INVASIVE PLANT MANAGEMENT
BENEFITS OF A MULTIDISCIPLINARY RISK ANALYSIS APPROACH

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Background

Rapid producer adoption of new technologies and research-based practices is one of the major reasons for the current record productivity of modern U.S. agriculture. A large body of literature has been developed on the process by which new innovations and techniques have been diffused to farmers and the factors affecting adoption at the farm level.

Decades of research by rural sociologists and other social scientists have demonstrated that farmers are more likely to adopt innovations and practices that are compatible with current practices, easily implemented, perceived useful, provide relative advantage, and provide economic returns or benefits.

Also viewed more favorably are innovations that provide “network benefits.” Network benefits are the efficiencies that accrue to early adopters over time as others adopt a particular innovation or practice. For example, early adopters of electronic mail enjoyed network benefits as others began to adopt the technology. Over time, the technology became more affordable, easier to use and more valuable as additional individuals began to send and receive electronic mail messages.

As shown below in Fig. 1, innovations exhibit different characteristics and offer different benefits to adopters. Hybrid corn, widely considered as a classic agricultural diffusion success, scores high on five of the six criteria shown, while computer technology scores high on four to six of the criteria. Meanwhile, management practices recommended to curb the risk of invasive plant species score highly on no more than two of the criteria.

Invasive plant management practices are generally compatible with current practices, as farmers are accustomed to controlling weeds and pests. In addition, depending on the invasive plant under consideration, the management practice can be easily implemented.

The Classic Diffusion Model

According to the conventional diffusion model first developed and popularized by Everett Rogers in the early 1960s, innovations proceed through five stages (above) en route to the adoption of an innovation. However, the model does not lend itself to the unique case of invasive plant management innovations. Producer decisionmaking can be better understood, and influenced, by integrating insights from risk analysis literature.

Hypotheses

H₁ Perceived risk from invasive species may be dampened or reduced by perceptions of “competing” risks, such as weather and economics.

H₂ Due to the familiarity of weeds and other pests, farmers are unlikely to view invasive plants as a serious risk warranting special action.

H₃ Farm-level decisionmaking is more likely to focus on the economic threshold of weed management rather than complete eradication of invasives.

H₄ Farmers will rely on a range of information channels—spanning mass media and interpersonal methods—for management decision-making.

Next Steps

1. Model row-crop farmer perceptions about significance and management of new and potentially invasive weeds.

2. Determine the communications media preferred by row-crop farmers for information addressing weed management.

3. Evaluate the impact of a tailored risk communications strategy addressing new invasive weeds, including apple of Peru.

4. Continue to build the collective expertise and capacity of the multidisciplinary Agricultural Risk Analysis Program.

An “Innovative” Approach to Adoption

Roger’s conventional diffusion model remains the dominant paradigm used by extension and communication professionals to encourage individuals to adopt recommended practices. While it is a well-established framework with a proven record of success, it is inadequate to guide adoption programs for preventive innovations, including invasive plant management practices.

Development of a coherent and testable theoretical framework to guide future adoption campaigns is a major aim of the Agricultural Risk Analysis Program. Based at Ohio State University and Purdue University, the Agricultural Risk Analysis Program is a multidisciplinary research and Extension group focused on factors influencing risk decision-making among farmers and consumers.

A major premise of this group is that adoption decisions are unique types of behavior that cannot be studied through the lens of any single discipline.

Biological and social science disciplines—sociology, communication, biology, psychology and economics—must be a part of the multidisciplinary endeavor.

Risk analysis also has a key role to play in adoption studies of preventive innovations such as invasive plant management practices. As previously noted, invasive plant management strategies cannot typically be justified solely on the basis of economic factors.

Given this situation, perceived risk is hypothesized to be a key driver in encouraging adoption of invasive plant management strategies at the farm level.

Unfortunately, producers do not generally perceive invasive plant management practices as particularly important, and the practices offer little or no economic or network benefit to potential adopters. The practices also are not generally perceived to save time or discomfort. These perceptions serve as barriers to the adoption of research-based practices recommended to help contain or curb the spread of destructive invasive plants.

Figure 1. Comparison of Innovation Characteristics and Benefits

<table>
<thead>
<tr>
<th>Innovation characteristic/benefit</th>
<th>Hybrid corn</th>
<th>Computers</th>
<th>Management of invasives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible with current practices</td>
<td>Yes</td>
<td>Yes/No</td>
<td>Yes</td>
</tr>
<tr>
<td>Implemented with relative ease</td>
<td>Yes</td>
<td>Yes/No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Provides advantage</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yields economic benefits</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yields network benefits</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Saves time or discomfort</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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