THE MOIST SOIL TEST

Laboratory Perspective
Ron Gelderman
SDSU

Test UNDRIED Soil Samples

BY J. J. HANWAY

IOWA STATE UNIVERSITY

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THE MOIST SOIL TEST - REVIEW

Two methods for handling

Direct method

- for loamy-coarse textures [soils that will pass thru a 10 mesh (0.08") screen], peats (or soils that slurry won't work)

1) Pass thru a 10 mesh screen
2) Determine soil moisture
3) Weigh equivalent dry wt needed for test
4) Adjust molarity and volume of extracting solns

for moisture content?

5) Direct Method is a weight to volume extraction compared to dry which is a volume (scoop) to volume extraction

THE MOIST SOIL TEST EXTRACTION - REVIEW

B) Slurry method

- difficult to obtain representative sample with very fine wet soils or with large clods with direct method.

1) Process so will pass thru 6-7 mesh (1/4”) screen
2) Subsample for moisture
3) Add 100 g dry equivalent to container and enough water to bring to 200 grams water (1:2 soil/water ratio)
4) Stir to break up clods and provide uniform suspension
5) Pipette equivalent dry wt. from slurry needed for analysis
6) The volume and molarity of extraction soln needs to be adjusted for the amount of water in suspension.

THE MOIST SOIL TEST EXTRACTION - REVIEW

B) Slurry method (cont)

7) The pipette needs to be calibrated for volume of suspension to produce dry equivalent wt needed.

8) Is a volume (pipette) to volume extraction similar to dry which is a volume (scoop) to volume extraction

To insure a good sample of field soil . . .

. . . not dry, crushed samples of "dirt".

ELECTRIC MIXER is used to prepare the soil-water slurry for sampling.

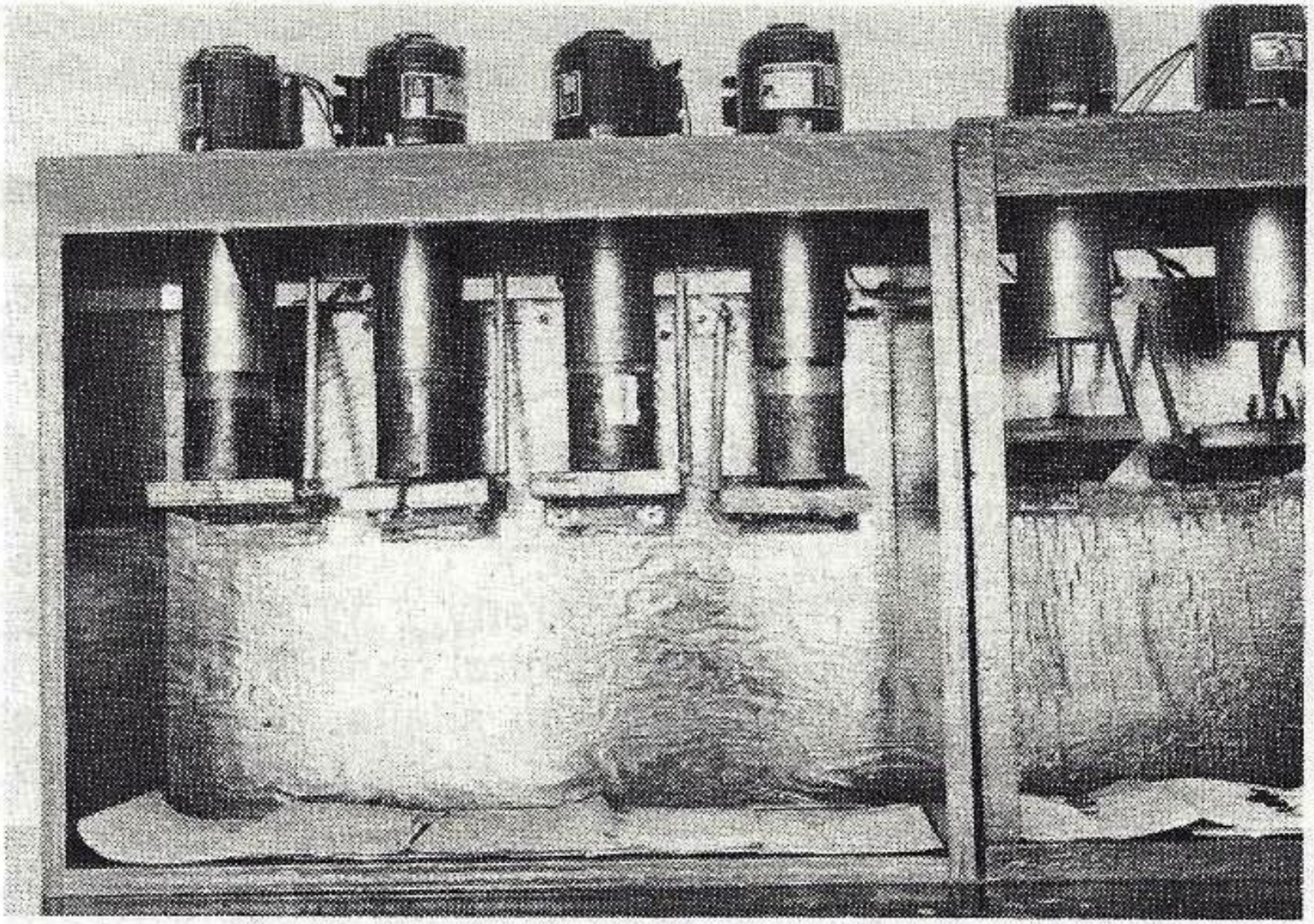


Figure 1. Electrical stirrers used in making a uniform soil suspension in the Slurry Method.

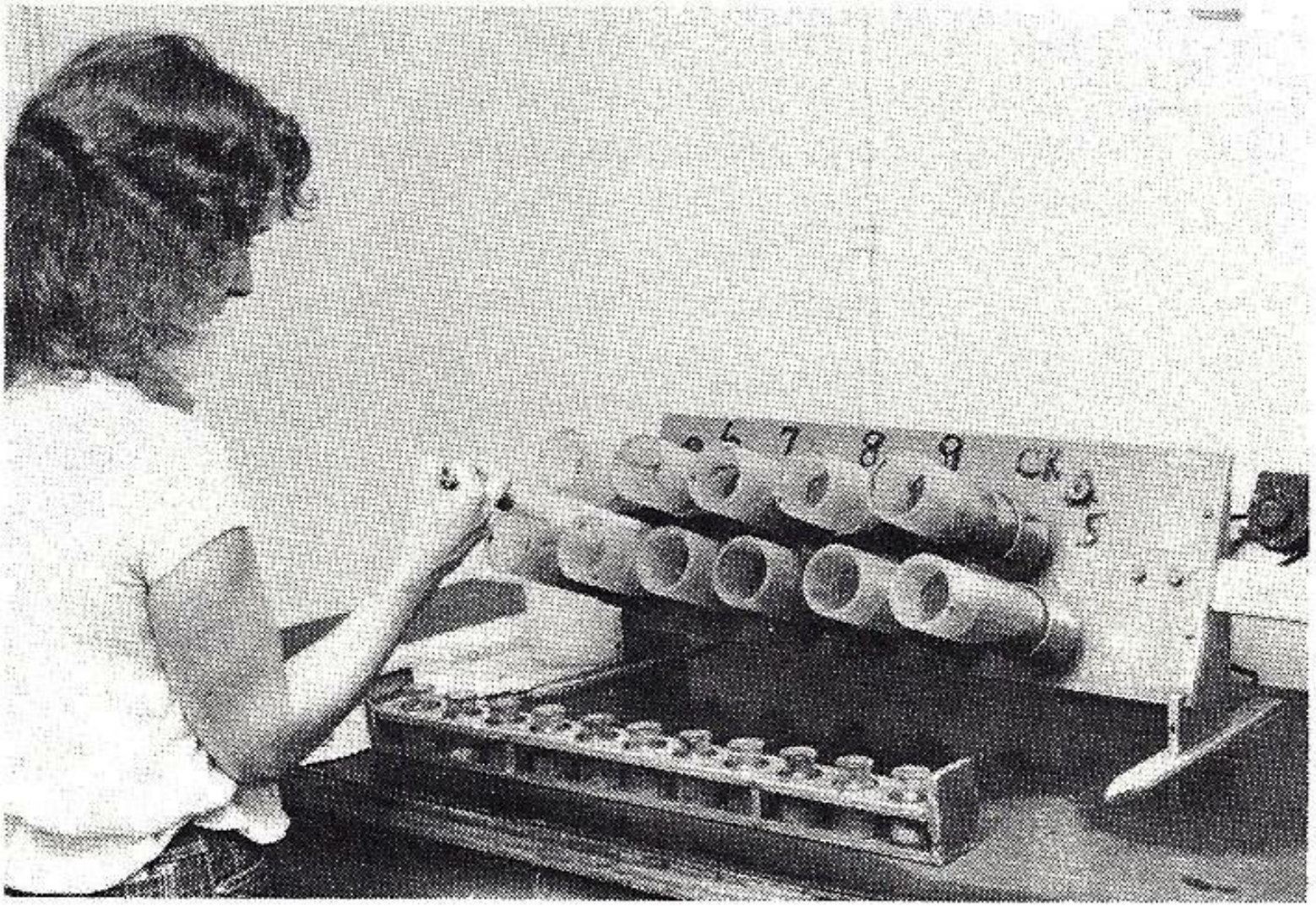
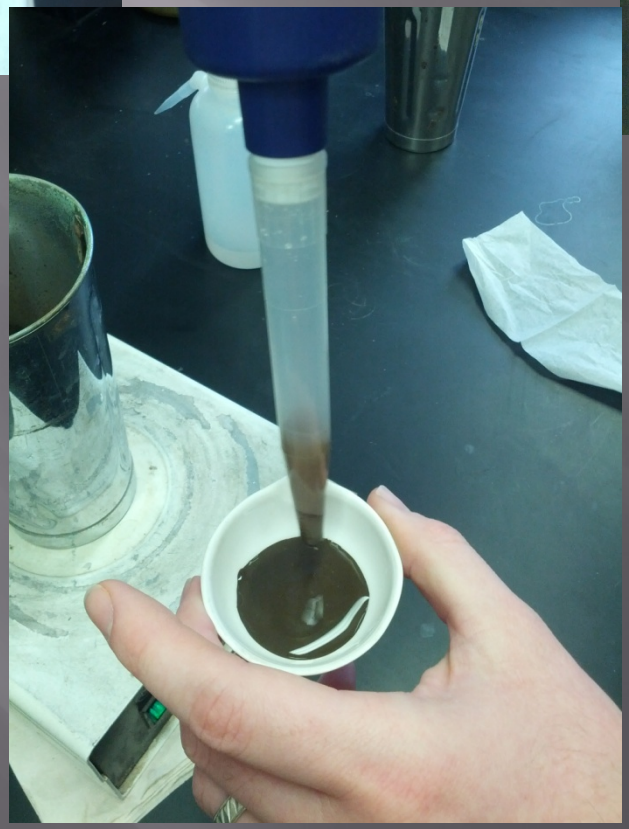
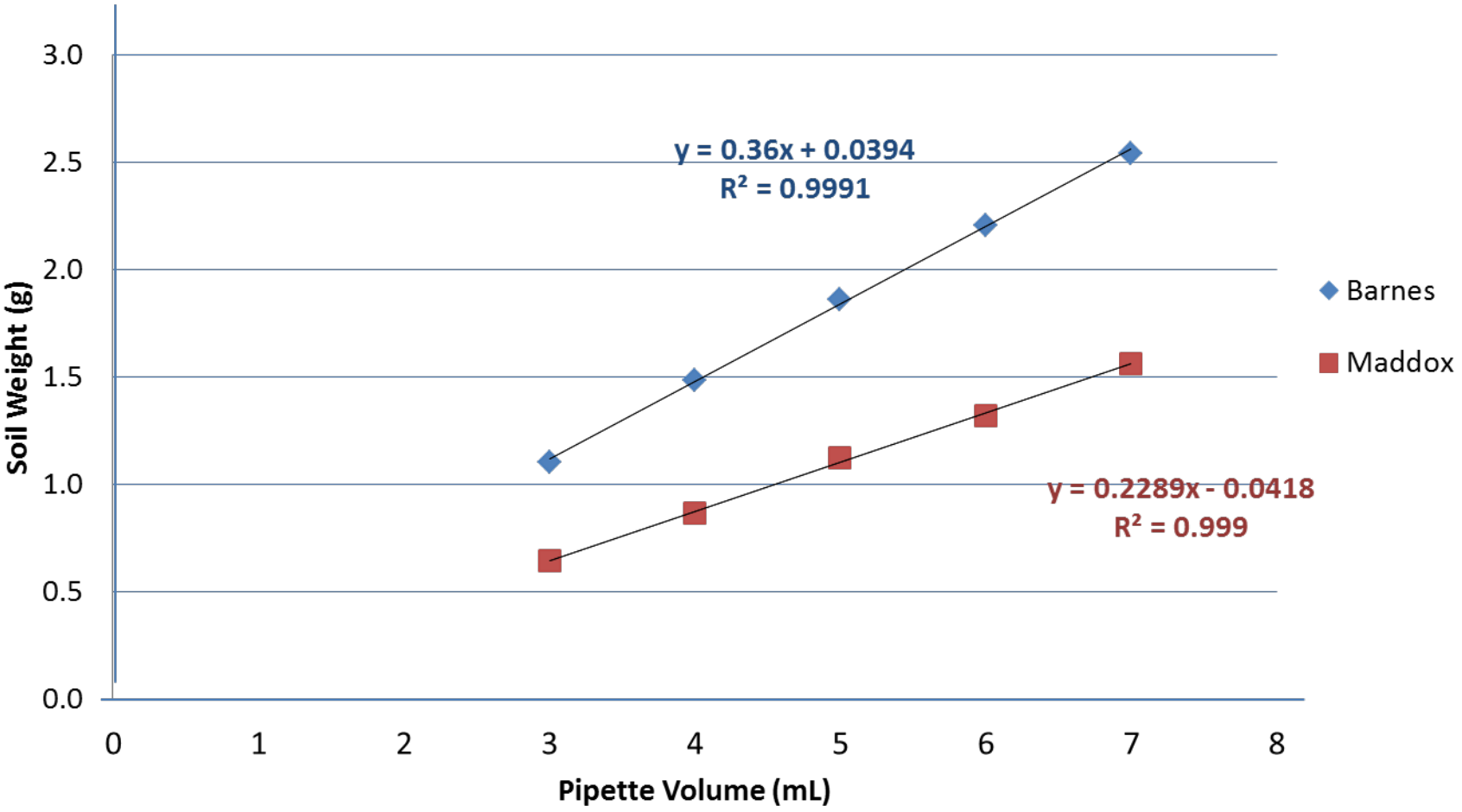


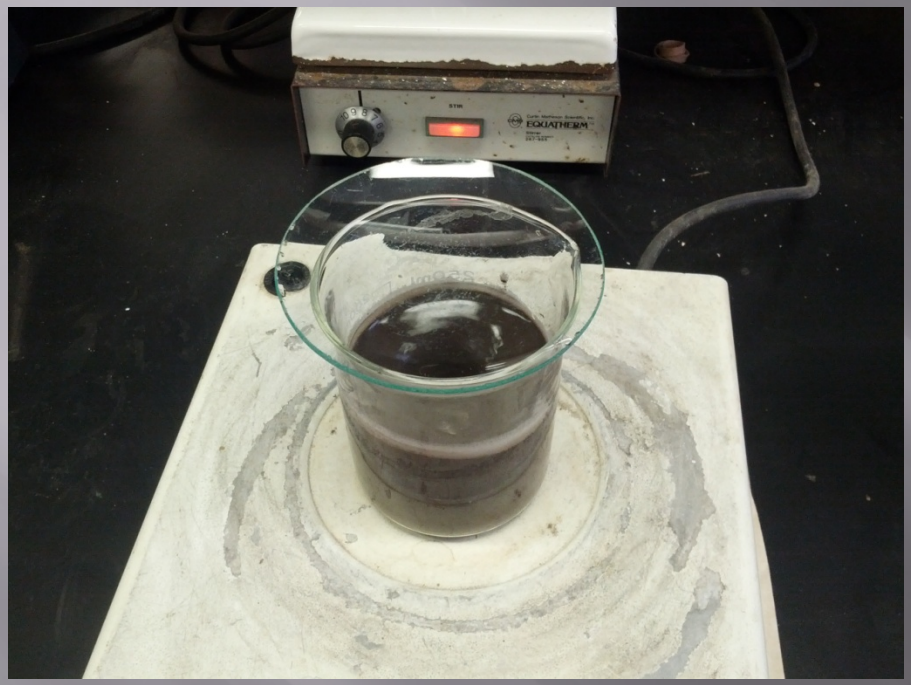
Figure 2. Drawing off a soil subsample for testing from cylinders on a rotator.



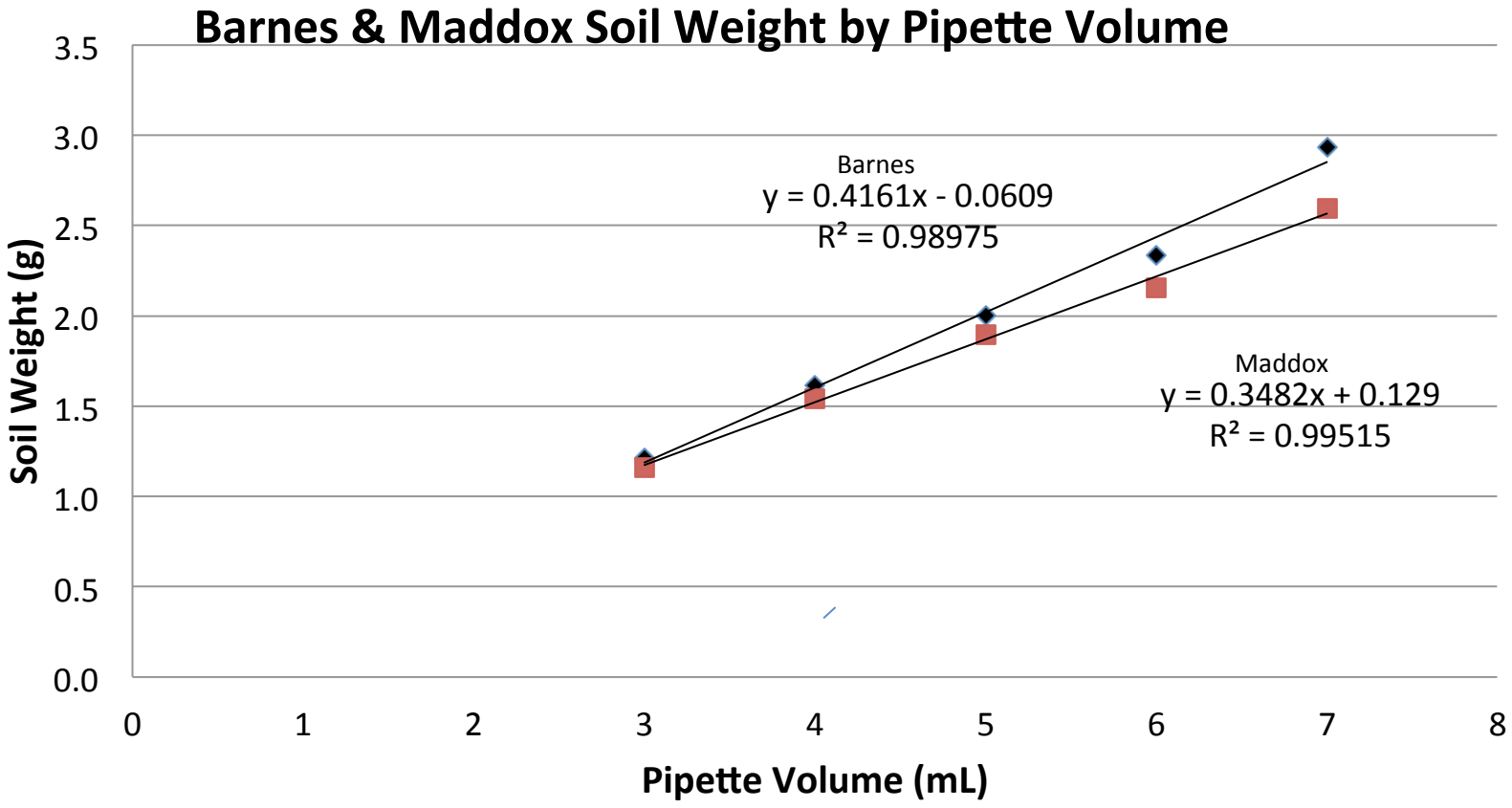
Barnes & Maddox Soil Weight by Pipette Volume



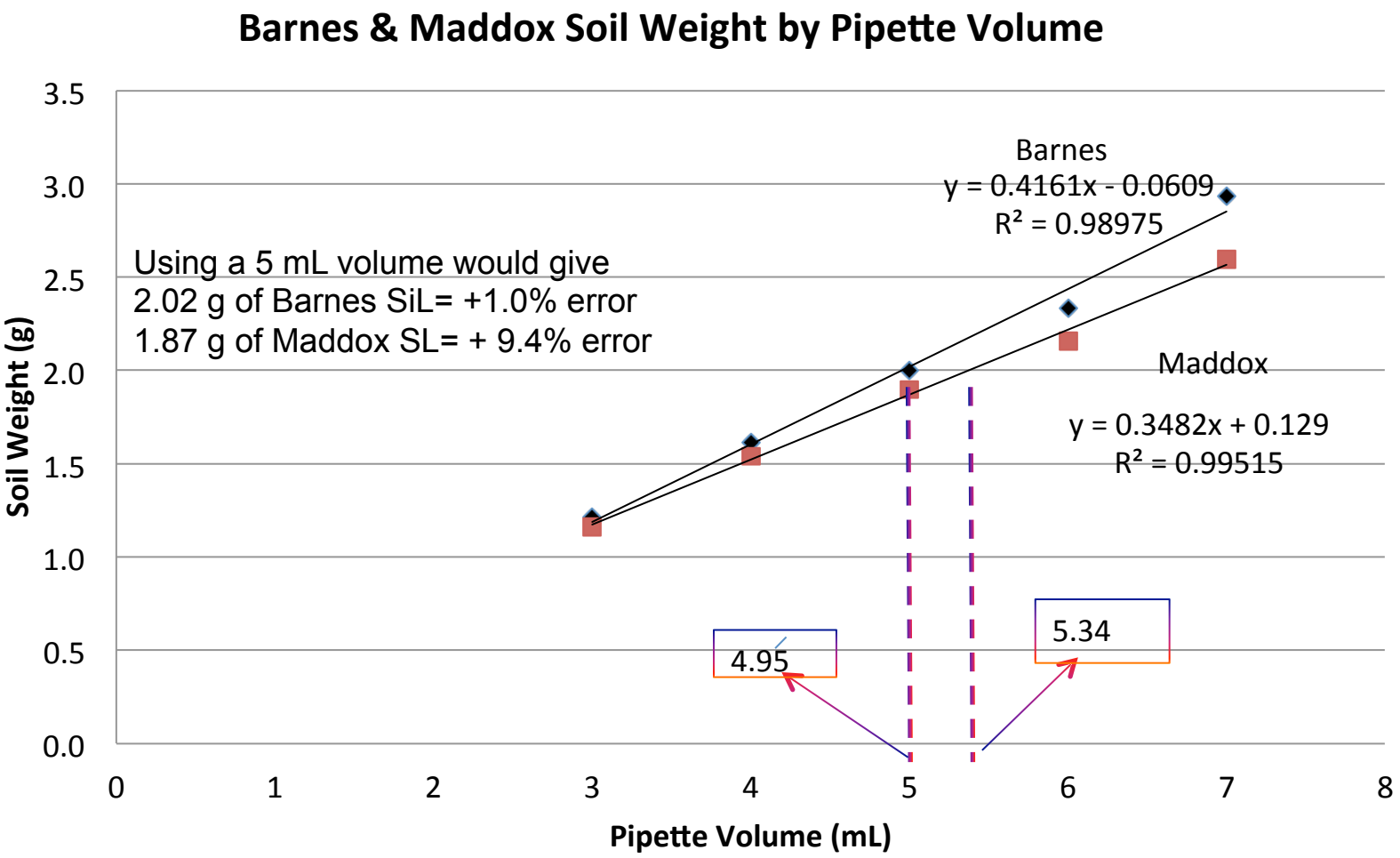
Mix and stir



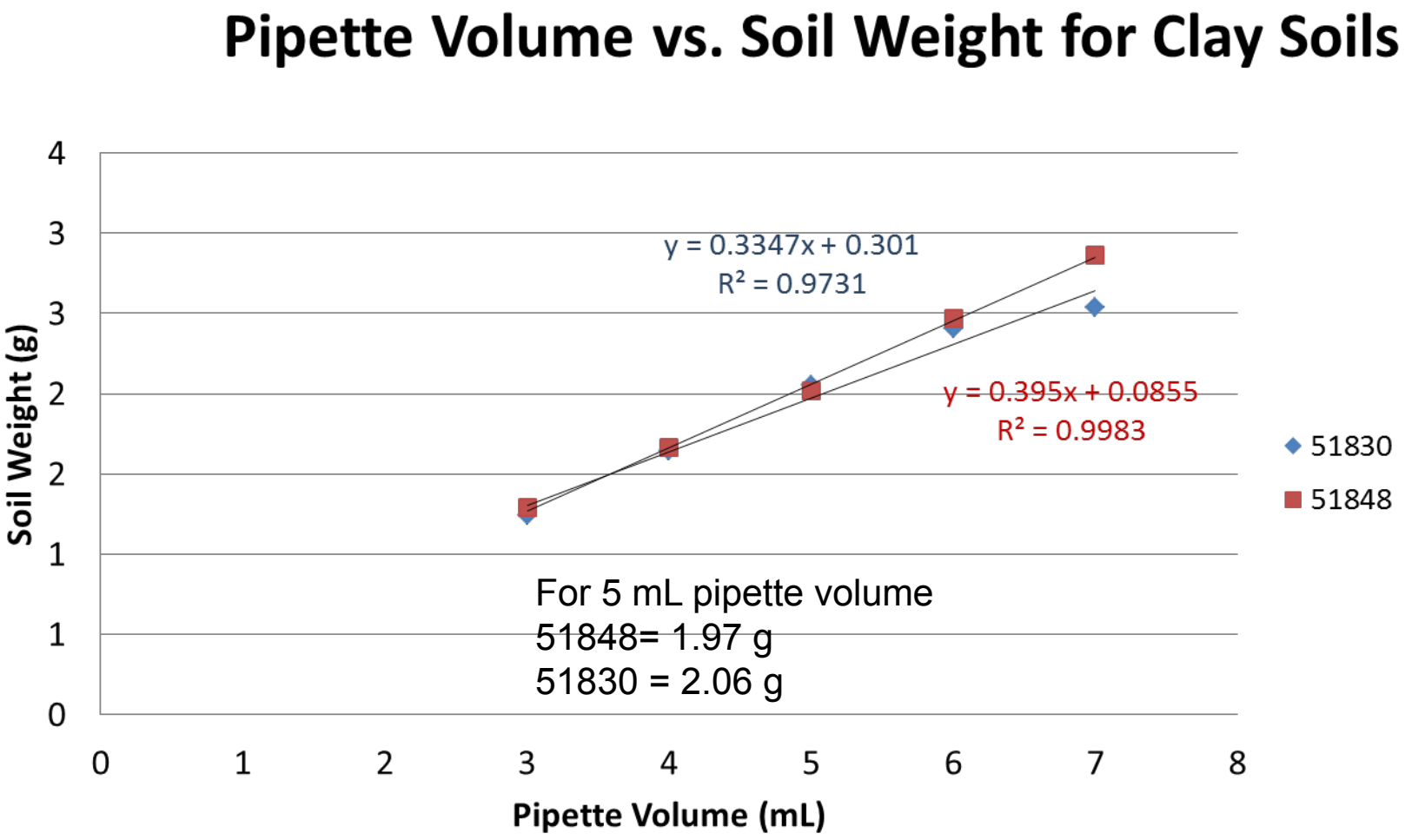
Moist Test - Slurry



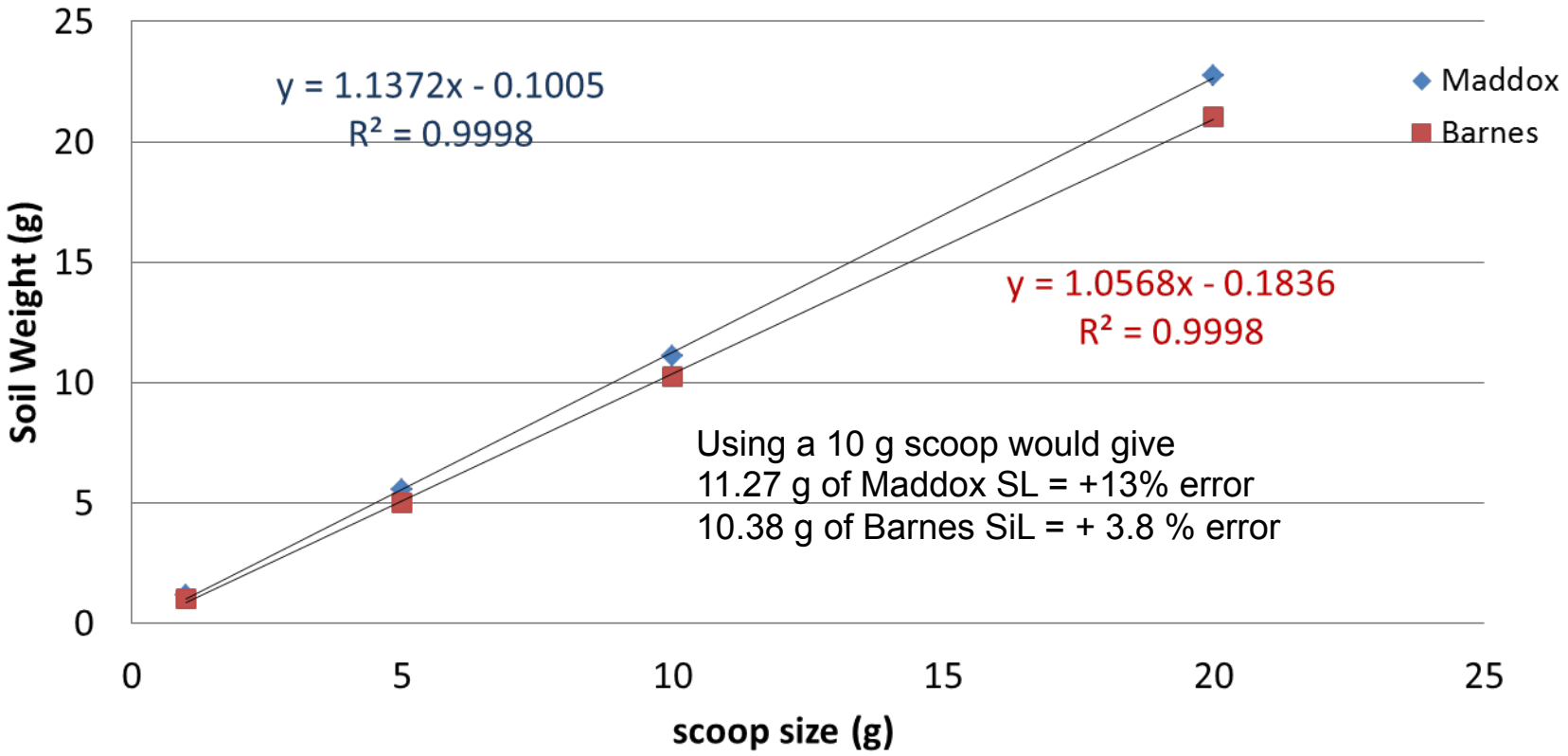
Moist Test - Slurry



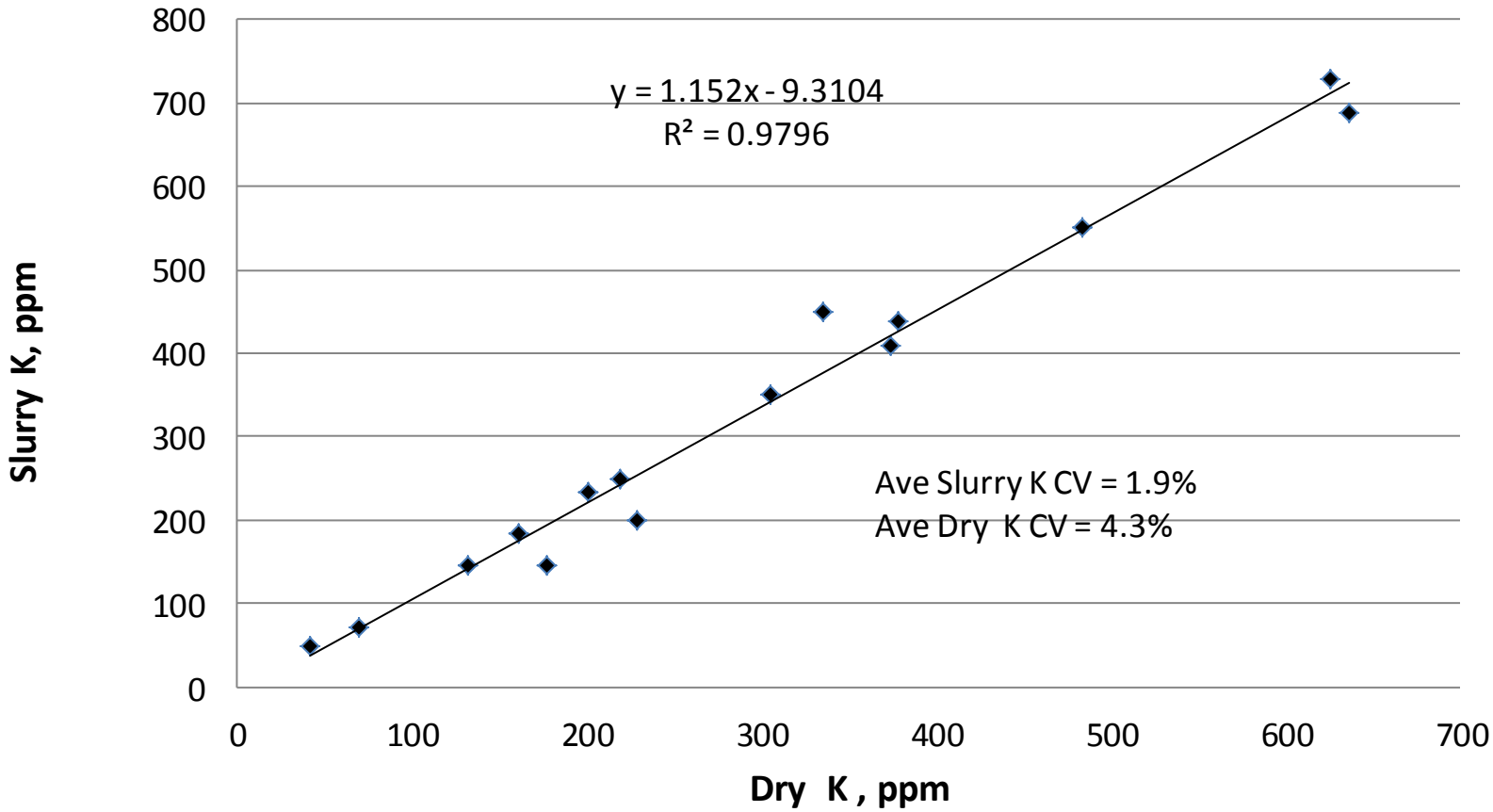
Moist Test - Slurry



Scoop Size vs. Sample Weight



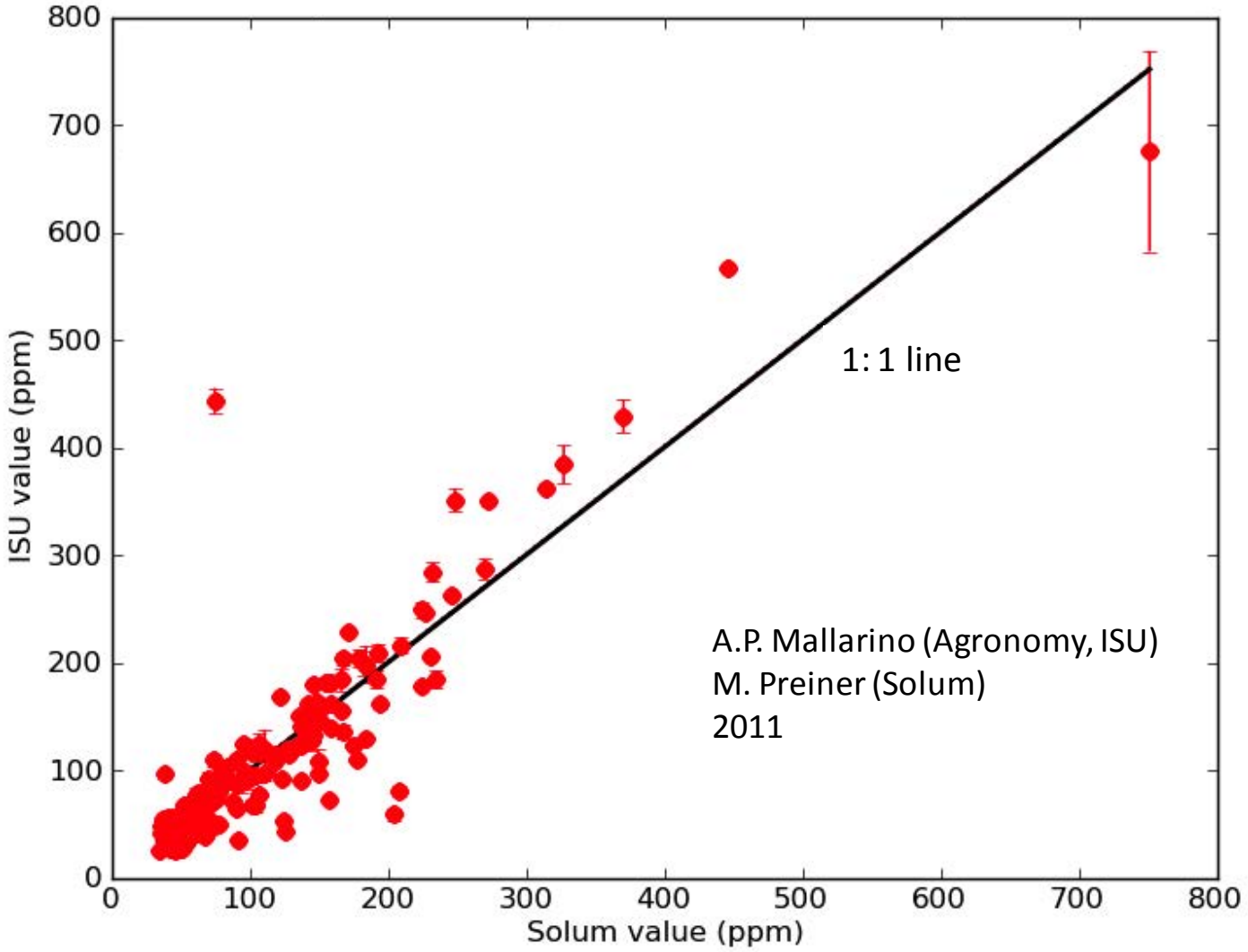
air dry soil, dry method K vs. slurry K, mean three runs – Amm. Ac.K



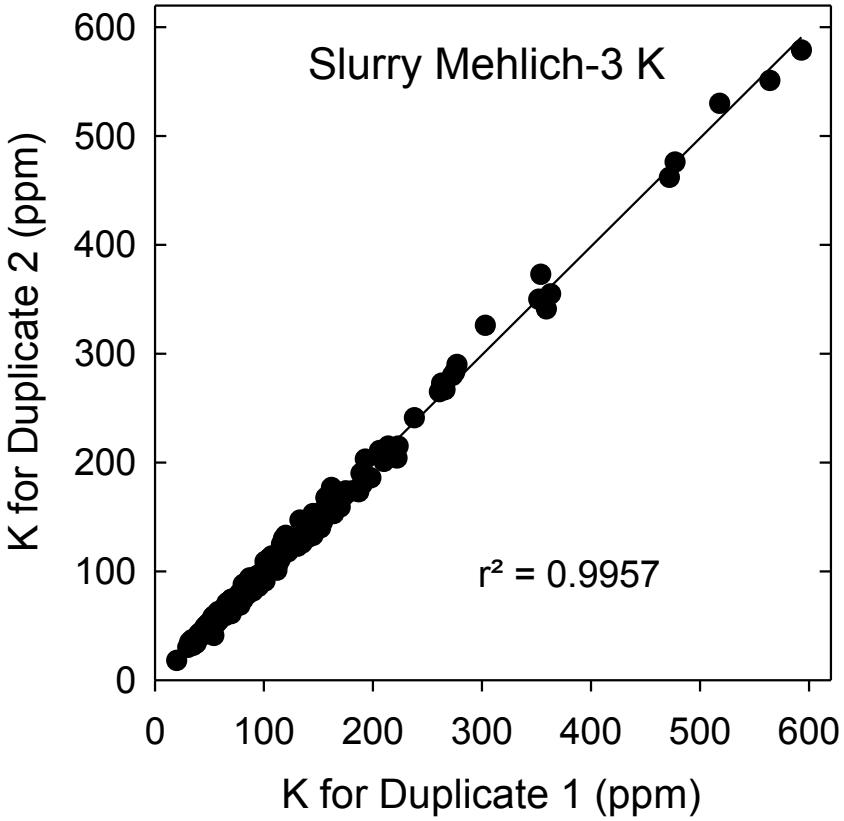
Dry vs. Moist K

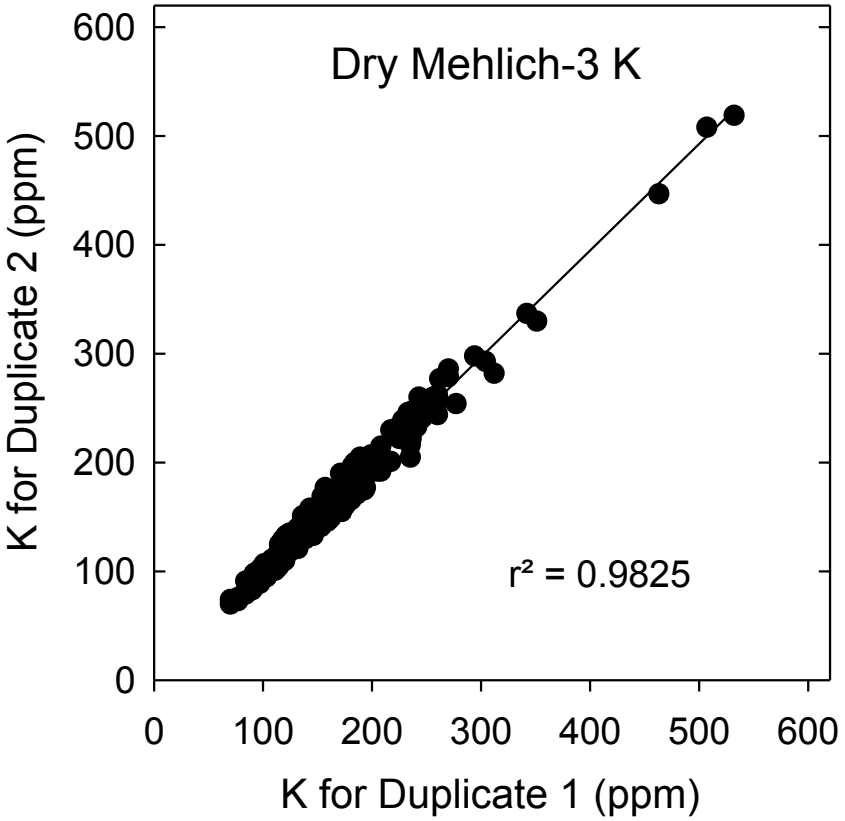
	Dry					Moist				
	Samples from 3 Different Extracts					**Samples from 3 Different Extracts**				
Soil	**Rep I**	**Rep II**	**Rep III**	Mean	CV	**Rep I**	**Rep II**	**Rep III**	mean	CV
	ppm K				%	**ppm K**				%
Barnes SiL	177	177	179	178	0.65	144	149	147	147	1.72
Maddox SL	234	237	216	229	4.96	205	197	200	201	2.01

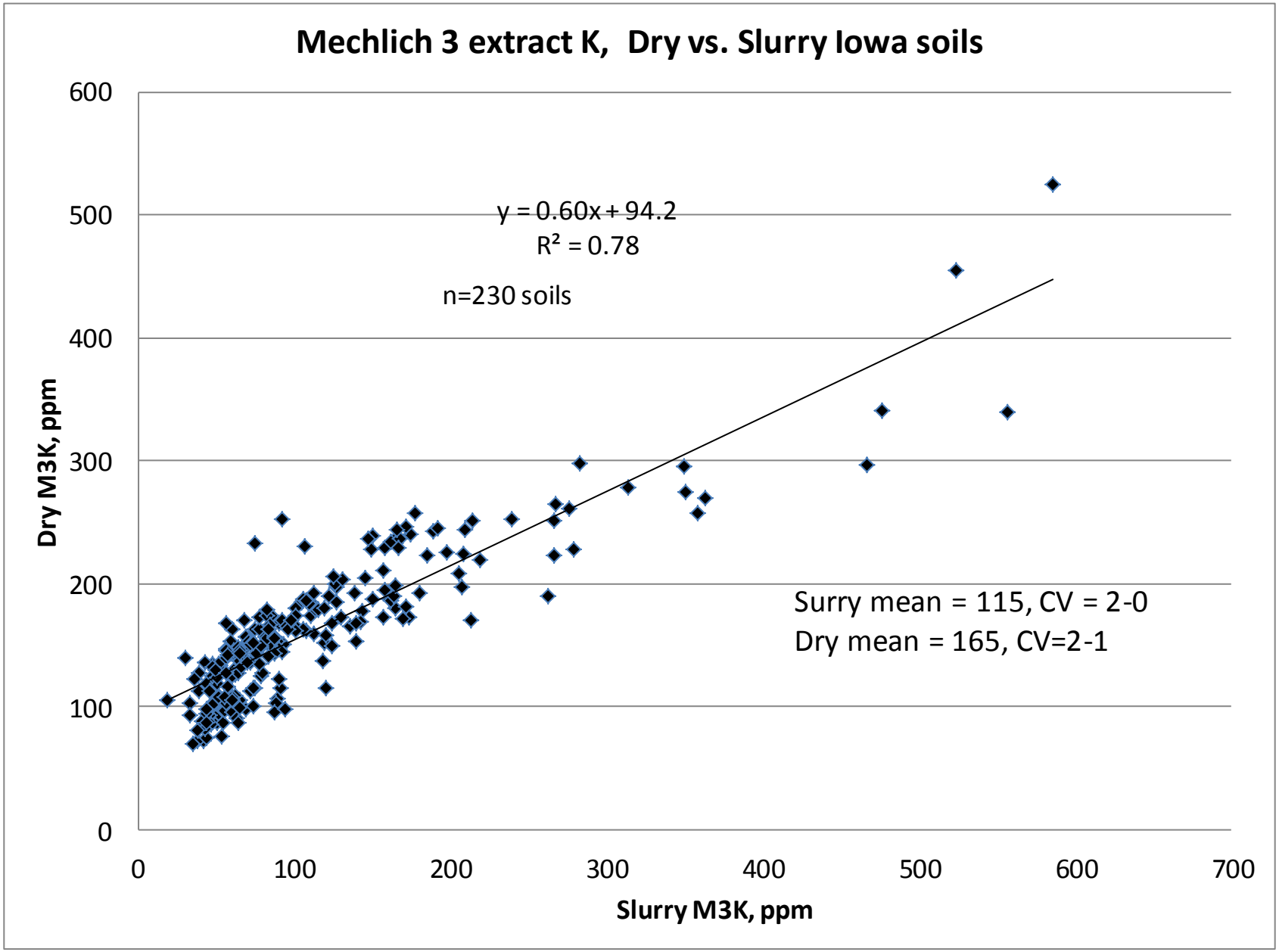
ISU - Solum Moist Sample Exchange (Slurry Testing)
Ammonium Acetate K



ISU Laboratory, Duplicate Analysis Comparison






Mechlich 3 extract K, Dry vs. Slurry Iowa soils
y = 0.60x + 94.2
R² = 0.78
n=230 soils
Surry mean = 115, CV = 2-0
Dry mean = 165, CV=2-1
Dry M3K, ppm
Slurry M3K, ppm
0
100
200
300
400
500
600
700

Summary Laboratory Moist K method

1) Slurry - Calibration of dry soil weight in subsample

2) Slurry - Extraction molarity and volume correction is needed
Direct - Would be more difficult to correct molarity and volume because every soil could be different

3) Precision of moist test seems to be similar or better than dry

4) Additional work

- within and among Lab variability
- operator variabiity (advantage for automated)
- Speed of mixing and stirring, where subsample taken
- Same soils - year to year or seasonal variability

Bottomline - The moist procedure needs to give reproducible results , so if were analyzing the calibrated K soils, for example, would be getting highly correlated results with original data. Need to be assured we are all doing the same test.

Thank You

Antonio Mallarino - sharing his data

Cory Smith – Technical Lab skill