Weed Technology

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Introduction to the Symposium on Precision Agriculture and Weed Science

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Introduction

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As a means of stimulating interest in precision weed management, the Weed Science Society of America hosted the Precision Agriculture and Weed Science Symposium at its 2017 annual meeting in Tucson, AZ. Today, agricultural practices are more and more frequently planned at the whole farm level as systems agriculture and with area-wide weed control approaches. Precision agriculture is an approach that takes us conceptually in the opposite direction. Precision agriculture, also called site-specific agriculture, allows large fields to be managed in the same way small ones are. It typically utilizes georeferencing of the crop and soil to improve production, but it can also be used for weed control to reduce the environmental impacts of herbicides and tillage. Weeds and methods used to control them have economic and environmental impacts, and weed management inputs are traditionally applied uniformly to the whole field regardless of weed density and distribution. Precision weed management, which involves applying the right amount of inputs on the right weeds at the right time, is better for the environment and more profitable for producers without compromising weed control efficacy.

Ground-, aerial-, and satellite-based sensor systems have vastly improved in the last decade and can now be used to detect weeds, compose weed maps, and develop decision-support tools to improve weed management strategies. Today, several farm implementation systems can simultaneously achieve weed detection and elimination. For example, a single system may contain optical sensors for the detection of weeds and applicators that can apply different herbicides at different dosages and in different combinations. Site-specific weed management tools are also being developed for mechanical weed destruction using inter- and intra-row hoeing, electricity, fire, or lasers.

Weed science is a little slow in catching up with where precision agriculture has gone in other disciplines, such as irrigation and fertilizer management. Precision agriculture could play a more active and participatory role in weed management in areas such as detecting herbicide-resistant weeds, remotely identifying weedy patches, using imaging to discriminate between weeds and crops, and applying herbicides in a variable manner. This symposium provided insights into how weed management might integrate into broader precision agriculture approaches to farming and updated information on recent developments in precision weed management technologies. The following articles are summaries of some papers presented during the symposium. We hope these articles will help generate interest for additional work that could greatly improve precision weed management technologies.

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