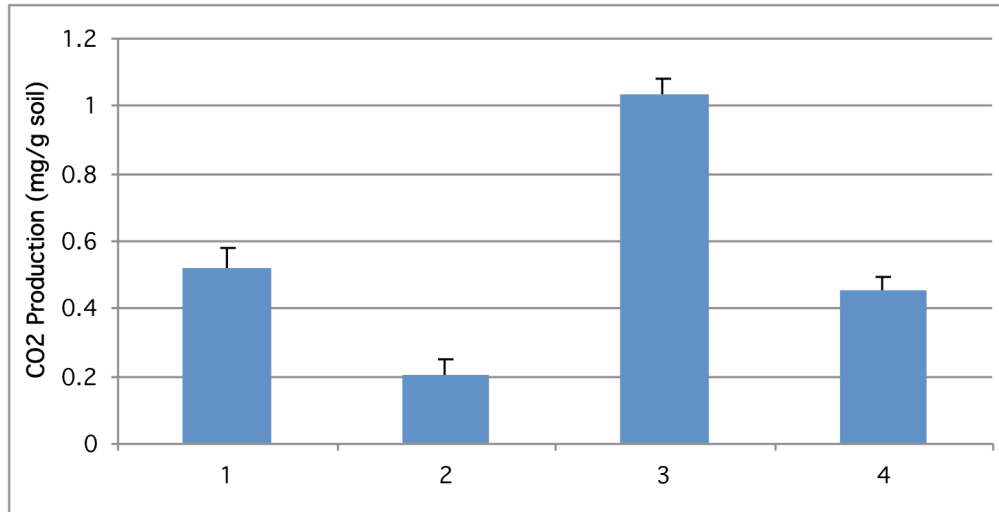


Making Predictions About Cellular Respiration by Soil Microbes

The data below show measured microbial activity from four soil samples from different habitats – corn field, old field (overgrown farmland), lawn, and forest.



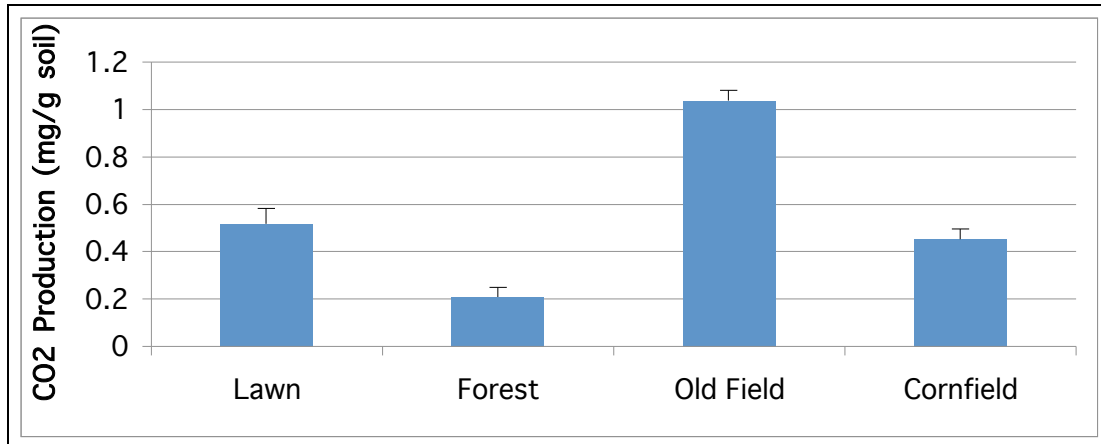
1. Examine the data above for each soil type. Label each bar (1-4) with the corresponding habitat. Provide a rationale for your predictions. Feel free to use the back of this page if you need more space.

2. Were your predictions correct? Provide logical explanations for any discrepancies.

Teacher Notes and Answer Key

Making Predictions About Cellular Respiration by Soil Microbes

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1. Examine the data above for each soil type. Label each bar (1-4) with the corresponding habitat. Provide a rationale for your predictions. Feel free to use the back of this page if you need more space.

Explanation: These data are somewhat counterintuitive. Why would microbial activity in a forest be so low? Most likely this is because woody vegetation is rich in lignin, which is more difficult to break down than the cellulose found in grasses and flowers characteristic of lawns and fields. Less respiration would occur there than in the other habitats. Comparing an old field, a cornfield, and a lawn: an old field would have a richer supply of organic matter than a cornfield or lawn. There may, however, be other factors for a lawn or cornfield such as time of year and time since last application of fertilizer (organic or synthetic) that may lead to different results depending on the sampling date. An old field would also have a less disturbed soil microbe community than a cornfield, which could be another reason why soil microbes in the old field released more CO₂ after being disturbed, allowing additional oxygen input and mixing of microbes and plant material.

2. Were your predictions correct? Provide logical explanations for any discrepancies.

It is less important to focus on “right answers” than on the quality of their rationale in #1. These are complex ecosystems, which are not well understood and difficult to describe.

Students will need to explain if/why their predictions differed from their predictions in #1. This question will help teachers understand any preconceptions students hold about soil carbon cycling.

Consider following up with a third question, asking students what further sampling they might do to make sense of this data. They could sample the same sites at different times of year, compare soil types at each site, sample additional lawns, forests, etc to see if the results are consistent, etc. For reference purposes, this data was collected in June 2009 near Kalamazoo, Michigan.