Crop Formation: Chehalis, WA, USA, 1994

Laboratory Code: KS-02-108
Material: Soil and Grass Cuttings

Formation: Concentric rings with four, uniformly spaced circles between them. The formation occurred in a harvested alfalfa field (see aerial photograph in Fig.1-A) and stood out in outline as regions where there was no re-growth vegetation.

Sample Information: Two sample collections were made by Ms. Mary Ellen Frister,1919 Evergreen Park Dr. #92, Olympia WA 98502. The first sample set (taken in Oct. 1994) consisted of soil and the second set of samples taken several weeks later, were grass clippings from new growth.

Laboratory Results:

Since our previous work with crop formations has been concerned with detailed studies of plant tissues and cells, we were somewhat at a loss as to what to do with the soil samples. On the other hand the soil was all we had to work with, at least initially. After some head scratching the decision was made to take a quick look at the soil to examine the possibility that there might be observable alterations in the content of active ions.

For this purpose we used a method previously employed to examine the redox (oxidation/reduction) or respiration activity in plant tissues. This is an ion-sensitive electrode system which allows one to examine the relative cation-anion activity within a test solution. The procedure for doing this will not be given here since the details have been discussed in the scientific literature (*Bioelectrochemistry and Bioenergetics*, **19,** pp.461-476, 1988).

Four soil samples were taken within the rings and circles, and two controls outside the formation. The redox tests were conducted at room temperature, with 10g of soil placed in 10ml deionized water. After about 90 min., 5ml aliquots were decanted off and the redox traces conducted at electrode potentials ranging from 0.5 to 3 volts (the range of oxidation potentials for most inorganic ions). The data from four of these soil samples are shown in Fig.1-B, where the formation samples are the heavy lines and the two controls the lighter lines. The data from two of the soil samples are not shown here since the curves were almost identical to the controls and would make the figure confusing.

First it should be noted in Fig.1-B that both control curves are almost identical in their redox responses. Samp.-7 from a solid circle gives a higher ratio at 1.0 volts, and Samp.-1 from the outer ring produced higher ratios than any of the other samples. These higher ratios in the formation samples suggest that the soil has an increased level of anion activity relative to the controls. It is unusual to find soil with redox differences of this magnitude. This ion imbalance could explain the lack of vegetation within the formation regions, since plant growth and development is very sensitive to ph as well as other ion activity in the soil.

Several weeks after the soil samples were taken, Ms. Frister returned to the site, and by crawling around on her hands and knees was able to obtain grass samples just beginning to grow within the formation regions. This now gave us plant material to work with, and from this we were able to confirm (again using the redox method) that the grass in the formation regions, when compared with the controls, had been affected by the ion imbalance in the soil.

Conclusions:

This is the first crop formation in which we have been able to detect a pronounced alteration in the redox activity or ion content of the soil when compared with normal or control soil. The mechanism by which this happens is not known; however, it is quite clear that subsequent plant growth is drastically affected. The influence of the formation energies can be observed in plants taken weeks or months post-formation.

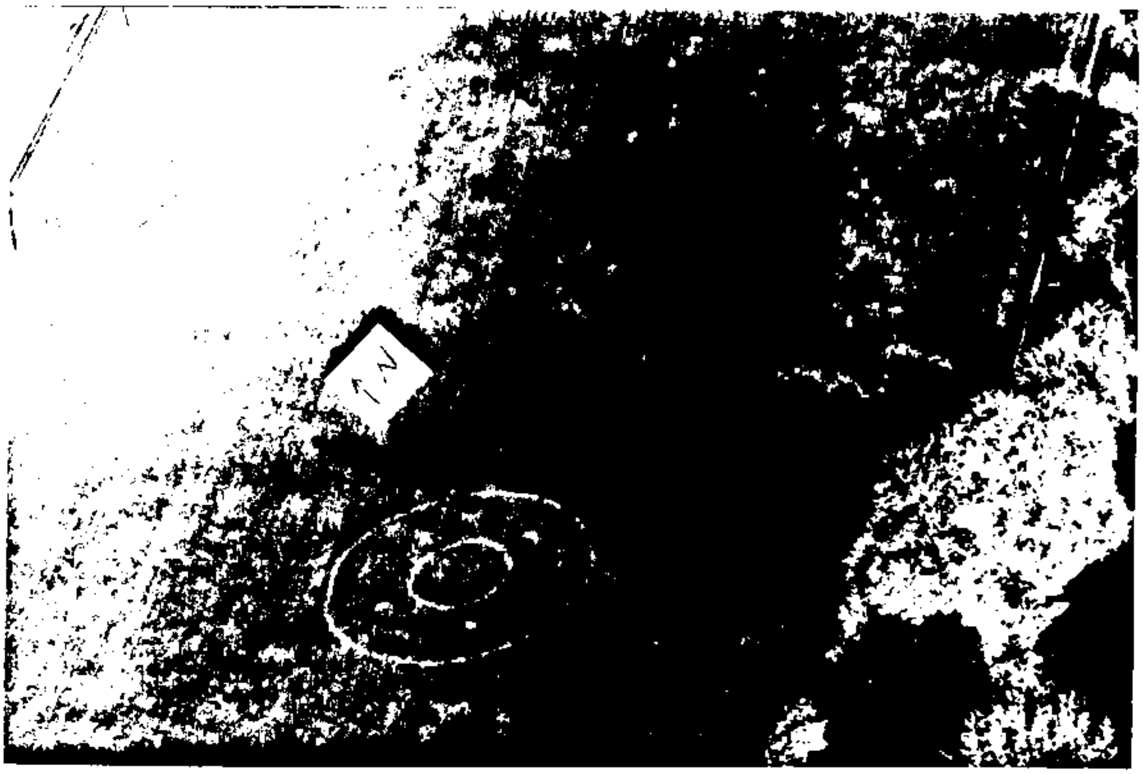
W.C. Levengood
Pinelandia Biophysical Lab.

John A. Burke
Am-Tech. Laboratory

2-3-95

Fig.1 Crop formation at Chehalis, WA, 1994 (KS-02-108)

(A)



(B)