# Soil Erosion Research at the Northern Great Plains Research Laboratory

Picture: Station entrance in Mandan, North Dakota; approx. 1913

# World Soil Day

- World Soil Day is held annually every December 5th and has been endorsed by the United Nations Food and Agricultural Organization since 2013
- The focus of World Soil Day in 2019 is “Stop Erosion, save the future”.
- Minimizing soil erosion from agricultural lands has been a goal of the Northern Great Plains Research Laboratory (NGPRL) since it was established.

# Beginnings

- Studying the effects of soil erosion and how to mitigate it has been a key tenet of the NGPRL since it was established in 1912 in Mandan, North Dakota.
- Picture: Manual Soil Sampling, 1918

# Shelterbelts

- One of the first goals of the lab was to develop shelterbelt trees that could survive the North Dakota winters and reduce soil erosion by wind.
- By 1937, a million trees had been grown at the laboratory nursery for shelterbelt and field windbreak plantings.
- Picture: Planting conifer seeds for growing shelterbelt trees 1918

# Shelterbelts

- From about 1920 to 1950, the program provided technical assistance to over 5,000 landowners for planting of thousands of farmstead shelterbelts and field windbreaks in the four-State areas of North Dakota, South Dakota, Montana, and Wyoming.

- Picture: Nursery beds of trees and shrubs tested for shelterbelt plantings, 1916

# Grasses for Erosion Control

- In the 1930s, the Northern Plains experienced severe drought conditions that caused extensive wind erosion to land that had been cultivated for crop production.

- To address this problem, George Rogler, a grass breeder, and Roderich Sprague, a plant pathologist, were transferred to the NGPRL in 1936 to develop improved grass cultivars for reseeding eroded areas and to study plant diseases.

- Picture: A.C. Dillman with crested wheatgrass 1915

# Grasses for Erosion Control

- The grass breeding work provided farmers and ranchers with grass cultivars suitable for establishment during the severe drought and hard financial times prevalent throughout the region during the 1930s.

- The grass commonly used to reseed eroded lands was crested wheatgrass. Crested wheatgrass was used to reseed approximately 10 million acres of damaged lands in the late-1930s and 1940s.

- Rogler's research in developing Nordan crested wheatgrass is credited by many as the grass that saved the Northern Plains from becoming a severe dust bowl region.

- Rogler was inducted into the North Dakota Agricultural Hall of Fame in 2018.

- Picture: George Rogler with Nordan crested wheatgrass 1941

# Minimal Tillage

- Starting in the early 1980s, soil scientists Armand Bauer and Al Black conducted extensive research on developing conservation tillage systems.

- Their research showed that annual cropping was feasible if proper residue management was practiced. Crop residues left on the soil surface reduced soil water loss enabling annual cropping, which provided greater returns than traditional crop-fallow systems that were common until this time.

- Bauer and Black were inducted into the North Dakota Agricultural Hall of Fame in 2010 and 2014 respectively.

- Picture: Soil scientist Al Black discussing conservation tillage

# Minimal Tillage

- To complement ongoing conservation tillage research at NGPRL in the 1980s and 1990s, evaluations of erosion risk were conducted using the latest methods.
- Research found that biennial small grain-fallow systems were non-sustainable in the long-term, while erosion losses from Conservation Reserve Program land could be minimized with adoption of no-till.
- Picture: Soil scientist Steve Merrill evaluating rooting patterns for dryland crops

# Minimal Tillage

- Don Tanaka, soil scientist, led multiple projects to evaluate crop rotations. The team of Don Tanaka, Joe Krupinsky, Steve Merrill, Mark Liebig, John Hendrickson, and Jon Hanson conducted extensive research that provided data for development of the crop sequence calculator.

- Picture: No-till seeding spring wheat on the Soil Conservation Districts Area IV Research Farm, 2000

# LTAR and Cover Cropping

- The Long-Term Agroecosystem Research (LTAR) Network is a common experiment conducted across multiple sites researching sustainable intensification of agricultural practices.
- Within the experiment, the beneficial effects of cover cropping practices is one of the factors that is being studied.
- Determining the beneficial effects of cover cropping, beyond minimizing soil erosion, have helped growers to adopt these strategies.
- To encourage the adoption of cover cropping as a beneficial practice, the NGPRL developed a Cover Crop Chart to help local growers determine the best cover crops for their circumstances.

# National Wind Erosion Research Network

- The National Wind Erosion Research Network (NWERN) is the first national, long-term, intensively instrumented wind erosion research network in the world, consisting of 15 sites in the U.S. as of 2019.
- The goal of the network is to determine how effective no-till fixed rotation systems and no-till dynamic cropping systems are at reducing soil loss from wind erosion on a long term basis.
- Studies with the Network are currently ongoing, under the supervision of Dr. David Toledo
- Picture: NWERN tower, 2019

# Thank you