# Dispersible Granule Technology


Chuck Anderson

The Andersons, Inc.

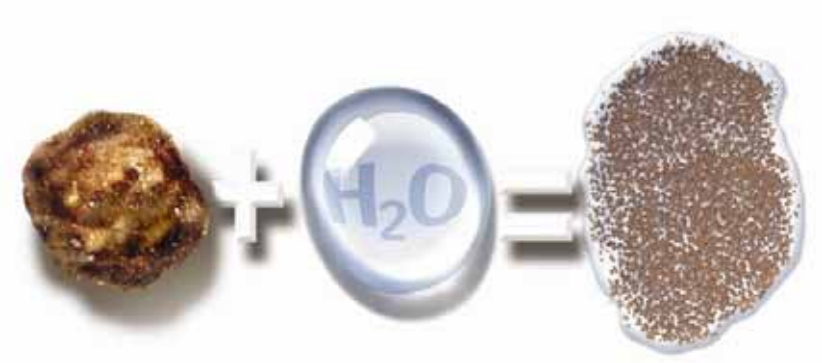
Turf & Specialty Group


The Andersons

- Grain & Ethanol
- Rail
- Plant Nutrient
- Consumer Retail
- Turf & Specialty

# Dispersing Granule Technology

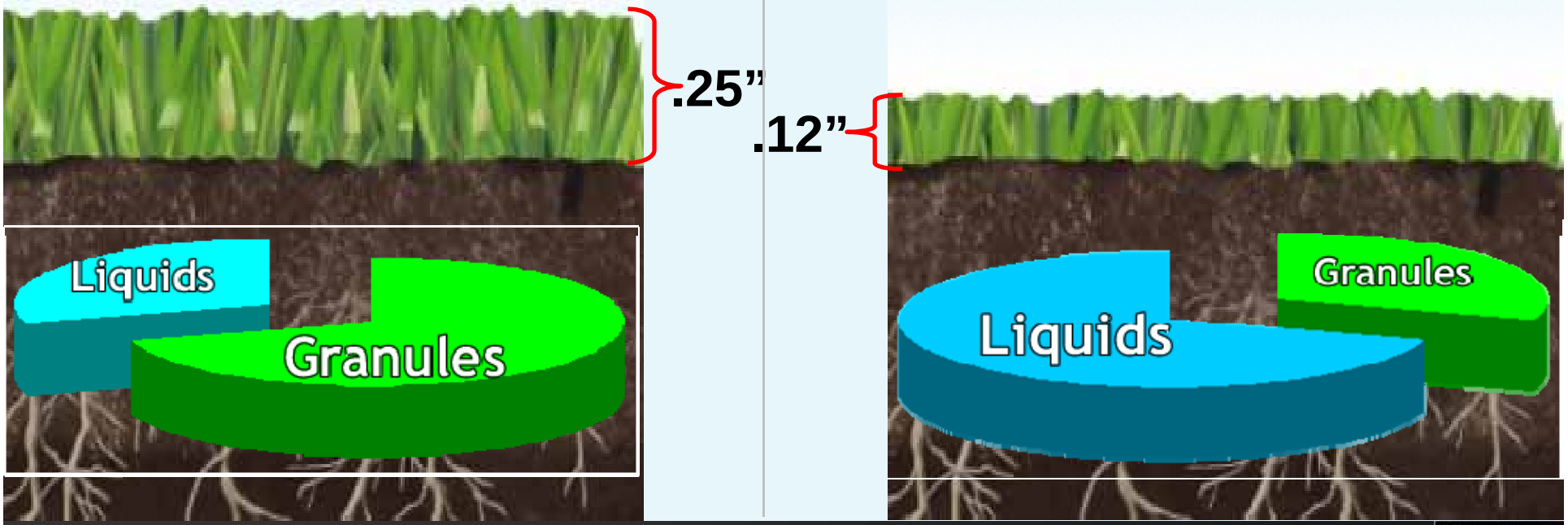

# Why dispersibility?



# Dispersibility… Why?

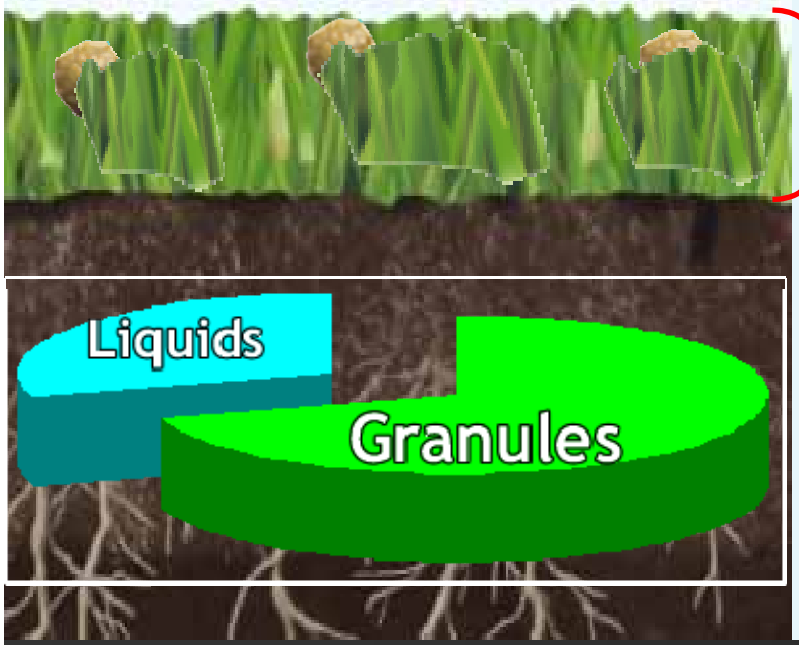
**1976** **Today**

- "Stimpmeter" was introduced
- Televised professional golf increases
- Greens-speed war between courses



# Dispersibility… Why?

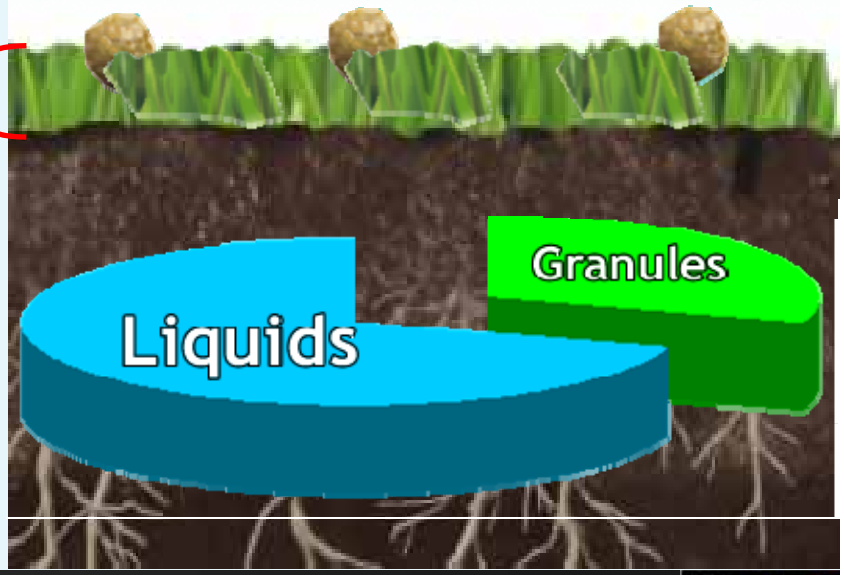
## 1976




.25”

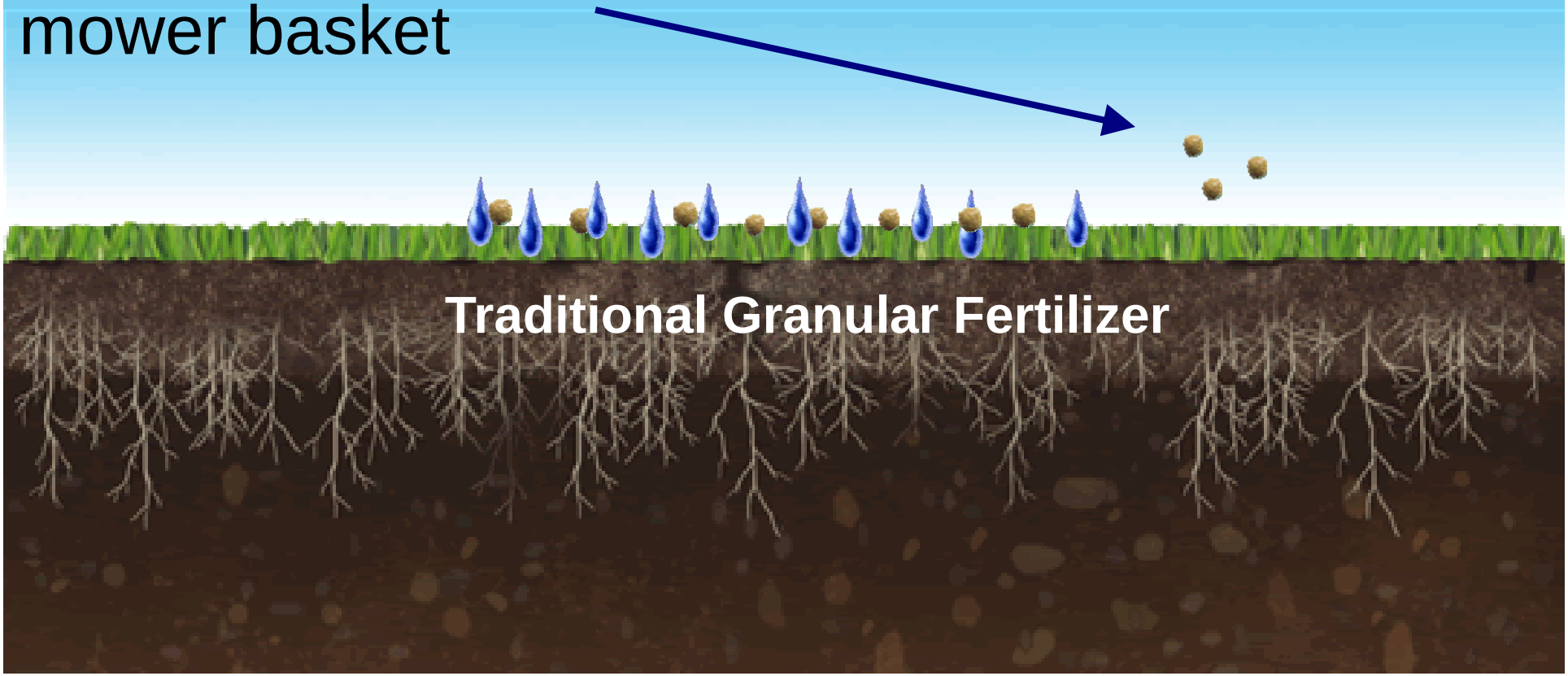
## Today

.12”



# Mower Pick-up on Golf Greens

Granules picked-up in mower basket



# Granule pick-up in mower basket

Mancino, C.F., D.M. Petrunak, D. Wilkinson. 1999 Penn State

47% of M.U. granules picked-up in hopper through multiple mowings

# Development of our first DG

# Development of DGlite

**Dreaming of the ideal pesticide carrier …**

- the right particle size
- low moisture ( < 2%)
- water dispersible
- bulk density = 45 lb ft$^3$
- pH for stability = neutral
- durable = rta 90%+
- particle uniformity = UI of 35+
- the right shape = spherical




The Andersons

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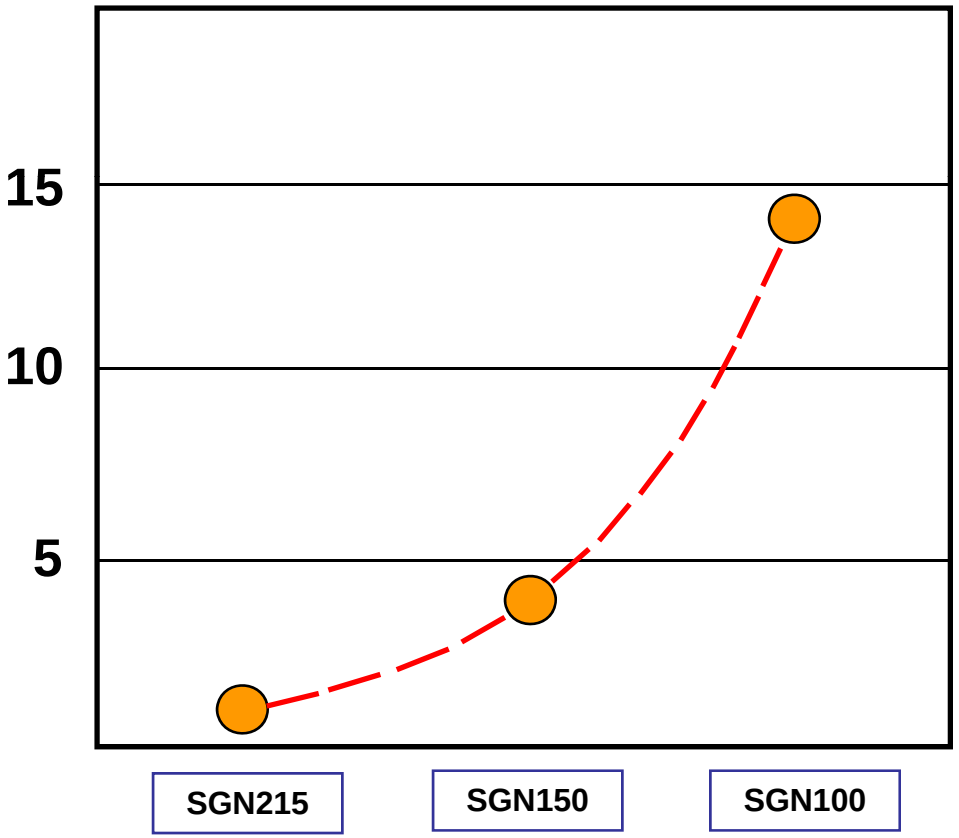
# Development of DGlite

The effect of particle count with dispersibility

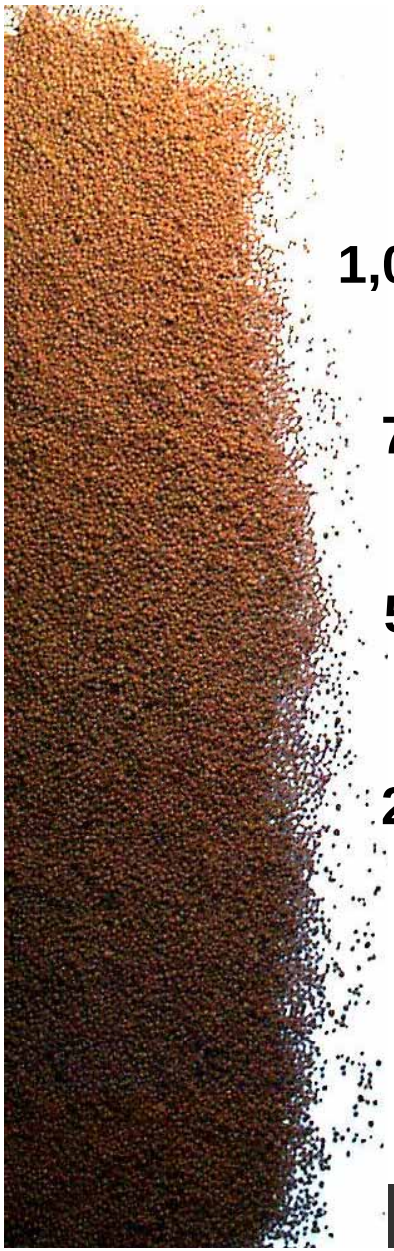



***Particles per square inch***

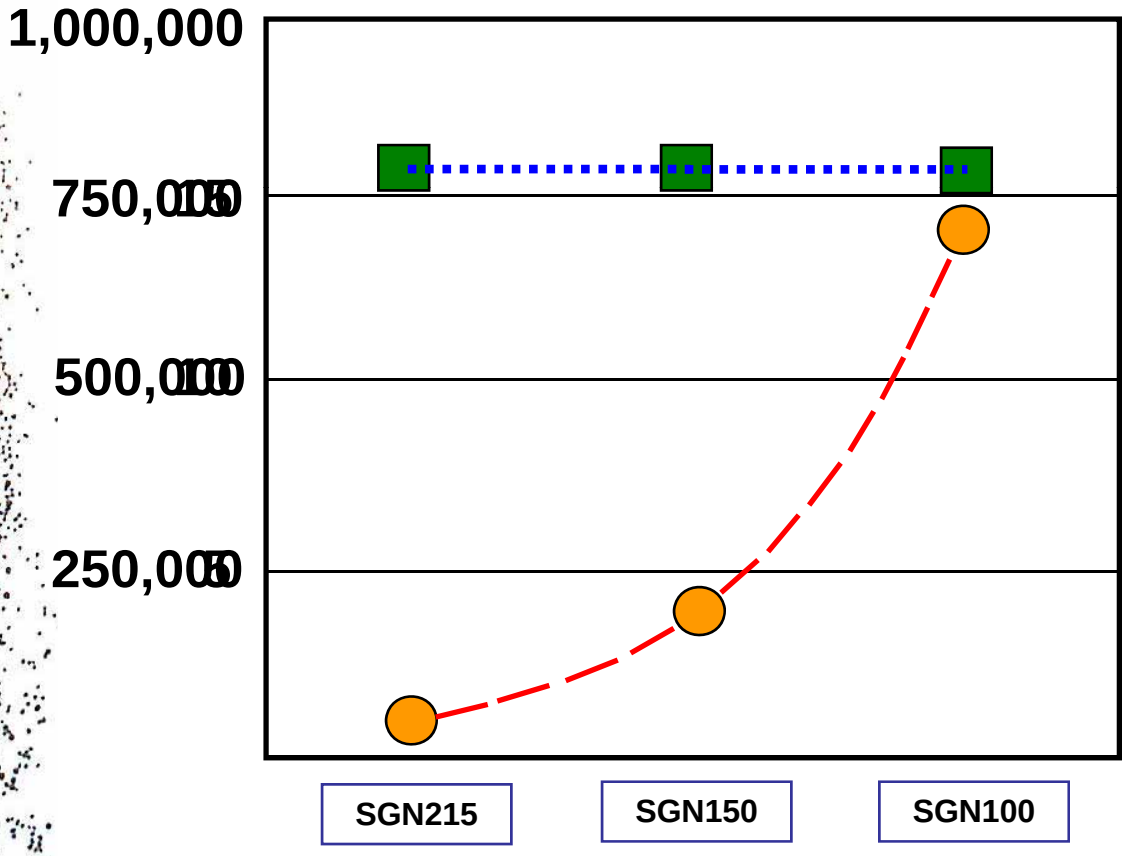
***200 pounds per acre***

***45 pounds per ft³***

# Development of DGlite



The effect of particle count with dispersibility



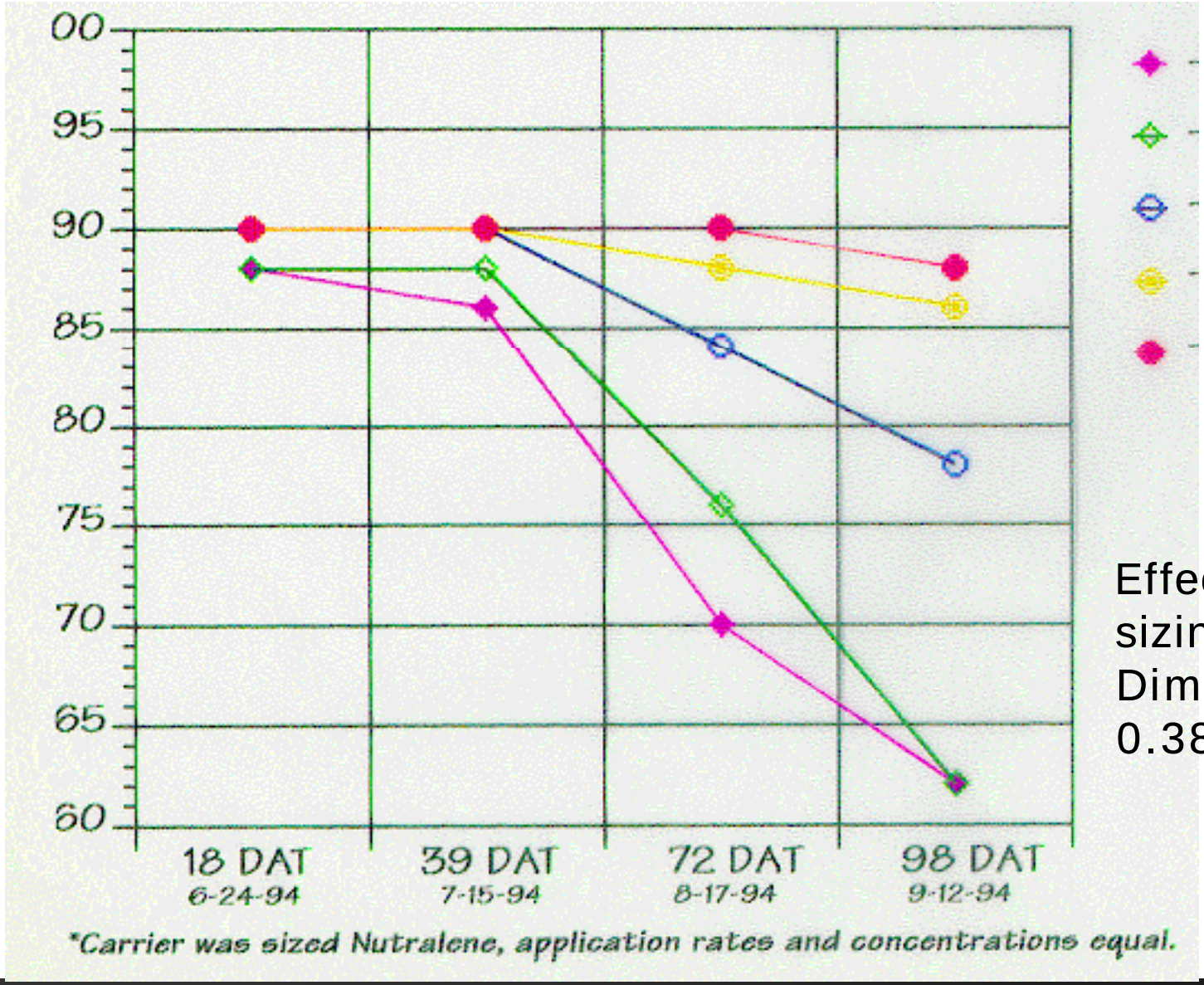

***Particles per square inch***

***200 pounds per acre***

***45 pounds per ft³***

"Self-Incorporating Granule"

# Particle Count (coverage)




Effect of particle sizing on Dimension/Fert, 0.38 lb AI/A

# The success of “DGlite” gave rise to the need for Dispersible Nutrients

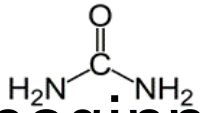
# Playing with

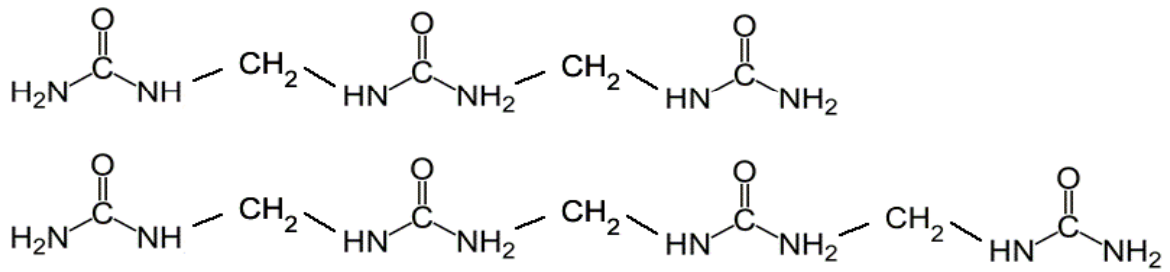
# M.U.D.

# Playing with M.U.D.

## **M**ethylene **U**rea **D**ispersible

- M.U. = perfect marriage for dispersibility
- Can utilize “short-chain” MU40 to “long-chain” Nitroform
- In beginning, we focused on solving the mower pick-up issue and pesticide efficacy



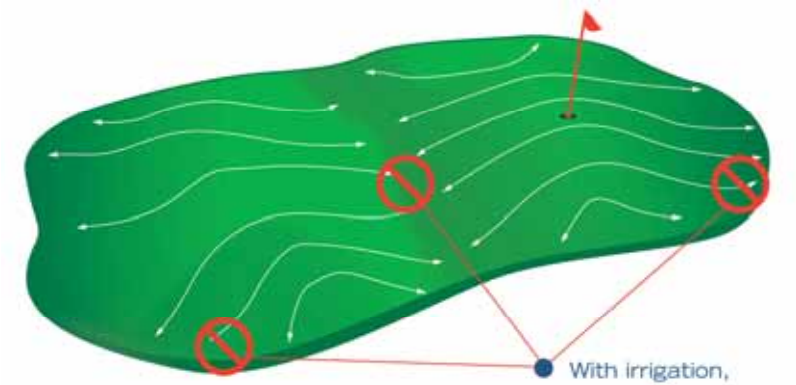



# Customer feedback: "Efficiency Gains"

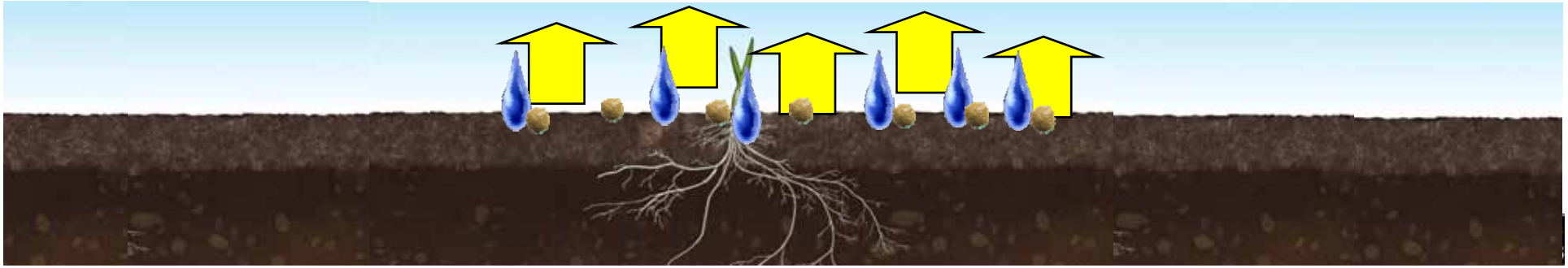
# Efficiency with Dispersibility

Early stories from users talked about efficiency

- No mower pick-up
- Tracking
- Lack of “wash-outs”
- Reduced volatilization?



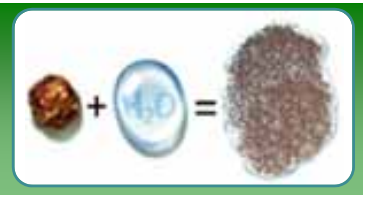

- Self-incorporating granule



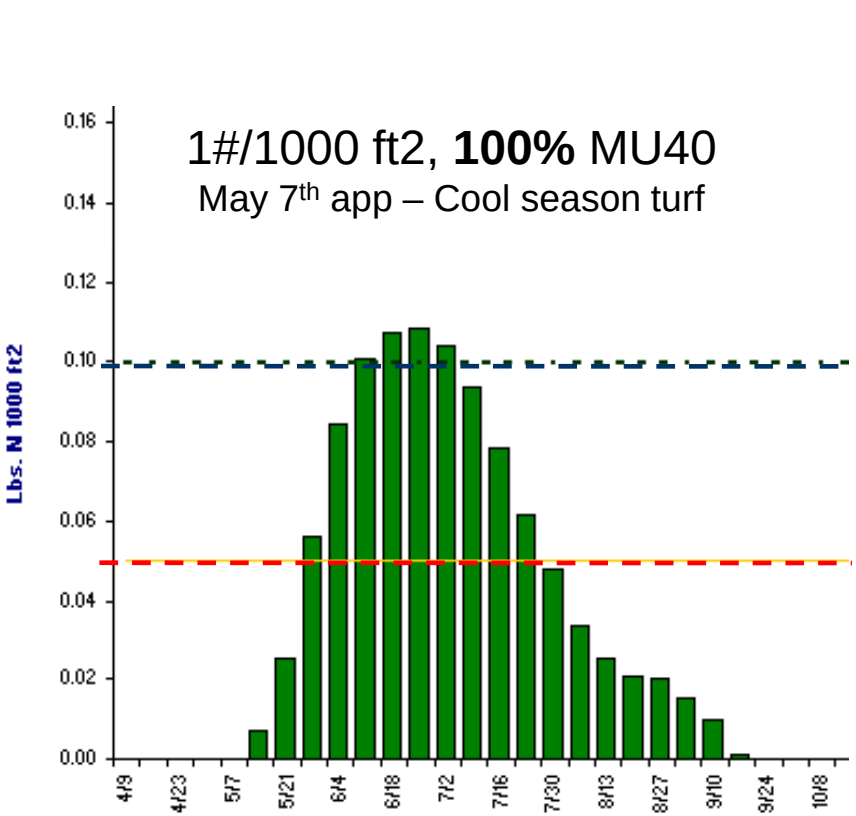
# First market hurdle:

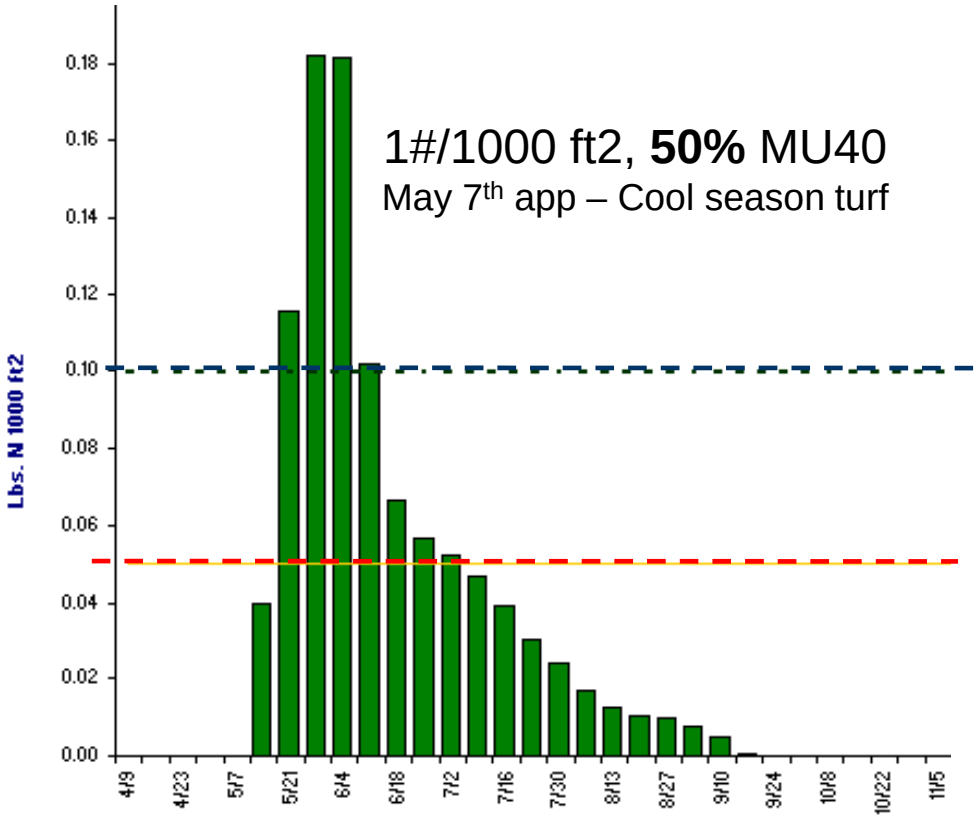
# MU-40 stigma

# Dealing with the M.U. Stigma



## "MU40 is 8-week green-up at best"

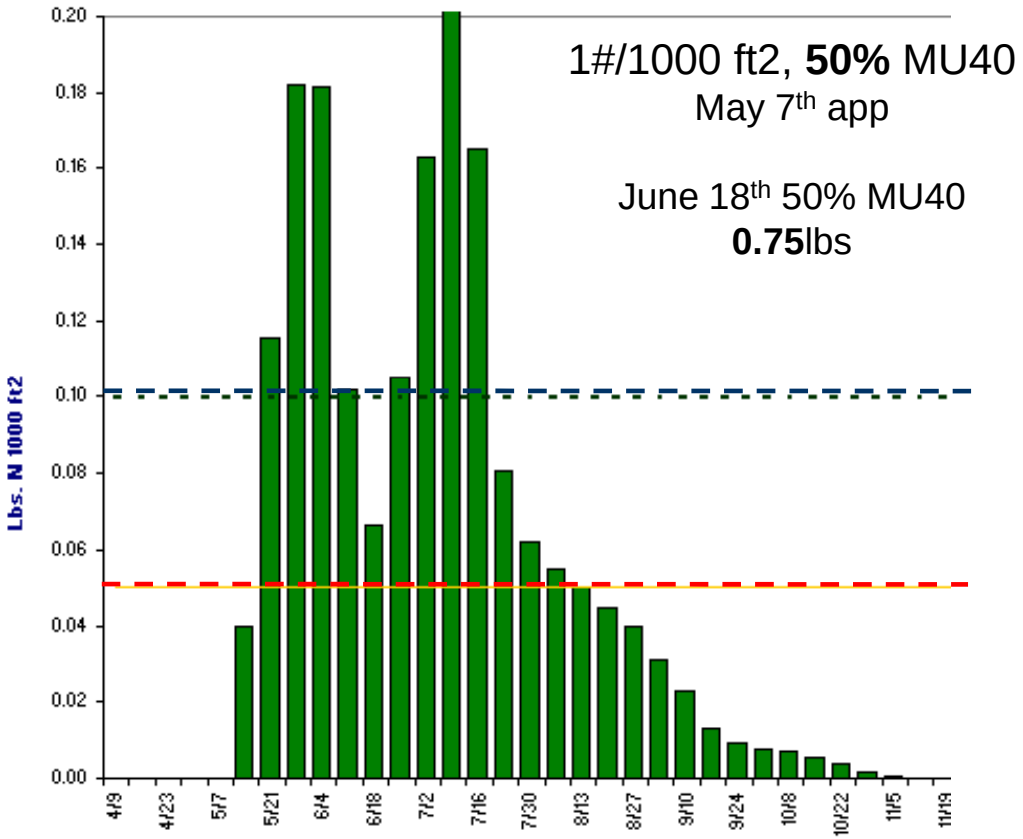



Focus on price per bag leads to blends of 50% SRN… value of the slow release is nearly lost

# Dealing with the M.U. Stigma

"longer-chains will build-up in soil resulting in exploding growth with hot weather"



# Revitalizing an old friend:

## Could a spreadsheet save the day?

# Revitalizing an old friend

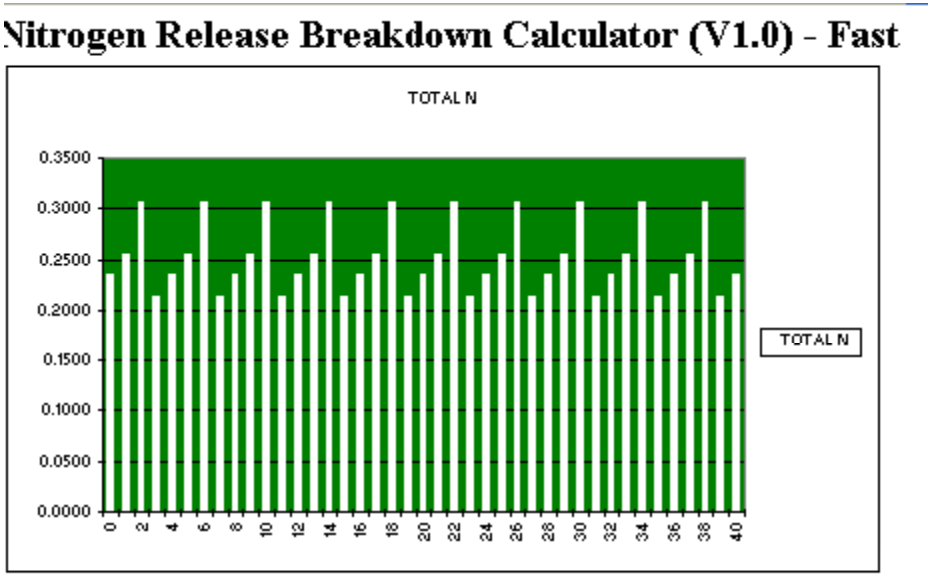
**Nitrogen Release Breakdown Calculator (V1.0)**

| | TREATMENT #1 | | | TREATMENT #2 | | | TREATMENT #3 | | | TREATMENT #4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product: | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | |
| Product Code: | ATT28265 | | | ATT28265 | | | ATT28265 | | | ATT28265 | | |
| Application Rate (#/M): | 3.5 | % | #N | 3.5 | % | #N | 3.5 | % | #N | 3.5 | % | #N |
| Total %N: | 28 | 0.00% | 1.5E-16 | 28 | 0.00% | 1.5E-16 | 28 | 0.00% | 1.5E-16 | 28 | 0.00% | 1.5E-16 |
| % of N from Nutralene: | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 |
| % SCU | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 |
| %Ammoniacal N: | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 |
| | | | 0.98 | | | 0.98 | | | 0.98 | | | 0.98 |

| | TREATMENT #6 | | | TREATMENT #7 | | | TREATMENT #8 | | | TREATMENT #9 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product: | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | | 28-3-10 w/ 96% SCU | | |
| Product Code: | ATT28265 | | | ATT28265 | | | ATT28265 | | | ATT28265 | | |
| Application Rate (#/M): | 3.5 | % | #N | 3.5 | % | #N | 3.5 | % | #N | 3.5 | % | #N |
| Total %N: | 28 | 0.00% | 1.46E-16 | 28 | 0.00% | 1.46E-16 | 28 | 0.00% | 1.46E-16 | 28 | 0.00% | 1.46E-16 |
| % of N from Nutralene: | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 | 0 | 0.00% | 0.000 |
| % SCU | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 | 96 | 26.88% | 0.941 |
| %Ammoniacal N: | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 | 1.12 | 1.12% | 0.0392 |
| | | | 0.98 | | | 0.98 | | | 0.98 | | | 0.98 |

Input applications

Early M.S. Excel tool used to model release of nitrogen




Model release

# Revitalizing an old friend

needs. Many turf managers are finding significant savings in their turf nutrition budgets using the TNT in combination with Andersons product technology. All you need to use this tool is a computer and Microsoft Excel 97 or higher versions (Excel 2002 or higher for best performance).

1) The first step is to do ning Vista operating system, right click icon,

File Download

Do you want to open or save this file?

Name: TNT_vers2008F1.xls
Type: Microsoft Excel Worksheet, 5.40MB
From: www.contecdg.com

Open Save Cancel

Always ask before opening this type of file

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file. What's the risk?

| Application | |
|---|---|
| United States - East an icon and "save") | dated Sept 23rd, 2008 |
| United States - Western and "save") | updated Sept 23rd, 2008 |
| United States, Excel 97 - East and | ted Sept 23rd, 2008 |
| United States, Excel 97 - Western | dated Sept 23rd, 2008 |
| United States, Excel 97 -Bermuda | nuda- updated Sept. 23rd, 2008 |
| Europe, Excel 97 or high | 5.6MB dated h, 2008 |

Check often for version updates to these tools

2) Save the file to your computer using the "click, then **save**"(If you are running Vista operating system, right click icon, and "Save Target as..."), and then place in your desired computer folder.

See below video training on the TNT.

Microsoft Excel

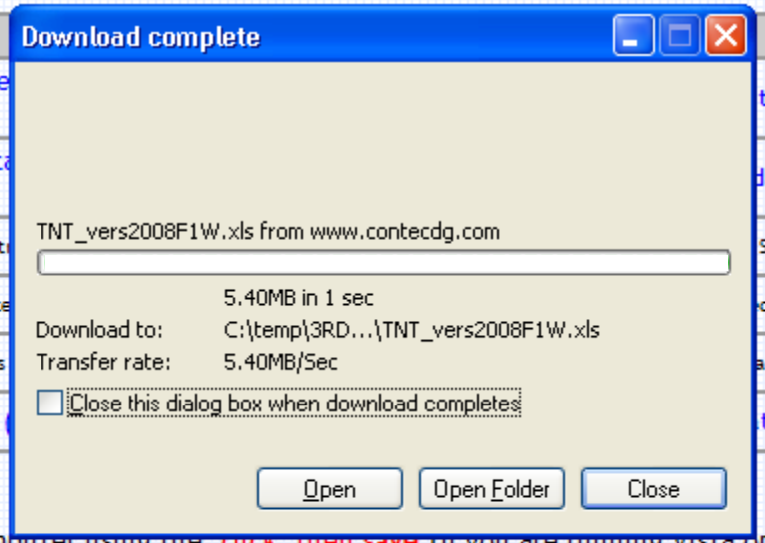
'F:\data\Excel\ContecDG\TNT_vers2007J1.xls' contains macros.

# Revitalizing an old friend

combination with Andersons product technology. All you need to use this tool is a computer and Microsoft Excel 97 or higher versions (Excel 2002 or higher for best performance).

1) The first step is to download the application from the menu below (If you are running Vista operating system, right click icon, and "Save Target as..."):

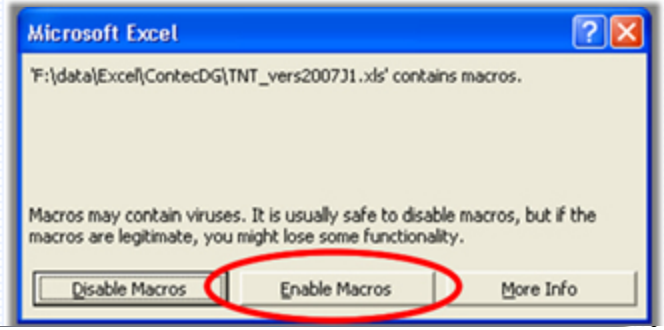
| Application | |
|---|---|
| United States - East and Ce... icon and "save") | ...ted Sept 23rd, 2008 |
| United States - Western St... and "save") | ...dated Sept 23rd, 2008 |
| United States, Excel 97 - East and Cent... | ...Sept 23rd, 2008 |
| United States, Excel 97 - Western State... | ...d Sept 23rd, 2008 |
| United States, Excel 97 -Bermudagrass... | ...a- updated Sept. 23rd, 2008 |
| Europe, Excel 97 or higher ... | ...ted March, 2008 |




2) Save the file to your computer using the "click, then save" (if you are running Vista operating system, right click icon, and "Save Target as..."), and then place in your desired computer folder.

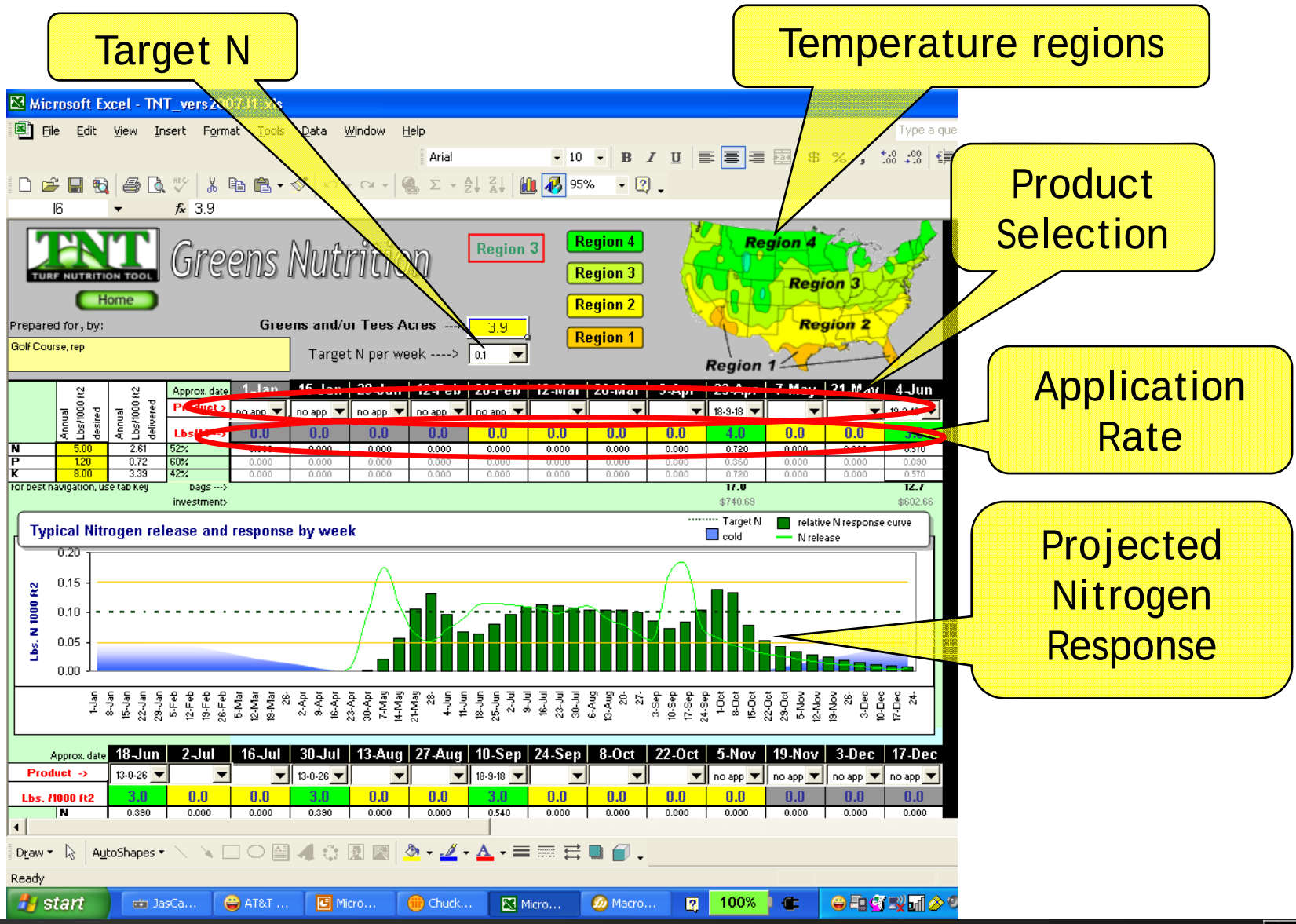
See below video training on the TNT.

3) Open the file. Please note the file has macros, which will not harm your computer, but you may get a warning "File xxxx, contains macros, macros may contain viruses...", select, "**enable macros**".




Note: If you open this file without a warning, and the

# Revitalizing an old friend



# Revitalizing an old friend

# Quick Demo

# In closing...

## The Future...

# Ohio Dept. of Development Grant

The Ohio State University OARDC · The Andersons · syngenta · National Lime & Stone Company · PSB Company · OBIC Ohio BioProducts Innovation Center

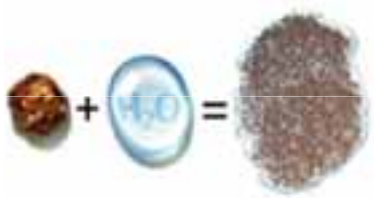
+ 3rd Ohio Frontier project

**3rd Frontier Investment**

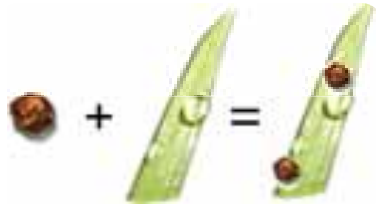
=

**Advanced Granule Technology**

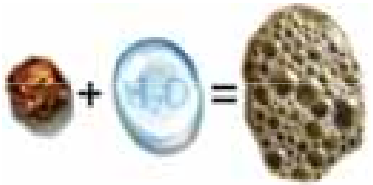
**3-year, $10 million research & commercialization**



1. Soil Dispersing Granules



2. Foliar Granules



3. Foaming Granules

4. Advanced Applicators

5. Emerging Biomaterials

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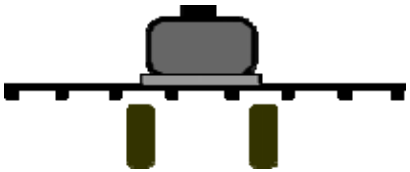

## 4. Advanced Applicators

ndersons R &

# Thank you