

BIOL 475
Vegetation Description and Analysis
Laboratory 8 and 9
Oct 30 and Nov 6, 2006
Sorted table analysis method using EXCEL
Sorted Table due 5 pm Friday Nov 10, 2006
100 points

I. OBJECTIVE:

To familiarize students with the method of table sorting and to use the table to describe some of the major vegetation units occurring in our study area.

II. WHY MAKE A SORTED TABLE?

Sorted tables are the heart of vegetation classification. They are the essential element of any publication of a classification, and provide the justification for dividing the vegetation into the units described. They present the relevé information in an ordered way so that readers can readily see the pattern of distribution of key plant species. When taken to the level of association tables, they show the relationship of the described vegetation units to other published units. In this exercise, we will produce a sorted table of the study areas and identify the key differential species for separating the units. We will combine our data with 6 relevés from the Bicycle Bump deciduous forest. Unlike the ordination, which provides a much more abstract synthesis of species information, the table presents all the species information, so it is easier to see problems that may be due to sampling errors or misidentified species. As we will see in the exercise, the sorted table can also be helpful in interpreting the ordination. Often it is best to do the sorted table before doing an ordination.

III. METHOD OF TABLE SORTING: (Note: refer to the 'Sorted Table' in Lab 8 on the web site to see where we are headed. Your final table should look similar to this.)

A. RAW TABLE

The raw table should have the species in rows and the relevé numbers in the columns. This is the file Species06.xls.

B. CALCULATE FREQUENCY VALUES FOR ALL SPECIES.

1. At the right side of your species data matrix create a column called 'frequency'. (Note: In some descriptions of the Braun-Blanquet method this is referred to as 'Constancy'. This, however, is easily confused with the 'constancy' classes (i.e., species occurrence within vegetation units) discussed below (Section F.2.b).
2. Remove all the points '.' in the matrix. Otherwise the 'Count' formula in Excel will count all cells with data in them. Highlight the body of the table (exclude the header). Then 'Edit/Replace'. Then fill in '.' in the 'find what' line, and leave the 'replace with' line blank. Then click 'Replace all'.
3. Calculate the frequency for the first species. In the cell corresponding to frequency for the first species, sum the total occurrences of the first species across all the plots. To do this, enter '=counta(Xy:Zy)', where X is the first column of species data, Z is the last column of species data, and y is the row. You can also highlight the entire line after entering the first parentheses and follow with the closed parentheses. Hit return. The frequency of the first species should appear in the cell.
4. Repeat for all the species. Select the cell with the 'counta()' formula. Then 'Edit/Copy'. Then highlight the rest of the frequency column below the cell with the formula. Then 'Edit/Paste'. Frequencies for all the species should appear in the appropriate cells.

C. ARRANGE THE ROWS (SPECIES) IN DESCENDING ORDER OF THEIR CONSTANCY VALUES.

Highlight the entire table. Select 'Data/Sort/Options/Orientation/Sort from top to bottom'. This will specify that you are sorting by rows. Click OK. Then specify the column number for the frequency values and 'descending'. This should arrange all the species in descending order of their frequency values.

D. ARRANGE THE COLUMNS (PLOTS) ACCORDING TO FIRST-CUT VEGETATION TYPES.

Sort the columns according to 'sites'. This will arrange the table so that the Upland Spruce Forest plots (relevés: R06-01 to R06-06) are on the left hand side of the table, and the Lowland Spruce Forest plots (relevés: R06-07 to R06-12) are in the middle and Deciduous Forest plots (relevés: R04-*) are on the right. These are sites 1, 2, and 3 respectively. You can also move individual columns as follows:

1. Highlight the column you want to move.
2. Select 'Edit/Cut'.
3. Highlight the column to the right of the one where you want to insert the cut column.
4. Then 'Insert/Cut cells'.
5. NOTE: It is easy to lose columns or rows during the sorting process. So keep a tally of the total number of species and relevés and check this periodically during the sorting.

E. CALCULATE SPECIES RICHNESS FOR EACH RELEVÉ

Calculate the total number of species in each relevé.

1. Create a new row at the bottom of the table labeled 'Species Richness'.
2. In the cell corresponding to the species richness for the first relevé, write the equation '=counta(Xy:Xz)' where X is the relevé column, y is the row of the first species in the table, and z is the row of the last species in the table.
3. Hit 'Return'. The number of species in the first relevé should appear in the cell.
4. Repeat for all the relevés. Select the cell with the formula. Then 'Edit/Copy'. Then highlight the rest of the relevé columns to the right of the cell with the formula. Then 'Edit/Paste'. Richness for all the relevés should appear in the appropriate cells.

F. ARRANGE SPECIES ACCORDING TO DIFFERENTIAL TAXA WITHIN THE VEGETATION TYPES.

1. Put in 4 blank row above the first species in the table. Label the rows according to these groups:
 - a. 'Differential taxa for Upland Spruce Forest
 - b. 'Differential taxa for Lowland Spruce Forest
 - c. 'Differential taxa for Deciduous Forest
 - d. 'Companion taxa'
 - e. 'Single occurrences'
2. Determine the group (see 1a to 1d above) for each species:
 - a. Move all species with 'species richness=1' below the 'Single occurrences' line.
 - b. Look for "differential" species for each type. Since we have more than 5 relevés in each category, we can use the rules in Table IV (next page) to determine if species are differential for a given group. Calculate the constancy of each species for each group. Constancy classes are as follows: I = the species occurs in 1-20% of plots in the category; II = 21-40%; III = 41-60%; IV = 61-80%; V = 81-100%. You can color code the species using a highlight color (yellow for differential species for the Upland forests, orange for the Lowland forests, and light green for the deciduous forests. We will go over an example species in class to show how to determine the constancy class.

TABLE IV
Determination of fidelity according to SZAFAER and PAWLÓWSKI
(BRAUN-BLANQUET 1932)

F = fidelity degree; A = cover-abundance combined estimation; C = presence or constancy class; V = vitality.				
F	in phytocoenon under consideration		in comparable phytocoena	
	C	A	C	A
5	IV-V	3-5	I-II	+2(1)
	IV-V	+2	I	+2
	I-III	+5	absent or very rare	
4	IV-V	3-5	II-III (IV)	+2(1)
			(relic or pioneer)	
	IV-V	+2	II-III	+1(2)
	III-IV	+2	I-II (III)	+1(2)
	I-III	+2	I (rare)	+
3	I-V	3-5	I-V	+2
	C, A various	V normal	C, A lower	V reduced
2	C, A, V various		similar	
1	I	+1	higher	
	V reduced			
	- outskirts and disturbed parts of the stand(s) -			

2. Put all the differential taxa for each group together in the table, using a procedure similar to that which you used to move the columns. Once you have a complete list of the differential taxa, create a row at the bottom of the table that has a count of the differential species for each vegetation type.
3. Reorder the columns within the subtypes based on the number of differential taxa in each group, with the plot having the most differential taxa on the far left.
4. Within each group of differential taxa, arrange the order so that the species occurring in the most plots of the group is at the top of the group and the species occurring in the fewest plots is at the bottom.
5. Arrange the companion taxa by order of their frequency.
6. Arrange the single occurrences by the order in which they appear from left to right in the table (i.e. single occurrences in the first plot on the left side of the table should be at the top of the list of single occurrences and single occurrences in the far right hand plot are at the bottom of the table).

G. REARRANGE THE COLUMNS (PLOTS) WITHIN EACH VEGETATION TYPE.

You may notice new subgroups within the preliminary vegetation types that have differential taxa of their own. You would then repeat the process, identifying differential taxa for these subgroups and further rearranging the table.

H. PUT THE COMMUNITY-TYPE NAMES FOR EACH CATEGORY AT THE TOP OF THE TABLE.

Create a new row above the plot-numbers row and label the columns with the vegetation subtype (refer to the example table on the web site for the format).

I. POLISH THE TABLE.

1. Label the appropriate groups of columns with the community-type names.
2. Label the groups of differential species with the proper community-type names.
3. Draw boxes with solid lines around the groups of differential taxa.

IV. SUMMARY OF SORTED TABLE TO BE TURNED IN:

Each class member should turn in a sorted table and one paragraph describing three vegetation units.

A. The Table. The tables should contain the following elements:

- The columns (relevés) should be sorted according to the three broad community types mentioned above.

- The rows (species) should be sorted, from top to bottom according to frequency, into the following categories

“Differential taxa for the *Upland Spruce*

“Companion taxa”

“Single occurrences”

- Draw boxes around the set of differential species for the *Betula papyrifera* subtype, and groups of differential species missing in the ‘depauperate subtype’.

- The right hand column of the table should contain the frequency of each species in the plots.

- The bottom row of the table should list the total number of species (richness) for each relevé.

B. The description. Write a **one page maximum** description of the vegetation of the three forest areas based on the table. Do not present detailed methods for this. Include the following.

1. A brief introduction with a description of the goals of the classification.
2. A brief description of the general forest study areas within the North Campus Lands.
3. A brief description of the methods used in releve sampling.
4. Photographs of the major units.
5. Use the table to describe the two major vegetation units. Include a brief description of the dominant plant taxa, the differential taxa, companion taxa, the rare species, and species richness of all three units.

Note: I will count off for misspellings, so check the spelling of species names carefully.