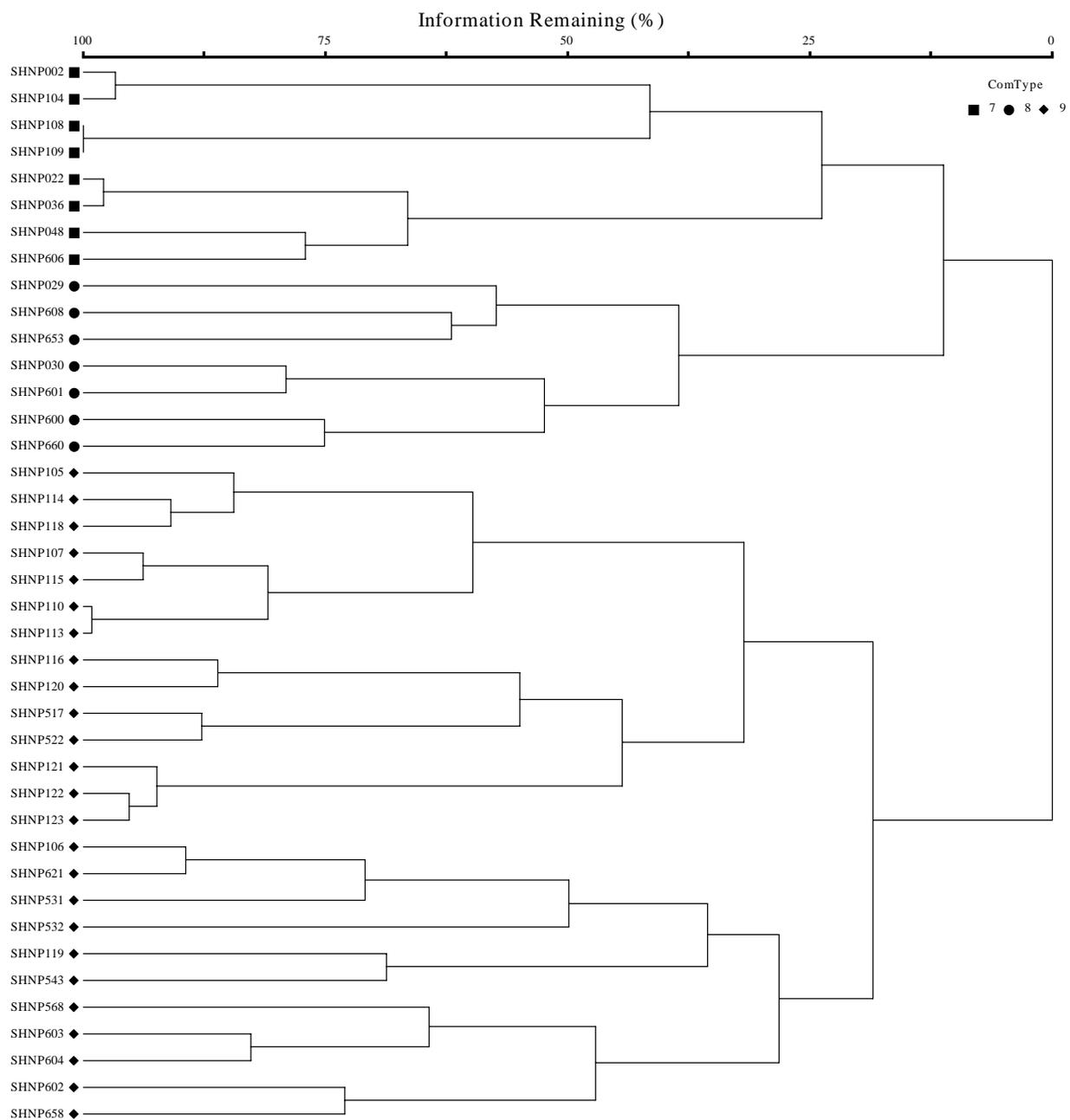


KEY TO COMMUNITY TYPES:

- 1 – Central Appalachian Pine-Oak/Heath Woodland
- 2 – Chestnut Oak – Black Birch Wooded Talus Slope
- 3 – Central Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
- 4 – Mixed Oak/Heath Forest (Low-Elevation White Oak-Scarlet Oak-Black Oak Type)
- 5 – Central Appalachian Dry-Mesic Chestnut Oak-Northern Red Oak Forest (see also Forests\_Subset 4 dendrogram)
- 6 – Mid-Atlantic Mesic Mixed Hardwood Forest
- 11 – Northern Blue Ridge Montane Alluvial Forest (see Forests\_Subset 3 dendrogram)
- 18 – Central Appalachian Acidic Oak-Hickory Forest (see Forests\_Subset 4 dendrogram)

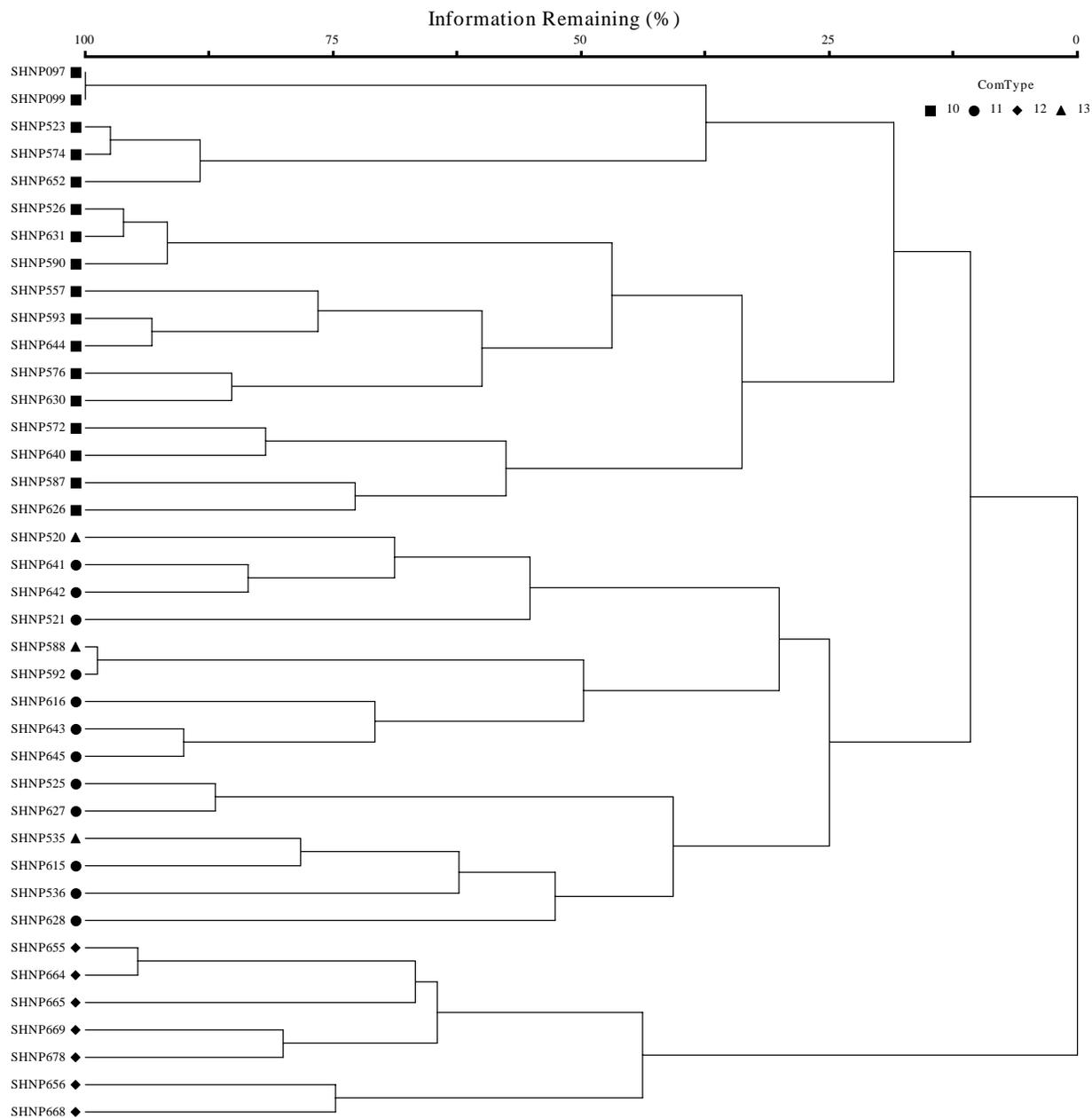
FORESTS\_Subset2 (High-Elevation): F-B -0.5/chord d/cover rel. by spp. max



**KEY TO COMMUNITY TYPES:**

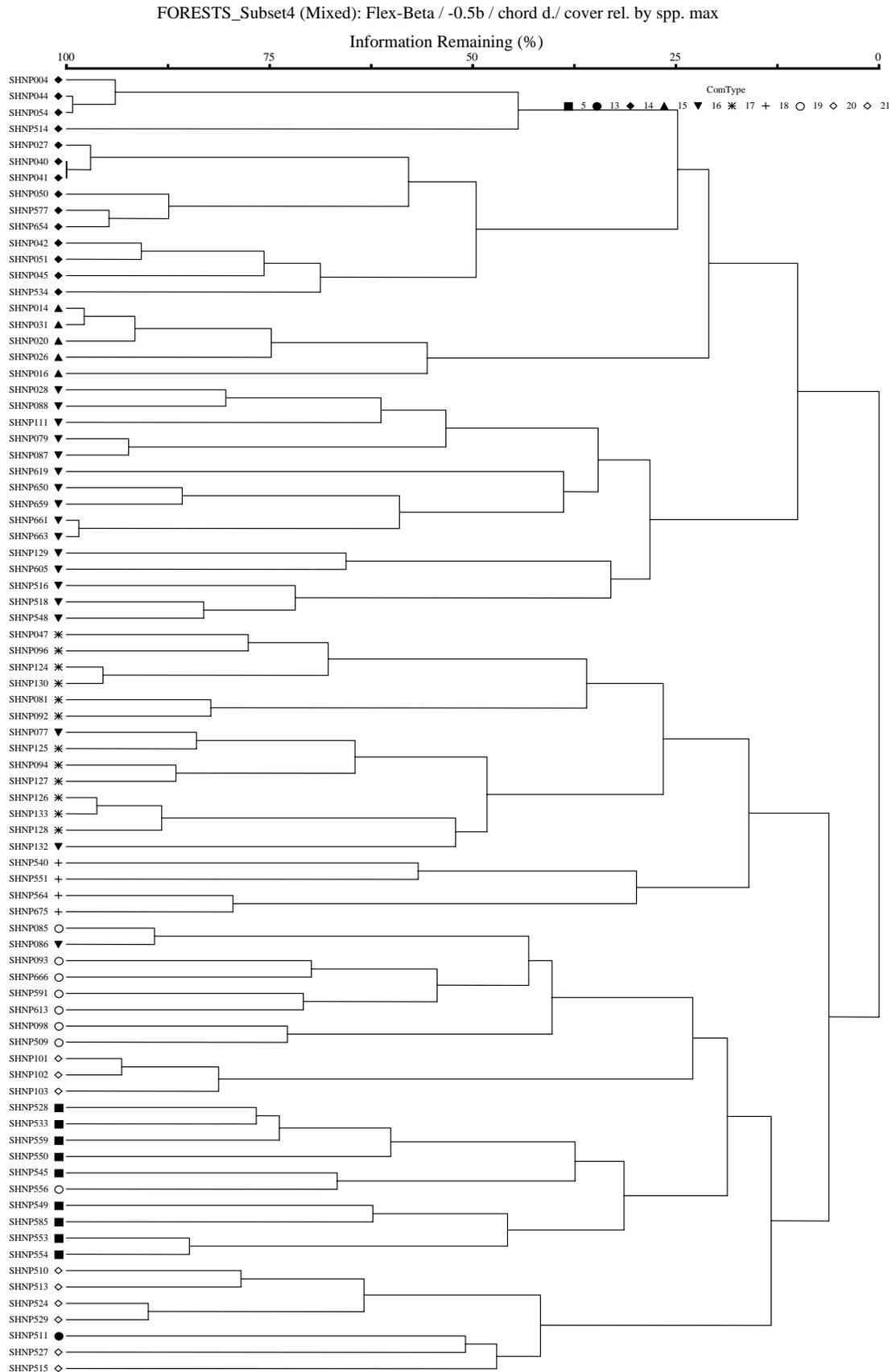
- 7 – Central Appalachian Northern Hardwood Forest (Yellow Birch – Northern Red Oak Type)
- 8 – Hemlock – Northern Hardwood Forest
- 9 – Northern Red Oak Forest (Pennsylvania Sedge – Wavy Hairgrass Type)

FORESTS\_Subset 3 (Low-Elev Rich Forests): F-B -0.5 / chord d./ raw cover



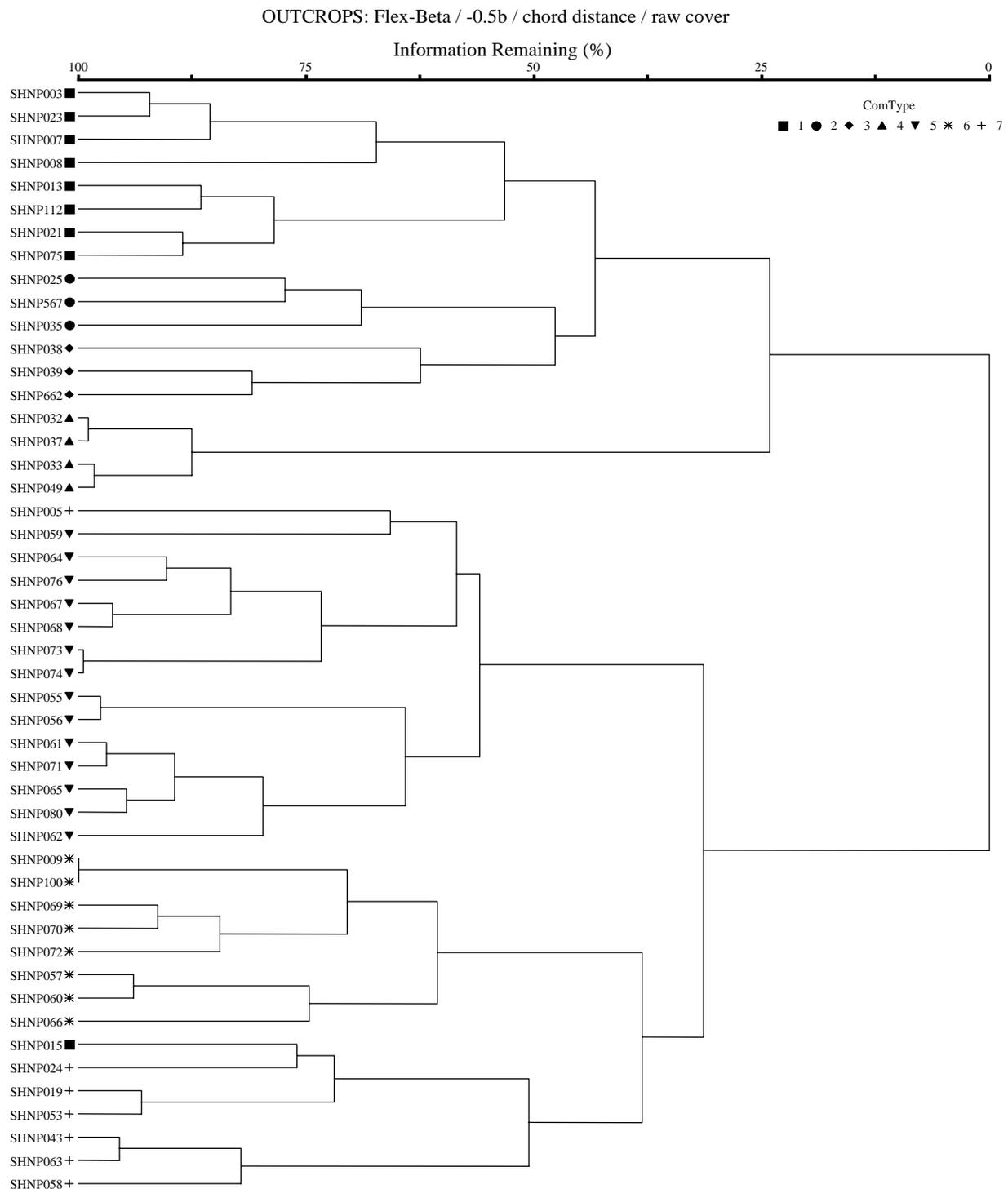
**KEY TO COMMUNITY TYPES:**

- 10 – Southern Appalachian Cove Forest (Typic Montane Type)
- 11 – Northern Blue Ridge Montane Alluvial Forest
- 12 – Central Appalachian Acidic Cove Forest (White Pine – Mixed Hardwoods Type)
- 13 – Successional Tuliptree Forest (Circumneutral Type)



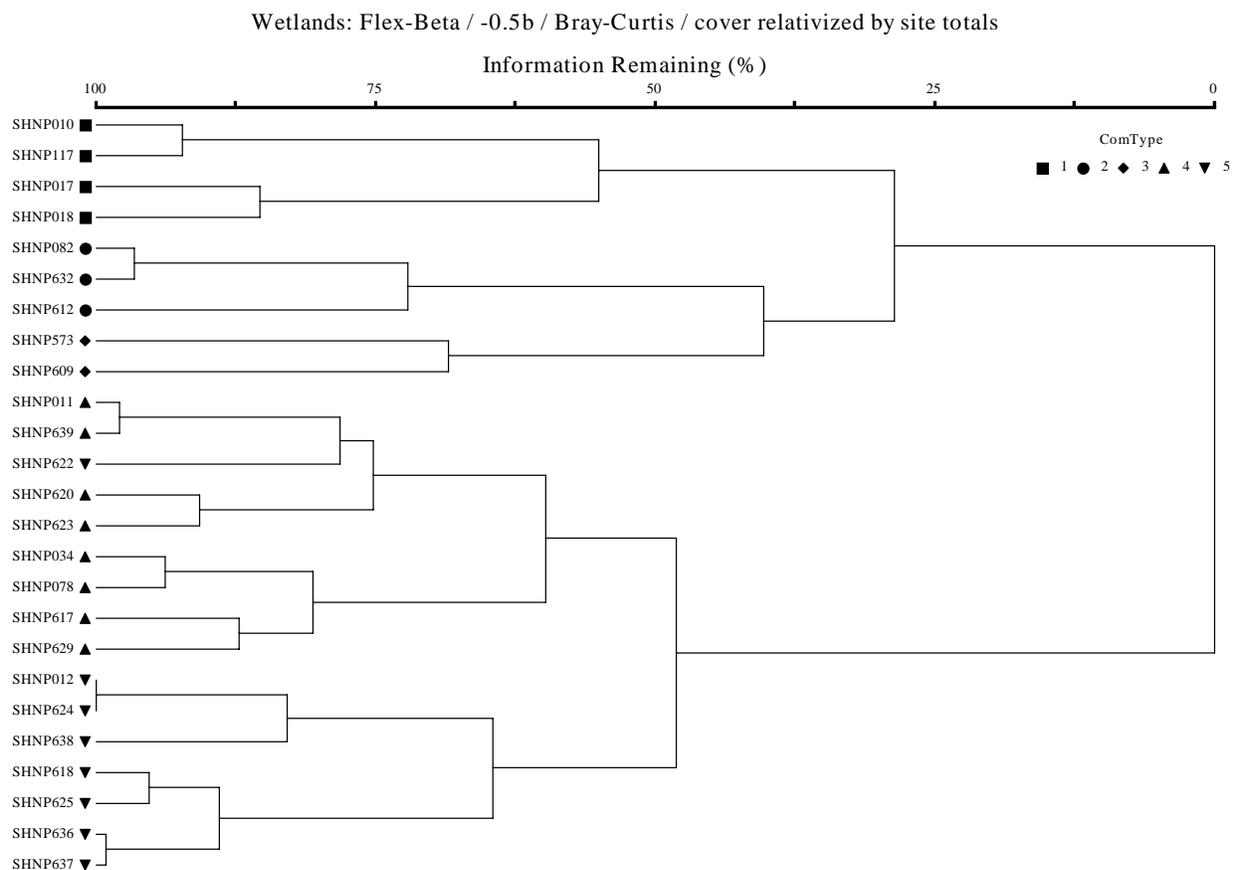
KEY TO COMMUNITY TYPES:

- 5 – Central Appalachian Dry-Mesic Chestnut Oak-Northern Red Oak Forest (see also FORESTS\_Subset 1 dendrogram)
- 13 – Successional Tuliptree Forest (Circumneutral Type) (see also FORESTS\_Subset 3 dendrogram)
- 14 – Central Appalachian Basic Boulderfield Forest (Montane Basswood – White Ash Type)
- 15 – Central Appalachian Rich Cove Forest
- 16 – Central Appalachian Montane Oak-Hickory Forest (Basic Type)
- 17 – Central Appalachian Montane Oak-Hickory Forest (Acidic Type)
- 18 – Central Appalachian Acidic Oak-Hickory Forest (see also FORESTS\_Subset 1 dendrogram)
- 19 – Central Appalachian Basic Oak-Hickory Forest (Submontane/Foothills Type)
- 20 – Northern Hardpan Basic Oak-Hickory Forest
- 21 – Black Locust Successional Forest



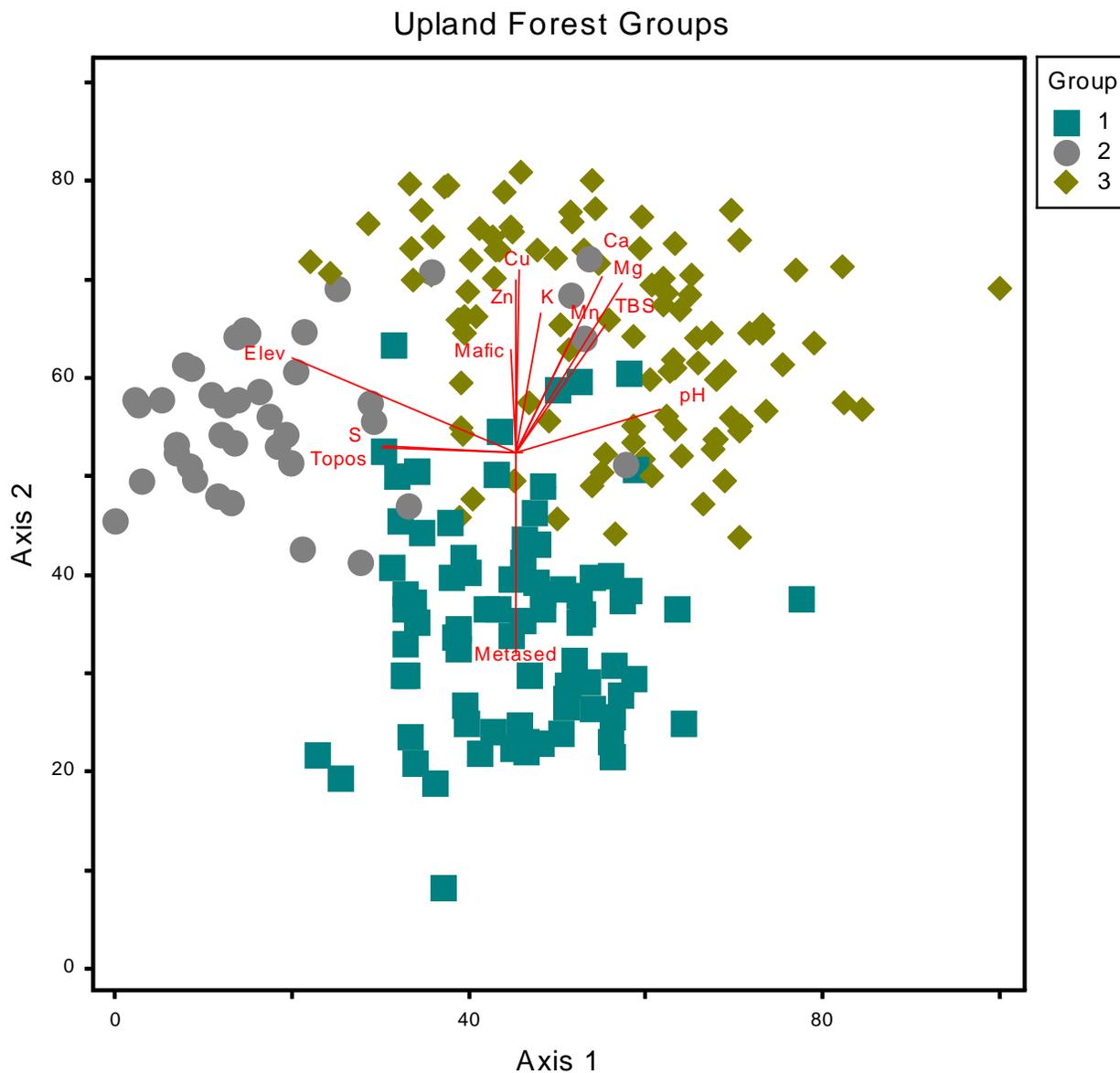
**KEY TO COMMUNITY TYPES:**

- 1 – High-Elevation Greenstone Barren
- 2 – High-Elevation Heath Barren / Pavement
- 3 – High-Elevation Outcrop Barren (Black Chokeberry Igneous / Metamorphic Type)
- 4 – Central Appalachian High-Elevation Boulderfield Forest
- 5 – Central Appalachian Basic Woodland
- 6 – Central Appalachian Circumneutral Barren
- 7 – Central Appalachian Mafic Barren (Ninebark / Pennsylvania Sedge Type)



KEY TO COMMUNITY TYPES:

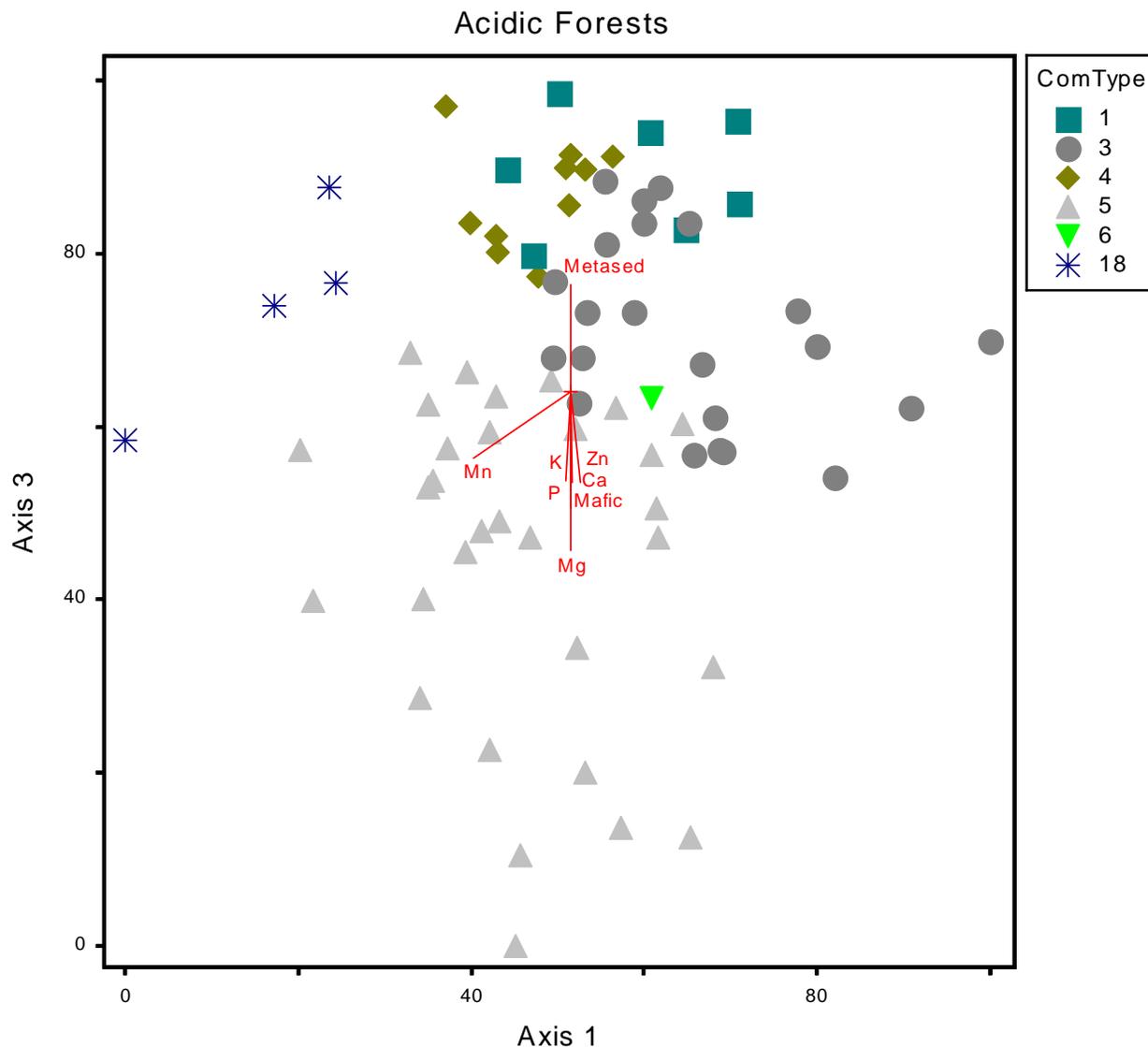
- 1 – Northern Blue Ridge Mafic Fen
- 2 – Central Appalachian Acidic Seepage Swamp
- 3 – Central Appalachian Woodland Seep
- 4 – Central Appalachian Basic Seepage Swamp
- 5 – High-Elevation Hemlock – Yellow Birch Seepage Swamp
- (6 – Shenandoah Valley Sinkhole Pond is represented by a single plot and not included in the dendrogram)



Scatterplot diagram for three-dimensional NMDS ordination of SHNP upland forest plots, showing the distribution of three major vegetation groups on the first and second axes:

- 1 – pine-oak/heath, oak/heath, and acidic boulderfield forests
- 2 – northern hardwood, northern red oak, and eastern hemlock-hardwood forests
- 3 – mesic and dry-mesic mixed forests

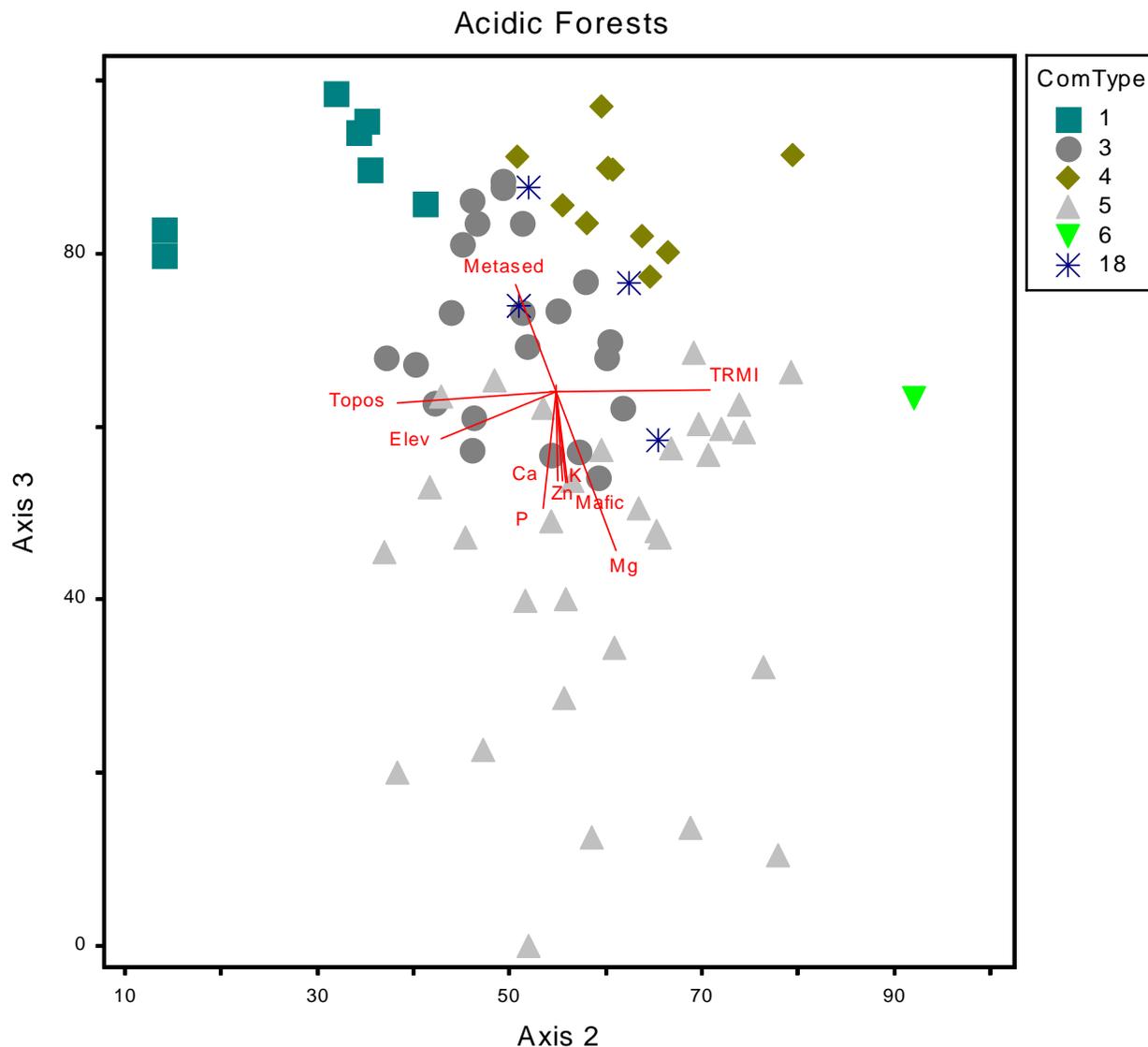
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.001$ ). See p. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP acidic forest plots, showing the distribution of community types on the first and third axes:

- F1 – Central Appalachian Pine-Oak/Heath Woodland
- F3 – Central Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
- F4 – Mixed Oak/Heath Forest (Low-Elevation White Oak-Scarlet Oak-Black Oak Type)
- F5 – Central Appalachian Dry-Mesic Chestnut Oak-Northern Red Oak Forest
- F6 – Mid-Atlantic Mesic Mixed Hardwood Forest
- F18 – Central Appalachian Acidic Oak-Hickory forest

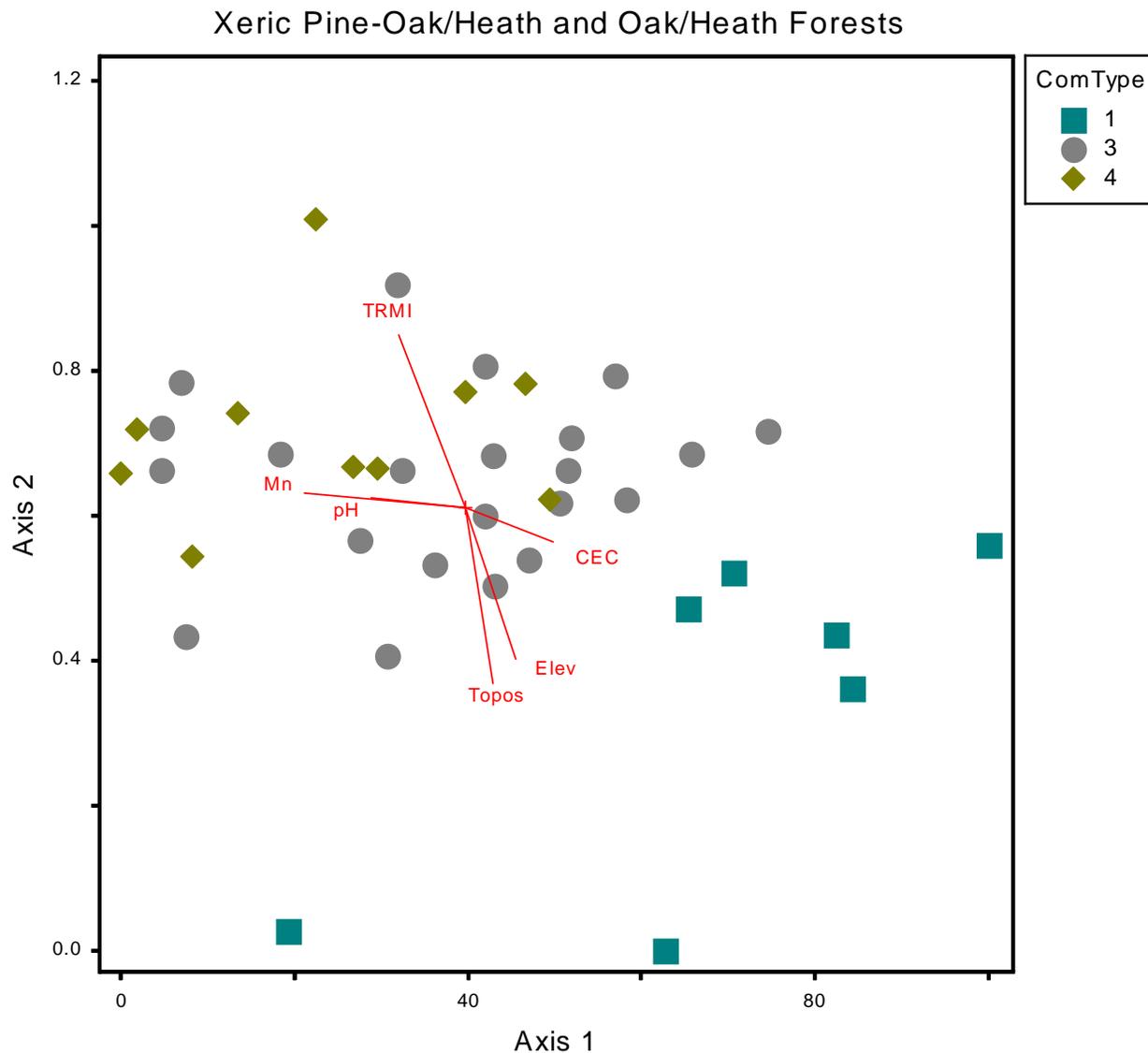
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.001$ ). See p. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP acidic forest plots, showing the distribution of community types on the second and third axes:

- F1 – Central Appalachian Pine-Oak/Heath Woodland
- F3 – Central Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
- F4 – Mixed Oak/Heath Forest (Low-Elevation White Oak-Scarlet Oak-Black Oak Type)
- F5 – Central Appalachian Dry-Mesic Chestnut Oak-Northern Red Oak Forest
- F6 – Mid-Atlantic Mesic Mixed Hardwood Forest
- F18 – Central Appalachian Acidic Oak-Hickory forest

Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.001$ ). See P. 25 for definition of environmental variables.



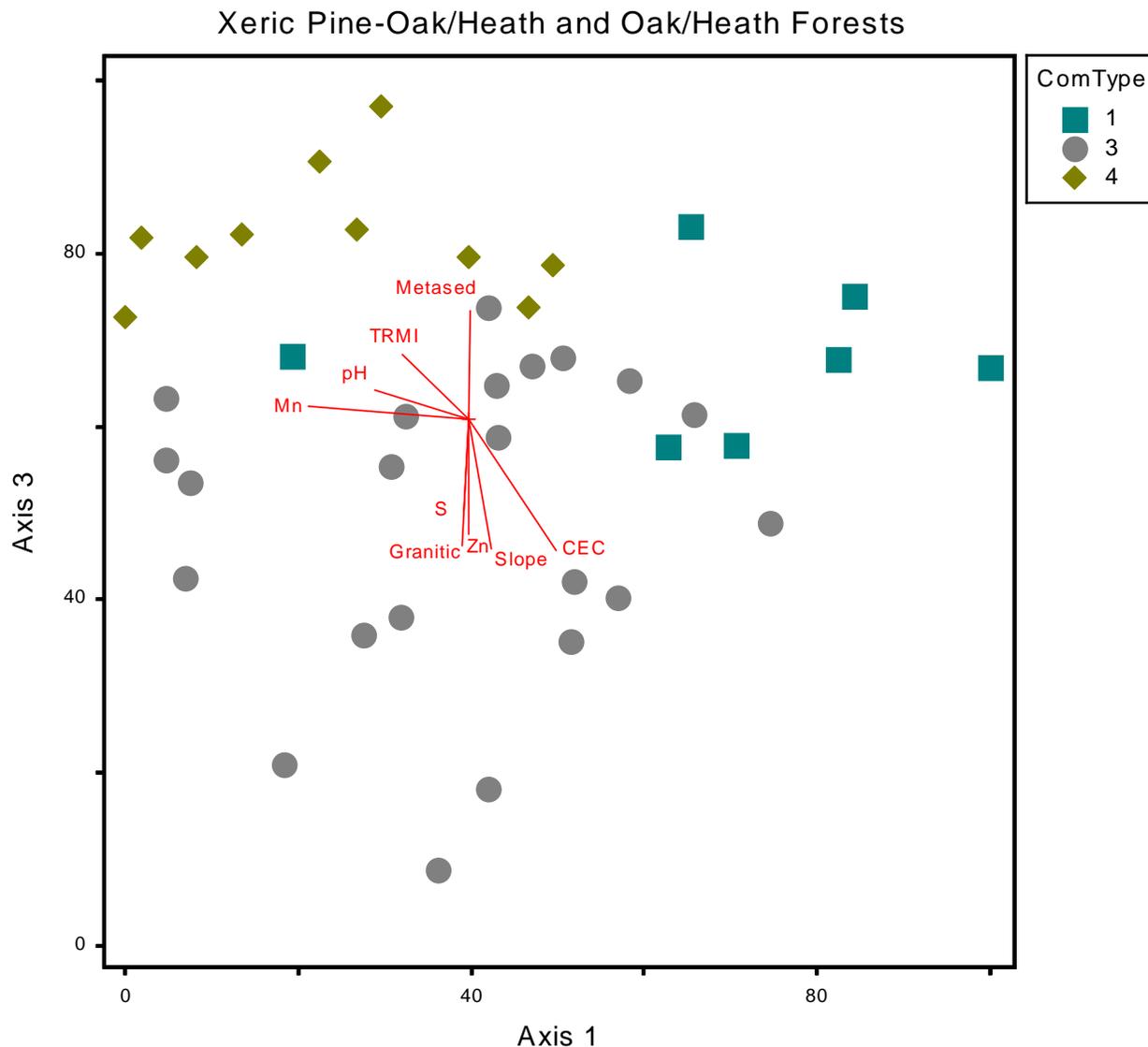
Scatterplot diagram for three-dimensional NMDS ordination of SHNP xeric pine-oak/heath and oak/heath forest plots, showing the distribution of community types on the first and second axes:

F1 – Central Appalachian Pine-Oak/Heath Woodland

F3 – Central Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest

F4 – Mixed Oak/Heath Forest (Low-Elevation White Oak-Scarlet Oak-Black Oak Type)

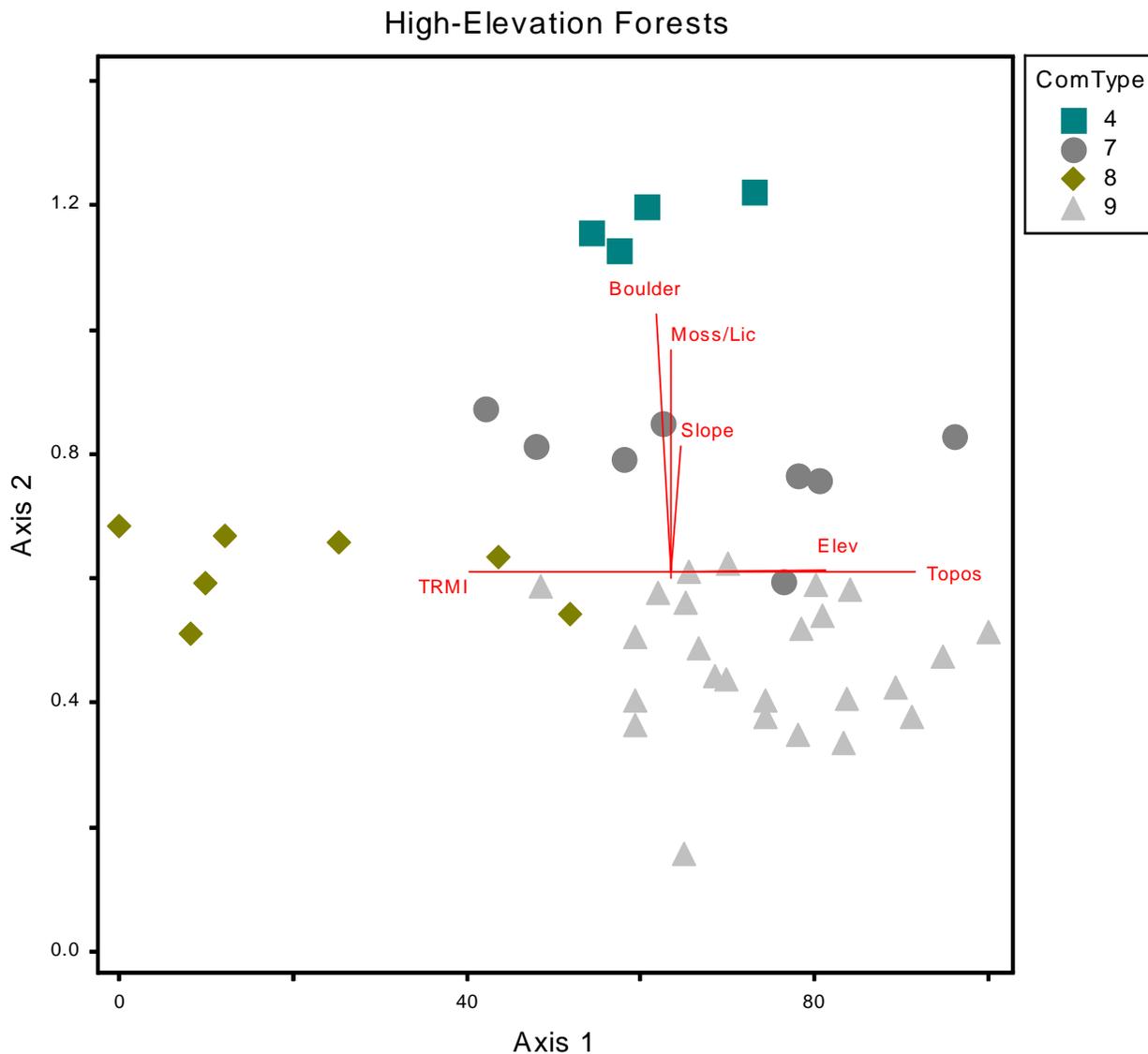
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.01$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP xeric pine oak/heath and oak/heath forest plots, showing the distribution of community types on the first and third axes:

- F1 – Central Appalachian Pine-Oak/Heath Woodland
- F3 – Central Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
- F4 – Mixed Oak/Heath Forest (Low-Elevation White Oak-Scarlet Oak-Black Oak Type)

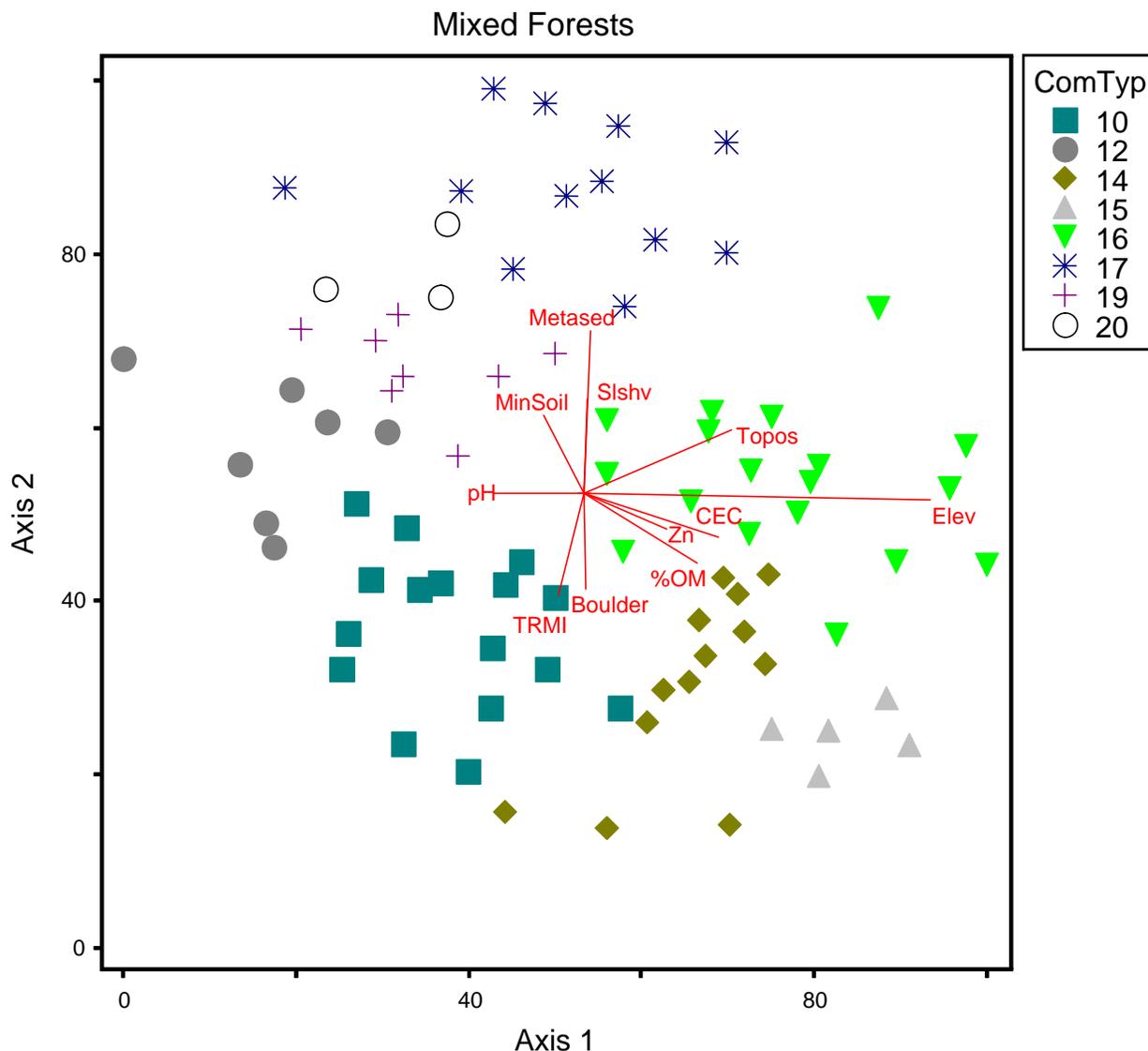
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.01$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP high-elevation forest plots, showing the distribution of community types on the first and second axes:

- O4 – Central Appalachian High-Elevation Boulderfield Forest
- F7 – Central Appalachian Northern Hardwood Forest (Yellow Birch-Northern Red Oak Type)
- F8 – Hemlock-Northern Hardwood Forest
- F9 – Northern Red Oak Forest (Pennsylvania Sedge-Wavy Hairgrass Type)

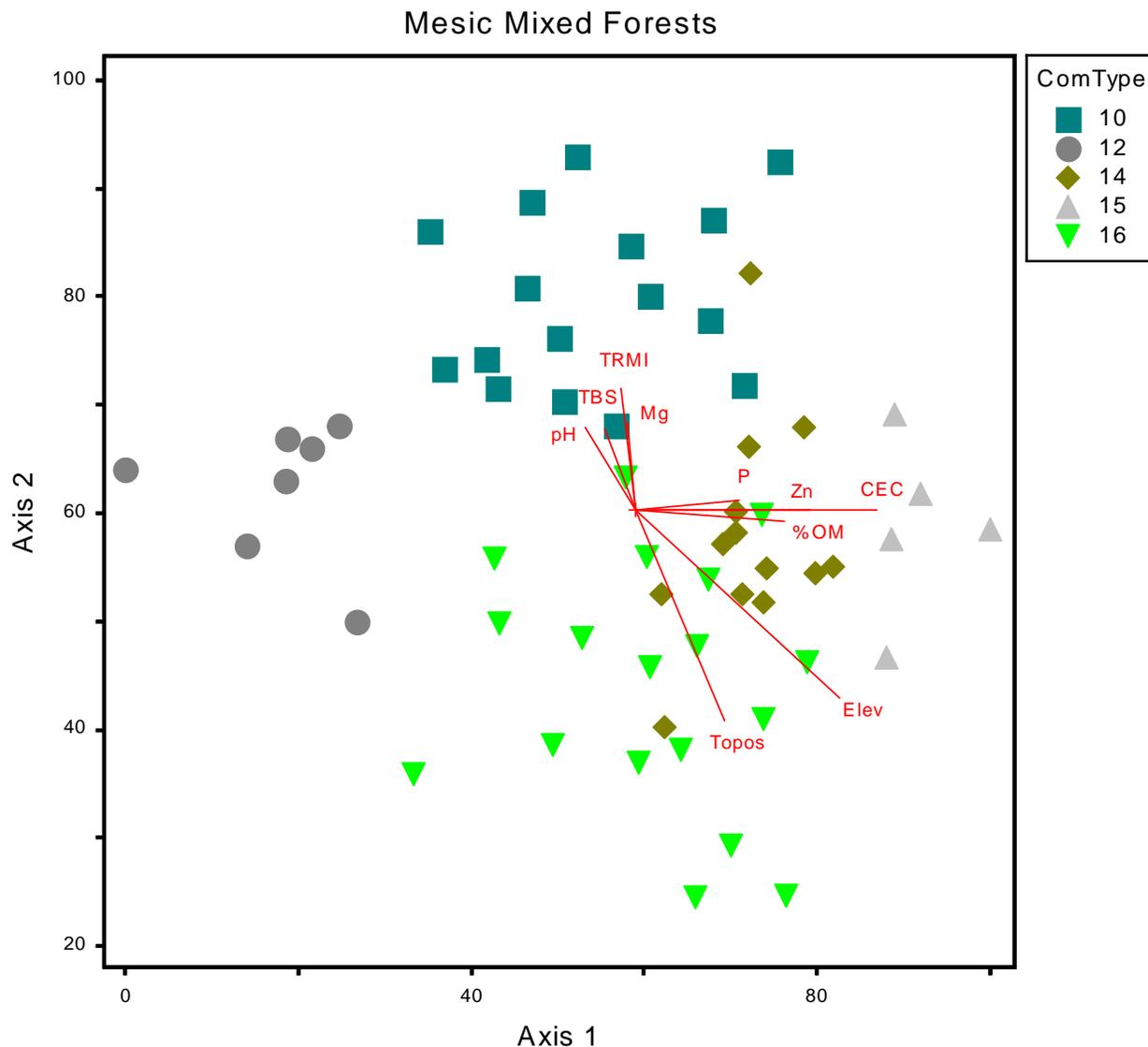
Joint plot vectors show significant correlations between compositional variation and topographic variables ( $p < 0.01$ ). Because soil could not be collected from some plots, no soil chemistry variables are included. See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of SHNP mesic and dry-mesic mixed forest plots, showing the distribution of community types:

- F10 – Southern Appalachian Cove Forest (Typic Montane Type)
- F12 – Central Appalachian Acidic Cove Forest (White Pine-Mixed Hardwoods Type)
- F14 – Central Appalachian Basic Boulderfield Forest (Montane Basswood-White Ash Type)
- F15 – Central Appalachian Rich Cove Forest
- F16 – Central Appalachian Montane Oak-Hickory Forest (Basic Type)
- F17 – Central Appalachian Montane Oak-Hickory Forest (Acidic Type)
- F19 – Central Appalachian Basic Oak-Hickory Forest (Submontane/Foothills Type)
- F20 – Northern Hardpan Basic Oak-Hickory Forest

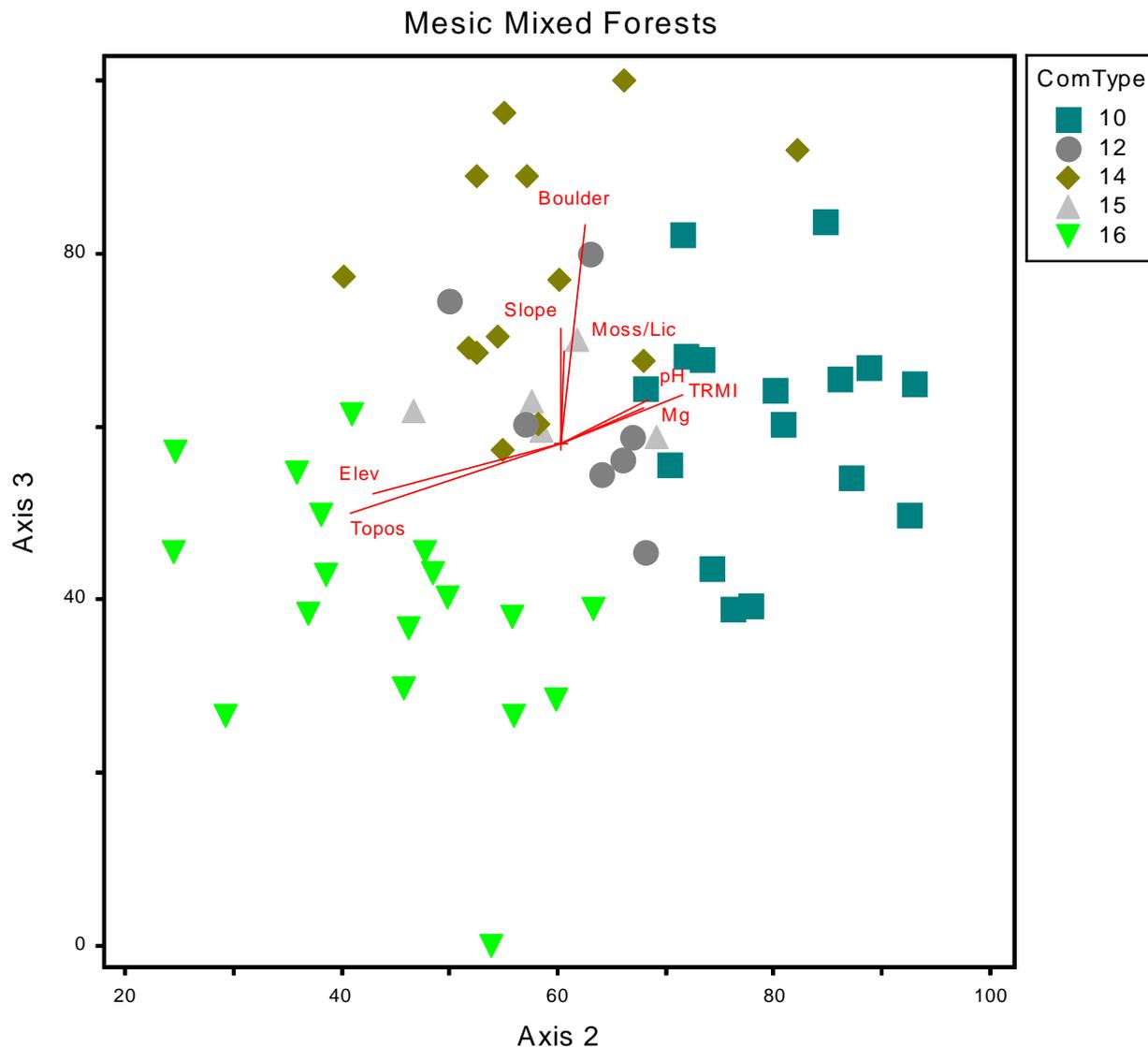
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.001$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP mesic mixed forest plots, showing the distribution of community types on the first and second axes:

- F10 – Southern Appalachian Cove Forest (Typic Montane Type)
- F12 – Central Appalachian Acidic Cove Forest (White Pine-Mixed Hardwood Type)
- F14 – Central Appalachian Basic Boulderfield Forest (Montane Basswood-White Ash Type)
- F15 – Central Appalachian Rich Cove Forest
- F16 – Central Appalachian Montane Oak-Hickory Forest (Basic Type)

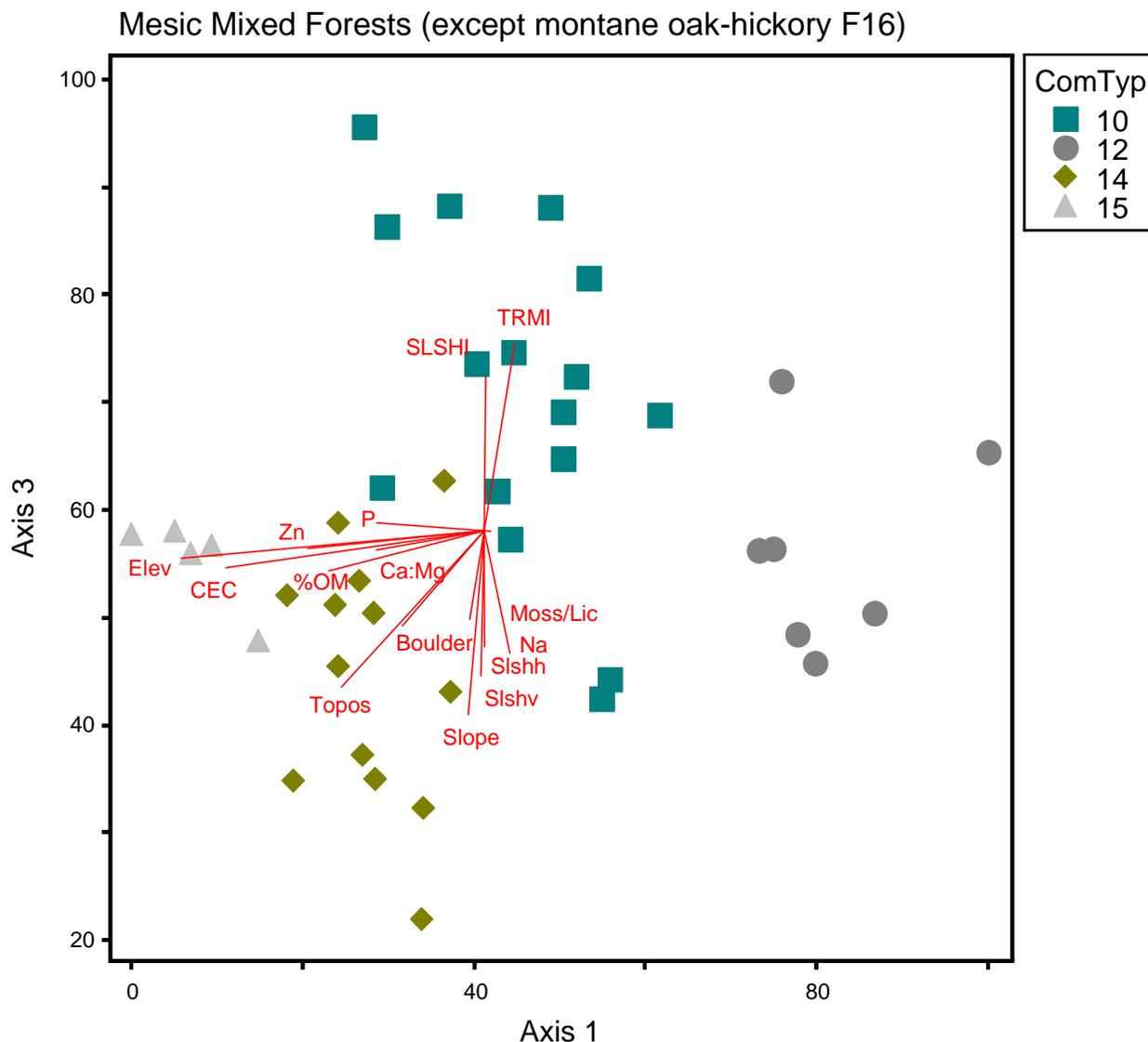
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.001$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP mesic mixed forest plots, showing the distribution of community types on the second and third axes:

- F10 – Southern Appalachian Cove Forest (Typic Montane Type)
- F12 – Central Appalachian Acidic Cove Forest (White Pine-Mixed Hardwood Type)
- F14 – Central Appalachian Basic Boulderfield Forest (Montane Basswood-White Ash Type)
- F15 – Central Appalachian Rich Cove Forest
- F16 – Central Appalachian Montane Oak-Hickory Forest (Basic Type)

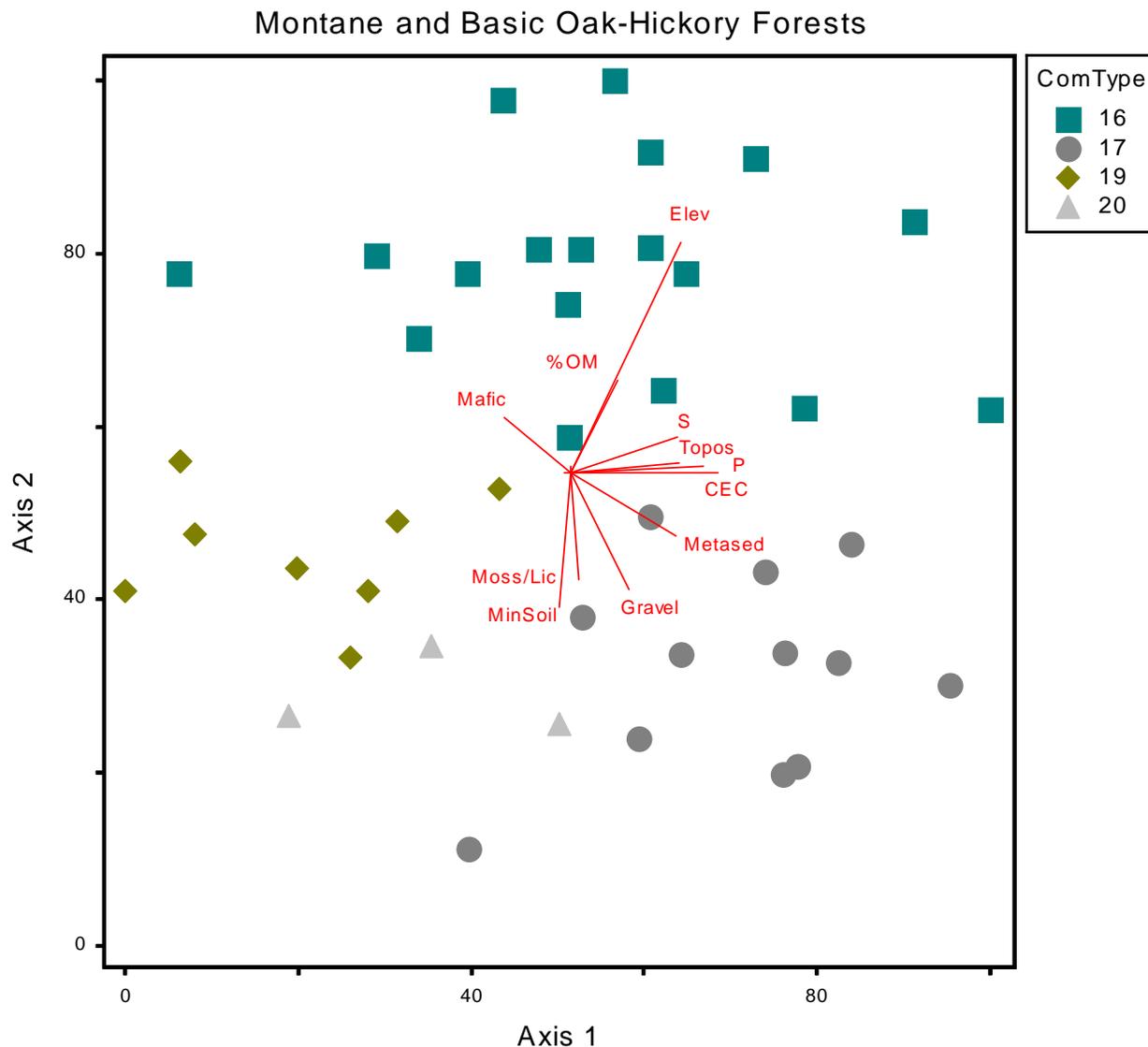
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.001$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP mesic mixed forest plots (except the Montane Oak Hickory Forest F16), showing the distribution of community types on the first and third axes:

- F10 – Southern Appalachian Cove Forest (Typic Montane Type)
- F12 – Central Appalachian Acidic Cove Forest (White Pine-Mixed Hardwood Type)
- F14 – Central Appalachian Basic Boulderfield Forest (Montane Basswood-White Ash Type)
- F15 – Central Appalachian Rich Cove Forest

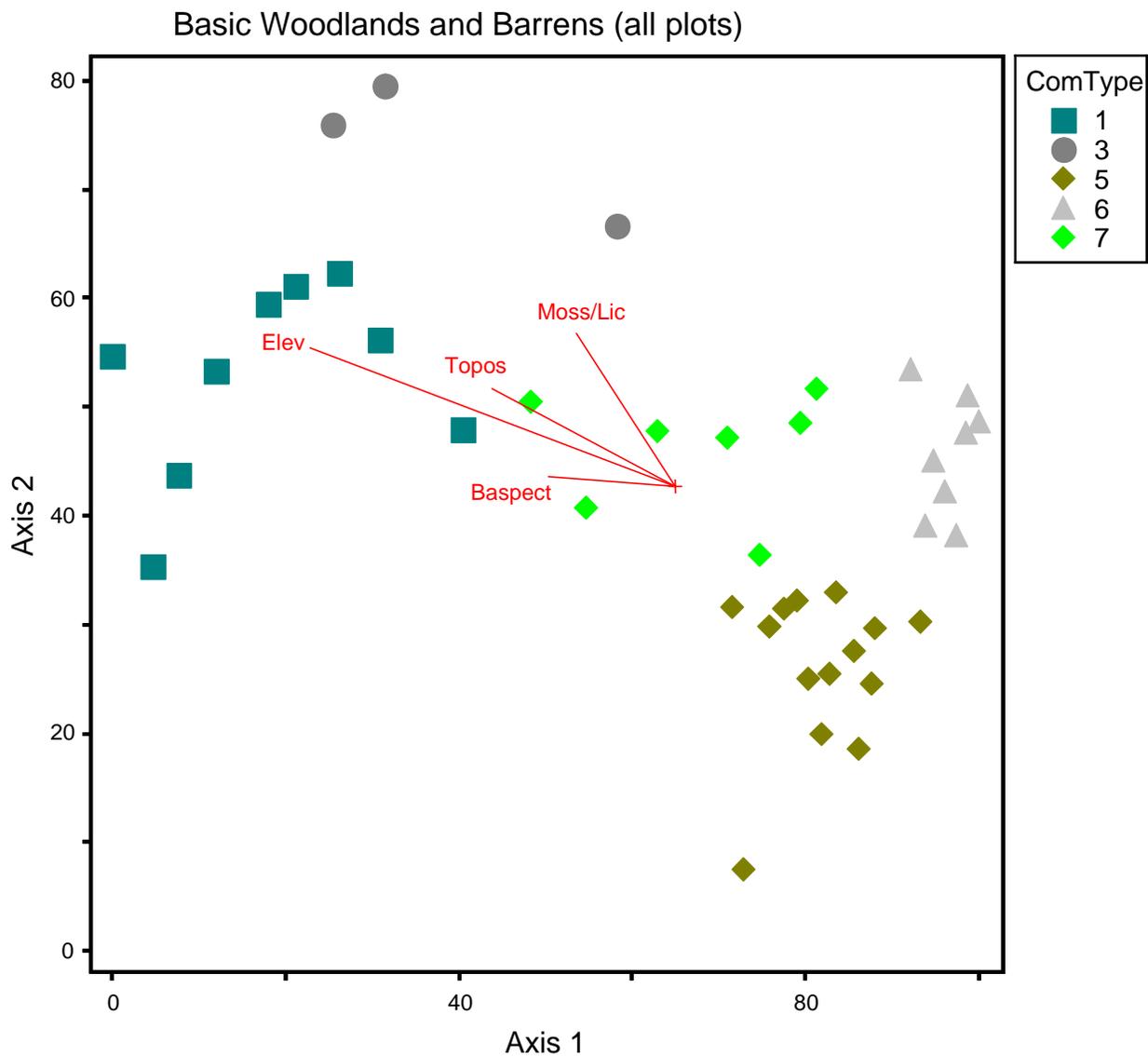
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.01$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of SHNP montane and basic oak-hickory forest plots, showing the distribution of community types:

- F16 – Central Appalachian Montane Oak-Hickory Forest (Basic Type)
- F17 – Central Appalachian Montane Oak-Hickory Forest (Acidic Type)
- F19 – Central Appalachian Basic Oak-Hickory Forest (Submontane/Foothills Type)
- F20 – Northern Hardpan Basic Oak-Hickory Forest

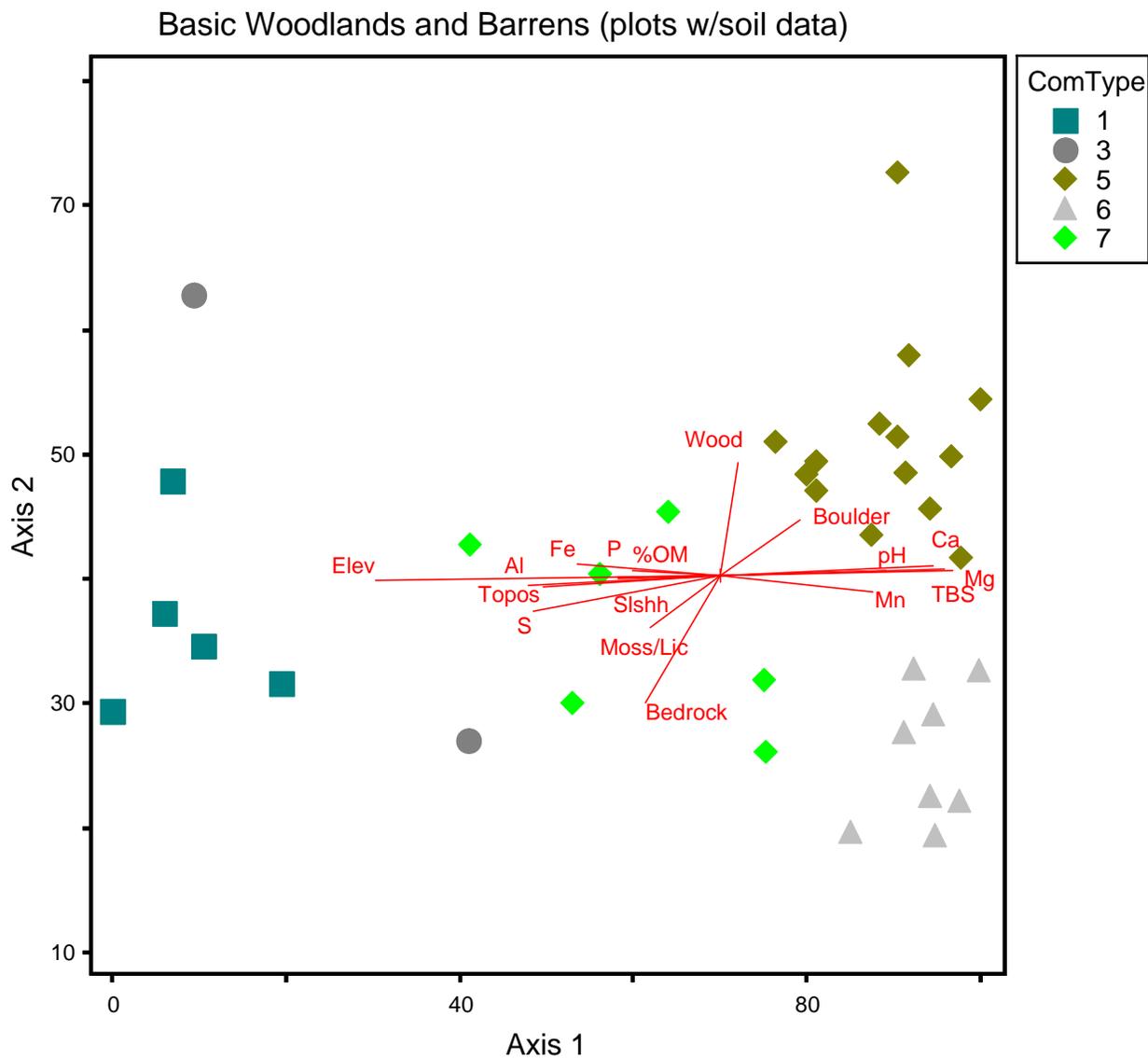
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.01$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of all SHNP basic woodland and outcrop barren plots, showing the distribution of community types:

- O1 – High-Elevation Greenstone Barren
- O3 – High-Elevation Outcrop Barren (Black Chokeberry Igneous/Metamorphic Type)
- O5 – Central Appalachian Basic Woodland
- O6 – Central Appalachian Circumneutral Barren
- O7 – Central Appalachian Mafic Barren (Ninebark/Pennsylvania Sedge Type)

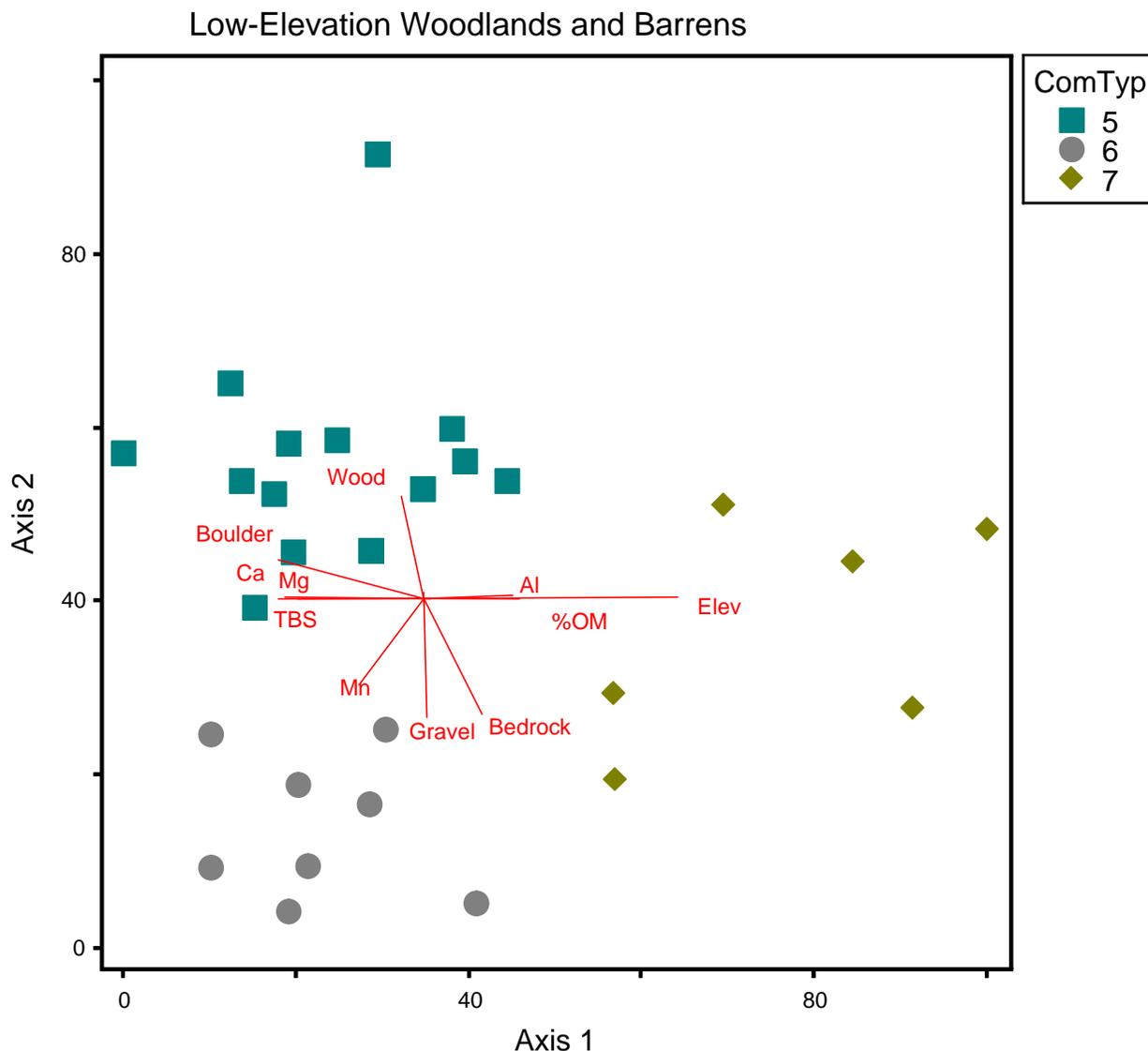
Joint plot vectors show significant correlations between compositional variation and topographic variables ( $p < 0.01$ ). Because soil could not be collected from some plots, no soil chemistry variables are included. See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of SHNP basic woodland and outcrop barren plots from which soil could be collected, showing the distribution of community types:

- O1 – High-Elevation Greenstone Barren
- O3 – High-Elevation Outcrop Barren (Black Chokeberry Igneous/Metamorphic Type)
- O5 – Central Appalachian Basic Woodland
- O6 – Central Appalachian Circumneutral Barren
- O7 – Central Appalachian Mafic Barren (Ninebark/Pennsylvania Sedge Type)

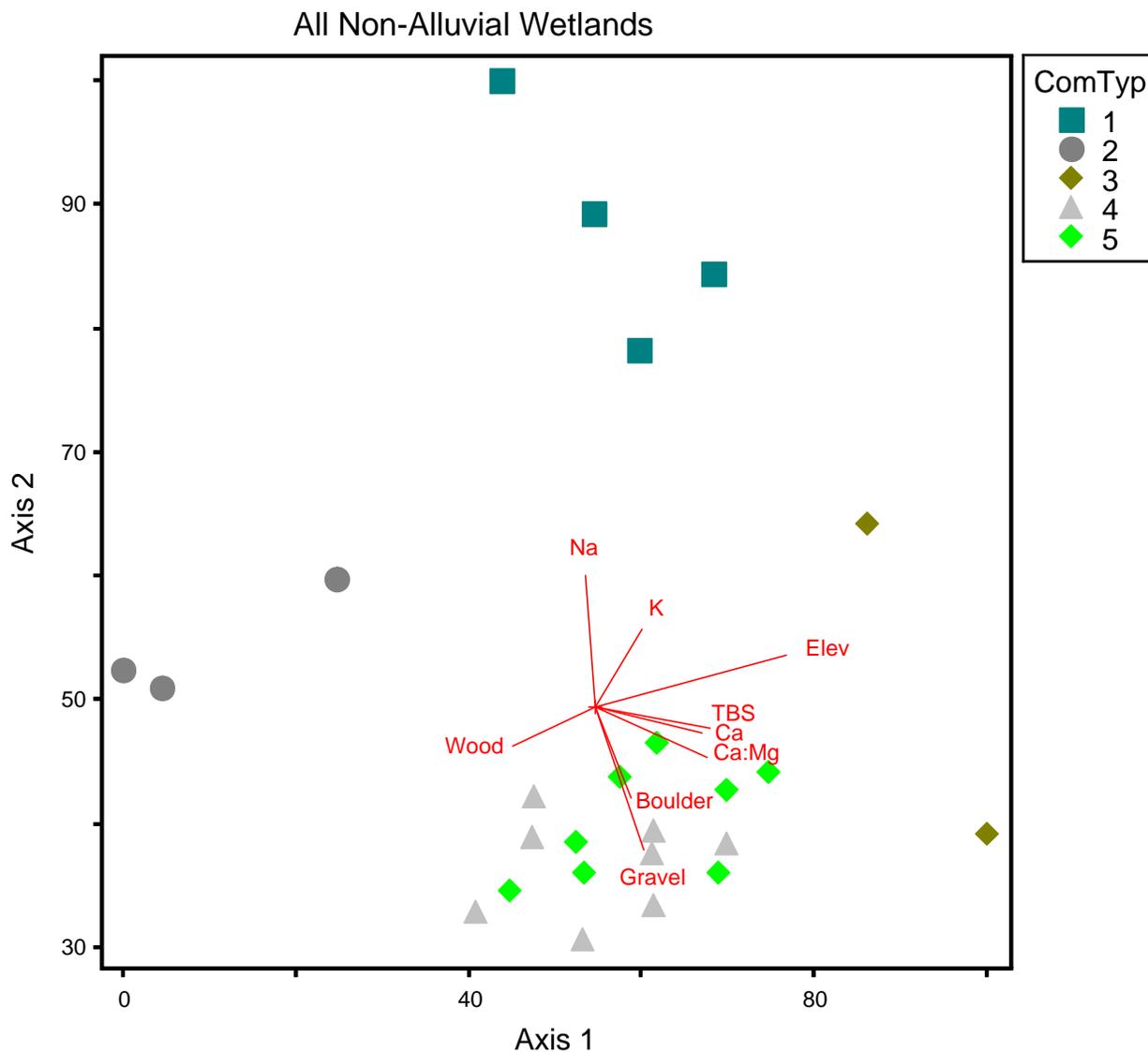
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.01$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of SHNP low-elevation woodland and outcrop barren plots, showing the distribution of community types:

- O5 – Central Appalachian Basic Woodland
- O6 – Central Appalachian Circumneutral Barren
- O7 – Central Appalachian Mafic Barren (Ninebark/Pennsylvania Sedge Type)

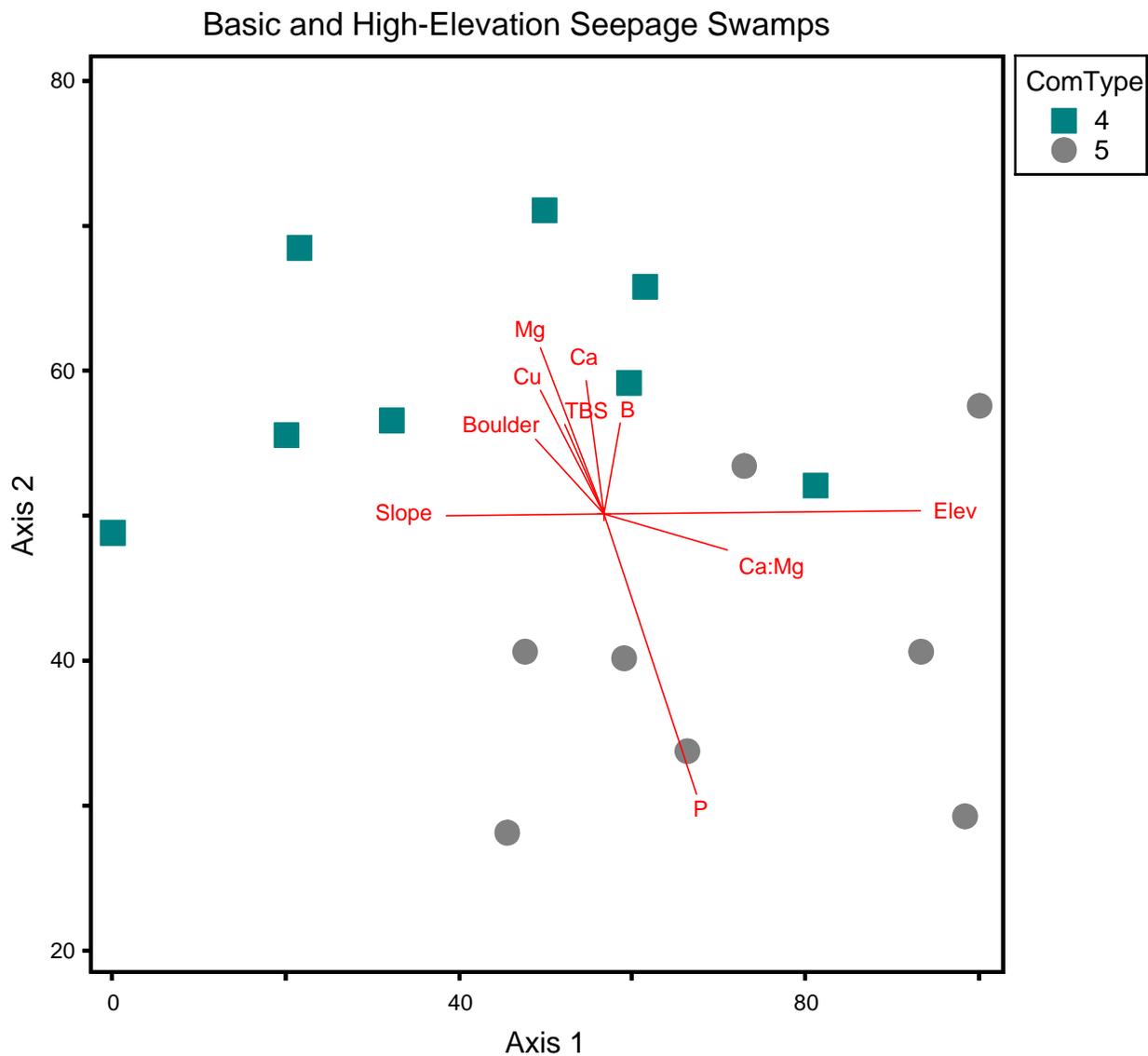
Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.02$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for two-dimensional NMDS ordination of all SHNP non-alluvial wetland plots, showing the distribution of community types:

- W1 – Northern Blue Ridge Mafic Fen
- W2 – Central Appalachian Acidic Seepage Swamp
- W3 – Central Appalachian Woodland Seep
- W4 – Central Appalachian Basic Seepage Swamp
- W5 – High-Elevation Hemlock-Yellow Birch Seepage Swamp

Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p = <0.05$ ). See P. 25 for definition of environmental variables.



Scatterplot diagram for three-dimensional NMDS ordination of SHNP basic and high-elevation seepage swamp plots, showing the distribution of community types:

W4 – Central Appalachian Basic Seepage Swamp

W5 – High-Elevation Hemlock-Yellow Birch Seepage Swamp

Joint plot vectors show significant correlations between compositional variation and soil/topographic variables ( $p < 0.10$ ). See P. 25 for definition of environmental variables.

## DEFINITIONS OF ENVIRONMENTAL VARIABLES SHOWN IN JOINT PLOT OVERLAYS

**%OM** – percent organic matter in soil  
**Al** – aluminum (ppm in soil)  
**B** – boron (ppm in soil)  
**Baspect** – Beer’s-transformed aspect (0 to 2; higher values indicate more mesic aspects)  
**Boulder** – surface cover of boulders (%)  
**Ca** – calcium (ppm in soil)  
**Ca:Mg** – calcium to magnesium ratio  
**CEC** – cation exchange capacity  
**Cu** – copper (ppm in soil)  
**Elev** – elevation (m)  
**Fe** – iron (ppm in soil)  
**Granitic** – granitic bedrock (charnockite, layered pyroxene granulite, Old Rag granite, etc.)  
**Gravel** – surface cover of gravel (%)  
**K** – potassium (ppm in soil)  
**Mafic** – metabasalt bedrock  
**Metased** – Chilhowee Group metasedimentary bedrock (quartzite, metasilstone, phyllite)  
**Mg** – magnesium (ppm in soil)  
**MinSoil** – surface cover of exposed mineral soil (%)  
**Mn** – manganese (ppm in soil)  
**Moss/Lic** – surface cover of bryophytes and lichens (%)  
**Na** – sodium (ppm in soil)  
**P** – phosphorus (ppm in soil)  
**pH** – soil reaction  
**S** – soluble sulfur (ppm in soil)  
**Slope** – slope inclination (degrees)  
**Slshh** – horizontal slope shape  
**Slshv** – vertical slope shape  
**SLSHI** – slope shape index (0 to 10; higher values indicate more concave slopes)  
**TBS** – total base saturation  
**Topos** – topographic position (ordinal scale: -1 to 5 [basin/depression to ridge crest])  
**TRMI** – topographic relative moisture index (0 to 60; higher values indicate greater site moisture potential)  
**Wood** – surface cover of decaying wood  
**Zn** – zinc (ppm in soil)