Dung Beetle Field Nurseries

Notes on Establishing a Field Nursery

A field nursery is a semi-controlled environment in which relatively small numbers of dung beetles are bred in order to produce greater numbers for subsequent field release. Breeding populations can be kept aside and the procedure repeated to continuously provide beetles for field release. Nurseries do not have a prescriptive size or shape and can be produced from available materials.

We recommend the use of 1000 L intermediate bulk containers (IBCs) as shown in **Figure 1**. The container and cage are cut in half using an angle grinder and holes are drilled in the base to allow water to escape but retain beetles. It is recommended holes be drilled approximately 100 mm apart using a 2 mm bit. In a 1000 L IBC this would equate to up to 81 holes in the base of each container. Depending on what was in the IBC it is at this stage the container can be thoroughly cleaned. Any existing inlet/outlet holes can now be plugged with geotextile (or shade cloth) and the top half of the IBC placed onto a pallet. An appropriate soil type for the beetle to be bred should be placed into the IBC to a level of approximately 400 mm. Shade cloth should be secured over the IBC using appropriate attachments, noting frequent removal is required for feeding and maintenance. Lids can be constructed from PVC pipe and elbow joints allowing them to be easily removed, but any method that prevents beetles escaping or entering is acceptable. One benefit of using IBCs for nurseries is that they can be carefully moved with tractor forks, whereas traditional in ground field nurseries are fixed in position for at least 12 months.

Figure 1*: an IBC cut in half and covered. A lid made by fixing shade cloth to a PVC pipe (25 mm) square is shown in the photo on the right hand side.*

1. **Populating the IBC**

   For smaller beetles (8-14 mm, e.g. *Euoniticellus fulvus*) densities of 200/m^2 are used while for larger beetles (16-24 mm, e.g. *Bubas bison*) densities of 100/m^2 are employed. Unless directed otherwise nurseries should be populated with equal numbers of male and female beetles.

2. **Dung Preparation**

   2.1 Collect fresh dung, the fresher the better, and place it in a bucket with a lid (20 L bucket is recommended for convenience). The lid will prevent unwanted insects from entering.

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2.2 If the dung is dry add some water to make it looser. For sheep dung let the pellets absorb water to become moist. The sheep dung should easily break apart.

2.3 You should store the dung for *at least* 3 days before use. It can be kept next to your nursery in the sun. The heat will destroy any insects/mites that were in the dung and will prevent competition with the beetles you are using to populate your nursery. It is also convenient to collect dung just once a week/fortnight and have it sitting next to your nursery.

3. Feeding

3.1 Feeding could be necessary up to three times each week. You will recognise when the beetles are using the dung as it will take on a dry, shredded appearance as the beetles suck out the moisture and take solid material beneath the surface to make brood masses.

3.2 Start by placing dung in the front left corner and over time work your way to the back (see ***Figure 2***). This pattern will encourage beetles to tunnel and create brood masses over the entire area of the nursery.

3.3 How much? - This will depend on how many beetles you have in a nursery and how active they are. Use a scoop that holds about 1 L of dung. For 100 beetles start by giving them 2 x 1 L and provide additional dung as required.

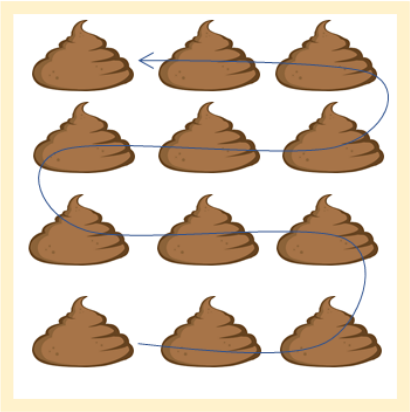

Figure 2: suggested feeding pattern

4. Maintenance

4.1 If the beetles are feeding well there will not be a lot of dung to remove. However, after dung has been in the nursery for a couple of weeks it can be removed. Gather the dung and place it in a bucket of water. Any beetles that were in it will float to the surface and should be placed back in the nursery. However, there should not be many beetles in old dung.

4.2 Most of the watering requirements will come about from natural rainfall and while feeding, the moisture contained in the dung. However, if long hot dry spells are experienced watering the nurseries to keep the soil moist is necessary. In a 1 m^2 IBC nursery each litre of water evenly distributed is the equivalent of 1 mm of rainfall. A watering can makes this task easy.

4.3 You should remove grass and weeds as they grow. If regularly maintained these can be pulled out as the roots will be shallow. If weeds become well established cut them at the base, do not pull them out as deep roots can disturb brood masses.

5. When to release beetles

Most beetles will have a 1 year life cycle from egg to adult, but some may require 2 or even 3 years to emerge. For example, the winter active *Bubas bison* can emerge after 1 year but can stay in the soil for 2-3 years before emerging as an adult. As beetles start to emerge, they can be collected and released onto dung in your paddocks. If you wish to continue the nursery process a breeding population needs to be retained. This is best done by transferring them to another nursery as then the original nursery can be left open and the emerging beetles can find their own way to dung. You could even transport nurseries into the desired paddock using your tractor forks. It is important to make sure equal numbers of males and females beetles are transferred to the new nursery so be sure to consult ID sheets to ensure you can determine the sex of your beetles.

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