Seed-placed starter fertilizer is an important planting practice for winter wheat. In Ontario trials, it has been shown to increase yields, on average, by 7.5 bu/ac. The primary objective of a starter fertilizer is to provide nutrients for early growth and promote root development. This improves winter survival and crop uniformity the following spring. However, even though many studies indicate that starter fertilizer improves yield, there are a few challenges that have lead growers away from the practice. A critical issue regarding starter fertilizer is the application rate: how much do I have to apply to gain these benefits?

To test how well your money is spent on starter fertilizer, a visual demonstration simulating the spread of phosphorus fertilizer material (liquid and dry) at a range of rates was designed (Fig. 1), allowing for a determination of how close the fertilizer gets to the seed. As phosphorus does not move freely in the soil, it is critical that fertilizer be within 1 inch of the seed to allow the first roots to contact the fertilizer and receive the starter effect.

There are several different application methods used for starter fertilizer application. This experiment included an evaluation of both “surface broadcast” and “in the seed furrow” (in furrow) application techniques.

### Methods

Three different rates were tested for each dry 11–52–0 (monoammonium phosphate, or MAP) and liquid (6–24–6) phosphorus fertilizer (Table 1). Five 7.5-inch in-furrow banding applications were simulated using a John Deere 1560 drill with 1590 boots; and one broadcast application was simulated using a Valmar Airflow system. To conduct the simulation, a 4- by 8-ft white board was used to act as the soil surface. The drill was calibrated for each fertilizer rate and each product and driven at field speed over the wood board with the fertilizer engaged. The droplets of liquid or granules of dry fertilizer were then marked on the board using black permanent marker.

### Results

Photographs were taken of the different liquid and dry treatments. Ideally, fertilizer should fall into semi-perfect 7.5-inch rows to be uniformly available to each and every seed. Rate C and E achieved this distribution. Rate C, 10 gal/ac, demonstrates a clean line of liquid fertilizer drops into 7.5-inch rows while Rates A and B do not. Rate B (5 gal/ac) is better than A (2.5 gal/ac), but the drops are not well distributed; the pattern is far too scattered. Similar results are seen with the dry fertilizer. Rate E, 100 lb/ac, demonstrates the most even fertilizer distribution while Rate D, 40 lb/ac, is acceptable but not as good at Rate E.

Choosing the right application rate and method is not as easy as reading the label. You want to ensure that the phosphorus is going down with the seed!

### Surface tension

Rate A (2.5 gal/ac) and B (5 gal/ac) demonstrate variable coverage across the board. The scattering of the liquid fertilizer results from surface tension of the liquid at the release point from the drill (Fig. 2). At low rates, the fertilizer drops form a mass of liquid that does not drop