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New indicators for multi pests and diseases assessment in Conventional, Organic and "in-Transition" vineyard systems

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Introduction

The number of French wine farms converting to Organic Farming (OF) from conventional viticulture is growing rather quickly. Thus, a process of identification, description and evaluation of indicators to manage the transition towards OF or integrated farming systems has been developed by INRA (Merot et al., Wery et al., this volume). Assessment indicators are needed to evaluate the system performance in relation to winegrower and stakeholder goals. Among them, pest pressure evaluation on the system is important in order to reduce pesticide use without an increased economic risk. This work presents the development of a new integrative assessment indicator to measure attack intensity and damage in grape clusters caused by major pests and pathogens.

Materials and methods

We used data from a network of 20 plots in Bordeaux and Languedoc French regions. We distinguished three winegrower categories: i) "Conventional" production method, ii) OF production for over 5 years: "Organic" and iii) "in-Transition" growers undergoing conversion to OF within the last 5 years. Plant health observations were realized in 2011 on grape clusters for downy mildew, powdery mildew, Botrytis bunch rot and grape berry moths. We determined the periods when the greatest intensity of these pests and diseases occurred and we integrated these severities on clusters into a single index, namely Evaluation Index of Damage in Cluster (EIDC). To account for the EIDC values, we calculated the Treatment Frequency Index (TFI) (Butault et al., 2010) per pest and pathogen using the pesticide treatment schedules in each farm in 2011.

Results and discussion

The EIDC index in Organic farms was the highest, whereas the in-Transition EIDC index was the smallest (Figure 1a). In Conventional viticulture, powdery mildew damage was the most important compared with that by moths; the reverse was true in Organic. For in-Transition farms, damage by moth and Botrytis rot were predominant.

The TFI index in Organic farms was the lowest (Figure 1b). Conventional growers treated slightly more against downy mildew than against powdery mildew. However, in OF and in-Transition categories, control of powdery mildew was clearly the most important. Lastly, the in-Transition phase was also associated with the greatest TFI against moths.

The Organic farmers may have suffered setbacks in downy mildew protection and maintain now traditional schemes limiting risk-taking. By contrast, powdery mildew damage was more significant, except for in-

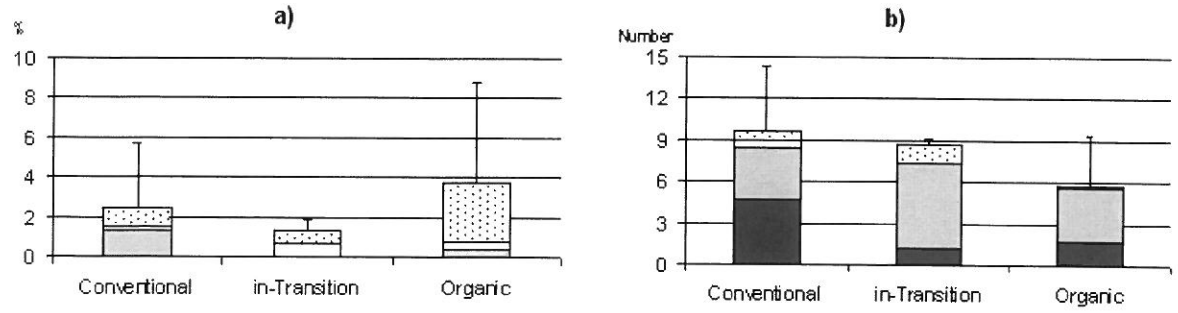

Figure 1 a) *Evaluation Index of Damage in Cluster (EIDC) of downy mildew (black), powdery mildew (grey), Botrytis bunch rot (white) and grape berry moths (black spots) for each farm category;* ***b)*** *Treatment Frequency Index (TFI) for the same pests and diseases and farm categories.*

Transition farms. In these farms, growers receive more supporting expertise and technical advice. Thus, the high in-Transition TFI against powdery mildew account for the lack of damage by this disease. For Botrytis bunch rot, in the quasi-absence of specific sprayings, the potential higher grapevine vigour may be hypothesized as a cause of increased disease intensity, notably in the in-Transition farms. Lastly, the in-Transition growers may be less reluctant to use insecticides against vine moths than Organic ones, thus limiting such damage.

Conclusions

Clear differences in damage levels due to the main pests and diseases (EIDC indicator) were shown according to the viticulture category. The way of controlling these pests and diseases (TFI indicator) was also, as expected, very different. The in-Transition category is a learning phase involving try-errors strategy. This phase is associated with more security in pest control, particularly concerning powdery mildew. Another year of survey is needed to confirm these results. The Link between EIDC and yield will also be further investigated.

References

Butault et al., 2010. Synthèse du rapport d'étude Ecophyto R&D, MEEDDAT-MAP-INRA, 90 p.