

USING TOPSOIL AS A MICROBIAL INOCULANT¹

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Abstract: Pastures historically irrigated from the Clark Fork River in southwest Montana exhibit elevated metals and acidity. In 1999, some of these pastures were amended with product lime (CaO-60% / CaCO₃-40%) and plowed to 12 inches (30 cm). The 1999 remediation strategies acknowledged and emphasized the mineral, inorganic chemistry of the soils yet the 2000 revegetation results were unacceptable. The years of 2000 and 2001 were the driest on record for the project area and spring drought hampered revegetation efforts. In 2002, the authors proposed some biological amendment strategies as a demonstration for improved grass establishment under dry conditions. The biotic component of soil restoration should be considered as an integral part of grassland agriculture. Acid, metal-laden soils are an inhospitable chemical environment for beneficial soil microbes. A liming event that raises the soil pH to 10 or more would also be inhibitory to most microbes. After a limed soil has mellowed to a more neutral pH, beneficial soil microbes and organic matter can be introduced as biological amendments.

This demonstration utilized living grassland topsoil, as a microbial inoculant, at a rate of 2 tons per acre (4.5 metric tons per hectare). Two rates of compost (1.5 % OM and 3.0 % OM) were applied with and without topsoil. The topsoil amendment and the limed control soil were tested for the presence of mycorrhizal propagules. The 3 treatments and respective controls were replicated 3 times for a total of 18 plots. All plots were chisel plowed to a depth of 6 inches (15 cm) prior to amendment applications. After amendment application, all plots were disk plowed twice to 6 inches (15 cm) for amendment incorporation and all plots were drill seeded with the same grass seed mix at the same rate. Each plot represents 0.09 acres (0.04 hectare). The entire demonstration area represents 1.6 acres (0.65 hectare) and will be irrigated in May and June of the first year (2003) if necessary for establishment. Plots will be monitored and evaluated annually in late July or early August using plant cover as the response variable.

Additional Key Words: mycorrhizae, VAM, soil organic matter

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