PUBLICATION 8124 FWQP FACT SHEET 3.9

Management Goals and Management Practices: Nursery and Floriculture

Sediment Management Goals and Management Practices for Nursery and Floriculture

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This fact sheet includes *Management Goals* (MGs) and *Management Practices* (MPs) for reducing soil erosion at its source and capturing sediment before it enters waterways, where it can cause water quality impairments downstream. The development of a comprehensive farm plan for sediment management in floriculture and nurseries involves a series of eight basic MGs:

MG 1. Evaluate the operation for irrigation, rainfall, and stormwater runoff patterns to identify erosion problem areas and their causes.

MG 2. Develop a nursery layout plan to minimize erosion from roof runoff and outdoor production areas.

MG 3. Review and improve irrigation practices.

MG 4. Implement practices that intercept runoff and sediment as close to the source as possible.

MG 5. Coordinate your efforts to control sources of runoff, sediment, and erosion with those of neighboring nurseries and farms.

MG 6. Protect unpaved roads and other heavy-use or bare soil areas from concentrated flows of water.

MG 7. Detain or filter sediment and runoff before it leaves the property.

MG 8. Evaluate and maintain sediment management goals and management practices.

The following MGs and MPs are intended to serve as a guide to help growers manage erosion and sediment during the production of floriculture and nursery stock. Growers have the greatest control over their own irrigation practices, but many of the MPs also provide some measure of management for erosion and sediment that result from rainfall events.

The best strategy for preventing sediment loss, water pollution, and damage to floriculture crops and nurseries is to develop a system of practices that includes back-up practices in case one strategy fails. Prevention is cheaper than repair and clean up.

Many of the specific MPs require some hydrology or engineering calculations to avoid damage from large storms. This publication provides Natural Resources Conservation Service (NRCS) names and numbers for practices that have NRCS construction standards and specifications. Please consult your local NRCS office for free assistance with developing these practices.

MG 1. Evaluate the operation for irrigation, rainfall, and stormwater runoff patterns to identify erosion problem areas and their causes.

MP 1.1. Identify locations where rainfall or irrigation runoff causes soil loss or soil deposition.

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Farm Water Quality Planning
A Water Quality and Technical Assistance Program for California Agriculture
http://waterquality.ucanr.org

This Fact Sheet is part of the **Farm Water Quality Planning (FWQP)** series, developed for a short course that provides training for growers of irrigated crops who are interested in implementing water quality protection practices. The short course teaches the basic concepts of watersheds, nonpoint source pollution (NPS), self-assessment techniques, and evaluation techniques. Management goals and practices are presented for a variety of cropping systems.

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MP 1.2. Identify upstream causes of accelerated runoff and erosion, with special attention to offsite sources, roof runoff, areas where runoff is concentrated on a road, and failure of existing management practices such as plastic-lined channels.

MP 1.3. Review current management goals and identify which cultural practices are effectively controlling runoff and erosion processes.

MG 2. Develop a nursery layout plan to minimize erosion from roof runoff and outdoor production areas.

MP 2.1. Provide a means of collecting and managing stormwater roof runoff from buildings including greenhouses (NRCS #558, Roof Runoff Management System).

MP 2.2. In fields, perform land smoothing prior to listing to remove irregularities on the land surface so that water will not be trapped or concentrated in low spots (NRCS #464, Irrigation Land Leveling, and NRCS #466, Land Smoothing).

MP 2.3. In furrowed fields, use survey instruments or hand levels to set furrow slopes for each planting block, with the following goals (NRCS #557, Row Arrangement):

MP 2.3.1. Avoid low spots within furrow run where water will accumulate.

MP 2.3.2. Where furrow slopes vary within a single field block, seek an average slope to minimize extreme slopes in part of the field.

MP 2.3.3. Avoid furrow slopes in excess of 3% at the top of a field since runoff from these furrows will increase surface flow along the entire length of the field road. Furrows with slopes in excess of 3% will cause less damage if they are located only at the bottom of the field.

MP 2.3.4. Break the block into two blocks and set furrow slope to less than 3% in each block separately if furrow slope exceeds 5% in part of a block.

MP 2.3.5. Follow the contour of the land where bedding, fumigation, and spraying equipment will allow.

MP 2.3.6. Use furrow layout to direct water away from steepest roads.

MP 2.3.7. Avoid concentrating runoff from two field blocks onto a single roadway unless adequate runoff capacity can be provided through an underground outlet or lined channel.

MP 2.4. Locate roads between field blocks to follow lowest water-concentrating swales, along highest ridge lines, and as needed where furrow angles change (NRCS #560, Access Road).

MP 2.5. Avoid cultivation or road construction on slopes greater than 25%.

MG 3. Review and improve irrigation practices.

MP 3.1. Conduct an irrigation audit or utilize the services of a mobile irrigation laboratory and adjust the system accordingly. Use the catch-can method to determine the efficiency of a drip irrigation system.

MP 3.2. Avoid overirrigating. Irrigate according to the soil or substrate's water-holding capacity (NRCS #449, Irrigation Water Management).

MP 3.3. Avoid irrigating large open areas susceptible to erosion.

MP 3.3.1 Consolidate container plants and shut off irrigation in unused portions of production areas.

MP 3.3.2 Group container plants by water requirements.

MP 3.4. Reduce surface runoff from irrigation.

MP 3.4.1. Match irrigation application rates with infiltration or percolation rates of the soil or substrate.

MP 3.4.2. Use mulch to increase infiltration and prevent splashing.

MP 3.5. Utilize pulse or cyclic irrigation to apply irrigation water over short intervals, thereby reducing the amount of water lost from containers and surrounding areas.

MP 3.6 Minimize the application of irrigation to saturated or nearly saturated soils; avoid irrigating just prior or just after a significant rain event.

MP 3.7. Convert overhead irrigation systems to drip (NRCS #441, Microirrigation System), sub-irrigation, or hydroponic systems to reduce the impact of water droplets.

MP 3.8. Inject a flocculating agent, such as polyacrylamides, to remove sediment (NRCS #450, Anionic Polyacrylamide).

MG 4. Implement practices that intercept runoff and sediment as close to the source as possible.

MP 4.1. Utilize sediment control devices such as sandbags and engineered sediment barriers (straw wattles, synthetic hay bales, fiber mats, and rolls) to slow or prevent sediment from moving a significant distance from its source.

MP 4.2. Cover crops can be used to protect bare soil from erosion during fallow cycles and to build up soil organic matter as a crop rotation. Cover crop roots and the cover crop residues incorporated later will increase infiltration and prevent erosion. Legume cover crops will also improve soil fertility and lessen reliance on commercial fertilizers (NRCS #340, Cover and Green Manure Crop).

MP 4.3. Plant bare soil and disturbed areas such as cut banks, field margins, and abandoned slopes with a dense cover of vegetation to control erosion and suppress weed growth. Select a mix of species that will establish quickly but also provide long-term coverage, attract beneficial insects, and compete against weed species (NRCS #342, Critical Area Planting).

MP 4.4. Treat areas susceptible to erosion, such as slopes or unlined drainage channels, with polyacrylamides to improve stabilization (NRCS #450, Anionic Polyacrylamide).

MP 4.5. A hedge of shrubs can be established along field margins or between field blocks to reduce wind effects, protect slopes from erosion, and attract beneficial insects. (NRCS #422, Hedgerow Planting).

MP 4.6. A row of trees or large shrubs can be established as a windbreak, to reduce spray drift, and to intercept insect and weed seed disbursement. This planting can also help protect steep slopes, stabilize stream or ditch banks, and reduce soil saturation in low-lying areas. (NRCS #612, Tree/Shrub Establishment).

MP 4.7. Manage existing gullies by controlling concentrated runoff with a combination of management, vegetative, and structural measures to prevent the advance of the gully. Prevent head cutting by installing a grade stabilization structure. (NRCS #410, Grade Stabilization Structure; NRCS #362, Diversion; NRCS #342, Critical Area Planting; NRCS #620, Underground Outlet; NRCS #557, Row Arrangement).

MG 5. Coordinate your efforts to control sources of runoff, sediment, and erosion with those of neighboring nurseries and farms.

MP 5.1. Work with neighboring landowners, when possible, to reduce runoff sources and impacts of soil erosion and sedimentation downstream or on adja-

cent lands. Erosion problems can often be solved without expensive measures if neighboring landowners are involved.

MG 6. Protect unpaved roads and other heavy-use or bare soil areas from concentrated flows of water.

MP 6.1. Thoroughly compact all backfill in irrigation pipeline trenches along unpaved roads.

MP 6.2. Grade road surfaces to slope slightly toward center line of the road rather than into ditches alongside roads where erosion can threaten crops.

MP 6.3. Seed moderately used road surfaces with annual or perennial grasses prior to winter rains (NRCS #342, Critical Area Planting).

MP 6.4. Mulch seeded roads to protect the soil surface from rainfall impact, slow surface runoff, protect grass seeds from drying out, and prevent bird predation. Apply mulch at a rate of 50 bales of weed-free straw per acre of road surface or one bale per 60 linear feet of 15-foot-wide road. Crimp straw into soil using an open disk or ring-shank roller (NRCS #484, Mulching).

MP 6.5. Install a diversion at the top of the field to direct runoff from adjacent land uses onto roadways that have sufficient protection to handle the extra flow or divert runoff and dissipate the velocity of flow into areas with established perennial vegetation (NRCS #362, Diversion). This arrangement may require establishment of a filter strip to dissipate flow (NRCS #393, Filter Strip).

MP 6.6. Construct a hillside bench, terrace, or earthen embankment midway up the field to intercept runoff from roadways, reduce the length of the slope, and divert the flow across the slope to a safe outlet (NRCS #192, Hillside Bench).

MP 6.7. Replace existing ditches or eroding channels with a perennial-grassed waterway or lined waterway to convey runoff from cropped areas, diversions, terraces, or roadways.

MP 6.7.1. A grassed waterway is appropriate where slope and expected channel velocities do not exceed the ability of perennial vegetation to prevent erosion. The waterway should be shaped and graded to accommodate the expected runoff (NRCS #412, Grassed Waterway).

MP 6.7.2. A lined channel may be necessary where vegetation and soil type are susceptible to erosion. An erosion-resistant lining of rock or other permanent material will protect the channel bottom and lower banks from peak flows (NRCS #468, Lined Waterway or Outlet).

MP 6.8. Where surface flow of runoff on roads is expected to exceed 3 cubic feet per second, install one of the following conveyance systems:

MP 6.8.1. *Temporary plastic-lined channels.* Use new 4 or 6 mil plastic keyed into soil along sides and top edge by at least 12 inches. Starting downstream, lap subsequent sheets over the top of the lower sheets by 3 feet. Inspect frequently during the rainy season for tears or undermining.

MP 6.8.2. *Underground outlet drains.* Appropriate where road locations are permanent and concentrated surface flow is a chronic erosion problem. Contact NRCS or your local Resource Conservation District (RCD) for proper sizing of corrugated black plastic pipe, frequency of surface riser inlets, and construction techniques (NRCS #620, Underground Outlet).

MG 7. Detain or filter sediment and runoff before it leaves the property.

MP 7.1. If you are recycling water, sediment captured in the water-recycling system can be incorporated into container substrate mixes at rates of less than 5% without changing the overall properties of the mix.

MP 7.2. Where water exits the farm, construct a long level earthen sill to disperse water evenly onto adjacent land or into a natural or constructed channel. This practice prevents concentrated flow that can cause gullying (NRCS #587, Structure for Water Control).

MP 7.3. Where runoff from cropped areas and roadways can be dispersed evenly, plant a vegetative buffer strip between cropped areas or a filter strip along the lower edge of the cropped area. Vegetated strips should be at least 15 feet wide and planted with a close-growing grass or legume combination to detain soils and nutrients and protect the soil from erosion (NRCS #194, Vegetated Buffer Strip; NRCS #393, Filter Strip).

MP 7.4. In locations where erosion is expected and sediment is known to leave the operation, construct a basin at the base of the field to intercept sediment-laden runoff. Basins can be designed to provide vehicle passage along the berm and can serve as parking areas or turning space after the rainy season. Consult with a hydrologist, an engineer, or an NRCS or RCD specialist to determine a size for the basin that is suited to the expected sediment load and to determine the pipe outlet size (NRCS #350, Sediment Basin).

MP 7.5. In locations where sediment as well as excess runoff may cause gullying or flooding problems downstream, construct a water and sediment control basin. Similar to a sediment basin, this basin is large enough to detain peak rainfall runoff as well as sediment. The detained water is slowly released after the storm. This practice is useful where plastic bed mulch is expected to increase runoff from the property. Consult with a hydrologist, an engineer, or an NRCS or RCD specialist to determine the optimum design (NRCS #638, Water and Sediment Control Basin).

MG 8. Evaluate and maintain sediment management goals and management practices.

MP 8.1. Evaluate the management goals and management practices implemented for sediment management during future runoff periods to ensure proper operation and function. Correct deficiencies as needed. Remove accumulated sediment regularly and incorporate it into the container substrate at a rate of less than 5% or reapply it to fields.

REFERENCE

Adapted from Daniel Mountjoy's *Sediment Management Goals and Recommended Practices for Strawberries* (Farm Water Quality Planning Fact Sheet 3.12), UC ANR Publication 8071.

FOR MORE INFORMATION

You'll find detailed information on many aspects of resource conservation and nursery and landscape work in these titles and in other publications, slide sets, CD-ROMs, and videos from UC ANR:

The Farm Water Quality Plan, publication 9002
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Publication 8124

pr-11/04-WJC/CR ISBN 978-1-60107-303-7

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This publication has been anonymously peer reviewed for technical accuracy by University of California scientists and other qualified professionals. The review process was managed by the ANR Associate Editor for Natural Resources.