Introduction

In North Dakota and around the world, energy development has increased demand for pipelines. Repeated issues related to pipeline installation such as soil erosion and runoff, may require multiple reseeding attempts. Our research tests wood-fiber hydromulch, land imprinting, the combination of imprinting and hydromulch, and wheat-straw crimping under rainfall simulation to gauge the effectiveness of reducing sediment load and runoff. This research aims to improve the understanding of potential methods to improve reclamation success.

Methodology

In the fall of 2020, sites at the Williston, ND REC were set up using a strip-plot design, utilizing 3 randomized blocks (below) with imprinting, crimping, hydromulch, the combination of hydromulch and imprinting, and no treatment as the control. All plots were seeded with oats (10 lbs/acre) and a native seed mix (38 lbs/acre) with plant establishment evaluated in 2021. The native seed mix contained western wheatgrass, slender wheatgrass, green needlegrass, and side-oats grama. Rain simulations were conducted in Sept. 2020 and again in June of 2021, for 30 min each. Sediment load, total runoff, and plant establishment were analyzed.





An Examination of Pipeline Site-Preparation Methods for Improving Plant Establishment

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Effect	Level	Equivalent Depth (cm)	Sediment Load (g/L)	Relative Cover of all Species
Year	2020	1.1 (A)	1.73	N/A
	2021	2.3 (B)	1.67	N/A
	p-value	*	ns	N/A
Treatment	Bare	1.7 (B)	2.52 (A)	50.8
	Mulch	2.6 (A)	1.03 (B)	47.7
	Im/mulch	1.9 (AB)	1.04 (B)	49.8
	Straw	0.8 (C)	1.83 (AB)	49.6
	Imprint	1.4 (BC)	2.10 (AB)	53.0
	p-value	*	*	ns
Slope	2%	1.8	1.66	18.3
	5%	1.5	1.75	22.5
	p-value	ns	ns	ns
* Indicates significance <0.05; ns indicates no significance				





crimped straw plot.

Results

- For equivalent water depth, (ED) there were treatment and year effects. Splitting ED up by year (below), mulch only treatments were the lone treatments to be significantly different than the control in 2020. Imprinting worked well in 2020, but was not different than the control. In 2021, straw was the only treatment to be significantly different than the control.
- For sediment load (SL) or erosion, both treatments receiving mulch were significantly different than the control, reducing SL by 58%.
- Plant establishment was not significant one year after planting for any treatment applied.



2021 Equivalent Water Depth



Discussion

Western North Dakota experienced significant droughts in both 2020 and 2021. Under drought conditions, utilizing a wood-fiber hydromulch, regardless of combination, significantly reduced sediment loads by 58% when compared to the control. We attribute this to a "sealing" effect. However, both treatments with hydromulch also increased ED, or total runoff. For runoff, imprinting only worked well in 2020, as the imprints settled out over time. Straw is the best option for prolonged droughts as it was the only treatment different than the control for runoff in 2021.

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