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Unit: II

Module Name: Reproduction of Algae (Sexual Methods)

Module No: 22

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Notes:

Introduction

Methods of Reproduction in Algae:

- There are three common methods of reproduction found in algae, as stated below:
 - Vegetative modes
 - Asexual modes
 - Sexual modes
- **Sexual Reproduction**
 - Sexual reproduction takes place by fusion of gametes of different sexuality.
 - The gametes are formed in gametangia by simple mitotic division or by reduction division.
 - The haploid gametes fertilize to make diploid zygote.
- **Sexual Reproduction Types**
- Depending upon morphological and physiological characteristics of gametes, sexual reproduction can be of the following types:
 - **Isogamy**
 - **Heterogamy**
 - i. **Anisogamy**
 - ii. **Oogamy**
 - **Aplanogamy (Conjugation)**
 - **Isogamy**
- In isogamous reproduction the fusing gametes are morphologically similar. These gametes are physiologically different due to different hormones.
- The gametes are represented by (-) and (+) strains to show morphological isogamy but physiological anisogamy

e.g. *Chlamydomonas moewusii*, *Ulothrix*, *Spirogyra* and *Zygnema*.

- **Example *Ectocarpus sp.***

Heterogamy- Anisogamy

- In anisogamy the fusing gametes are morphologically as well as physiologically different. These are formed in different gametangia.
- The microgametes or male gametes are smaller, active and formed in large number.
- The macrogametes or female gametes are larger, less active and formed in relatively smaller number.

e.g. *Chlamydomonas braunii*, *Enteromorpha*

- **Example *Enteromorpha***
- Male and female gametes of different size. Anisogamic fusion is observed.

Heterogamy- Oogamy

- It is the most advanced type of sexual reproduction.
- The male gametes or microgametes are formed in antheridia. The female gamete is large, usually one and formed in female structure oogonium.
- During fertilization the male gametes reach oogonium to fertilize egg and a diploid zygote is formed.

e.g. *Chlamydomonas coccifera*, *Chara*

- **Example *Chara***
- Exhibits advanced Oogamy. Reproductive structures are called antheridia and Oogonia. Male fructification is called globule and female one is nucule.
- At fertilisation, the motile antherozoids swim upto the Oogonium and fuse with the ovum as as to form a zygote.
- The Zygote secretes a thick wall and becomes the oospore.

Aplanogamy or Conjugation

- Implies to the fusion of two non-flagellate amoeboid gametes. (Aplanogametes)
- Gametes are morphologically similar, physiologically dissimilar e.g. Order Conjugales.
- In fresh water algae sexual reproduction is the best means of perennation as it is followed by the formation of thick walled zygote or oospore.
- The zygote soon develops a thick wall and becomes zygospore. The wall is usually three layered.
- It undergoes a resting period.
- Prior to germination, the zygospore nucleus divides meiotically. Of the four nuclei formed, three degenerate and only one survives.
- This one, on germination forms a new haploid plant.
- **Example *Spirogyra***

- **Conjugation of the non flagellated gametes**

Parthenogenesis

- In rare cases, such as *Spirogyra mirabilis* and *Spirogyra groenlandica* the gametes fail to fuse, round off and secrete a cell wall around and behave like spores.
- Such spores are called **Parthenospores** (azygospore) which on germination form new plant.

Conditions for sexual reproduction

- The sexual reproduction takes place after considerable accumulation of food material
- The climax of vegetative activity is over.
- Bright light is a major factor for the production of gametes.
- A suitable pH value is required.
- Optimum temperature is necessary