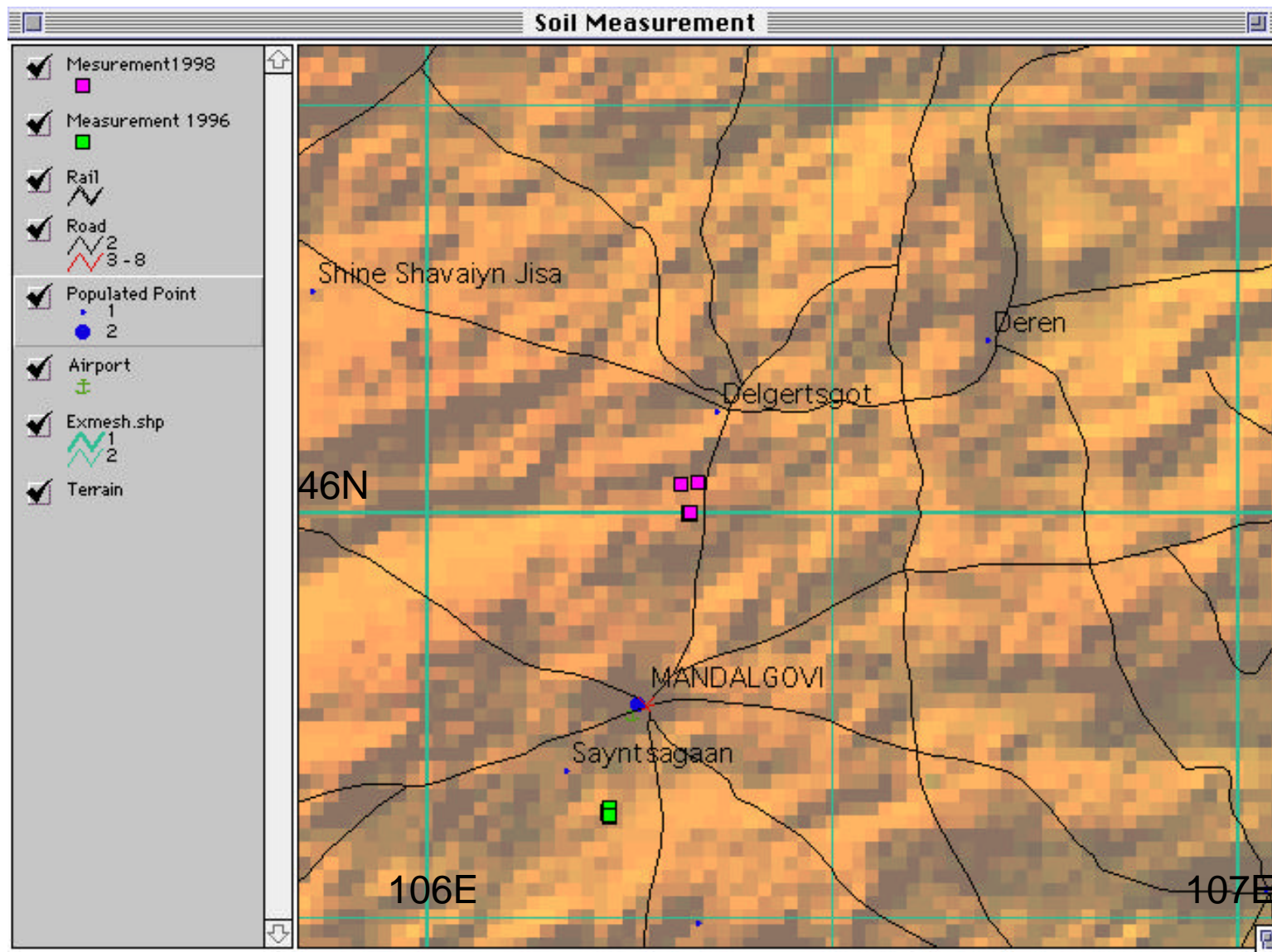


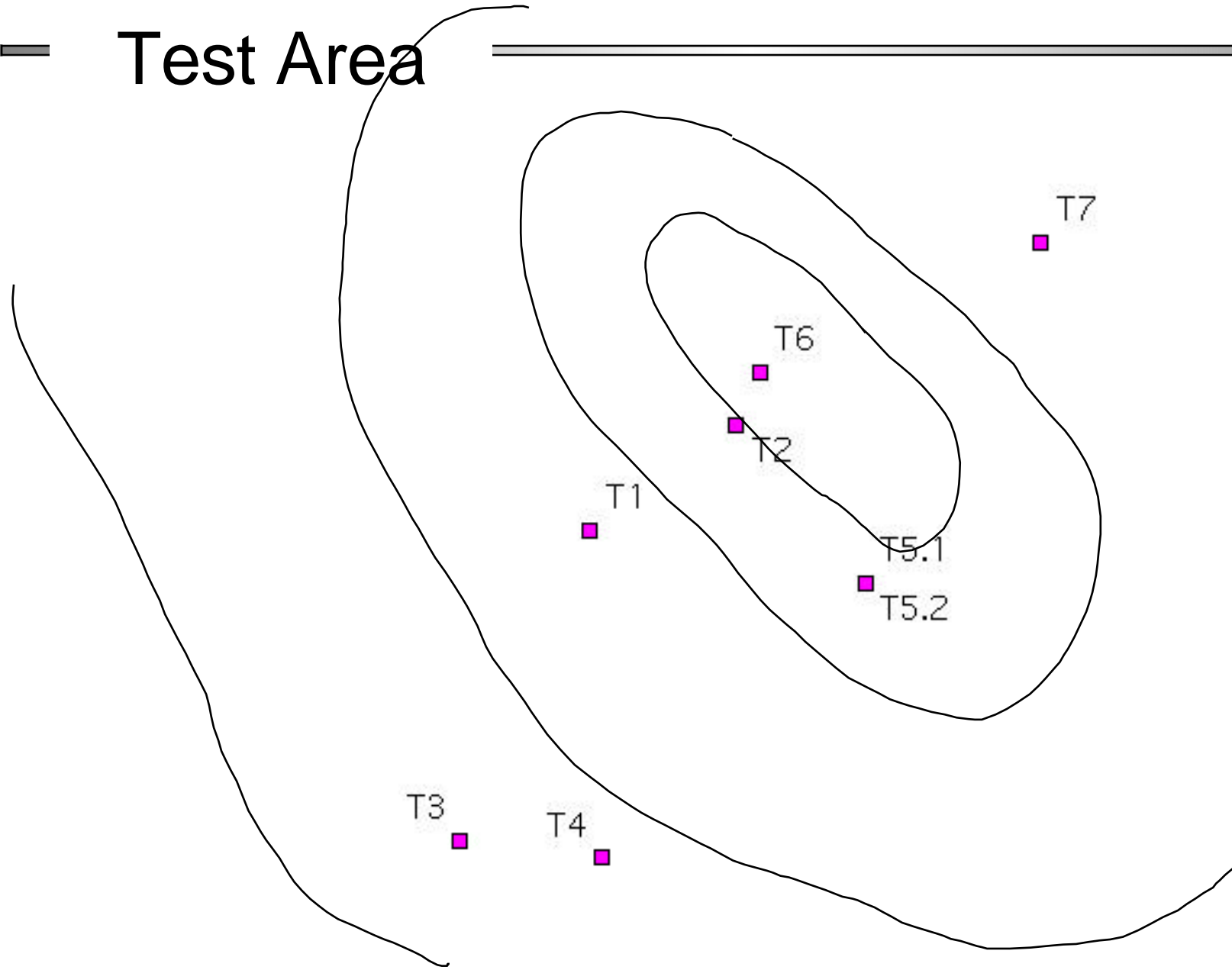
— Soil Measurement in Mongolia —

Masataka TAKAGI
Infrastructure Systems Engineering
Kochi Univ. of Technology

Test Area



Test Area



— Measurement Items

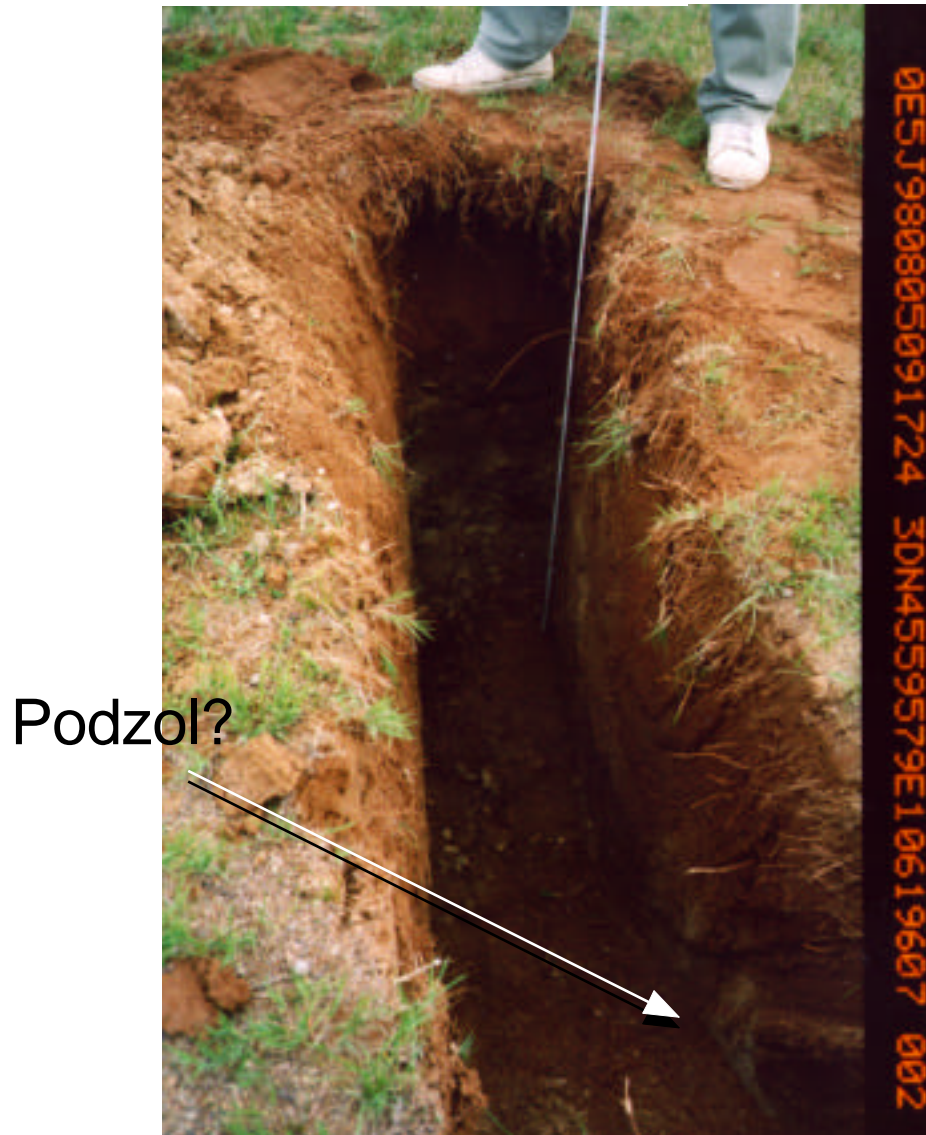
- ◆ Soil Moisture
 - ◆ Moisture Ratio
 - ◆ Moisture Suction
- ◆ Soil Grading
- ◆ Soil Acid
- ◆ Soil Hardness

— Powerful Equipment



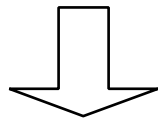
Power Shovel for Making Trench

Profile of Trench



— Soil Moisture Ratio

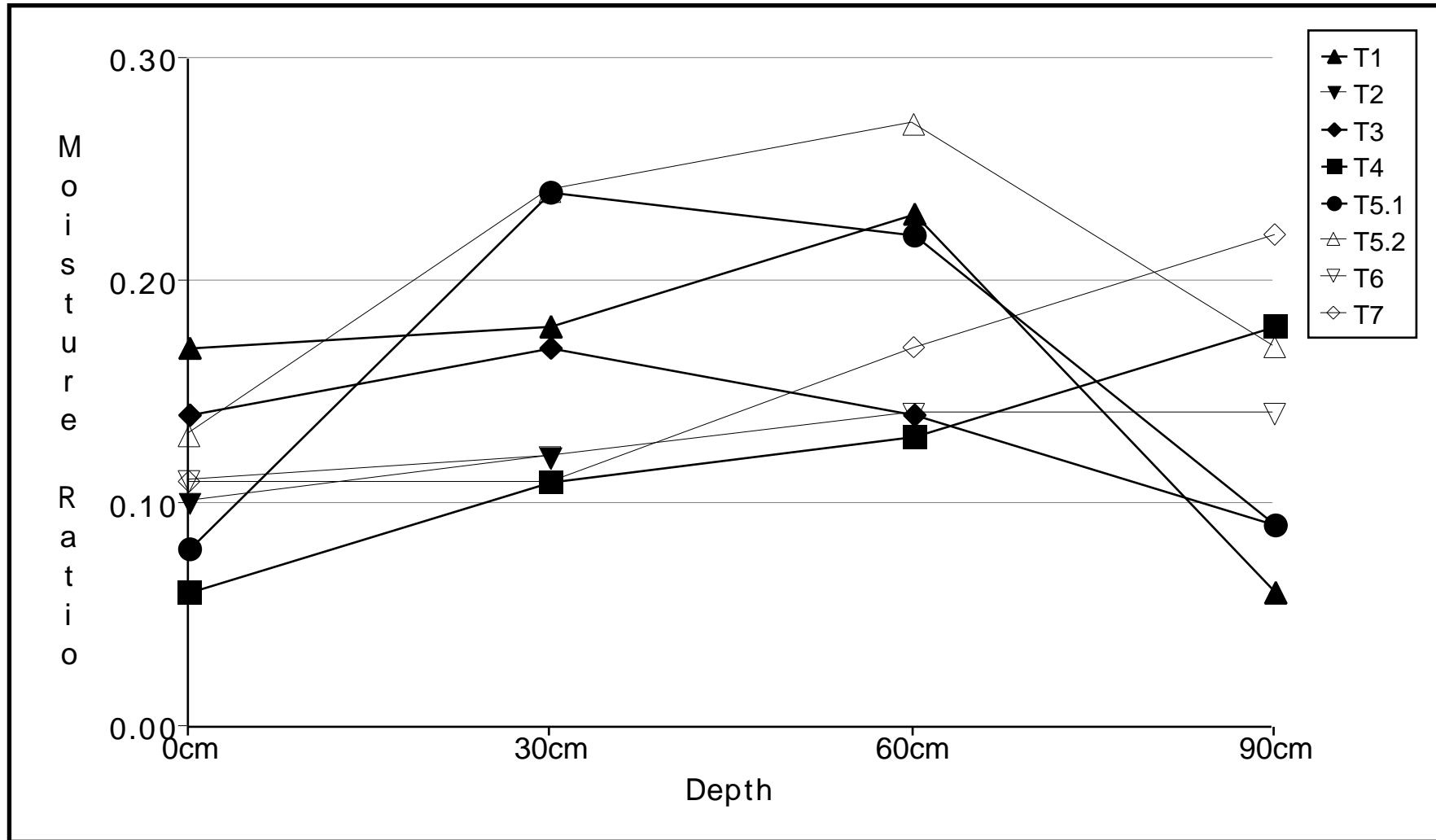
◆ Microwave for household goods (1996)



◆ FDR Moisture Meter (1998)



Results (Moisture Ratio)



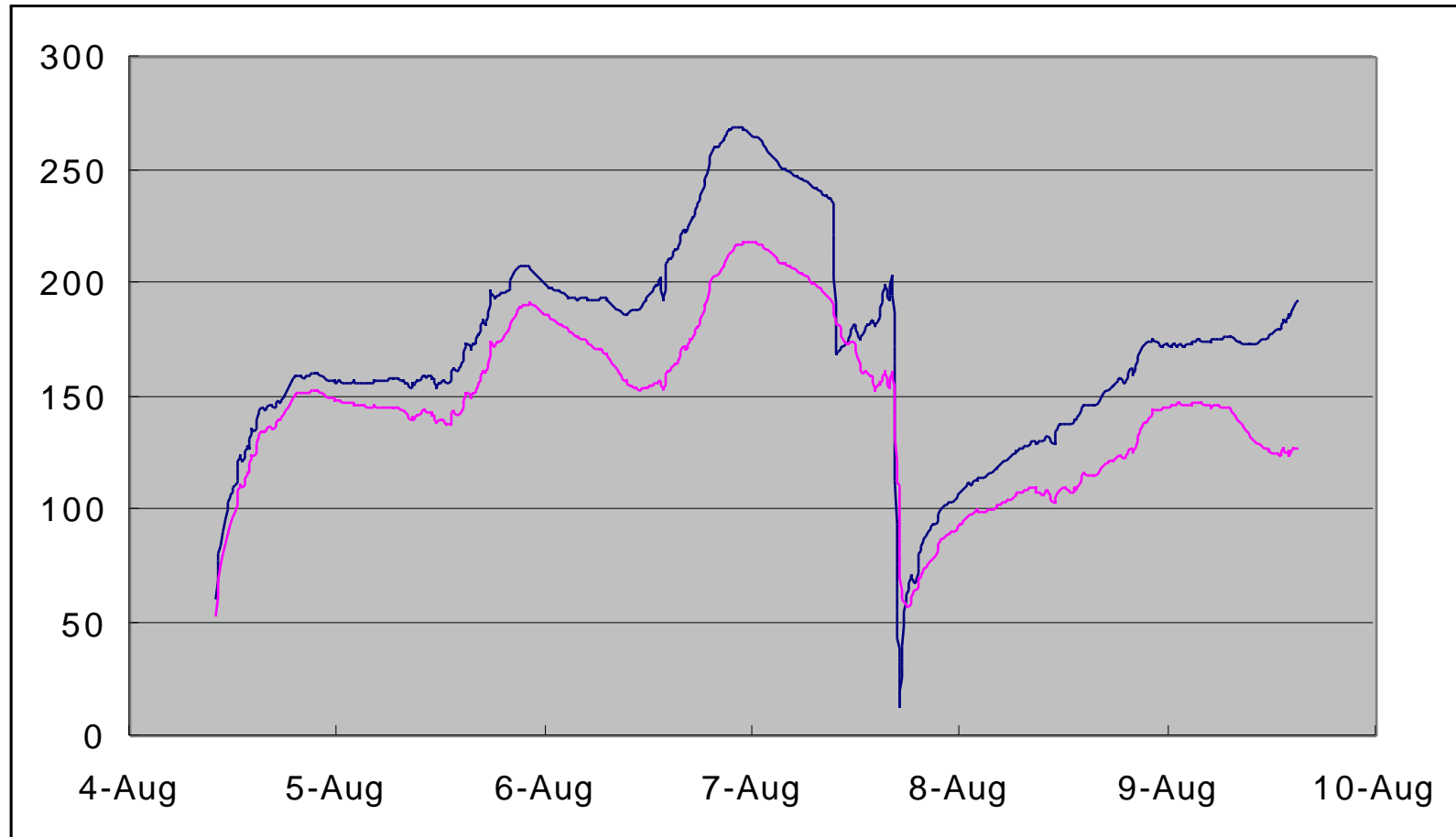
— Soil Moisture Suction

◆ Tensiometer

- ◆ Moisture suction can be measured by manometer



Results (Moisture Suction)



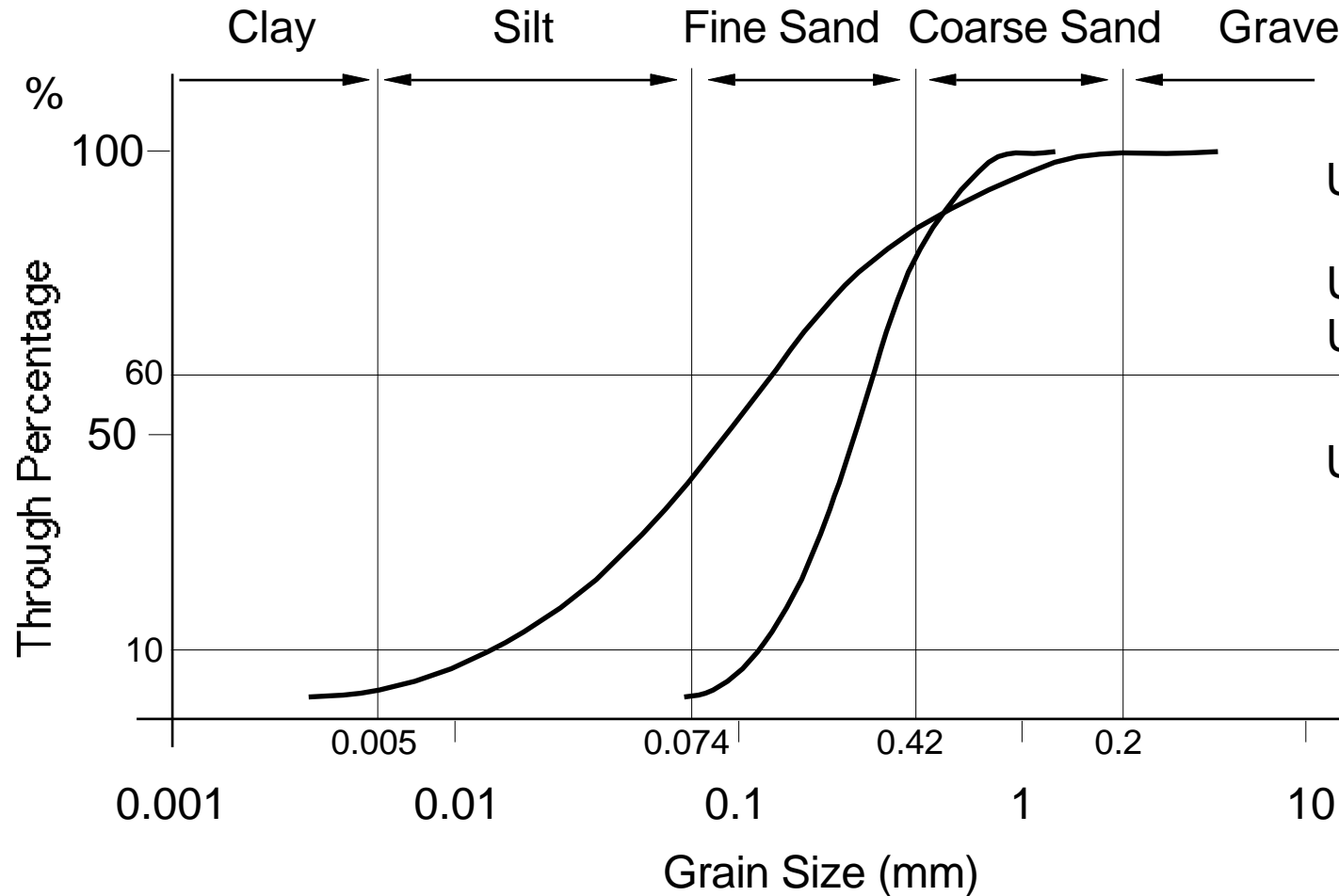
Soil Grading

- ◆ Grading Curve
- ◆ Effective Grain Size (U_{10})
- ◆ Coefficient of Uniformity (U_c)
- ◆ Coefficient of Curvature (U_c')



using Strainer
0.075 - 80 mm

Soil Grading



$$U_c = \frac{D_{60}}{D_{10}}$$

$U_c > 10$: Well Graded

$U_c < 5$: Poor Graded

$$U_c' = \frac{D_{30}^2}{D_{10} \times D_{60}}$$

Grain Size Accumulation Curve

— Results (Soil Grading)

Name	D10			D60			Uc		
	0cm	30cm	60cm	0cm	30cm	60cm	0cm	30cm	60cm
T1	0.08	0.08	0.08	0.3	0.22	0.3	3.74	2.91	3.74
T2	0.08	0.25	5.01	5.93	8.82	24.6	70.06	35.85	4.91
T3	0.08	0.08	0.08	0.25	0.22	0.38	3.23	2.85	4.91
T4	0.08		0.08	0.27		0.15	3.23		1.95
T5.1									
T5.2	0.07		0.07	0.16		0.32	2.08		4.24
T6	0.08		0.07	0.16		0.2	2.04		2.73
T7	0.07	0.08	0.08	0.22	0.21	0.23	2.97	2.79	2.91

— Soil Acid & Soil Hardness

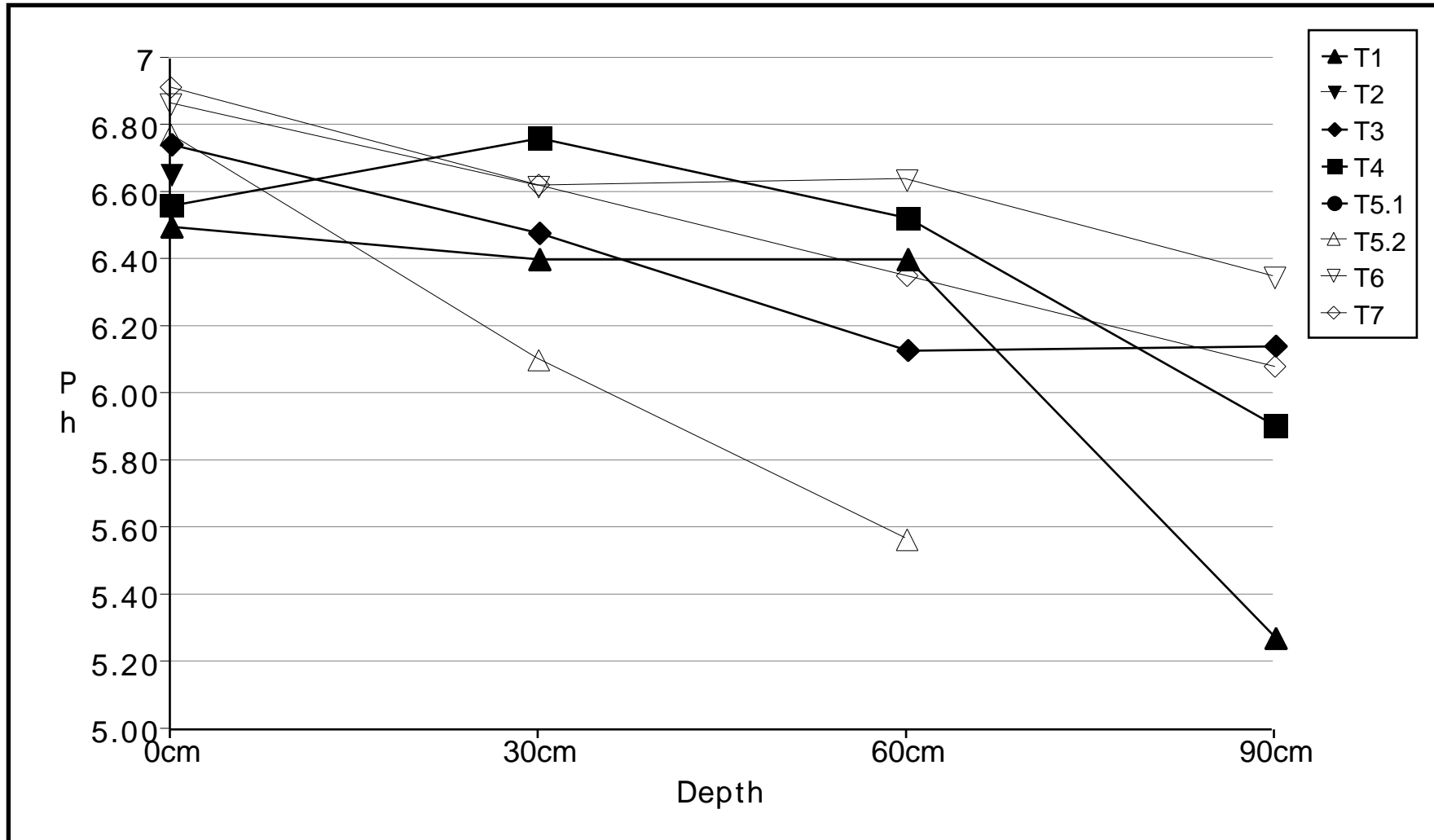


Soil Acid Meter
(Measure Ph)



Soil Hardness Meter
(Yamanaka Type)

Results (Acid)



Results (Hardness)

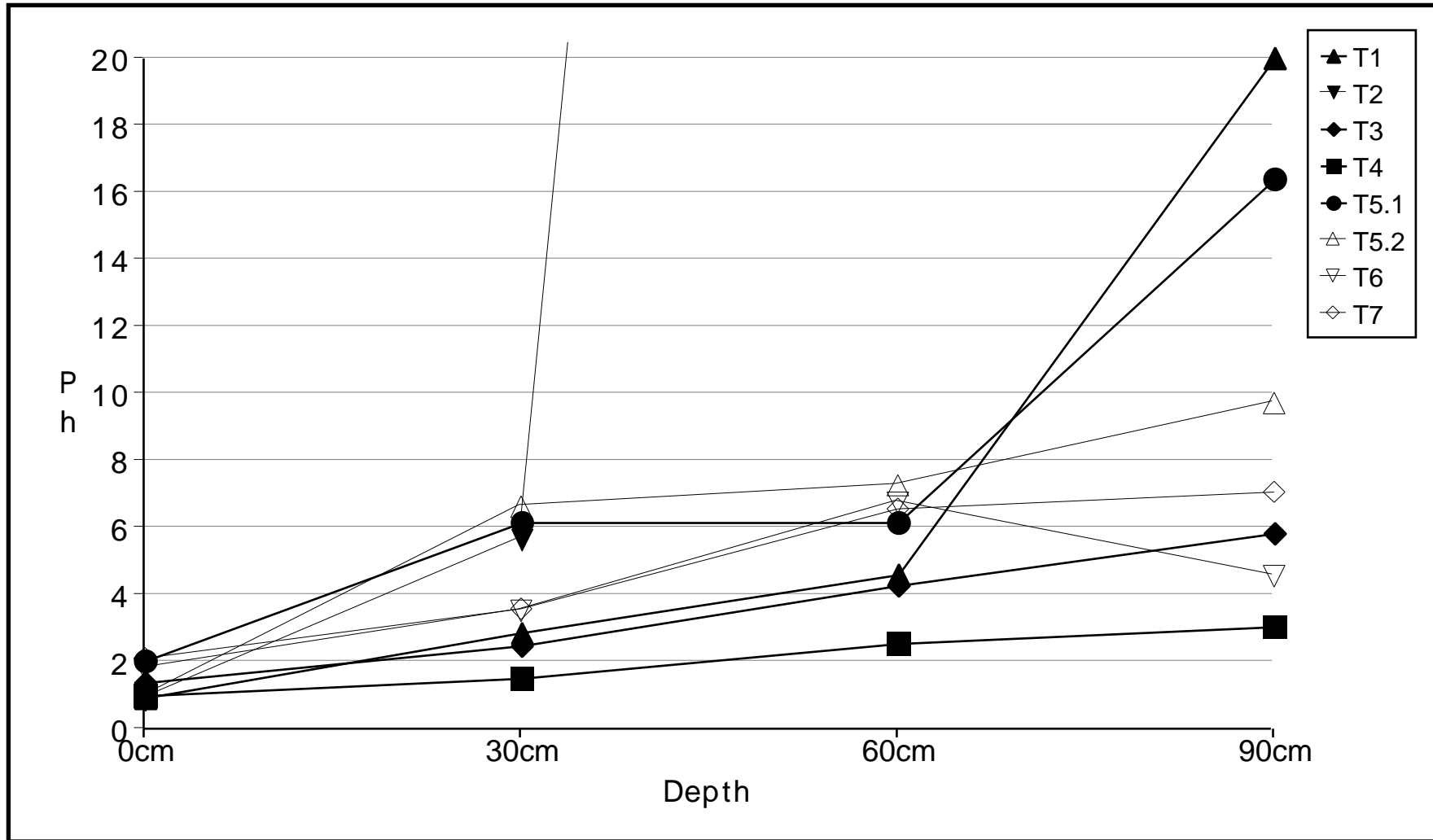


Figure of Soil in Test Area

◆ Moisture Ratio

- ◆ 30cm - 60cm Wet

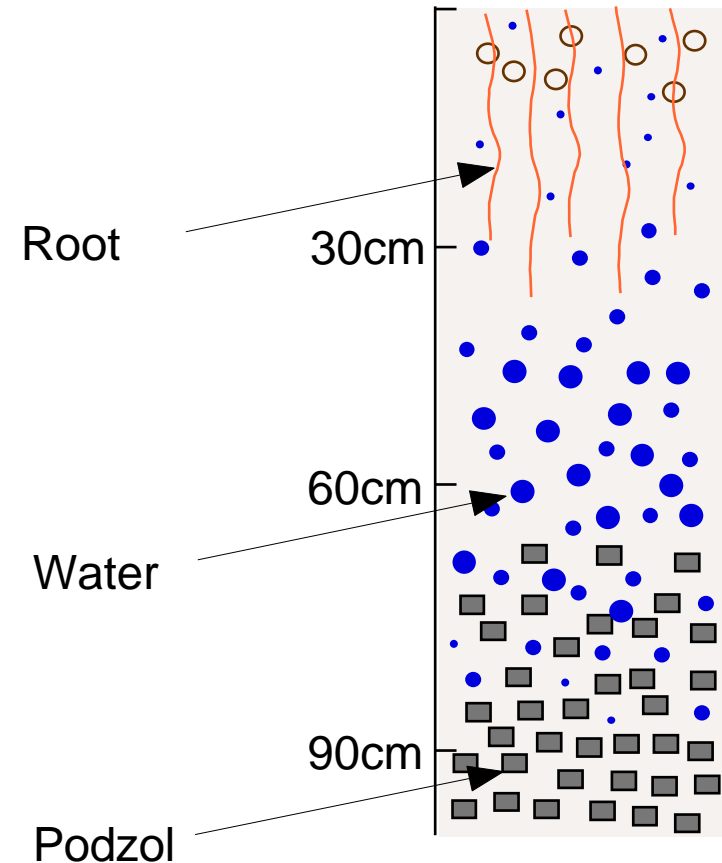
◆ Grading

- ◆ Poor Graded

◆ Acid

- ◆ High acid in deep

- ◆ Podzol



— Further Study

- ◆ Soil Moisture and Reflectance
- ◆ Soil Grading and BRDF