

Progress Report to the Maryland Soybean Board for the Project:

**"Enhanced Rock Weathering - Crop and Soil Impacts of Basalt Application"**

Activities covering 1 April through 31 July 2024.

A complete set of 96 soil samples was collected in late March and early April from 16 upslope and 16 downslope sampling areas in the field experiment near Lewistown, Frederick County Maryland. The samples were processed and analyzed for electrical conductivity (parentheses total dissolved solids), and soil pH in suspensions of pure water, 0.01 molar calcium chloride, and one molar potassium chloride. The purpose of the soil pH measurements in the salt solutions is to compensate for the change in soluble salts present in the field due to rain events and the dissolution of amendments and soil minerals. The change in the three measures of soil pH between October 2023 before the treatments were applied and late March or early April 2024 is shown in Figure 1. The variability in water pH due to changes in EC made it such that no comparisons were statistically significant. However, in the last sampling, the agricultural lime treatment in the upper soil layer had achieved a higher pH than the control and the recommended rate of basalt rock. The data suggests that agricultural lime reacts more quickly than silicate rock to change soil pH. Soil was sampled again in late June. Those samples have been processed and are presently under analysis.

Suction lysimeters were installed in February to collect samples of leaching water from 90 cm or 3 ft deep. The pH of the leaching water was close to 8 in all the samples taken on March 17th and April 14th. There was no effect of the rock treatments on the pH of the leaching water, further suggesting that the silicate rocks as well as the limestone take more than a few months to react with the soil acids.

The winter wheat crop planted immediately after the rock treatments were applied in October 2023 was harvested in late June of 2024. No visible responses to the rock treatments were observed in the wheat plants and there were no differences in wheat yields, all of which were approximately 100 bushels per acre ( figure 3).

Plans for the immediate future include analysis of the 96 June soil samples and the development of methods to measure the dissolved bicarbonates in the leaching water. In

late fall we plan to take deep cores to one meter or more depth to evaluate the presence of bicarbonates in the subsoil.

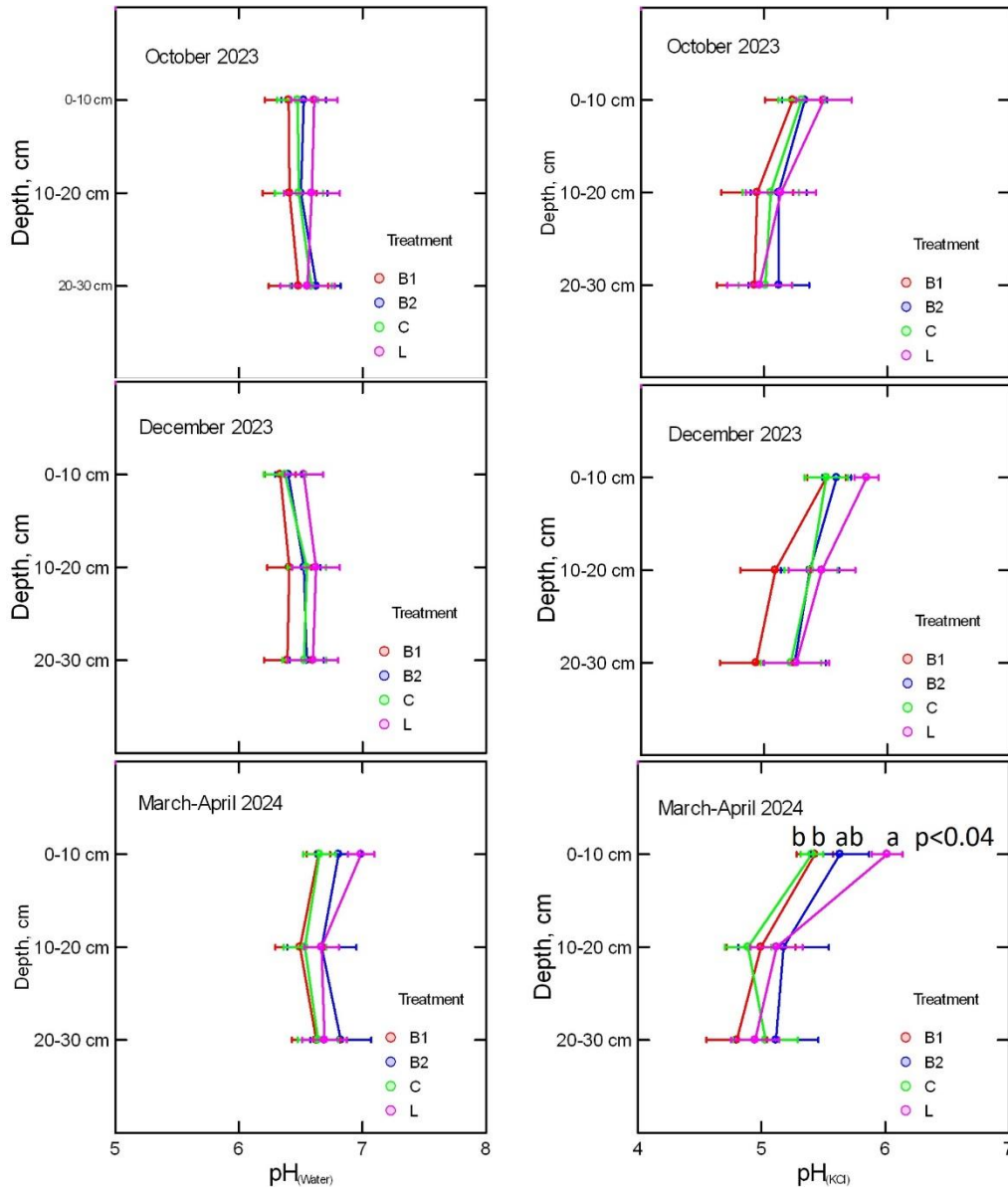


Figure 1 Soil pH at three soil depths and on three dates as influenced by rock powder application treatments on a fine-textured field in Frederick County, MD.

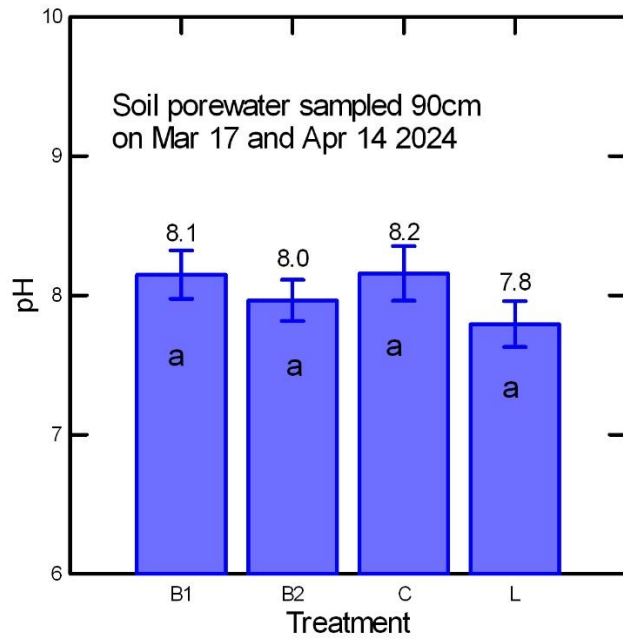


Figure 2. The pH of soil macro-pore drainage water collected at 90 cm deep on 17 March and 14 April, 2024, as affected by rock powder application treatments.

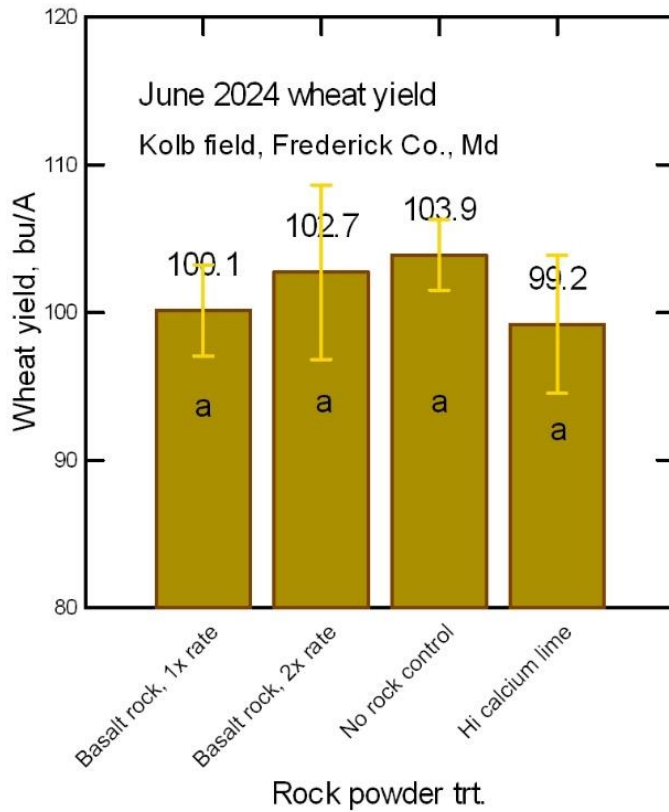


Figure 3. Winter wheat yields harvested in June 2024 as affected by rock powder application treatments applied in October 2023.