



## Creating Strip Shapefiles for Single-Strip Spatial Evaluation (SSEA)

The Single-strip Spatial Evaluation Approach (SSEA) is a practical on-farm research method that uses yield monitor data. It evaluates the effect of a management practice across management zones using one field-length treatment strip and compares it to the adjacent “control” areas ([Factsheet #124](#)). The SSEA is easy to implement, minimizes disruption to normal field operations, and does not slow down harvest. This factsheet describes how to plan and create strip shapefiles for SSEA analysis using the SSEA webtool (see [SSEA User Guidelines](#) for instructions and interpretation of results). A step-by-step demonstration video for creating strip shapefiles is available [here](#).

### Ways to Implement a Single Strip

- *Approach 1: Field-flagged strip*  
If digitized treatment application data (as-applied maps, planter data, etc.) are not available, mark the four corners of the treatment strip with GPS coordinates. These coordinates can be converted to a shapefile by NMSP staff or companies with expertise in precision agriculture.
- *Approach 2: Digitized equipment*  
If digitized treatment application data are available, follow the methods outlined below to create strip shapefiles directly in QGIS.

### Planning the Treatment Strip

In SSEA, the field and the treatment strip location is decided upon before planting, using yield stability zone maps ([Factsheet #123](#)):

- Select a field that has a yield stability zone map for the same crop as will be planted in the year of experimentation and harvested with a yield monitor.
- Decide which zones are of the greatest research interest: high-yielding (Q1/Q2), low-yielding (Q3/Q4), stable (Q1/Q4), or variable (Q2/Q3) (Figure 1).
- Identify the single management practice (treatment) to be evaluated (e.g., fertilizer rate or product, fungicide, seeding rate).
- Ensure sufficient space (at least the width of the treatment strip) on both sides of the

treatment strip; this space will be the control area (strips) that will be compared to the treatment to decide if there was any impact on yield. Ideally place the treatment strip near the center of the field, leaving room for control strips during analysis (Figure 1). Avoid headlands, field edges, wooded boundaries, or known problem areas, as these can bias yield comparisons and reduce confidence in results. Note: Control strips are not physically implemented in the field.

- Strip alignment: Align strip based on the planting angle, the heading or the planting azimuth for the fields should be noted.
- Minimum strip width: The width of the treatment strip depends on the width of the sprayer or planter and must be at least two harvester or chopper widths wide.

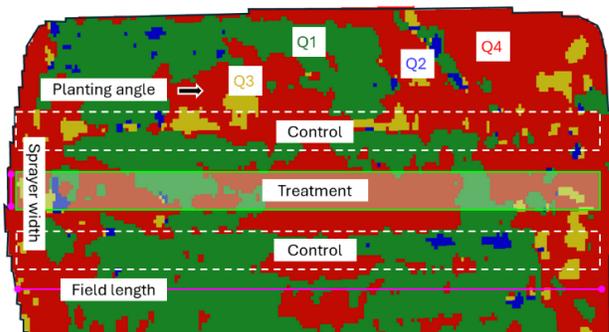


Figure 1. Illustration of SSEA strip geometry and alignment. A treatment strip is created parallel to planting angle with two equally sized control strips on both sides. Yield stability zones (Q1-Q4) guide strip placement and evaluation.

### Converting Ellipsoidal to Cartesian

The planting azimuth/heading angle, always recorded as ellipsoidal (3D), needs to be converted into cartesian (2D) to create strips with a known width. Steps to do this:

- Access conversion tool: <https://ssea-nmsp-tool.shinyapps.io/StripQGISAngleTool/>.
- Enter the latitude and longitude of the field that you are planning to use for the strip.
- Enter the header or planter azimuth.
- Leave the UTM Zone as 18 for fields in NY.
- Hit compute.
- Copy the cartesian angle (“Copy Button”).

## Creating Strip Shapefiles in QGIS

The steps below describe how to create a single strip shapefile with the treatment and two control strips using a temporary line layer, the Advanced Digitizing panel, and the buffering command in QGIS.

### Step 1. Set a projected coordinate reference system (CRS)

- Perform all digitizing in a projected CRS with linear units (meters or feet), such as UTM Zone 18N EPSG:32618; a projected CRS is required to preserve accurate strip width, distance, and alignment.
- Do not digitize strips directly in WGS 84 (latitude/longitude) as degrees do not preserve distance.
- Note: Although strips are created in a projected CRS, the SSEA tool requires strip shapefiles in WGS 84 (EPSG:4326). Reprojection is done later (Step 7).

### Step 2. Create a temporary line layer for strip alignment

- In QGIS, create a New Temporary Scratch Layer, geometry type LineString. This line represents the centerline of the treatment strip.
- Assign the same projected CRS used for digitizing (UTM Zone 18N, EPSG:32618).

### Step 3. Digitize the treatment strip centerline using Advanced Digitizing

- Open the Advanced Digitizing panel in QGIS.
- Using the cartesian angle obtained from the angle conversion tool, set the angle constraint to the computed cartesian angle and digitize a straight line aligned with the planting and harvest direction. The line should be field length and be placed where the treatment strip is planned.

### Step 4. Create the treatment strip polygon

- Use the Buffer tool on the digitized line; set buffer distance to ½ the strip width and cap style to Flat (not Round). The buffered polygon is the treatment strip with the correct width and alignment.

### Step 5. Create control strips

- Duplicate the treatment strip polygon.
- Move one copy to each side of the treatment strip to create the two control strips.

- Maintain a minimum distance of one harvester width between strips.
- Ensure that all three strips are parallel and the same size, avoiding headlands, field edges, and non-representative areas.

### Step 6. Create and populate the attribute field

- Open the attribute table for the strip layer.
- Create a new text field named Strip. Populate the field using treatment and control as labels. The SSEA tool uses this information to distinguish treatment and control areas in the report.

### Step 7. Reproject and export for the SSEA tool

- Reproject the strip layer to WGS 84 (EPSG:4326).
- Export the layer as an ESRI Shapefile.
- Ensure all supporting files (.shp, .dbf, .shx, .prj, etc.) are included.

## In Summary

The SSEA tool accepts strip shapefiles only in EPSG:4326. Use the steps outlined in this factsheet to accurately convert strip location information into a shapefile needed to analyze a SSEA trial. Note: Strip shapefiles created in QGIS can be used in farm management software (e.g., SMS) to generate prescriptions Rx maps.

## Additional Resources

- Nutrient Management Spear Program Agronomy Fact Sheet Series: [nmsp.cals.cornell.edu/index.html](http://nmsp.cals.cornell.edu/index.html).
- New York On-Farm Research Partnership: [nmsp.cals.cornell.edu/NYOnFarmResearchPartnership/](http://nmsp.cals.cornell.edu/NYOnFarmResearchPartnership/)

## Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



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2026