

**Effect of Erosion on Crop Yields on Major Soil Associations
in Western North Dakota**

**Larry J. Cihacek
NDSU Soil Science Department**

and

**Tom Conlon
Dickinson Research Center**

A study was established in 1987 on Section 24 of the Ranch Headquarters of the Dickinson Research Center on soils mapped as a Cabba-Amor association. Areas of slightly, moderately or severely eroded soil were identified and characterized based on topsoil loss compared to series type description. Samples were collected from 0-6", 6-12", 12-18", 18-24", 24-36" and 36-48" depth increments for characterization for pH, organic matter total N, NO₃⁻-N, carbonates, texture available water holding capacity bulk density and hydraulic conductivity. Annually, each erosion site was sampled in spring and fall to a depth of 48" for determination of soil moisture and NO₃⁻-N levels. This study was concluded in 1990.

Yield data for each erosion level were collected for barley and either corn or sudangrass in each year of the study from 3 subplots at each erosion level. Table 1 shows barley grain and straw yields for each year and for a 4-year average. The severe erosion site generally gave significantly lower grain yields than the moderately or slightly eroded sites. Although significant differences were not generally noted between erosion levels for straw yields, the numerical trends were similar to grain yields. The general yield relationships for barley grain and straw were slight > moderate > severe erosion.

similar observations were made for corn and sudangrass dry matter yield with the severely eroded site generally giving significantly lower yields than the moderately or lightly eroded sites (Table 2). The general yield relationships for corn or sudangrass dry matter production were slight > moderate > severe erosion.

Table 1. Erosion effects on barley grain and straw yields. Ranch Headquarters, Dickinson Research Center.

Erosion level	Grain Yields ¹						Straw Yields ¹					
	1987	1988	1989	1990	4-year average	Percent of maximum yield	1987	1988	1989	1990	4-year average	Percent of maximum yield
	-----bu/A-----						-----bu/A-----					
Slight	27.6b	4.6b	37.7b	40.5b	27.6b	100	998b	739a	2338a	3202a	1819a	100
Moderate	14.7a	5.2b	24.0ab	27.4a	17.8ab	67	584a	516a	1950a	3006a	1514a	83
Severe	14.9a	1.5a	19.0a	26.8a	15.5a	56	560a	322a	1395a	3367a	1411a	78

¹ Values followed by the same letter within a given year (column) are not significantly different at $p \leq 0.05$ as determined by LSD.

Table 2. Erosion effects on corn or sudangrass dry-matter production. Ranch Headquarters, Dickinson Research Center.

Erosion level	Corn Dry Matter Yield ¹				Sudangrass Dry Matter Yield ¹
	1987	1988	1990	3-yr Average	1989
Slight	8560b	982b	1628b	3730b	2337b

Moderate	5632ab	437a	1072ab	2380a	1274b
Severe	3951a	453a	677a	1695a	494a

¹ Values followed by the same letter within a given year (column) are not significantly different at $p \leq 0.05$ as determined by LSD.

[Available Water to 4 ft - Dickinson, ND](#)

[Total Water to 4 ft - Dickinson, ND](#)

[Dickinson Soil Water Summary](#)

