Extended Abstract
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Paper/Poster Title	**Adoption of fungi-resistant grapevine varieties and marketing channels in Switzerland**

Abstract prepared for presentation at the 96th Annual Conference of the Agricultural Economics Society, K U Leuven, Belgium

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Abstract	***200 words max***
The reduction of environmental and human health risks from pesticide use is on top of the policy agenda worldwide. Grapevine is among the most intensive crops in terms of pesticide use in many parts of the world. The use of varieties that have increased resistance to fungal pressure could allow substantial reductions in pesticide use, but the adoption and diffusion of these varieties globally is still very limited. We here provide the first paper investigating the adoption of these varieties. More specifically, we investigate the farm-level adoption decision of resistant grapevine varieties in Switzerland and provide insights into the determinants and barriers for their wide-spread use. Using survey data from 775 producers, we especially investigate the relevance of marketing channels for the uptake of resistant varieties. More specifically, we test and quantify the relevance of specific channels by which grapes and wines reach consumers, such as direct marketing to consumers. We find that 20.1% of the respondents use fungi-resistant varieties, but the land devoted is only about 1.2%. Our results narrow down to a simple conclusion: the more distant the producer is from the final consumer of wine, the less likely the producer will use fungi-resistant varieties.	

Keywords	Sustainable Agriculture, Aggregate Supply and Demand Analysis
JEL Code	Q10, Q110

Introduction	***100 – 250 words***

The reduction of environmental and human health risks from pesticide use is on top of the policy agenda worldwide (Möhring et al., 2020). Grapevine is among the most intensive crops in terms of pesticide use in many parts of the world. Most applications stem from fungicide treatments (80- 90%) (de Baan et al., 2015; Linder et al., 2006). The use of grapevine varieties that have increased resistance to fungal pressure allow substantial reductions in fungicide use (by 60-100%) (Rousseau et al., 2013; Viret et al., 2019), but the adoption and diffusion of these varieties globally is still very limited (Pedneault and Provost, 2016). There are no studies investigating factors affecting the farm-level adoption of fungi-resistant grapevine varieties. New varieties are only adopted if expected benefits exceed perceived costs. Fungi-resistant varieties offer two main economic benefits. First, they reduce production costs due to

reduced input use and labor employed (Rousseau et al., 2013). Second, yields are higher and more vigorous due to fungi-resistance (Siegfried and Temperli, 2008). Additionally, reduced health impacts on the producer may provide short- and long-term economic benefits (Chatzimichael et al., 2021). The main cost of resistant varieties stems from marketing risks, i.e. the uncertainty regarding consumers' preferences and marketing channel stability, especially due to a lack of knowledge of new varieties. Marketing channel choice can contribute to overcoming these obstacles and reduce marketing risks. We test and quantify the relevance of specific channels by which grapes and wines reach consumers, such as direct marketing to consumers.

Methodology	***100 – 250 words***

We use data from an online survey of 775 Swiss grapevine growers. We investigate how marketing channels affect both the uptake of resistant varieties as binary information as well as the adoption intensity expressed as the acreage under fungi-resistant varieties and number of adopted fungi resistant varieties, controlling for a wide range of other factors (e.g. farm and farmers characteristics and environmental conditions). Our main specification is an Ordinary Least Squares (OLS) regression. Omitted variable bias and simultaneity is a concern for our analysis. We try to approach this in several ways. First, we account for a large set of farm and farmer characteristics and a rich set of environmental and regional characteristics. Second, we estimate inverse probability weighted regressions. Third, we estimate how much selection on unobservables would be required to explain away estimated relationships. Finally, we conduct a series of robustness checks to explore the stability of our findings.

Results	***100 – 250 words***

We find that 20.1% of the respondents use fungi-resistant varieties. However, the acreage under fungi-resistant varieties is only about 1.2%. Our results show positive associations of adoption and the use of marketing wine, not grapes. Moreover, we especially find that a specialized focus on direct marketing is associated with higher uptake of fungi-resistant varieties. For example, if a producer has more than 50% of sales via direct marketing to consumers increases the probability that she/he has fungi-resistant varieties by ca. 8%. Our results narrow down to a simple conclusion: the more distant the producer is from the final consumer of wine, the less likely the producer will use fungi-resistant varieties. The identified associations are robust to the inclusion of various controls as well as addressing omitted variable biases.

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

For industry and policy this implies that creating more direct connection points between producers and consumers may facilitate a transition towards low-pesticide and thus more sustainable grapevine production. Policy may also develop a concerted and coherent set of activities that combines breeding of new fungi-resistant varieties and creation of appropriate information and marketing channels. Next to supporting the development of fungi-resistant varieties, industry and policy

can support (more) direct marketing channels, information campaigns and labelling on fungi resistant varieties and support for farmers' transition towards fungi-resistant varieties, e.g. via financial support, education or extension services.

Literature

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