

Possible bee hive from C1000 grocery crate

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Introduction

I was surprised to discover that the new smaller sized C1000 foldable grocery crate is almost the right size for a Dutch simplex-sized brood chamber. This made me wonder whether one can cheaply modify it for such use. The cheapest option would fit 7 frames.



Older size crate (too big for a hive)



Newer size crate (good for 7 or 8 frames)

I originally bought the crate to carry my beekeeping stuff, but that's when I noticed that the simplex frame is such a snug fit.

I'm a beginner beekeeper in Gelderland in the Netherlands. My first hive is a Segeberger 6-frame hive made for Dutch simplex frames, with feeding box (cost: about EUR 50.00). Segeberger is cheaper than wood, but it's still not cheap. For my second hive, I may try to build my own.

Initial description

The inner dimensions of the crate are 450 mm (w) x 320 mm (d) x 235 mm (h). The outside dimensions are 480 mm x 350 mm.

I'm thinking that one could fill up the spaces with styrofoam and/or hardboard and/or newspapers or cardboard. The hives in Holland that use the simplex frame typically have thicker walls on two sides, where the overly long ears of the frames come to rest.

These crates can be stacked neatly. One could cut a rectangular hole in the bottom for ventilation and to allow mites to fall off onto an inspection tray made of wood. One would have to raise the bottom crate a bit so that there is space between the crate and the tray. A potential problem is that the space between the frames in two stacked boxes would be 16 mm, which is quite a bit more than beespace.

The lid of the hive could be made from hardboard, with a styrofoam inner top board (with a hole cut in the centre of it) under the lid. One could also add a small lining made from thin wooden strips on top of the inner top board, so that there is space between it and the lid.

There are holes all around the crate, and one can use one or two of them as flying holes. To ensure that the bees pass cleanly from the outside through the wall materials, one can use short pieces of some garden hose pipe to lead the bees from the hole into the chamber.

The amount of space to fill under the ears is 36 mm on each side (45 mm from the crate wall to the wooden frame, minus 9 mm beespace).

As for the lid and tray, one can make them identical and simply use the one upside down as the tray. The vertical sides can be, say, 5 cm high. One does not need to take the thickness of the board into account when measuring the vertical sides, if all sides are moved to the left (I hope that that is true!).

Alternatively, one could make the tray from styrofoam, or partly from hardboard and partly from styrofoam – that way one can ensure a snug fit between the hive and the tray, if the hive simply rests on the styrofoam.

I think it might also be a good idea to line the entire crate on the inside with plastic, to make sure it is rain proof.

If one wants to stack crates, one must also make sure that the "feet" of the top crate can actually fit into the bottom crate – if you use only styrofoam, that wouldn't be a problem, but if hardboard is used for the inner walls, one might have to cut grooves into the tops of it to accommodate the crate feet.

Available materials

At the local hardware store (Gamma), the following products are available:

* Styrofoam ("polystyreen isolatieplaat"), 20 mm: 1000 mm x 500 mm x 12 sheets = EUR 8.00

* Hardboard ("MDF plaat"), 8 mm: 1220 x 610 mm = EUR 5.50; 2440 x 1220 mm = EUR 11.00

* Hardboard ("MDF plaat"), 12 mm: 1220 x 610 mm = EUR 6.50; 2440 x 1220 mm = EUR 14.50

* Hardboard ("MDF plaat"), 18 mm: 1220 x 610 mm = EUR 9.00; 2440 x 1220 mm = EUR 21.00

The crate itself costs EUR 7.00 at the grocery store.

Two options for frame distance

I initially thought to use a frame distance of 35 mm, but that would require using hardboard, which turned out to be quite expensive. The simplex frame is 22 mm wide, so that means 13 mm between frames.

For a 35 mm frame distance: $8 \text{ frames} \times 35 \text{ mm} + 9 \text{ mm beespace} = 289 \text{ mm}$. This leaves 31 mm (roughly 15 mm on either side), to be filled with hardboard or styrofoam.

After I did the first costing, I figured that if I use a frame distance of 38 mm, I can get away with using only the cheap styrofoam and none of the expensive hardboard (except for the lid and tray).

For a 38 mm frame distance: $7 \text{ frames} \times 38 \text{ mm} + 9 \text{ mm beespace} = 275 \text{ mm}$, leaving 45 mm, or roughly 22 mm on either side to be filled with hardboard or styrofoam.

Description of dimensions

For the design with 35 mm frame distance, one would fill 15 mm on all four sides with hardboard – either 2 x 8 mm (i.e. 1 mm too much) or 1 x 12 mm (and fill up the rest of the space with newspaper or cardboard).

For the design with 38 mm frame distance, one could use styrofoam on all four sides. On the short sides, one could use a single sheet of styrofoam on each side, and fill up the rest of the space with newspapers, for a snug fit. Or, one could use two sheets of styrofoam on the one side and one sheet on the other side, and fill up the rest of the space with newspaper.

If one places a lid directly on top of the crate, the frame is about 16 mm less tall than the inside height of the crate. I suppose one could make 9 mm below and 7 mm above the frame. If plastic sheeting is used at the top of the top chamber, it won't matter if the bees glue the tops of the frames to the lid, therefore one could make even more space at the bottom of the frame.

Because the crate will be filled in with extra walling on all four sides, the length of two of the sides would be shorter by the thickness of the other two sides. If one keeps the short sides their original length, it means that the inner walls on the long sides would have to be 378 mm (450 mm minus 2 x 36 mm).

The simplex frames are made of 1 cm thick wood. This means that the height of the inner wall on the short sides should be 218 mm (235 mm minus 7 mm minus 10 mm). However, the height of the inner wall on the long sides should still be 235 mm.

Dimensions of individual pieces

Lid/tray (e.g. 8 mm hardboard)

Flat portion: 490 mm x 360 mm

Long side (x2): 490 mm x 50 mm

Short side (x2): 360 mm x 50 mm

Top board (e.g. 20 mm styrofoam)

Flat portion: 480 mm x 350 mm

Assuming 35 mm frame distance:

Inner wall, short side

2 x 218 mm (h) x 320 mm (w) (styrofoam) and

2 x 218 mm (h) x 320 mm (w) (hardboard)

Inner wall, long side

2 x 245 mm (h) x 378 mm (w) (hardboard)

Assuming 38 mm frame distance:

Inner wall, short side

2 OR 3 x 218 mm (h) x 320 mm (w) (styrofoam)

Inner wall, long side

2 x 245 mm (h) x 378 mm (w) (styrofoam)

Other

Wooden feet, piece of garden hose, grille, paint, glue, etc.

Cost

Assuming 35 mm frame distance

2 x hardboard, 8 mm: 1220 x 610 mm = 2 x EUR 5.50

1 x styrofoam, 20 mm: 1000 mm x 500 mm x 12 sheets = EUR 8.00

1 x crate = EUR 7.00

Total excluding other: EUR 26.00

Assuming 38 mm frame distance

1 x hardboard, 8 mm: 1220 x 610 mm = EUR 5.50

1 x styrofoam, 20 mm: 1000 mm x 500 mm x 12 sheets = EUR 8.00

1 x crate = EUR 7.00

Total excluding other: EUR 20.00

For comparison, the cost of Segeberger 6-frame brood chamber is EUR 30.00. A complete Segeberger 10-frame hive with two brood chambers, bottom board and lid is EUR 125.00.

Questions

1. Would it be okay for me to use stationery/packaging grade styrofoam inside the bee hive? Won't the bees nibble take the styrofoam apart? With what can I treat the styrofoam to protect it from the bees?

2. Can I get away with using 8 mm hardboard for the lid and/or tray, or must I go for something thicker? Obviously the board would be painted against rain damage.

3. Would there be sufficient insulation in this box? Keep in mind that the only thing between the bees and the cold (if you don't warp the hive for the winter) would be 20 mm of styrofoam plus about 5 mm of newspaper/cardboard, plus a thin layer of hard plastic.

4. What effect would it have on the crate's ability carry weight if I cut a hole in the crate bottom? Normally the crate is strong enough to carry groceries that weigh a tonne if you have to carry it from the car to the kitchen.

5. Given that the handles of the box are on the short sides, wouldn't it be better to use make the flying holes on the long sides? That would also mean warm build.

6. How would you deal with the large space between frames in stacked boxes? The space between frames in the bottom box and top box would be 16 mm – the bees would fill it with wax. One solution may be to partially cover each box's frames with a sheet of plastic, but that would mean that the bees would have to walk around the plastic and it would interfere with varroa control, since not all mites would fall all the way to the tray at the bottom. Another solution, which would not interfere with varroa control, may be to attach strips of wood to the tops (or bottoms) of the frames so that the frames reach the correct height.

7. Do you think garden hose pipe would give the bees enough room to enter and exit the hive, or would a garden hose be too narrow for two bees to pass each other? What else can I use from the hole in the plastic to the space inside the hive, to prevent the bees from entering the spaces between the inner wall and the outer plastic crate wall? Or should I just cut a long slit at the bottom in the same way that an ordinary hive would have?

Samuel Murray, June 2013