

# Effect of apple variety for detecting apple maggot, *Rhagoletis pomonella*: how the colour of the fruit influences the attractiveness of the red sphere trap?

Caroline Provost ([cprovost@cram-mirabel.com](mailto:cprovost@cram-mirabel.com)) and Manon Laroche  
Centre de recherche agroalimentaire de Mirabel, 9850 Belle-Rivière, Mirabel, Québec, Canada, J7N 2X8.

## Introduction

Several pests are present in orchards in North America, one of the main ones being the apple maggot, *Rhagoletis pomonella* (Walsh). Residual insecticide treatments are used in commercial apple orchards for effective control when catch thresholds are reached (1). The hotter summers that we have experienced in recent decades have increased the pressure of this pest. The recommended scouting method uses the sticky red sphere to attract the female when ready to lay (1-4). However, for two decades, several new apple varieties were added to the orchard. We noted less efficacy of the red sphere trap to scout the apple maggot in the presence of these new varieties.

The project aims to **increase the efficiency of the red sticky spheres to detect the apple maggot, *Rhagoletis pomonella* (Walsh), in apple orchards with new apple varieties.**

## Methods

The trials were carried out during 2019 and 2020 in five orchards with a history of apple maggot infestations. Red sticky sphere traps were placed in six apple varieties (Tab. 1) and at two places in the orchard: in the border and in the center (4 replicates/variety/orchard). The capture of apple maggot was followed during the growing season. From June to September, these parameters were collected: apple maggot individuals on red spheres, apple fruit colour, and yield and fruit damage at harvest.

Table 1: Characteristics of the apple varieties studied.

Apple variety	Fruit colour	Type of variety	Period of maturity
Cortland	Red	Traditionnal	Late
Delcorf	Yellow	New	Early
Empire	Red	Traditionnal	Late
Honey crisp	Orange	New	Mid-late
Primegold	Yellow	New	Mid-late
Spartan	Red	Traditionnal	late

## Results and discussion

- ✓ Apple variety attractiveness in 2020 was comparable to 2019, except for Spartan (Fig. 1).
- ✓ The most attractive varieties were Delcorf (2019-2020), Primegold (2019-2020), Honeycrisp (2019-2020), and Spartan (2020). On the other hand, the traditional red varieties Cortland and Empire captured less apple maggots (Fig.1, 3).
- ✓ Apple maggot catches tended to be slightly higher early in the season in border plots.
- ✓ Varieties with yellow (2019 and 2020) and orange (2020) fruit capture more apple maggots than varieties with red fruit (Fig. 2).
- ✓ At the start of the season, varieties with yellow or orange apples were the most attractive, and varieties with yellow apples caught more apple maggots from mid-August onward (Fig. 4).
- ✓ The colorimetry analysis shows the variations in colours that may explain decreasing attractiveness of Honey crisp during the season.
- ✓ The project will help present a more efficient screening tool to reduce insecticide treatments against this pest



## References

- 1, Leskey, T.C., Chouinard, G., Vincent, C., 2009. In R.J. Prokopy. *Biorational Tree-Fruit Pest Management*. Massachusetts: CABI, 110-143.
- 1, Agnello AM, Spangler SM, Reissig WH, 1990. *Journal of Economic Entomology* 83, 539-546.
- 2, Aluja M, Prokopy RJ, 1993. *Journal of Chemical Ecology* 19, 2671-2696.
- 4, Rull J, Prokopy RJ, 2004. *Environmental Entomology* 33, 1695-1702.

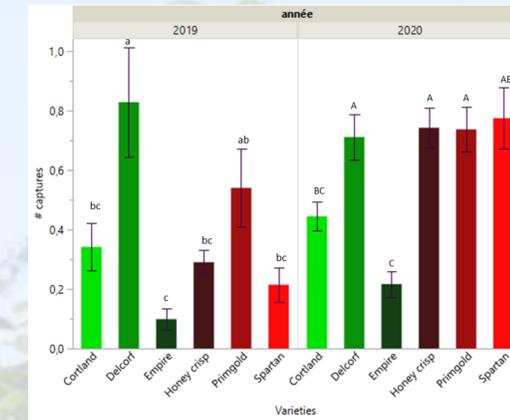


Figure 1: Apple maggot catches according to the apple varieties and year.

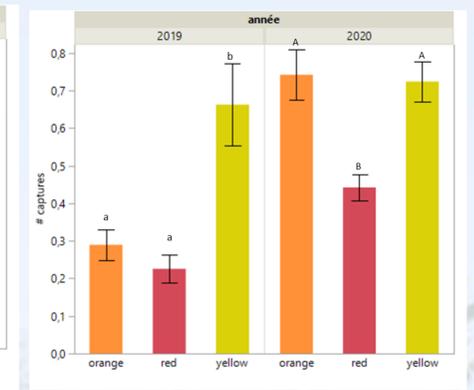


Figure 2: Apple maggot catches according to the color of the fruit for 2019 and 2020.

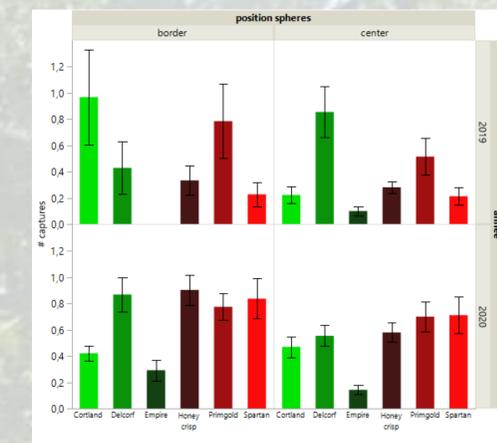


Figure 3: Apple maggot catches according to the apple varieties and the sphere place (border or center), for 2019 and 2020.

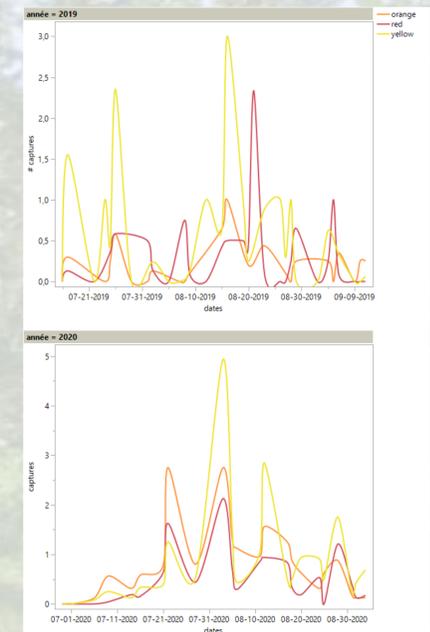


Figure 4: Apple maggot catches throughout the growing season depending on the apple color.

## Acknowledgements

The authors wish to thank Élodie Bezeau and Floriane Brophy for their technical support and the orchardists for access to their lands. Funding for this project has been provided in part through the AgriScience program-cluster on behalf of Agriculture and Agri-food Canada.