

Keyline Plowing and Soil Moisture

There wasn't a compaction problem at the trial site and the use of a subsoiler was unnecessary. These factors may explain the lack of trends in the data

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In 2015 a trial involving a keyline subsoiler plow was put in place. Subsoiling can sometimes increase a soil's water holding capacity by fracturing compacted layers (plow pans) and creating channels for water to infiltrate the soil. The keyline pattern runs across a slope – similar to contour cropping – and attempts to distribute water more evenly across the landscape using the plow channels.

Over summer 2016, data was taken in order to see the residual effects of the plow on soil water content. There was a weather station on the property that measured the water content of high and low spots in the field. Both the keyline plowed field and the control field were monitored for water content. When the data was received, it was graphed and analyzed.

There were three hypotheses going in to this study:

1. Keyline plowed at the top of a slope should hold more water than the control due to subsoiling;
2. Keyline plowed at the bottom of a slope should hold less water than control due to the keyline pattern upslope; OR
3. Keyline plowed at the bottom of the slope should hold more water than control due to subsoiling.

When the soil moisture data after each rainfall was graphed, we observed three trends:

1. Keyline plowed at the top of a slope had a lower moisture content than the control, but retains H₂O better – it took longer for water to drain away after a rainfall.
2. At moisture contents less than 0.26m³ water per m³ soil, keyline plowing at the bottom of a slope held less water than the control.
3. At moisture contents greater than 0.26m³ water per m³ soil, keyline plowing at the bottom of the slope held more water than the control.

Our observations do not support our hypotheses, so what is going on? There was not a compaction problem where the trial was located. The use of a subsoiler was unnecessary. This may explain why we saw no clear trends in the data.



Keyline Plowing: Soil Nutrients and Grass Yield- 2016

Keyline plowing was developed in Australia in the 1940s and 1950s. The technique uses a specially designed subsoiler plow to create channels that work with the topography of a field to help redistribute water more effectively through the landscape.

Keyline plowing had no significant effect on soil nutrients or grass yield in 2016.

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In 2014 RAIN's Keyline Plowing Project was initiated to determine whether keyline pattern subsoiling would help with water distribution. The aim was to determine if the keyline technique had an impact on grass yield and the water content of soil throughout the field.

Soil Nutrients

In order to determine if the soil nutrients have been affected due to the keyline plow, samples were taken from both the high point and low point of every pasture involved. In general, the soil nutrients were not affected by plowing. The only significant difference was higher levels of zinc in the low lying areas. Zinc is held on the surfaces of clay, organic matter, and organic materials, but there did not seem to be a significant difference in the organic matter between high or low sampling sites, therefore the difference in zinc is likely due to natural variability and sample size.

The only way to change nutrients in the soil is to add nutrients or to change the pH. Some advocates for keyline plowing have claimed that it helps increase organic matter, but in this study that did not seem to be the case. Building organic matter is a gradual process that takes many years, and this project may not have had a long enough time span to see that kind of result.

Grass Yield

Grass yield was not significantly different between the keyline plowed treatment and the control. Grass growth is very dependent on the amount of available water in the soil. Keyline plowing is supposed to slow water movement from high to low areas and even out topography effects, but with the drought in 2016 it was difficult to determine if there was a practical benefit from this method of water management.

