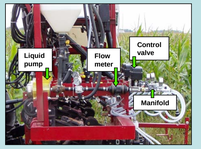
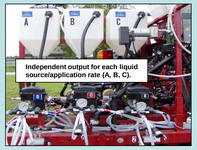
Variable Fertilizer Source, Placement, and Rate Applicator for Field Plot Research

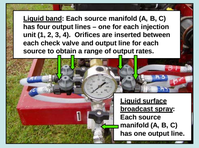
Peter L. Wakeman, Todd W. Andraski, and Carrie A.M. Laboski. Dept. of Soil Science, University of WI-Madison

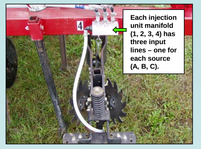
DEPARTMENT OF SOIL SCIENCE
University of Wisconsin-Madison

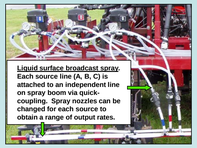
Variable rate technology has provided a means for greater fertilizer application options for field plot research. We constructed a fertilizer applicator unit mounted on a three-point tool bar with the capability to apply a range of fertilizer rates using several sources (three liquid and two granular) and placement methods (3-m wide broadcast or four 76-cm surface/subsurface bands including strip-till and sidedress). In addition, the fertilizer unit can be removed from the tool bar and attached to a four-row corn planter for liquid or granular starter fertilizer applications. The fertilizer source and rate is electronically controlled using a console coupled with radar and liquid or granular rate control systems using a controller area network (CAN). Liquid sources are independently transferred from a polyethylene hopper through a roller pump driven by an electric motor and the application rate is regulated by an on/off control valve and flow meter. Granular sources are independently conveyed from a polyethylene hopper equipped with a displacement mechanism driven by an electric module motor assembly through four outlets and transferred through polyvinyl chloride tubing via gravity. For subsurface banding liquid or granular fertilizers, four injection units spaced 76-cm apart are mounted on the tool bar. Each unit includes a 51-cm cutting coulter, a row clearing device, injection knife, and spring-loaded disk sealers. An attachable boom for liquid broadcast applications includes an independent line with a set of four nozzles for each source. Attachable granular delivery components can be used to switch between banding or broadcast fertilizer placement methods.

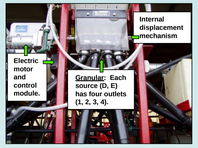


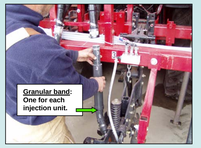












Liquid injected or surface band

Liquid surface broadcast spray

Granular injected or surface band

Granular surface broadcast