

Extended Abstract

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Paper/Poster Title	Socio-spatial information sources influencing farmers' decision to use mechanical weeding in sugar beets
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Abstract	200 words max
<p>Farmers decisions to adopted novel technologies is likely to be influenced by the behaviour of other farmers. Those effects are typically described as peer effects and are intensively studied. What remains unclear from the existing literature, however, is the general mechanism underlying those peer effects. Specifically, existing literature does not seem to clearly distinguish between peer effects that result from <i>information exchange</i>, i.e. farmers talking to each other and from the possibility of <i>field observation</i>, i.e. the possibility to observe the application of technology, the outcomes of the application and the general state of the fields. We aim to study if <i>information exchange</i> and <i>field observations</i> are indeed two different mechanisms both leading to “peer effects”. We explore the relationship between the two sources, hypothesizing that each provides complementary information due to the different underlying mechanisms, resulting in the highest information gain when both sources are present. To study those two mechanisms, we focus on the example of mechanical weeding in sugar beets in Germany. We will conduct an online survey among sugar beet farmers on the use of mechanical weeding in early spring 2022. Distinguishing between <i>information exchange</i> and <i>field observation</i> as two different mechanisms that drive peer effects, and understanding how they relate to each other, is crucial for designing effective extension services and policies to promote adoption of desired farming practices. [224]</p>	
Keywords	Social network, spatial information diffusion, social learning, technology adoption, instrumental variables
JEL Code	Q100 Agriculture: General, Q16 R&D; Agricultural Technology; Biofuels; Agricultural Extension Services, Q18 Agricultural Policy; Food Policy see: www.aeaweb.org/jel/guide/jel.php?class=Q)
Introduction	100 – 250 words
<p>Farmers rely on relevant, readily available, and low-cost information when deciding whether to adopt agricultural technologies. Peer or neighbouring effects are assumed to be one important source for farmers decision making. Previous studies on peer effects, however, have not clearly distinguished between (verbal) <i>information exchange</i> between farmers and the possibility to make <i>field observations</i> during the entire season in the neighbourhood. We hypothesize that these two information sources differ in the underlying mechanism and type of information delivered. Neglecting this difference might reduce the effectiveness of policies and extension services. Therefore, we aim to determine how important <i>information exchange</i> and <i>field observation</i> are to farmers' adoption decisions by answering the following questions:</p> <ol style="list-style-type: none">1.How do <i>information exchange</i> and <i>field observation</i> influence adoption?2.Do the two sources substitute or complement each other?3.What is the size and structure of the network relevant from making field observations? <p>We aim to answer these questions in the case of mechanical weeding in German sugar beets. EU sugar beet farmers are facing a reduction of available active ingredients in herbicides due to environmental reasons, causing a need for alternative measures such as mechanical weeding. Mechanical weeding might be complex, as costs (e.g. labour time) and effectiveness under different local conditions are</p>	

difficult to predict. Based on Rogers' theory of diffusion of innovations, we conjecture that this complexity might be an adoption barrier. *Information exchange* and *field observation* of mechanically weeded fields, could reduce complexity. Contrarily to Rogers' definition, we focus not only on the observability of results, but also whether the technology can be observed in use. [261]

Methodology

100 – 250 words

To investigate the importance of *peer effects* and *field observation*, we conduct an online survey among German sugar beet farmers in spring 2022. The survey will be preregistered and the empirical study plan outlined using the open science framework (OSF) platform. Farmers are asked if they apply mechanical weeding and if so, what machines they use. Additionally, respondents should indicate if they know other adopters and if they can indicate on an interactive map where they grow sugar beet and where they observe mechanically weeded fields from others. Information about the number of other adopters is used to approximate the possibility of *information exchange*, while the number of mechanically weeded fields from others provides information about the awareness of other fields and the possibilities to make *field observations*. We regress those factors on the decision to adopt mechanical weeding while controlling for the distance between own and neighbouring fields, distance to demonstration farms, the advisory region, farmers' age, farm size, production type, and specialization. The other farmers' adoption decision may not be completely exogeneous, as it and the own adoption decision could be influenced by some common confounder. We aim to control for this by including regional dummies but also by exploring an instrumental strategy using the share of organic farms in the county and share of organic area in the county as instruments. [224]

Results

100 – 250 words

Our survey will provide data on the status-quo of mechanical weeding in sugar beets in Germany. We will obtain region- and time-specific data on the use of certain machines. Those who do not use mechanical weeding, we will ask for the reason behind and get to know whether they intend to use it in the future. We will find how *information exchange* and *observing fields* matter as information sources for the adoption decision. To explore the relationship between the two we examine their individual and joint explanatory contribution. This allows us to test our hypothesis if *information exchange* and *field observation* are the same or complementary information. Additionally, we obtain descriptive results on the size (distance between plots) and structure (number of other farmers mentioned and fields observed) of the relevant network Results from our survey will be useful in identifying measures that promote adoption of agricultural practices. [148]

Discussion and Conclusion

100 – 250 words

We expand the existing knowledge on peer effects by clearly separating between two different mechanisms, namely *information exchange* and *field observations*, the can lead to peer effects. We study the empirical importance of those mechanisms using a novel survey tool developed for this purpose. The obtained results provide useful information for designing more effects extension services and policies. If we find that *field observations* are most important, we can conclude that it needs more farmers to try new practices. Polices could support farmers, for example, by allowing to try a new technology for a year at a low price. Or by cooperating with farm to establish demonstration farms that test new technologies over a longer period. If *information exchange* between farmers matters more, measures such as discussion rounds and best-practice exchanges should be fostered. If we find that both sources complement each other a mixed of those measures seems to be most promising. [153]