Shasta College HydroMulch Trials: Does the Application Rate of 4,536kg/ha (4,000lbs/acre) of Hydro Mulch Inhibit Native Grass Germination and Establishment?

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I. Introduction:

The application of hydro mulch on slopes for erosion control and plant establishment is commonly used in the sediment and erosion control industry. Applying the proper amount of hydro mulch to protect slopes from soil loss and simultaneously promote seed generation and plant growth is imperative to permanent site stabilization. Product retention on the soil surface controls erosion, but will the application of too much hydro mulch inhibit seed germination and growth? Beginning in December of 2008 , Shasta College's Instructor John McCullah and the students from the watershed restoration class, with assistance from the heavy equipment and operations class, tested the hypothesis that *the application rate of 4,536kg/ha (4000lbs/acre) of hydro mulch (vs. the application rate of 2268kg/ha ((2000lbs/acre)) inhibits native grass seed germination and growth.* Seed germination and plant growth density in plots treated with various hydro mulches at rates equivalent to 2,268kg/ha (2,000lbs/acre) and 4,536kg/ha (4,000lbs/acre) was observed and photo-documented. The study also observed the effectiveness of each hydro mulch treatment, at the 2,268kg/ha (2,000lbs/acre) vs. 4,536kg/ha (4,000lbs/acre) application rates, in terms of erosion control and product retention on the soil surface.

The study took place in Redding California at the Shasta College Erosion Control Training Facility, in the rainy season 2008/2009 (December-May). The facility is a testing ground for cutting edge erosion control products and BMP techniques. The site includes a mountain of soil for slope tests, flat land with a slight grade for sheet flow testing, a flood channel for stream erosion studies and a sediment pond.

Method:

The study was conducted on 18 test plots 3m x 4.57m (15ft x 10ft), with an additional two control plots. The study site was situated on a 2:1 grade. The plots were vertically track-walked with a bulldozer, and then seeded on December 16, 2008 with 85 grams of a native seed blend (equivalent to 33.75kg/ha (30 lbs/ ac)). The blend contained 1/3 Nassella pulchra (Purple Needle Grass - the CA State Native Grass) and 2/3 Elymus glaucus (Blue Wild rye). Students uniformly hand seeded all treated plots. Biosol at a rate of 562.5kg/ha (500lbs/ac) and AM 120 Mycorrhizae at a rate of 22.5kg/ha (20lbs/acre) were applied to the test plots (except the compost plot) by hand. Subsequent to seeding and fertilizing, four different hydromulch products were applied using a Finn hydroseeder: Soilguard-Bonded Fiber Matrix, HydraCX2 Cotton Fiber Reinforced Matrix-NAG, Flexterra Flexible Growth Medium, TerraMulch-hydraulic mulch. Each product was applied to four test plots, with the application rate set at 2,268kg/ha on two test plots and at 4,536kg/ha on two test plots.

Two inches of medium screened, locally produced compost was applied to one test plot over a seed application of the same grass species mix and rate as the other plots (33.75kg/ha). On December 18, the compost plot was split in half and seed was applied to the top of one half plot, leaving half the plot with the seed under 5cm (2") of compost; meaning that half the compost plot had seed under a 5cm compost blanket and half the plot had seed under and on top. This test plot was installed to determine if a 5cm layer of compost would inhibit seed germination and plant growth.

Two control plots were established. One control plot was track-walked, seeded and fertilized with Biosol at 562.5kg/ha and mycorrhizae at 22.5kg/ha, the same rate as the hydro mulched plots, and the other plot was track-walked with no additional treatment.

Photo documentation was used to make comparative observations between the plots treated with different hydro mulches at the two application rates. Each plot was evaluated on three criteria: 1. Seed growth density. 2. Erosion control effectiveness of the product. 3. Retention of product on the plot.

Observations:

The compost treatment out performed all products applied at 4,536kg/ha (4,000lbs/acre) in seed germination and grass growth. It scored the highest, along with Flexterra FGM, in erosion control effectiveness. Finally, it retained on the soil surface as well as all other products applied at 4,536kg/ha. At this time, the compost plot has the best grass establishment with no discernible difference between treatments (seed application under the compost only as opposed to seed under and on top of compost).

The application rate of 4,536kg/ha (4,000lbs/acre) of the hydro mulch products utilized in this study resulted in no observable difference in seed germination or plant growth than the application rate of 2,268kg/ha (2,000lbs/acre). The observations indicate that the application rate of 4,536kg/ha does not inhibit seed germination and plant growth. Furthermore, plots treated with 2,268kg/ha applications did not perform as well as those treated with 4,536kg/ha in terms of erosion control effectiveness, soil stability and product retention through the first rain season.

The plot treated with two inches of compost outperformed the hydro mulch products utilized in this study in all observed criteria: time to seed germination, quantity of seed germinated, rate of growth, erosion control effectiveness, and product retention on the soil surface.

Conclusion:

Hydro mulch should be applied at rates that effectively limit erosion and still allow seed germination and growth of vegetation for permanent stabilization. While application rates of 2,268kg/ha allow seed germination and plant growth, the study found such a rate is not as effective in preventing surface erosion as a 4,536kg/ha rate. The long, intense winters in northern California, coupled with the slow establishment rate of native grasses make temporary soil surface stabilization imperative to control erosion and establish vegetation on disturbed areas. Product retention on the soil is the only defense against soil loss until vegetation gets established.