

Free report about vegetation richness and diversity

[Sociology](#), [Community](#)



Abstract

Ecology, a scientific discipline based on ecosystem, interrelates organisms, vegetation, process and condition in nature. For ecological study of any landscape knowledge about structure of plant communities and role of soil is required. Knowledge of plant community is based on understanding of spatial relationships, abundance and diversity of plants or vegetation in that area. From the study of plant community and their associated edaphic or soil factors knowledge of vegetation patterns and species assemblage is developed. In a plant community it is very difficult to quantify number and distribution of all species and individuals, so techniques for obtaining representative sample have been described in this experiment. There are two types of sampling techniques – plot and plotless. Main objective of this experiment is to have knowledge of plot technique.

Keywords: vegetation, plant community, sample

Introduction:

Vegetation richness and diversity is one of the basic topics in ecology, rather biology. This topic helps to get an idea about structure of plant community in any landscape. In this lab experiment plots locations were selected subjectively by choosing sites with many species. Purpose of this experiment was to evaluate species richness, diversity by % cover, diversity by density, Shannon's Diversity Index of plant of various types - such as tree, shrubbery and herbaceous.

Methods:

Plot technique was used in this experiment. In this method a representative area was chosen within plant community followed by rigorous sampling of plant species and associated soils within areas of the plot called quadrats. Within a quadrat individual plants were identified. Then plants were counted for density calculation or the area covered by each species was estimated for calculation of percent cover.

Results:

First location-

Tree:

Species % cover

Red Oak 23

Tulip Tree 25

Sugar Maple 5

Species richness = 3

% cover total = 53

Calculating Diversity by % Cover:

Species % cover

Red Oak $23/53 = 0.44$

Tulip Tree $25/53 = 0.47$

Sugar Maple $5/53 = 0.09$

Shannon's Diversity Index

$$H' = -\sum p_i \ln(p_i)$$

$$H' = -[(0.44(\ln 0.44)) + (0.47(\ln 0.47)) + (0.09(\ln 0.09))]$$

$$H' = -[(0.44(-0.82)) + (0.47(-0.76)) + (0.09(-2.41))]$$

$$H' = -[-0.36 -0.357 -0.2169]$$

$$H' = 0.9339$$

Shrubbery:

Species % cover

Beech40

Fruit tree10

Species richness = 2

% cover total = 50

Calculating Diversity by % Cover:

Species % cover

Beech40/50 = 0.8

Fruit tree10/50 = 0.2

Shannon's Diversity Index

$$H' = -\sum p_i \ln(p_i)$$

$$H' = -[(0.8(\ln 0.8)) + (0.2(\ln 0.2))]$$

$$H' = -[(0.8(-0.223)) + (0.2(-1.6))]$$

$$H' = -[-0.1784 -0.32]$$

$$H' = 0.4984$$

Herbaceous:

Species % cover

Species 130

Aster15

Species richness = 2

% cover total = 45

Calculating Diversity by % Cover:

Species % cover

Beech30/45 = 0. 67

Fruit tree15/45 = 0. 33

Shannon's Diversity Index

$$H' = -\sum p_i \ln(p_i)$$

$$H' = -[(0.67(\ln 0.67)) + (0.33(\ln 0.33))]$$

$$H' = -[(0.67(-0.4)) + (0.33(-1.1))]$$

$$H' = -[-0.268 -0.363]$$

$$H' = 0.631$$
Second Location-

Tree:

SpeciesNumber of individuals

Birch3

Hemlock8

Oak 1

Beech1

Species richness = 4

Individual total = 13

Calculating Diversity by Density:

SpeciesNumber of individuals

Birch $3/13 = 0.23$

Hemlock $8/13 = 0.61$

Oak $1/13 = 0.08$

Beech $1/13 = 0.08$

Shannon's Diversity Index

$H' = -\sum p_i \ln(p_i)$

$H' = -[(0.23(\ln 0.23)) + (0.61(\ln 0.61)) + (0.08(\ln 0.08)) + (0.08(\ln 0.08))]$

$H' = -[(0.23(-1.47)) + (0.61(-0.5)) + (0.08(-2.53)) + (0.08(-2.53))]$

$H' = -[-0.3381 -0.305 -0.2024 \times 2]$

$H' = 1.048$

Shrubbery:

Species % cover

Maple20

Beech $5+1 = 6$

Birch $26 + 2 = 28$

Species richness = 3

% cover total = 54

Calculating Diversity by % Cover:

Species % cover

$$\text{Maple}20/54 = .37$$

$$\text{Beech}6/54 = 0.11$$

$$\text{Birch}28/54 = 0.52$$

Shannon's Diversity Index

$$H' = -\sum p_i \ln(p_i)$$

$$H' = -[(0.37(\ln 0.37)) + (0.11(\ln 0.11)) + (0.52(\ln 0.52))]$$

$$H' = -[(0.37(-1)) + (0.11(-2.21)) + (0.52(-0.66))]$$

$$H' = -[-0.37 -0.2431 -0.3432]$$

$$H' = 0.9563$$

Discussion:

Shannon's Diversity Index for tree is almost same for both location but the index for the shrubbery is different in two locations. Quadrat size depends upon community attributes and quadrats are located either systematically or randomly depending upon the experiment.

Reference

Biology Department. (2013). Lab handout for vegetation richness and diversity. SUNY-Fredonia, Fredonia, NY.