

CHAPTER III. WASHITA '94 SITE CHARACTERIZATION

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The majority of the test sites used in Washita'94 were selected to provide representative spatially distributed soil moisture information. Several sites were used solely for transect soil moisture studies and a few other sites were sampled occasionally by investigators for specific reasons. In addition, some changes in the sites used were made during the three different experimental periods. The purpose of this section is to summarize the site characteristic. Summary of the conditions are presented in Tables III-1 through 3. The methods and codings are described in the following sections.

A.SITE CODING

Each site is described by a two number code. The first number represents the area and the second the site number within the area. Figure III-1 shows the locations of the areas and the fields.

B.SOIL TEXTURE

The soil texture data presented in Table III-4 are for the surface 5 cm layer. These values are based on laboratory particle size analysis conducted at the USDA Hydrology Lab as part of the current study.

C.BULK DENSITY

The method used in this investigation is a volumetric displacement procedure that has been successfully employed in previous experiments. The procedure uses a specially designed bulk density ring with a hook gage and securing bolts. The ring is placed on the ground and secured by driving the bolts into the soil. A plastic film is then placed inside the ring. Water from a graduated cylinder is then used to measure the background volume. After removing the water and plastic, soil is extracted to a specific depth, in this case 5 cm. This soil was placed in plastic cooking bags and sealed. The plastic is then returned to the ring and the total volume is measured using water from the graduated cylinder. The volume of soil extracted is the difference between this volume and the initial background volume (values typically run between 700 and 900 ml). The soil sample is then returned to the lab where a wet weight is obtained. It is then oven dried and weighed again for a dry weight. The bulk density of the soil is computed by dividing the dry weight (less any tare) by the soil volume. The result is in g/cm^3 .

We attempted to obtain four samples from each soil moisture grid sampling site. In some cases there are no samples, however, it is possible using field observations to use representative values for fields that were not sampled. The field averages are listed in Table III-1 through III-3. The values appear to be consistent with those we would expect from previous experience. Additional details

on individual samples and conditions are available in the field notebooks.

D.VEGETATION PARAMETERS

Vegetation wet and dry biomass were determined by sampling two 18 x 18 inch areas in each field. For the first experimental period, most of the vegetation samples were obtained between April 7 and April 9 during dry soil condition. After the rain of April 11, some growth in the winter wheat was observed. Two fields (13 and 31) were sampled again on April 15.

E.SURFACE ROUGHNESS

Several photographs of a gridded board inserted into the soil surface were obtained for each sampling site. In some cases, it was quite difficult to place the board correctly due to the soil's hardness. In other situations, the vegetation was deemed to be too dense for photographing the soil surface.

These photos were enlarged and a digitizer was used to measure the heights of the surface (approximately 100 points per photo). These x and y values were then used to compute the standard deviation of the surface heights and the correlation lengths listed in the tables. Figure III-2 includes photos of a winter wheat field during each of the three experimental periods and one of the rangeland sites in April.

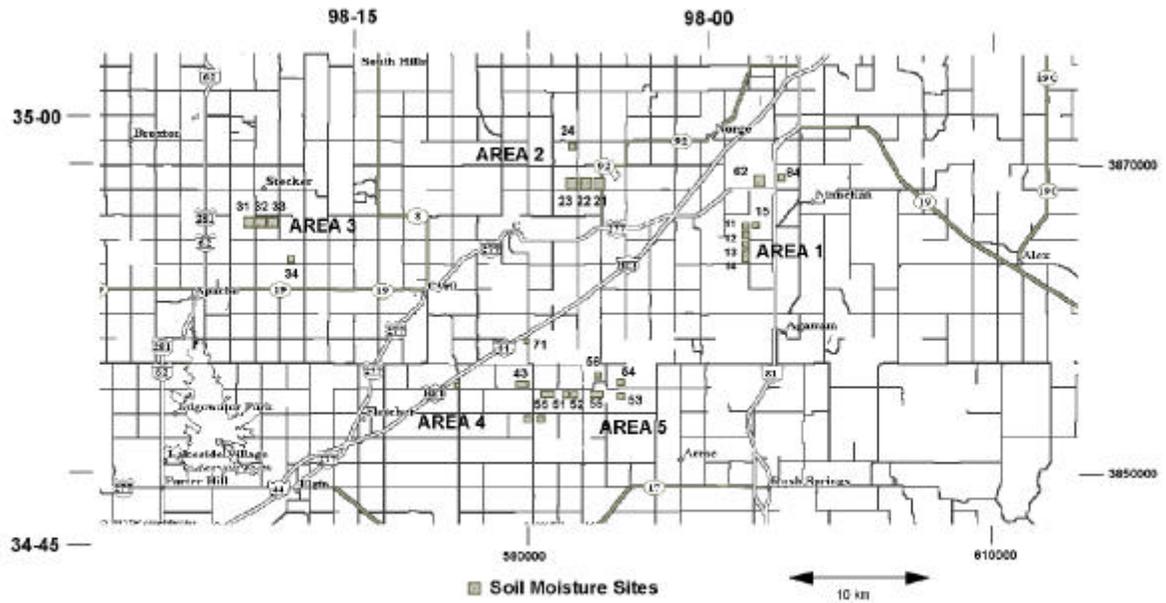


Figure III-1. Washita'94 Soil Moisture Sampling Sites



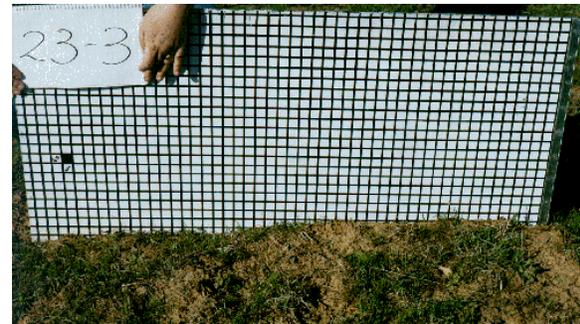
a) Winter Wheat April



b) Winter Wheat October



c) Winter Wheat August



d) Rangeland April

Figure III-2. Surface roughness conditions on selected sites during the Washita'94 experiments.

Table III-1. Washita'94 April Site Characterization

Site	LandCover	Bulk Density		Vegetation Biomass				Surface Roughness	
		Date	Average	Date	Wet Biomass	Dry Biomass	Water Content	RMS	Correlation Length
			(g/cm ³)		(g/m ²)	(g/m ²)	(g/m ²)	(cm)	(cm)
11	Alfalfa/Wheat	40694	1.36	40994	2228	429	1798	0.8	11.3
12	Bare	40594	1.05					3.4	13.0
13	Winter Wheat	40694	1.42	40694	1703	317	1386	0.8	6.0
13	Winter Wheat			41694	2761	657	2104		
14	Range	40694	1.01	40694	702	606	96	0.7	8.8
15	Spring Oats	41494	1.20						
21	Range	40994	1.14	40994	442	364	78	0.9	10.6
22	Range	40994	1.24	40994	298	191	107	0.7	11.0
23	Range	40794	1.36	40794	371	306	65	1.3	12.9
31	Winter Wheat	40894	1.39	40894	1067	270	797	1.0	10.5
32	Winter Wheat	40894	1.42	40894	2449	516	1933	0.6	5.1
33	Winter Wheat	40894	1.40	40894	1813	397	1416	0.9	7.4
33	Winter Wheat			41694	3129	676	2453		
34	Pasture	40994	1.24	40994	344	241	103	0.5	8.0
53	Winter Wheat	40794	1.20	40794	1048	250	797	1.2	9.2
54	Pasture	40794	1.15	40794	266	180	86	0.8	12.8
55	Winter Wheat	40794	1.39	40794	1051	234	817	0.7	11.5
62	Pasture	41094	1.11						
71	Bare	41694	0.99					5.2	13.6
71	Bare	41694						0.6	5.9

Table III-2. Washita'94 August Site Characterization

Site	Cover	Bulk Density	Vegetation Biomass			Surface Roughness			
			Wet Biomass	Dry Biomass	Water Content	Orientation 1		Orientation 2	
						RMS	Correlation Length	RMS	Correlation Length
(g/cm ³)	(g/m ²)	(g/m ²)	(g/m ²)	(cm)	(cm)	(cm)	(cm)		
11	Alfalfa	1.31	344	109	235	0.55	7.03		
12	Corn	1.15				2.47	10.96	1.00	8.18
13	Bare tilled	1.02				1.80	8.91	1.11	10.62
15	Bare rows	1.31				1.43	8.36	0.31	6.82
33	Bare tilled	0.90				1.49	14.06	1.17	7.12
53	Bare tilled	1.13				1.41	7.88	1.57	6.52
62	Grass	1.08	944	437	507	0.60	6.44		
72	Grass	1.24	605	275	330	0.54	5.53		

Table III-3. Washita'94 October Site Characterization

Site	Cover	Bulk Density	Vegetation Biomass			Surface Roughness			
						Orientation 1		Orientation 2	
			Wet Biomass	Dry Biomass	Water Content	RMS	Correlation Length	RMS	Correlation Length
(g/cm ³)	(g/m ²)	(g/m ²)	(g/m ²)	(cm)	(cm)	(cm)	(cm)		
11	Alfalfa	1.32	370	96	274	0.67	6.77	0.56	5.43
11	Bare tilled	1.12				1.41	12.79		
12	Bare stubble	0.94	580	251	329	1.98	11.30	2.86	8.55
13	Bare tilled	0.95				1.12	6.92	1.73	8.35
14	Grass		1708	1049	659				
15	Bare Stubble	1.25	777	135	642	0.64	4.81		
23	Grass		648	413	235				
33	Winter Wheat	0.90	37	1	36	1.43	5.16	0.71	2.20
34	Grass		435	261	174				
53	Winter Wheat	1.24	199	31	168	0.94	6.09	0.38	3.43
56			256	121	135				
62	Grass		1548	655	893				

Table III-4. Washita'94 Soil Texture Data

Site	Sample	Sand	Silt	Clay	Texture
		(%)	(%)	(%)	
11	BC26	20.6	51.5	27.9	Clay Loam
11	BC27	26.8	47.2	26.0	Loam
12	BC28	22.7	56.2	21.1	Silt Loam
12	BC29	21.4	59.5	19.1	Silt Loam
13	BC30	57.3	36.7	6.0	Sandy Loam
13	BC31	63.1	30.8	6.1	Sandy Loam
14	BC32	29.6	56.8	13.6	Silt Loam
14	BC33	32.2	54.0	13.8	Silt Loam
21	AN33	92.0	8.0	0.0	Sand
21	AN35	89.3	9.6	1.1	Sand
33	S2	69.5	20.8	9.7	Sandy Loam
33	S3	47.7	33.6	18.7	Loam
33	S17	71.2	19.5	9.3	Sandy Loam
33	S18	47.9	34.6	17.5	Loam
33	S19	43.6	44.6	11.8	Loam
33	S20	46.9	37.0	16.1	Loam
34	AK2	81.8	7.0	11.2	Sand
34	AK4	91.0	7.0	2.0	Sand
53	D24	81.0	14.0	5.0	Loamy Sand
53	D26	85.8	12.7	1.5	Sand
54	Y2	84.9	10.1	5.0	Loamy Sand
54	Y12	53.3	41.1	5.6	Sandy Loam
62	B21	71.6	17.0	11.4	Sandy Loam
62	B22	70.8	22.0	7.2	Sandy Loam