2. Packing at mass rearing facility

STEP I OF PROCESS IN FLOW CHART IN APPENDIX 2

After irradiation has been carried out, sterile pupae should be adequately packed for transportation to the release (fly emergence) centre. Packing procedures for short and long distance transportation, including transboundary shipment, may vary as described below (Zavala *et al.* 1985, FAO/IAEA 2000 and FAO/IAEA 2001, FAO/IAEA/USDA 2003). Size and weight of packages are designed to minimize breakage.

2.1 PLASTIC BOTTLES

Sealed bottles should only be used for short-distance transport of irradiated pupae to a local fly release (fly emergence) centre (**Figure 2.1**). Air-conditioned or refrigerated vehicles are used for the transport; no additional packing or insulating material is required around the bottles. Plastic containers should be placed on the deck of the vehicle with proper brace stabilizer materials, to avoid excess movement.

2.2 CARDBOARD BOXES

Polyethylene bags containing sterile pupae are loaded into secure cardboard shipping boxes for longer distance transportation to release centres. As an example, the shipping box used to hold the 4-litre bags of pupae that fit into the canisters of Hussman irradiators is constructed of double-walled corrugated cardboard of 74 × 34 × 34 cm with a top and bottom full overlap. Inside the box, a central compartment, 46 cm long, is lined with additional layers of

FIGURE 2.1
Plastic containers used to sterilize and transport medfly pupae in Mexico

FIGURE 2.2
a) Inside view of a box used to ship sterile medfly pupae from Guatemala Moscamed rearing facility, b) Inside view of a box used to ship Queensland fruit fly in Australia

FIGURE 2.3
Sealed boxes used for shipping sterile medfly pupae from Guatemala Moscamed rearing facility

corrugated cardboard. Nine bags of pupae are placed lengthwise within this central compartment in three layers of three bags each. Layers, as well as bags within a layer, are separated by spacers of double- and single-wall, respectively, corrugated cardboard. The space remaining at either end of the box (≈10 cm of the length of the box) is used to hold cooling units. These can be cooling units (hydrogel) prepared at the packing facilities, or using two packs of "blue ice", wrapped in newspaper (**Figure 2.2a**). According to the capacity of the cardboard box, temperature must be kept at 15–20°C. In Australia 2-litre bags of pupae are placed in a cardboard carton, with ten of these cartons in a styrofoam box (**Figure 2.2b**). (FAO/IAEA/USDA 2003).

Once full, a box is sealed with carton staples (placing staples in locations where they will not hit the bags of pupae) and two bands of fibre-reinforced plastic adhesive tape (**Figure 2.3**).

2.3 LABELLING

All boxes are properly labelled with the words: "Fragile" and/or "Biological Material". The words "Live Insects" and indication of the storage conditions ("This Side Up", "Handle with Care", "Keep Cool" or "Do not leave in the sun") should also be present on the boxes (**Figure 2.4**). These words should be adopted as international standards. Note the words "Keep Refrigerated Do Not Freeze" is misleading and should therefore not be used, since as mentioned in Section 3.1, the boxes should not be held at temperature below 20°C.

To facilitate tracking of consignments, these should have complete information on the location of the addressee and a shipment number. Additionally boxes for each shipment have to be numbered consecutively in large, clear writing on the outside of the box, e.g. "Shipment 18, Box 3 of 24" (FAO/IAEA/USDA 2003).

FIGURE 2.4
Three labels placed on boxes containing sterile medfly pupae shipped from Argentina (Mendoza rearing facility) to Spain (region of Valencia)

2.4. REFERENCES CITED

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