June 27, 1993

RESEARCH REPORT: PINELANDIA BIOPHYSICAL LAB.

LABORATORY Code: KS-01-102

PLANT MATERIAL: Plants and heads, *Triticum aestivum*

FORMATION: Kennewick, Washington, U.S.A., formed on May 29, 1993, samples collected on June 9,1993.

SAMPLES COLLECTED BY: Mr. Jerry Phelps, Kennewick, Wash. Information regarding this formation has been coordinated through Ms. Ilyes of Port Angeles, WA.

COMMENTS ON SAMPLES: Excellent scale diagrams were submitted by Mr. Phelps, on which the locations were noted for six plant and six soil sample points. Plants received at the lab. on 6-11-93 and immediately placed at 4ºC (stems and heads still at green stage). As a result of this superb sampling and condition of the plant material, it has been possible to make interesting, in-depth studies of the changes within this formation, details of which are presented in the following sections.

SOIL SAMPLES: The soil work will be done at a later date.

LABORATORY EXAMINATION:

As the plant samples are discussed, reference will be made to the specific locations at which the samples were collected. For this reason the reader may want to refer to the Phelps diagrams designated here as Fig.1A showing the overall structure (black areas downed wheat), Fig.1B the precise scale drawing and Fig.1C the plant sample locations.

I) STEM NODE DIAMETER RATIOS:

Each sample group consisted of six plants with each plant having five growth nodes. The stem node ratio (see Report No.1, Aug. 2,1991) was determined at four of the five node points. The bottom or N1 node was not examined because of soil contamination and the presence of adventitious roots. Measurements were conducted on all specimens before the statistical analyses were carried out.

The mean node ratio, R was determined for each node position within the six plant populations. This ratio is simply determined as,

$$R = N/In$$

where N is the node diameter and In the internode (stem) diameter about 1/2 cm above the node. The data provided from the statistical analyses disclosed that the node swelling at the N4 and N5 positions on the formation samples was significantly higher ($P<0.05$) than the corresponding values in the #6 control sample; with one exception, the R values in the #2 samples taken within the ring of upright plants. The highest degree of node swelling was noted in the #1 and #4 inner circle samples, data from which are summarized in Fig.2A (upper), and should be compared with the #6 control data in the lower curve (see legend at bottom of chart).

It was of particular interest to note that the node swelling in the #5 control sample was also of a greater degree than in the #6 control. This appears to be another example of a "proximity control" effect as found in a Canadian control sample (Report No.16) taken only 10 ft. outside a formation. Here we note on Fig.1C that sample #5 was taken 20 ft. outside the formation whereas #6 control was taken 1/4 mi. away. If this is indeed a proximity effect then we should find very similar node swelling levels in sample #5 when compared with #2 taken within the inner ring of upright plants. These two sets of data are plotted in Fig.2B (lower), where it is quite apparent that the node ratio values are similar. This suggests very comparable levels of applied energy at these two sampling points.

II.) STEM NODE BENDING AND LATERAL SPLITTING:

The following table provides a summary of the node bending taken at the N4 and N5 positions (no significant node bends were noted at the N2 and N3 locations on the submitted samples). The six plant, mean values are listed in degrees and represent the magnitude of the bending from the vertical or upright position. The degree of bending in the formation samples is in every case significantly greater ($P<0.05$) than in the control #6 plants. It is of interest to note here that the bending figure in the upright sample #2 is only slightly greater than in the #6 controls. The bending in the "proximity control" #5 is at the same level as in the #6 plants.

MAGNITUDE OF NODE BENDING IN KENNEWICK WHEAT

	N4 Node ---Deg.		---N5 Node	
Sample	ave.	s.d.	ave.	s.d.
#1	22.5	12.4	23.0	12.2
#2	10.8	6.2	11.0	4.4
#3	30.5	10.8	36.8	8.5
#4	26.5	6.4	46.3	9.0
#5	5.3	3.7	6.3	3.4
#6	6.8	6.1	4.0	3.6

If the heat energy within the formation produced both the node swelling and the final node bending then one might expect to find a relationship between these two anatomical alterations. As shown in Fig.3 a direct relationship was found (r=0.89) when using data from the N4 node position. A greater scatter in the points was found when using the N5 data (reduced correlation). A close examination of the nodes revealed why this was the case.

At the N4 and N5 positions in samples #1, #3 and #4 (see Fig.1C diagram) the nodes revealed the presence of lateral splitting and cracking, very similar to that found in the Pennsylvania sample examined in 1992 (see page 5 in Report No.5, code KS-01-5). This splitting was most pronounced at the N5 nodes and this could account for the more erratic bending at the N5 positions compared with the data at the N4 location. This splitting, in a number of these samples gave the appearance at the N5 position, of material being removed (see Fig. 4A); however, this is probably due to pronounced tissue shrinkage after the heating and rupture sequence.

One noticeable difference between the Kennewick and Penn. sample sets was the location of the split on the node. In the Penn. samples the split was on the outside of the bend whereas, as shown in Fig. 4A, in the Kennewick formation the split is on the inside of the bend. This is readily explained by comparing the size of the fissures in relation to how they would respond to the final force vectors. In the Penn. sample the split was a vary narrow channel which ended up as would be expected, on the tension side of the bend. In Fig. 4B the view is looking down onto the inside of the bend at the N5 location and it is clear that a considerable volume of material has been dehydrated, leaving a wide, deep channel. As this node cooled after the transient heating and translational forces had passed, the stem would literally collapse toward the deep channel side exhibiting the breakdown of supporting fibers in the cell walls. In the formative stage the channel side of the node would be the side of the plant stem onto which the heating and wind force was directed, that is, the tension stress side. In the final analysis the physical mechanisms of the Pennsylvania and Kennewick node splitting forces were quite similar, the primary difference being the level of the formation energies.

III) SEED STUDIES:

After removing from the heads the seeds were dried down and taken out of dormancy. The results of a seed weight analysis are as follows.

Sample	Wt./Seed - mg	Wt. Difference
#1	17.0	-43.4%
#2	29.5	-1.7%
#3	23.0	-23.3%
#4	23.5	-21.7%
#5	28.8	-4.2%
#6	30.0	-------

All three of the downed circle samples have low seed weights. This difference was not seen in the ring of upright plants. These seeds were taken at a very early development stage and a very slow, low level of germination was obtained in a standard paper roll test; however, the data were not sufficient to examine seedling development. Mr. Phelps plans to remove seeds from the same sampling locations at plant maturity. Additional seed work will be discussed at a later date.

COMMENTS:

The anatomical and physiological transformations in the Kennewick crop formation plants are in a general sense typical of those found in plants from many other formations examined at this laboratory. From this statement, one might conclude that the formation mechanisms are straightforward and clearly understood. If from all these studies, there is one clear positive statement that can be safely made, it is- *The energies involved in crop circle formations are extremely complex, randomly interactive and in detail , essentially unpredictable.* It is abundantly clear, however, that most formations are not hoaxed or perpetrated by subversive humans.

Our current understanding is such that it is now time to place the burden of proof on the shoulders of those claiming "all formations are man made". If such an explanation is attempted, then to be of any value it must explain in detail how all the plant transformations are brought about; nothing of a well documented nature can be neglected or ignored, as has been the case in the past. Taking the Kennewick formation as an example, a "man made" hypothesis needs to describe the following:

1) The type of energy and method of application to produce node swelling, node bending and severe lateral node splitting, uniformly expressed within plants covering a circular area 110 ft. in diameter and in sharply defined regions.

2) Reduction in embryo growth and development (reduced seed weight) without affecting the developing somatic (non-reproductive) tissue or outward appearance of the plant - again in a uniform manner and over a large area.

3) How to uniformly induce higher growth rates and development in seeds which have reduced weights and characteristics of low viability (Report No.9, No.16 and others). Again over significant areas and uniformly.

4) How does one induce, within large crop areas, more rapid seedling development under light and nutrient stress conditions (see report No.16)?

In the case of node swelling it should be emphasized that a comprehensive study of node sizes in artificially lodged wheat plants, was conducted in 1992 by Ms. Susanne Lenzner in Gottingen, Germany. Within numerous test populations of plants she found no statistical difference in the node size of plants downed for periods of time from one day to eight weeks, when compared with normal upright controls. In the future, lodging cannot be used as an explanation for node swelling.

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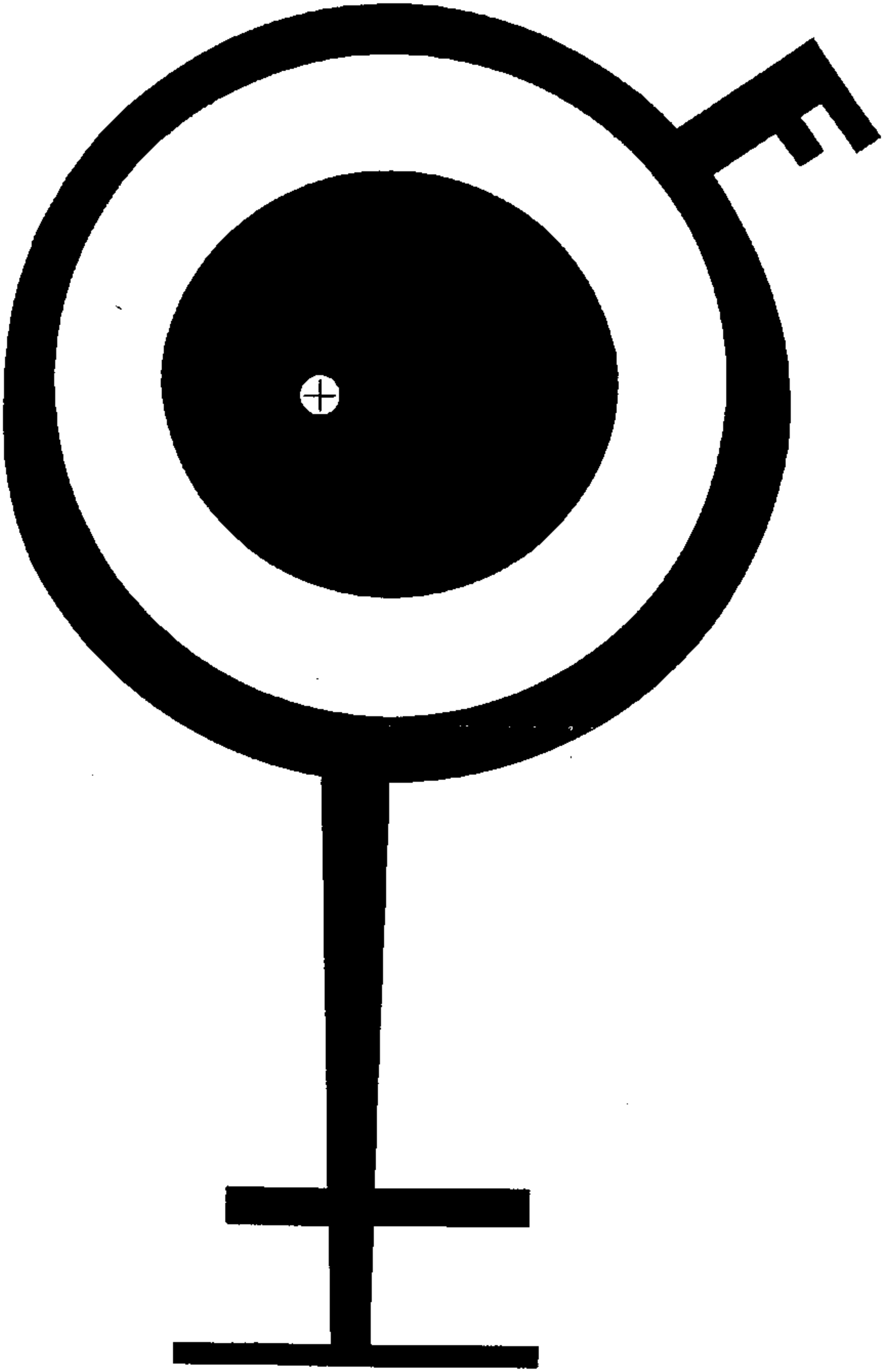
Fig.1A



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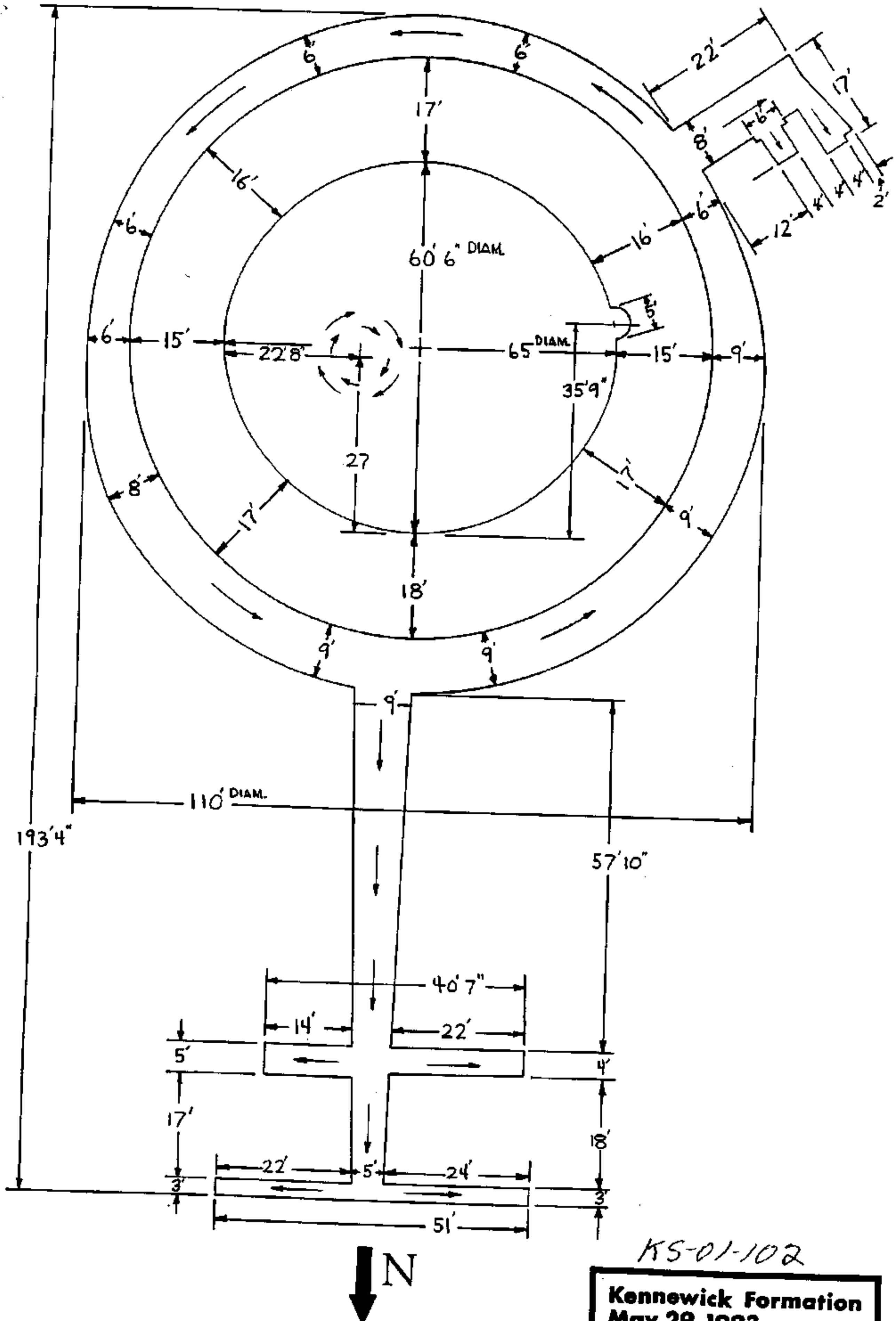
Kennewick Formation
May 29, 1993

Fig.1B



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Kennewick Formation
May 29, 1993

GRAIN SAMPLES — JUNE 9

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Fig.1C

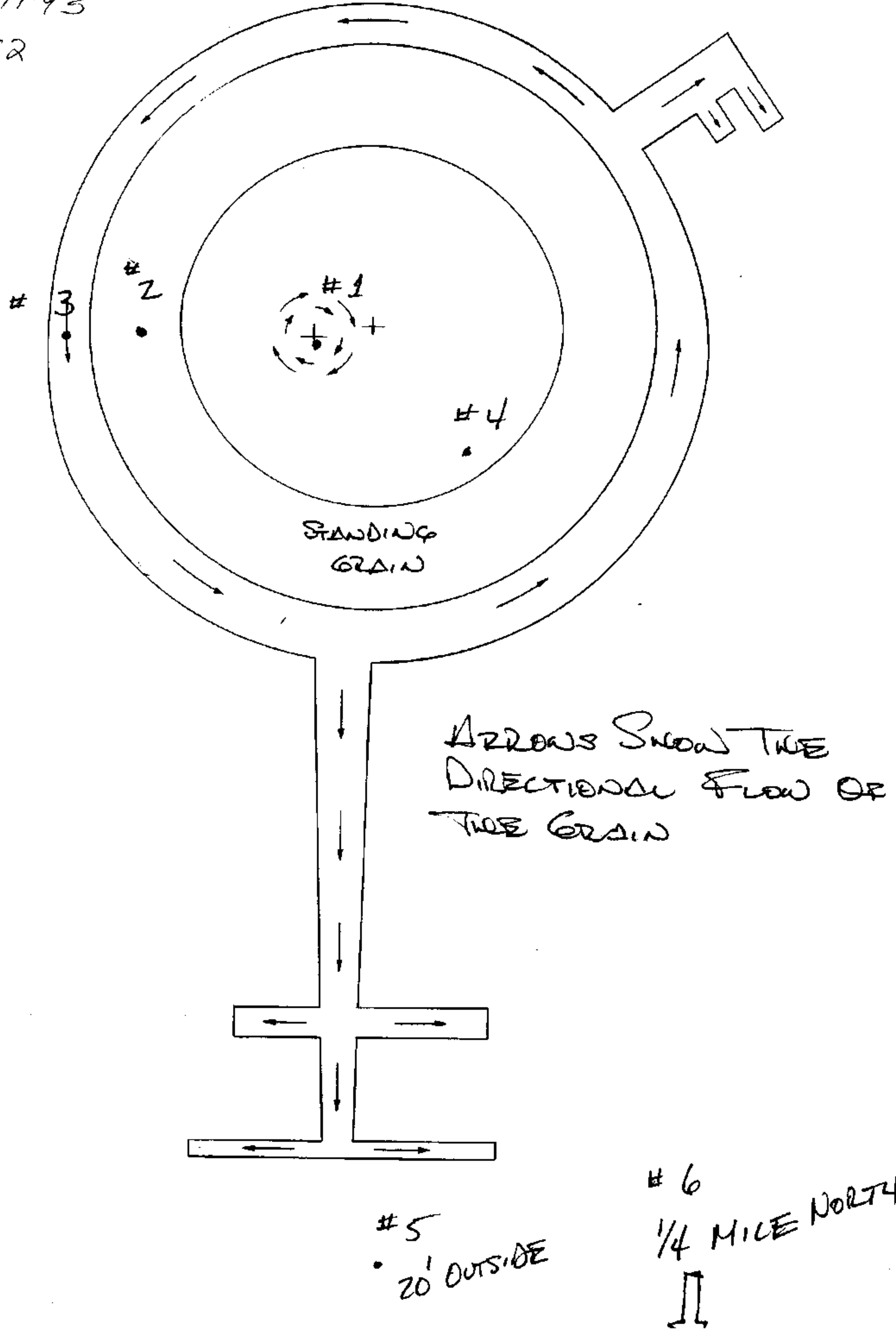
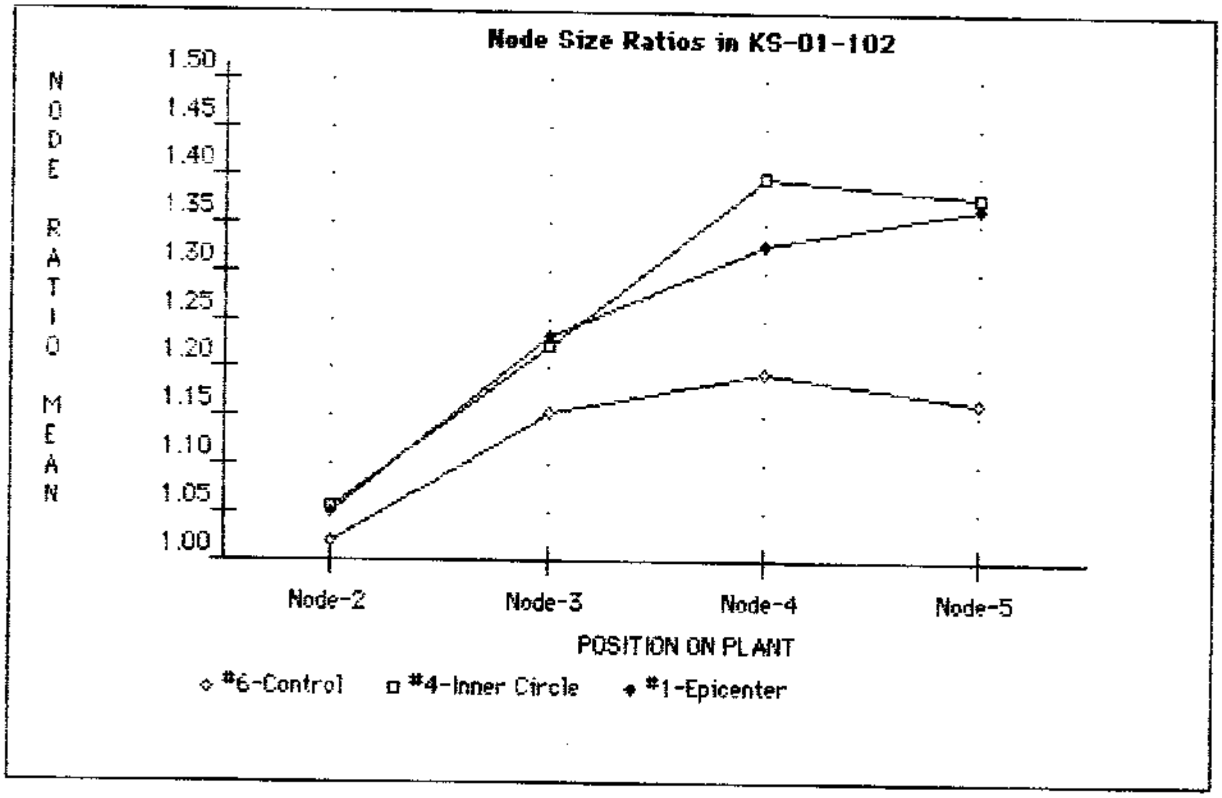


Fig.2 Node ratio comparisons in the Kennewick samples (1993)

(A)



(B)

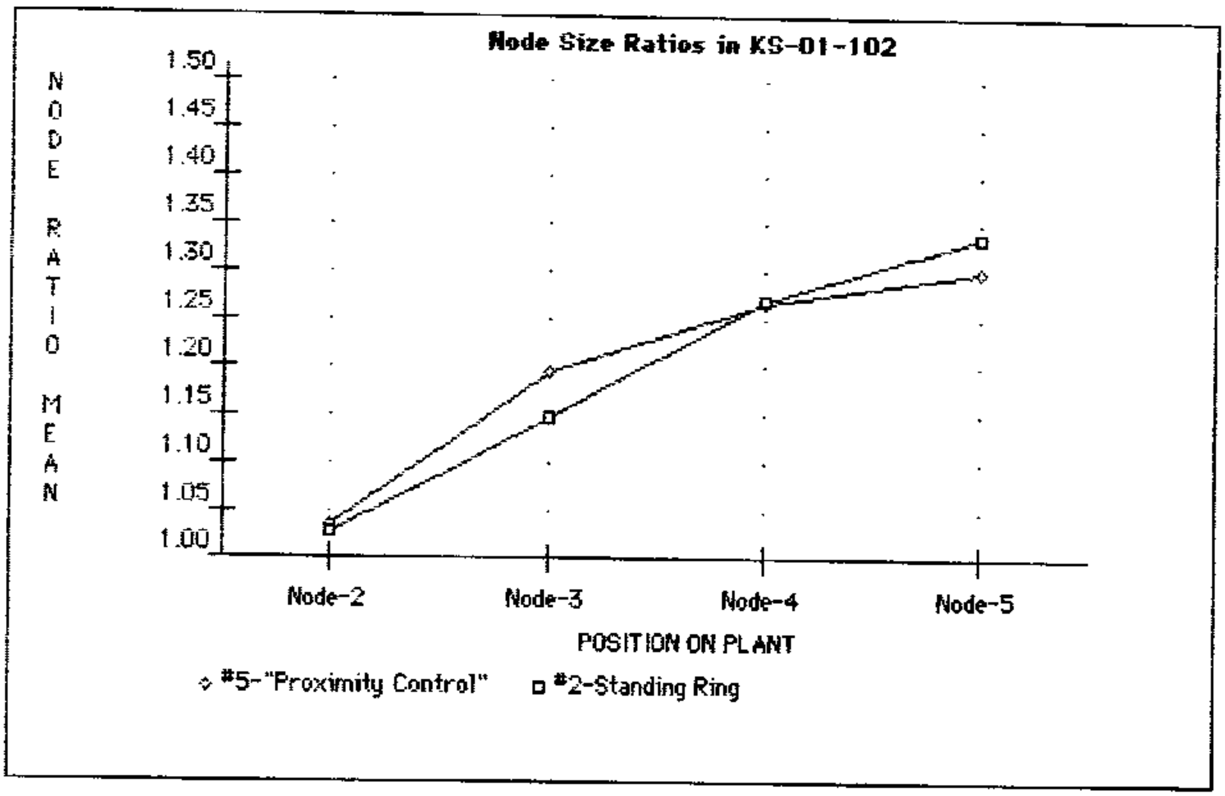


Fig.3 Relationship between node expansion and node bending at the Node-N4 location in the Kennewick, Washington, crop formation samples, 1993 (code KS-01-102)

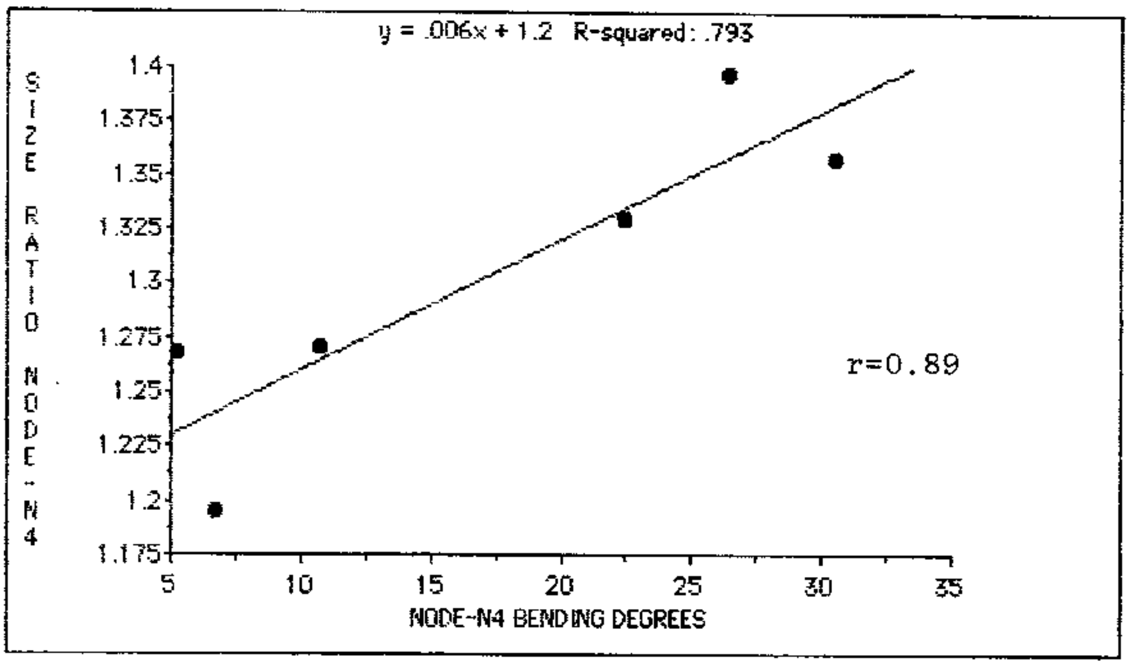
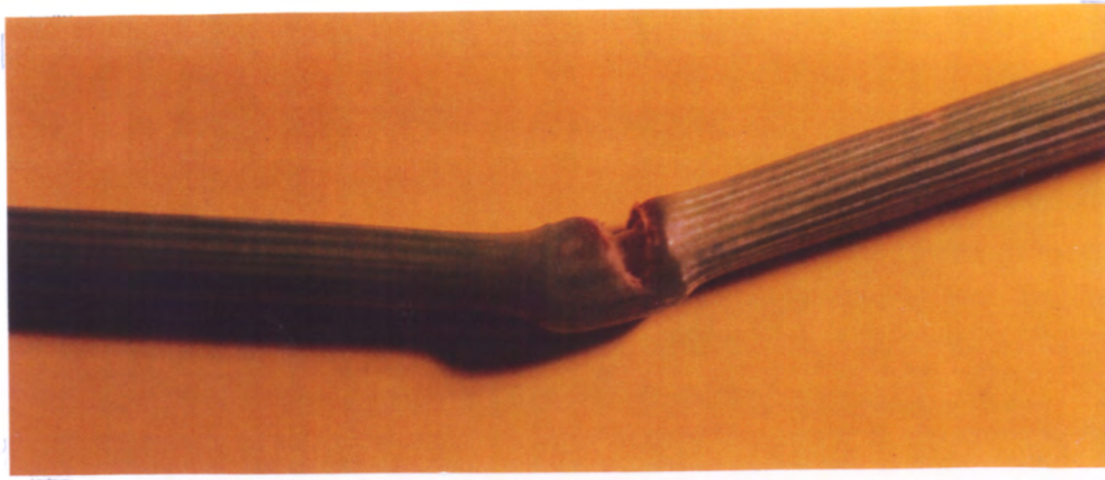


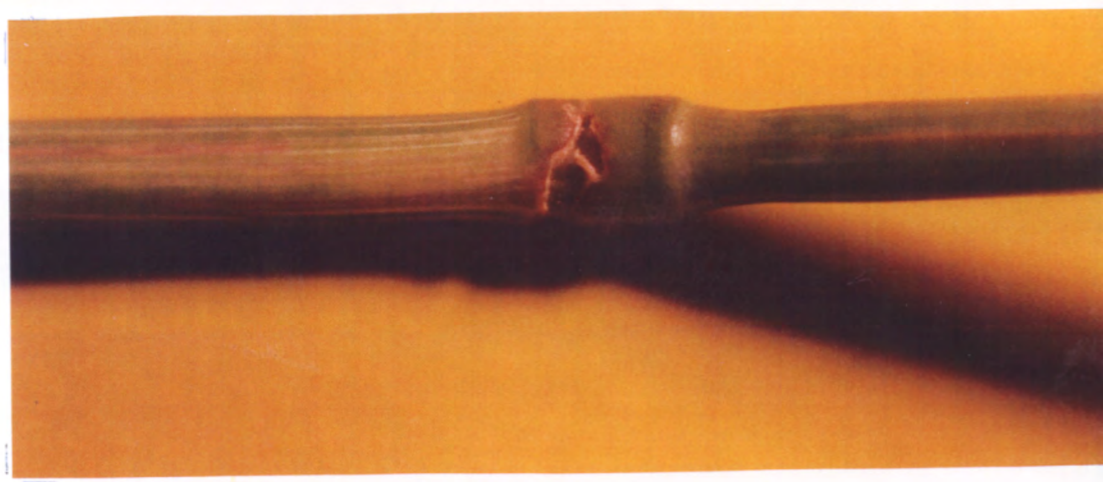
Fig.4 Examples of severe node splitting in crop formation samples from Kennewick, Washington, U.S.A. 1993

(KS-01-102)

A. Node-N5 Split
(Samp.#3 out-ring)



B. Node-N5 View of inner bend split
(Samp.#1 epicent.)



C. Node-N5 normal control (Samp.#6)