

Search Protocol for Seedlings 2013

Goal:

1. Find all seedlings in designated areas.
2. Record vital stats about each found seedling.
3. Make circle or frame map to refind every seedling in August.

Site Notes:

Upon arriving at a designated site, please park safely so that cars coming from either direction can see you. Place the orange safety triangles 20 m or so up the road in either direction.

For each site, you will search a maximum of twenty circles. Eighteen will center on a plant that flowered the previous year; two will center on a randomly determined location. Focal plants will be located using an R workspace or a GPS, and will be marked with a blue flag. Before beginning your search, find the metal tag marking a flagged plant, and check it against the list of focal plants that have been mapped previously. If there is an existing map, retrieve the map page(s) from the site binder, put them on a clipboard and bring them to the circle. Random circles will be marked with red flags. If seedlings are found in a random circle, please mark the center of the random circle with a nail and a numbered metal ID tag.

There will be two master data sheets for each site. The first master datasheet is a list of all circles for each site, in numerical order. The second data sheet lists the same circles sorted by northing coordinate (or easting coordinate at some sites). For all circles at the site, please record the site name, the number of seedlings found, the date, the initials of individuals working on that circle, focal plant status (basal, flowering, not present), head status (erect, gone, fallen), and if the head has fallen its cardinal or intercardinal direction from the focal plant and its distance (cm) from the focal plant. Please include these last three data (plant status, and last year's head information) in the notes column.

Seedling Search:

Use measuring tapes to determine the area of the circle. Please note that the radius will change by site. We will search a radius of 41 cm at sites with all 18 focal plants and 50 cm at sites with fewer focal plants. We have found it useful to lay out two tape measures at right angles, crossing at the center of the circle, to delineate quadrats for searching.

Each circle should be entirely searched by two individuals. We operate under the soccer rule: if a seedling is on the line, it is in. Please minimize your disturbance to the vegetation. I recommend gently using your hands to hold back vegetation while you are initially looking, and then, if still necessary, selectively removing patches of duff. We work in pairs; the two searchers start on opposite sides of the circle. After each person thoroughly searches his/her half, they switch sides for the double check. As you find seedlings or other Echinacea plants, please mark them immediately with pencils. If you do not find any seedlings, simply write "0" under "SL_ct" by the appropriate circle on the site's circle list data sheet. Please also record the number of flowering Echinacea plants ("FIPlaCt") and other Echinacea ("otherCt") found within the circle. Do not include the focal plant in these counts. No map needs to be drawn if no seedlings are found.

If seedlings are found, write the number of seedlings under "SL_ct," and record the FIPlaCt and otherCt. On a circle map datasheet, give each seedling a letter ID. You can label the pencil that marks the seedling with the same letter, to help you draw a map (see below). Under "Status," record whether the cotyledons are green, yellow, or brown. Use a ruler to measure the height of each leaf to the mm. Measure from the cotyledons; hold the leaf gently, but flat against the ruler. Make sure that you are measuring from zero on your ruler.

Circle Map and Matrix:

Please be very accurate with your drawings and measurements as these maps will be used to find the seedlings and other plants later this summer and in future years. For each map, record the site, circle ID, date, time, initials, and the radius of the circle. Please draw the seedlings labeled with their letter ID as they occur in the circle. Be mindful that the top of the page is north. Use (●) to mark seedlings with cotyledons, use “B” to mark basal plants, and (*) to mark flowering plants. If the focal plant has been previously mapped, add the seedlings and any other plants you find to the existing map, using a different color to differentiate this year’s additions.

On the circle matrix datasheet, please record the site, date and initials of searchers in the designated spaces. Please record the Circle ID on the line at the top of the page, in the heading of the column labeled “Circle/Focal Plant”, and in the first row in the left-hand column of the distance matrix. Also record all seedling letter IDs on the left hand column. For each seedling, at least five measurements should be taken to surrounding tagged plants. The first measurement should be to the circle center. It is best to find tagged plants in different directions from the seedling to improve triangulation. If possible, it is also useful to use the same five or six plants to measure to all the seedlings. If there are not enough close tagged plants available, you can use surrounding stationary objects, such as stumps or rocks. Record the tagged plants’ ID (or write “stump” or “white rock”) in the top row of the distance matrix, and then record the corresponding measurements (cm) to the focal plant and to the lettered seedlings. It may also be useful to record distances between measuring point plants and objects in the circle matrix. If there are not enough near plants or objects, you may place a tagged nail as a measuring point. We have found it helpful to place these nails exactly 0.5 m away from the focal plant in the cardinal directions. Wherever you place it, make sure that measurements are also taken to the nails so we can find them again. Please include nails on the map and in the circle distance matrix.

Whether measuring from nails, objects, or plants, always measure from the very center. Draw all measuring point plants and objects onto the circle map, marked and labeled appropriately. All other Echinacea plants that occur in the circle should also be drawn on the maps. Make enough measurements so that the locations of the other plants can be used to locate the seedlings, and include these “other” plants on the distance matrix.

Coordinate Frame:

As an alternative to drawing a map, you may use the coordinate frame and fill in an accompanying data sheet. In general, use this frame procedure when you map 3 or more seedlings. After marking all seedlings, other Echinacea plants and the focal plant with pencils, place the frame over the circle. Orient the frame so that one meter stick (the y-axis) is to the west and the other meter stick (the x-axis) is to the south. Record the easting (x-coordinate) and northing (y-coordinate) measurements for each seedling, other plants, and the focal plant. The focal plant goes on the first line. Record leaf heights, cotyledon status, and circle data as for the circle maps. Be consistent with your head position relative to the strings of the frame, to reduce parallax errors.

Seedling Marker:

For each seedling, place a toothpick exactly 5cm from the seedling, in the direction of the focal plant. Please record a seedling’s toothpick color by its initial on the distance matrix. If the toothpick is close to other seedlings, you may want to take additional measurements from the toothpick to that seedling on your circle matrix and record the toothpick, designated as a “T,” and its color on the map.

If seedlings are close to each other (within 12 cm or so) please record their distances to one another on the circle matrix.

Equipment List:

Pens (multiple colors)

Pencils

Lettered tags

Thumb-tacks

3-ring binder for the site being searched

Data sheets

- site circle list
- site master datasheets (2)
- circle maps
- circle matrix datasheets
- frame datasheets

Coordinate frame

Long measuring tapes

Pins

Nails

Metal tags

5-meter and 8-meter tape measures

20-cm rulers

Toothpicks (multi-colored)

Compass

Clipboards

Flags

Flag bags

Radios

Metal detector

Triangles