Welcome everyone, myself, Ashish Venkatesh Prabhugaonkar, Assistant Professor at DCT's Dhempe college of Arts and Science, Miramar, Panaji Goa. This module is for program Bachelor of Science subject Botany. Semester 6, course code is BOC 110. Title of this course is plant ecology and phytogeography. Title of this unit is phytogeography. Module name is theory of tolerance. In this module we are going to learn theory of tolerance and its implications in phytogeography. At the end of this module, we should be able to explain the theory of tolerance in phytogeography, also describe its role in understanding Phytogeography.

Theory of tolerance is a theory which describes role of abiotic factors in distribution of various plant over the land surface or various animals over the earth surface. Law of Minimum stated by Taylor (1934) is described in broad ecological terms as follows:

 The functioning of an organism is controlled or limited by that essential environmental factor or combination of factors present in least favourable amount

 The factors may not be continuously effective but only at some critical period during the year or perhaps some critical year in climatic cycle

Threshold of tolerance

 If we consider whole biosphere, every environmental factor varies through a wider range of intensity than any single organism can tolerate. Ex. temperature

 For each individual there is present a lower and a upper limit in the range of environmental factor between which it functions efficiently

 The threshold is minimum and maximum quantity of any factor that effects survival of an organism

Shelford's Law of tolerance or Theory of Tolerance

 Organisms are limited in their growth, reproduction on minimum and maximum intensity of a factor which can be termed as upper and lower limit of tolerance of that abiotic factor

 Idea that factors could be limiting at their maximum as well as minimum quantities was incorporated in law of tolerance formulated by V. E. Shelford in 1913

 This law postulates that each ecological factor to which an organism responds has maximum and minimum limiting effect between which lies a range or gradient that is known as limits of tolerance

 Zone of compatibility of an organism includes a broad range of optimum and narrow zones of physiological stresses which ends in upper and lower limit of tolerances, above and below which lies lethal zone

 The law of tolerance, or theory of tolerance, is best illustrated by a bell shaped curve.

Theory of Tolerance can also be understood as principles concerning plant

responses:

1. Range of distribution of plants is limited by their tolerances. Each plant species has a range of climatic and edaphic conditions. Therefore, tolerance of a large taxon is the sum of tolerances of its constituent species.

2. Tolerances have a Genetic basis. The response of plants to environment is governed by their genetic makeup.

Ex. Many of the crops through breeding and genetic changes have been made to grow in wider range of environmental conditions.

Difference in tolerances can be observed in groups of organisms

 Developmental stages of plants show different degree of tolerances

Ex. seeds and mature plants are more tolerant to temperature and moisture variations than their seedlings

 Organisms show various adaptations to evade zone of physiological stress. Ex. Hibernation, ephemeral species

 Further, species vary in in their limits of tolerance to same factor. Ex. Atlantic Salmon

 Moreover, plant or animal may have wide range of tolerance for one abiotic factor but relatively narrow range of tolerance for another condition

These are the references for this module.

Thank you.