

CONIFERS:

A Container Nursery Fertilization Program



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CONIFERS

A Container Nursery Fertilization Program

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INTRODUCTION

The CONIFERS program is designed to improve the efficiency of fertilization programs in container nurseries. It was initially designed to serve the container nurseries involved with the production of reforestation, reclamation, and conservation planting stock. However, CONIFERS also can be applied to other container production programs in the horticulture industry.

CONIFERS provides a quick and accurate way to calculate fertilizer solutions in nurseries. The program has been written such that almost any nursery employee can determine how to mix fertilizer solutions accurately with little training. The CONIFERS program goes one step further by providing a rapid means of calculating the duration of fertilizer application to achieve target levels based on the delivery system. This feature of CONIFERS will assist nursery managers in reducing fertilizer runoff and costs by reducing over- and under-fertilization.

The program is designed for growers who fertilize through their overhead irrigation systems. The program is designed to work with both traveling boom and fixed irrigation systems. Using the application time portion of the program, nursery managers also can calculate durations of irrigation cycles based on delivery system parameters.

CONIFERS is designed to be used with commercially available, premixed, water-soluble fertilizers. Therefore, it cannot adjust the ratio of primary nutrients in the fertilizer. It is designed for the user to set a nitrogen level; the program will calculate the rates of phosphorus and potassium applied as well.

The units were selected based on conventional equipment (i.e. flow meters in gallons per minute and weights in milligrams, grams, and pounds).

EQUIPMENT REQUIRED TO RUN CONIFERS

1. IBM®-compatible computer with either a 3.5" or 5 1/4" drive.
2. DOS® 2.1 or greater.
3. The CONIFERS program.

KEYING CONVENTIONS USED IN THIS MANUAL

1. Throughout the text portion of the manual, any key-strokes required for input are denoted encased on either side by < > symbols.
2. Throughout the examples included in the appendices entries on the screen displays are depicted in bold case followed by an <Enter>.

INFORMATION REQUIRED TO RUN CONIFERS

1. The target concentration of nitrogen to be applied in parts per million (ppm).
2. Ratio of nitrogen (N), phosphorus (P), and potassium (K) in the water-soluble fertilizer. This can be obtained from the label on the fertilizer bag (i.e. 20-20-20 or 10-15-12).

This is all the information required to run the fertilizer calculation portion of this program.

3. The target amount of fertilizer solution (in milliliters) or nitrogen (in milligrams) to be applied to each container. If you are unsure about how to calculate how much fertilizer solution is needed to apply, Landis et al. (1990) provides a quick way to determine the water-holding porosity of a container. This calculation goes as follows:

- A. Determine *total container volume*. This can be done by plugging the bottom of a container and filling it with water. Then pour the water into a graduated cylinder and measure its volume.
- B. Determine *total pore volume*. This is done by plugging the drain holes of the container and filling the container with media. Then add a measured amount of water to the container until the media is completely saturated with water at the surface. The measured amount of water added is the total pore volume.
- C. Determine the *aeration pore volume*. This is done by removing the plugs at the bottom of the container and collecting the water that drains out. The volume of this drainage water is the aeration pore volume.
- D. Calculate the *water-holding pore volume*. This is done by subtracting the aeration pore volume from the total pore volume.

The amount of fertilizer you want to apply should be equal to the water-holding pore volume. This will prevent under-fertilizing and reduce over-fertilization and nutrient runoff.

* Note: This is the maximum water holding capacity of your container/media combination. As your crop grows this volume becomes less due to compaction and roots occupying pore space.

- 5. The flow rate of the system in gallons/minute.
- 6. Irrigation system efficiency. No overhead irrigation system is 100% efficient. Some irrigation water is usually applied directly to walkways and wall surfaces. This step requires the user to estimate what percentage of irrigation water does not fall on the nursery bench. There are techniques available to determine this; however, these techniques require detailed explanations and measurements and we will not cover them here.

7. Determine container system efficiency. There is an inherent irrigation inefficiency in most container growing systems. This inefficiency involves the gaps or voids of surface areas between container openings due to the arrangement of containers or their support structures. (Landis et al. 1989). A simple set of calculations can be used to determine container system efficiency.

- A. Calculate the container opening of one container.

Most container openings are either round or rectangular.

$$\text{Area of a circle} = 3.14159 \times \text{radius}^2$$

$$\text{Area of a rectangle} = \text{side 1 length} \times \text{side 2 length}$$

- B. Calculate the number of containers per tray or flat.
- C. Calculate the total surface area of a tray.
- D. Calculate the total area of container opening per tray. (Line A X Line B).
- E. Calculate container system efficiency.

$$\frac{\text{Line D}}{\text{Line C}} \times 100$$

For example, say you are using 1-gallon pots with a 6" diameter opening. There are no trays so we will estimate using a 1-square-foot area.

- A. Open area of one container =
 $3.14159 \times 3.00 \text{ in}^2 = 28.27 \text{ in}^2$
- B. Containers per square foot = 4
- C. Total surface area of 1 ft² = 12" X 12" = 144 in²
- D. Total open area = 28.27 in² X 4 = 113.10 in²
- E. Container system efficiency = 113.10 ÷ 144.00 = 78.5%

8. For fixed irrigation systems the following information is necessary:

- A. The surface area square feet of one bench.
 - B. the number of benches being irrigated/fertilized simultaneously.
9. For traveling boom irrigation systems the following information is necessary:
- A. Width of seedling bed (bench width) in feet. This value will need to represent both bench widths being covered by a single irrigation boom if there is an aisle between them;
 - B. Length the boom travels in feet.
 - C. Boom speed in feet/minute.
10. The injector or siphon ratio.

HOW TO RUN CONIFERS

User Inputs

All user inputs into CONIFERS are either alphabetic (without case sensitivity) or numeric as an integer. There are no decimal inputs or percent sign inputs. The minimum concentration in parts per million (ppm) is one (1). Any corrections to an input can be made by using the <Backspace> key before pressing the <Enter> key.

Starting CONIFERS

Place the CONIFERS program disk in an appropriate drive. Type the drive designation followed by a colon (:) (e.g., a: or b:) and press <Enter>.

To start CONIFERS, simply type <CONIFERS> at the DOS prompt and press the <Enter> key.

Running a CONIFERS Calculation

CONIFERS is a prompt-driven program. All you need to do is enter an appropriate response at the end of each question (or prompt) and press the <Enter> key. Answer all the questions on a screen. When you press the <Enter> key for the last question, the program will advance to the next screen.

At any time during the program, the user can abort the program either by pressing the <Control><Break> keys simultaneously or the <Control><c> keys simultaneously.

Screen 1

The first screen you will see after starting CONIFERS is an introduction screen. Press the <Enter> key to continue the program. Press the <Esc> to exit the program.

Screen 2

The second screen asks the user to input target fertilizer properties. After answering a question, press <Enter>, and another question will appear.

The first question asks the user to set the nitrogen level in ppm.

The second question asks the user to set the percentage of nitrogen in the fertilizer.

The third question asks the user to set the percentage of phosphorus in the fertilizer.

The fourth question asks the user to set the percentage of potassium in the fertilizer.

The fifth and final question asks the user to input the injector ratio or siphon rate. Here you need to enter the number of parts of water in which 1 part of fertilizer is added. If your injector is set at 1:100, you need to enter <100>, as this represents the amount of water to which 1 unit of fertilizer is added.

If you are not using an injector, simply set the injection ratio to "1" and this will give you the applied solution formulation.

After entering your injector ratio, press the <Enter> key. The computer will generate the amount of fertilizer needed to formulate your concentrated stock solution. The computer provides these amounts in grams per liter of water, grams per gallon of water, and pounds per gallon of water.

This screen also provides information on the concentration of P_2O_5 , P, K_2O , and K in your applied solution. *The CONIFERS program was written for commercial fertilizers with P_2O_5 being the only source of phosphorous (P) and K_2O as the only source of potassium.*

You can print a hard copy of this prescription if you so desire.

Now that the amount of commercial fertilizer to be mixed with water has been determined for the stock solution, you may want to calculate how long to run your fertilizer system to achieve the optimum usage of your fertilizer. The remaining steps of CONIFERS will do this for you. If you do not wish to do this, you can exit CONIFERS at this point by pressing the <3> key. If you wish to continue, proceed with the application time program of CONIFERS by pressing the <2> key. If you wish to have CONIFERS calculate another formulation, press the <1> key.

If you entered <2> (to use the application time program), the following set of screens will appear and require you to input additional information.

Screen 3

This screen will ask you to enter the type of irrigation system you are using, either a traveling boom or fixed irrigation system.

Screen 4a

If you selected a fixed-spray irrigation system, answer each question that appears on the screen. After typing each answer, press the <Enter> key.

The first question asks how you want to determine how much nitrogen to apply to each container. You can select milligrams per seedling by pressing the <G> key or select milliliters by pressing the <L> key.

Depending on how you answered the first question, the second question will ask you to enter the amount of nitrogen you want applied to each seedling in milligrams or the amount of applied solution in milliliters.

The third question asks for the flow rate of your irrigation system. Remember that on some systems the flow rate will change by the number of active emitters. Make sure you enter the appropriate flow rate for the number of emitters you are using.

The fourth question asks for the number of square feet in one bench.

The fifth question asks for the number of benches to be fertilized simultaneously.

Questions 4 and 5 are used to calculate the total bench area to be fertilized. If you have this value, enter it for the fourth question, then enter <1> on the fifth question.

The sixth question asks for your irrigation system efficiency. This is the percent of your irrigation which does not land on a bench.

Screen 4b

If you selected a traveling boom irrigation system, answer each question that appears on the screen. After selecting each answer, press the <Enter> key.

The first question asks how you want to determine how much nitrogen to apply to each container. You can select milligrams per seedling by pressing the <G> key or milliliters by pressing the <L> key.

Depending on how you answered the first question, the second question will ask you to enter the amount of nitrogen you want applied to each seedling in milligrams or the amount of applied solution in milliliters.

The third question asks for the flow rate of your irrigation system. Remember that on some systems the flow rate will change by the number of active emitters.

Make sure you enter the appropriate flow rate for the number of emitters you are using.

The fourth question asks for the width (in feet) of a seedling bed (bench). If you have a traveling boom which has an aisle between two beds, enter the combined width of the two beds.

The fifth questions ask for the length (in feet) the boom travels in one direction.

The sixth question asks for the boom speed in feet per minute.

The seventh question asks for your irrigation system efficiency. This is the percent of your irrigation which does not land on a bench.

Screen 5

The fifth screen asks you to enter your container system efficiency. It provides a brief description of container system inefficiency and a simple example with 6" diameter pots.

After entering the container system efficiency value and pressing the <Enter> key, CONIFERS will calculate either the amount of time required to achieve your target fertilizer rate for a fixed overhead irrigation system or how much fertilizer is applied in one pass of a traveling boom irrigation system.

Remember that CONIFERS considers one pass in one direction as a single pass. If you have a traveling boom irrigation system which irrigates in both directions you will need to double this value if you fertilize going in both directions.

For Users with Traveling Boom Irrigation Systems

There are many traveling boom irrigation systems available today. To achieve target fertilization levels you may need to adjust some components of your system. CONIFERS automatically computes adjustments if the actual application rates differ from the target rates. The adjustments are computed by varying the flow rate, boom travel speed, or both. Other relatively simple adjustments may include changing fertilizer concentrations in the applied solution, or changing the injection ratio. By running CONIFERS several times and adjusting these attributes, you can determine what will work best for you.

TECHNICAL SUPPORT

For program technical support in English contact the New Mexico State University, Mora Research Center, Tel. (505) 387-2319; FAX (505) 387-9012. For program support in Spanish, please send a facsimile stating

your name, the problem, and your FAX number and we will do our best to solve the problem.

LITERATURE CITED

Landis, T.D.; Tinus, R.W.; McDonald, S.E.;
Barnett, J.P. 1989. *Containers and Growing Media*, Vol. 2. *The Container Tree Nursery Manual*. Agric. Handbk. 674. Washington. DC. U.S. Department of Agriculture. Forest Service. 119 p.

APPENDIX A

Example 1. A typical example for a fixed irrigation system with output measured in milligrams per seedling.

At the DOS® prompt type <CONIFERS> and press <Enter>.

Screen 1.

This program was developed to assist with the computation of bulk fertilizer applications for injector fed systems for either fixed or traveling boom operations.

Press <Enter> to continue? <Enter>

Now enter the target level of nitrogen, fertilizer percentages, and injector ratio. Questions will appear one at a time. Following the question regarding your injector ratio, CONIFERS will provide the appropriate calculations for the stock solution. After a few moments, your stock solution mixing levels will appear.

Screen 2.

What is the desired concentration level of Nitrogen (N) in ppm for the applied solution?

150 <Enter>

What is the percentage of elemental Nitrogen (N) in the fertilizer? 20 <Enter>

What is the percentage of elemental Phosphorous oxide (P_2O_5) in the fertilizer? 20 <Enter>

What is the percentage of elemental Potassium (K_2O) in the fertilizer? 20 <Enter>

What is the injector ratio or siphon rate 1:###? 100 <Enter>

Mix 75.00 grams of fertilizer per liter, 283.90 grams of fertilizer per gallon, or 0.63 pounds of fertilizer per gallon in the stock solution of Nitrogen (N) to obtain 150 ppm in the applied solution.

There is 150 ppm of P_2O_5 and 65 ppm of P applied.

There is 150 ppm of K_2O and 125 ppm of K applied.

Would you like a printed copy of this setup y/n?

Do you want to 1) Calculate a different scenario, 2) proceed with application time calculations or 3) End this session 1/2/3? 2

Now that the amount of commercial fertilizer to be mixed with water has been determined for the stock solution, input the required information about your irrigation system so CONIFERS can calculate application times.

Answer the following questions as they appear on the screen. Questions will appear one at a time. After entering a response and pressing the <Enter> key, the next question will appear.

Screen 3.

Is the application system a fixed spray or a traveling boom enter an F or a T? F <Enter>
Is the Nitrogen (N) application figured in milligrams/seedling or in milliliters/seedling enter a G or an L? G <Enter>
How many milligrams of Nitrogen (N) are applied to each seedling? 3 <Enter>
What is the flow rate for the system in gallons/minute? 15 <Enter>
What is the application area in square feet for one bench? 128 <Enter>
How many benches are being fertilized simultaneously? 7 <Enter>
Enter a number from 0 to 100 that indicates the percent of overspray that does not fall on the seedling bed? 10 <Enter>

Now enter the container system efficiency.

Screen 4.

There is an inherent inefficiency in most containerized production operations. This inefficiency is due to the arrangement of containers within their support structures. The following example is of a common container and expresses its efficiency in a ratio of container opening surface area to total surface area.

Container	Diameter	Number of Containers/ Square Foot	Container Surface Area/ Square Foot	Efficiency
1 gallon	6.00 in.	4	113.10 sq.in.	79 %

What is the efficiency of the container system being utilized? 79 <Enter>
How many seedlings exist per square foot? 4 <Enter>

In a few moments CONIFERS will calculate the amount of time to achieve the application of 3 milligrams of nitrogen per seedling.

Screen 5.

These application rates are on a per seedling basis.

Time required to apply 3 milligrams of Nitrogen (N) is 1.78 minutes.

75.61 grams or 0.17 pounds of fertilizer and 0.27 gallons or 1.01 liters of water are required for the stock solution.

Would you like a printed copy of the results y/n?

Example 2. A typical example for a fixed irrigation system with output measured in milliliters per seedling.

At the DOS prompt type <CONIFERS> and press <Enter>.

Screen 1.

This program was developed to assist with the computation of bulk fertilizer applications for injector-fed systems for either fixed or traveling boom operations.

Press <Enter> to continue? <Enter>

Now enter the target level of nitrogen, fertilizer percentages, and injector ratio. Questions will appear one at a time. Following the question regarding your injector ratio, CONIFERS will provide the appropriate calculations for the stock solution. After a few moments your stock solution mixing levels will appear.

Screen 2.

What is the desired concentration level of Nitrogen (N) in ppm for the applied solution?
150 <Enter>

What is the percentage of elemental Nitrogen (N) in the fertilizer? 20 <Enter>

What is the percentage of elemental Phosphorous oxide (P_2O_5) in the fertilizer? 20
<Enter>

What is the percentage of elemental Potassium (K_2O) in the fertilizer? 20 <Enter>

What is the injector ratio or siphon rate 1:###? 100 <Enter>

Mix 75.00 grams of fertilizer per liter, 283.90 grams of fertilizer per gallon, or 0.63 pounds of fertilizer per gallon in the stock solution of Nitrogen (N) to obtain 150 ppm in the applied solution.

There is 150 ppm of P_2O_5 and 65 ppm of P applied.

There is 150 ppm of K_2O and 125 ppm of K applied.

Would you like a printed copy of this setup y/n?

Do you want to 1) Calculate a different scenario, 2) proceed with application time calculations or 3) End this session 1/2/3? 2

Now that the amount of commercial fertilizer to be mixed with water has been determined for the stock solution, input the required information about your irrigation system so CONIFERS can calculate application times.

Answer the following questions as they appear on the screen. Questions will appear one at a time. After entering a response and pressing the <Enter> key, the next question will appear.

Screen 3.

Is the application system a fixed spray or a traveling boom enter an F or a T? F <Enter>
Is the Nitrogen (N) application figured in milligrams/seedling or in milliliters/seedling enter a G or an L? L <Enter>
How many milliliters of Nitrogen (N) are applied to each seedling? 30 <Enter>
What is the flow rate for the system in gallons/minute? 15 <Enter>
What is the application area in square feet for one bench? 128 <Enter>
How many benches are being fertilized simultaneously? 7 <Enter>
Enter a number from 0 to 100 that indicates the percent of overspray that does not fall on the seedling bed? 10 <Enter>

Now enter the container system efficiency.

Screen 4.

There is an inherent inefficiency in most containerized production operations. This inefficiency is due to the arrangement of containers within their support structures. The following example is of a common container and expresses its efficiency in a ratio of container opening surface area to total surface area.

Container	Diameter	Number of Containers/ Square Foot	Container Surface Area/ Square Foot	Efficiency
1 gallon	6.00 in.	4	113.10 sq.in.	79 %

What is the efficiency of the container system being utilized? 79 <Enter>
How many seedlings exist per square foot? 4 <Enter>

In a few moments CONFERS will calculate the amount of time to achieve the application of 30 milliliters of nitrogen per seedling.

Screen 5.

These application rates are on a per seedling basis.

Time required to apply 30 milliliters of solution is 2.66 minutes.

113.42 grams or 0.25 pounds of fertilizer and 0.40 gallons or 1.51 liters of water are required for the stock solution.

Would you like a printed copy of the results y/n?

Example 3. A typical example for a traveling boom irrigation system with output measured in milligrams per seedling.

At the DOS prompt type <CONIFERS> and press <Enter>.

Screen 1.

This program was developed to assist with the computation of bulk fertilizer applications for injector fed systems for either fixed or traveling boom operations.

Press <Enter> to continue? <Enter>

Now enter the target level of nitrogen, fertilizer percentages, and injector ratio. Questions will appear one at a time. Following the question regarding your injector ratio, CONIFERS will provide the appropriate calculations for the stock solution. After a few moments your stock solution mixing levels will appear.

Screen 2.

What is the desired concentration level of Nitrogen (N) in ppm for the applied solution?
150 <Enter>

What is the percentage of elemental Nitrogen (N) in the fertilizer? .20 <Enter>

What is the percentage of elemental Phosphorous oxide (P_2O_5) in the fertilizer? 20
<Enter>

What is the percentage of elemental Potassium (K_2O) in the fertilizer? 20 <Enter>

What is the injector ratio or siphon rate 1:###? 100 <Enter>

Mix 75.00 grams of fertilizer per liter, 283.90 grams of fertilizer per gallon, or 0.63 pounds of fertilizer per gallon in the stock solution of Nitrogen (N) to obtain 150 ppm in the applied solution.

There is 150 ppm of P_2O_5 and 65 ppm of P applied.

There is 150 ppm of K_2O and 125 ppm of K applied.

Would you like a printed copy of this setup y/n?

Do you want to 1) Calculate a different scenario, 2) proceed with application time calculations or 3) End this session 1/2/3? 2

Now that the amount of commercial fertilizer to be mixed with water has been determined for the stock solution, input the required information about your irrigation system so CONIFERS can calculate application times.

Answer the following questions as they appear on the screen. Questions will appear one at a time. After entering a response and pressing the <Enter> key, the next question will appear.

Screen 3.

Is the application system a fixed spray or a traveling boom enter an F or a T? T <Enter>
Is the Nitrogen (N) application figured in milligrams/seedling or in milliliters/
seedling enter a G or an L? G <Enter>
How many milligrams of Nitrogen (N) are applied to each seedling? 3 <Enter>
What is the flow rate for the system in gallons/minute? 15 <Enter>
What is the width of the seedling bed? 12 <Enter>
What is the length the boom travels 200 <Enter>
What is the travel speed of the boom in feet/minute? 6 <Enter>
Enter a number from 0 to 100 that indicates the percent of overspray that does not
fall on the seedling bed? 10 <Enter>

Now enter the container system efficiency.

Screen 4.

There is an inherent inefficiency in most containerized production operations. This inefficiency is due to the arrangement of containers within their support structures. The following example is of a common container and expresses its efficiency in a ratio of container opening surface area to total surface area.

Container	Diameter	Number of Containers/ Square Foot	Container Surface Area/ Square Foot	Efficiency
1 gallon	6.00 in.	4	113.10 sq.in.	79 %

What is the efficiency of the container system being utilized? 79 <Enter>
How many seedlings exist per square foot? 4 <Enter>

In a few moments CONIFERS will calculate the amount of time to achieve the application of 3 milligrams of nitrogen per seedling.

Screen 5.

These application rates are on a per seedling basis.

21.03 milligrams of Nitrogen (N) are applied per boom pass.

To apply 3 milligrams of Nitrogen per boom pass one of the three following modifications should be made to the boom operating system.

Holding flow rate constant, change the boom speed to 42.1 feet per minute.

Holding boom speed constant, change flow rate to 2.1 gallons per minute.

Change flow rate to 5.5 gallons per minute and change boom speed to 15.5 feet per minute.

Would you like a printed copy of the results y/n?

Example 4. A Typical example for a traveling boom irrigation system with output measured in milliliters per seedling.

At the DOS prompt type <CONIFERS> and press <Enter>.

Screen 1.

This program was developed to assist with the computation of bulk fertilizer applications for injector fed systems for either fixed or traveling boom operations.

Press <Enter> to continue? <Enter>

Now enter the target level of nitrogen, fertilizer percentages, and injector ratio. Questions will appear one at a time. Following the question regarding your injector ratio, CONIFERS will provide the appropriate calculations for the stock solution. After a few moments your stock solution mixing levels will appear.

Screen 2.

What is the desired concentration level of Nitrogen (N) in ppm for the applied solution?
150 <Enter>

What is the percentage of elemental Nitrogen (N) in the fertilizer? 20 <Enter>

What is the percentage of elemental Phosphorous oxide (P_2O_5) in the fertilizer? 20
<Enter>

What is the percentage of elemental Potassium (K_2O) in the fertilizer? 20 <Enter>

What is the injector ratio or siphon rate 1:###? 100 <Enter>

Mix 75.00 grams of fertilizer per liter, 283.90 grams of fertilizer per gallon, or 0.63 pounds of fertilizer per gallon in the stock solution of Nitrogen (N) to obtain 150 ppm in the applied solution.

There is 150 ppm of P_2O_5 and 65 ppm of P applied.

There is 150 ppm of K_2O and 125 ppm of K applied.

Would you like a printed copy of this setup y/n?

Do you want to 1) Calculate a different scenario, 2) proceed with application time calculations or 3) End this session 1/2/3? 2

Now that the amount of commercial fertilizer to be mixed with water has been determined for the stock solution, input the required information about your irrigation system so CONIFERS can calculate application times.

Answer the following questions as they appear on the screen. Questions will appear one at a time. After entering a response and pressing the <Enter> key, the next question will appear.

Screen 3.

Is the application system a fixed spray or a traveling boom enter an F or a T? T <Enter>
Is the Nitrogen (N) application figured in milligrams/seedling or in milliliters/seedling enter a G or an L? L <Enter>
How many milligrams of Nitrogen (N) are applied to each seedling? 30 <Enter>
What is the flow rate for the system in gallons/minute? 15 <Enter>
What is the width of the seedling bed? 12 <Enter>
What is the length the boom travels 200 <Enter>
What is the travel speed of the boom in feet/minute? 6 <Enter>
Enter a number from 0 to 100 that indicates the percent of overspray that does not fall on the seedling bed? 10 <Enter>

Now enter the container system efficiency.

Screen 4.

There is an inherent inefficiency in most containerized production operations. This inefficiency is due to the arrangement of containers within their support structures. The following example is of a common container and expresses its efficiency in a ratio of container opening surface area to total surface area.

<u>Container</u>	<u>Diameter</u>	<u>Number of Containers/ Square Foot</u>	<u>Container Surface Area/ Square Foot</u>	<u>Efficiency</u>
1 gallon	6.00 in.	4	113.10 sq.in.	79 %

What is the efficiency of the container system being utilized? 79 <Enter>
How many seedlings exist per square foot? 4 <Enter>

In a few moments CONFERS will calculate the amount of time to achieve the application of 30 milliliters of nitrogen per seedling.

Screen 5.

These application rates are on a per seedling basis.

140.17 milliliters of Nitrogen (N) are applied per boom pass.

To apply 30 milliliters of Nitrogen per boom pass one of the three following modifications should be made to the boom operating system.

Holding flow rate constant, change the boom speed to 28.1 feet per minute.

Holding boom speed constant, change flow rate to 3.2 gallons per minute.

Change flow rate to 7.3 gallons per minute and change boom speed to 13.7 feet per minute.

Would you like a printed copy of the results y/n?