

Quadrant II – Transcript and Related Materials

Programme	: Bachelor of Science (First Year)
Subject	: Botany
Course Code	: BOC101
Course Title	: Biodiversity I (Microbes, Algae, Fungi and Bryophytes)
Unit IV	: Bryophytes
Module Name	: Reproduction in <i>Riccia</i>
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Reproduction in *Riccia*

Riccia exhibits :

- A. Vegetative reproduction
- B. Sexual reproduction

A. Vegetative reproduction

1. **Fragmentation** – depends on the ageing of the vegetative cells. Older portions die and lobes become separated.
2. **Adventitious branches** – from the ventral surface of the thallus special adventitious branches develop, which later get detached from the parent due to decay of connective tissue and develop into a new plant.
3. **Persistent apices** – the thallus lobes are killed due to prolonged dry conditions, except the apical portions i.e. the persistent apices which survive deep into the soil and in the subsequent rainy seasons resume growth and form new plant.

4. **Tuber formation** – apices of the thallus become thickened to form tuber at the end of growing season. Under unfavourable conditions plant perish and the tuber remain dormant in the soil, which resume growth under suitable conditions.

B. Sexual Reproduction

a. Distribution of sex organs

- Developed on the thallus
- Developed in extending line back from the growing regions
- Generally lie in the dorsal furrow or groove sunk deeply, each in a separate cavity
- Developed in acropetal order
- Younger ones near the growing point and older away from it
- Species can be Monoecious (antheridia and archegonia on same thallus) or Dioecious (antheridia and archegonia on different thalli)

b. Structure of the sex organs

1. Antheridium

- Elongated structure
- Consist of an ovoid, or a pear shaped body seated on a short, few celled stalk
- Stands in a pit (antheridial chamber)
- Antheridial chamber opens on at the upper surface by a narrow pore called Ostiole
- Body of the antheridium has an outer, jacket layer of sterile cells called antheridial wall, protective in function
- Encloses a mass of small, fertile cubical cells called androcyte mother cells

- Each androcyte mother cell has a denser cytoplasm and a relatively larger nucleus
- It divides diagonally to form two sperm cells known as the spermatids or androcytes
- Each sperm is a minute, slender, curved structure, furnished with a pair of whiplash flagella at its anterior end
- Sperm consist of an elongated nucleus
- Dehiscence
 - Presence of moisture is required
 - Androcyte wall dissolves and sperms lie freely in the viscous fluid in the antheridial cavity surrounded by jacket layer
 - Water enters antheridial cavity through ostiole

2. Archegonia

- Is a flask shaped organ, consisting of two parts – a swollen portion called venter and a long slender neck
- Venter directly attached to the thallus tissue, no visible stalk
- Neck consist of a vertical row of four cells, the neck canal cells surrounded by a layer of sterile cells forming a protective jacket
- Jacket neck cells are arranged in six longitudinal rows
- Each row is 6-9 cells in height
- The tip of the neck is made up of four specialised large, cap or lid cells with greater diameter than the neck cells
- Venter also has a jacket of sterile cells continuous above the jacket of the neck, the venter wall
- It encloses the venter cavity which is filled with two cells – the lower, larger egg cell and upper, smaller venter canal cell

- Venter canal cells acts like a plug, holding the egg in place
- Archegonium lies within a cavity
- At maturity, NCC and VCC degenerate
- Their products, when hydrated, form mucilage which imbibes water and swells
- Cover cells separate due to force and forms a narrow passage

c. Fertilization

As the male and female gametes mature

Sporophytic Phase

i. Zygote

- Fusion cell formed by the union of sperm with the egg
- Has a diploid nucleus and cellulosic cell wall

ii. Embryo

- Zygote undergoes repeated division and cell enlargement
- Forms embryo – a mass of undifferentiated cell
- Venter expands and transforms into calyptra

iii. Sporogonium

- Undifferentiated embryo shows separation
- Two layers are formed – outer single layer of cells called Amphithecium, and inner central mass of cells called Endothecium
- Endothecium – constitute first cell generation of sporogenous tissue and called Archegonium, further forming spore mother cells
- Some cells disintegrate to form nutritive fluid called nurse cells
- Sporogenesis leads to the formation of spores

Sporophyte

- Lacks foot and seta, only spore sac or capsule is present
- Capsule spherical in outline
- Wall one layered thick
- Capsule wall encloses spore mother cell, calyptra around sporogonium
- No elaters

Spores

- Meiospores are pyramidal in shape
- Consist of tiny mass of cytoplasm containing a small haploid nucleus
- Protective wall of the spore is termed sporoderm
- Sporoderm is usually differentiated into two layers – outer exine and inner intine