Comparing actual N rate responses to the N rate calculator (MRTN) approach to setting N rates

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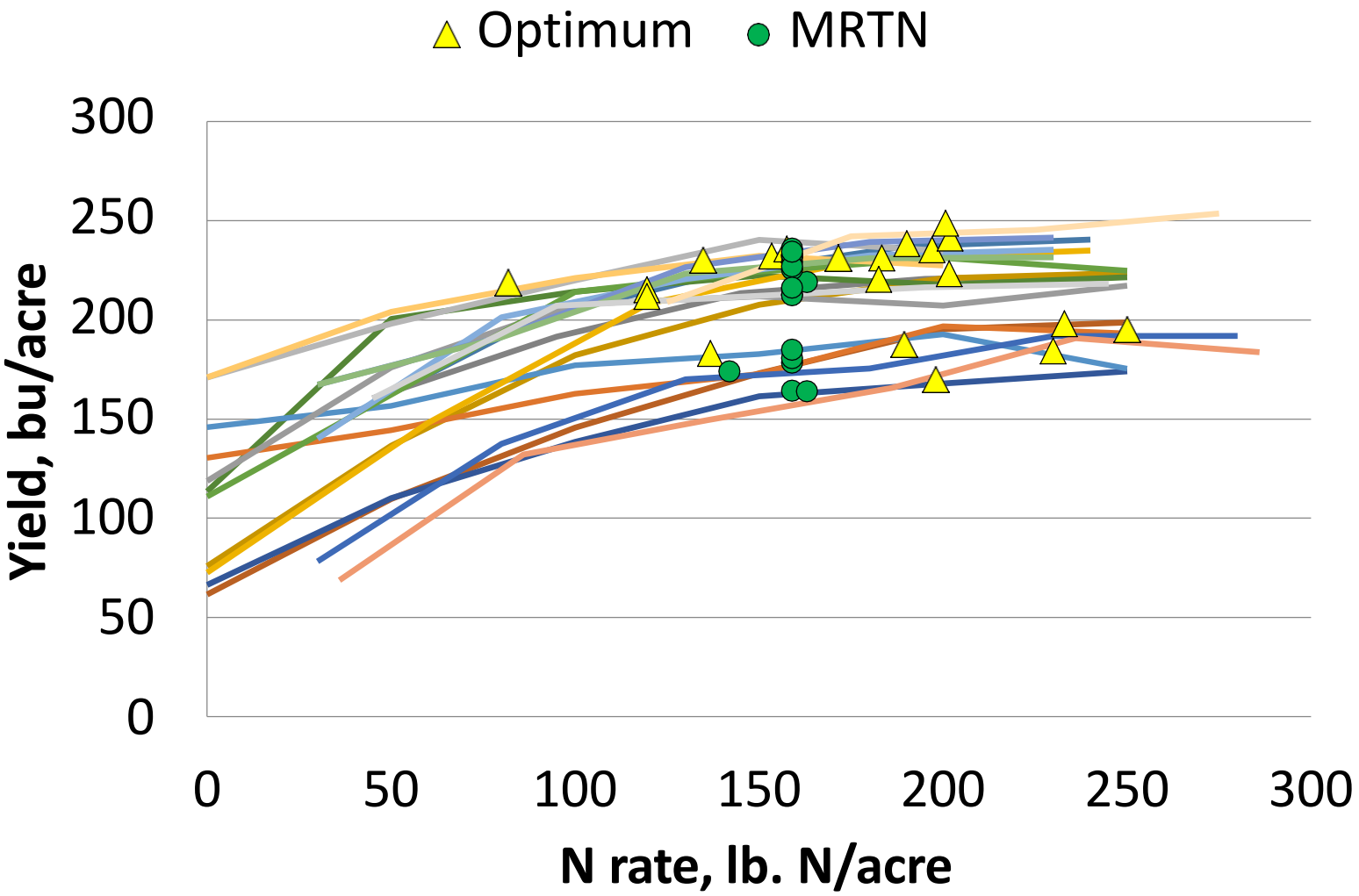
The following slides show the actual yield responses to N rate in on-farm trials for each year and by previous crop – corn or soybean. "Optimum" symbols (△) on each response curve are where the last amount of N just paid for itself in that trial. The MRTN symbols (●) are at the N rate (and yield) produced by the N rate calculator version for that year for the appropriate region (north, central, south) in Illinois. We used typical corn and N prices for each year.

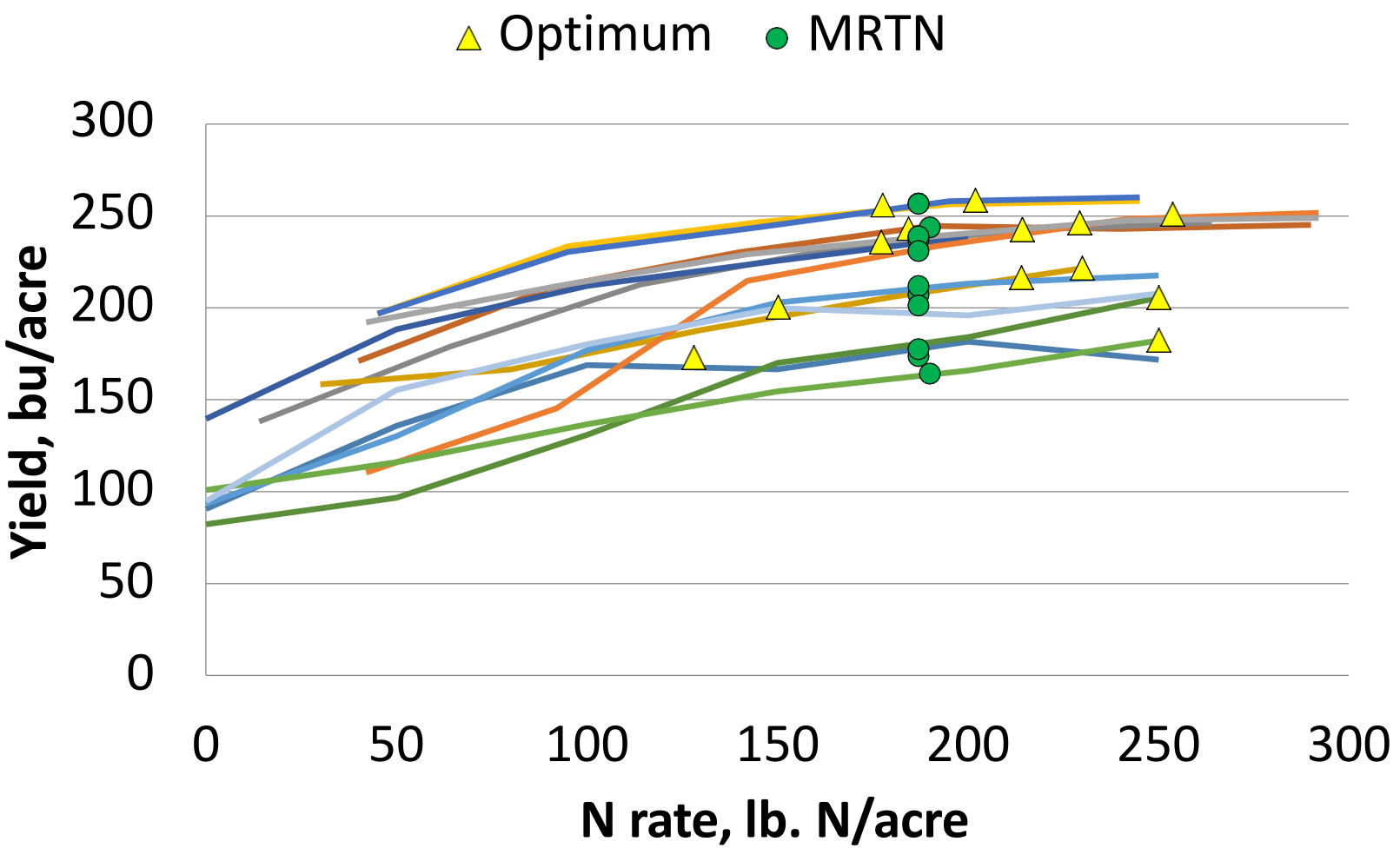
Optimum N rates from trials in years or sites with more N loss tend to be higher than MRTN rates, while in years with less N loss, optimum N rates tend to be lower than MRTN rates. The "return to N" is the price of corn times yield minus the N rate times N price. The MRTN is based on a large set of data over years, so is the "best guess" N rate.

20 On-Farm N trials, Soy-Corn 2014



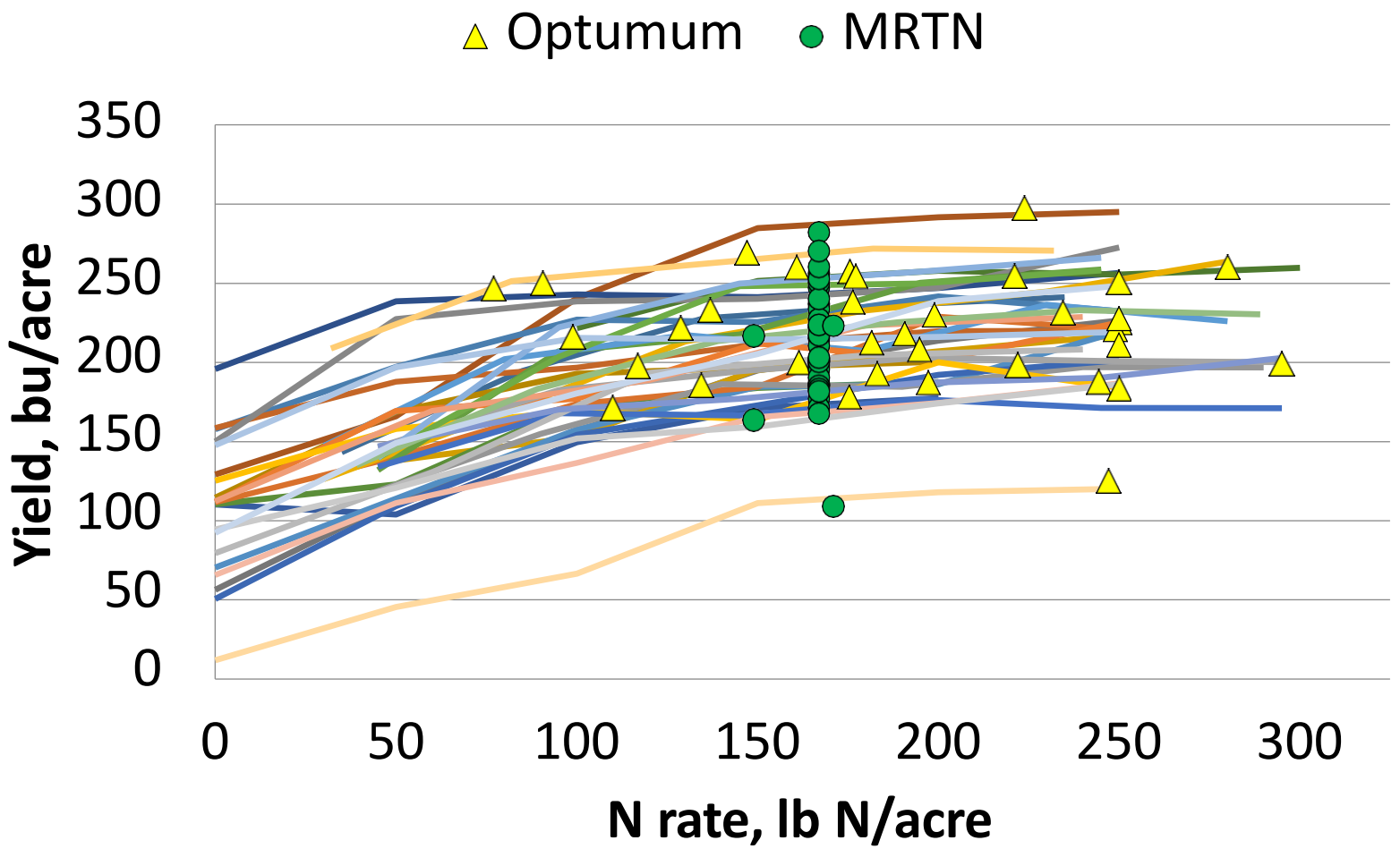
The average optimum N rate was 16 lb. N/acre higher than the MRTN rate, and using it instead of the MRTN would have increased yield by an average of 6 bushels and return to N by $16/acre.

13 On-Farm N Trials, Corn-Corn 2014



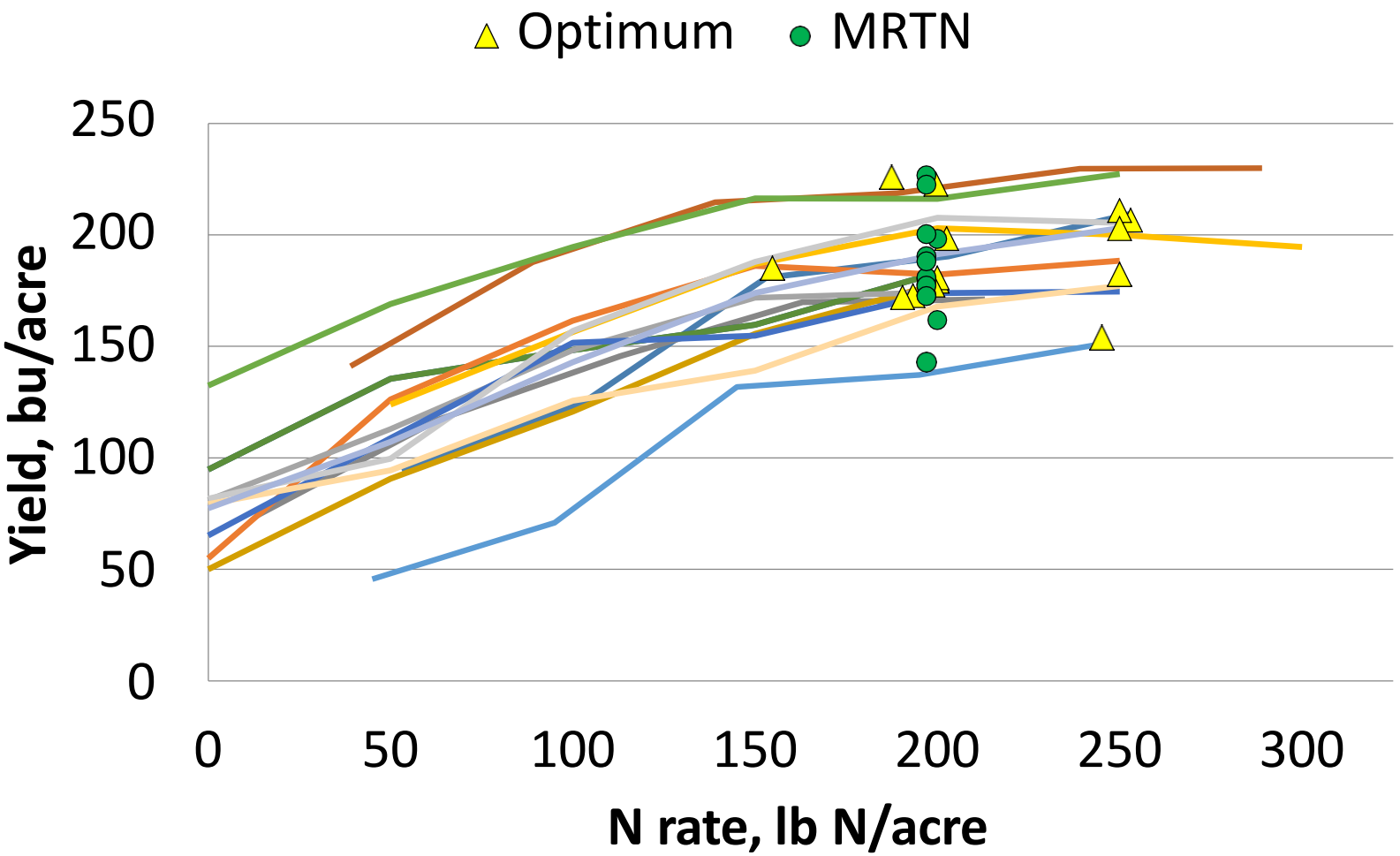
The average optimum (EONR) N rate was 17 lb. N/acre higher than the MRTN rates, and using the actual optimum (if we could have known it) instead of the MRTN would have increased yield by an average of 7 bushels and the return to N by $20/acre.

35 on-farm trials, Soy-Corn 2015



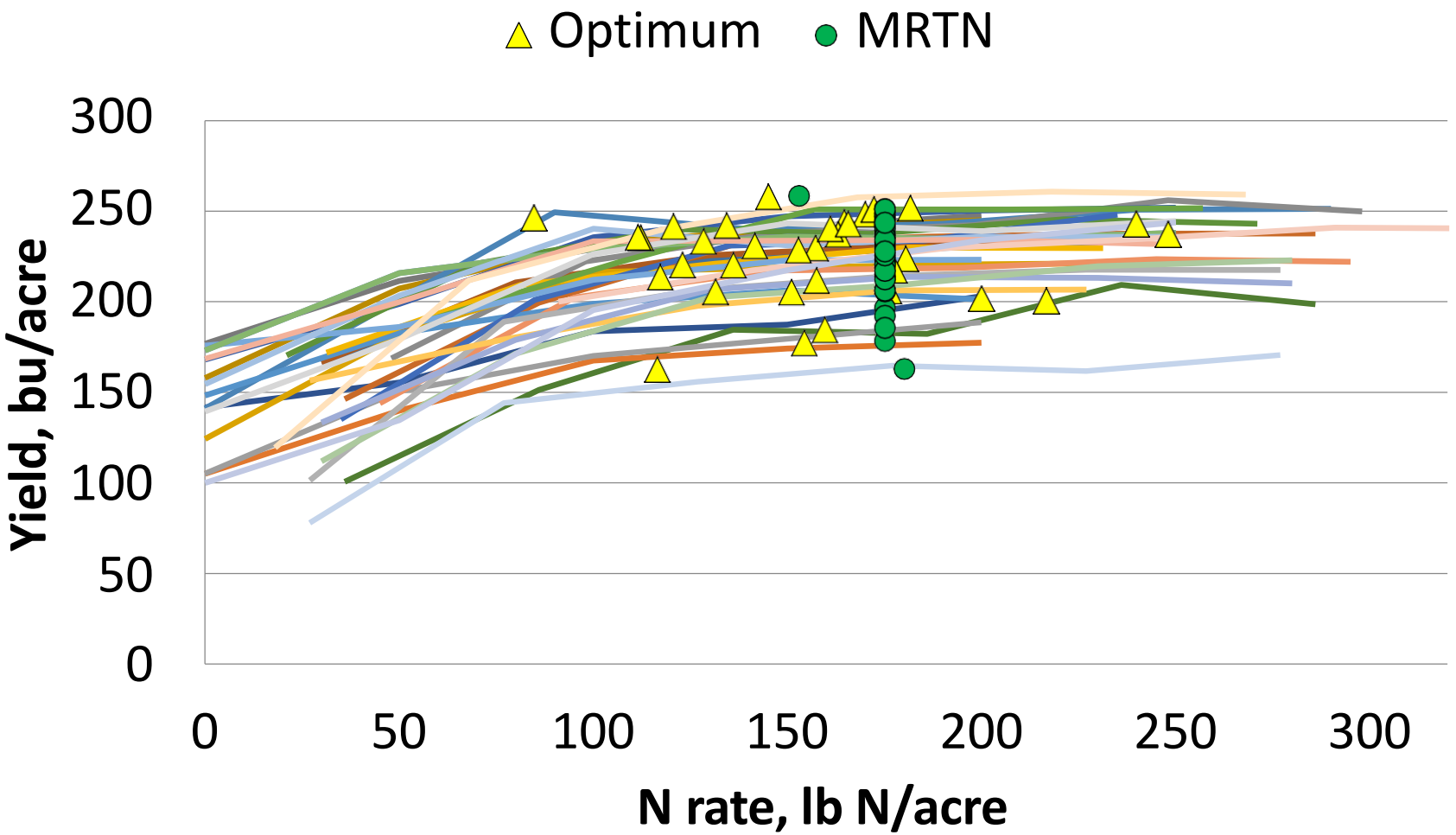
June 2015 was very wet, with most of the optimum N values to the right (higher than) the MRTN. Averaged over sites, the actual optimum (EONR) N rate was 25 lb. N/acre higher than the average MRTN, and using the optimum instead of the MRTN would have increased yield by an average of 9 bushels and return to N by $24/acre.

15 on-farm N trials, Corn-Corn 2015



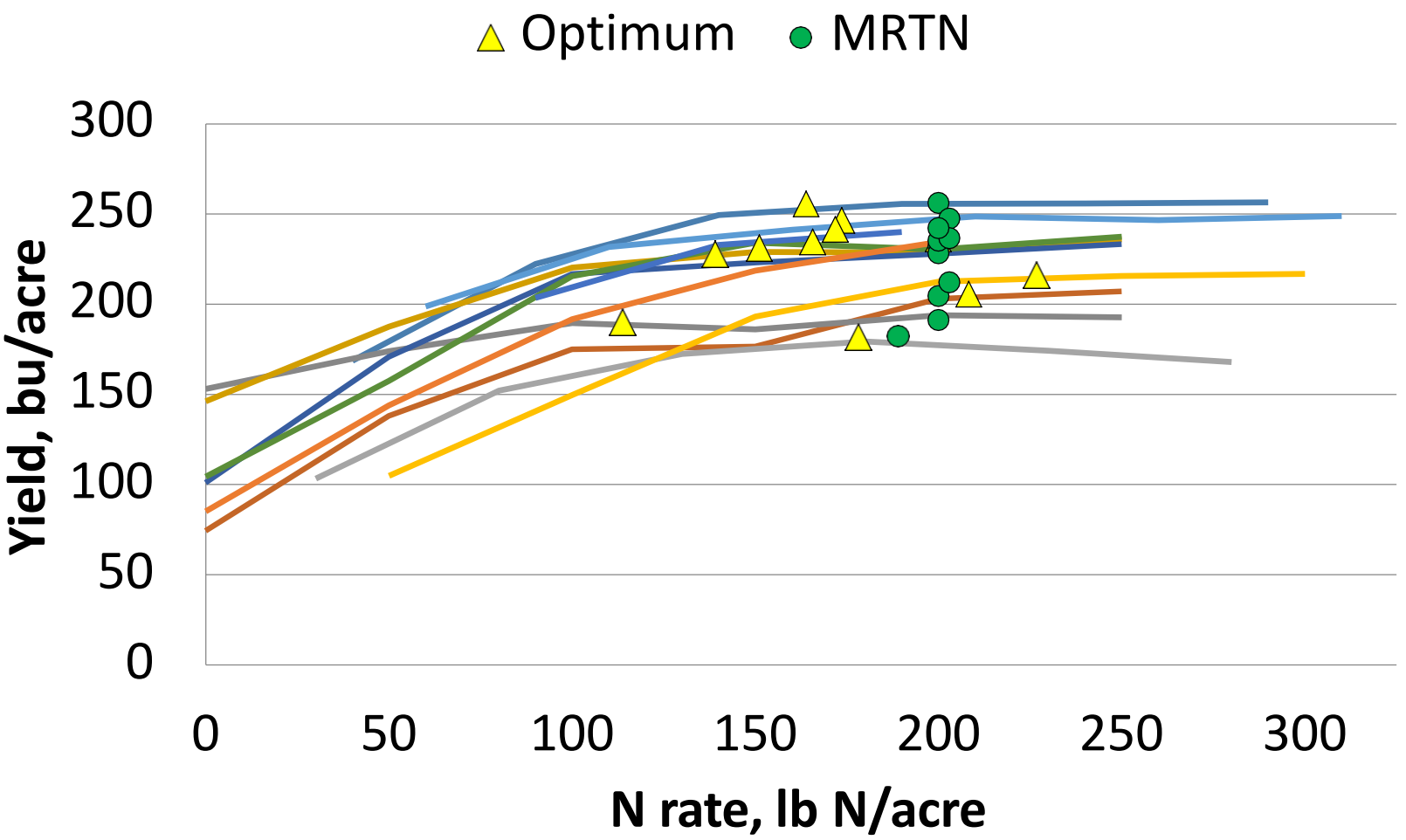
Averaged over sites, the actual optimum (EONR) N rate was 16 lb. N/acre higher than the MRTN values, and actual optimum would have increased yield by an average of 5 bushels and the return to N by $15/acre compared to using the MRTN.

33 on-farm N trials, soy-Corn 2016



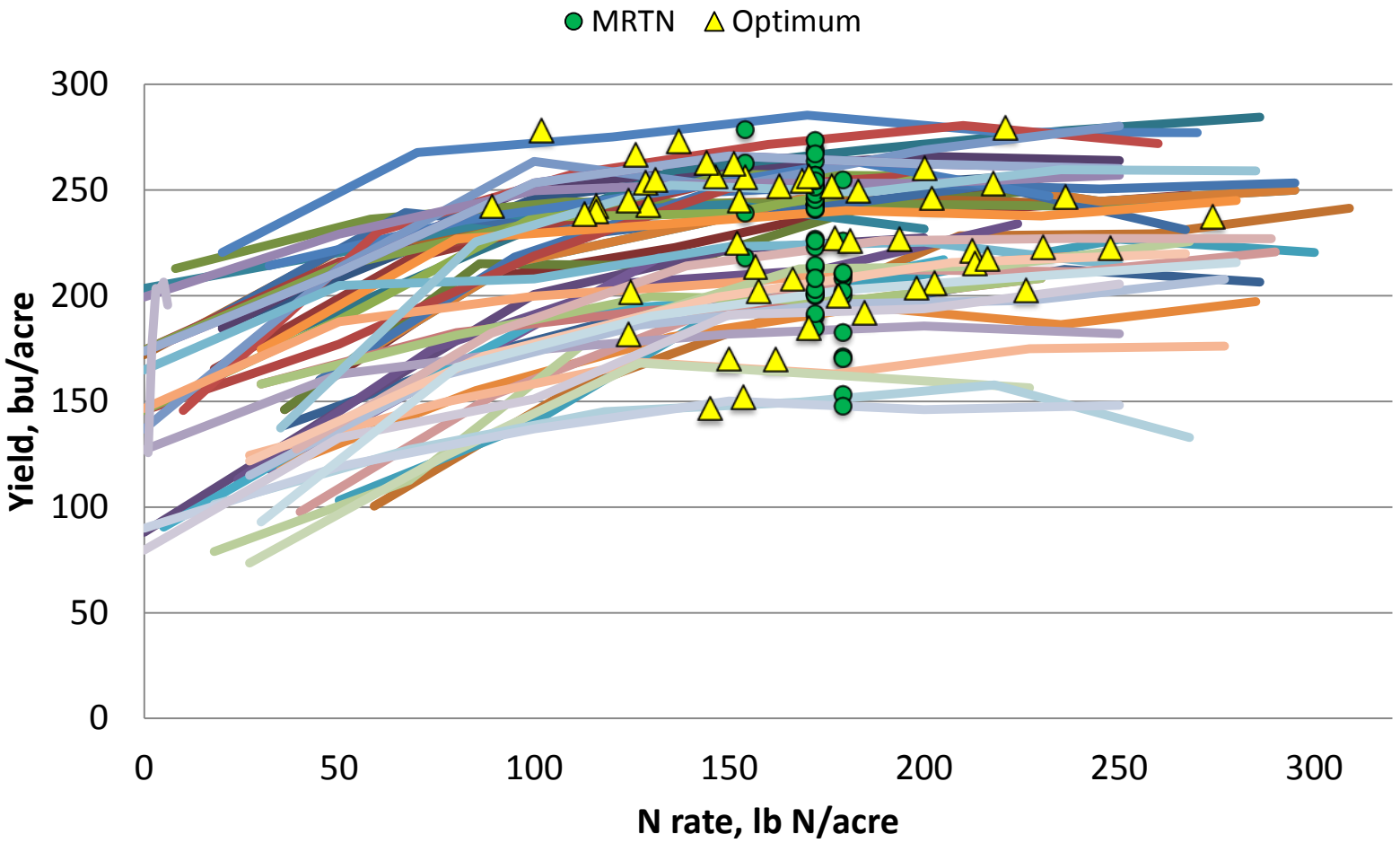
May and June were not wet in 2016. The average optimum N rate was 16 lb. N/acre less than the average MRTN, and using actual optimum instead of the MRTN would have increased yield by an average of 1 bushels and the return to N by $10/acre.

11 on-farm N trials, Corn-Corn 2016



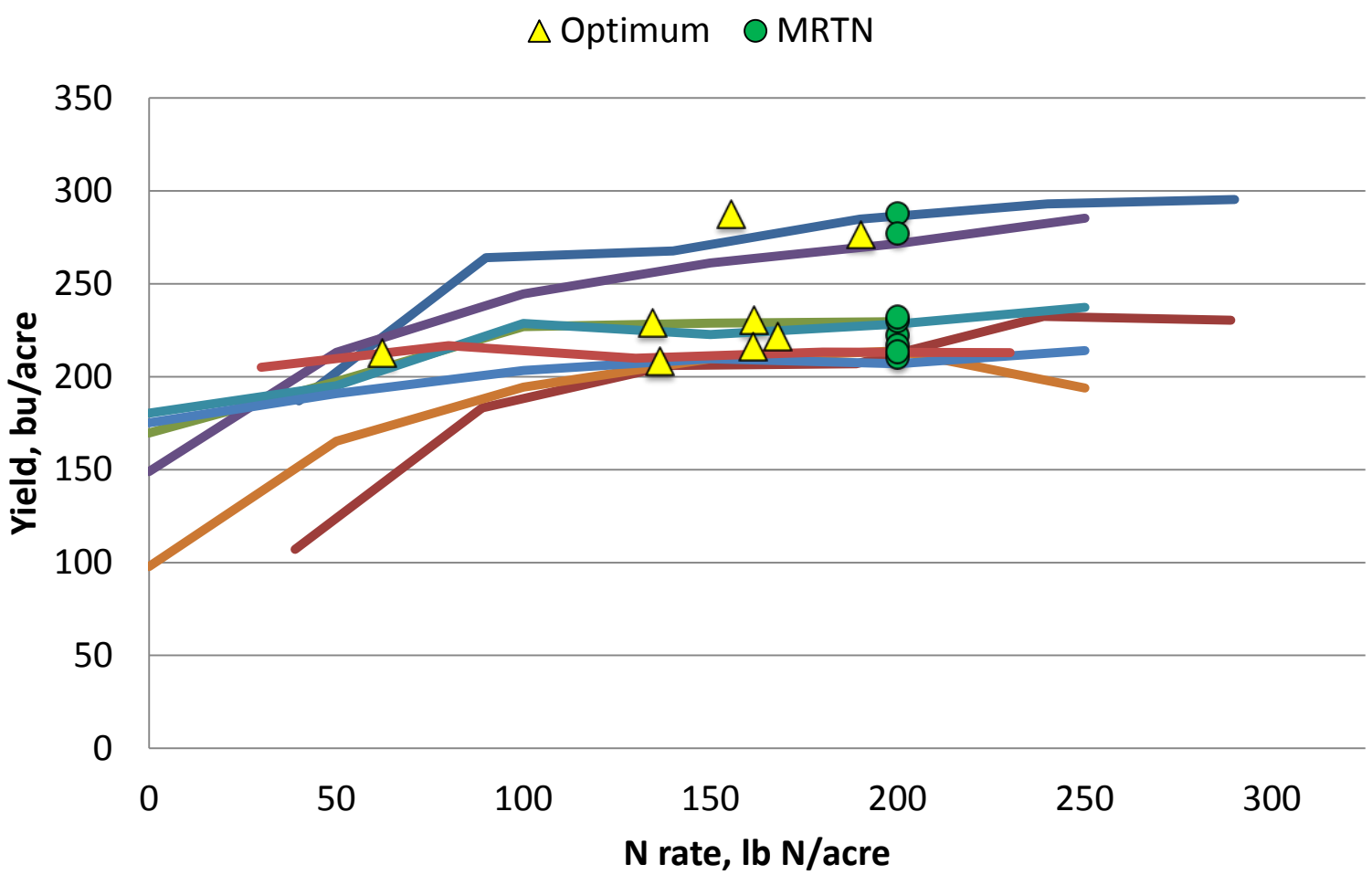
With little N loss, the average optimum N rate was 28 lb. N/acre less than the average MRTN, and using actual optimum instead of the MRTN would have had no effect on yield and would have increased the return to N by $10/acre, all from saving N.

51 on-farm N trials, soy-corn, 2017



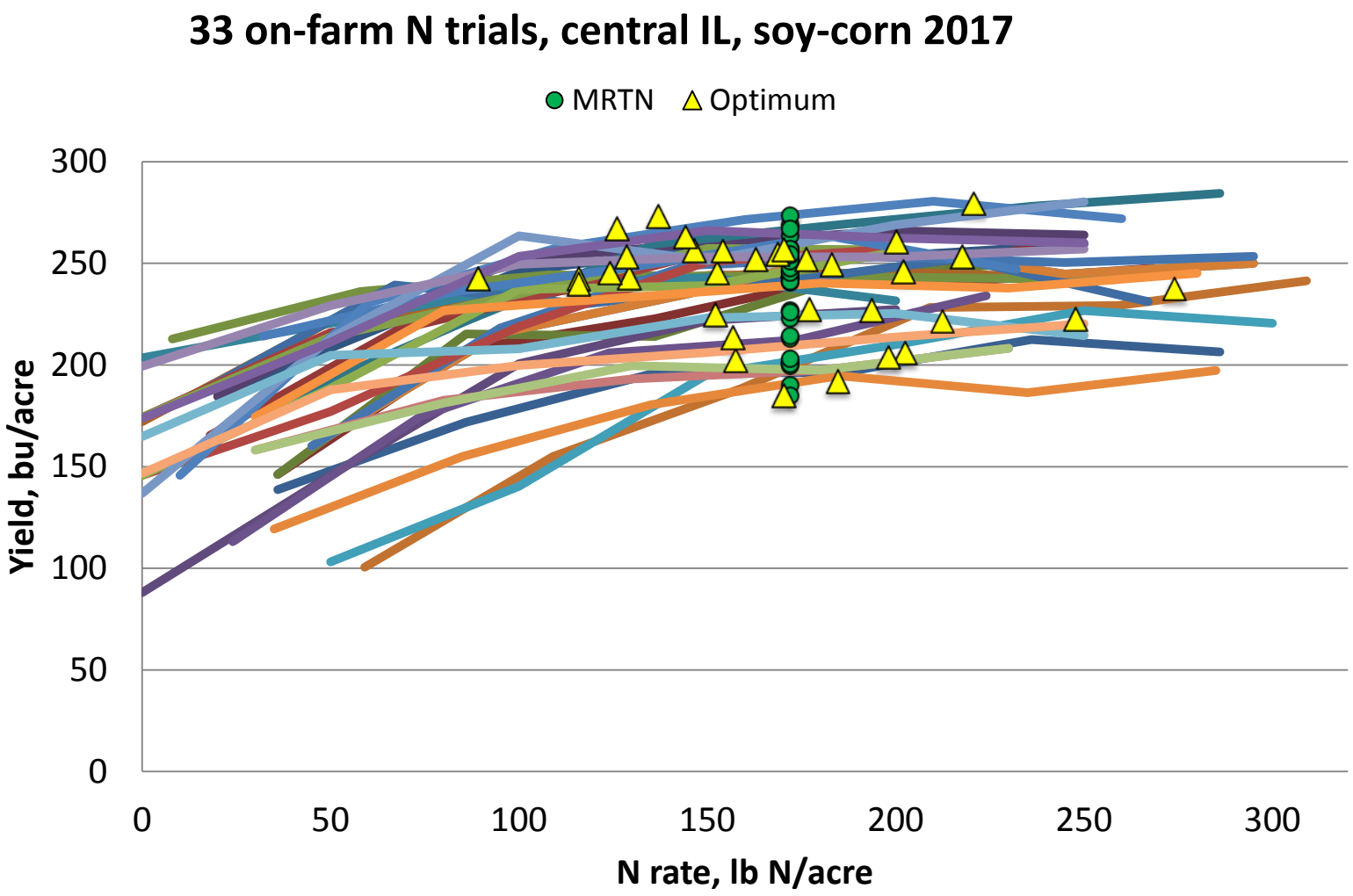
20 of 51 sites needed more N than MRTN rate
Using actual optimum N rate* instead of MRTN:
- would have used 4 lb less N
- would have yielded 3 bu/acre more
- would have returned about $13 more per acre to N

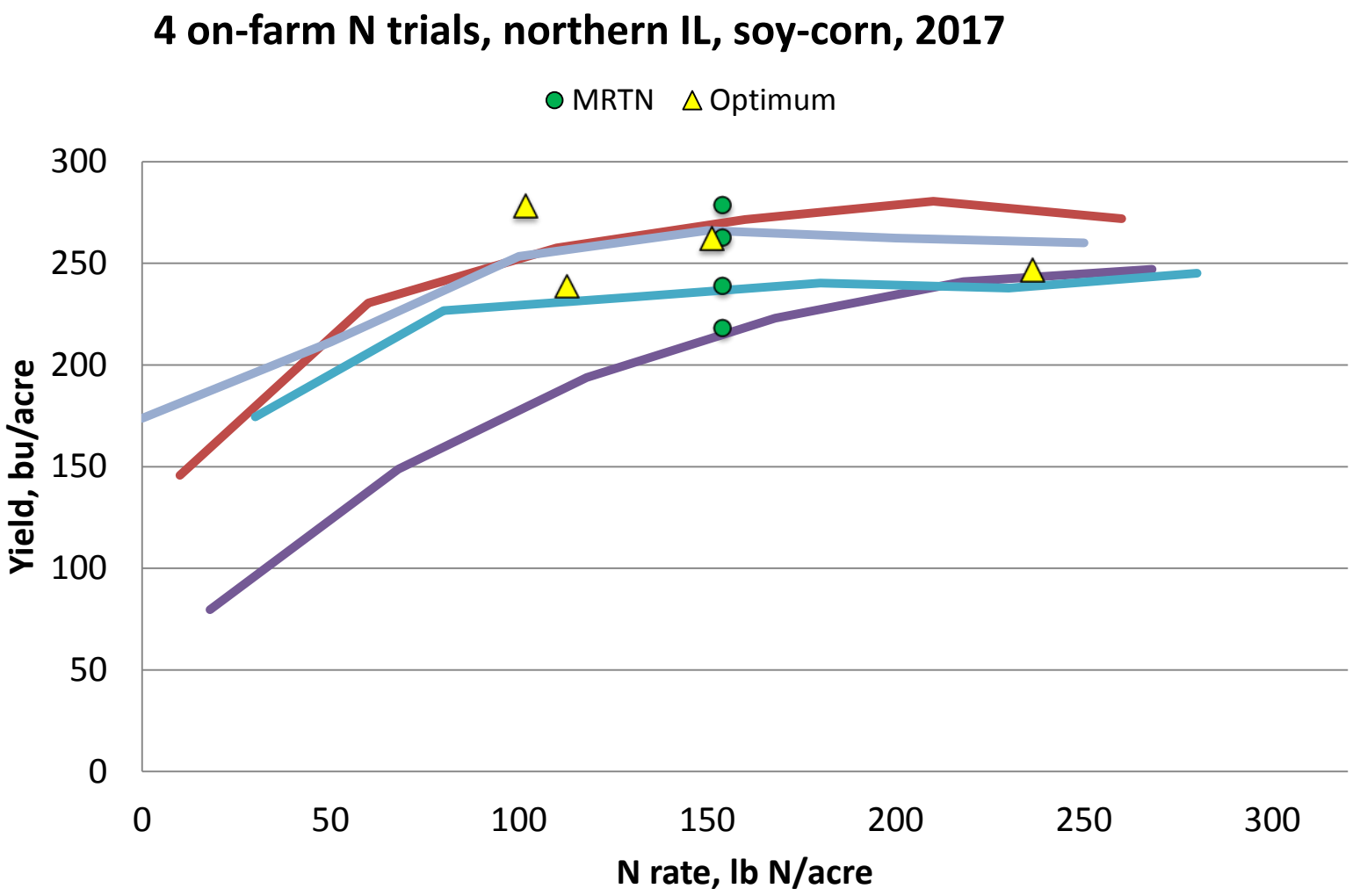
*We have no way to know the actual optimum N rate before the trial has been done – that is, before the season

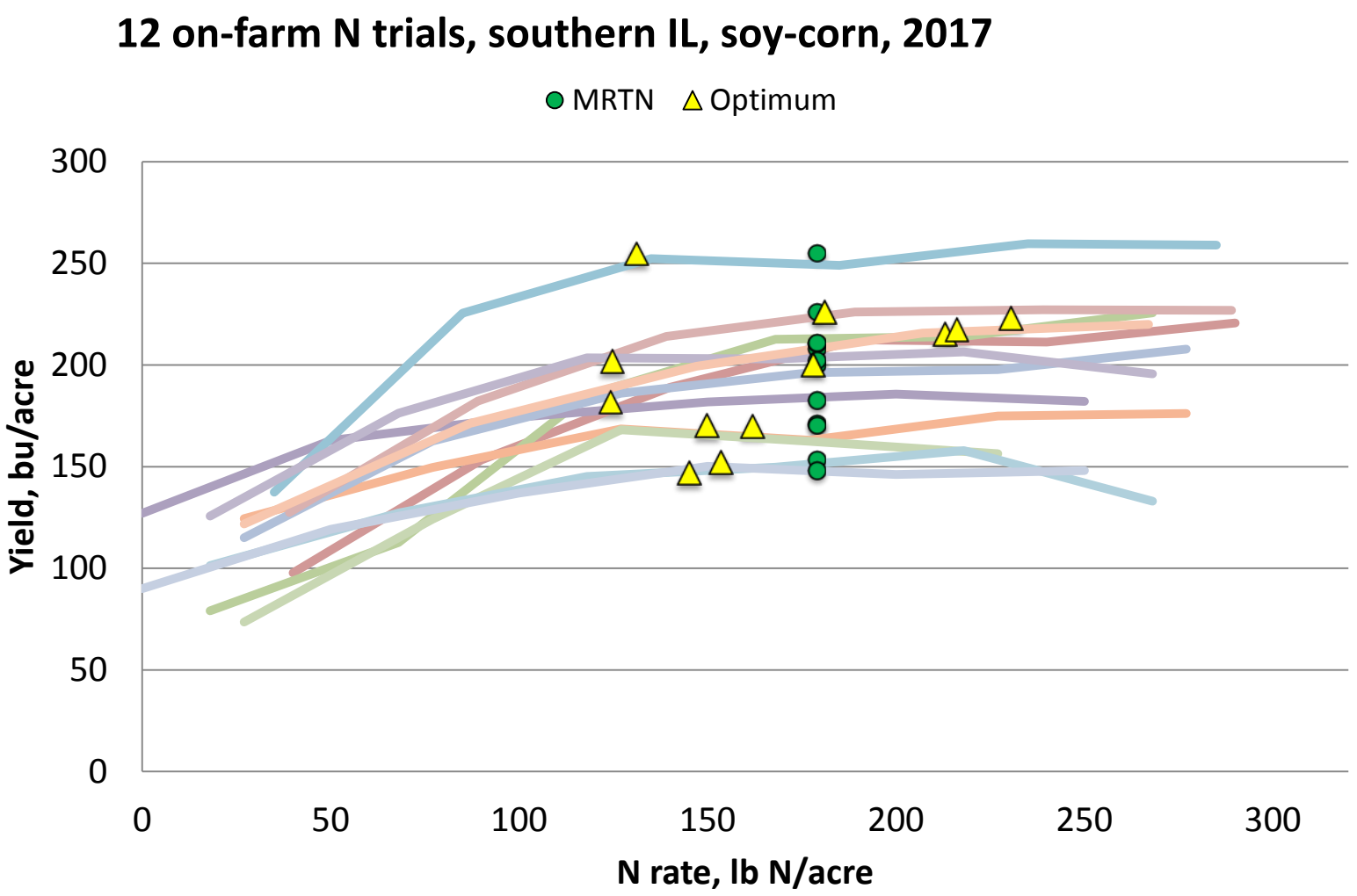


No site needed more N than the MRTN rate
Average optimum N rate was 54 lb less than MRTN
Using MRTN increased yield by 1 bu over avg. yield at EONR
Using actual optimum N rate averaged $16/acre higher return than MRTN, due to N saving

Knowing the EONR before the season isn't possible – it takes a trial.


33 on-farm N trials, central IL, soy-corn 2017
MRTN
Optimum
300
250
200
150
100
50
0
Yield, bu/acre
0
50
100
150
200
250
300
N rate, lb N/acre


4 on-farm N trials, northern IL, soy-corn, 2017
MRTN
Optimum
300
250
200
150
100
50
0
Yield, bu/acre
0
50
100
150
200
250
300
N rate, lb N/acre


12 on-farm N trials, southern IL, soy-corn, 2017
MRTN
Optimum
300
250
200
150
100
50
0
Yield, bu/acre
0
50
100
150
200
250
300
N rate, lb N/acre