Module Detail	
Subject Name	<BOTANY>
Paper Name	<Plant Ecology II>
Class	M.Sc. III Sem
Topic	Ecological Succession
Objectives	To make the students aware of the components of plant succession

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ECOLOGICAL SUCCESSION

Stages of Ecological Succession

Learning objectives:

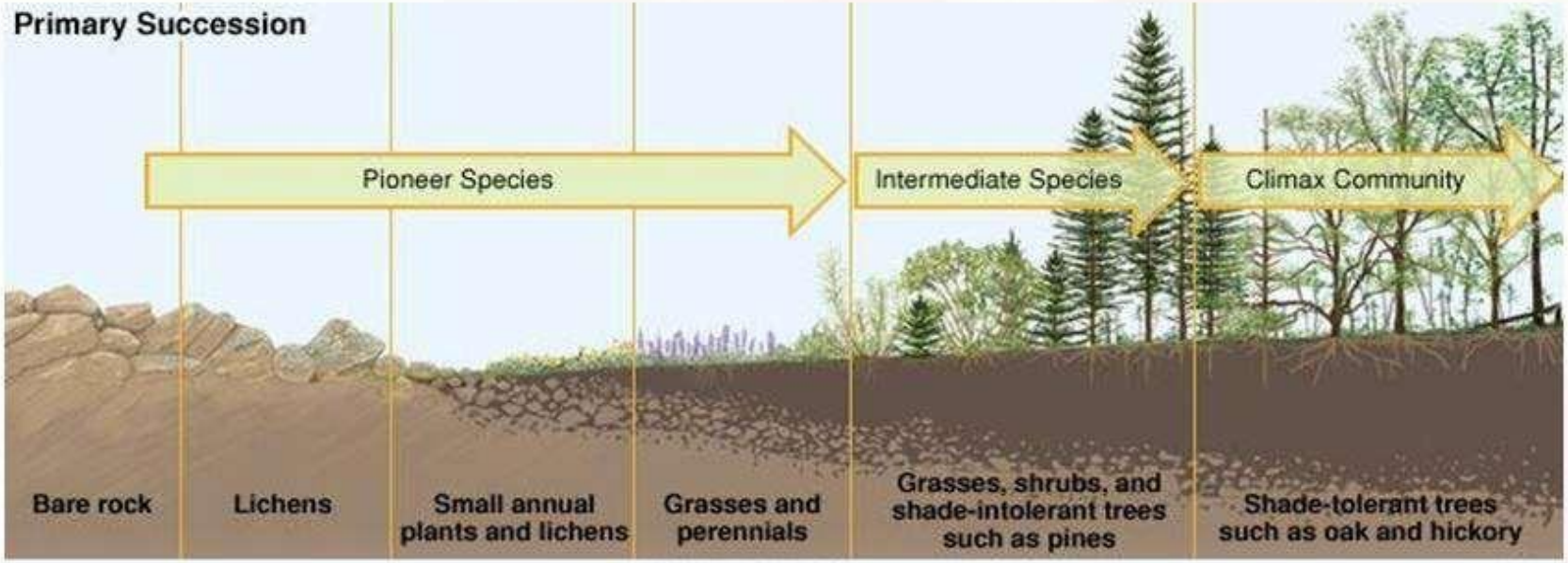
- What is Ecological Succession?
- The process of Ecological Succession
- Types of Ecological Succession
- Causes of Ecological Succession
- Process of Ecological Succession
  - Nudation
  - Invasion
  - Competition and Co-action
  - Reaction
  - Stabilization (climax)

Succession

ECOLOGICAL SUCCESSION

What is Ecological Succession?

- ***Definition***: *The gradual* ***replacement*** *of one* ***community*** *by the other*
- An orderly process of **community change** in a unit area (E.P. Odum)
- A process of *Ecosystem Development*



Succession

Formation of forest on a bare area through Ecological Succession

Qu.-What is plant succession

ECOLOGICAL SUCCESSION

- **Community**: A combination of different **population**
- **Population**: group of individuals of a particular species
- The community in an ecosystem is **NOT stable**
- Pass through many **developmental stages** in definite sequence
- Generally from Simple to Complex

A Coral Reef Community

A Forest Community

ECOLOGICAL SUCCESSION

(1). Primary Succession

- Starts from an area where there was **no previous living matter**
- Example: rock surface, newly created pond
- First community establishing the new area : **Pioneer Community**
- Example: Lichens, Phyto-plaktons

A Bare Rock Surface (without any life)

Lichens on Rock Surface (Primary Succession)

ECOLOGICAL SUCCESSION

(2). Secondary Succession

- Starts from a previously built-up substratum (already existing living matter)
- Sudden changes causes the disappearance of the existing community
- Example: fire, snow fall, biotic interventions
- Thus the area become devoid of any living matter
- Secondary succession is comparatively rapid process

A Grassland (ecosystem)

The Grassland on Fire

A Bare Area after Fire

ECOLOGICAL SUCCESSION

(3). Autogenic Succession

- After succession has begun, the community itself modify its own environment and thus causing its own replacement

(4). Allogenic Succession

- Replacement of existing community by external conditions and not by the existing organisms

Fish death due to severe algal bloom (autogenic cause)

Fish death due to industrial river pollution (allogenic cause)

ECOLOGICAL SUCCESSION

Process of Ecosystem Succession

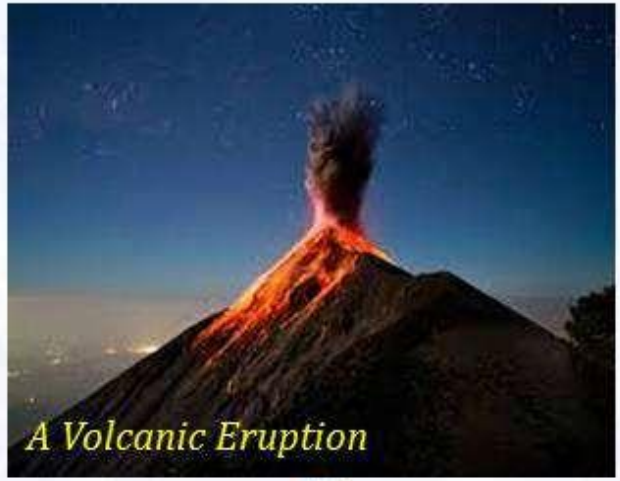
- Ecological succession is completed through a series of **sequential steps**:

1. **Nudation**
2. **Invasion**
3. **Competition and Co-action**
4. **Reaction**
5. **Stabilization (climax)**

ECOLOGICAL SUCCESSION

(1). Nudation

- First step in succession
- ***Development of a bare area*** (without any life)
- Causes of nudation:
  - **Topographic**: soil or topography related
  - **Climatic**: due to glaciers, dry period, storm
  - **Biotic**: forest destruction, agriculture, disease epidemics



A Volcanic Eruption

Nudation of the Area

ECOLOGICAL SUCCESSION

(2). Invasion:

- Second step
- ***Successful establishment of a species in a bare area***
- Invasion is completed in **THREE** steps
  - ***A. Migration***
  - ***B. Ecesis***
  - ***C. Aggregation***

Lichens invade and establish on rock surface

ECOLOGICAL SUCCESSION

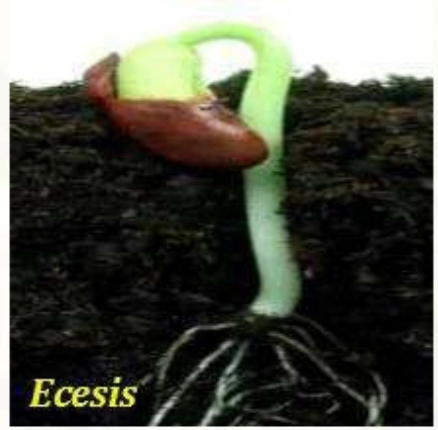
(2). Invasion:

(A). Migration (Dispersal):

- Seeds, spores, propagules reach a bare area

(B). Ecesis:

- ***Process of successful establishment of species***
- Seeds/spores germinate, grow and reproduce
- Only few progenies survives (harsh condition)



(C). Aggregation:

- After ecesis, individuals of a species increase their number and they stay close to each other

ECOLOGICAL SUCCESSION

(3). Competition and Co-action

- Aggregation results in **large number** of species within a **limited space**
- This results in **competition** (food or space)
- Competition may be **intra-specific** or **inter-specific**
- Individuals of a species affect each other (**co-action**)
- Competition and co-action results in:
  - *Elimination of unfit individuals*
  - *Survival of fit individuals*
- ***A species with wide reproductive capacity and ecological amplitude will survive***

Intra-specific

Inter-specific

ECOLOGICAL SUCCESSION

(4). Reaction

- Most important stage in ecological succession
- It is the modification of the environment through the influence of living organism present on it
- Due to reaction, change in soil, water, light and temp. etc. modified
- Due to the modification, the present community become unsuitable for the existing environmental conditions
- Such communities will be quickly replaced by another community (**seral**)
- **Sere:** the whole sequence of communities that replaces one another in the given area is called sere (ecological sere)
- Various communities contributing sere are called seral communities (seral stages)

Qu.-Explain the types of succession

Qu.- what do you mean of Autotropoic succession

ECOLOGICAL SUCCESSION

(5). Stabilization (Climax)

- Last stage of ecological succession
- Final (terminal) community become more or less stabilized for longer time
- This community can maintain its equilibrium with the climate of the area
- This final community is called **Climax Community** (climax stage)
- Climax community is not replaced by other communities
- Climax community is determined by the **climate** of the region
- Example of climax community:
  - Forest
  - Grassland
  - Coral Reefs

Qu.-Describe the process of succession.

Qu.- Explain the climax stage.

Qu. The development of plant community is called :

A. Reaction

B. Succession

C. Invasion

D. All of these

Succession

Reference

1. *Sahney, S.; Benton, M.J. (2008). "Recovery from the most profound mass extinction of all time". Proceedings of the Royal Society B: Biological Sciences.* ***275*** *(1636): 759–65. doi:10.1098/rspb.2007.1370. PMC 2596898. PMID 18198148.*

THANK YOU