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Energy security and global warming mitigation versus food security: What do agricultural experts in Iran think about biofuels?

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Introduction

The word ‘‘biofuels’’ refers to any energy source from renewable organic matter, including wood and other forest products, plants, human and animal waste, and agricultural crops (Cacciatore et al. 2012). Biofuels are basically divided into three main categories: forestry biomass, agricultural biomass, and waste biomass (Halder et al. 2012). However, there is still a debate among scholars regarding the advantages and disadvantages of biofuels. Biofuels could make a significant contribution to resolving the challenges of climate change, slowing the depletion of energy resources, reducing dependence on oil, and increasing agricultural incomes. The cultivation of biofuels would have the added benefits of enhancing soil and water quality (Yazdanpanah et al. 2015ab). Yet, in Iran, there has been little debate on their role. Some suggest that cultivating biofuels could be one way of addressing some of the many climate-change-related problems currently faced by Iran. However, if countries’ aim is to achieve the binding targets of biofuel development, there must be greater emphasis on improving the education of farmers and consumers with respect to biofuels and on communicating effectively with them about such crops and their role in the larger energy picture.

As education and communication could be a catalyst for biofuel adoption, the role of agricultural professionals and experts is very important. Agriculture professionals and experts are an important source of information for farmers regarding adoption and innovation. They can facilitate the adoption of innovations or they can limit their diffusion. However, only if these people are knowledgeable and well disposed toward the biofuel concept can the necessary

knowledge and values can be properly incorporated into the farmer and consumer learning process. Extensive research has been conducted regarding the perceptions of biofuels held by stakeholders such as the public, students, consumers, and foresters. To the best of the authors' knowledge no such studies have concentrated on the case of agricultural professionals and experts. The aim of this study is to provide much needed empirical data about the perceptions of Iranian agricultural professionals toward biofuels. It will provide a knowledge base for the development of public policy measures that aim ultimately to increase biofuel adoption among Iranian farmers.

Material and Methods

The population of interest consists of agricultural professionals in Khuzestan province. The study used a cross-sectional survey design. The HBM was quantitatively tested using the survey methodology to understand professionals' perceptions. An in-depth literature review was used to develop the questionnaire to collect data for this study. To design questionnaire items we i) reviewed previous literature using investigated stakeholders' perceptions regarding biofuels (Gautam et al. 2013; Qu et al. 2012).Data were collected through personal interviews based on a questionnaire structured to assess the central components of the HBM. The questions were scored on a 1–5 point scale (very low, low, moderate, high, and very high). All scales indicated excellent reliability, generally 0.76 to 0.9. Finally, the validity (final step) of the questionnaire was approved by a panel of experts.

Results and Discussion

Regarding demographic variables, the participants comprised 188 (66%) males and 97 (34%) females. Participants were aged from 22 to 58, and had a mean age of 37.15 years (Sd. = 8.02).The descriptive results (Table 2) revealed that the mean scores of perceived susceptibility and perceived severity with respect to the problem of fossil fuel were, respectively, 32.02 out of 40 (SD. = 5.5) and 29.44 out of 35 (SD. = 4.14). These findings revealed that the agricultural professionals experience high susceptibility and high severity regarding the use of conventional fuel. The mean score for perceived benefits of using biofuels was 71.88 out of 100 (SD. = 13.77), suggesting that most professionals believed that development of biofuels has greater benefits to the environment, society, rural development, and climate change mitigation than fossil fuels. Perceived barrier had a relatively moderate mean score, 82.43 out of 105 (SD. 12.48), which shows that the professionals feel that there are some barriers to the development of biofuels in Iran. The general beliefs regarding fossil fuels and biofuels among our sample (Mean = 24.06 out

of 30, SD = 4.40) was high. In examining agricultural professionals' willingness to using biofuels, the results showed that they have a relatively high intention to use them (Mean = 44.67 out of 60, SD = 9.62).

Willingness to use was selected as the dependent variable and perceived susceptibility, perceived severity, perceived benefits, perceived barriers, general beliefs regarding fuselfossil and biofuels, and cue to action as independent variables and entered into the SEM. Path relationships revealed that the perceived severity perceived benefits, general beliefs regarding fossil and biofuels, and cue to action are significant predictors of the willingness to use biofuels. These variables predicted about 43% of the variance in professionals' willingness.

Conclusions and Outlook

The results of the study reveal that, on the one hand, agriculture experts are well aware of the role of biofuels in future energy security and in mitigation of global warming. They are also aware of the potential effects of biofuel on food production and prices. However, they also show a high degree of willingness to consider developing these products.

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