

# Using Rye Winter Cover Crops to Protect the Soil and the Environment

Many of the soils in the Upper Midwest developed under tall grass prairies that kept the soil covered with living plants all year. Modern day corn and soybean cropping systems, however, only have plants actively growing from approx. May 1 to Oct 1 (Fig. 1). As result, there are no plants growing in the soil for approximately 7 months each year. In many years the soil is frozen for 3 to 4 months, but that still leaves 3 to 4 months when nutrients, soil organic matter, and topsoil can be lost from "brown" fields without "green" plants.

Winter cereal cover crops, such as winter rye, are one approach to filling the "brown" gap in our cropping systems. Winter rye grows in the fall until the ground freezes and resumes growth soon after the soil thaws. A rye winter cover crop can reduce erosion, recycle nitrogen and phosphorus, and add organic matter to the soil. Reducing losses of nutrients and sediments to surface waters or tiles will improve water quality. But, recycling nutrients, protecting topsoil, and adding organic matter to the soil will also improve soil productivity. Our future research will quantify changes in soil productivity with winter cover crops.

Fig. 1

## Corn and Soybeans have a 7 Month "BROWN" Gap

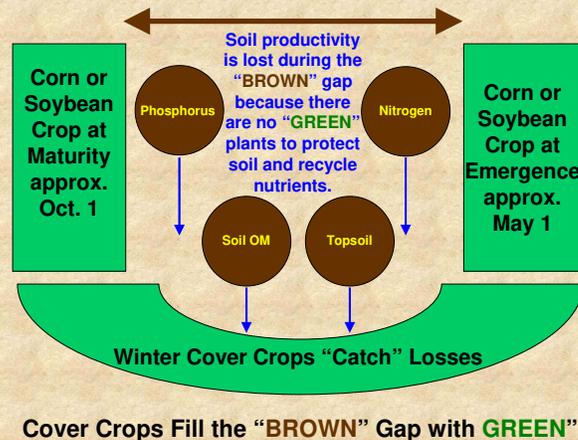
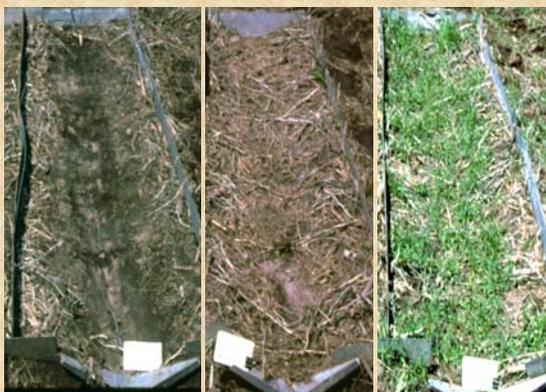


Fig. 2

## Erosion After Simulated Rainfall

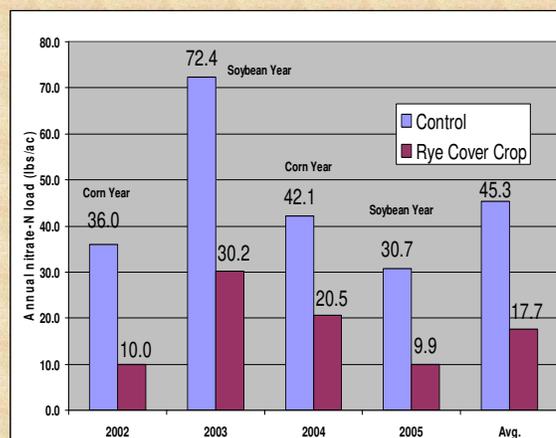


NO COVER CROP	OAT COVER CROP	RYE COVER CROP
0.89 tons/ac	0.54 tons/ac	0.32 tons/ac

Fig. 2 shows three no-till soybean plots in mid-April after a 1 hr simulated rain (4.5 in/hr). The no cover crop plot shows evidence of residue movement and rill formation. Soybean residue was held in place on the cover crop plots. Erosion was reduced 39% with an oat cover crop, even though it winterkilled. A growing rye cover crop, however, reduced erosion by 64%.

Fig. 3

## Nitrogen Loss in a Corn-Soybean Rotation with a Cover Crop



Numerous studies have shown that fertilizer management alone will not prevent N losses in tile drainage. In Iowa most of our N losses occur between March 1 and June 1, when there are no plants growing or the plants are very small. In the study shown in Fig. 3, a rye cover crop reduced N losses in tile drainage by 60% even in soybean years.