



Nursery & Garden Industry
Queensland

Growing Bed Design and Installation



Constructing production growing beds to the standard recognised and encouraged under the Nursery Industry Accreditation Scheme Australia (NIASA), the nursery industry best management practice program, provides a range of significant benefits not always easily identified.

Construction of growing beds to NIASA accreditation standards may be slightly more expensive, but is soon recognised as a sound investment when the following factors are considered:

- *increased longevity of the useful life of the growing bed*
- *reduced maintenance of the cropping area*
- *trouble free all weather access*
- *improved production efficiency*
- *healthier work environment*
- *lower labour input requirements*
- *improved efficiency of collection and drainage of irrigation waste water and excess rainfall to water storages*
- *reduced pest and disease pressure*
- *reduced chemical usage*
- *a measure of on-farm biosecurity protection against current and future pest and disease threats.*
- *increased environmental benefits*

The production area and growing beds should be constructed with the current cropping requirements in mind. However, the production area design should be made as versatile as possible, allowing for future changes to production, including crop type, container size, crop density, production runs, irrigation method, growing media, mechanisation and access requirements.

Production areas should be designed to provide suitable all-weather access to the growing beds, provide a safe work environment and reduce any potential environmental issues caused by water from irrigation and rain events. The exposure of the site and growing beds to wind should be determined, and buffers or wind breaks planned to manage all

wind effects on the proposed production area.

The design of growing beds in a production area will be dependent on specific site characteristics, such as the general slope of the production area, the soil type and expected rainfall volume, intensity and frequency. Growing beds should be designed and constructed to provide complete separation from the soil (a potential pest and disease source), divert local waste water and overland flow away from production areas, quickly drain away irrigation waste water, and efficiently remove excess rain water to water storage facilities. A well designed growing bed will prevent the water rising to the level of the container drainage holes, reducing the risk of contaminating the crop with pathogens.

The first step in designing a growing bed is to identify the slope and nature of the ground to be built on. This, in combination with an assessment of potential runoff volumes, is a critical component of designing growing beds. Information on rainfall intensity, frequency and duration can be obtained from the Bureau of Meteorology to assist in sizing of drainage systems to carry expected flows from rainfall events. If rainfall events are catered for in the design the system will have sufficient capacity to carry any irrigation runoff generated. Assessment of the fall and earthworks required may result in the production area being divided into smaller zones, and runoff water being collected in pits to be subsequently disposed of or pumped to a water storage.

Ground preparation for the growing bed construction should aim for a fall of 1:70 to be maintained to ensure that drainage water is carried away quickly and effectively, without causing damage to the growing surface.

Once the site has been graded, the trenches for subsurface drainage are dug through the area. Trenches for subsurface drainage pipes should be



excavated to a fall of 1:100 to allow sufficient flow within the pipes to efficiently remove the drainage water and minimise sediment build-up.

Subsurface drains are generally installed in a herringbone pattern, with trenches spaced approximately 5-6 m apart over the growing area. However, the spacing and size of the subsurface drains is dependent on the anticipated intensity of rainfall. If insufficient drainage is installed, the system will not be able to dispose of the water quickly enough, and water will move through the blue metal as the drainage pipes overflow, leading to erosion of the growing bed.

Once earthworks are completed the whole area, including the drainage trenches, is covered with black builder's plastic of a minimum thickness of 200 microns. This creates a barrier between the nursery bed and the underlying soil so drainage water can be collected and drained away efficiently. This also prevents drainage water causing boggy areas and contaminating groundwater supplies. The plastic also helps minimise the need to top up the blue metal by preventing the underlying soil moving into the blue metal bed.

To enable water to be carried away more rapidly, slotted Ag-pipe or PVC pipe is laid into the trenches on top of the plastic, and the trenches backfilled with 20 mm blue metal. Slotted pipe with a sock can be used to minimise the movement of fines into the drainage system and reduce blockages.

After the installation of the sub-surface drainage, the growing bed is covered with a minimum 75 mm depth of 10-25 mm blue metal or similar. The

Figure 1: Laying blue metal on growing beds



material used for this must be free draining and contain minimal fine particles to reduce blocking of the subsurface drainage. All efforts must be made to prevent puncturing the plastic, which will allow water through to the underlying soil, creating boggy areas. Machinery should not be driven over the plastic once it is laid, and if machinery is used to move the blue metal, it must only be driven over the areas already covered by blue metal. Another option may be to use a tipper truck used for laying blue metal on roads to lay the bed (Figure 1).

Weedmatting can be installed on top of the growing bed to prevent debris and spilt growing media from contaminating the blue metal, and to provide a more stable platform for smaller sized containers. A weed mat surface also makes the area easier to clean between crops, but will result in dirty pots from media splash onto the containers.

The installation of the irrigation system is ideally done once the blue metal has been laid. Having no irrigation to work around makes it easier to spread the blue metal, but it may be more convenient to install the irrigation first if the preference is for pipes to be buried under the blue metal.

If upright sprinklers are used, a stake will be necessary to support them on, and this may mean that the membrane will be punctured. The amount of water draining into the ground underneath the plastic through these holes can be minimised by mounding the soil under the plastic directly around the stake, and sealing the hole with tape. It should be noted that laying irrigation laterals under the plastic can lead to maintenance problems if the system needs to be accessed at a later date and would not be recommended.

For more information on growing bed construction refer to "Managing Water in Plant Nurseries".

Lex McMullin

Farm Management Systems Officer
Nursery & Garden Industry Queensland