

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (First Year)

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Course Code: BOG 102

Course Title: Coastal and Mangrove Ecology

Unit: 03

Module Name: Seed dispersal and establishment in Mangroves

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Seed dispersal and establishment in Mangroves

Plants produce seeds that are capable to grow into new plants. If the seeds fall to the ground under the parent plant, they might compete for light, water or nutrients from the soil leading to high mortality. Plants being rooted and immobile, rely upon a variety of dispersal vectors to transport their propagules. Seed dispersal means dissemination of seeds to various distances from their parent plants.

Seed Dispersal in Mangroves

Mangroves are found in the tropical, subtropical and intertidal regions of the world. They grow in saline water and saline and anoxic soil. Mangroves have evolved a special mechanism to help their offspring survive in harsh environment. All mangrove trees share two reproductive adaptations – viviparity and propagule dispersal. After Mangrove flowers are pollinated the plants produce seeds.

Unlike most plants, whose seeds germinate in soil, many mangroves (e.g. Red Mangrove) are viviparous, whose seeds germinate while still attached to the parent tree. In mangroves the seed dormancy is absent. Embryo grows continuously without any hindrance inside the fruit while it is attached to the mother plant. The little seedlings are called propagule.

Once germinated, the seedling grows either within the fruit (e.g. *Avicennia*). The embryo develops while on the parent plant but does not penetrate the fruit coat or out through the fruit (e.g. *Rhizophora*, *Ceriops*, *Bruguiera*) to form a propagule which can produce its own food via photosynthesis.

Once mature propagules get detached, and fall either into water or soil. If a mangrove seed falls during low tide, it can begin to root in the soil. The mature propagule which falls in the water can transport it to great distances. Mangrove seeds (propagules) are buoyant and therefore suited to water dispersal.

Once the propagule drops from the parent tree there is an obligate dispersal period which each species propagule must remain in the water. During this period embryonic development continues. For the Red Mangrove this dispersal period is the longest at 40 days. The Black Mangrove's propagule must drift for at least 14 days. The White Mangrove's dispersal period is the shortest at 5 days, which also includes germination.

So depending upon the species, propagules will float for a number of days. Then it is waterlogged and sink to the muddy bottom, where they lodge in the soil.

Establishment of seed

Once a propagule is ready to root, its density changes so that the elongated shape now floats vertically rather than horizontally. In this position, it is more likely to lodge in the mud and root.

The whole seedling floats horizontally on the tides and currents. When the seedling reaches brackish water, the less buoyant root sinks. Flips the whole seedling to a vertical position where the root can hopefully touch bottom and take hold. This type of germination is called viviparous germination

Some mangroves like *Avicennia* and *Sonneratia* produce seeds and fruits which have a buoyant outer coating to float until reach favourable water salinity. When the salinity is right, the coating peels off, and the seed sinks to the bottom and takes hold and grows. This type of germination is called crypto-vivipary germination.

If it doesn't root, it can alter its density and drift again in search of more favourable conditions. The lateral roots immediately develop on this seedling, and it soon establishes as a plant in the muddy soil. The plumule remains above the water level and grows safely.

The flotation time allows for the propagules to vacate the area where their parent grows and avoid competition with an already established mangrove.