

## Sustainable best practice in horticulture at Greenmount Campus

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There are many sustainable best practices that can be adopted in a horticulture business in order to achieve a balance between available resources and care for the environment. A number of these are carried out at the Horticulture Development Centre (HDC), Greenmount Campus. These practices when adopted in nurseries will contribute toward achieving accreditations e.g. Assured Produce Scheme, LEAF (Linking Environment and Farming), BOPP (British Ornamental Plant Producers Certification Scheme), which enable growers to supply retailers who demand these qualifications.

Some of the best practices adopted at HDC are:

- Integrated pest management\*
- Safe use and disposal of chemicals
- Prevention of pollution of ground water
- Water recirculation using ebb and flood systems
- Waste management\*

(\*See the following sections).

### A) Integrated Pest Management

One of the biggest problems in the commercial production of crops is the outbreak of pests. Even when spray programmes are carried out strictly according to schedule, there can still be occasions when an outbreak can occur when certain pests become resistant to the specified chemicals e.g. aphid species to pirimicarb and pyrethroid or when certain chemicals are no longer approved for use e.g. aldicarb. An alternative method is the use of Integrated Pest Management (IPM).

The use of IPM is not something new and it has been with us for many years but its implementation requires commitment. IPM is the working together of cultural, biological and chemical control. By this integrated approach the reliance on chemicals is reduced and the control of pests found to be more effective.

#### i) Cultural control

The biggest cultural control is prevention. When production factors for example, temperature, humidity, nutrient and moisture are all optimum the plant thrives and becomes less prone to pest and diseases. These cultural methods are practised at HDC.

- There is a minimum of 5 percent ventilation in glasshouses to allow for air movement and minimise condensation on the leaves. Moist air promotes fungal diseases such as *Botrytis* and mildew. Air movement is further enhanced by using circulation fans.

- Humidity is further reduced by active ventilation where a low level of pipe heat is provided in conjunction with a level of ventilation. The optimum level is calculated by the environmental computer.
- Where appropriate, leaf wetness is minimised by adopting an 'ebb and flood' system or a trickle tape system where plants are watered from the base of the plants rather than by an overhead watering system.
- The standard of hygiene is kept high. Old compost and rubbish can harbour pests; therefore cleaning out between crops is essential.

## ii) Biological control

In commercial horticulture crop production a large number of plants of the same species are grown together under a standard environmental condition. This monoculture system is the norm upsetting the natural balance between pests and predators (Fig. 1). In most cases pest species become more dominant.



**Fig. 1 Sticky traps to trap pests for identification. (Yellow for white flies and blue for thrips).**

To mimic natural systems, biological control could be established by artificially introducing predator species into the controlled environment (Fig. 2). These predators have been tested rigorously under quarantine conditions for a number of years before being made available for commercial use. The predators range from insects to single cell organisms such as bacteria and in some cases viruses. These

predator species are best introduced in small numbers at regular intervals giving time for a natural balance to occur between predators and pests. The majority of species used are not native and will therefore require specific conditions; e.g. warmer temperatures or a source of material to feed on when the level of pests are low. Hence, predators are mainly used under glasshouse conditions where temperatures are warmer or used outdoors during the summer months.



**Fig. 2 Biological predators used at HDC**

**Table 1 Biological predators used at HDC**

Pest	Location	Control Predator
Whitefly	Glasshouse	<i>Encarsia formosa</i>
Aphids	Glasshouse and tunnel	<i>Aphidius colemani</i> , <i>Aphidoletes aphidimyza</i>
Two spotted mite	Glasshouse, tunnel and outdoor	<i>Amblyseius californicus</i> <i>Feltiella acarisuga</i> <i>Phytoseiulus persimilis</i>
Thrips	Glasshouse and tunnel	<i>Amblyseius cucumeris</i> <i>Orius laevigatus</i>
Leafminer	Glasshouse and tunnel	<i>Dacnusa sibirica</i> <i>Diglyphus isaea</i>
Caterpillar	Glasshouse and tunnel	<i>Trichogramma pupae</i> <i>Bacillus thuringiensis</i>
Sciarid Fly	Propagation under glasshouse and tunnel	<i>Hypoaspis aculeifer</i> <i>Hypoaspis miles</i> <i>Steinernema feltiae</i> <i>Atheta coriaria</i>

The above predators (Table 1) were found to be effective over time. However, time and effort are required to plan and implement their introduction. For example, in the control of white fly, the predator *Encarsia formosa* can be introduced to the crop as a preventative prior to the pest being found. If whitefly has been detected repeated weekly applications are needed.

### iii) Chemical control

In an IPM system a small amount of carefully chosen approved chemicals are used when absolutely necessary. Chemicals are chosen based on their compatibility with the predators used, and timing is essential. Chemicals are applied at the appropriate stage of the life cycle of the pests and predators. To minimise harm to the predators, only affected plants are treated with the chemicals.

From our own experience at Greenmount Campus, we have found that IPM is a very effective strategy to control pests without extra cost. The additional cost of predators is compensated by the reduction in chemicals used. The added benefit in using an IPM system is from an environmental perspective. Less harmful chemicals are used throughout the supply chain; i.e. less chemicals in the environment with reduced exposure to both crops and those using the chemicals.

## **B) Waste management**

The agriculture and horticulture industry in the UK produces a wide range of waste types ranging from plastic sheeting to waste chemicals and machinery oils (Defra, 2005).

Under Government legislation 'The Controlled Waste (Duty of Care) Regulations (Northern Ireland) 2002' we all have a duty of care in relation to the waste produced. To comply with this regulation waste must be stored securely. Transfer notice is required if the waste is passed on to a third party and this notice must kept for 2 years.

The Duty of Care Guidelines (DoE, 2008) provides the following recommendations:

### **i) Waste audit**

A waste audit should be carried out at least on an annual basis. Types and quantities of waste, current methods of disposal and pollution potential should be identified. This was carried out at HDC (Table 2). From this audit recycling and disposal solutions can be put in place. The audit can also be used to identify where input resources could be saved with the avoidance of waste initially.



**Fig. 3 Waste to be segregated**

Table 2 Waste audit at the Horticulture Development Centre, Greenmount Campus.

Waste identified	Quantity produced per year	Storage method	Current method of disposal	Future method Of disposal
Organic e.g. prunings, dead plant material, used composts	10 m <sup>3</sup>	Compost trailer, bulk storage bay	Certified composting contractor	Onsite composting
Plastic e.g. tunnel covering, pallet wrapping	40 m <sup>3</sup>	Specific bins	Certified recycling contractor	Not identified
Pots: used pots & trays	6 m <sup>3</sup>	Separate pallet boxes	Return to suppliers, save for reuse after washing	Sterilise and reuse. Use biodegradable pots and trays.
Empty chemical containers (compressed)	200 litres	Supplied drum	Certified contractor	Not identified
Paper	120 litres	Dry collection sacks	Recycle contractor	Composting
Cardboard	4 m <sup>3</sup>	Dry collection cage	Recycle contractor	Composting
Glass (Horticulture)	25 kg	Specific bins	Landfill	Not identified
Wood pallets	100 pallets	Clean storage area	Return pallet system / recycle contractor	Processed on site

### ii) Training

All staff have to be trained to deal with waste. This includes how the materials are segregated, their destinations and some materials have to be cleaned before being sent for recycling.

### iii) Storage

Providing a storage area within a nursery with easy access to all will help to segregate the waste into discreet groups alleviating the problem of mess. Following discussion with local authorised disposal contactors different skips or bins can be provided for items such as waste packaging and plastics for ease of disposal. Segregation also identifies materials which have potential value, e.g. metals.

In summary the best method to deal with waste is to follow the best practice of:

- Avoidance - avoid waste production - plan better.
- Reduction - reduce the volume produced.
- Reuse - reuse where possible.
- Recycle - identify opportunities in recycling.
- Dispose - dispose of waste in an environmentally positive way.

Record keeping not only helps keep track of waste but also helps to comply with legislation.

Further help and advice in dealing with waste is available from the following websites:

- [www.ni-environment.gov.uk](http://www.ni-environment.gov.uk)
- [www.wakeuptowaste.org](http://www.wakeuptowaste.org)
- [www.netregs.gov.uk](http://www.netregs.gov.uk)
- [www.envirowise.gov.uk](http://www.envirowise.gov.uk)
- [www.wrap.org.uk](http://www.wrap.org.uk)