

Year 1 of a Trial of Biological Fungicides

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UCCE

Introduction

- Being a smart consumer of scientific data.
- Materials and Methods of the trial
- Results
- Discussion
- Work ongoing in Year 2 – 2013-2014

Be a critical consumer of science.

- The case for adherence to objective procedure in science rather than allowing subjective beliefs to enter in.

What do those letters really mean?

Data Set

Set 1:

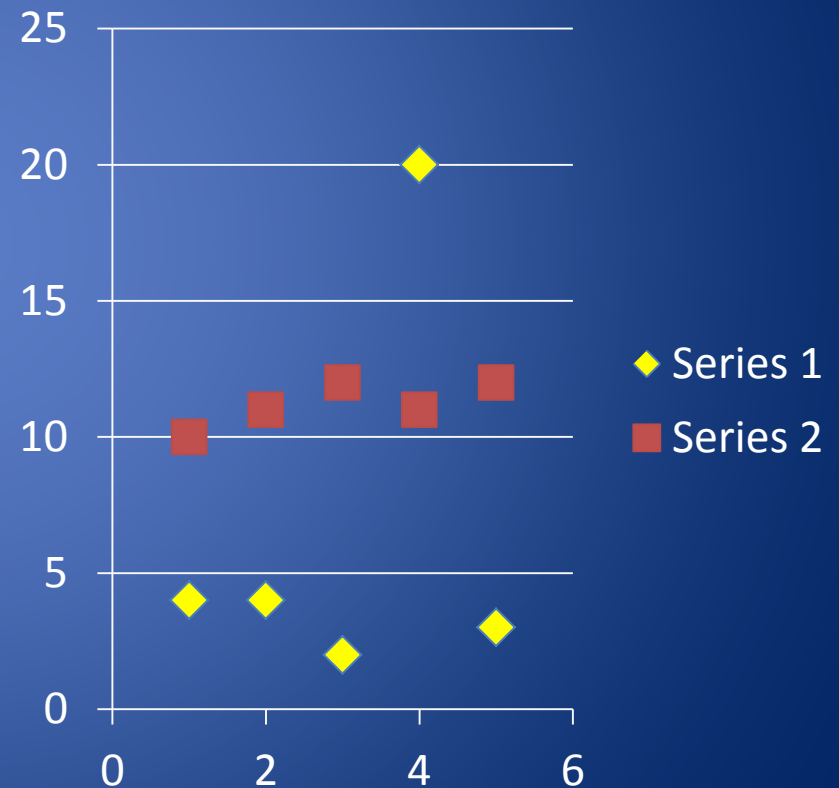
2, 3, 4, 4, 20 : average = 7.25 A

Set 2:

10, 11, 12, 11, 12: average = 11 A

$p = 0.22$

Graphical Display of Data



Modified data

Set 1:

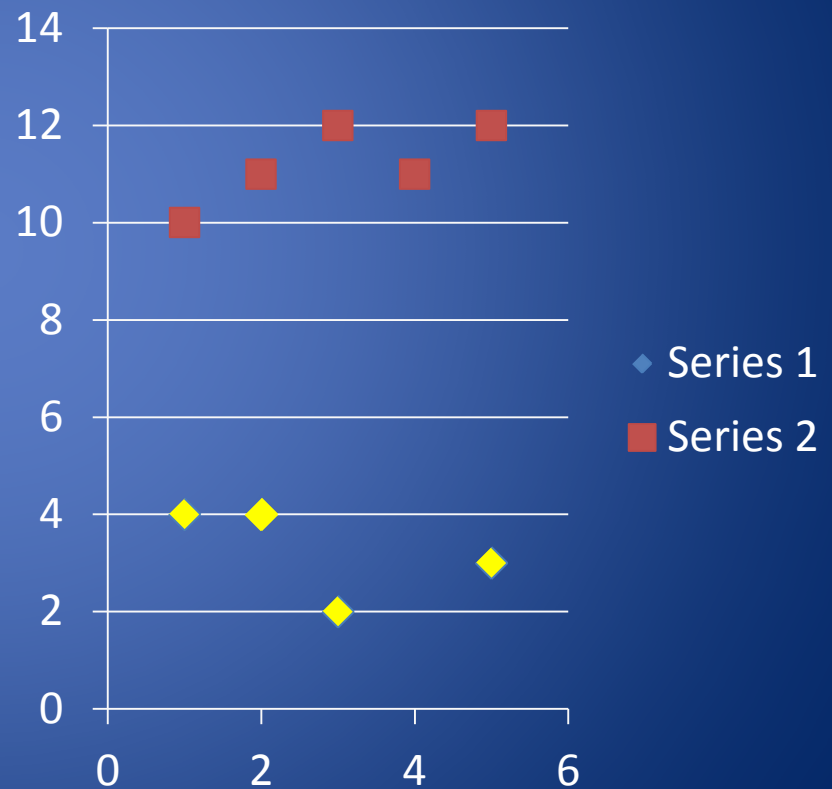
2, 3, 4, 4, - : = 3 A

Set 2:

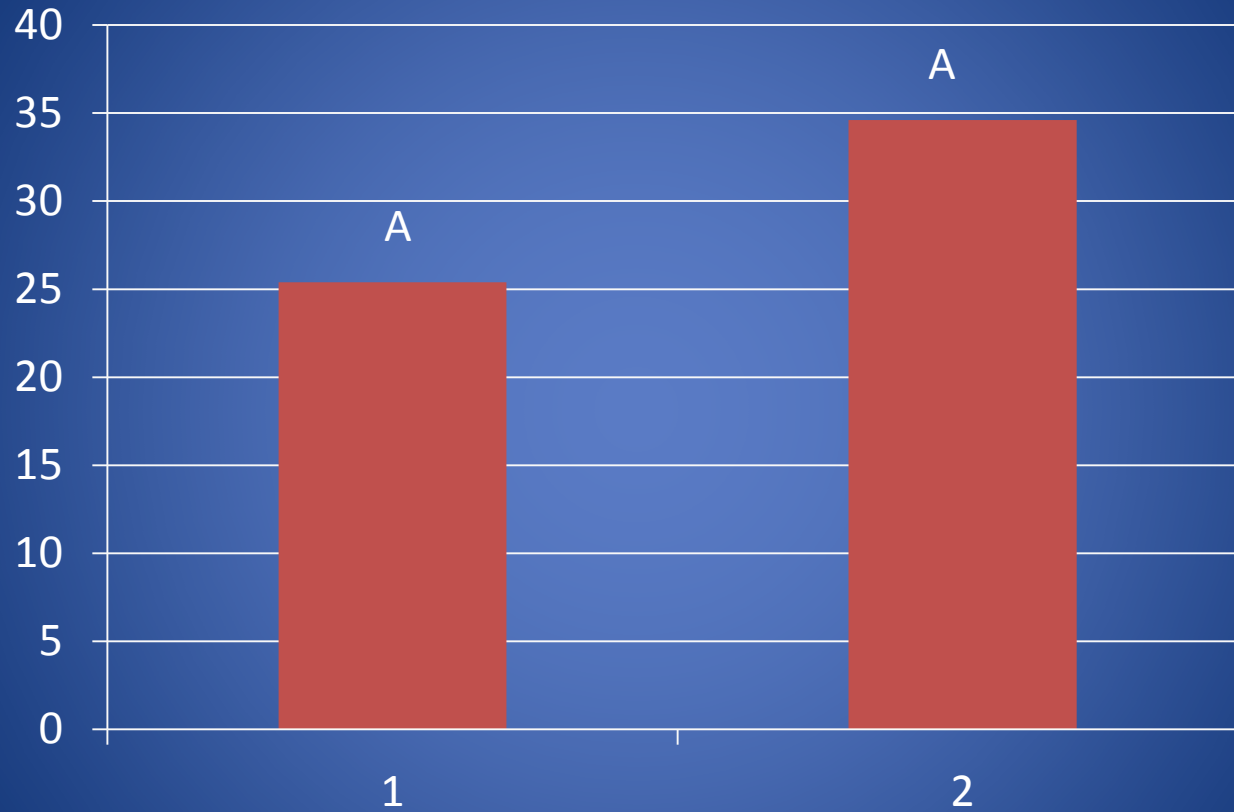
10, 11, 12, 11, 12 = 11 B

$p = 0.002$

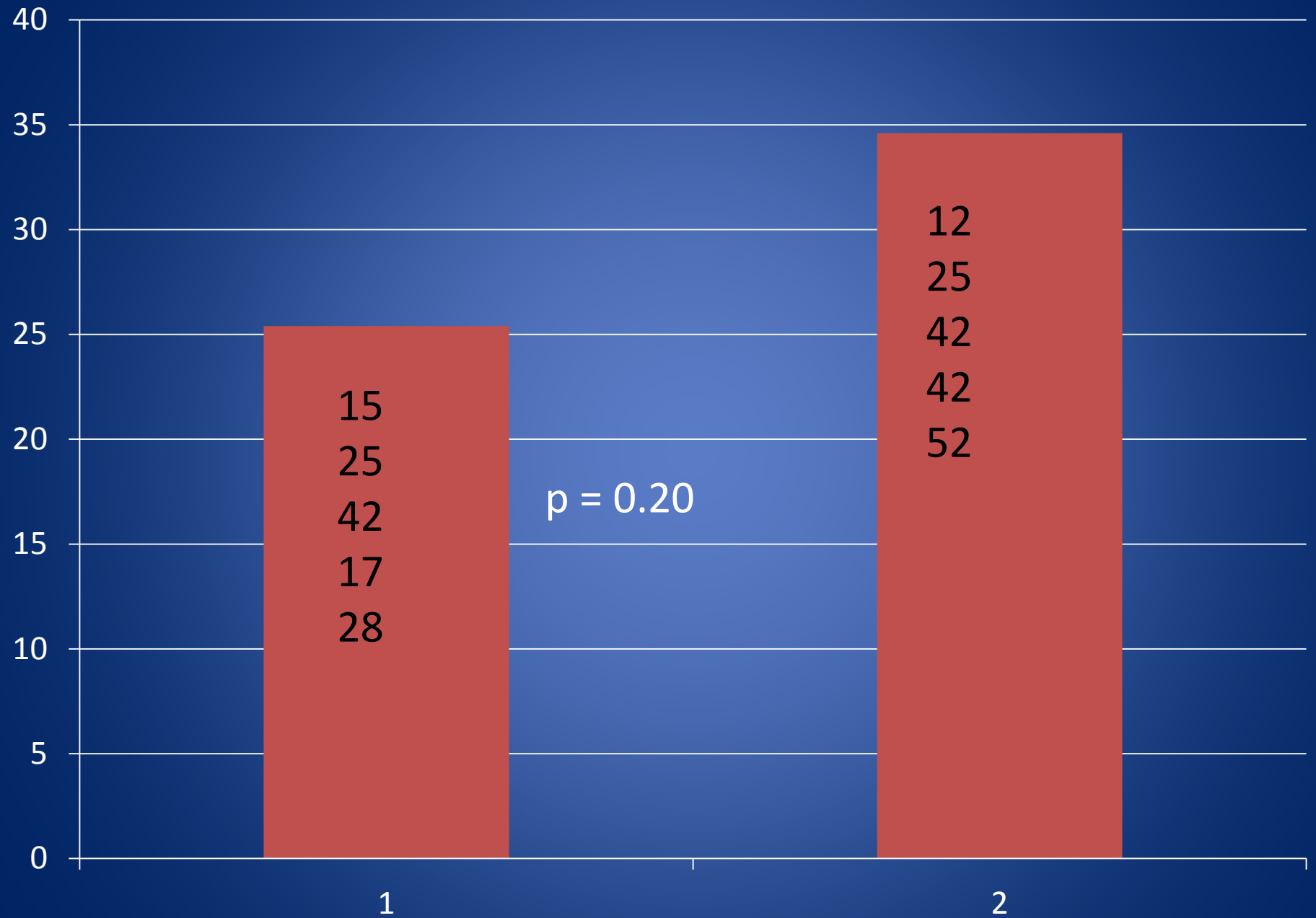
Graphical Display



Numerical Differences



Look at the internals of the data set!



The Study

- Verticillium infected field (average 30 CFU/g soil)
- Organically managed.

Treatment List

- Dazitol
- Actinovate 2 rates
- Serenade 2 rates
- Biotam
- SoilGard
- Tainio product series
- Double Nickel 55
- Untreated control

Dazitol (AITC + oleresin of capsicum)

- 6.25 gal/A applied 3 days prior to planting

“The silver bullet replacement for methyl bromide pre-plant usage” – Louis Champon, Champon 100% Natural Products

Bio Tam (*T. asperellum* + *T. gamsii*) + Serenade (*Bacillus subtilis*)

- 5 lbs/A pre-plant application 3 days prior to planting followed by Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 2 qt /A applied monthly after planting. Second application of Biotam 5 lbs/A and Serenade Soil @ 4 qt/A in February.

Serenade treatments (*Bacillus subtilis*)

- Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 2 qt /A applied monthly after planting.
- Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 4 qt /A applied every 60 days after planting.

Actinovate (*Streptomyces lydicus*)

Actinovate Treatment One

- 1) 3 oz per 100 gal root dip at planting.
- (2) followed by 6 oz/A in drip tape
- (3) followed by 3 oz/A every 30 days in drip tape

Actinovate Treatment Two

- 1) 3 oz per 100 gal root dip at planting.
- (2) followed by 6 oz/A in drip tape
- (3) followed by 6 oz/A every 30 days in drip tape

SoilGard (*Trichoderma virens*)

- Apply at planting as root dip or planting furrow drench at 5 lb/ A and again through drip tape every 4 weeks through harvest.

Double Nickel 55 (*Bacillus amyloliquefaciens*)

- Apply at planting at 1/2 lb/A powder as root dip or planting furrow drench and again through drip tape every 4-6 weeks through harvest.

Terraclean (Hydrogen dioxide)

Treatment 1

- (1) 128 fl oz/100 gal drench
- (2) 2 gal/A drip applied at planting
- (3) 1 gal/A drip applied 10 days post plant and 28 days post plant
- (4) 1 gal/A drip applied 60, 90 and 120 days post plant

Treatment 2

- (1) 128 fl oz Terra Clean /100 gal drench + Serenade Soil @ 6 qt/ A soil drench
- (2) 2 gal/A Terra Clean drip applied at planting followed by SS @ 3 qt /A
- (3) 1 gal/A Terra Clean + 3 qt /A Serenade Soil drip applied 10 days post plant and 28 days post plant
- (4) 1 gal/A Terra Clean + Serenade Soil @ 3 qt/ A drip applied 60, 90 and 120 days post plant

Tainio series — multitude of bacteria and enzymes

- (1) Spectrum @ 50 g / A + Pepzyme C @ 12.5 oz/A 3 days preplant
- (2) Biogenesis @ 1 lb/A+ Pepzyme C @ 12.5 oz/A as plant dip
- (3) Pepzyme C monthly through drip tape
- (4) Micro 5000 @ 2.66 oz/A at 2 leaf stage foliar

Results

Late December 2013



Serenade

Actinovate

Plant Diameters

	1/21	2/13	3/4	4/13
Actinovate 1	10.6 a	14.1 a	15.8	16.2
Actinovate 2	11.4 a	13.7 ab	14.6	16.4
Biotam + Serenade	8.4 cd	11.5 d	13.7	15.8
Dazitol	8.9 bcd	11.7 cd	13.7	17.7
Double Nickel 55	10.0 abc	12.7 bcd	14.4	15.9
Serenade 4 qt + 2 qt	7.7 d	11.6 d	13.8	16.7
Serenade 4 qt + 4 qt	9.4 bcd	12.4 bcd	13.7	16.0
Soilguard	9.5 a-d	11.9 cd	13.8	16.8
Tainio series	10.0 abc	12.9 abc	14.2	17.0
Terraclean	8.2 cd	11.5 d	14.2	16.8
Terraclean + Serenade	9.1 bcd	12.5 bcd	14.1	17.1
Untreated grower standard	9.1 bcd	11.7 cd	13.1	17.9

Yield to 5/14/2013**April Total**

Actinovate r1	3894.00a	2175.00ab
Actinovate r2	3818.33a	2428.00a
Biotam	2176.67b	1377.00b
Dazitol	2505.67ab	1568.00ab
Double Nickel 55	3084.00ab	1637.00ab
Serenade 4 qt +2 qt	2853.00ab	1471.67b
Serenade 4 qt +4 qt	2621.00ab	1459.67b
Soilguard	2993.33ab	1652.33ab
Tainio	3454.00ab	2075.33ab
Terraclean	2284.00b	1406.67b
Terraclean + Serenade	2656.33ab	1559.67ab
Untreated standard	2145.00b	1189.00b

	May Total	June Total	July Total	Aug Total	Season Total
Actinovate r1	3741.67a	2791.00a	1902.33a	140.64a	16820.67a
Actinovate r2	3069.67a	3237.67a	2812.33a	149.35a	17201.34a
Biotam	2254.00a	3251.33a	3402.00a	503.14a	14468.33a
Dazitol	2514.67a	3075.33a	3049.33a	269.16a	14625.00a
Double Nickel 55	3038.67a	2837.67a	2573.67a	203.64a	15052.67a
Serenade 4 qt +2 qt	3244.67a	3287.00a	3623.67a	371.49a	16887.67a
Serenade 4 qt +4 qt	2959.67a	3617.67a	3236.33a	362.02a	16157.00a
Soilguard	3212.33a	3331.67a	2887.00a	359.45a	16352.33a
Tainio	3409.00a	3687.33a	3190.33a	170.27a	18145.00a
Terraclean	2496.67a	2997.00a	2750.00a	125.01a	13681.33a
Terraclean + Serenade	2544.00a	2810.00a	2230.00a	191.78a	13454.33a
Untreated grower standard	2812.00a	4019.33a	3800.00a	306.15a	16150.33a

July



Smoked



Work in 2013-2014

- ASD – no ASD for Tainio series, Actinovate, Serenade, Double Nickel 55 and Soilguard
- New materials – three treatments (Serenade, *Azospirillum brasilense*, Actinovate) post Dazitol. *Pythium polyversum*, MBI-106 as stand alone treatments.

