-Irrigation definitions-

Precipitation rates:

Square spacing	Triangular spacing

$$IPH_{gross} = \frac{96.3 \times gpm}{(S \times R)} \qquad\qquad IPH_{gross} = \frac{96.3 \times gpm}{S \times (R \times 0.866)}$$

S = spacing between sprinklers in a row (feet)

R = spacing between rows (feet)

0.866 = sine of 60°

$$96.3 = \frac{ft^3}{7.48} \times \frac{60\ min}{hour} \times \frac{12\ inches}{foot}$$

-or-

$$\text{Net precipitation rate} = \frac{\text{Avg. catch vol. (ml)} \times 3.66}{\text{Runtime (min.)} \times \text{Area of catchcup (sq. in.)}}$$

$$3.66 = \frac{1\ in.3 \times 60\ min.}{16.38\ ml \times 1\ hr.}$$

$$\text{Net precipitation rate} = \frac{\text{Avg. catch vol. (ml)} \times 23.62}{\text{Runtime (min.)} \times \text{Area of catchcup (sq. cm.)}}$$

$$23.62 = \frac{60\ min \times 1\ in.}{1\ hr. \times 2.54\ cm}$$

Irrigation Definitions (cont.)

Coefficient of Uniformity (CU)

- CU = 100 (1-D/M)
- D = (1/n) $\sum$ |Xi-M |
- M = (1/n) $\sum$ Xi
- Where: CU = Christiansen's Coefficient of Uniformity (%)
- D = Average Absolute Deviation From the Mean
- M = Mean Application
- Xi = Individual Application Amounts
- n = Number of Individual Application Amounts

Low quarter Distribution Uniformity (DU$_{lq}$)

DU = [average of low 25%/overall average] X 100

Runtime Minutes= $\dfrac{\text{Target irrigation (min.) x 60}}{\text{Precip. Rate (inches/hour)}}$

Nozzle Discharge

Discharge (gpm) = 29.82 $\sqrt{P}$ D^2 C$_d$

P   = Nozzle pressure (psi)
D   = Nozzle orifice diameter (in.)
C$_d$ = Nozzle discharge coefficient
        (tapered $\cong$ .96 to .98)

or, another way

GPM = 28.6 X (nozzle diam.) 2 X   (PSI HEAD)1/2

Inches (depth) = <u>1.604 x gallons</u>
$$\qquad\qquad\qquad\qquad \text{Ft}^2$$

$$1.604 = \frac{ft3}{7.48\,gal.} \; x \; \frac{12in.}{ft} \; x \; \frac{1}{ft2}$$

Conversion Factors for irrigation

1 psi = 2.31 feet of water column
1 acre-inch = 27,154 gallons
1 cfs = 449 gpm
1 acre = 43560 ft^2
1 cubic foot = 7.48 gallons
1 acre-inch / hour = 453 gpm
1 million gal. per day (mgd) = 694.4 gpm
1 horsepower = 0.746 kilowatts