November 25, 1992

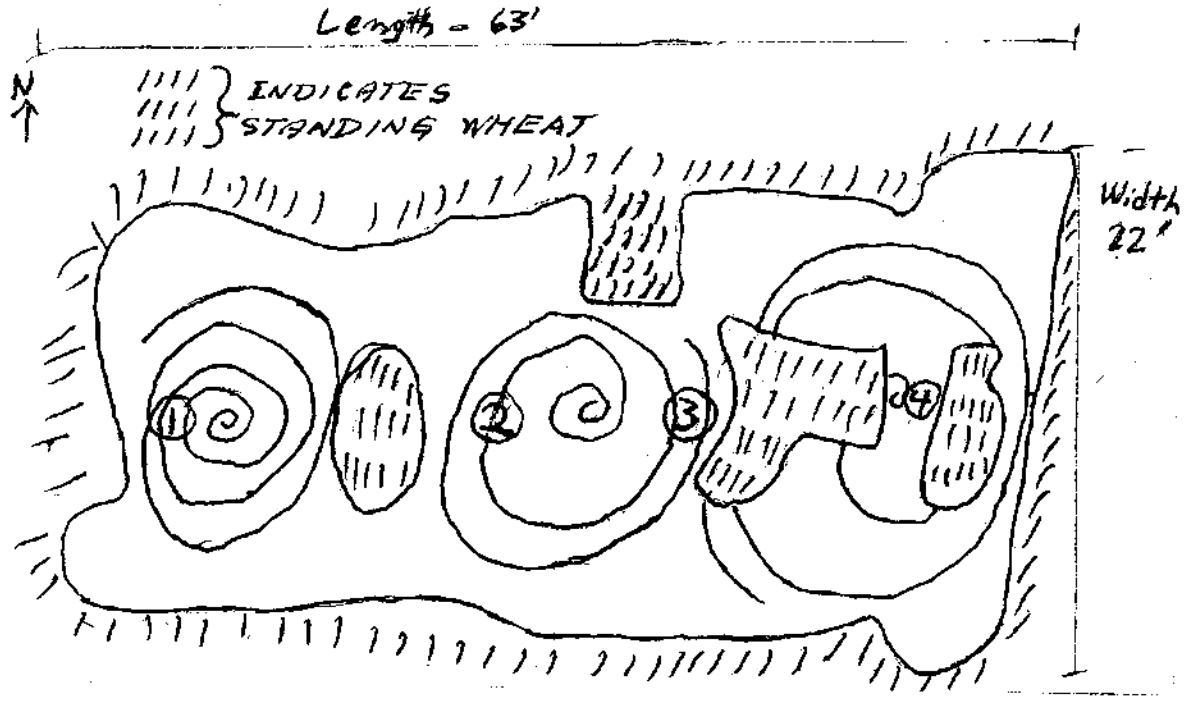
RESEARCH REPORT: PINELANDIA BIOPHYSICAL LAB.

LABORATORY Code: KS-01-77

PLANT MATERIAL: Wheat heads with seeds, *Triticum aestivum*

FORMATION: Three contiguous spiral formations - Aug. 21-22, 1992 at Esterhazy, Saskatchewan, Canada.

SAMPLES COLLECTED BY: Mr. Daniel J. Clairmont, Esterhazy, SK. Below is a traced over, penciled map drawn by Mr. Clairmont - the circled numbers indicate where the samples were taken.



Mr. Clairmonts Comments on Map:

*-"all standing wheat green"
*-"samples of flattened wheat were dried colored on discovery of crop circle. No color change since then."
*-"gravel road 40' to north, going east-west"
*-"swirls show direction of fall of flattened wheat"
*-"no other wheat in this field or surrounding fields, wind damaged."
*-"control sample taken 200' to south."

EXTERNAL APPEARANCE: The external appearance of the seed heads from the circle samples were all similar to the control samples.

SEED DEVELOPMENT: Seeds from the circle samples were clearly sub-normal in development. The endosperm had not developed completely in the circle seeds and they were more shrunken in appearance than the controls. This difference is shown in Fig.1- the Samp.*4 seeds are typical in appearance of all the circle samples. The reason for showing the Samp.*4 seeds will become apparent in a later section. Although limited seeds were available there were sufficient numbers to compare weight differences in the test sets - these data are listed as follows;

SAMPLE	WT./20 SEEDS	WT./SEED	WT. CHANGE
Control	0.95 gm	0.048 gm	-------
Samp.*1	0.73	0.037	-22.9%
Samp.*2	0.56	0.028	-41.7%
Samp.*3	0.37	0.019	-60.4%
Samp.*4	0.47	0.024	-50.0%

CELL WALL PIT EXAMINATION: Bract tissue samples.

SAMPLE	PIT DIA. (microns)	N-PITS	DIA. CHANGE
Control	1.99 s.d. 0.25	30	---------
Samp.*1	2.06 s.d. 0.47	30	+3.5% (N.S.)
Samp.*2	1.69 s.d. 0.26	30	-15.1% (P<0.05)
Samp.*3	1.65 s.d. 0.20	30	-17.1% (P<0.05)
Samp.*4	1.63 s.d. 0.26	30	-18.1% (P<0.05)

The significant decrease in pit diameters in Samp.*2-*4 indicate an extended application of the energies producing the crop formations (see Fig.3 in Report*5).

SEED GERMINATION: Regular paper roll germination - 20 seeds per roll. The Seedling Development Factor1 data summarized in Fig.2 exhibit very surprising variations in the seedling growth within the sample groups. Samp.*1,*2 and *3 are significantly suppressed in development whereas Samp.*4 disclosed a significant increase in seedling growth and development. As shown in Fig.2 the development factor values from the Samp.*4 seeds lie above the control throughout the entire 10 days of testing (Samp.*2 and *3 had zero Df values up to 8 days).

This striking growth difference between the Control and Samp.#4 is shown in the actual germination test seedlings in Fig.3-A, B and C, taken at 14 days. The Samp.#1 photograph is shown so that one may compare these photographs with the Df data plotted in Fig.2. In the Samp.#4 set there appears to be two separate populations of seedlings - a few which are just beginning to grow and a second, major group which grew very rapidly from the initial stages of germination.

COMMENTS:

We are now at a stage in the crop circle work where it is becoming apparent that each sample group needs to be examined from a broader perspective, that is, in relation to the patterns of bioenergetic alterations which have been outlined in reports from numerous crop circles. Here, in these findings from the Canadian formations we take a leap into what at first consideration seems to be a very confusing situation, and the beginning of a real challenging analytical problem. As a starting point we will look at the plant responses within specific sample sets from the above, and attempt to objectively outline what they may tell us.

In the Table listing bract pit diameter changes there are three sample sets exhibiting significantly decreased pit sizes (Samp.#2, #3 & #4). From Fig.3 in Report#5, a decrease in pit diameter indicates a prolonged exposure to the heat energy, resulting in tissue dehydration (the same result could be obtained through a higher energy input for a shorter duration). Moderate levels of heat shock are known to deactivate gene systems in plants, which after the heat shock are reactivated. Above a certain level (>40^{0}C) protein degradation can occur and in tissues undergoing meiosis, such as the developing embryo tissues, the DNA damage can be irreparable. The ultimate result of heat damage is loss of viability and cessation of development. The loss of vigor in Samp.#1,#2 & #3 is typical of the response one might find in heat damaged embryos.

From the pit data it would be anticipated that Samp.#4 would also be in this same low vigor category. What was found, however, is quite the opposite - the Df value is significantly higher than the controls. This is the only sample from these formations which is even remotely in agreement with the inverse correlation between pit diameter and development factor Df, as previously discussed in Report#9. It is important to note that one possible explanation for the lack of this inverse correlation between pit size and the Df values, may lie in the manner in which the sample groups were selected. The results in Report#9 were based on samples collected from one single formation(KS-01-39). On

the other hand Mr. Clairmonts map shows sampling from three different formations (Samp.#2 & #3 were from the same formation and interestingly have essentially identical although very low Df responses).

What is also apparent in the above sample groups is the absence of a direct (or inverse) relationship between bract pit size changes and the Df response, that is, when comparing one formation with another. What could account for this absence of predictability? One possible explanation may relate to the complex makeup of the energy distributions of the forces producing the crop formations. One characteristic feature of the entire "crop" of World formations is the appearance of a recurrent kinetic process that never seems to exactly repeat itself. Even though the process is governed by forces which may be precisely defined mathematically (i.e. the Mandelbrot formation) their long term evolution is fundamentally unpredictable.

In an attempt to reconcile this unpredictability with the empirical results obtained in this laboratory over the last two years, these complex energy processes are being considered within the framework of a kinetic, oscillating system operating under conditions of deterministic chaos. The scientific literature abounds with references to deterministic systems in which unpredictable, highly complex geometric forms are produced. Many of these recurrent processes have been shown to have structures identical in form with the most complex of the crop formations. This deterministic chaos concept will be discussed in greater detail at a later date.

Wm C Levengood

Dr. W.C. Levengood

[1] Seedling Development Factor, Df= L x Fg where L is mean seedling length - cm and fg is the fraction germinated.

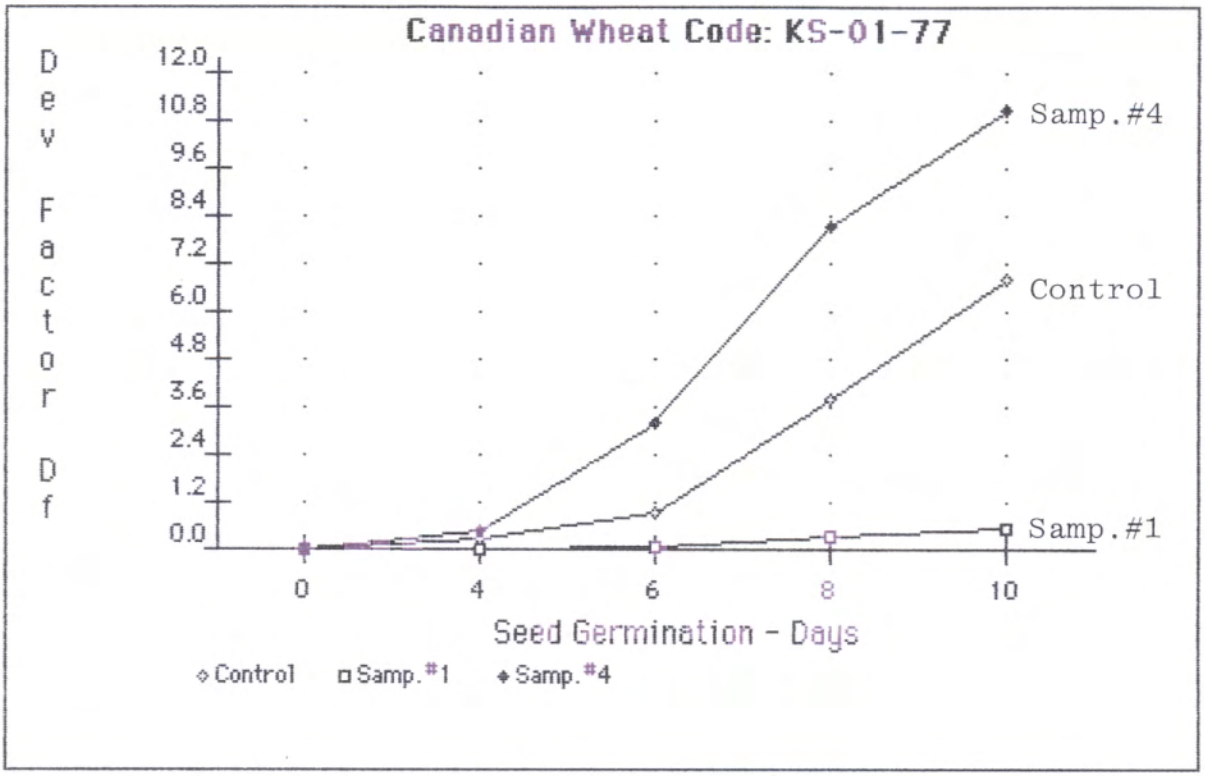


Fig.2 Germination responses in Canadian circle samples

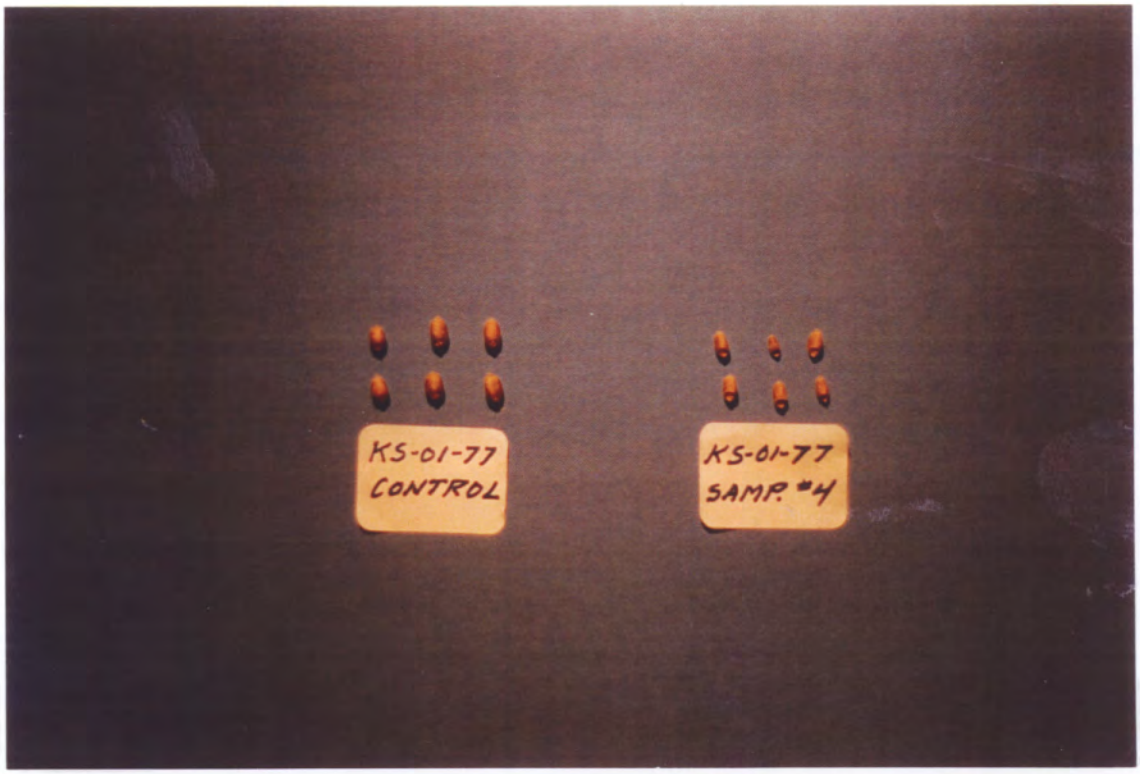
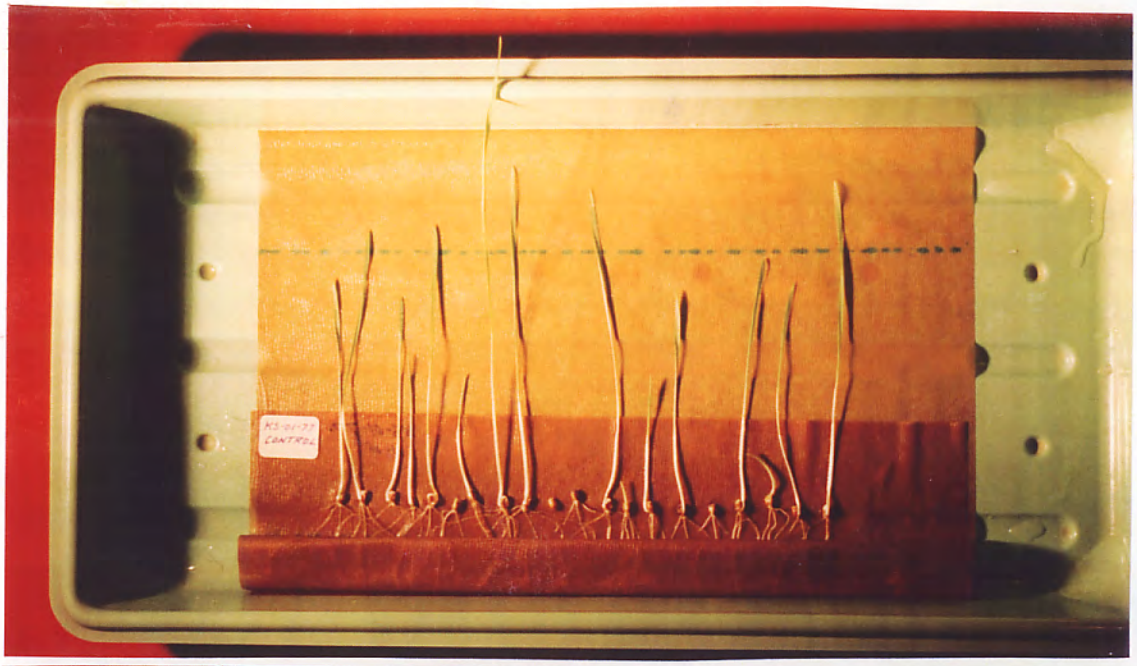


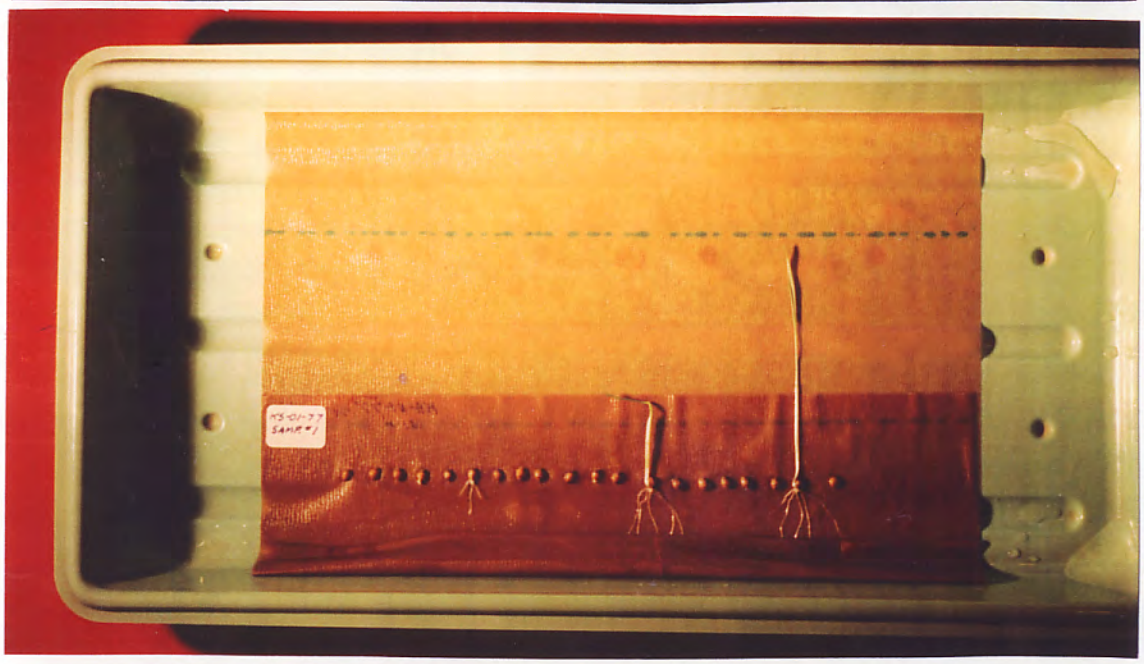
Fig.1 Comparison of seeds from Canadian circle samples (KS-01-77)

Fig.3 Seedlings from germination tests (KS-01-77)

Control--



Samp.#1--



Samp.#4--