

Making a difference

NDSU EXTENSION SERVICE

NORTH DAKOTA STATE UNIVERSITY

Cover Crops = Healthier Soils

The Situation

The landscape in north central North Dakota is generally a rolling type where subsurface water moves laterally in natural flow from high ground to low ground due to the differences in elevation. High grounds are referred to as recharge areas with good internal soil drainage resulting in low water-table levels. Low grounds on the other hand are referred to as discharge areas with moderate to poor soil drainage with resulting high water-table levels. Because the parent material of North Dakota soils is rich in soluble salts and the sodium rich shale, high water-table levels close to the soil surface can lead to the accumulation of excessive salts/sodium or both. A heavy rainfall will generally cause surface runoff, and excess surface water as well as subsurface water will move from recharge to discharge areas. This in turn raises the soil water-table level close to the surface in the discharge areas.

Excess soil water can be managed by planting water-use efficient crops like alfalfa. One strategy could be to plant high water-using crops on the recharge areas (to intercept the excess subsurface water before it will reach the discharge areas) and to establish salt-tolerant grasses in the discharge areas. These grasses will use-up some of the soil water, provide a vegetative cover to prevent erosion, reduce evaporation and add biomass to the soil resulting in improved soil structure and drainage. **Leaving the discharge areas bare will result in high water-table levels due to the poor drainage and capillary rise of soil water.**

Extension Response

To educate producers and the public on the close relationship between growing cover crops and healthy soils, Langdon Research Extension Center hosted the 2014 Cavalier County Soil Health Tour, in coordination with the local NRCS, Cavalier County Soil Conservation District and Cavalier County Extension. The tour included visiting a local farm where cover crops were successfully established on a saline-sodic (discharge) area over a period of three years (2012 to 2014). Tour participants then visited a site with a 30' wide strip of alfalfa planted on the recharge area and three salt-tolerant grass strips planted on discharge area. Additionally, three strips of cover crop mixes (1.

sweet clover and turnips 2. barley and sugarbeets 3. oats, alfalfa, turnips and radishes) were compared for their growth patterns on a saline-sodic gradient. Sugarbeets, barley, oats and sweet clover were observed to be more salt-tolerant than turnips, radishes and alfalfa. As a demonstration, two soil pits were dug in sites that exhibited good and saline-sodic soils. Specialists demonstrated and discussed soil formation factors, processes and characteristics of the Langdon area soils along with their effect on the agronomy of major crops. The tour concluded with a demonstration of the NRCS rainfall simulator which showed surface runoff differences between no-till and conventional-till soils, and soils with and without a cover.

Impacts

To evaluate the impact and relevance of the topics, a scale of 1-5 was used to assess the knowledge level of the participants before and after attending the tour with 1 = 20% (minimal knowledge) and 5 = 100% (very knowledgeable). Irrespective of the initial knowledge level, 77% of the participants reported at least one step increase in their awareness for all topics after attending the tour, whereas, 15% of participants reported 2 steps increase in their awareness. This was impressive as 23% of the participants rated their initial knowledge level at Level 4, 54% at level 3 and 15% at level 2 before attending the tour. Only 8% of the participants rated their pre-participation knowledge at level 1.

Feedback

"Will try to establish growing plants on bare areas."

"Was considering Tile drainage, it pointed out sodic and saline problems."

"Saw great variation in soils in short distance, therefore the need to treat areas differently."

"It was great to see what is under the soil (soil pit)."

Contact

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