Research Report From: Pinelandia Biophysical Laboratory

Grass Lake, Michigan, 49240

Crop Formation: Hoeven, Netherlands 1999
Report No. 123

Laboratory Code: KS-05-13 **Date: March 3, 2001**
Location: Hoeven, Holland
Material: Barley *(Hordeum vulgare)* plants and soil samples.
Formed: See Fig.1 for dates.
Sampled by: by Nancy Talbott and associates; also by Eltjo Haselhoff
Formation Characteristics: Three circles of approximately equal diameter (see Fig.1)

Unique Aspects:

In many crop formations with straightforeward circular geometry the node expansion values taken from samples collected along radial lines are found to decrease exponentially with distance (d) from the epicenter of the circular, downed area. By making the reasonable assumption that node expansion is proportionally related to the level of the energy absorbed by the plant pulvini (stem nodes) precise agreement was obtained between the empirical, quantitative alterations in the plant stems and a widely applied concept of physics dealing with the absorption of electromagnetic energy by matter, namely the Beer-Lambert principle, in fact, in crop formations and in bovine excision sites the application of the model has produced linear regrsessions with exceptionally high correlation coefficients (in the range of 0.90 to 0.99). The derivation and application of this Beer-Lambert model as applied to crop formation energies was recently published in a peer reviewed scientific journal [(1)].

In this 1999 paper we point out that the Beer-Lambert model is useful for examining only those limited regions where plants have been exposed to the radiation; in accord with the original intent of this model. One very unique feature of these "Beer-Lambert type formations" is the very sharp line of demarcation between the node expansion level in the energy exposed regions and the total lack of effect in plants taken within a fraction of a meter outside the formation. This surprising and apparently efficient confinement of the microwave energies within the formation area was very clearly observed in the data from Circle-A at the Hoeven site discussed here.

To clearly show this unique feature, the node expansion data (first sampling) are plotted in Fig.2 for one of six, radial (60^0) samplings in circle-A (approx. NW direction). At the downwd-crop edge of this sampling radius (4.5 m from epicenter) the expansion was at +67% , whereas the mean value from the six samples taken at "edge of circle-A" in standing crop, was around the 0% level, that is, in the range of all the other normal, standing control plants (mean variation of all controls +1% with 0.5% s.d.), all the other radii disclosed this same pronounced change in going from just inside the formation to the standing plants. This clearly demonstrates that the microwave energies causing the node expansion did not extend beyond the limits of the downed region (similar, sharp boundary transitions were also observed in the data from circle-B). This leads to the rather interesting conclusion that within the complex plasma vortex system there are very precise spatial controls governing the distribution of the microwave energy.

Summary of Findings:

1) - since each of the three circles were sampled at different times the apical node length (N_L) measurements will be listed separately for each circle at the sampling site. It should be noted that the data are presented as percent change (+ or -) relative to the level in the control plants taken outside the formation. Also listed in the tables are the levels of expulsion cavities found in the apical nodes.

Circle-A (formed 6-7-99)

Sampling Date	---------N_L--------- percent change	s.d.	N - plants	Expulsion Cavities
First 6-13-99	+97.0%	26.7	335	0%
Second 7-19-99	+142.8%	26.9	147	7.5%

Circle-B (formed 6-12-99)

First 6-13-99	+30.5%	7.6	363	0%
Second 7-20-99	+99.3%	35.8	135	42.2%

Circle-C (formed 7-2-99)

First 7-18-99	+58.0%	21.0	259	5.8%

2.) - in the time period between the first and second sampling the node expansion is significantly increased in circles A and B. This second incremental increase may have taken place at the time circle-C was formed; the presence of expulsion cavities in the second sampling groups would tend to support this hypothesis.

3) - in circle-A the N_L increase between the first and second sampling was 46% and in circle-B, 69%. These increases cannot be explained by normal plant growth, since we find that the mean node length increase in the controls was only 32% over this same time period.

4.) - the level of magnetic drag material in soil samples taken from the circles, was significantly higher than the normal background (control) level of 0.4 mg/g-soil. The mean level of H-drag material and the range within the circles and related areas are listed as follows. These data are from soil taken at first sampling, unfortunatly the second sampling of soil was lost in the mail?

Circle	mg/g-soil ave.	s.d.	N-samples	Range	Condition
A	3.47	0.85	19	1.79 - 5.52	Downed Crop
B	3.44	1.30	19	1.55 - 6.17	" "
C	0.70	1.18	24	0 - 5.58	" "
Between A&B	6.42	-----	1	-----------	Upright Crop
"Grape Shot"	2.72	0.19	2	2.53 - 2.91	Downed Crop

Here we notice that the distribution of magnetic material is higher in the region between circles A and B than within the downed regions. This is in complete accord with the observations from most crop formations in which magnetic material is found, in fact, in many cases the data show that the distribution of magnetic material is linear with distance from the epi-center of the formation. This type of distribution agrees quite closely with a mathematical model formulated from the physics of centrifugal forces operating within a rapidly rotating plasma vortex system. This outward force on the particles is shown quite clearly in Fig.3 where the levels of magnetic material are plotted as distance from the circle edge; significant decline does not occur until 20 m from the circles (see table above for levels inside the formations).

Comparison of the Beer-Lambert model with the Inverse-square Law

The inverse square law states that *"The illumination of any surface varies inversely as the square of the distance (d) of the surface from the source."* This model applies primarily to those situations where d is small or within the vacuum of space. A few months ago a modified version of this inverse square principle was suggested by E. Haselhoff [2] as a better fit to the experimental data. He further postulated that the radiation was caused by "an electromagnetic point source" emanating from a so called ball of light ("BOL") located at a presumed height (h) above the formation.

We now examine both the Beer-Lambert and Inverse-square models using the node length data from within circle-A (sampled by E. Haselhoff). The linear regression curve for the Beer-Lambert model is shown in Fig.4, and in Fig.5 the linear regression curve using the proposed inverse square law; in this case h was taken as one meter above the crop surface. It is very apparent that the degree of scatter in the data is much less when using the Beer-Lambert model.. The mathematical correlation coefficients (r) in these regression analyses are as follows:

Beer-Lambert Model $r = 0.994$
Inverse Square Model $r = 0.853$

Furthermore, it cannot be assumed that light energy comming from the BOL is causing the node expansion. Even if one speculates that some type of high power laser produces the heating, the resulting alterations in the plant tissues would be entirely different than in the case of microwave radiation. In contrast with microwave energy which heats from the inside if the pulvini outward (higher dielectric constant inside the nodes) the energy from a source emitting in the visible light region would heat the outer surface of the plants causing a collapse and dehydrationof tissue with eventual necrosis. With external heating, the presence of expulsion cavities, significant node expansions and continued plant development, would not be explained.

Does optical scanning of nodes correlate with the standard visual method of determining node length measurements?

An optical scanning method was recently proposed [(2)] for examining node lengths in plants. Since a massive amount of data has accumulated from the standard, visual method of node length measurements it is important to know if the scan method is in agreement with the laborqatory technique. Two complete sample sets were taken at identical locations along radii in circle-A; one group was examined by the scanning method and data presented in bar charts; the second group examined by the visual technique at the Pinelandia Laboratory. Fig.6 shows the linear regression analysis of this data. Although an R^2 value of 0.905 indicates a good correlation, the slope (0.912) of the curve and the intercept constant (0.122) indicate it is not a direct correlation. In a direct correlation the slope would be very close to 1.0 and the intercept close to zero. These data indicate that the optical scanner is underestimating the node lengths.

Refrences:

1) W.C. Levengood & N.P. Talbott, Physiol. Plant., 105: 615-624 (1999)

2) E. Haselhoff, Private Communication.

W.C. Levengood

Fig.1

<u>Circles A</u> - Formed June 7, 1999, <u>about 2 am</u> (pinkish-purple football-shaped light seen "making" circles)

<u>Circle B</u> - Formed June 12,1999, <u>about 2 am</u> ("flash" of light seen making single circle)

<u>Circle C</u> - Formed July 2, 1999, <u>about 3 pm</u> (bright ball of light seen over area of field where circle formed)

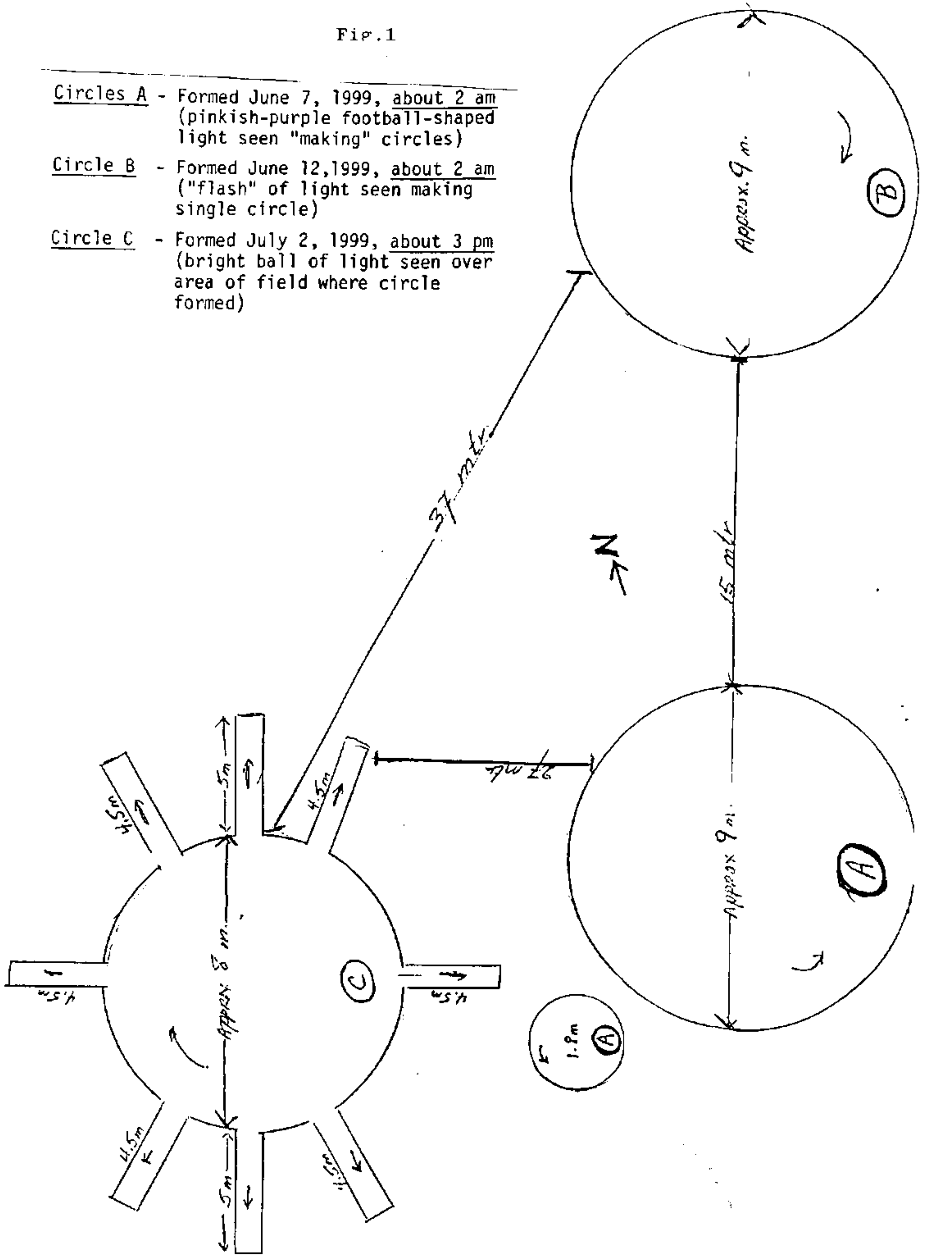
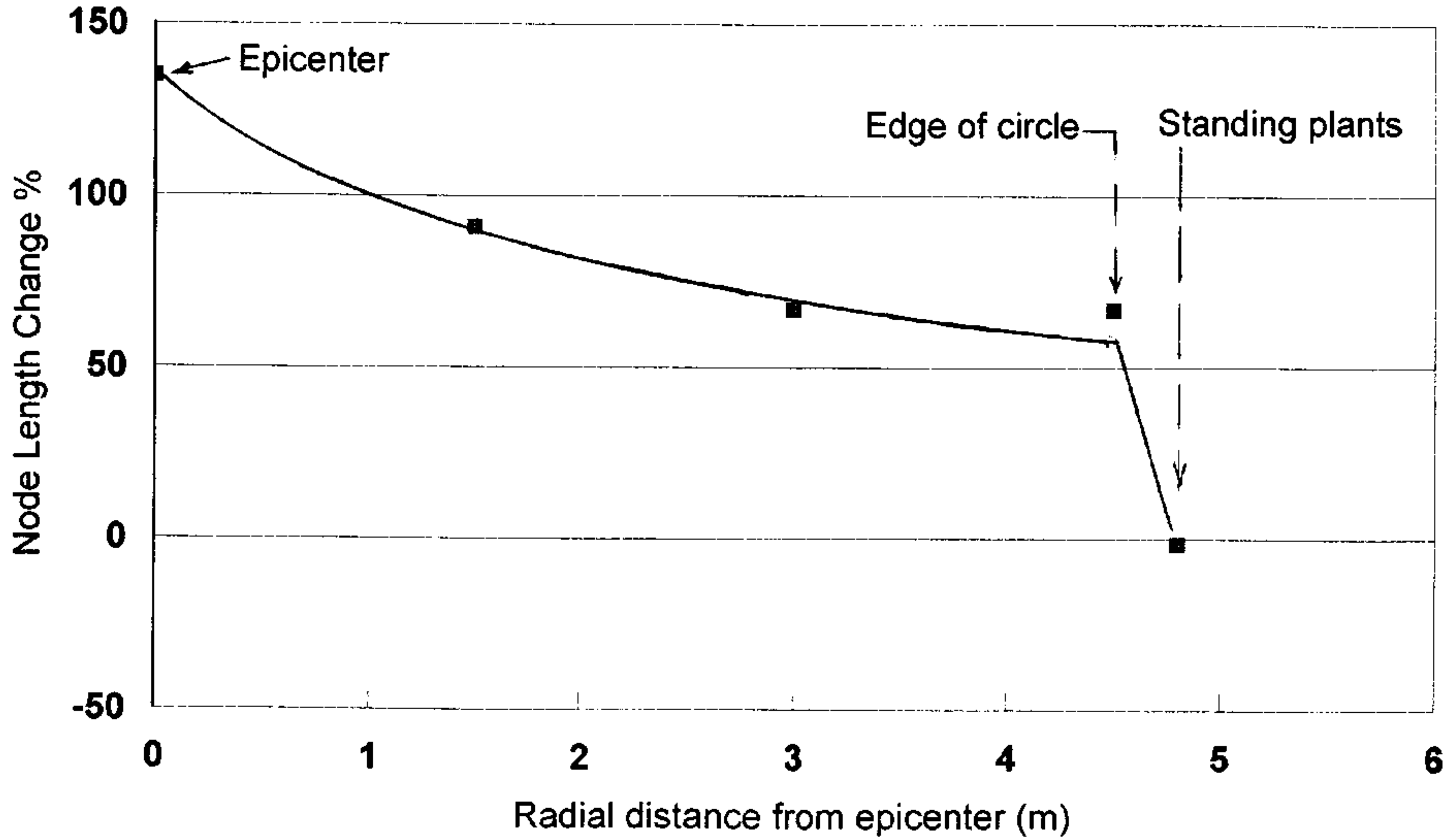


Fig.2

Node length change along W-radius of circle-A in Hoeven formation KS-05-13 (1999)



Distribution of magnetic material outside circles A and B (KS-05-13)

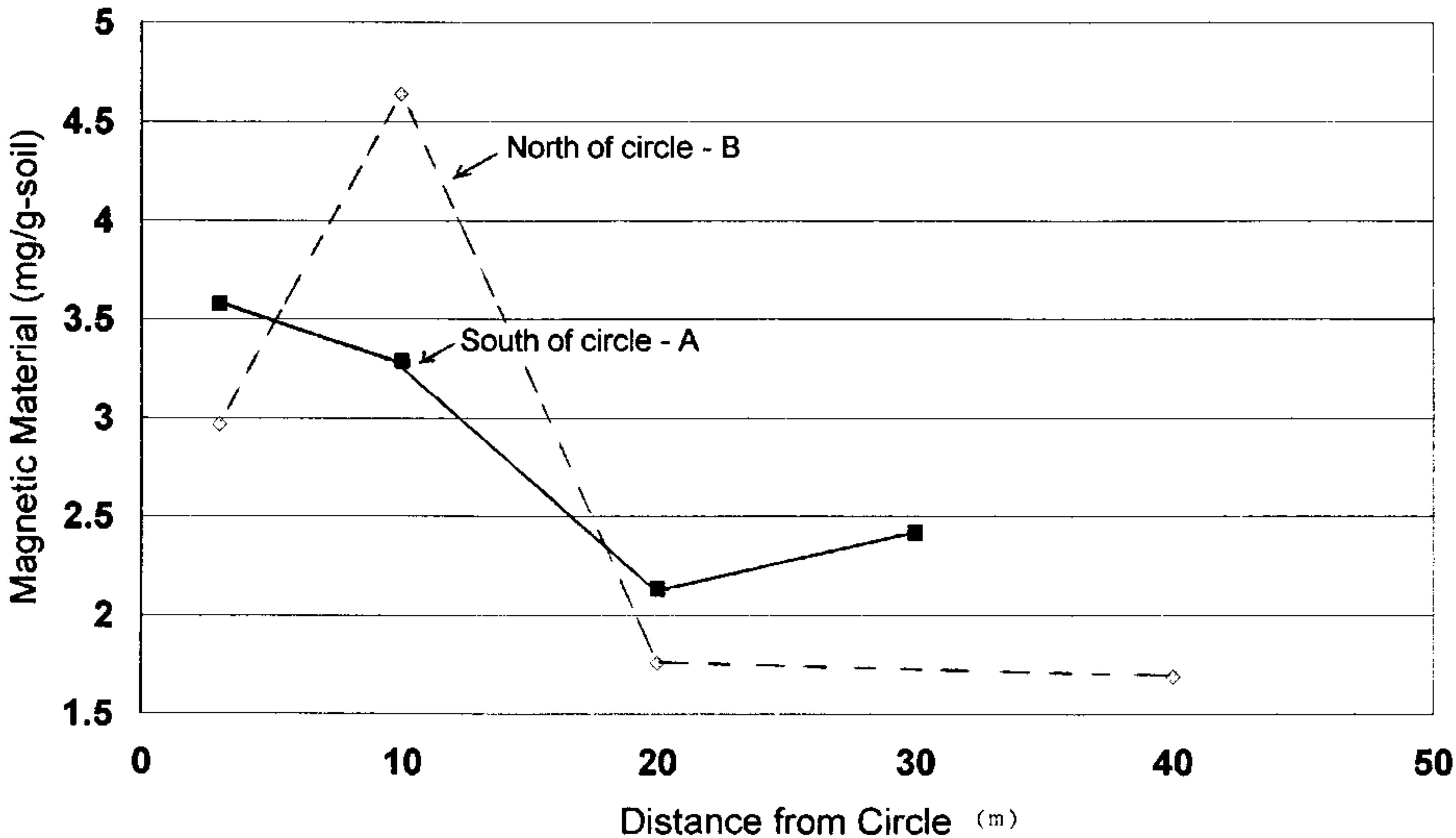


Fig.4'

Beer-Lambert model applied to node length changes (percent) within the confines of Circle-A (mean values of radial sampling KS-05-13; 8-20-00)

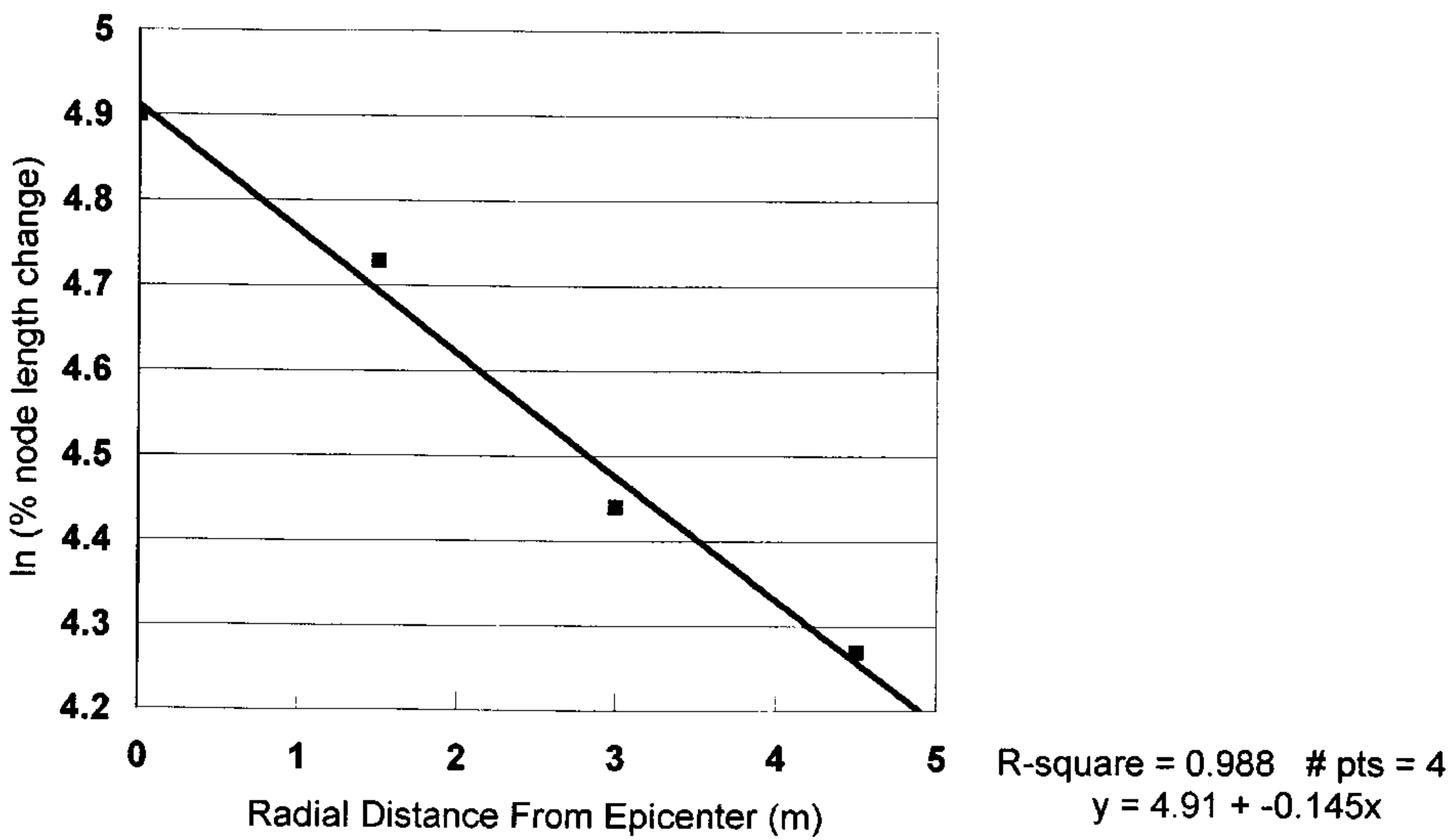


Fig. 5.

Application of the 1/r-squared law of electromagnetic energy distribution to node length data from circle-A in KS-05-13 (8-20-00)

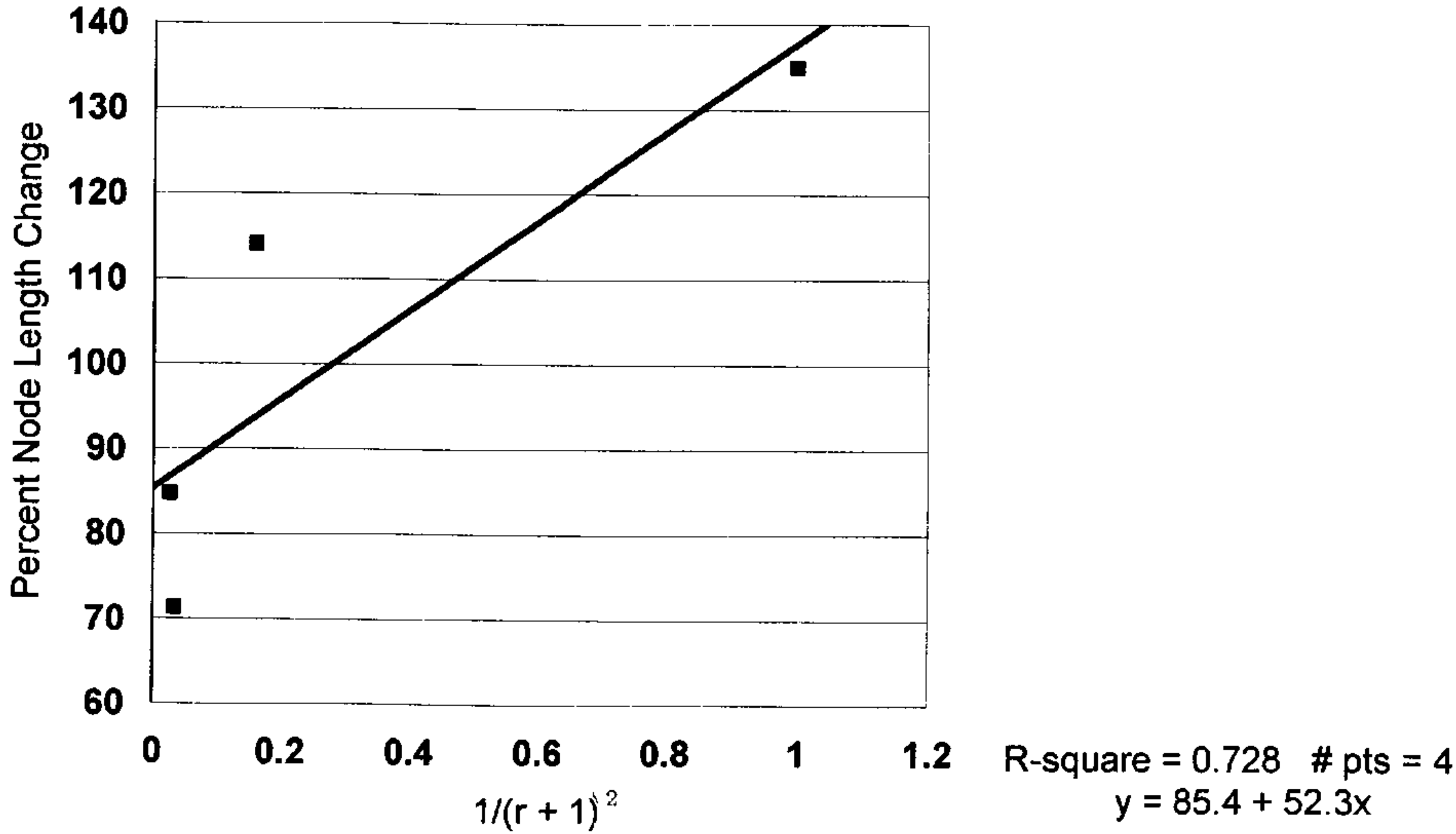


Fig.6

Comparison between node length data taken at the Pinelandia laboratory with data from an optical scanner method (each point is a mean value from sample sets containing 15-20 plants in circle-A, KS-05-13, 1999)