Hillside Farming: Managing Soil and Water Slope

AWQA MEETING
12/11/2013
Preventing Runoff at the Source

• **4 Ds:**
  - Decrease
  - Detain
  - Dissipate
  - Divert

• **ACT**
  - Avoid
  - Control
  - Trap
## Cover Crop

<table>
<thead>
<tr>
<th>Seed Varieties</th>
<th>Life Cycle &amp; Planting Time</th>
<th>Grass Characteristics</th>
<th>Lbs. of seed per 100 ft. by 10 ft. of roadway</th>
<th>Lbs. of seed per acre</th>
<th>Estimated cost per acre for seed</th>
</tr>
</thead>
</table>
| *Cereal Rye
  "Merced" Variety
  Secale cereal
  *Don't confuse cereal rye with annual rye Lolium multiflorum, potentially an invasive weed |
  Annual
  early season Sept-Nov. |
  Good on dry, sandy slopes, excellent roots |
  2 |
  80 |
  52 (a) |
| Common Barley
  "UC 937" Variety
  Hordeum vulgare |
  Annual
  late season Nov. & Dec. or for emergencies |
  Good on all soils, fair roots |
  4.5 |
  180 |
  63 (b) |
| Trios
  "102" |
  Annual
  early season Sept.-Nov. |
  Good on all soils, good roots & low growth pattern |
  1.5 |
  60 |
  57 (c) |
| Tricale |
| California Brome Bromus carinatus (nurse crop, fast germ. rate, short lived - 3 yrs.) |
  Perennial Native Mix
  early season Sept. & Oct. |
  Good on dry, sandy slopes, good roots |
  0.3 |
  25 |
  174 (d) |
| Creeping wild rye Leymus triticoides (long lived, slow germ. rate) |
Row Arrangement
Row Arrangement

1. Lay guideline on steepest portion of the block, setting it at 1.0-2% slope and marking ends with sacks or stakes.

2. Using a string to maintain distance apart, walk uphill 100' or 200', using wheels or tape to measure the distance.

3. After completing the top half of the block, make measurements downhill from guideline.

Row Arrangement Figure A: Laying Guidelines
Row Arrangement
Road Seeding
Waterbars
Waterbars

Table. Water bar spacing recommendations for unpaved roads from Kocher, Gerstein, and Harris. 2007. as adapted from Keller and Sherar 2003. For this table, 'erodive soils' are those with high concentrations of silt or fine sands relative to clay content.

<table>
<thead>
<tr>
<th>Road or trail Grade (%)</th>
<th>Soil erodibility</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Low to non-erodive soils (ft)</td>
</tr>
<tr>
<td>0-5</td>
<td>250</td>
</tr>
<tr>
<td>6-10</td>
<td>200</td>
</tr>
<tr>
<td>11-15</td>
<td>150</td>
</tr>
<tr>
<td>16-20</td>
<td>115</td>
</tr>
<tr>
<td>21-30</td>
<td>100</td>
</tr>
<tr>
<td>30+</td>
<td>50</td>
</tr>
</tbody>
</table>
Hoop Houses Anchor Row Protection
Sediment Basin (NRCS)
Sediment Storage: 900 cu.ft./acre
Detention Storage: 3600 cu.ft./acre
HYDROLOGY: SOLUTION OF RUNOFF EQUATION

\[ Q = \left( P - 0.2S \right)^2 \frac{P-I_o}{P+0.8S} \]

Curves on this sheet are for the case \( I_o = 0.2S \), so that

Rainfall (P)

Direct Runoff (Q)

Rainfall Infiltration

Forest

10-20% Runoff

80-90%
Sediment and Stormwater Control Basins

• Water erosion is affected by:
  – Precipitation patterns
  – Soil properties
  – Slope
  – Vegetative cover

Runoff
Cultivated Hillslope Lands of Northern Monterey Co.
1.5 cfs / acre
Principal Spillways Design

Flow Rate = 5 acres x 1.5 cfs/ac = 7.5 cfs
Principal Spillways Design

Spillway Figure A: Configuration of discharge holes on outlet pipe.
Principal Spillways Design

Flow Rate = 5 acres x 1.5 cfs/ac = 7.5 cfs

Table A2. Discharge Table for a Corrugated Metal Pipe Barrel Flowing Full with a Head of 5.0 ft (K = 1, L = 70 ft).

<table>
<thead>
<tr>
<th>Barrel Diameter (inches)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>4.5</td>
</tr>
<tr>
<td>18</td>
<td>12.2</td>
</tr>
<tr>
<td>24</td>
<td>24.7</td>
</tr>
<tr>
<td>30</td>
<td>42.1</td>
</tr>
<tr>
<td>36</td>
<td>64.5</td>
</tr>
<tr>
<td>42</td>
<td>91.9</td>
</tr>
</tbody>
</table>