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Understanding Farmer Participation in On-Farm Research

Abstract

On-farm research plays a critical role in advancing agricultural practices by offering real-world insights into production challenges and solutions. This study explored farmers' perspectives related to on-farm research. Findings revealed that while the importance of on-farm research is widely recognized, there is a notable gap between interest and active participation. Respondents cited time constraints, complex protocols, and privacy concerns as deterrents to participation but said relevant results, consultations, and provided inputs would enhance involvement. Years farming and acres farmed were found as influences to on-farm research. University researchers can increase participation by offering technical assistance or research equipment to support farmers.

Keywords: On-farm research, applied research, farm research

Introduction

On-farm applied research serves as a vital learning tool in agriculture, facilitating the practical application of theoretical knowledge, enhancing farmers' skills, and increasing the implementation of improved management practices. On-farm research offers

numerous benefits, including technology transfer, validation of small-plot studies, new discoveries, and evaluation of site-specific management techniques (Thompson et al., 2019). It enhances productivity, economics, practice adoption, and farmer satisfaction (Kyveryga, 2019). Overall, on-farm research is becoming increasingly widespread due to growing interest among farmers, agronomists, and researchers (Kyveryga, 2019).

One key benefit of on-farm applied research is its ability to bridge the gap between academic knowledge and practical application. Participatory approaches in agricultural research, such as citizen science, have gained traction as practical learning tools. Citizen science initiatives can enhance collaboration between researchers and farmers, fostering a shared understanding of agricultural challenges and solutions (Gevel et al., 2020). This participatory model empowers farmers by involving them in the research process and enriches the data collected, leading to more relevant and applicable findings.

The importance of social dimensions in agricultural research is substantial. Examining intersectionality in this field reveals how factors such as gender, generation, and social status impact farmers' participation in agricultural practices (Tavenner & Crane, 2019). Integrating these social factors into on-farm research allows educational programs to be customized to address the diverse needs of different farmer demographics, ultimately increasing the effectiveness of learning initiatives.

While the value of on-farm research is clear, participation is low among Maryland (MD) farmers despite efforts to address potential barriers to participation, like ensuring financial compensation to farmers and providing technical assistance by dedicated research personnel. To capture attitudes toward on-farm research and modify recruitment efforts and execution of on-farm research, University of Maryland Extension (UME) educators surveyed farmers attending statewide winter educational meetings from November 2023 through March 2024.

Methods

Faculty within UME, Agriculture and Food Systems (AgFS) Team annually survey attendees at winter educational meetings. A survey instrument is designed in the fall and approved through the University of Maryland Institutional Review Board. Across the 2023-2024 winter season, the 34 question survey included multiple-choice, Likert scale, and open-ended questions to collect farm and demographic information, production practices, profitability estimates, and four questions that measured respondent attitudes towards on-farm research. UME educators provided a consent statement to participants and distributed the survey at the conclusion of each in-person meeting. The participants completed a paper survey, and all data were compiled into Qualtrics software for data management. Responses were summarized as percentages, means, and frequencies. To determine a demographic trend in responses, we utilized the Chi-square test in SAS (PROC FREQ, SAS version 9.4, [SAS Institute, 2009]) comparing demographics (such as gender, duration of farming experience, and total acres managed) to on-farm research attitude questions. The Chi-square test is a versatile and robust statistical tool that allows researchers to assess relationships between categorical variables (McHugh, 2013). The Chi-square test indicates whether there is a statistically significant association between variables, but it does not measure the strength of the association. Therefore, Cramér's V provided insight into the strength of the association, further supporting its statistical significance.

Results

Demographics

Twenty-one educational meetings were hosted across Maryland between November 2023 and March 2024. The meetings were strategically located around the state to reach the intended audience of farmers. Of the 21 meetings, 12 meetings focused on agronomy, four on vegetable production, two on fruit production, and three on forage and hay production. A total of 462 participants completed all or part of the survey, but data were analyzed from the 258 respondents who identified themselves as full-time or part-time farmers only. The process removed government and ag service providers so that only responses from farmers were utilized. The majority of respondents were male

(93%) and farmed for over 20 years (77%). Among farmer respondents, 79% identified as full-time farmers, and 21% as part-time farmers, with an average farm size ranging from 457 to 851 acres.

Participation in On-Farm Research

When asked about the significance of on-farm research trials, a majority of respondents (87%) classified them as “important” or “very important.” Despite this, only 65% reported being “very likely” or “likely” to participate in such research, while 6% indicated they were “very unlikely” to participate. Participants rated the strength of their agreement with various factors that may deter participation in on-farm research using a four-point Likert scale. Key deterrents identified included limited time availability (86%), complicated research protocols (69%), and concerns over data privacy (60%) (Figure 1). These factors are indicated by the combined responses of “agree” and “strongly agree,” which were reported as the most significant barriers to participation.

Figure 1. Respondents' level of agreement on factors that deter participation in on-farm research, shown as a percentage of responses for each factor.

Participants were asked to rate their agreement on how various factors would increase their participation in on-farm research. These factors included the provision of inputs or products, monetary compensation, labor assistance, individual consultation, and research results relevant to their operation. Respondents indicated that relevant research results (92%), one-on-one consultation (85%), and supplied inputs or products (84%) would most likely enhance their participation in on-farm research, as reflected by the combined “agree” and “strongly agree” responses (Figure 2).

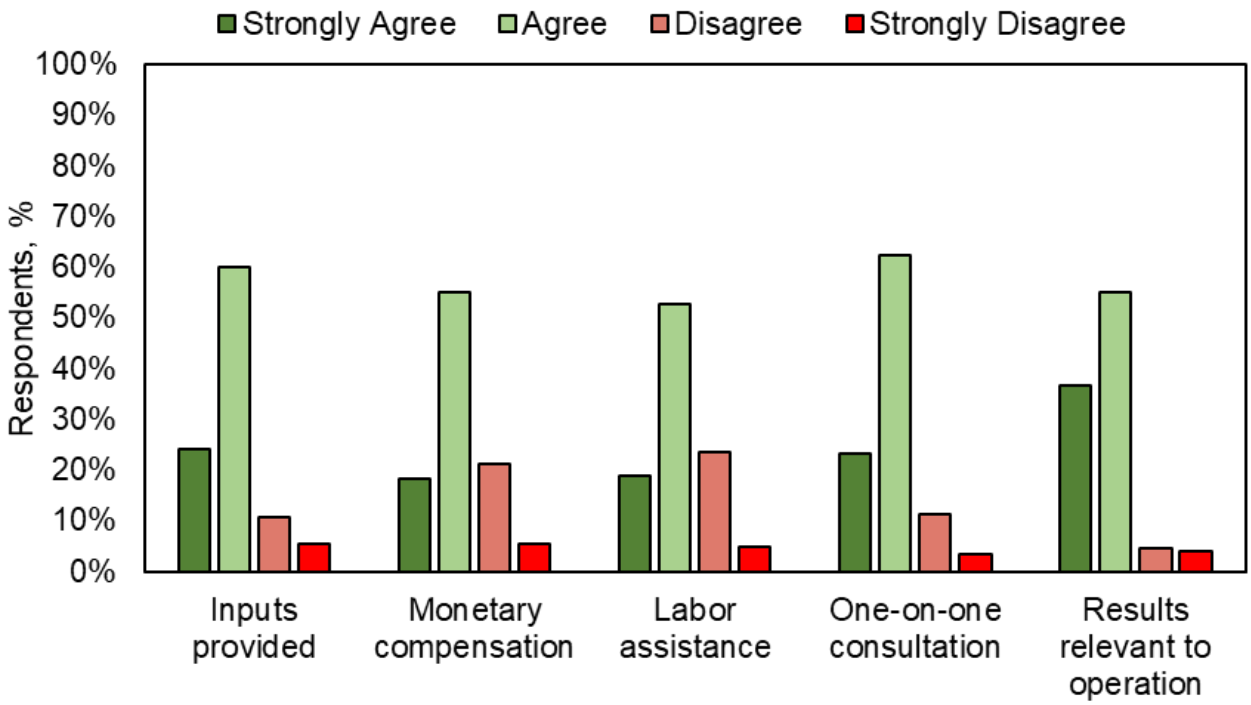

Figure 2. Respondents' level of agreement on factors that enhance participation in on-farm research, shown as a percentage of responses for each factor.

Demographic Impacts on Participation

To better understand farmer participation in on-farm research, each survey question was analyzed in relation to demographic variables using Chi-square tests and Cramér's V. Results indicated that factors such as years of farming experience and farm size significantly influenced various aspects of farmers' engagement in on-farm research (Table 1).

Table 1. Chi square model results (P-value for chi square and Cramer's V value) comparing dependence of on-farm research attitude to number of years of farming experience and number of acres of farming operation. Significant chi square relationships ($p < .05$) are identified.

	Years Farming		**Farm Size**	
Survey Question	Chi-square (P-value)	Cramer's V	Chi-square (P-value)	Cramer's V
Importance of on-farm research	0.4172	0.1513	**0.0388***	**0.2765**
Likelihood of participation in on-farm research	0.8932	0.1109	0.4000	0.2325
Participation Deterrent – Equipment	0.3064	0.1801	0.1182	0.2892
Participation Deterrent – Time commitment	0.4649	0.1617	0.6423	0.2299
Participation Deterrent – Data privacy concerns	0.8915	0.1218	0.2418	0.2701
Participation Deterrent – Complicated protocols	**0.0338***	**0.2058**	0.3917	0.2609
Participation Deterrent – Confusing protocols	0.1281	0.1842	0.2800	0.2747
Participation Enhancement – Provided inputs	0.8164	0.1079	0.9924	0.1668
Participation Enhancement – Monetary compensation	0.8929	0.1212	0.3029	0.2628
Participation Enhancement – Labor assistance	0.2892	0.1587	0.7919	0.2206
Participation Enhancement – One-on-one consultation	**0.0420***	**0.2192**	0.8547	0.2077
Participation Enhancement – Results relevant to operation	0.2718	0.1753	0.1246	0.2749

<u>On-farm research importance and farmed acres</u>

The survey collected the number of acres farmed in ranges from less than 25 acres to over 5,000 acres. Among those who indicated any level of importance for on-farm trials, most managed 200 acres or more (see Figure 3). The few respondents who viewed on-farm research as unimportant (n=4) did not manage farms representative of the responses, with 50% managing under 25 acres and 50% managing over 2,501 acres.

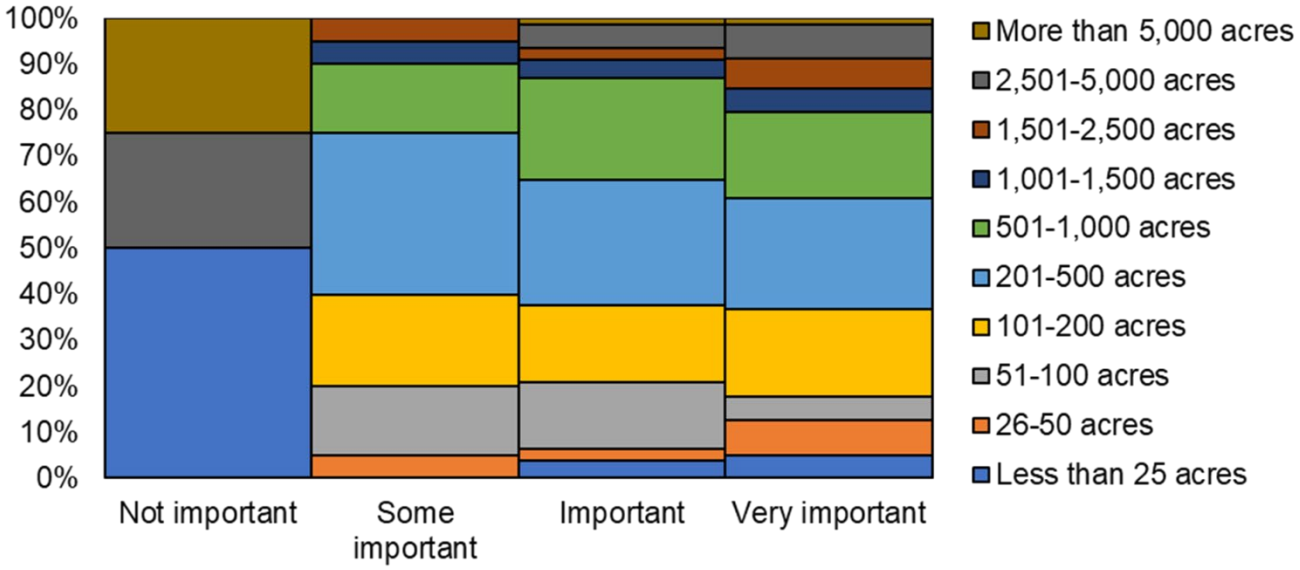

Figure 3. Percentage of respondents for each response option, categorized by the number of acres managed, regarding the importance of on-farm research. These factors were significantly dependent on one another ($p<.05$).

Influences of years farming

The number of years spent farming was a significant factor influencing both a deterrent (complicated research protocols) and enhancement (one-on-one consultation) to participation in on-farm research. Experienced farmers with over 11 years of farming were more likely to agree that complex research protocols deterred their involvement in on-farm research. In contrast, less experienced farmers were more likely to disagree with this statement (Figure 4). When considering the role of one-on-one consultation in promoting research participation, responses were polarized among experienced farmers, who were divided between strong agreement and strong disagreement regarding its positive impact on their involvement. Notably, beginning farmers with fewer than 5 years of experience constituted a large portion of respondents who strongly disagreed that consultation increased their participation (Figure 5).

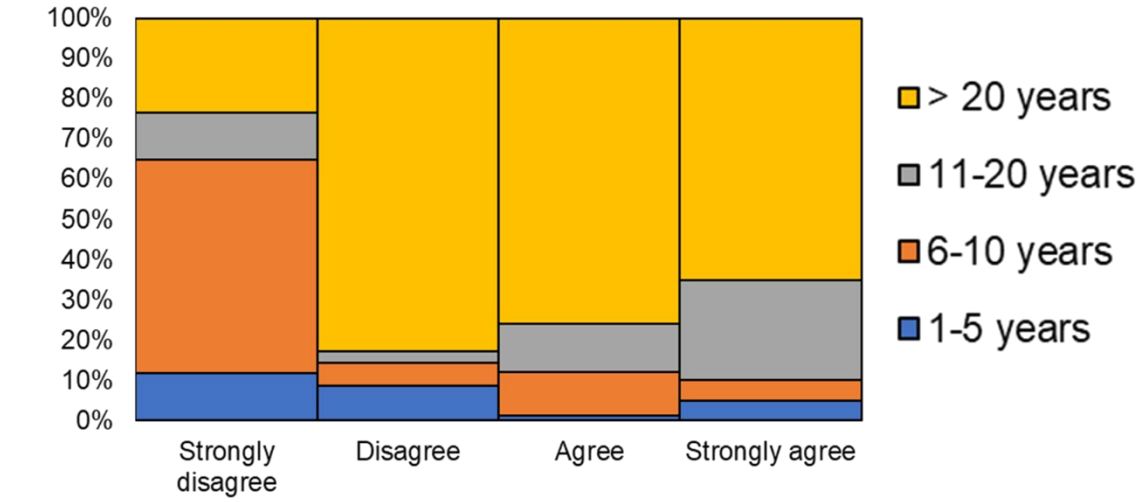

Figure 4. Percentage of respondents for each response option, categorized by years of farming, regarding their agreement that complicated research protocols deter participation in on-farm research. These factors were significantly dependent on one another ($p<.05$).

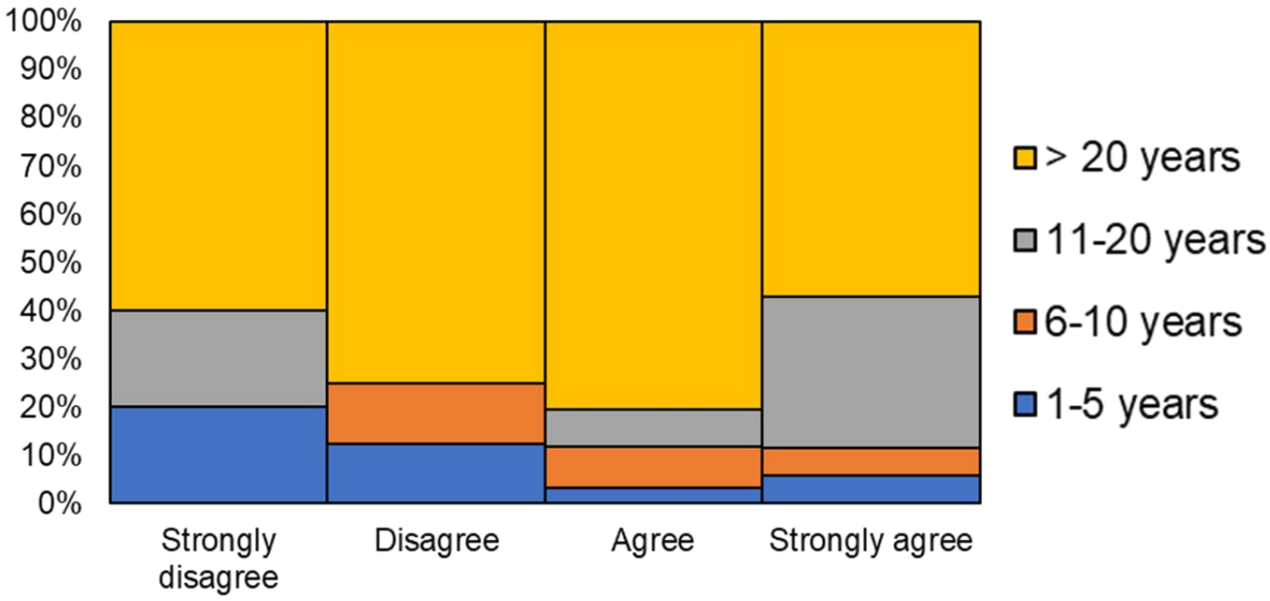

Figure 5. Percentage of respondents for each response option, categorized by years of farming, regarding their agreement one-on-one consultation increases participation in on-farm research. These factors were significantly dependent on one another ($p<.05$).

Discussion

The purpose of the survey was to understand farmers' participation in on-farm research and identify factors that deter or enhance this participation. The survey gathered this information from Maryland farmers attending Extension educational workshops. The majority of respondents were male, with over 20 years of farming experience, and most identified as full-time farmers managing an average of 457 to 851 acres. While most participants acknowledged the importance of on-farm research, only 65% expressed a likelihood of participating in such activities. Respondents identified several deterrents to participation, including limited available time, complicated research protocols, and concerns regarding data privacy. Factors that could enhance participation included the relevance of research results to their operations, one-on-one consultations, and the provision of inputs or products.

To enhance participation in on-farm research, Maryland researchers could provide targeted technical assistance that addresses the concerns identified in the survey. This support may include dedicated research personnel who assist farmers in managing research protocols and access to research equipment to facilitate the execution of research processes. Effective communication regarding the availability of personalized results reports for research participants could support recruitment efforts. The findings emphasize the need for researchers to develop simplified protocols for on-farm research and highlight the personalized results that participants will receive. Additionally, offering inputs or products can effectively recruit farmer participants, fostering greater involvement in on-farm research initiatives.

Acknowledgment

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