Polypogon monspeliensis, Rottboellia exaltata* and *Setaria italica*.

The Berry and Utricletype of fruit having 4 species such asin berry *Nymphaea alba, Nechamandra alternifolia, Pistia stratiotes* and *Vallisneria spiralis* while in utricle having *Heliotropium indicum, Lemna perpusilla, Spirodela polyrhiza* and *Wolffia globosa.*

The Achene and Drupe type of fruit having 3 species such as in achene are *Nelumbo nucifera*, *Ranunculus sceleratus* and *Sagittaria trifolia* while in drupe having *Potamogeton nodosus*, *Trapa natans* and *Zannichellia palustris*.

The Follicle and Nutlettype of fruit having 2 species such as in follicle viz. *Aponogeton undulates* and *A. natans* while in nutlet having *Myriophyllum spicatum* and *Lucas aspera*.

Rest of all have one (1) species in Cremocarpsuch as *Centella asiatica*, in Pod such as *Neptunia oleracea*, in Silicula having *Coronopus didymus*, andin Siliqua having *Rorippa indica*.

Vegetation type aquatic and marshy habitats-

1. **Free floating hydrophytes**- These hydrophytes remain in contact with water an air but not soil float free on water surface viz. *Eichhornia crassipes, Hygroryza aristata, Lemna perpusilla, Pistia stratiotes, Spirodela polyrhiza* and *Wolffia globosa*.
2. **Rooted hydrophytes with floating leaves**- These plants, roots are fixed in mud but leaves float on water surface viz. *Centella asiatica, Nymphaea alba, Nelumbo nucifera, Nymphoides hydrophylla, Ottelia alismoides* and *Trapa natans*.
3. **Rooted submerged hydrophytes**- These plants remain completely submerged in water and rooted in soil viz. *Ceratophyllum demersum, Hydrilla verticillata, Limnophila aquatica, Myriophyllum spicatum, Nechamandra alternifolia, Potamogeton nodosus, Vallisneria spiralis* and *Zannichellia palustris*.
4. **Rooted emergent hydrophytes**- These plants grow in shallow water which require excess of water but their shoots are partly or completely under water fixed in soil such as *Alternanthera philoxeroides, Ammannia baccifera, Anagalli sarvensis, **Aponogeton undulates**, **A. natans**, Bacopa monnieri, Coronopus didymus, Hygrophila auriculata, Neptunia oleracea, Persicaria glabra, Ranunculus sceleratus, Rorippa indica, Sagittaria trifolia, Sphenoclea zeylanica* and *Veronica anagallis-aquatica*.
5. **Amphibious hydrophytes**- These plants occur on soft wet mud or rooted in shallow water. Most of the plants thrive well even after the soil is considerably dried up such as *Arundo donax, Bergia texana, Caesulia axillaris, Centipeda minima, Cotula anthemoides, C. hemisphaerica, Cyperus compactus, C. compressus, C. corymbosus, C. difformis, C. iria, C. nutans, C. rotundus, Commelina benghalensis, Chrysopogon zizanioides, Cynodon dactylon, Cynotis axillaris, Echinochloa crus-galli, Eclipta prostrata, Eleocharis acutangula, Fimbristylis dichotoma, Grangea maderaspatana, Gnaphalium luteo-album, G. pensylvanicum, G. polycaulon, G. pulvinatum, Heliotropium indicum, Hoppea dichotoma, Ipomoea aquatica, I. carnea, Juncus bufonius, Justicia diffusa, Ludwigia adscendens, L. hyssopifolia, L. octavalis, L. perennis, L. prostrata, Lucas aspera, Oldenlandia umbellata, Lippia nodiflora, Polypogon monspeliensis, Portulaca oleracea, Rotala indica, Rottboellia exaltata, Rumex dentatus, Rungia repens, Scirpus lacustris, S. articulates, S. maritimus, Setaria italica, Sphaeranthus indicus, Spilanthes ciliata, S. oleracea, S. paniculata, S. radicans, Typha angustifolia* and *T. domingensis* [14, 15].

Conclusion:-

These aquatic and marshy floras of Semara Taalare rich in vegetation which showed the large number of natural adaptation as swamps as well as wetlands. During the floristic survey of this areas revealed the good succession for flora and fauna which is rich diversity. Here the losing of habitats of wetland and aquatic plants due to agricultural and arable activities around the lands which showed losing and degradation of wetlands.

Here the species accounting are largest found in Asteraceae have 15 species, Cyperaceae 12 species, Poaceae 8 species, Onagaraceae 5 species and in families Scrophulariaceae, Acanthaceae, Hydrocharitaceae, Lemnaceae have 3 species while Brassicaceae, Commelinaceae, Convolvulaceae, Lythraceae, Oxalidaceae, Polygonaceae, Potamogetonaceae, Typhaceae have 2 species and rest of all family including Alismataceae, Amaranthaceae, Apiaceae, Aponogetonaceae, Araceae, Boraginaceae, Ceratophyllaceae, Elatinaceae, Gentianaceae, Holaragaceae, Juncaceae, Lamiaceae, Menyanthaceae, Mimosaceae, Nelumbonaceae, Nymphaeaceae, Pontaderiaceae, Portulacaceae, Primulaceae, Ranunculaceae, Rubiaceae, Sphenocleaceae, Trapaceae and Verbinaceae have 1 species.

Eichhornia crassipes, *Nelumbo nucifera*, *Nymphaea alba* and *Lemna perpusilla* are found to the large number of dwelling colonization habitats.

The macrophytes have ability to purification of contamination water through uptake of pollutants and heavy metal which maintain B.O.D of water for survival of flora and fauna resulting as balanced the adapted ecosystem. So this ecosystem plays crucial role of environment to maintain temperature and water quality.

Author Contribution
All authors contribute equally.

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