Making Artificial Beans

Below is a method for making artificial beans using gelatin capsules. You can also see the procedures in Janzen et al. (1977) and Hudaib et al. (2013) for alternative approaches and ideas about adding plant secondary compounds.

Preparing Powder

Beans should be very finely ground in a flour mill. Some protocols suggest removing the seed coat by soaking the bean in water first. You can decide whether to remove the seed coat or not, but just be consistent between bean types.

Filling Capsules

Most funnels are not small enough to channel powder into the capsules, so a 1mL pipette tip can be attached to decrease the diameter of the funnel tip (Figure 1). The end of the tip can be cut at an angle such that powder only flows out when the funnel is tapped. Capsules can be propped up using the frame of a 200 μL pipet tip rack (Figure 1). Line up open capsules in the rack. Insert the funnel tip into an empty capsule and use a spatula or spoon to scoop a small amount of powder into the funnel. Gently tap the top or side of the funnel with the spatula until the first capsule is full, and repeat to fill all of the capsules down the line. Then use the flat, round end of the dissection probe or a pen to pack the powder down. Fill capsules a second time and pack. Fill a third time to overflowing and cap. It may be helpful to place some powder in the lid before closing. It is very important for capsules to be tightly packed, otherwise larvae will have reduced weight or die because they cannot feed properly. A capsule of size ‘0’ should hold about 0.8g of powder. It is a good idea to mass your first few capsules to make sure they are filling them consistently.

![Figure 1. Modified pipette tip and rack for filling capsules with bean flour.](image)
Setting Up Dishes

Fill the bottom of each dish with capsules (about 3-8 depending on the size of the dish), and place two females in each dish to ensure that eggs are laid. Dishes should be incubated at 30° C until data collection.