Appendix 1. Methodologies for Field Tests

Appendix 1.1 Active C Methodology

In their study, Weil et al. (2003) used a small subsample (approximately 20 grams) of field moist soil which was crumbled gently onto a piece of black paper and left to air-dry, preferably in direct sunlight, for 15 minutes.

A stock solution consisting of 0.2M $KMnO_4$ adjusted to a pH of 7.2 using NaOH was prepared, along with three standard solutions. The standard solutions consisted of the 0.02M $KMnO_4$ diluted using three volumes of distilled water (1.25, 2.50, and 5.00 ml) to produce three standards with molarities of 0.005, 0.01, and 0.02, respectively. Standard solutions were made in order to create a standard curve based on the absorbance readings from the 550 nm colorimeter. This curve was then used to determine the amount of active C in the soil-$KMnO_4$ solutions.

Once the soil was dry, 2.0 ml of the 0.2M $KMnO_4$ was placed in a centrifuge tube using a bulb pipette and distilled water added to the 20 ml mark on the tube. The tube was shaken to ensure the solution was mixed thoroughly. One level scoop (approximately 5 grams) was then placed in the solution and the tube capped and shaken vigorously for two minutes.

The tube was left to sit for a ten minute settling period, during which time the standard solutions could be tested for absorbance using the colorimeter. This involved diluting 0.05 ml of each standard in a centrifuge tube containing 50 ml of distilled water. Approximately 15 ml of the diluted standard was then put in the glass cuvette. The outside of the cuvette was wiped to ensure no particles interfered with the absorbance reading and the cuvette was placed in the colorimeter well. The reading was recorded and a standard curve was created.

After the ten minute settling time, 45 ml of distilled water was added to a clean centrifuge tube. Using a bulb pipette, 0.05 ml from the test sample was added to the tube containing 45 ml of distilled water. Distilled water was then added to the 50 ml mark and the tube capped and shaken. Fifteen milliliters of this solution was then transferred to the glass cuvette. The cuvette was wiped down and placed in the colorimeter well and the absorbance recorded.

Appendix 1.2 Basic EDTA Methodology

In this study 5 to 10 grams of dry field sample is placed into a mortar and pestle and pulverized (Bowman 1997). One scoop (approximately 0.5 g) of each soil sample to be used for the standards and one scoop of each of the unknown samples are then placed in separate labeled vials or tubes. This procedure requires that four soils with known soil organic matter (SOM) contents of <1%, 2%, 3%, and >4% be used as the standards. Twenty milliliters of the basic EDTA, consisting of equal parts NaOH and Na_2EDTA, is added to each of the containers and the mixture is shaken vigorously for 30 seconds. A clean vial is then prepared by placing a funnel lined with filter paper on top and the mixture of soil and basic EDTA is transferred to the funnel. The color of the clear filtrate

that results from the unknown samples is then compared with the color of the known standards and the estimated percent SOM recorded.