When soil conditions are conducive to a 90% plant establishment rate, we currently recommend seeding rates of 30,000 kernels/acre for grain corn on silt loam soils in New York, based on small-plot studies at the Aurora Research Farm from 2003 to 2005 and field-scale studies from 2006 through 2010 (What’s Cropping Up?, Vol. 21, No.1, p.4-5). The results from the studies in the 2000s are similar to a 1991-1993 study in which nine hybrids (released in the late 1980s or early 1990s) also had optimum yield at 30,000 kernels/acre (What’s Cropping Up?, Vol. 4, No.2, p.3). Recent hybrid releases, however, have been selected at higher plant populations and lodge less because of the Bt corn borer trait. Consequently, there is a general belief that recent hybrid releases require higher seeding rates than hybrid releases from the late 1980s and early 1990s. In addition, new hybrid releases may respond more positively to N fertilization so there is also a general belief that new hybrid releases planted at high rates with high N fertilization will “really kick it out”. Most of our studies in the 2000s were conducted at recommended side-dress N rates so perhaps that is the reason why our results do not validate the general belief that high seeding rates (~35,000 kernels/acre of higher) are required for optimum yield in NY. On the other hand, most corn seed is now treated with soil-applied insecticide/fungicide, which results in greater stand establishment today. Consequently, the higher plant establishment rate may offset the need to plant new hybrid releases at higher seeding rates. We completed a 2-year hybrid by seeding rate by side-dress N rate study (small-plot) in 2011 to determine if new hybrid releases respond more positively to higher seeding rates at higher side-dress N rates.

We evaluated two hybrids with the Bt corn borer trait (DKC51-86 and P0125XR) at four seeding rates (25,000 to 40,000 kernels/acre) and two side-dress N rates (100 and 125 lbs N/acre) in small plot research at the Aurora Research Farm in 2010 and 2011. About 25 lbs of N/acre were also applied in the starter so a total of 125 and 175 lbs N/acre were applied.

Figure 1. Corn yield response, averaged across two hybrids (DKC51-86 and P0125XR), to four seeding rates (25,000 to 40,000 kernels/acre) and two side-dress N rates (100 and 125 lbs N/acre) in 2010, 2011, and averaged across both years. About 25 lbs of N/acre were used in the starter fertilizer so a total of 125 and 175 lbs N/acre were applied.

Plant establishment rate averaged 87% for the DEKALB hybrid and 79% for the Pioneer hybrid in 2010 and about 90% for both hybrids in 2011. When averaged across years, hybrids did not influence yield so results have been averaged across hybrids. The quadratic regression equation predicted maximum yield at about 35,000 kernels/acre in 2010, a year with record yields in NY and at the experimental site (Fig.1). The quadratic equation, however, typically overestimates maximum values as evidenced by only a 1.5% yield difference between the 30,000 kernel/acre (295 bushels/acre) and the 35,000 kernel/acre seeding rate (299 bushels/acre). In 2011, a year with very dry June and July conditions, regression analyses indicated no response to seeding rate (Fig.1). When averaged across years and hybrids (Fig.1), yields were virtually the same at seeding rates of 30,0000 (239 bushels/acre), 35,000 (239 bushels/acre), and 40,000 kernels/acre (240 bushels/acre).

Of equal importance, there was no difference in yield between N rates (Fig. 1). Also, there was no difference between hybrid by seeding rate by side-dress N rate interaction in either year of the study or when averaged across years (Fig.1). This indicates that optimum yields were achieved for both hybrids in both years at the 30,000 kernel/acre seeding rate at the recommended side-dress N rate when corn follows soybeans. No further yield increase was observed at the higher seeding rates in the presence of higher N rates.
Conclusion
Once again, the recommended seeding rate of 30,000 kernels/acre resulted in close to optimum yield in a year with the highest yield on record (2010) and in a year with the second driest July on record (2011) in the presence of recommended or elevated N rates when corn follows soybeans. Nevertheless, almost all grain growers plant at higher seeding rates so we question whether this seeding rate response is consistent across different soil types and farming operations in NY. Consequently, Geoff Reeves, an MS student with our program at Cornell, initiated field-scale studies in 2011 on four farms evaluating two hybrids at four seeding rates (25,000 to 40,000 kernels/acre) in the major corn grain regions of NY. We have two studies in western NY (twin-row corn in Orleans County and 30-inch rows in Livingston County) and two studies in central NY (20-inch rows in Cayuga County and 30-inch rows in Seneca County). We evaluated stand establishment, lodging, yield, moisture, and test weights in 2011. We will collect the same data again in 2012 and Geoff will conduct a partial budget analyses to determine optimum economical seeding rates for grain corn across different soil types and farming operations in NY.