Koppert

Optimizing bumblebee hive placement for tomato cultivation under grow lights

Whitepaper

Partners with Nature

Introduction

Pollination is critical for the successful cultivation of tomatoes, especially in controlled environments such as greenhouses. Bumblebees (Bombus spp.) are among the most effective pollinators for these crops, facilitating higher yields and improved fruit quality.

However, to maximize the effectiveness of bumblebee colonies, proper hive placement is essential, particularly when using grow lights and screening systems. This white paper outlines key strategies for optimizing the placement of bumblebee hives to ensure efficient pollination under these conditions.

Key considerations for hive placement

Elevation above crop canopy

Bumblebee hives should always be placed above the crop canopy. This ensures that the bumblebees can become active with the first light of day. Hives placed too low may not only be less accessible but could also experience reduced light exposure, affecting bee activity.

Orientation of hive entrances

For horizontal rows containing more than two hives, it is crucial to alternate the entrance orientations. By directing every other hive entrance in a different direction, you can help prevent orientation issues among the bumblebees.

This practice reduces competition and promotes more efficient foraging behavior, leading to improved pollination rates.

Ensure that early daylight is not blocked by screens, double layers of glass or privacy coatings since it will negatively effect bumblebee activity.

Maximizing morning daylight exposure

Position bumblebee hives to catch the first light of the morning. Early sunlight is critical for activating bumblebee colonies, enabling them to become active and orient themselves for foraging. Be mindful of screens, multiple layers of glass, or privacy coatings that could block this essential light (UV, blue and greenlight).

Recommendations

If the top side screen blocks early daylight, consider opening it earlier to enhance light access.

Light diffuser or privacy foil

Side screens, potentially blocking early daylight

Top of side screens opened

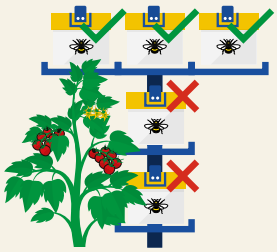
Proper hive stand configuration

When utilizing single hive stands, which is not recommended, it is crucial to position them above the heads of the plants. Avoid stacking more than three hives vertically and rotate the entrances to different directions to prevent drifting behavior among the bees.

Limit vertical hive stands

Avoid using vertical hive stands that place hives lower than 0.5 meters below the crop head. Hives positioned too low may not receive adequate daylight, leading to delayed activation.

Additionally, if entrances face the same direction, there is a tendency for bees to drift toward the lower hives, compromising pollination efficiency.



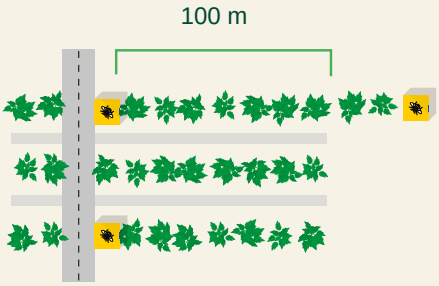
Advise for longer rows

Hive placement for long rows

For plant rows exceeding 100 meters in length, prepare two additional hive locations per hectare, positioning them on either side of the last greenhouse pole before the end of the plant row, above the crop. Introduce one extra bumblebee hive per location from mid-November to the end of January to ensure adequate pollination coverage.

Strategic placement relative to greenhouse walls

If a back wall faces east (toward sunrise), do not position hive stands directly adjacent to this wall. Instead, place them at least 5 to 15 meters away to minimize the impact of shadows cast by side screens, ensuring that early morning light reaches the hives effectively.



Hive maintenance and accessibility

Finally, ensure that your hive opening and closing system is fully operational before the pollination season begins. Proactive maintenance is crucial; delaying repairs could lead to lost pollination opportunities during critical periods.

Conclusion

Optimizing bumblebee hive placement is essential for effective tomato pollination in greenhouse environments, particularly when utilizing grow lights and screens. By following the guidelines outlined in this white paper, growers can significantly enhance the efficiency of bumblebee colonies, leading to improved crop yields and fruit quality. Implementing these strategies will not only support bumblebee health and productivity but also contribute to sustainable greenhouse practices.

For more information and best practices on greenhouse pollination, please visit our website or contact us for expert consultation.

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