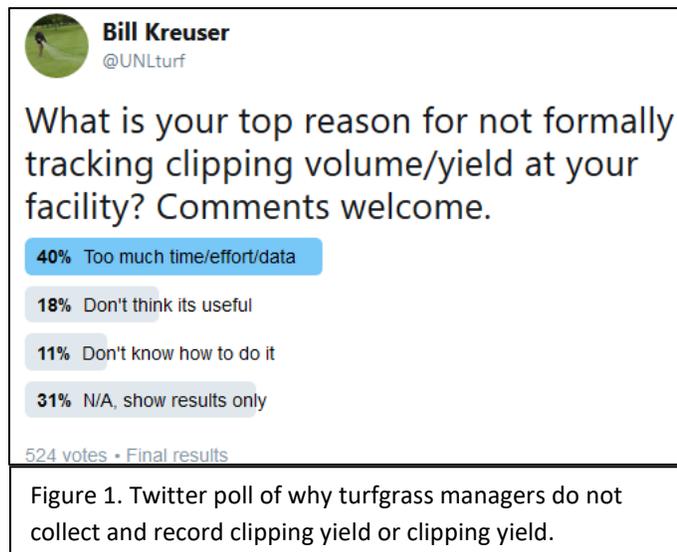


## What's the deal with measuring clipping volume?

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There has been a growing discussion among turfgrass professionals about measuring and recording the amount of clippings collected while mowing. This debate has picked up steam in recent months, especially with golf course superintendents. While it is very common for most turf managers to ask their employees, "How much grass did you get today?" that answer typically isn't an actual number. Some superintendents have started to keep better track of the clipping production on their putting greens. Others seem interested, but still have several questions like how to do it, how much time does it take, and how can the data be used (Fig.1). Micah Woods, PhD from the Asian Turfgrass Center has advocated for accurate measurement and recording of clippings for years. He recently posted his free e-book on the subject to his website: <https://www.asianturfgrass.com/buckets>. It contains a lot of helpful information that answers many of those questions.



We advocate that turfgrass managers collect clipping volume instead of weight (Fig. 2). While weight is most useful, it is nearly impossible to determine in a field setting. We measure clipping weights daily for our PGR research, and it is extremely laborious. First the clippings need to be dried at 150F for 24-36 hours and then all sand needs to be painstaking removed. By measuring volume – such as liters, quarts, gallons, etc. – the complications of sand, dew, and water content is minimized. Dr. Woods advocates using mL per square meter, but liters per 100 square meters is most popular on Twitter. The metric units can be intimidating for US turf managers, so it's convenient to know that L/100 m<sup>2</sup> is very similar to qts/1000 ft<sup>2</sup>.



Figure 2. Graduate student, Jacob Fuehrer, collected clipping volume daily at the East Campus Turf Plots. Many golf course superintendents use kitchen stock buckets to quickly empty and measure clippings from their large mower buckets. Some even mount the stock bucket to the side of triplex mowers.

So why take the time to measure clipping volume, especially if weight is more important? We can approximate weight from clipping volume. This past summer, we collected clipping volume from a research green each day. We then spent the time cleaning and drying the clippings to weigh them. We found that roughly each gallon of clippings from a bentgrass putting green weighed 0.35 lbs when clean and dry (Fig. 3). Creeping bentgrass typically contains between 4-6% nitrogen (N), 0.3-0.6% phosphorus (P), and 1.5-3.0% potassium (K) by dry weight. We can multiply those ranges by the estimated clipping weight to approximate amount of nutrients removed during mowing.

For example, if a bentgrass putting green had a cumulative annual clipping volume of 100 gallons per 1000 ft<sup>2</sup> and we assume one gallon weighs 0.35 lbs, then 35 lbs of clippings were removed during that year. Then assuming the clippings were 5% N, .5% P and 2% K, mowing would have removed 1.8 lbs N, 0.2 lbs P, and 0.7 lbs K. Was the 1.8 lbs N removed more or less than what was applied during that year? You can see how tracking clipping volume can help ensure your fertilization rates are appropriate.

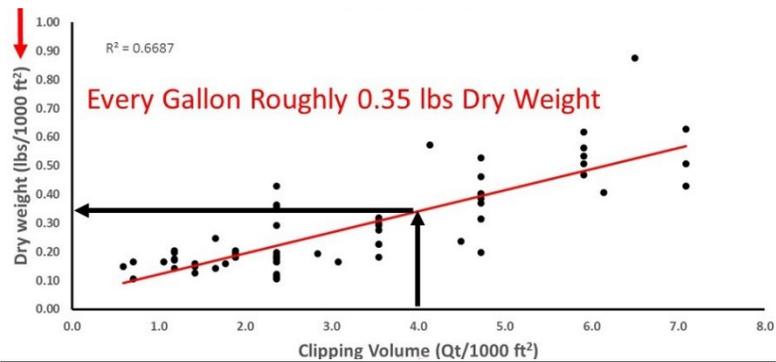


Figure 3. The relationship between clipping volume and dry weight.

Clipping volume can also help direct management inputs. Our latest research suggests there may be an ideal clipping yield/volume to maintain healthy putting greens. Too little growth and the turf gets disease (e.g. dollar spot) and it can't recover from wear. Too much growth and the putting green gets puffy, performance is reduced, and disease like brown patch increase. Our goal should be to use inputs like PGRs and nitrogen fertilization to sustain a healthy and uniform amount of growth. Instead of using the same nitrogen fertilizer and PGR rate continually, adjust those rates to dial in your yields. If there is too much growth, then increase the PGR rate and reduce the fertilization. If growth is slow, then reduce PGR rate. We recommend the lowest label rate to sustain plant health and limit a "rebound" growth surge and increase the nitrogen fertilizer rate.

Finally, don't get too caught up in the day to day growth/clipping volume swings. Instead, look at the average growth rate over the past week. Is that value increasing or decreasing? Where is it relative to your goal growth rate? It isn't essential to measure every green, either. Many superintendents just measure the green that historically grows the fastest, slowest, and an average green. The data can be stored in Excel or in turfgrass management apps like <http://GreenKeeperApp.com>.

While clipping volume measurement seems like a lot of extra work, it allows managers to more precisely manage nitrogen and PGR inputs. This ultimately improves putting green consistency and performance. I'd encourage you to try and measure clipping volume at your golf or sports turf facility in 2019. Check out Dr. Woods' e-book or send me an email for more details.

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