### Horticulture:

#### Deciduous fruit trees:
*(Shed all leaves annually)*
- Apricot
- Peach
- Plum
- Apple
- Pear
- Pomegranate

**Rate & Methods of Application**: Use 3 gallons per acre with drip irrigation; Use 2 ounces / 6.5 gallons water as foliar application.

**Time of application**: Use 1 gallon per acre at the beginning of growing season & before first bloom

**Follow up Applications**: Reapply 1 gallon per acre after fruit set (Apples-Peaches) then every 2 weeks; Reapply 1 gallon per acre after fruit set then every 3 weeks for all others trees

#### Evergreen fruit trees:
*Leaves are present throughout the year*
- Citrus (Orange, Lemon, Lime, etc.), Mango, Olive, Avocado, Guava

**Rate & Methods of Application**: Use 3 gallons per acre with drip irrigation

**Time of application**: Use 1 gallon per acre with drip irrigation and before flowering

**Follow up Applications**: Reapply 1 gallon per acre after fruit set followed by 1 gallon per acre in 3-4 weeks

#### Banana

**Rate & Methods of application for first time planting in new land & during land preparation using drip irrigation**: Use 1 to 1.5 gallons per acre in clay soil & 1.5 to 2 gallons; Sandy soil Reapply an additional 3 to 4 gallons

**Time of application**: Split the amount into 3 to 4 doses in the beginning of the growing season (before blooming/budding) and then every 15 days

**Rate & methods of application for second year of planting**: Use 3 to 4 gallons

**Time of application**: Split the amount into 3 to 4 doses in the beginning of the growing season (before blooming/budding) and then every 15 days

#### Grape vines

**Rate & methods of application**: Use 3 gallons per acre with drip irrigation

**Time of application**: Use 1 gallon per acre before budding; Split the rest into 3 doses starting after fruit set and every 15 days under drip irrigation

#### Date Palm tree

**Rate & methods of application**: Use 15 ounces per tree

**Time of application**: Split the 15 ounces into 5 doses, each 3 oz per tree during the growing season

### Vegetables:

#### All Vegetable Crops not listed below

- 3 gallons per acre applied on soil surface or incorporate 2-4" at planting. Reapply 1.5 gallons per acre after the initial application & at prebloom. Reapply 1 gallon per acre at initial fruit set

#### Generals:
*Examples: Tomatoes, Peppers, Cucumbers*

**Open Field with Flood irrigation**: **Rate of & methods of application**: Apply 3 gallons by flood irrigation and/or foliar spraying.

**Time application**: Add 1 gallon to 100 to 150 gallons water and then spray on soil before planting. Reapply 1 gallon per acre after one month. Reapply 1 gallon per acre in 2-4 weeks.

**Open Field/Green Houses with drip irrigation**: **Rate of & methods of application**: Apply 3 gallons by drip irrigation.

**Time application Under drip irrigation**: Apply 0.5 gallon after planting. Add 0.5 gallon every 2 weeks.

**Green house/foliar application**: Use 2 ounces in 25 gallons water

**With insecticides and fungicides**: Use 4 ounces in 150 gallons water

#### Potatoes

**Rate & methods of application**: Apply 3 gallons per acre under pivot system.

**Time of application**: Split the amount into 4 doses:
- **1st dose**: 1 gallon at the planting of the tubers;
- **2nd dose**: 1 gallon at Ridge (after 25 to 30 days of planting);
- **3rd dose**: 1/2 gallon after 2 weeks after second application;
- **4th dose**: 0.5 gallon after 2 weeks after third application

### Ornamentals

#### Commercial Nurseries
*(Container Grower)*

**Rate & methods of application**: Use 3 gallons in 100 gallons of water, Drench: 6 " pots -6 to 8 ounces per plant; Drench: 10 " pots -32 ounces per plant

#### Container Grown Ornaments (Newly/Established)

**Rate & methods of application**: Use 15 ounces per tree

**Time of application**: Split the 15 ounces into 5 doses, each 3 ounces per tree during the growing season

#### Field Grown Ornamental

**Rate & methods of application**: Use 3 gallons in 100 gallons of water

**Time of application**: Drench or foliar application every 4 weeks

#### Liner and Seed Beds

**Rate & methods of application**: Use 1.5 gallons in 15 gallons of water

**Time of application**: Drench or foliar application every 4 weeks

#### Landscape
*(Ornamentals/Flower Beds)*

**Rate & methods of application**: Use 3 gallons in 100 gallons of water; 2.5 gallons for foliar

**Time of application**: Drench at transplanting or every 4 weeks.
### Landscape (Shrubs & Trees)

**Rate & methods of application:** Use 3 gallons in 100 gallons of water; Drench 1-4 gallons per plant depending on size; Foliar use 2.5 gallons in 100 gallons of water to run off or 9 ounces per 1000 sq ft in 2 gallons of water to run off.

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<table>
<thead>
<tr>
<th><strong>Agricultural Crops</strong></th>
<th><strong>Rate &amp; methods of application</strong></th>
<th><strong>Time of application</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>All Crops not listed below</strong></td>
<td>1-2 gallons per acre at seedling stage or at transplanting. Use 2 gallons per acre post applications if needed.</td>
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<tr>
<td><strong>Rice</strong></td>
<td>Use 2 gallons per acre in clay soil by spraying.</td>
<td>Spray 1 gallon per acre on soil after soil plowing and irrigation and before transplanting the rice seedlings. Reapply 1 gallon per acre 1 month after transplanting the rice seedlings.</td>
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<tr>
<td><strong>Cotton &amp; Corn</strong></td>
<td>Use 2 gallons per acre by spraying.</td>
<td>Spray 1 gallon per acre on soil during land preparation and before planting. Reapply 1 gallon per acre after 1 month of planting and after thinning.</td>
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<tr>
<td><strong>Wheat &amp; Barley</strong></td>
<td>Use 1.5 gallons per acre at planting to increase tillers &amp; root development. Reapply 1 gallon per acre with liquid nitrogen at feeks 5 stage or 2 quarts per acre if applying nitrogen twice during this stage in the spring.</td>
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<tr>
<td><strong>Clover</strong></td>
<td>Use 2 gallons per acre by spraying.</td>
<td>Spray in case of flood irrigation on soil or use with fertilizers in case of sprinkling irrigation. <strong>1st dose:</strong> Apply 1 gallon per acre during land preparation  <strong>2nd dose:</strong> Reapply 1 gallon per acre after 2 to 3 weeks of seed germinations  <strong>Reapply an additional 0.5 gallon per acre after each cut</strong></td>
</tr>
<tr>
<td><strong>Soybean &amp; Peanuts</strong></td>
<td>Use 3 gallons per acre in sandy soil by spraying or drip irrigation.</td>
<td>Spray in case of flood irrigation on soil or use with fertilizers in case of sprinkling irrigation or drip irrigation. Split the amount into 3 doses:  <strong>1st dose:</strong> 1 gallon per acre at planting (seedling)  <strong>2nd dose:</strong> 1 gallon per acre after 30 days of planting  <strong>3rd dose:</strong> 1 gallon per acre after 2 weeks  <em>Can be added with a post-emergence application of Glyphosate or Blazer herbicide, surfactant &amp; manganese during the fourth trifoliate</em></td>
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<tr>
<td><strong>Sugar Cane</strong></td>
<td>Use 3 gallons per acre in sandy soil by spraying.</td>
<td>Spray on soil in case of flood irrigation. Split the amount into 3 doses:  <strong>1st dose:</strong> 1 gallon per acre at beginning of growing season  <strong>2nd dose:</strong> 1 gallon per acre after 2-3 weeks  <strong>3rd dose:</strong> 1 gallon per acre after 2-3 weeks</td>
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<tr>
<td><strong>Sugar Beets</strong></td>
<td>Use 3 gallons per acre in sandy soil by spraying.</td>
<td>Spray on soil in case of flood irrigation. Split the amount into 3 doses:  <strong>1st dose:</strong> 1 gallon per acre at beginning of growing season  <strong>2nd dose:</strong> 1 gallon per acre after 2-3 weeks  <strong>3rd dose:</strong> 1 gallon per acre after 2-3 weeks</td>
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<td><strong>Pastures</strong></td>
<td>Use 1.5 gallons per acre for spring application followed by 1 gallon per acre after each harvesting period.</td>
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<tr>
<td><strong>Tobacco</strong></td>
<td>Use 2 gallons per acre at transplant/seedling stage in transplant water. Greenhouse use 1 gallon in 50 gallons of water in float beds</td>
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<th><strong>Turf</strong></th>
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<tr>
<td><strong>Hydro seeding</strong></td>
<td>Use 8 gallons in 400-500 gallons of water/acre with the hydro-seeding mix</td>
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<tr>
<td><strong>Sod Farming, Commercial Turf, &amp; Athletic Fields</strong></td>
<td>Use 3 gallons in 60-70 gallons of water/acre. Higher rates may be required on compacted soils</td>
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<tr>
<td><strong>Landscape Turf</strong></td>
<td>Use 3 gallons in 60-70 gallons of water/acre. For smaller applications: Use 9 ounces / 1000 in 2 gallons of water. Higher rates may be required on compacted soils</td>
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<tr>
<td><strong>Golf Courses</strong></td>
<td>For <strong>greens and tees:</strong> Use 6.0 ounces /1000 sq ft, 4-6 applications per year  For <strong>fairways:</strong> Use 4.0 ounces /1000 sq ft, 4-6 applications per year  May be applied with fertilization and at time of over seeding and sprigging</td>
</tr>
</tbody>
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*actosol can be used alone or in combination with fertilizers & chemicals as tank mixes. Check compatibility before mixing & use largest nozzle sizes to ensure clog free flow.*

**Recommended dilution rates unless otherwise listed:**

*Soil: 20:1 / Foliar: 40:1*
**ARCTECH, Inc.** manufactures humic acids under the trade name actosol - an organic humic biostimulant and fertilizer. Humic substances (HSs) are naturally occurring, brown and black organic matter. Comprised of humic acid, fulvic acid and humin, they are collectively called “humus.” The importance of humus in productive agriculture has been known for a long time. Application of HSs in soil results in increased crop yields and tree biomass even in arid, saline, impaired lands which otherwise are lying barren. The HSs applied in the soils become stable and increased biomass uptakes more carbon dioxide.

Benefits of humic acids in the agricultural growing cycle of the plant helps in three ways:

1. Physically by agglomerating the soil (improves tilth and improves infiltration of soils) especially soils compacted with high Na and salt build up, by increasing moisture holding capacity; thus resistant to drought, decreases soil erosion.
2. Chemically by increasing EC of soils, increasing nutrient uptake especially P, increasing buffering capacity.
3. Biologically by being electron accepter and thus increases cell division or growth, hormonal activity, and enhanced photosynthesis.

In USA, in commercial sector HA products are being recognized as excellent natural biostimulant.

Concentration of **actosol** at the time of application: The Humic Acid optimum efficacy and its positive effect on increasing yield and quality of plants depends critically on its concentration at the time of application. At high concentration, humic acid has herbicidal effect and can cause phytotoxicity to the plants. As shown in the following Figure 1, application rate ranges from 800 ppm for foliar applications and 1500 ppm for soil applications.

![Figure 1 Application rates of humic acid for plant growth](image)

**Methods of actosol applications:**

**actosol** can be applied with irrigation water systems including surface irrigation/flood irrigation, drip irrigation, spray and pivot irrigation.

**Jar Test for compatibility:**

**actosol** is compatible with most fertilizers, pesticides, fungicides & herbicides, However, a standard jar test is recommended. Combining chemicals to do several jobs with a single spray saves time and labor.

Following is the steps for conducting the jar test:

1. In one gallon container: Add ½ gallon of water and then add actosol and fertilizer, or actosol and pesticide, or actosol and fungicide, or actosol and herbicide in proportion to rates to be used in the field. Then mix well.
2. In another one gallon container: Add ½ gallon of water and 1/2 teaspoonful of an adjuvant; and then add actosol and the pesticide, or fungicide, or herbicide in proportion to rates to be used in the field.
3. Close both jars and shake for 30 seconds.
4. Let the jars stand for at least 5 minutes (30 minutes is better) and check the results. If the mixture without the adjuvant stays mixed, use the combination in the spray tank.
5. If the mixture **actosol** with the adjuvant and the pesticide or fungicide or herbicide stays mixed, but the one without the adjuvant does not, be sure to add the adjuvant to the spray tank.
6. Should either mixture separate after 5 minutes, but mixes readily after shaking, the mixture can be used in the spray tank if good agitation is maintained. If a separate oily layer, large oil globules, clumps of solids or sludge forms in the bottom of the jar containing adjuvant; the mixture should not be used.