50 Variable Rate System For Side-Dressing Liquid N Fertilizer

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Economical applicators that accurately and rapidly modulate fertilizer rates on-the-go are needed for site-specific crop management. Application error reduces the benefits of site-specific fertilization. Presently, most conventional applicators must be manually reset, and do not record actual application rates. Site-specific fertilizer rates may need to change every 10 to 20 m for nutrients, such as N, that vary across short distances (Cahn et al., 1994). At such short intervals the response time of the system will limit the accuracy of the application. For example, to vary fertilizer rates at 20-m intervals while traveling at 8 km h⁻¹, a system with a 2-s response time would apply the correct rate to only 78% of the interval distance. Costs of variable-rate application systems for site-specific crop management might be minimized by using components that are already available in the marketplace.

Variable rate applicators vary in complexity, ranging from rigs that control flow rate, change chemicals, and vary application pattern to those that only modulate flow rate (Schueller, 1992). Liquid applicators that vary flow rate in response to nozzle pressure and ground speed are perhaps the easiest to adapt for rate-only variable application (Schueller, 1989). The essential requirements for this type of applicator are rapidly responding pumps or valves to change fertilizer flow rates and minimize delivery time to the nozzles (Schueller, 1989; Schueller & Kulkarni, 1988). This paper describes a rate-only variable applicator that uses the DICKEYJohn¹ control system for site-specific side-

¹ Trade names are used in this paper solely for the purpose of providing specific information. Mention of a trade name, proprietary product, or specific equipment does not constitute a guarantee or warranty by the U. S. Department of Agriculture or the University of Illinois.