Site-specific field management requires equipment that can vary application rates as the equipment moves through the field. A data flow model for such equipment consists of an application rate processor, geoposition sensor, ground speed sensor, other sensors, operator interface, target rate map, field log map, communications link, and application controllers. Each component of the model can be implemented today, but not all site-specific application equipment has every component. Current technology and equipment for site-specific seed, fertilizer, water, and pesticide application are surveyed as are future possibilities.

Technology for the site-specific application of seed, fertilizer, and pesticides make site-specific crop management a reality. The soil and crop management maps that form the basis for application prescriptions are of limited value if equipment cannot accurately apply inputs according to the desired prescription.

Certain accuracy issues are the same for uniform and variable rate equipment and are not the focus here. These include variations in rate between rows due to poor manifold systems, wind dispersal of spray and broadcast granular materials, errors in material placement at high implement speeds, variations in air and soil conditions at the time of application, slope effects, and inherent metering system properties (Weber et al., 1993).

Specific accuracy issues are unique to variable rate application, particularly those centered around making rate or product transitions at the places called for in the application map. Issues related to the accuracy of the application map itself also are problematic and addressed by Wollenhaupt et al. (1997, this publication).

This chapter presents a general data flow model for site-specific application equipment and surveys current products for seed, fertilizer, pesticide, and water application. Because product development is occurring at a rapid rate, the main use of this survey is to show how the model is implemented across the industry today.

SITE-SPECIFIC APPLICATOR MODEL

A general data flow model for a site-specific applicator is given in Fig. 12–1. In a completely manual system, the operator visually monitors ground speed and field position and adjusts the application rate per some predefined prescription. The