

Winter Cover Crops in New York State: 2014 Double Crop N Rate Study Set-up Protocol

(Revised March 5, 2014)

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Nutrient Management Spear Program

<http://nmsp.cals.cornell.edu/NYOnFarmResearchPartnership/DoubleCrops.html>

Overview

Cover crops have received increasing interest from farmers in recent years. The reasons vary from erosion control and nutrient uptake to improved soil quality, increasing organic matter and field trafficability. Due to the drought in 2012, more farmers are interested in growing winter cereals as double crop, benefiting from the protection offered by cover crops and harvesting the cereal as forage in May to increase per acre crop yields. Properly managed, these crops can supply 2-4 tons of dry matter per acre, and in some fields in 2012 we measured up to 5 tons of dry matter of high quality forage from winter cereals planted after corn silage, even with little growth in the fall. The goal of this project is to determine the optimal nitrogen rate needed by winter cereals (rye, triticale, and wheat) seeded after corn silage and harvested for forage prior to corn planting in May. In homogenous looking areas of fields seeded to winter cereals after corn silage in fall 2012, sites that are 65 by 80 ft. will be set up. These sites will have 4 replications of 5 different N rates: 0, 30, 60, 90, and 120 lbs N/acre applied at time of greenup (see attached field map). Soil samples will be taken prior to fertilizer application to determine starting fertility of each plot and overall field. In May, above ground biomass will be harvested from each plot in order to determine forage quantity and quality in relation to N application.

Spring 2013 Initial site set up

Supplies

Plot map

300 ft. marked measuring tape (marked with green and red tape)

150 ft. measuring tape

1 striped anchoring pin

4 white step-in posts

20 orange drive way markers

80 flags (you will likely not need all of these, but there are extras just in case)

- 16 pink (control)
- 16 red (30 lbs of N)
- 16 yellow (60 lbs of N)
- 16 blue (90 lbs of N)
- 16 orange (120 lbs of N)

Soil probe, scraper and bucket

20 soil sample labels

40 soil bags (20 plots, double bagged)

16 bags of fertilizer (extras have been included in case of spillage):

- 4 marked red (30 lbs of N)
- 4 marked yellow (60 lbs of N)

- 4 marked blue (90 lbs of N)
- 4 marked orange (120 lbs of N)

1-quart container

Cooler or shipping container plus ice packs

Camera (if available)

GPS (if available)

Prior to Setup

- 1) Please ensure we have a copy of the field history for the particular site being setup.
- 2) If possible, take photographs of the field.

Site Setup

- 1) Place the first step-in white post. This should be the one in the lower left hand corner of the map.
- 2) Attach the 300 ft. measuring tape to first post and stretch out to the 80 ft. mark on the tape (should be marked in red). Then put in the next white post at the 80 ft. mark, which should be the upper left corner of the site.
- 3) Next, turn 90 degrees and proceed stretching the 300 ft. tape until you have reached the 145ft. mark (also marked in red). Step in a white post at that mark. This should be the upper right hand corner of your site.
- 4) Turn 90 degrees again and continue stretching the tape until you come to the 225 ft. mark on the tape (again marked in red). There you will put in your lower right hand and last post white post.
- 5) Finish stretching out the 300 ft. tape back to your first post – this should be at the 290 ft. mark on the tape.
- 6) Leave the 300 ft. tape around the perimeter.**
- 7) Next take the 150 ft. measuring tape and stretch it diagonally across the rectangle just marked out, from the post in the lower left hand corner per the diagram to the upper right hand corner. This diagonal should be approximately 103.1 ft. If not, adjust corner posts accordingly.

Setup of Plots

- 1) Attach the 150 ft. measuring tape to the anchoring pin and set the anchor pin into the ground at the 5 ft. mark (green) on the 300 ft. measuring tape that goes around the perimeter. Then stretch the 150 ft. tape across the plot to the 220 ft. mark on the 300 ft. perimeter tape. The distance across should be about 65 ft.
- 2) Next put in proper color flags along this tape: one at the 5 and 15 ft. (pink), 20 and 30 ft. (yellow), 35 and 45 ft. (orange), 50 and 60 ft. (blue) marks.
- 3) Move the 150 ft. tape and anchoring pin to the 15 ft. mark (green) on the 300ft tape and stretch across to the 210 ft. mark (also green). It should be about 65 ft. across once again.
- 4) Place orange driveway markers at the 5, 20, 35, and 50 ft. marks along the 150 ft. tape. After this, place flags at the 15 ft. (pink), 30 ft. (yellow), 45 ft. (orange), and 60 ft. (blue) marks on the tape.
- 5) Repeat steps 1–4 another 4 times. The 300ft. measuring tape and site map will indicate where you should lay out the remaining plots. The plot map will also indicate the change in flag colors due to randomization of the plots within the site.

Soil Sampling of Plots

For each treatment plot:

Use a soil probe to take eight 0–8 inch-deep cores for one composite soil sample following the steps below. It is very important to consistently take 0–8 inch depth samples.



- 1) Place the first soil bag in the bucket and then place the soil label, facedown, in the bottom of the first soil bag. Then place the second bag within the first. This will prevent the label from becoming illegible and ensures that the sample will not be lost as likely in case of bag breakage.
- 2) Using the soil probe, take a total of eight, 0-8 inch deep soil cores around the **inside perimeter of each plot**. Scrape the cores into the plastic bag lined bucket. Try not to step into or trample the plot while sampling.
- 3) After all cores have been taken for a plot, twist the inner bag and knot the outer one in order to allow easy unpacking of samples.
- 4) Place soil sample bags in a cooler/shipping container with ice packs for transport to the NMSP lab as soon as possible for processing and analysis.

Fertilizer Application:

- 1) **Ensure that all soil samples have been taken prior to the application of fertilizer!**
- 2) Place the color-marked bag of fertilizer in the same color plot.
Note: the pink plots do not get any fertilizer since they are the controls.
- 3) At each plot open the corresponding bag and evenly (or as close to evenly as possible) hand broadcast fertilizer across the plots.
- 4) Rubber lab gloves are recommended when handling urea. Fertilizer is easier to spread when transferred into a one quart container (not the soil sampling bucket!). Multiple light passes across the plot ensure more even distribution.
- 5) Clean up bags (do not leave in field).

Finishing Setup:

- 1) Please make notes on the plot map of the orientation of the site within the field for reference.
- 2) If possible please note location with a GPS.
- 3) If feasible, determine stand density by measuring a yard length of a cover crop row outside the site and at two different locations in the field. Also, count the number of tillers with two or more unfolded leaves on each of these plants along each of the yard lengths. Then record number of plants and tillers on field activity sheet.
- 4) Take pictures of the site once set up.
- 5) Clean-up supplies and junk from site.
- 6) **If you haven't done so already, make sure to supply a copy of the field history with the samples when you send them back to NMSP. No samples will be processed or analyzed if there is no field history on file for that site.**
- 7) Fill out field activity sheet and send back with samples to NMSP.
- 8) Send or transport samples back to NMSP: **Greg Godwin, 330 Morrison Hall, Dept. of Animal Science, Cornell University, Ithaca, NY 14853**

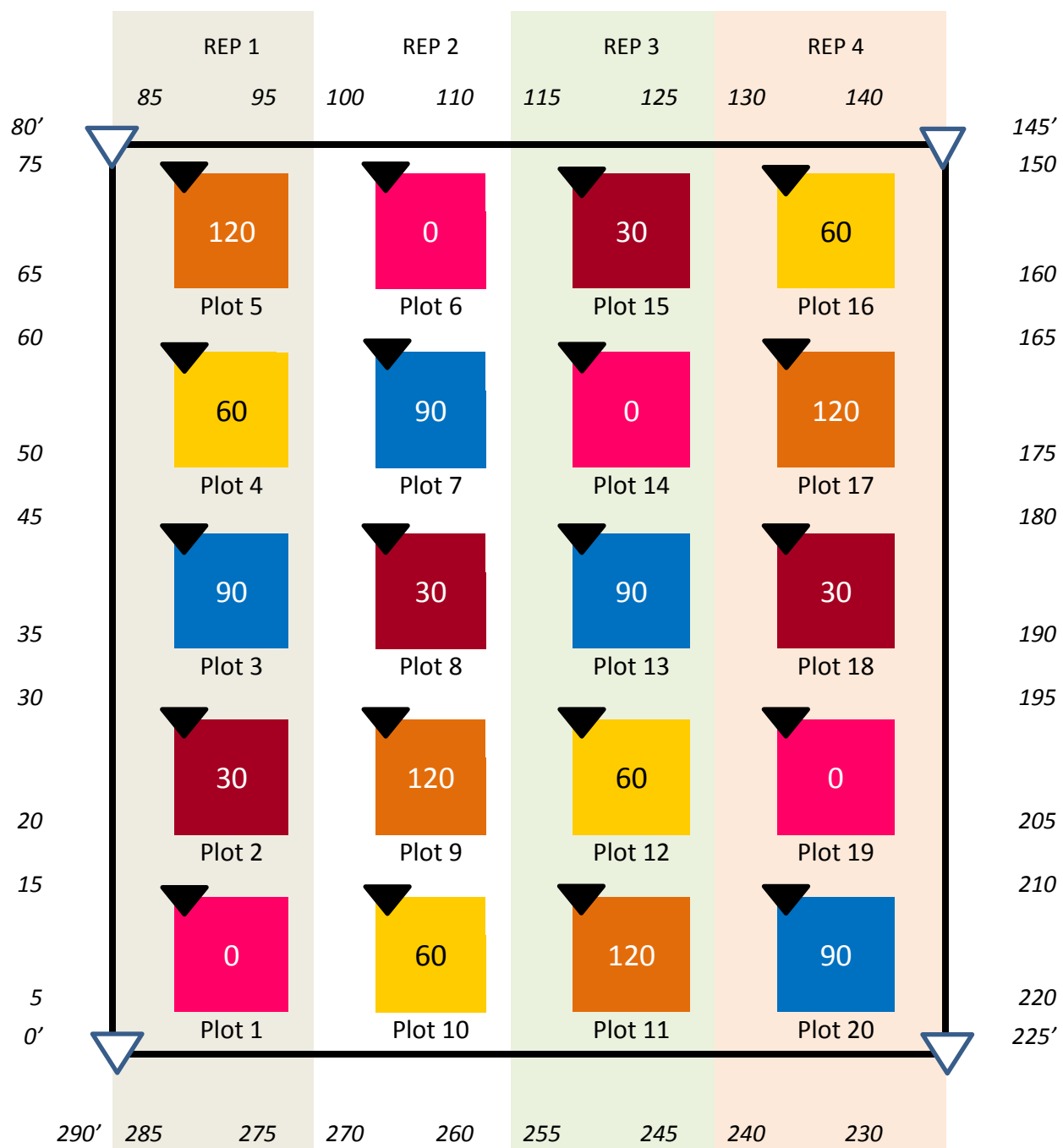


Figure 2: Plot set-up. Fertilizer rates (lbs N/acre) are noted in plots and color coded for flagging and match colored labels on bags of pre-weighed fertilizer.

Field Activities Record 2014

Location: _____

Experiment: 2014 Double Crop N Rate Study

Date	Activity, Participants, Observations, and Notes.
	<i>Count and record the number of rows included in the harvest frame and estimated row spacing.</i>

2014 Double Crop N Rate Study - Site Map

Date: _____ Collaborator: _____ Farm name: _____

Field ID: _____

Location: _____

Map with key reference points and distances between points:

GPS location (center of each rep)		
Rep	Latitude	Longitude
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____