Substituting in the desired values:

$$\frac{150}{75} \times \frac{100}{34} = 5.9 \text{ ounces}$$

which indicates that 5.9 ounces (165 g) of ammonium nitrate would be dissolved with water to a volume of 100 gallons to obtain a 150-ppm N solution. The same formula could be used for P and K but we must remember the percentages of P and K given on the bag are as oxides, P_2O_5 and K_2O, respectively. Therefore, when using the P_2O_5 and K_2O percentages on the bag and substituting in the above formulas, the ounces obtained for P_2O_5 should be multiplied by 2.3 and the ounces obtained for K_2O multiplied by 1.2.

For example, if potassium diphosphate (54% K_2O) is the potassium carrier the following substitutions are made in the formula.

$$\frac{150}{75} \times \frac{100}{54} = 3.7 \times 1.2 = 4.4 \text{ ounces}$$

Thus, 4.4 ounces (126 g) of potassium diphosphate dissolved to the 100-gallon volume results in a 150-ppm K solution.

If the nursery operator is to inject the K solution into the irrigation water with an injector that has a 1:500 dilution ratio, 499 gallons (1886 liters) of irrigation water are mixed with each gallon of fertilizer solution. Therefore, 500 times 4.4 ounces or 138 pounds (62 kg) of potassium diphosphate are dissolved with irrigation water to a volume of 100 gallons.

$$4.4 \text{ ounces} \times 500 \text{ dilution ratio} = 2200 \text{ ounces}$$
$$2200 \text{ ounces} \div 16 \text{ ounces/pound} = 138 \text{ pounds}$$

This 100 gallons of concentrated solution will be mixed during injection with 49,900 gallons (188,622 liters) of irrigation water for a total volume of 50,000 gallons (189,000 liters) of irrigation water with 150 ppm K. If the nursery operator was irrigating an acre with 0.5 inch (1.27 cm) or 13,500 gallons (51,030 liters), then 3.7 acres (1.5 ha) could be irrigated with the 50,000 gallons of irrigation water or 100 gallons of concentrated K solution.

$$\frac{50{,}000 \text{ gallons of irrigation water}}{13{,}500 \text{ gallons/acre}} = 3.7 \text{ acres}$$

The nursery operator may not want to spend the extra time involved in dissolving dry fertilizers and may choose to purchase solution fertilizer. For example, a 34% N solution could be purchased and injected instead of dissolving and injecting ammonium nitrate. The concentration of N in the solution fertilizer should be obtained from the manufacturer or calculated from the weight of 1 gallon of fertilizer. Assume the fertilizer weighs 10 pounds (4.5 kg) per gallon. Thus, each gallon contains 3.4 pounds or 1,542,214 mg of N. Divide this by 3.8 since 1 gallon is approximately 3.8 liters which converts to 405,846 mg of N per liter of fertilizer or 405,846 ppm N.

$$10 \text{ pounds/gallon} \times \frac{34\% \text{ N}}{100 \text{ (constant)}} = 3.4 \text{ pounds N/gallon}$$

$$3.4 \text{ pounds N/gallon} \times 453{,}592.4 \text{ mg/pound} = 1{,}542{,}214 \text{ mg N/gallon}$$

$$\frac{1{,}542{,}214 \text{ mg N/gallon}}{3.8 \text{ liters/gallon}} = 405{,}846 \text{ mg N/liter} = 405{,}846 \text{ ppm N}$$

If the nursery operator injects this fertilizer and is using a 1:500 injector, the irrigation water would contain 812 ppm N which is about 5.4 times the 150 ppm N desired.

$$\frac{405{,}846 \text{ ppm N}}{500 \text{ dilution ratio}} = 812 \text{ ppm N}$$

$$\frac{812 \text{ ppm N}}{150 \text{ ppm N desired}} = 5.4$$

Thus, each gallon of concentrated fertilizer must be diluted 5.4 times before injection. An alternative is to use an injection system that will dilute the concentrated fertilizer 2706 times, which also results in irrigation water with 150 ppm N.

$$\frac{405{,}846 \text{ ppm N}}{150 \text{ ppm N desired}} = 2706 \text{ dilution ratio}$$

Refer to Circulars 693 and 694 for computational assistance when dissolving fertilizers for injection.

Irrigation Water Monitoring

The elemental content of the irrigation water before and during injection should be determined monthly or as changes are made in the concentration of fertilizer applied. Checking the nutrient concentration of the irrigation water during injection ensures that proper elemental concentrations are being disseminated. The irrigation water may inherently contain fertilizer elements, especially if runoff water is used. Thus, the injected concentration of an element should be reduced to compensate for the indigenous concentration of the element in the irrigation water.

A correlation between the elemental content of the irrigation water and soluble salts of the irrigation water can be established so that future soluble salts levels of the irrigation water containing injected plant nutrients could serve as an indication that appropriate concentrations of elements are disseminated. However, this is only a guideline since the