Low Tunnel Production: Impact on Disease Incidence and Yield in Day-Neutral Strawberries

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Anthracnose fruit rot (Fig. 1) is a challenging fungal disease for strawberry growers, caused primarily by *Colletotrichum nymphaeae*. Resistance to commonly used fungicides is present in Ontario, and there are limited alternative anthracnose products available to growers. Anthracnose is spread mainly from splashing rain and irrigation. Infection requires extended duration of leaf wetness. Growing strawberries under plastic low tunnels can be a tool to reduce rain-induced leaf wetness, potentially reducing disease and increasing yields, in addition to providing season extension. In Maryland, low tunnel systems increased marketable yield by 313% compared to open beds, and fruit rot was 12% less under low tunnels compared to open beds (Lewers et al., 2017).

In 2025 day-neutral strawberries were grown under low tunnels at the Ontario Crops Research Centre-Simcoe. The objective of this project was to demonstrate the impacts of low tunnels on strawberry yield, marketability, and disease severity in Ontario.

Figure 1. Anthracnose fruit rot.

Strawberry (cv. 'San Andreas') bare-root transplants were planted in raised, white plasticulture beds on 20 May, 2025. Plots consisted of 24 plants, spaced 30 cm apart in a staggered double row and were arranged in a randomized complete block design with 5 replicates. Plots were 1m apart within rows and rows were on 1.5m centers.

Treatment list:

1. **No tunnel**

2. **Tunnel with sides always up ("sides up")** (sides remained raised throughout the season)
3. **Tunnel with sides raised and lowered ("sides up&down")**

Tunnels were installed at planting. Low tunnel hoops, anchor pipes, and bungee cords from Dubois Agrinovation were used to build the tunnels. The plastic film for the low tunnels was 6 mm 25% light diffusion from Gintec Shade Technologies. Three hoops placed 1.5m apart were used per plot (Fig. 2).

No fungicides were applied to any of the plots. Tunnel sides were lowered and raised 8 times when any rainfall was forecasted.

Plots were harvested twice a week from 25 July to September 26, 2025. Marketable yield, unmarketable yield and disease presence (% incidence) was recorded and analyzed using R Studio.

Figure 2. Low tunnels with sides always raised (a,b) or lowerered for rain protection (b).

Only anthracnose was present in significant levels during the trial. Botrytis fruit rot was present at very low levels (data not shown). Using low tunnels reduced anthracnose incidence (% infected berries) when averaged across all harvest assessments (Fig. 3). Although it was a dry season with little rain (approximately 181 mm from planting to last harvest) which reduced overall disease pressure, differences between the tunnel use was still apparent and became more evident in September, following multiple rain events (Fig. 4). On the last harvest, 45% of berries in the no tunnel treatment were infected with anthracnose, compared to only 16% with the low tunnels sides always up and 2.6% when low tunnel sides were moved up and down due to rain. The proportion of marketable berries was affected by tunnel treatment (Fig. 5). On multiple harvest dates the use of low

tunnels, with the sides up and the sides up and down, significantly increased the proportion of marketable berries compared to the no tunnel treatment.

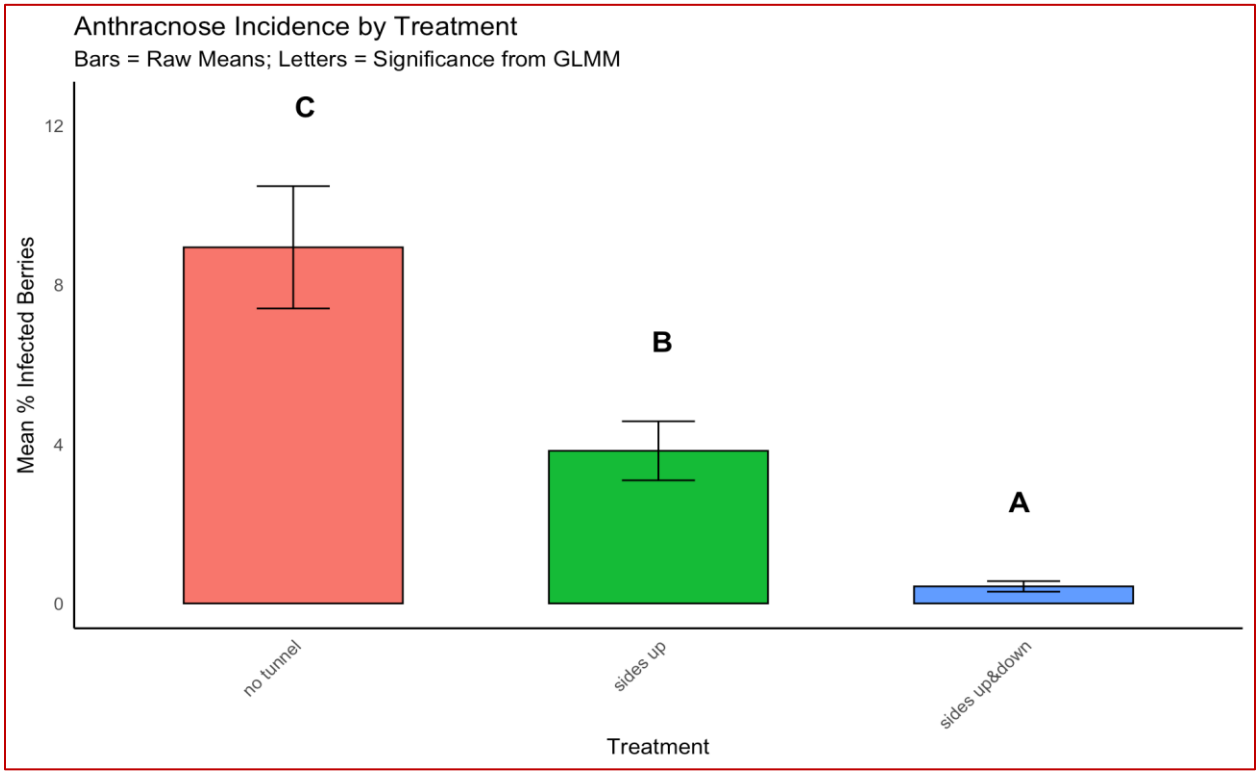

Figure 3. Incidence of anthracnose in plots with no tunnels, when the tunnel sides were always up, and when the tunnel sides were moved down during rain events. Different letters indicate significant differences between treatments ($p<0.05$).

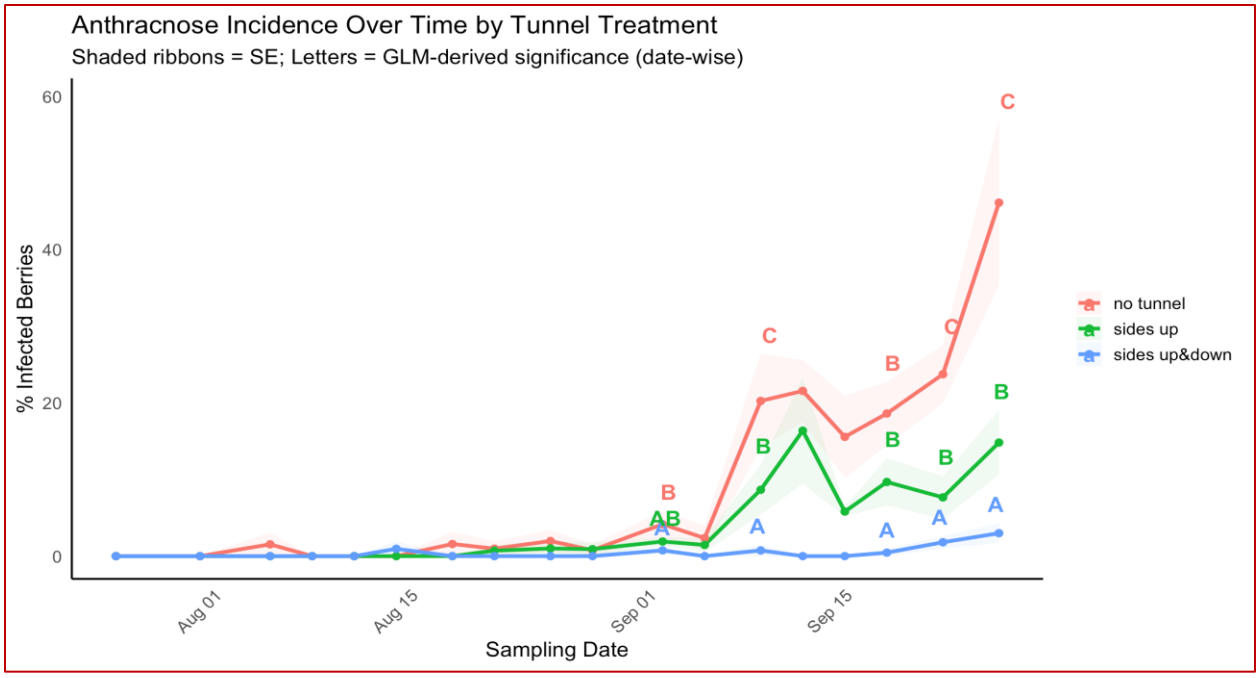

Figure 4. Incidence of anthracnose in plots with no tunnels, when the tunnel sides were always up, and when the tunnel sides were moved down during rain events from 25 July to September 26. Different letters indicate significant differences between treatments ($p<0.05$).

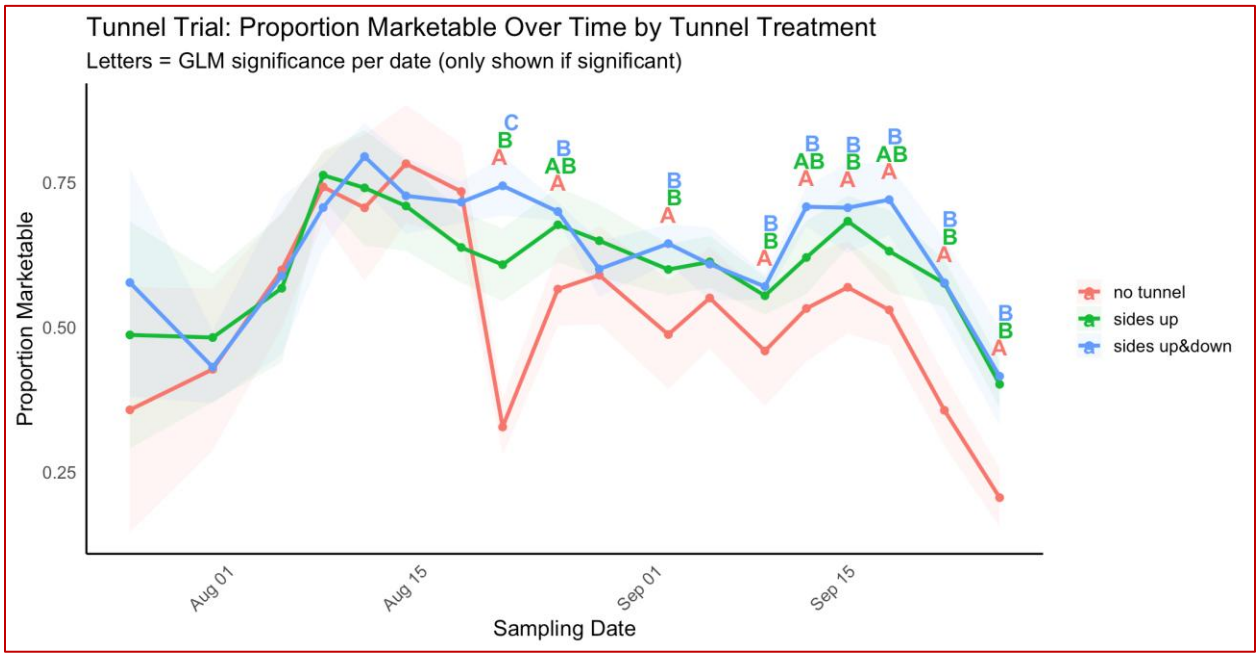

Figure 5. Proportion of marketable berries to unmarketable berries (abiotic and disease) over time with no tunnels, when the tunnel sides were always up, and when the tunnel

sides were moved down during rain events from 25 July to September 26. Different letters indicate significant differences between treatments ($p<0.05$).

- Low tunnels with the sides always raised and the sides raised and lowered due to rain reduce anthracnose incidence and improve marketable yield compared to no tunnels.
- **Although not as effective at reducing anthracnose as raising and lowering the tunnel sides with rain, installing low tunnels with the sides always raised still improved disease management and fruit quality and requires less labour compared to regularly raising and lowering the plastic.**
- Tunnels require significant labour but could be considered in a small acreage system where growers are looking to reduce fungicide inputs.
- Growers can use the **Low Tunnel Strawberry Production Guide** from the University of New Hampshire to build their own system.

This project was funded by Horticulture Crops Ontario. Thank you to OMAFA Summer Research Assistants Kendra Workman and McKenzie Susil who harvested and maintained the plots. Thank you to Leah Ritcey-Thorpe who performed the data analysis.

References:

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