Introduction

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Site-specific management, also known as precision agriculture or precision farming, is based on identifying variability within a particular field and then modifying inputs or changing management strategies as a result of this variability. Many growers have used this approach to a limited extent, for example, by treating low areas differently than high areas. With recent advances in geographic positioning, remote sensing, data processing, harvesting equipment, and fertilizer and pesticide applicators, the approach can be used from a more practical standpoint to identify variability and vary the inputs over an entire field.

The goal of site-specific management is to result in for more efficient use of inputs allowing for placement of fertilizers and pesticides only where they are needed, a procedure using variable rate technology. This approach not only benefits the producer, but also the environment. One successful example of site specific management has been in the sugarbeet (*Beta vulgaris* L.) industry where excessive nitrogen causes rampant growth and poor sugar production (Smith and Rains, 1996). Grid sampling for residual nitrate has allowed for variable nitrogen application resulting in an increase in net return. Grid sampling for soil borne diseases has shown nonuniform distribution of verticillium wilt [*Verticillium dahliae* (Kleb)] in potato (*Solanum tuberosum* L.) fields suggesting the possibility for variable rate fumigation (C.J. Rosen, unpublished data).

Potentially, the concept can also be extended to varying cultivar selection, as well as irrigation and tillage practices according soil type. With proper yield monitors or recording devices, a yield map that integrates the effects of field variability can be constructed. Yield maps can be invaluable for identifying the problem areas and where the better performing areas of the field may be.

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Considerable advances in site specific agriculture have been made for agronomic crops, but applications for horticultural crop production are just beginning to emerge. During the past 10 years, many conferences have been held, but few participants worked with horticultural crops. In part this is due to the fact that operations in horticultural production are often done by hand rather than machines. For many horticultural crops yield monitoring techniques have also not been adequately developed. However, the concept of site specific management can also apply to hand harvested and smaller acreage crops. Examples of previous research on horticultural crops include yield monitoring of potato (Rawlins et al., 1995; Schneinder et al., 1996) and more recently tomato (*Lycopersicon esculentum* Mill.) (Pettygrove et al., 1999) and cranberry (*Vaccinium macrocarpon* Solander ex Ait.) (Hughes et al., 1999).

Several questions, some simple and some very complex, still remain to be addressed—even for agronomic crops (Batchelor et al., 1997). Areas of research that need to be addressed include determining: the optimum size grid to sample, whether remote sensing can substitute for more costly grid sampling, what aspects of site specific management are most cost effective, how year to year yield differences due to weather be taken into account and managed, what the best way to keep track of all the data collected. Many of these topics will take many years to understand and will require teams involving horticulturists, soil scientists, agricultural engineers, entomologists, plant pathologists, and economists.

The objective of this colloquium is to report on the state of site-specific management for horticultural crop production. Recent research efforts as well as applications by industry are presented. The possibilities in site-specific management are exciting yet at the same time can seem overwhelming. Adoption of the technology is inevitable, the evolution is just beginning.

Literature cited

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