Extended Abstract
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Paper/Poster Title	**Paper: A trans-theoretical model for the gradual willingness to participate of German farmers in humus programmes**

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Abstract	***200 words max***
Farmers can counteract climate change by storing carbon dioxide from the air in agricultural soils via humus growth. Humus programmes are one approach to motivate farmers for applying humus-building measures. As there are only a few humus programmes and a small number of participating farmers, this paper analyses the gradual willingness to participate in humus programmes and influencing factors by using a trans-theoretical model. The results show that on average, farmers think of participating in a humus programme but without a concrete plan. However, the willingness to participate is positively influenced by a risk-seeking attitude, a positive attitude towards the climate-effect of humus growth as well as previous knowledge about humus programmes and knowledge about the humus content of the own fields. In contrast, the intention to improve the condition of agricultural land has a negative effect on the willingness to participate in humus programmes. This paper contributes to the literate by identifying first key determinants of the participation process which can be worth for policy makers and private certification companies.	

Keywords	carbon sequestration, German farmers, humus programmes, trans-theoretical model
JEL Code	Agriculture: Land Ownership and Tenure; Land Reform; Land Use; Irrigation; Agriculture and Environment Q15 see: www.aeaweb.org/jel/guide/jel.php?class=Q)

Introduction	***100 – 250 words***

Agricultural soils offer huge carbon sequestration capacity. By applying carbon farming measures, such as direct sowing or application of compost, farmers build up humus which transfers carbon dioxide from the atmosphere into the soil. Thereby, farmers can counteract climate change. To support farmers in humus growth and thus carbon sequestration, a few humus programmes in which farmers receive a humus premium for a certain increase in humus have been developed by non-governmental organisations. However, humus programmes are relatively new and unexplored. Hence, there is no literature about farmers' adoption and influencing factors as a basis for policy makers and non-governmental organisations. Therefore, the objective of our study is to analyse farmers' gradual willingness to participate in humus programmes and how socio-economic variables as well as attitudinal characteristics influence the participation process. For this, an online survey with 150 German farmers was conducted in 2022. By using an adjusted trans-theoretical model, this study is the first which analyses farmers' gradual willingness to participate

in humus programmes and influencing factors. The results are of interest for policy makers and private certification companies, as we provide indications on which kind of farmer playing a pioneering role regarding participation in humus programmes.

Methodology	***100 – 250 words***

The trans-theoretical model was established to clarify that change of behaviour is a process, meaning progress through gradual stages. We represent the first stage 'pre-contemplation', which indicate that people are not intended to change their behaviour, with the following statement: 'I do not participate in a humus programme and I am not thinking about participating either.' In the second stage 'contemplation', people have a basic intention to change which we queried with the following: 'I do not participate in a humus programme, but I am thinking about participating.' The third stage is called 'preparation' in which people are intended to act in the near future and have a concrete plan for changing, retrieved by: 'I have concrete plans to participate in a humus programme in the future.' Finally, people in the 'action'-stage have made changes in their behaviour, which we captured as follows: 'I already participate in a humus programme.' We also include a fifth stage in case anyone has already finished a humus programme: 'I have already participated in a humus programme, but I am no longer participating.' By using an ordered logit model, we analysed the influence of personal and farm characteristics, e.g. risk attitude and farm size as well as the influence of farmers' previous knowledge about humus and attitude towards e.g. environmental protection.

Results	***100 – 250 words***

The majority of the surveyed farmers (65.3%) specified that they are thinking about participating in a humus programme but do not have a concrete plan yet, which is connected to stage 2. Stage 1, meaning not thinking about participation, was chosen by 21.3% of the farmers, while 10% indicated to have concrete plans for participating in a humus programme in the near future (stage 3). Only 3.3% allocated themselves to the 'action'-stage (stage 4), meaning they already participate in a humus programme. No one finished a humus programme so far (stage 5). With regard to the ordinal logistic regression results, prior knowledge about humus programmes and knowledge about the humus content of the own fields have both a statistically significant and positive effect on the gradual willingness to participate in humus programmes. Furthermore, farmers who are rather risk-seeking or believe in the climate-protecting effect of humus growth are statistically significant more likely to be in a higher stage of the trans-theoretical model, meaning they are more likely to participate. In contrast, farmers with the farm goal to improve the condition of agricultural land are statistically significant more likely to be in a lower stage of the trans-theoretical model, indicating a negative effect of the intention to improve soil conditions on the gradual willingness to participate in humus programmes. Other variables, such as farm size, livestock density or impact of climate change on yields have no statistically significant effects.

Discussion and Conclusion	***100 – 250 words***

Overall, the willingness to participate and even the awareness regarding humus programmes among farmers is low. Approximately one quarter of the surveyed farmers do not even think about humus programmes and nearly two-third of them although think about humus programmes but without concrete plans to participate. The regression results show, that the pioneering role with regard to participation in humus programmes tends to be taken by farmers who are rather risk-seeking, have prior knowledge about humus programmes as well as have already dealt with their own humus content and believe in a positive climate-effect of humus growth. Thus, policy makers and private certification companies can be given the advice to spread more information about the positive effect of humus growth as well as humus programmes and thereby, unifying framework conditions of such programmes as inconsistent presentation of information leads to confusion instead of knowledge. Moreover, limiting the risks for farmers by, for example, paying the premium for applying humus-building measures instead of for the final humus growth can increase the willingness to participate, which should be investigated in further studies. In addition, more reasons for participation must be detected in further studies, as the negative effect of the intention to improve the soil condition on the gradual willingness to participate implies other reasons behind the participation than taking advantage of the ecological benefits of humus, e.g. altruistic reasons with regard to climate protection or monetary reasons.