

# *Best Management Practices (BMPs) for Nurseries to Protect Water Quality*

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**T**his water protection program has been divided into three stages for ease of implementation. Stage I should be implemented wherever feasible by all nurseries. Stage II is strongly recommended for implementation whenever physically and financially possible, whereas Stage III illustrates the ideal in water quality management. The specific recommendations for protecting water quality have been broadly categorized into the following three management areas: irrigation, fertilization, and pest and pesticide management. Justification for implementing the prescribed BMPs and their relevance to protecting water quality can be found in appropriate chapters of the publication *Water Quality Handbook for Nurseries*.

## *I. Irrigation Management*

### **A. Backflow Prevention**

#### ***Stage I***

- Install backflow prevention devices.
- Train personnel to keep the end of the filler hose above the spray tank's water level, leaving an air gap between the water and the hose.
- Ensure that someone is near the spray tank during all filling and mixing operations.
- Fill tanks with water first, then move the tanks away from the water source to add pesticide or fertilizer.
- If well water is used on site for human consumption, have the well water tested regularly for contamination.

#### ***Stage II***

- Check backflow prevention devices at least once a year and record the date and result of this check.
- Move fuel tanks, pesticide storage bins, or any other chemical storage units to sites at least 100 feet away from wells or other water supplies.

#### ***Stage III***

- Fill and seal any nearby abandoned wells according to the specifications of the Oklahoma Water Resources Board.

### **B. Runoff and Storm Water Management**

#### ***Stage I***

- Become familiar with all regulations regarding irrigation runoff and find out if a water discharge permit is required.
- Determine where and how much irrigation runoff leaves the nursery.
- Test and record the quality of irrigation water and runoff. Compare lab results against local and Oklahoma water quality standards and regulations.
- Develop a plan to deal with off-site storm water retention and runoff from the nursery.
- Keep records of rainfall or utilize Mesonet data for this purpose.

#### ***Stage II***

- Use drip irrigation or intermittent (pulse) irrigation to reduce wasted water.
- Adjust individual sections of the irrigation system to avoid excess watering in some sections.
- Group plants with similar water needs together to improve irrigation efficiency.
- Establish plant buffer zones between production areas and ditches, creeks, ponds, lakes, or wetlands.
- Convert paved or bare soil areas to vegetation that will retard runoff (turf grasses or other comparable plant materials) wherever possible.

#### ***Stage III***

- Install and use moisture sensors, such as tensiometers, for more accurate scheduling of irrigation.
- Capture runoff water on site and then recycle it onto crops, blending it with fresh water as necessary.

## *II. Fertilization Management*

#### ***Stage I***

- Test irrigation water sources three times a year for salt levels, bicarbonates, and pH. Review the results before any fertilizer is added.
- Test field soils annually to account for carry-over of nitrogen and other nutrients that might be present. Use this information to determine fertilization levels.

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- Purchase pH and EC meters and use them to monitor pH and EC (soluble salts) of the media, soil, and irrigation source water.
- Relocate fertilizers that are stored within 100 feet from water sources.

### **Stage II**

- Initiate transition from the use of soluble fertilizers to controlled-release fertilizers.
- Whenever feasible, spread out applications of controlled-release fertilizers and use split applications of soluble fertilizers over the growing season.
- Reduce routine leaching of crops.

### **Stage III**

- Eliminate routine leaching of crops.
- Use only controlled-release fertilizers except when special circumstances warrant the occasional use of soluble formulations.

## **III. Pest and Pesticide Management**

### **A. Integrated Pest Management**

#### **Stage I**

- Discontinue routine spray programs for pests. Apply pesticides only when needed.
- Map the nursery to document plant locations. Use this plant map to methodically inspect the nursery weekly and record pest problems.
- Identify specific pest problems to determine appropriate control options.
- Use action thresholds based on acceptable levels of infestation or disease to decide when to treat.
- Use traditional chemical pesticides effectively.
- Start using some of the many highly effective, softer pesticides that are much less toxic to the environment, e.g., horticultural oils or soaps.
- Make careful pest control notes in the field and transfer them to permanent records upon returning to the office.
- Evaluate and record the effectiveness of previous control strategies during weekly inspections.
- Identify changes in cultural practices that might reduce specific pest problems.

#### **Stage II**

- Begin growing and selling pest-resistant (low pesticide input) plant materials.
- Identify biological control agents that can replace chemical pesticides.

- Develop procedures for applying pesticides directly on or around the plant, rather than using broadcast-ing or widespread spraying, which unnecessarily ex-poses soil.

#### **Stage III**

- Assign one person to be an IPM manager, with re-sponsibility for coordinating all pest management actions.
- Use more bio-intensive control options, such as bio-logical control and improved cultural practices.

### **B. Preventing Contamination from Pesticides**

#### **Stage I**

- Know the soil type and depth to ground water at the nursery site. Porous soils and shallow water tables require special care.
- Store pesticides in a facility with an impermeable floor and no floor drain situated at least 100 feet from any well, stream, or pond.
- Mix pesticides at least 100 feet from any well, stream, or pond.
- Use up all mixed pesticides on suitable plant mate-rial. Don't store or dump them.
- Triple rinse or pressure rinse used pesticide contain-ers and then spray rinse water over a production area.
- Do not get rid of unused pesticides by washing them down drains or throwing containers into farm dumps.
- Follow prescribed precautions carefully when apply-ing soil-based pesticides. Do not overapply foliar-based pesticides.
- Do not apply pesticides or other agricultural chemi-cals when rainfall is imminent or heavy irrigation is scheduled.
- Do not spray pesticides around sinkholes.

#### **Stage II**

- Draw up an emergency action plan to contain pesti-cide spills in mixing and storage areas and to clean up pesticide spills in production areas. Instruct all personnel in the use of this plan.
- Utilize hazardous chemical collection days to get rid of old chemicals. Return empty pesticide containers to dealers.
- Keep records of soil and water tests as a reference for making future pesticide application decisions.

#### **Stage III**

- Compare the leaching and surface runoff potentials of alternative pesticides and use those with the low-est potential to contaminate, i.e., low leaching poten-tials for porous soils and shallow water tables or low runoff potentials for sites near surface water bodies.