

ADOPT Model in the Canadian Context

Presented at the First International Forum on Agroecosystem Living Labs, October 4-6, 2023, Montréal, QC, Canada



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BACKGROUND: A lot of research has been done on the adoption of well-established beneficial management practices (BMPs). But what about the BMPs that are new, and therefore have very little data available? The goal of this project was to test a model, called the Adoption Diffusion Outcome Prediction Tool (ADOPT), that could potentially be used to predict the time to peak adoption and peak adoption rate of brand new BMPs in Canada.



What is ADOPT?

The ADOPT model can be accessed online (<https://adopt.csiro.au/>). The methodology was published in 2017 by seven Australian economists with the objective of better understanding agriculture-specific factors that influence adoption and diffusion of technologies and practices. The ADOPT model requires the input of answers to 22 multiple choice questions pertaining to the target population.

General Method

We partnered with the Ontario Soil Network (OSN) to collect information on the adoption of cover crops using data from the Ontario Agricultural Soil Health Survey, which was distributed in the Lake Erie basin (see map). This data collection was conducted in 2021 and 2022 as part of the Ontario Living Laboratories initiative, and this survey (along with agricultural statistics) provided most of the information for the

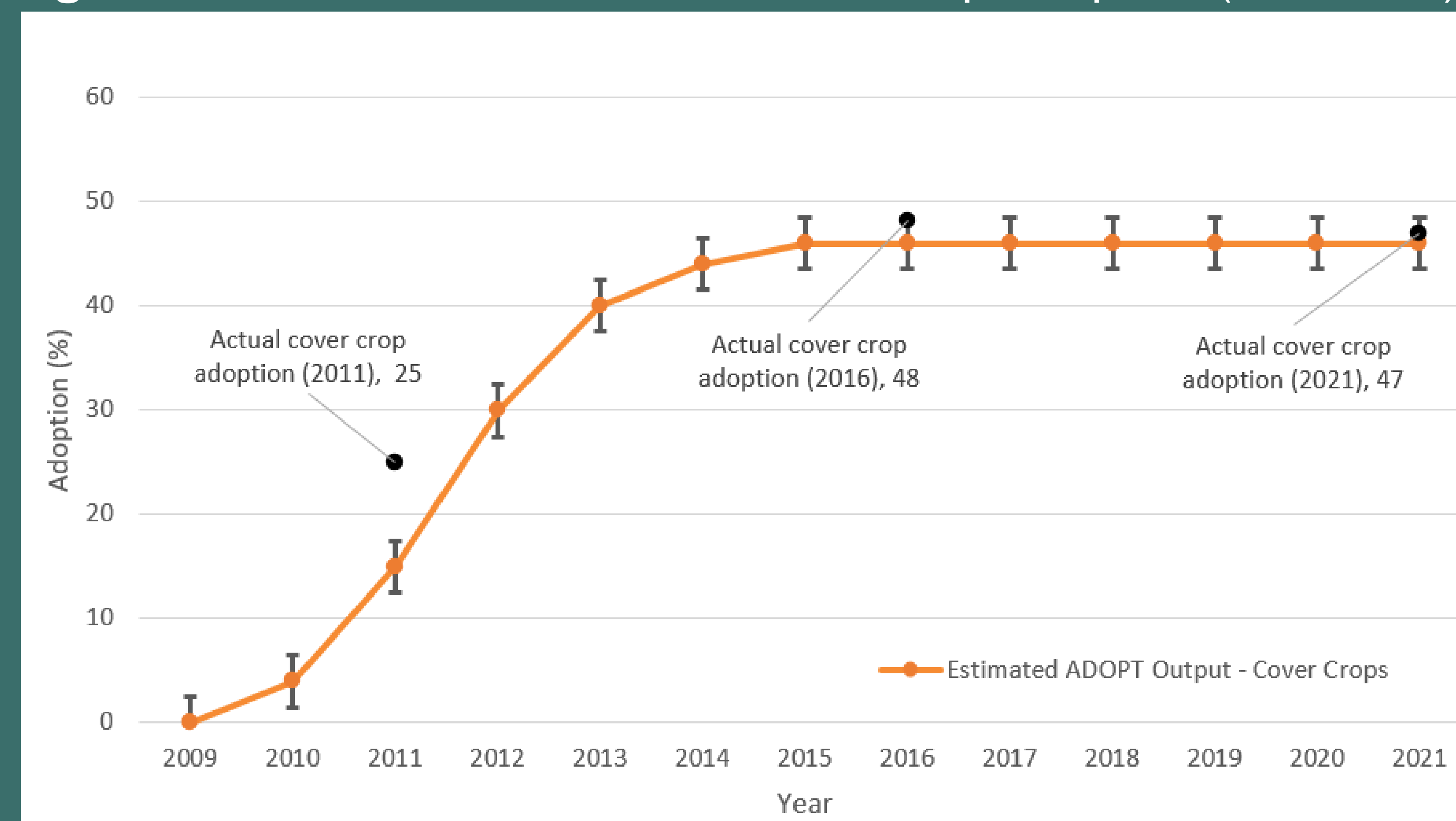


Source: Living Lab – Ontario (2021).

ADOPT Model inputs. Some data gaps remained, which were filled with two different methods (described in the top-right panel). We then compared results from the ADOPT Model with actual adoption rates of cover crops from the Census of Agriculture to test whether the model is a good predictor of BMP adoption over time.

Our results suggest that the ADOPT Model could be a **potential** tool for estimating peak BMP adoption rates in Canada.

Figure 1 – Estimated vs. Actual Cover Crop Adoption (Method 1)

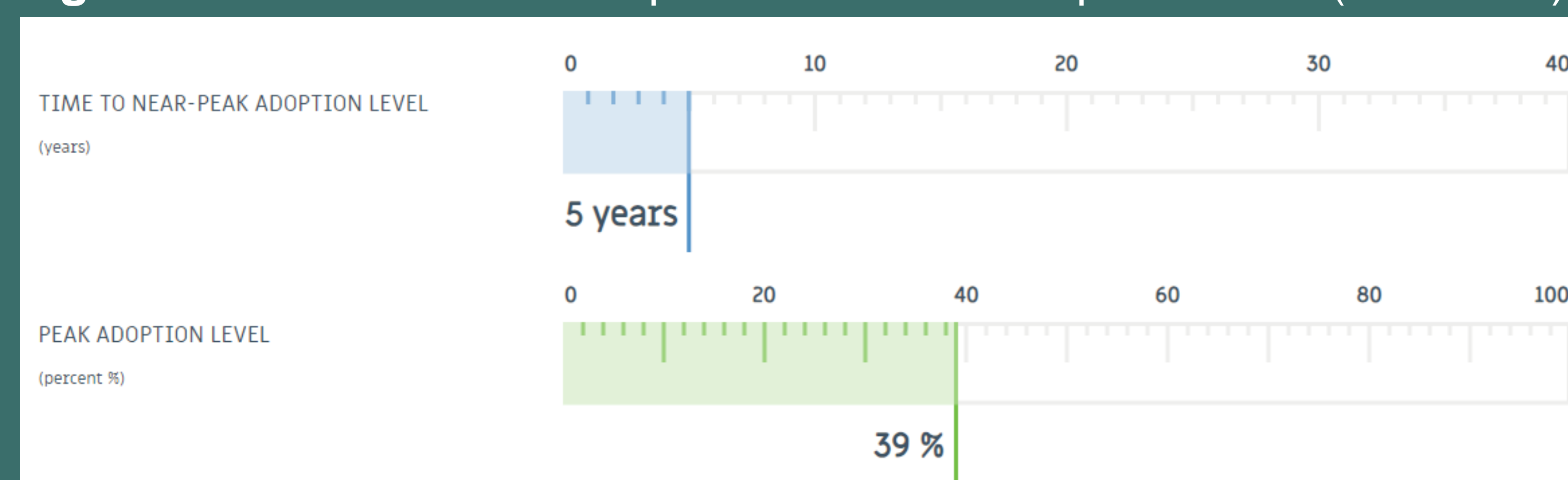


Note. Actual adoption from crop farmers in Southern Ontario rose from 25% in 2011 to a peak of 48% in 2016 and leveled at 47% in 2021, which falls within the 5% error (bars shown).

Results based on data from the Ontario Agricultural Soil Health survey and official agricultural statistics in addition to academic sources to fill data gaps (method 1) are **promising**. The peak adoption level of cover crops and the approximated portion of the time path to stable adoption in Ontario estimated by the ADOPT model **aligned** with real adoption rates and growth trends in Southern Ontario (approx. 46%, Figure 1).

However, when survey data collected at Canada's Outdoor Farm Show in 2022 was used instead of academic sources to fill data gaps (method 2), ADOPT underestimated the peak adoption rate (Figure 2). The key differences between the farmer survey and the academic literature review is that farmers estimated it would take longer for the BMP to start becoming profitable and the changes would be more difficult to reverse if needed.

Figure 2 – Time to Peak Adoption and Peak Adoption Level (Method 2)



Note: Peak Adoption graph produced from CSIRO ADOPT (2022).

Method 1 vs. 2

- Two methods were used to test the ADOPT model.
- To fill data gaps on questions related to reversibility, environmental benefits, and profits in method 1, we used information from academic sources.
- For method 2, data was collected at Canada's Outdoor Farm Show .

RESULTS

- The ADOPT Model estimates a peak adoption level of 46% after six years for method 1 (see Figure 1).
- The results align with cover crop adoption rates reported by the Census of Agriculture for Southern Ontario in 2016 and 2021.
- For method 2, with data from Canada's Outdoor Farm Show, the peak adoption estimated was 39%, or about 7% lower than method 1.
- The model indicates five possible high-impact factors affecting the peak adoption of cover cropping. The highest impact factors corresponding to method 1 are profit benefit in years cover crops are used, the potential for future profit benefit, environmental benefits, risk exposure, and ease and convenience.

Conclusions and Practical Lessons

- The ADOPT model is a potentially useful tool to estimate BMP adoption in the Canadian context. The results for cover crops were very close to observed data in method 1.
- It is important to carefully consider potential sources for the ADOPT model data inputs, particularly in terms of how closely this data represents the farmers you wish to model. Even small differences in some variables (such as future profits) between sources can have a significant impact on the results.
- If using a survey to provide input information, it is crucial to clearly define the BMP and avoid using a suite of BMPs.
- ADOPT results are based on farmer perceptions, which may differ from one region to another. Thus, ADOPT results for one geography may not apply to another.

For questions related to the paper, or a complete reference list, please email margot.mccomb@agr.gc.ca . Images from www.canva.com and www.flaticon.com

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