



# DRIP OR SOLID-SET CHEMIGATION OR FERTIGATION INJECTION RATE WORKSHEET FOR WEIGHT-BASED APPLICATIONS

Chemigation Calculation Worksheet Series

By

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# Drip or Solid-Set Chemigation or Fertigation Injection Rate Worksheet for Weight-Based Applications

This worksheet helps growers, consultants, and fieldmen to calculate the necessary **liquid fertilizer or chemical** injection rate for **static irrigation systems** that don't move during irrigation, such as drip, solid set, hand lines, or wheel lines, when the targeted application is specified in **pounds of product per acre**.



Chemigation pump set up to inject fertilizers and agricultural chemicals for distribution to field crops with the irrigation water.

## Required Information:

1. Application or treatment area width in feet (width of the total area that is irrigated during the set).
2. Application or treatment area length in feet (length of the total area that is irrigated during the set).
3. Product application rate in pounds per acre.
4. Product concentration in pounds per gallon.

**Example:** In this example, we are applying Urea Ammonia Nitrate (UAN) 32 (32-0-0), which contains 3.54 pounds of nitrogen (N) per gallon, at 25 pounds of N per acre into a drip irrigation system. The drip lines are 8 feet apart and 820 feet long. The field is a rectangular-shaped block containing 32 drip lines. The grower typically irrigates in 8-hour sets, but wants to apply the fertilizer to spatially set it in the top half of the rooting zone where the active roots are concentrated. So the grower has chosen to apply fertilizer during the last 2 hours, followed by a flush of clean water through the system.

AREA: Determine the size of the field in acres.		
	Example	Your System
<b>A. Dimensions of Treatment Area</b> (Assuming rectangular area) <ul style="list-style-type: none"> <li>Application area width, in feet.</li> <li>Application length, in feet.</li> </ul>	8-foot row spacing × 32 rows = <b>256 ft</b>	
	Length of rows is <b>820 ft</b>	
<b>B. Area of Treatment in Square Feet</b> If not rectangular, calculate accordingly. Width, in feet × Length, in feet.	256 ft × 820 ft = <b>209,920 ft<sup>2</sup></b>	
<b>C. Acreage in Treatment Area</b> Convert treatment area to acres. Acres = Square feet ÷ 43,560 ft <sup>2</sup> /acre. (C = B ÷ 43,560)	209,920 ft <sup>2</sup> ÷ 43,560 = <b>4.82 acre</b>	

VOLUME TO APPLY: Determine the total volume of chemical to apply in gallons.		
	Example	Your System
<b>D. Application Rate (weight)</b> of chemical to be applied per acre.	<b>25 lb N/acre</b>	
<b>E. Product Concentration</b> of the injected chemical solution in pounds per gallon from the label.	<b>3.54 lb N/gal UAN</b>	
<b>F. Product Volume per Acre</b> Pounds per acre ÷ concentration per gallon. (F = D ÷ E)	25 lb/acre ÷ 3.54 lb/gal = <b>7.1 gal UAN/acre</b>	
<b>G. Total Volume of Chemical Needed</b> Volume of chemical to be applied Volume per acre × Total acres. (G = F × C)	7.1 gal/acre × 4.82 acre = <b>34.2 gal</b>	

APPLICATION TIME: Determine the application duration in hours.		
Fertilizers are most effective in the active-rooting zone of the plant, which comprises the top one-third of a plant’s potential rooting depth. Therefore, injecting during the last 1/3 or 1/4 of the set time is recommended, which is then followed by a flush of clean water to rinse the injection and irrigation system, and also to help position the fertilizer in the soil profile.		
	Example	Your System
<b>H. Application Duration</b> Application time in hours.	<b>2.0 hr</b>	

INJECTION RATE: Calculate the injection rate in gallons per hour.		
	Example	Your System
<b>I. Injection Rate in Gallons per Hour</b> Total volume ÷ Application time. (I = G ÷ H)	34.2 gal ÷ 2.0 hr = <b>17.1 gal/hr</b>	

So, the grower would irrigate normally for the first 5.5–6.0 hours. Then the chemical would be injected at 17.1 gal/hr during the last 2 hours of the irrigation set until the 34.2 gallons of liquid fertilizer is gone. Once injection is complete, the injection pump is turned off and the irrigation system will apply only water for another 10–20 minutes, or long enough to be sure that the chemical is completely flushed from the lines.

Some helpful conversions for calibration testing:

Multiply:	By:	To Get:
gallons/hour	2.13	ounces/minute
gallons/hour	63.09	milliliters/minute
gallons/hour	0.0355	ounces/second
gallons/hour	1.05	milliliters/second

## Additional Resources

Carpenter, J., and W.S. Johnson. 1997. [Pesticide Chemigation through Pumped Irrigation Systems](#). *University of Nevada Cooperative Extension Publication FS-97-37*. University of Nevada.

DeValerio, J., D. Nistler, R. Hochmuth, and E. Simonne. 2015. [Fertigation for Vegetables: A Practical Guide for Small Fields](#). *University of Florida IFAS Extension Publication HS1206*. University of Florida.

Haman, D. Z., and F. Zazueta. 2014. [Chemigation Injection Methods for Irrigation](#). *University of Florida IFAS Extension Publication CIR864*. University of Florida.

Hanon, B., N. O'Connell, J. Hopmans, J. Simunek, and R. Beede. 2006. *Fertigation with Microirrigation*. Oakland: University of California Agriculture and Natural Resources.

Kranz, W., C. Burr, J. Hay, J. Schild, and D. Yonts. 2016. [Using Chemigation Safely and Effectively: Training Manual](#). University of Nebraska Extension.

Liu, G., and G. McAvoy. 2015. [How to Reduce Clogging Problems in Fertigation](#). *University of Florida IFAS Extension Publication HS1202*. University of Florida.

Peters, R.T., T. Hoffmann, and W.H. Neibling. 2011. [Calculating Chemigation Injection Rates](#). *Washington State University Extension Publication FS035E*. Washington State University.



Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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