

# Fact Sheet on Methyl Bromide Alternatives



UNEP Regional Office for Africa Compliance Assistance Programme

Fact Sheet 2

## Floating Trays for Tobacco Industry

### Floating Tray system as alternative to Methyl Bromide

#### Introduction

Methyl bromide is a non-selective biocide used in seedbeds to eliminate weeds, nematodes, diseases and insects. This fact sheet focuses on the use of the Floating Tray System for seedling production of tobacco, tomatoes and other vegetables.

#### What is Floating tray system?

Floating tray technique uses artificial growing media, it completely eliminates the need for methyl bromide for fumigation. This non-soil technique requires composted pine bark (or any other such substrate) and polystyrene trays (so called floating trays) floating in water (hence the floating tray system).

#### What are the advantages of this system?

This technique, besides being more eco-friendly than the traditional methods using methyl bromide, is associated with many other benefits. The elimination of Methyl Bromide is, of course, the major advantage giving the new system a major positive impact on the environment. Other advantages include the use of fewer chemicals and also in smaller quantities (about 1/6), the opportunity for an integrated management of disease and other pests, the efficient use of water and fertilizers and the production of superior seedlings in terms of uniformity and drought tolerance. Research has consistently shown that yields are the same or tend to be better than from the conventional system

#### How are Floating trays made?

The floating trays used in this system are moulded from expanded polystyrene. The term floating tray comes from the fact that the trays are about 98% air and the rest is polystyrene (a type of plastic) and as a result when placed in a water bed the trays float. They can be imported from South Africa and Zimbabwe's Tobacco Research Board. The trays measure 670 mm in length, are 345 mm wide and 60 mm deep (Fig 1.). Although the dimensions of the trays are standard, the number of cells within each tray can vary. It is possible to obtain trays of numerous cell numbers and sizes. In Zimbabwe the recommended trays have 200, 242 or 300 cells. Study has shown that tobacco seedlings can be successfully produced in any of these trays. The higher the cell numbers the more economic the tray is, since this means a higher density of seedlings per unit area, but the management skills required are obviously higher.



Currently more than 75% transplantable seedlings are easily achievable in Malawi, Zambia and Zimbabwe and the higher this number is, the more economic the technique becomes. Table 1 below shows the number of trays required per hectare of transplanted seedlings assuming about 65% transplantable seedling and 15 000 plants per hectare. The conventional system requires 108 m<sup>2</sup> and assumes a seedling density of 450-500 seedlings/m<sup>2</sup>

**Figure 1. 242 Cell Polystyrene tray** seedling and 15 000 plants per hectare. The conventional system requires 108 m<sup>2</sup> and assumes a seedling density of 450-500 seedlings/m<sup>2</sup>

**Table 1. Various tray sizes and the subsequent number of trays and seedbed area required to produce 15 000 seedlings**

Tray type (Cell number)	Number of trays /ha (approx.)	Seedbed area (3 trays across) /ha (approx.)
200	99	23.2 m <sup>2</sup>
242	81	19.0 m <sup>2</sup>
300	66	15.5 m <sup>2</sup>

#### Site selection and bed construction

The site should be very carefully selected as it can be made permanent. The floating tray beds should be located on a warm, north or north-west facing slope where they will be better exposed to the sun and usually protected from the prevailing cold winds in winter. Protection from wind above the site and cleared ground below the site improves the temperature of the site and minimizes the incidence of ground frost during cold spells. Choosing a more or less level ground will simplify bed construction although some surface drainage is also important. Long beds will be difficult to level and the levelling requires a spirit level (one cannot just eyeball). The site needs to be easily accessible for supervision. Figs 3 illustrates bed construction using loose bricks.

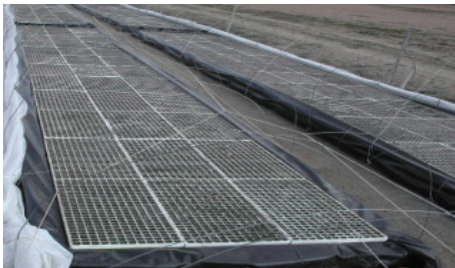
The entire design and construction of the floating tray beds depend to a large extent on the dimensions of the floating trays, in that the bed dimensions need to be almost exact multiples of the tray dimensions. The most common dimensions of available trays seem to be 670 mm (length) x 345 mm (width) x 60 mm (depth) and



**Fig 2. Completed beds constructed from loose bricks.**

multiples of these dimensions are what need to be carefully considered when building the floating tray beds.

The beds can be almost any length but it is suggested that the width of the beds are just sufficiently wide to accept three or four floating trays side by side, width wise. That is, the inside dimension of the retaining float water wall must be approximately 1.05 m wide. This just comfortably fits three trays with enough space to ensure that the trays will float independently of each other, i.e.  $0.345\text{ m} \times 3\text{ trays} = 1.035\text{ m}$  (Fig 3). Four trays width wise is a viable and more economical alternative (i.e. a width of 1.4m). The width stipulation is to ensure that all trays can easily be reached from the outside of the bed when



**Fig 3. Floated trays in a 9 x 3 bed.**

operations such as clipping and thinning are done by hand. Wider beds can be used in greenhouse float beds as the seedlings can be sprayed or clipped

by using a gantry which spans the entire greenhouse.

One should bear in mind that although large floating tray beds are more cost effective, they do have the disadvantage that waterborne diseases may spread more rapidly.

### **Media and tray preparation**

Once the floating tray beds have been constructed the trays need to be prepared for floating. Pine bark can be mixed with water in the ratio 2: 1 and loaded into trays. Alternatively, pine bark, washed river sand and water are mixed in the ratio 1:1:0.5 by volume (Fig 4). The ratio of the water may be reduced or increased depending on the moisture content of the other constituents. A simple test can be used to find out the right amount of water required for the mixture. If one holds the moistened media in ones' hand and squeezes it into a ball, the ball should crumble in less than 10 seconds on letting go; otherwise one has added too much water. One or two drops from the squeezed media indicate the right water content while a stream of drops indicate too much water. This is more critical for a pine bark and sand mix than for a 100% pine bark.

The pre-composted pine bark with a 0.25 to 6 mm particle size distribution must be used. Large pieces of pine bark are removed by screening through a 6-mm sieve. The pH is measured and sufficient lime added to correct it to about 5.5. The lime must be added 1-2 weeks before use or alternatively the pH can be corrected at source so one may choose to specify one's pH requirements to the supplier of the pine bark.

The sand is the "Normal Grade" (0.5 to 2 mm particle size distribution) and should be pre-washed. It is important that the sand does not have a high proportion of fine material because this will increase the potential for water logging. The sand can be re-sieved using a 6-mm sieve.

The sand can be a source of weed seeds, pathogens and nematodes and so it is recommended that the sand be solarised, steamed, boiled or fumigated with Herbifume or basamid.



**Fig 4. From left to right: pine bark, washed**

### **Quantities of media required**

The recommended 200, 242 and 300 cell trays require media of the amounts shown in Table 2.

**Table 2. Approximate quantities of media for the relevant tray size**

Tray type (Cell number)	Number of trays /ha	Sand per tray (Litres)	Pine Bark per tray (Litres)	Total media per hectare (Litres)
200	99	2.1	2.1	415.8
242	81	2.9	2.9	469.8
300	66	2.3	2.3	303.6

### **Africa's Methyl Bromide Champions in Floating Tray System**



**Fig 5. Float seedlings under greenhouse conditions at the Tobacco Research Board Farm, Zimbabwe**



**Fig 6. Excellent float seedlings at Lingadzi Estate in Malawi**