

Downcast Is Effective For Forecasting Onion Downy Mildew In Ontario

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Introduction

- *Peronospora destructor* causes onion downy mildew, a destructive foliar disease.
- Fungicides must be applied before infection for effective control.
- The disease occurs sporadically in the Holland Marsh, Ontario.
- Symptoms appear 10–14 days after infection.
- The DOWNCAST model predicts risk of sporulation and infection (Sporulation Infection Periods, SIPs) using temperature, humidity, and leaf wetness data.
- Forecasting helps to determine when fungicides are needed. Fungicides are advised if lesions or sporangia are detected in fields or on rotorod spore traps.
- Rotorod traps are assessed three times per week during the season.

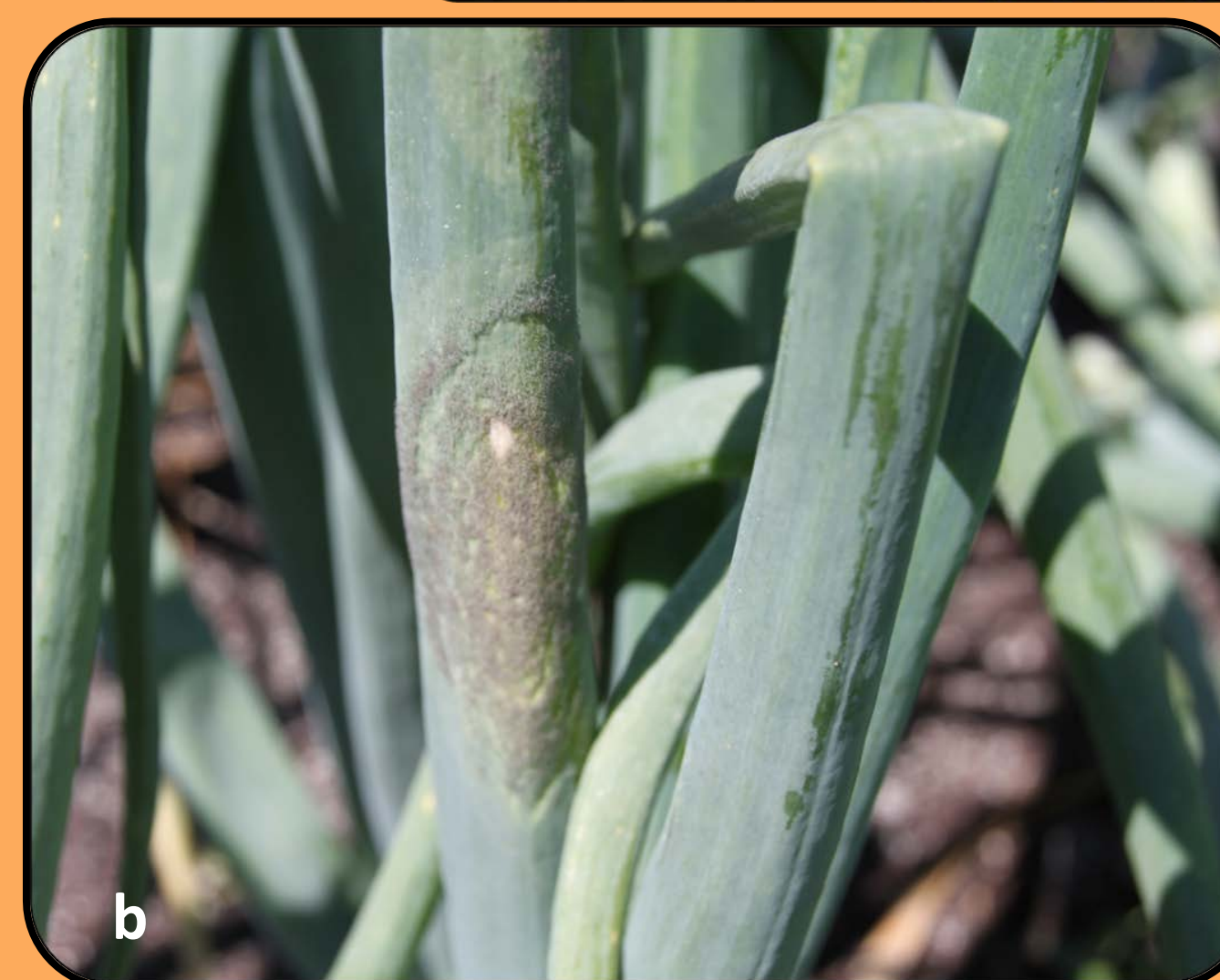
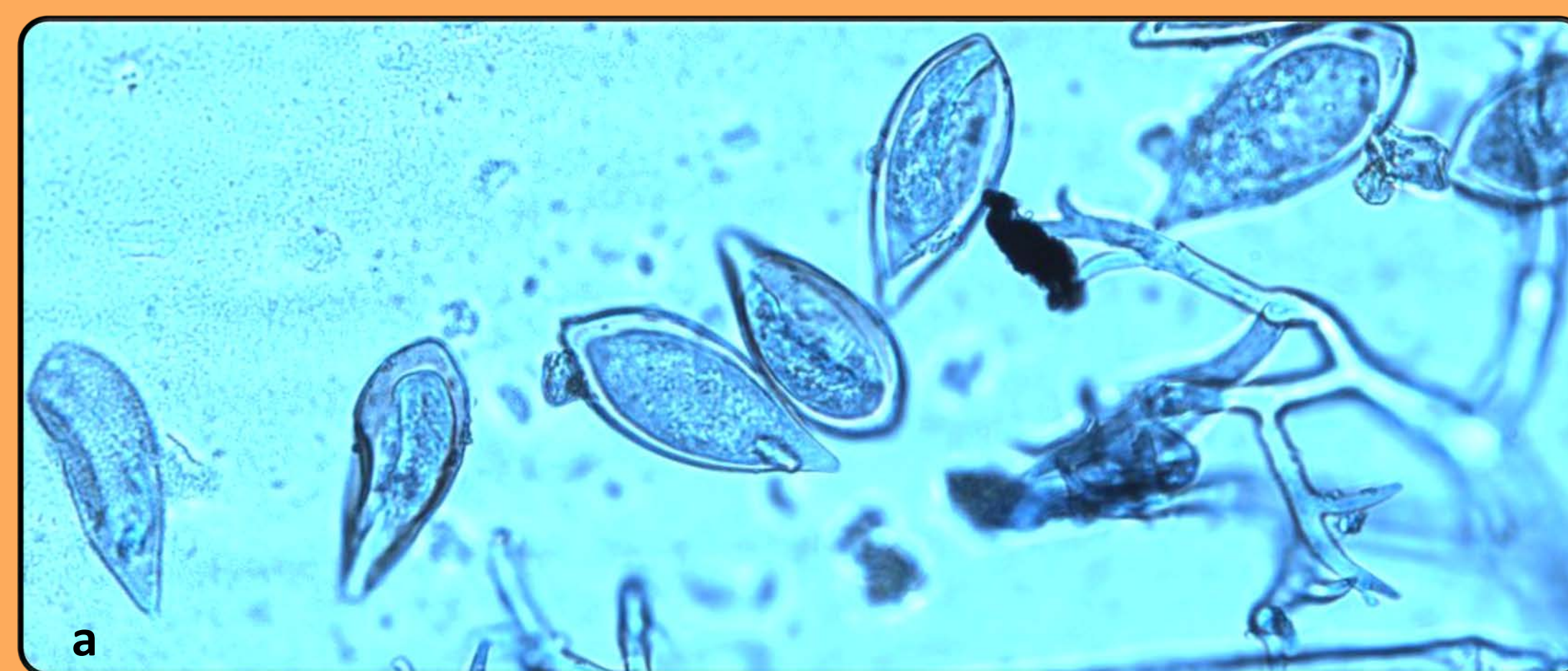


Fig 1. a) Onion downy mildew sporangia and b) sporulation on an onion leaf c) symptoms on onion plants.

Forecasting for Onion Downy Mildew DOWNCAST Model

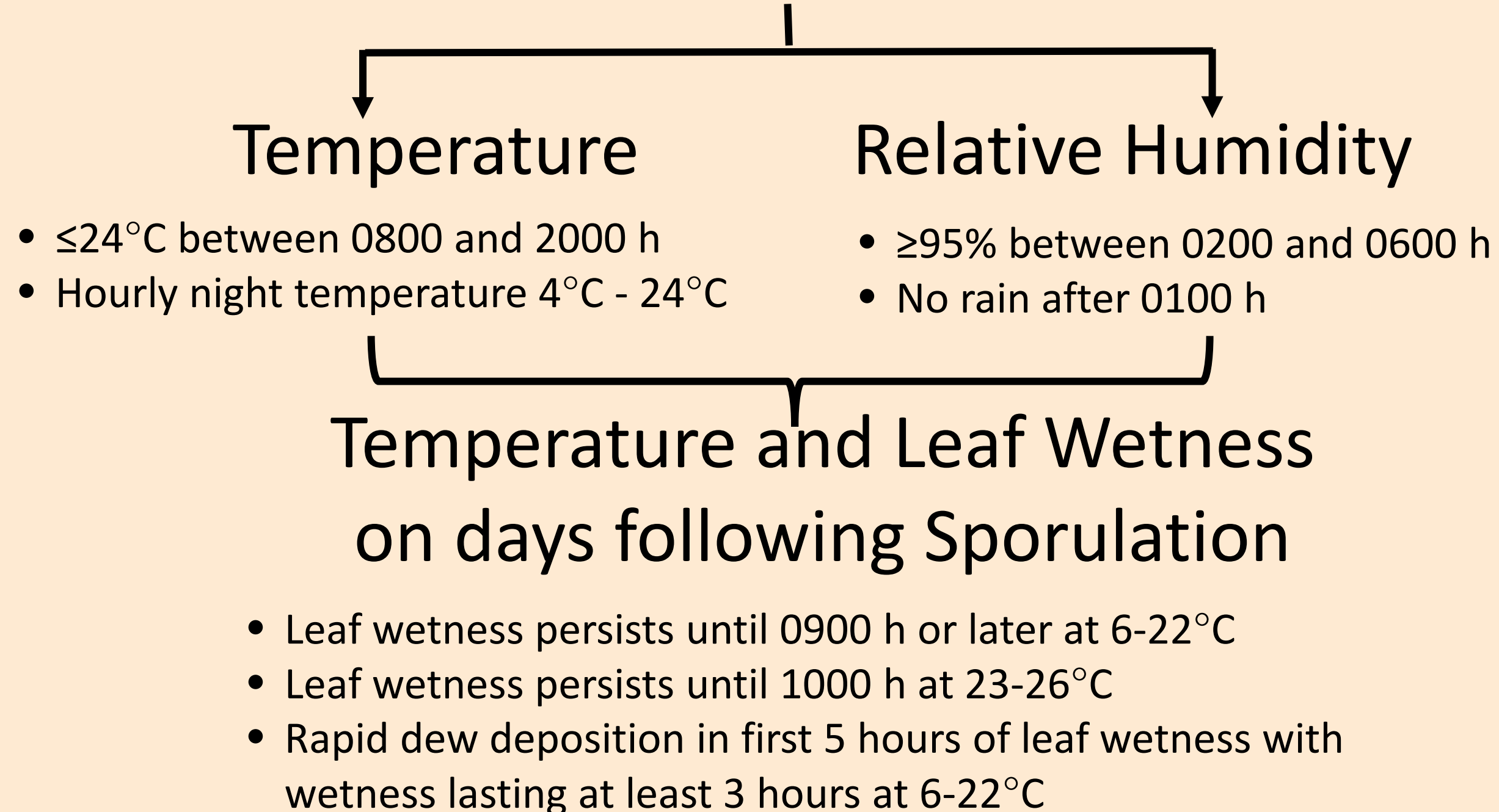


Fig 2. Portable weather station beside a commercial onion field.



Fig 3. Rotorod spore trap in an onion plot.

DOWNCAST Results

Table 1. DOWNCAST SIPs, sporangia of *P. destructor* and downy mildew (DM) occurrences over 14 years.

Year	DOWNCAST SIP	Sporangia	DM in Fields
2012	x	n/a	x
2013	✓	n/a	✓
2014	✓	✓	✓
2015	✓	✓	✓
2016	✓	x	x
2017	✓	n/a	✓
2018	✓	n/a	✓
2019	x	n/a	x
2020	✓	✓	x
2021	✓	✓	✓
2022	✓	✓	x
2023	✓	✓	✓
2024	✓	✓	✓
2025	✓	✓	x

Conclusions

From 2012 to 2025, there were 8 years where DOWNCAST accurately forecasted a downy mildew outbreak that occurred and 3 years where there was no disease risk and no disease was found. There were 3 years where downy mildew was forecasted, but no disease was found in the region. This may be due to timely fungicides applications, but there was no disease in nontreated checks. DOWNCAST is effective, especially for predicting years with low risk of downy mildew.