

## CLIMATOLOGY OF SOIL WATER

A long term study (at least 5 years) was initiated in August 1985 to determine the climatology of soil water on continuous spring wheat at the Carrington, Dickinson, Hettinger, Langdon, Minot, Streeter and Williston Branch Experiment Stations and at the Fargo Station.

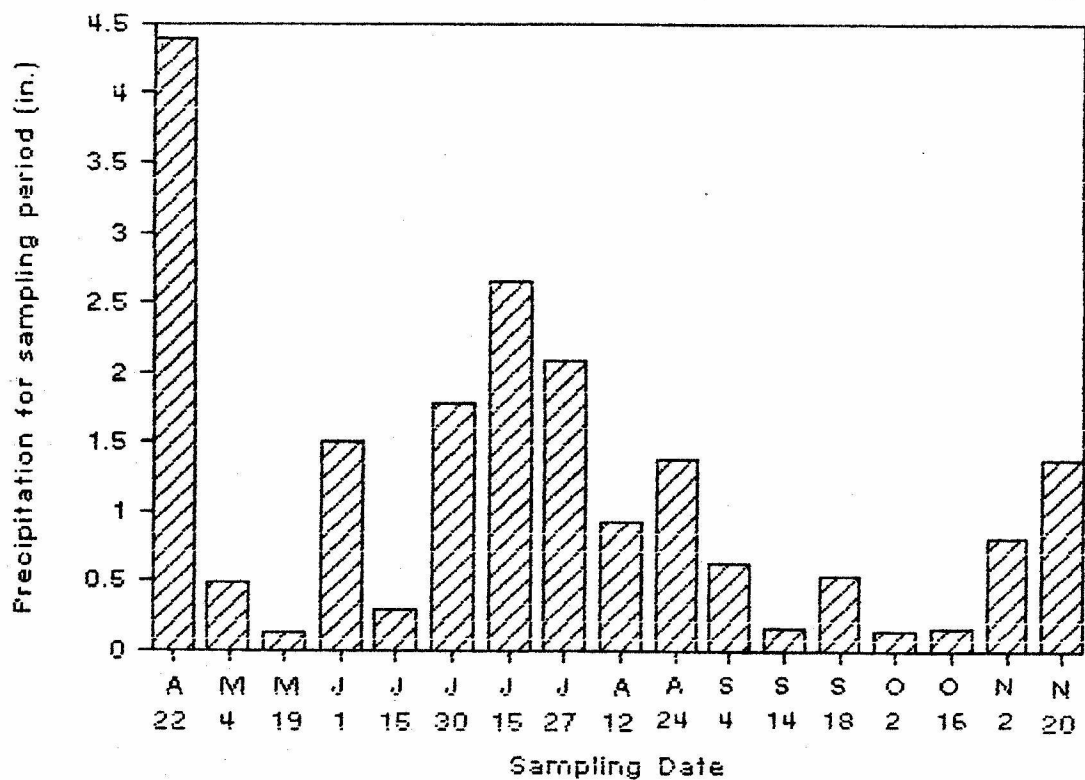
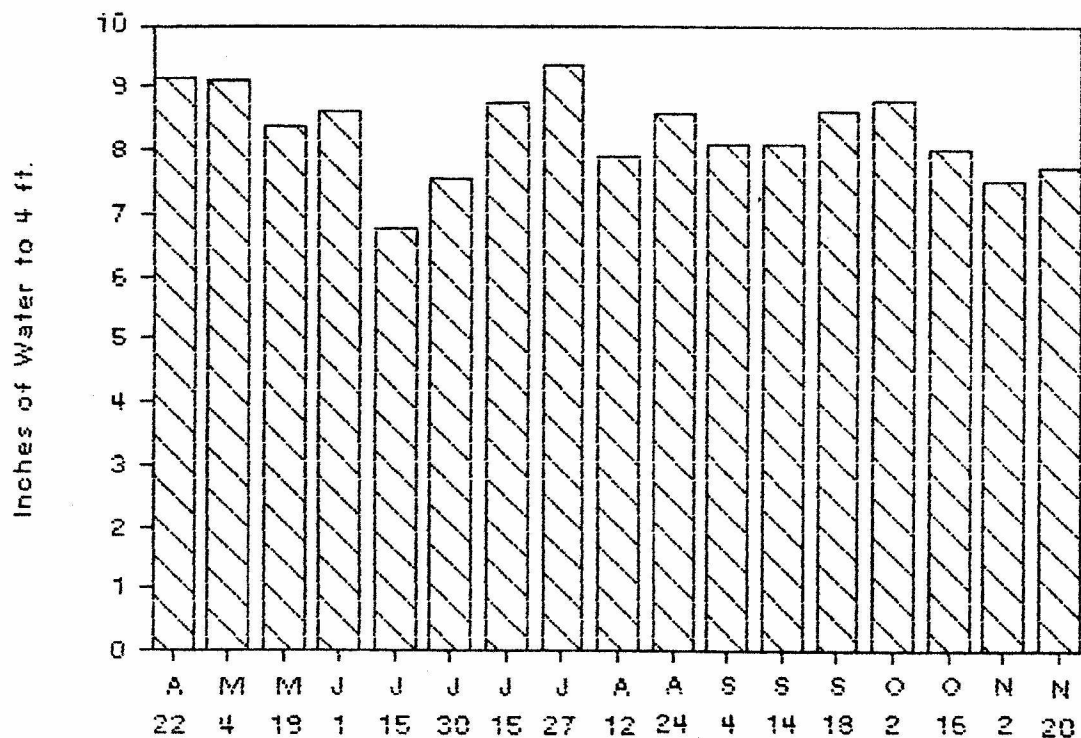
Soil water data will be used to develop a climatology (averages and variations) of soil water throughout the year and may help explain other research results on these plots. In addition, data will be used to develop a model to predict soil water recharge in the fall. Such a model would eliminate the need for a statewide soil water survey in late autumn.

Soil water content of eight layers to depths of 48 inches was measured at 3 sites on biweekly or monthly intervals from spring thaw until fall freezeup by station personnel. Precipitation is measured nearby. Soil characteristics including bulk density, particle size, field capacity, and wilting point which are used to determine the available soil water were determined in spring, 1986.

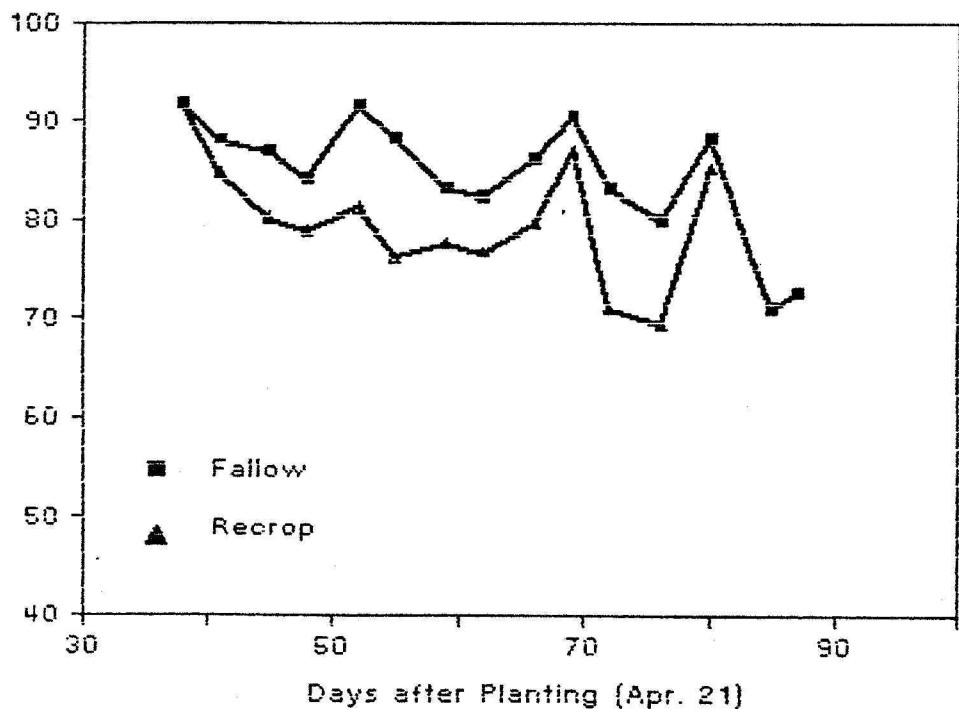
Soil water recharge was assessed at each station analyzing precipitation variables and the change in total soil water at various depths. Precipitation variables used were cumulative between sampling, cumulative but scaled—limited in quantity, and weighed by time before sampling. In general cumulative precipitation was the better prediction variable, but all variables were useful. Differences between them depend on the characteristics of precipitation, especially the number of events.

At this time the main problem is still the lack of data. The project is only about two years old and much of the data are from very wet periods when no recharge is evident. It is also important to note that the models do not work well when time between samplings is greater than about 14 days. In addition they do not work well during the grand consumption stage of soil water in June and July. Thus, most of the work was directed towards the fall recharge period. So far reasonable models have been developed for Carrington, Dickinson, Minot, and Streeter. The project's ultimate success will depend on the continued cooperation of Branch Experiment Station personnel because long term data are essential.

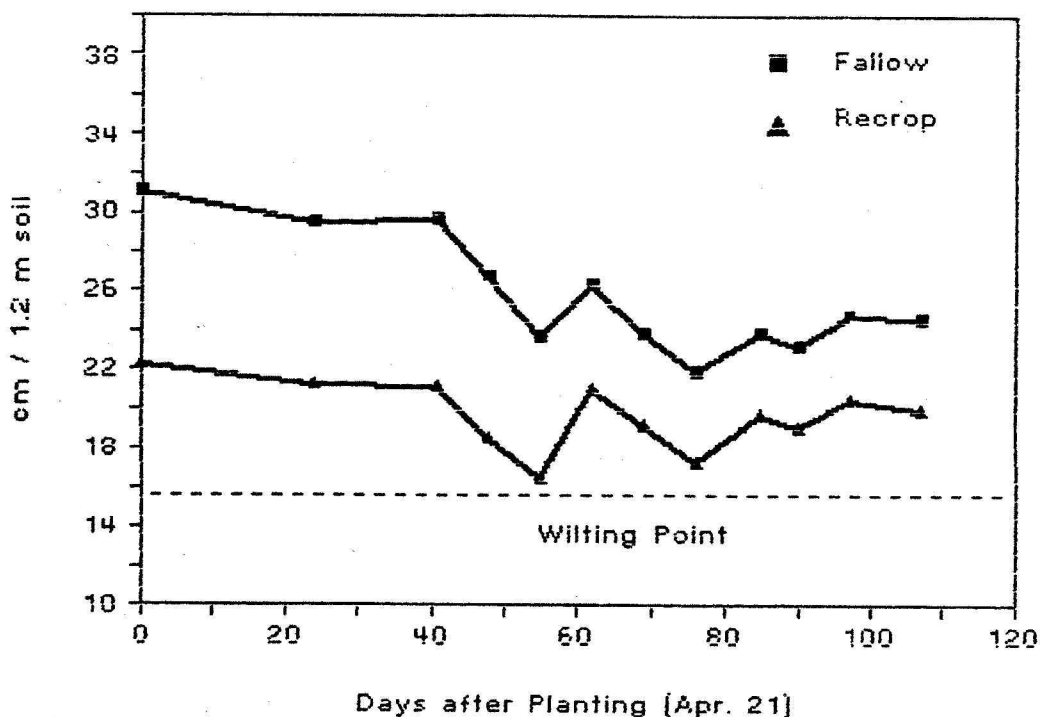
# Climatology of Soil Water, 1987



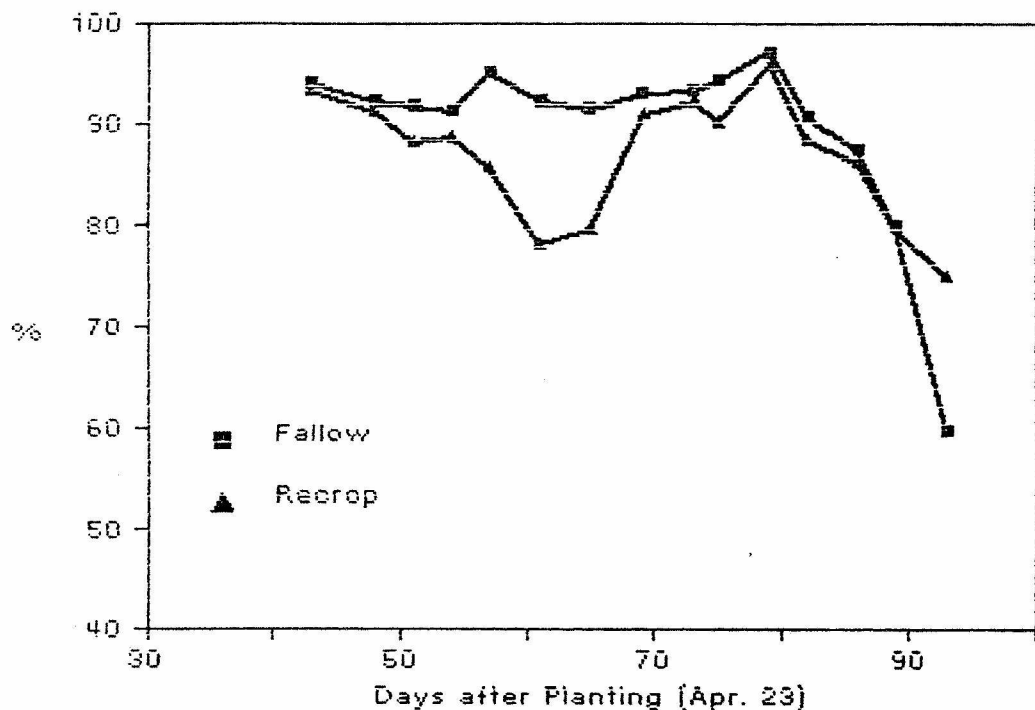
## Relative Water Content, 1987



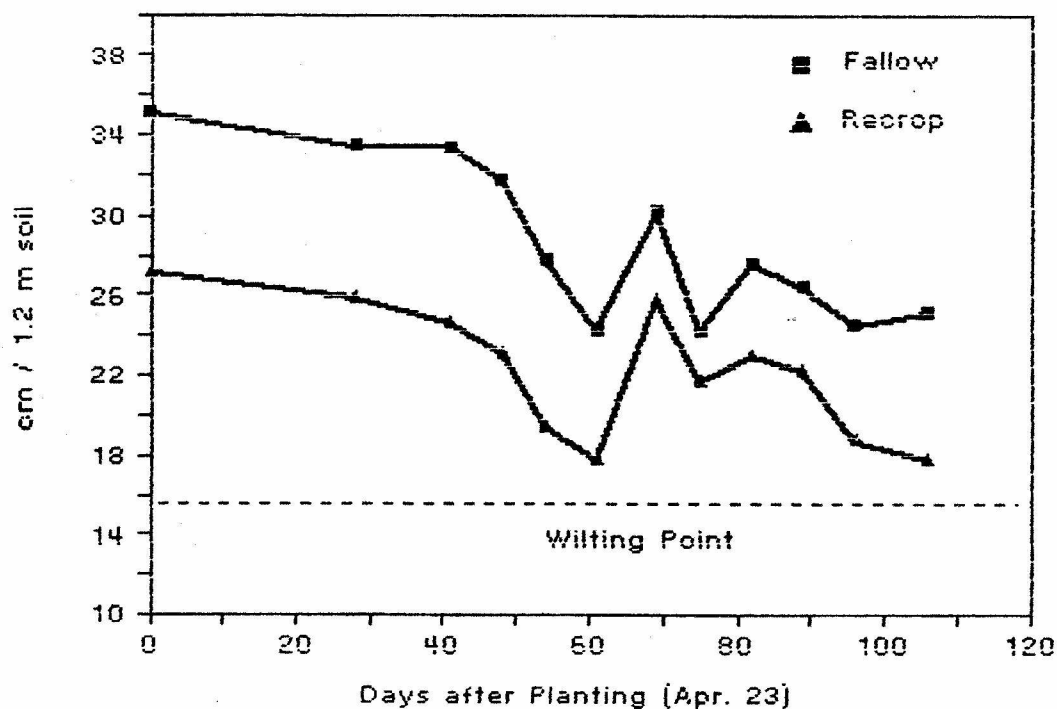
## Total Soil Moisture, 1987



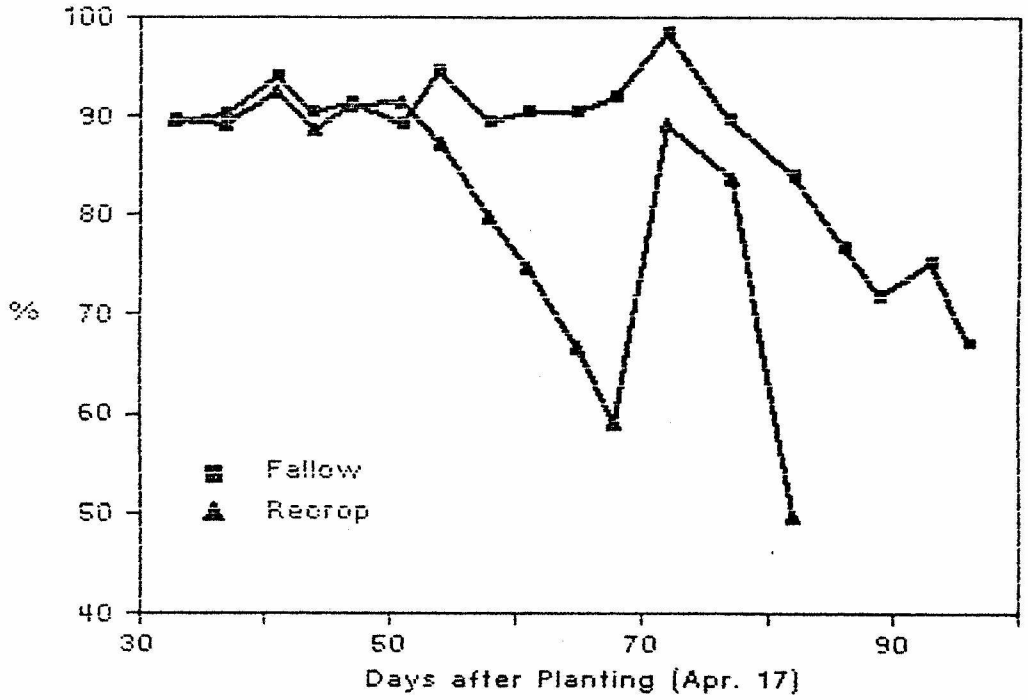
## Relative Water Content, 1986



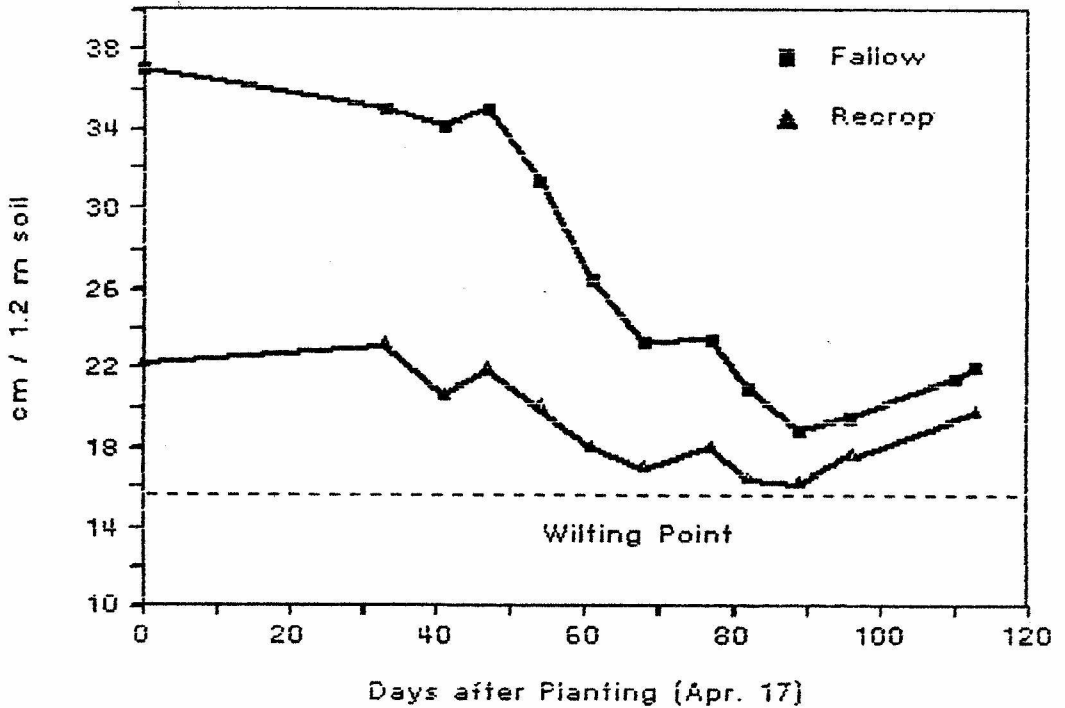
## Total Soil Moisture, 1986



## Relative Water Content, 1985



## Total Soil Water, 1985



<b>Station</b>	<b>Sampling Date</b>	<b>Depth (cm)</b>	<b>T.W. (in)</b>	<b>A.W. (in)</b>	<b>T.W. (cm)</b>	<b>A.W. (cm)</b>
Dickinson	8/22/85	122	4.60	1.90	11.68	4.83
	10/25/85	122	12.18	4.10	30.94	10.41
	4/01/86	122	12.33	4.25	31.32	10.80
	4/23/86	122	12.00	3.92	30.48	9.96
	5/12/86	122	15.77	7.69	40.06	19.53
	5/28/86	122	12.73	4.64	32.33	11.79
	6/10/86	122	10.51	2.43	26.70	6.17
	6/25/86	122	8.05	-0.03	20.45	-0.08
	7/09/86	122	9.35	1.27	23.75	3.23
	7/23/86	122	9.49	1.41	24.10	3.58
	8/07/86	122	7.47	-0.61	18.97	-1.55
	8/22/86	122	7.29	-0.79	18.52	-2.01
	9/17/86	122	8.11	0.02	20.60	0.05
	10/01/86	122	11.24	3.16	28.55	8.03
	10/14/86	122	10.46	2.38	26.57	6.05
	10/29/86	122	9.29	1.21	23.60	3.07
	4/22/87	122	7.80	-0.30	19.80	-0.75
	5/04/87	122	8.90	0.81	22.60	2.05
	5/19/87	122	8.23	0.14	20.91	0.35
	6/01/87	122	8.46	0.37	21.50	0.95
	6/15/87	122	6.66	-1.44	16.91	-3.65
	6/30/87	122	7.46	-0.63	18.95	-1.61
	7/15/87	122	8.57	0.48	21.77	1.21
	7/27/87	122	9.15	1.05	23.23	2.68
	8/12/87	122	7.79	-0.31	19.78	-0.78
	8/24/87	122	8.43	0.34	21.42	0.87
	10/12/87	122	8.55	0.46	21.72	1.17