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Potential miscanthus' adoption in Illinois: Information needs and preferred information channels

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ARTICLE INFO

Article history:
Received 3 September 2006
Received in revised form
28 March 2008
Accepted 2 April 2008
Available online 22 May 2008

Keywords:
Miscanthus × giganteus
Bioenergy
Energy crops
Potential adoption
Farmers' needs
Information channels
Survey methodology
Focus groups

ABSTRACT

This study examined farmers' information needs and concerns and preferred information channels regarding the introduction of miscanthus in their current production systems in the state of Illinois, USA. Surveys and focus groups targeted farming populations from Northern, Central, and Southern regions of the state to evidence regional differences. A secondary objective was to identify potential adopters of miscanthus and to asses the level of awareness regarding miscanthus and the associated possibility of receiving carbon credits. Factor analysis, multivariate ANOVA, and categorical data analysis were the selected statistical tools. Only two out of 313 respondents knew about the existence of the crop before completing the survey. Thirty percent of the respondents were identified as potential adopters of miscanthus with the highest proportion of potential adopters found among farmers in the Northern Illinois region. There are clear differences among the information needs of farmers in each region in Illinois as well as in the preferred channels. Information campaigns aimed to increase awareness and education regarding the use of miscanthus as an energy crop in Illinois, should specifically address these regional information needs and channel them through preferred media.

1. Introduction

Adoption of renewable biomass resources can promote the development of sustainable industrial societies through increasing independence from foreign oil sources and mitigation of greenhouse gas emissions [1]. In the US, power from biomass (biopower) is a proven commercial electricity and heat generation option, currently supplying over 3% of the total energy consumption and surpassing hydropower as the largest domestic source of renewable energy [2]. Following federal initiatives, 23 states have passed legislation which ensures that a minimum and increasing amount of renewable energy is included in the portfolio of the electricity resources serving a state.

The state of Illinois requires that at least 5% of the state's energy production and use will be derived from renewable forms of energy by 2010, and at least 15% from renewable forms of energy by 2020. Illinois' dependence on coal for energy, along with the dominance of row cropping systems and the state's climate, set the conditions for the state as one of the most suitable in the US for bioenergy use [3]. Economic analysis of bioenergy crops in Illinois has shown that these crops can be produced at a profit greater than traditional crops at expected levels of production and crop value [3,4].

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doi:10.1016/j.biombioe.2008.04.002

Miscanthus is receiving increased attention as a dedicated energy crop in the US and Europe, due to its positive input/output energy balance that makes it an ideal biomass crop [3,5,6]. Management factors affecting miscanthus growth and productivity have been recently summarized by Miguez et al. [7]. Yet, the rate of adoption of this bioenergy crop might be slowed by a significant initial investment and delayed economic returns that limit the number of potential adopters to those who can afford the temporary economic hindrance. Nevertheless, adopters of new technologies or innovators have repeatedly shown to be farm operators on highly productive areas with higher incomes and/or larger farms [8].

Yet economic costs and benefits alone are not sufficient to predict the entire adoption decision process. Other characteristics of the innovation (i.e., technical complexity, perceived risk, compatibility with current operation, etc.), of the media of communication (i.e., mass media, other growers, etc.), and of the potential user (i.e., personality variables, needs, interests, etc.) play an important role [9]. In addition, neighbors' opinions, business partners, landlords, lenders, and the family context itself may be expected to constrain the adoption of alternative cropping enterprises [10,11].

The innovation-decision model introduced by Rogers [9] emphasizes the role of information, risk factors, and the social position of the decision maker in the community. The model depicts the adoption of an innovation as spreading among farmers with different predispositions to innovate. Studies have shown that availability of information to producers and the level of education and experience of prospective adopters are better determinants of adoption than income [12–14]. Adopters were more knowledgeable regarding the specific innovation, had a higher educational level, and less farming experience, i.e., were younger, than non-adopters. The innovation-decision process is not passive; it is basically an information-seeking and information-processing activity in which the individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation [9].

Farmers' perspectives and goals differ from those of researchers or government agencies; therefore, the availability of information must target the producers' needs and concerns regarding the innovation. The inevitable communication resulting from this process would help to identify obstacles to the use of new technology in the early phases of development [15].

Heaton et al. [3] estimated that 'if only 20% of the 110,000 km^2 of total cropland in Illinois were to produce miscanthus they could provide electricity in excess of current state demand'. By the average size of Illinois farms (152 ha), that 20% of total cropland represents up to 14,473 farmers, each allotting 100% of their land area to miscanthus; or 72,365 producers allocating 20% of their land area to miscanthus. According to the USDA, NASS, Illinois Field Office [16], there were 72,500 farms in IL in 2005. To reach this level of adoption, the diffusion strategy must use efficient communication channels appropriate to each stage of the innovation-decision process to transmit the available information on miscanthus production.

Farmers use a wide range of channels for receiving agricultural information; while mass media and face-to-face channels are very important, online methods are increasingly gaining acceptance [17]. In the early stages of the innovation-decision process, mass media is highly useful to create awareness, but it is too general to provide specific how-to answers for which professionals and experienced peers are invaluable sources of knowledge [9]. However, several studies have demonstrated the high variability of preferences of information delivery among farmer audiences, even within relatively small geographic areas [17–21]. At any rate, segmenting this heterogeneous population into more homogenous groups (i.e., by regions) will help increase the efficiency of knowledge communication by targeting each group directly through its preferred channels.

Farmers' acquired knowledge will determine the attitude formed toward the innovation, which in turn will determine the adoption or rejection of the new idea. Perceived need and positive attitudes toward environmentally sound practices have significantly encouraged the adoption of crop rotations [22], sustainable agriculture [23], soil conservation practices [14], and best management practices in dairy farms [24].

Given the significance of knowledge delivery and acquisition in the early phases of technology adoption, the absolute lack of literature from the farmer and potential adopter standpoint is noticeable: What do farmers think about the innovation? What information do they need to consider adoption? Which issues are more important (i.e., economics, production practices, environment, energy security, etc.) when thinking about the innovation? How do they prefer the information be delivered?

This paper seeks to bridge the current gap by addressing these questions in regard to the potential adoption of miscanthus as a bioenergy crop in Illinois.

1.1. *Purpose and objectives*

The purpose of this study was to assess factors associated with the potential adoption of miscanthus in Illinois. The objectives were to: (a) identify farmers' level of knowledge and awareness regarding energy crops and the possibility of receiving carbon credits when including these crops, (b) summarize information needs as growers consider an alternative crop such as miscanthus, (c) identify and profile potential energy crops growers, and (d) outline best methods of providing information to potential growers.

2. Materials and methods

2.1. *Data collection*

Focus groups (FGs) and survey methodology were used to address the objectives of the study. Data were collected between February 2005 and March 2006.

2.1.1. *Focus groups of Illinois farmers*

Three FGs were conducted in three locations around the state to gain greater insight into farmers' information needs regarding miscanthus and preferred channels for that information. FGs were conducted in Winnebago, Sangamon, and Monroe counties, as representative of the Northern,