



**Commercial Products**

# **Toro Sprayer**

**Calibration Tool**

**Metric**

**User Guide**

**&**

**Installation Instructions**



**Table of Contents**

Introduction ..... 2

Program Instructions ..... 4

Toro Software End User License Agreement ..... 17

## Introduction

To accurately calibrate the sprayer the Spray technician or the Superintendent must be able to verify the following:

- What the sprayer is putting out.
- How consistent each and every nozzle on the sprayer is.
- Calculate the proper amount of product to add to the water.
- How much water is required to cover the desired area.

To assist in the sprayer calibration process the Toro Sprayer Calibration tool has been developed,

This program will allow the spray technician or the superintendent to quickly and accurately check the performance of the sprayer and also calculate the desired application rate, product to water ratio and the amount of water needed to cover the desired area.

This booklet will explain the functions of the program and the information that it will provide.

## Windows® PC

### Installation Instructions

Download the ToroSprayers.exe file

Double click on the file to unzip.

The files will be unzipped into the directory where you downloaded the file.

Double click on setup.exe

This will install the program on your computer.

### Starting the Program

Click on "Start" on the Windows® toolbar.

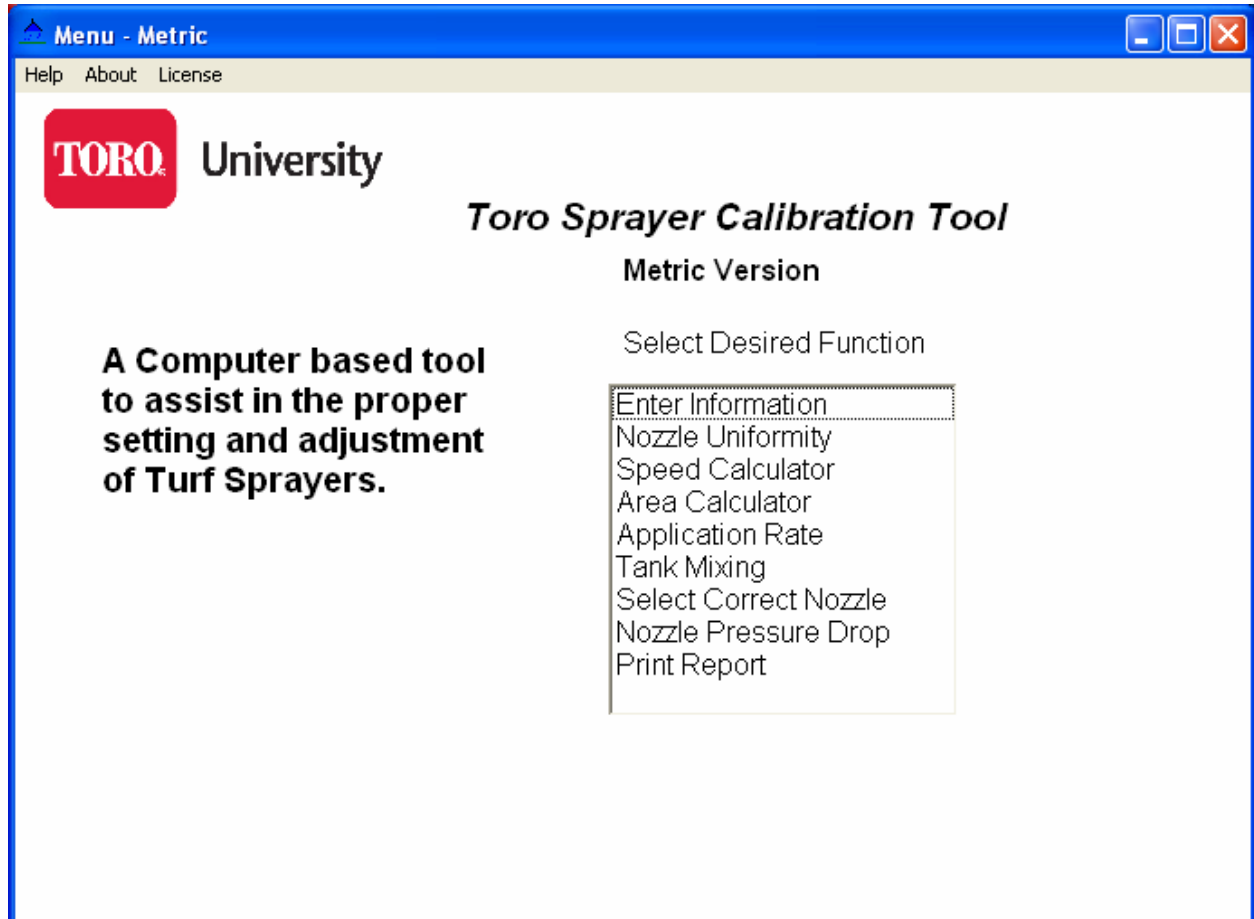
Click on "Programs".

Click on "Toro Sprayers".

Click on "Toro Sprayers" to Start the Program.

## Toro Sprayer Calibration Tool Program Instructions

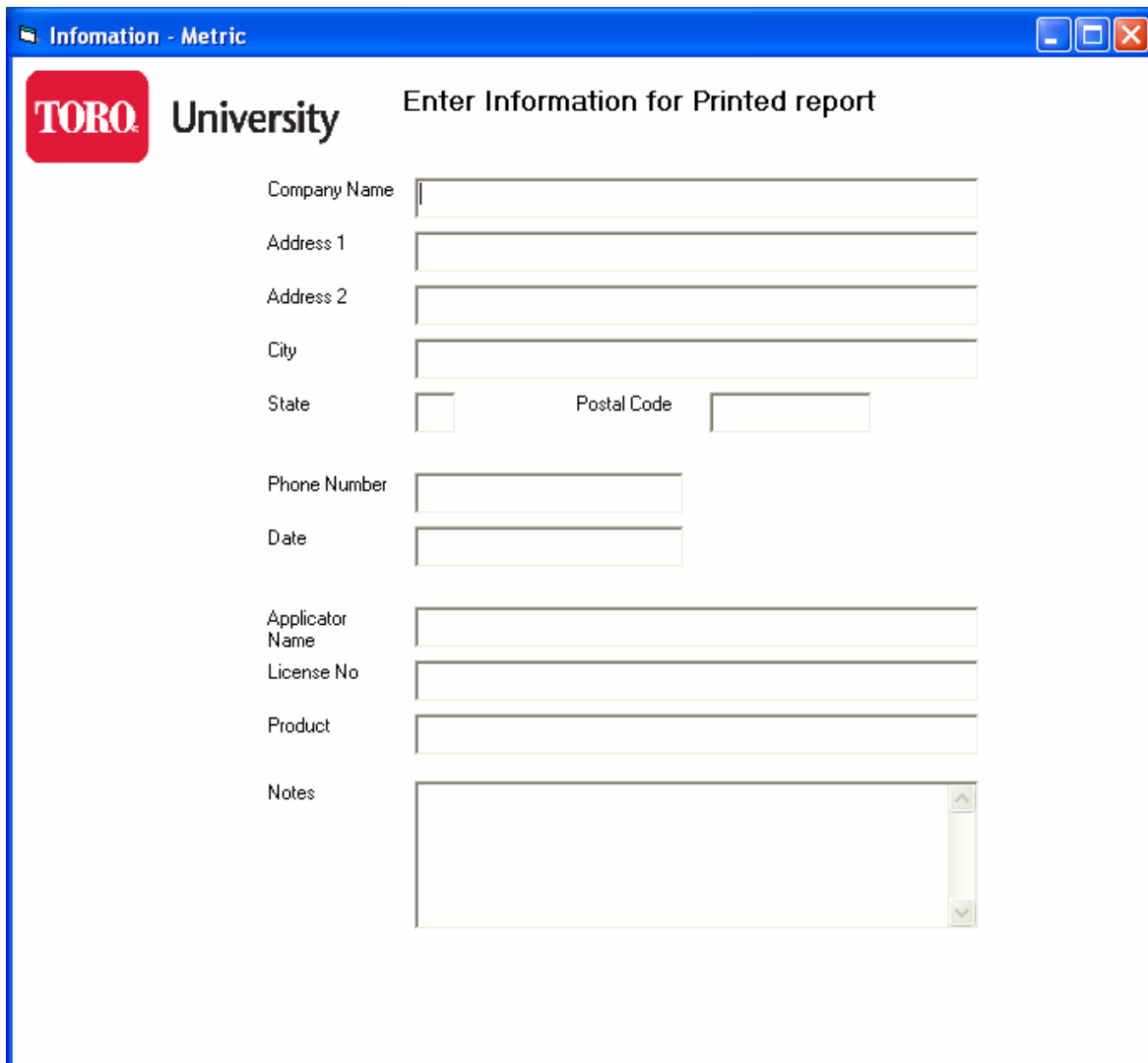
From the main menu screen, select the desired function.



Select from the following program functions:

1. Enter Information
2. Nozzle Uniformity.
3. Speed Calculator.
4. Area Calculator
5. Application Rate.
6. Tank Mixing.
7. Select Correct Nozzle.
8. Nozzle Pressure Drop.
9. Print Report

## Enter Information



Information - Metric

**TORO University** Enter Information for Printed report

Company Name

Address 1

Address 2

City

State  Postal Code

Phone Number

Date

Applicator Name

License No

Product

Notes

This screen allows the user to enter information that will be included on a report that can be printed at the end of the calculations.

There are areas to enter the following information.

1. Company Name
2. Address
3. Phone Number
4. Date
5. Applicator Name
6. License Number
7. Product Applied
8. Additional Notes

## Nozzle Uniformity

↑ Nozzle Uniformity Calculator - Metric
⏏

**Enter Variation Percentage**  **Average Output (In Milliliters)**

(Standard: 5 to 10 Percent)

**Enter Catch Time In Seconds**  **Minimum Allowable**

(Standard: 20 to 60 Seconds)

**Enter Pressure**  **Maximum Allowable**

(From Nozzle Spec Sheet)

**Enter amount For Each Nozzle from Nozzle Catch Test**  
(Milliliters Caught per Nozzle)

Nozzle 1	<input style="width: 40px;" type="text" value="118"/>	Nozzle 10	<input style="width: 40px;" type="text" value="118"/>
Nozzle 2	<input style="width: 40px;" type="text" value="118"/>	Nozzle 11	<input style="width: 40px;" type="text" value="0"/>
Nozzle 3	<input style="width: 40px;" type="text" value="105"/>	Nozzle 12	<input style="width: 40px;" type="text" value="0"/>
Nozzle 4	<input style="width: 40px;" type="text" value="118"/>	Nozzle 13	<input style="width: 40px;" type="text" value="0"/>
Nozzle 5	<input style="width: 40px;" type="text" value="130"/>	Nozzle 14	<input style="width: 40px;" type="text" value="0"/>
Nozzle 6	<input style="width: 40px;" type="text" value="118"/>	Nozzle 15	<input style="width: 40px;" type="text" value="0"/>
Nozzle 7	<input style="width: 40px;" type="text" value="118"/>	Nozzle 16	<input style="width: 40px;" type="text" value="0"/>
Nozzle 8	<input style="width: 40px;" type="text" value="118"/>	Nozzle 17	<input style="width: 40px;" type="text" value="0"/>
Nozzle 9	<input style="width: 40px;" type="text" value="118"/>	Nozzle 18	<input style="width: 40px;" type="text" value="0"/>

**Low**

**High**

The purpose of this program is to check the accuracy of the individual nozzles to be sure that they all fall within the entered variation percentage.

If the output of any of the nozzles is too high or too low, the program will indicate which nozzles do not fall within the acceptable range.

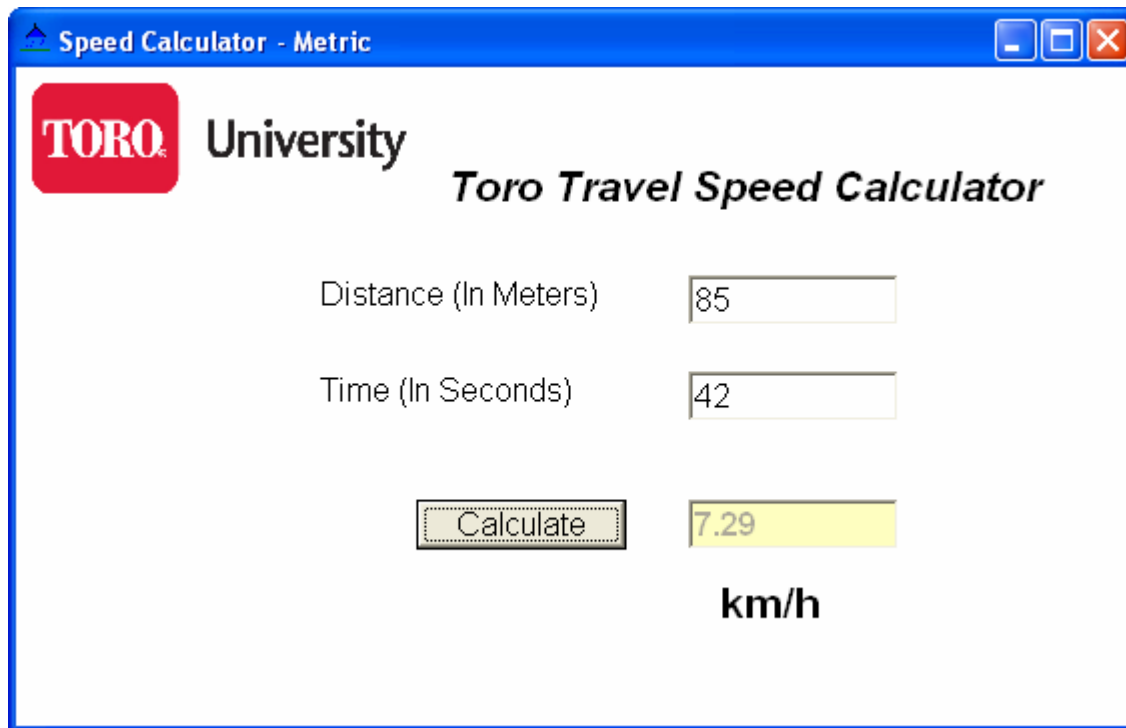
The program will also calculate the actual output in l/min that the sprayer is delivering.

This is used to compute the actual sprayer application rate in the later screens.



1. Nozzle Uniformity
  - a. Enter the allowable Nozzle Variation Percentage.
    - i. Usually 5 to 10%
  - b. Enter the Catch time in Seconds.
    - i. Used to calculate the l/min per Nozzle
  - c. Enter the pressure used in the Nozzle Catch test.
  - d. Enter the water caught per nozzle(In milliliters)
    - i. Enter an amount for each nozzle on your sprayer.
    - ii. Program will determine how many nozzles you have on the sprayer and calculate the average output per nozzle.
  - e. Press Calculate.
    - i. The program will return the Average Output for the Nozzles.
    - ii. The maximum allowable output and the minimum allowable output.
    - iii. The program will also flag the nozzles that do not fall between this range.
    - iv. The program will also calculate the l/min per nozzle for use in the Application rate calculations.

## Speed



The screenshot shows a window titled "Speed Calculator - Metric" with a blue header bar. Inside the window, there is a red "TORO" logo and the text "University" and "Toro Travel Speed Calculator". The interface includes two input fields: "Distance (In Meters)" with the value "85" and "Time (In Seconds)" with the value "42". Below these is a "Calculate" button. To the right of the button, the result "7.29" is displayed in a yellow box, with "km/h" written below it.

To calibrate the sprayer the actual speed that the sprayer is traveling is needed. This speed number is used for the later calculations to calculate the actual application rate.

1. Speed Calculator
  - a. Enter the distance traveled in meters.
  - b. Enter the time in seconds to travel the entered distance.
  - c. Press Calculate.
    - i. This will display the km/h that you were traveling.
    - ii. This is used for the Application rate calculation.

## Area Calculator

Area - Metric

**TORO** University

Triangle

Base in Meters: 150

Height in Meters: 210

Calculate

Area in Sq meters: 15750

Area in hectares: 1.575

The area of a Triangle equals, (Base times Height) divided by 2

$h$

$b$

$h$

$b$

To calculate the area of a specific shape, select the desired shape from the drop-down box.

1. Area Calculator
  - a. Enter the requested Distance(s) in meters.
  - b. Press Calculate.
    - iii. This will display the Area in square meters.
    - iv. This will display the Area in hectares.

## Application Rate

Calibration Rate - Metric

**TORO** University

**Calibration Rate**

l/min (From Nozzle Uniformity Screen)

km/h (From Speed Calculator)

Nozzle Spacing (In Centimeters)

**L/ha**

Now we will calculate the actual application rate that the sprayer is delivering.

### 1. Application Rate

- a. The program will pull the l/min from the previous screen and enter it in the Liters per Minute field.
  - i. This can be changed if you desire.
- b. The program will also pull the km/h number from the previous screen.
  - i. This can also be changed if desired.
- c. Enter the nozzle spacing of your sprayer.
  - i. Standard on Toro sprayers is 50 cm.
- d. Press Calculate and the program will display application rate in L/ha (Liters per hectare)

## Sprayer Calibration (Tank Mixing)

**TORO University** *Toro Sprayer Calibration Tool*  
**(Tank Mixing)**

Product Label Rate - m/ha Millileters per hectare.   
Manufacturers recommended Rate.

Sprayer Calibration Rate -l/ha Liters per hectare, Per   
Manufacturers Recommendation.

Area to be sprayed (in Hectares)

Milliliters of Product per Liter of Water	(Millileters)	<input type="text" value="0.33"/>
Total Water required for Area to be sprayed	(Liters)	<input type="text" value="4004"/>
Total Product required for Area to be sprayed	(Millileters)	<input type="text" value="1320"/>
	(Liters)	<input type="text" value="1.32"/>

To calculate the actual amount of water and product needed to cover the desired area, enter the desired application rate for the product and the actual application rate for the sprayer. The tank-mixing screen will perform the appropriate calculations.

The program will display the amount of water required in gallons to cover the entered area. It will also display the amount of product required in milliliters and liters.

1. Tank Mixing
  - a. Enter the product application rate.
    - i. This is milliliters of product per hectare.
  - b. Enter the Sprayer Calibration rate.
    - i. In Liters per hectare.
    - ii. This should be per the manufactures recommendation.
    - iii. This should also be the actual amount of water that the sprayer sprays.
  - c. Enter the area to be sprayed.
    - i. In hectares.
  - d. Press calculate.
    - i. The program will display the milliliters of product to be mixed per liter of water.
    - ii. The program will also display the total amount of water needed to cover the entered area.
    - iii. The program will also return the total amount of product required in both milliliters and liters.
  - e. If the total water required is larger then the capacity of the sprayer tank then press "Multiple Tank Mix"
    - i. This will calculate the quantities of water and product for each individual tank fill.

## Multiple Tank Mixing

	Tank 1 to 3	Tank 4
Enter Sprayer Tank Capacity (In Liters)	1250	
Total Water Required For Area to Be Sprayed	4004	
Total Water Per Tank	1250	254
Milliliters per Liter (Product)	0.33	0.33
Product (in Milliliters) Per Tank	412.5	83.82
Product (In liters) Per Tank	0.41	0.08

Solve

In the event that the amount of water needed to cover the desired area is greater than the capacity of the sprayer, multiple tanks are needed. The program will calculate the proper mixing rate for multiple tanks.

### 1. Multiple Tank Mixing

- a. The program will enter the total water required for the area to be sprayed from the previous screen.
  - i. Enter the capacity of your sprayer tank.
    1. The program will return the total water per tank.
    2. The Milliliters per liter of product required.
    3. The amount of product required for each tank.
  - ii. The first column is for complete tanks
    1. "Example Tank 1 to 2"
  - iii. The second column is for the last partial tank.

## Nozzle Selection

**TORO University** Nozzle Selection

Enter Desired Application Rate in L/ha: 148

Enter Application Speed in km/h: 20

Enter Nozzle Spacing in Centimeters.: 50

Calculate

Reset

2.47  
l/min. per Nozzle

**Acceptable Range**

2.59 +

2.35 -

Refer to Nozzle Chart (Nozzle l/min Column)

To achieve the proper application rate from the sprayer the proper nozzle for the desired application rate needs to be selected.

1. Nozzle Selection Screen.
  - a. Enter the desired Application rate in L/ha
  - b. Enter the Application speed in km/h
  - c. Enter Nozzle spacing in Centimeters.
    - i. The program will return the l/min per nozzle output that is required to achieve the desired application rate and the speed and nozzle spacing that was entered.
    - ii. It will also display the acceptable maximum and minimum output of the nozzles.
    - iii. Use this information to select the proper nozzle.



## Nozzle Pressure Drop

Pressure Drop - Metric

**TORO** University

Calculate Actual Pressure Drop at the Sprayer Nozzles.

Actual Catch in l/min: 1.82

Actual Nozzle Pressure: 2.49

Nozzle Chart Flow in l/min: 2.58

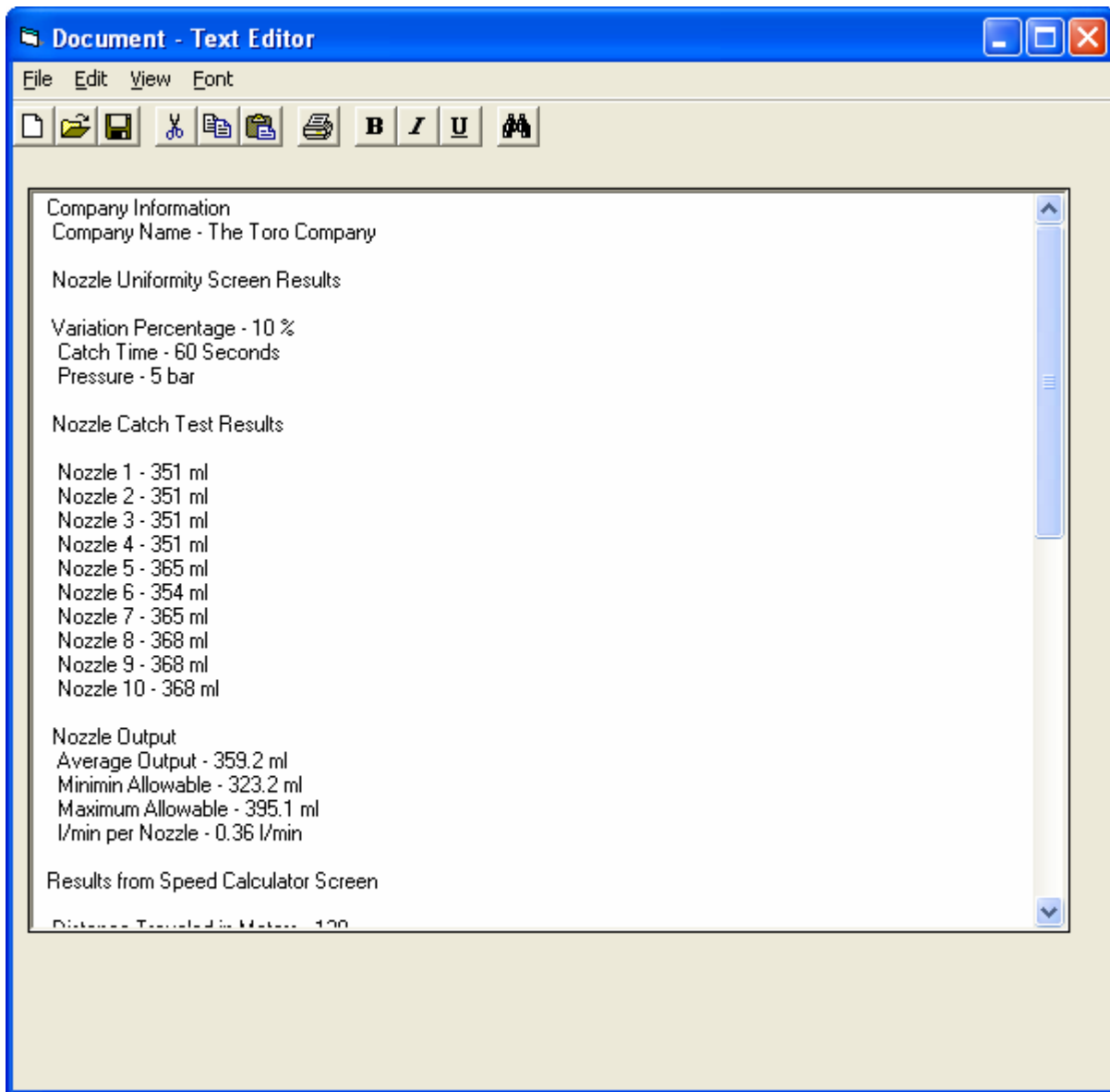
Pressure from Nozzle Chart: 5

Calculate

When a situation is encountered where the proper application rate can not be achieved, this can indicate a problem with the sprayer. An area to check is the actual pressure at the nozzle. Pressure Drop Screen

- a. To troubleshoot an application rate problem we can calculate the actual pressure at the nozzle.
- b. Enter the actual l/min from a catch test.
- c. Enter the Nozzle Chart flow in l/min.
- d. Enter the Pressure from the Nozzle Chart.
- e. Press calculate.
  - i. The program will return the actual pressure at the nozzle that it takes to product the output that you got in the catch test.

## Print Report



This screen will display the information collected from all of the calculation screens. This is useful for documenting the application rate, amount of chemical used, company name, date and applicator. It will collect all of the information used to perform the calculations.

The file can then be saved for further reference. If a printed copy is desired, the saved text file can be opened with Notepad, Wordpad or MS Word and printed from there.

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