

PLASTIC BINS ARE BETTER THAN WOOD

Why wooden orchard bins can harbour codling moth

Codling moth (*Cydia pomonella*) is one of the most damaging pests of apples and pears. Its larvae feed inside fruit, then leave the fruit when mature and search for a protected place in which to spin a cocoon, known as a hibernaculum. In winter, larvae may remain in these sites in diapause before completing development and emerging as adult moths.

38× MORE MOTHS EMERGED FROM WOODEN BINS THAN FROM PLASTIC BINS	2–4 cm DEPTH LARVAE TUNNELLED INTO RELATIVELY SMOOTH PLYWOOD	None COMPARABLE EXCAVATION FOUND IN THE PLASTIC BINS
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01
THE MECHANISM

NOT JUST CRACKS

HIBERNACULUM
The silk-lined shelter a mature larva builds for pupation. Where it can be built determines where the next generation emerges.

More than existing cracks

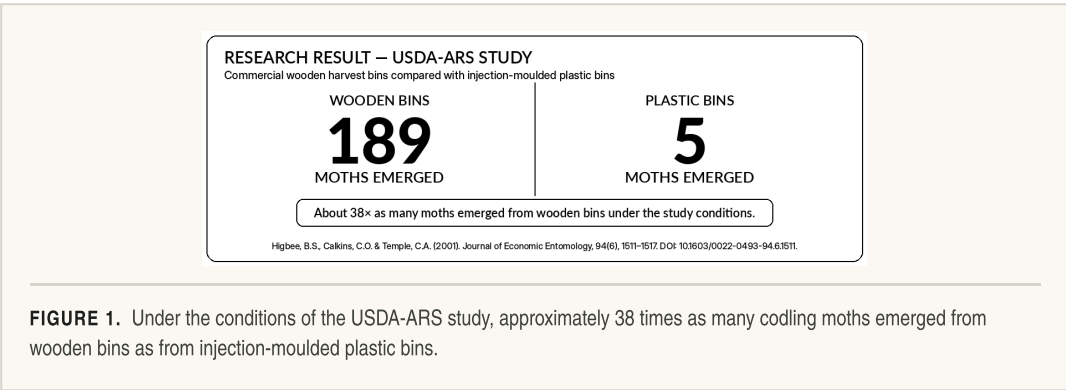
Wooden orchard bins are often described simply as providing “hiding places” for codling moth. Scientific research shows that this description is incomplete. Wood is not merely a passive collection of cracks and joints: it is a fibrous material that codling moth larvae can physically modify.

02
THE EVIDENCE

USDA-ARS · 2001

The 189 versus 5 research finding

A USDA-ARS study compared commercial wooden apple bins with injection-moulded plastic bins after orchard exposure. The result was striking: 189 moths emerged from the wooden bins, compared with only five from the plastic bins. The researchers therefore recorded almost 38 times as many moths emerging from wooden bins under the conditions studied. The difference was statistically significant at both study sites.



03 WHY THE GAP IS SO LARGE

EXCAVATION

KEY DISTINCTION

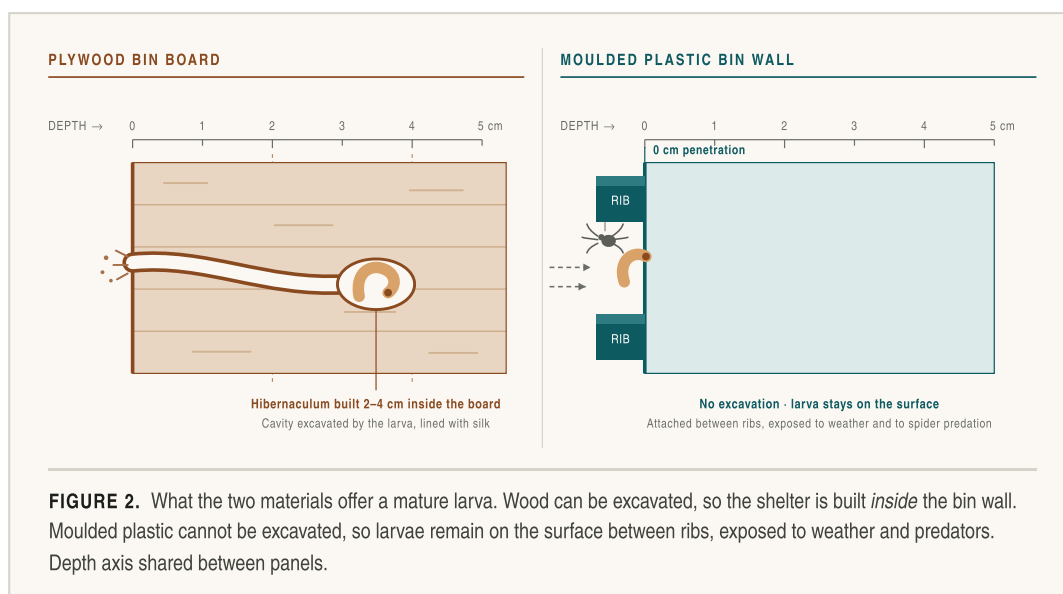
Cracks make access easier. They are not the only mechanism. Sound, smooth timber is not exempt.

Wood can become the shelter

Why was the difference so large? The researchers observed larvae using irregularities on wooden surfaces, but they also found something more important. Larvae excavated cavities in the wood, bored tunnels approximately 2–4 cm into relatively smooth plywood and constructed hibernacula within those cavities. They also incorporated chewed wood into their silken webbing. In other words, the larvae were able to manufacture protected overwintering sites from the bin material itself.

Describing the problem only as shelter points suggests that sound, smooth timber should present little risk. The observed tunnelling shows otherwise: the material itself can become the shelter.

No comparable excavation was found in the plastic bins. The few larvae that colonised plastic were attached in relatively open areas between structural ribs. Researchers noted that these larvae appeared more exposed to external conditions, and some had been preyed upon by spiders. Plastic bins were therefore not completely immune to colonisation, but they did not provide the same excavatable substrate.



04 WHAT THE STUDY DID NOT FIND

RULING FACTORS OUT

OPERATIONAL NOTE

Bins move between orchards, packhouses and storage. A colonised bin is a mobile overwintering site.

Moisture, debris and fruit residue

Moisture retention and accumulated organic matter may still affect the bin environment, inspection and cleaning. However, the USDA study did not establish either factor as the cause of the large difference between wood and plastic. It also found no significant difference between bins that had contained infested fruit and bins left empty. Fruit residue was therefore not required for wooden bins to become colonised; larvae apparently entered while the bins were standing in the orchard.

South African research has likewise identified stacked wooden fruit bins as frequent overwintering sites for diapausing codling moth larvae. This is operationally important because bins move between orchards, packhouses and storage areas.

05 CONCLUSION

FOR GROWERS

THE SCIENTIFICALLY DEFENSIBLE CONCLUSION

It is **not merely** that wooden bins contain more shelter points. It is that wood provides codling moth larvae with a **physically modifiable, fibrous overwintering substrate**.

For growers managing codling moth, bin construction should therefore be considered within an integrated pest-management programme, alongside monitoring, sanitation and other control measures.

PRACTICAL IMPLICATIONS FOR BIN MANAGEMENT

- ☐ Treat bin material as an IPM variable, not just a handling choice.
 - ☐ Prioritise bins standing in the orchard — colonisation does not require fruit residue.
 - ☐ Track bin movement between orchard, packhouse and storage.
 - ☐ Remember that plastic reduces, but does not eliminate, colonisation.
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SOURCE

Higbee, B.S., Calkins, C.O. & Temple, C.A. (2001). Overwintering of codling moth (Lepidoptera: Tortricidae) larvae in apple harvest bins and subsequent moth emergence. *Journal of Economic Entomology*, 94(6), 1511–1517. DOI: 10.1603/0022-0493-94.6.1511.