Research Report from Pinelandia Biophysical Laboratory
Grass Lake, Michigan 49240

November 23, 2002

Crop Formation: Colts Neck, New Jersey, 2002
Laboratory Code No. KS-05- 124

Location: Colts Neck, New Jersey
Material: Rye (*Secale cereale*) stems with seed heads; soil in and around formation.
Formed: Estimated - during first two weeks of Aug., 2002
Sampled by: Linda M. Howe, Alex Chionetti and Vincent Creevy, 2002
Formation Characteristics: Dumbbell shape with rings at center (overall 430 ft. long and 230 ft. wide). See Fig 1 - recopy of aerial photo.

Summary of Findings:

1) – Node Lengths and Expulsion Cavity Analyses:

A total of nine sets of formation plants and 3 sets of controls (each set containing from 5-10 plants) were examined for node lengths. Out of the nine formation sets, all disclosed node expansions greater than the average from the control sets. In Table I is a summary of the node measurements.

Table I.
Node length results from the KS-05-124 crop formation.

	Node Length (mm)			
Sample Group	ave.	s.d.	N-plants	Percent Change
Control	2.44	0.47	23	------------------
Formation	3.59*	0.66	82	+47%

* -- P<0.05

Since there was no node bending in any of the sampled material, gravitropic responses can be discounted, and it can be concluded that the node expansion is due to rapid heating from the microwave energy in the plasma systems. This was further indicated by the fact that about 5% of the formation plants disclosed expulsion cavity type splitting of the nodes; no splitting was found in the control plants.

2) Seed Examination:

It was found that the seed set was very poor in these rye plants. Either the head contained no seeds or just one or two per head. This applied to both the controls and in plants taken from the formation site. This may have been caused by a severe drought condition in this area.

3) – Magnetic Particle Analyses:

Due to very unusual patterns of magnetic particle distribution around this site, three different soil samplings were conducted. In the original field work, Linda Howe took eight soil samples within the formation and four controls at various distances from the site. At a later date Mr. Alex Chionetti took four more samples along the midline (see Fig.1) of the formation. These internal, magnetic particle data are summarized in Table II along with the controls taken outside the formation.

Table II.

Average level of magnetic particles in and around Crop Formation KS-05-124.

	mg/g-soil		
Location	ave.	s.d.	N-samples
Outside (controls)	10.57	5.27	3
Inside Formation	4.56	0.50	12

The fact that the average level is much higher outside the formation than inside is completely in accord with what is found in the majority of crop formations in which magnetic material is found. The reason for this is based on the fact that within the formation the centripetal forces within a rotating plasma vortex, cause the particles to be thrown outside the confines of the visible crop formation.

The very high s.d. value in the control data (Table II) stems from the fact that even though the west sample was taken several hundred feet from the formation the level of magnetic drag material was 17.8 mg/g-soil; a surprisingly high level considering the distance from the formation. This brought up the intriguing question – what are the characteristics of the magnetic particle distribution pattern extending along the west radius? To answer this question, a third soil sampling was conducted by Mr. Vincent Creevy, of Howell, N.J. Samples were collected at precisely 50 ft. intervals starting from the center of the "corridor" within the formation and extending 900 ft. due West and ending at a paved area.

The magnetic drag results from this west radius sampling are summarized in Fig.2; the arrows at the lower left designate the relative location of the crop formation. Extending outward from the edge of the formation, there does not appear to be much change in the level of deposited H-drag material; however, the scale on the ordinate has been compressed to allow the very high levels (at around 800 ft.) to be plotted on the same graph. By examining only that portion of the data in Fig.2, which extends out to 550 ft. from the formation, we find, as shown in Fig.3, that the distribution is approximately linear with distance. As mentioned above, this linear relationship is readily explained by considering the physics of centripetal forces on particles held in a rotating vortex system.

At around 600 ft., other factors enter this already complex system, causing a pronounced increase in the deposit of magnetic material. In Fig.4 is a plot of the deposition data from 600 to 800 ft. The regression analysis disclosed a very precise exponential function (see bottom right in Fig.4) with $r = 0.996$ correlation coefficient. This means that the forces causing this surge in the deposit of magnetic material was far from random.

This pile up of material in the vicinity of a crop formation brought to mind the hydrodynamic interactions involved in the pile up of plants within crop formations (see ref.1, Fig.6). In the Colts Neck formation the situation is far more complex since we are dealing with the interactions between magnetic material and moving plasma vortices. This means that this degree of complexity takes the analysis into the realm of magnetohydrodynamics, defined by Cowling(ref.2) as " the study of the motion of an electrically conducting fluid in the presence of a magnetic field" (in plasma physics air is considered as having fluid properties).

For the sudden release of magnetic particles held within rotating plasma systems, one would anticipate an interaction between vortices of similar size and with opposing rotational vectors. That such paired systems were present at the Colts Neck site is very clearly shown at the lower right edge of Fig.1 (see arrows), where two small crop formation circles (almost out of the field of view) appear to be formed from two closely associated, rotating vortices.

The diagram at the right side of Fig.4 depicts the proposed vortex interactions. The solid lines with arrows, inside the vortex cores, show the motion of ionized gases. Within each vortex system the movement of the charged particles produce an electric current, which in turn induces a magnetic field at right angles to the current flow – in the systems shown here, the magnetic fields are orthogonal to the page surface. From the direction of flow it can be seen that within the region between the vortex cores, the associated magnetic fields have the same polarity (depicted by an "N" at each core). Due to the repelling nature of like magnetic fields, the center of this region (at the end of the vertical arrow in Fig.4) would theoretically have very low or zero attractive force on magnetic particles held within the vortices. In other words the magnetic particles would fall out of this region onto the soil surface.

The fact that the fallout distribution follows an exponential function (bottom rt. in Fig.4) is the most probable function one would expect to observe in a pattern of magnetic particles deposited from interacting vortices composed of ionized gases rotating at fixed angular velocities (ref.3). The observed increase in the concentration of particles, starting at 600 ft west, indicates that in this region the two vortex systems are just beginning to interact with each other. As their mutual interactions draw them together the deposited material increases exponentially. At 800 ft. (see Fig.2) the systems become unstable and the vortex systems draw apart and the "fallout" of magnetic material decreases. Unfortunately, soil samples could not be obtained beyond 900 ft. because of a large paved area.

4.) Concluding Comments:

By conducting detailed analyses in plant and soil material taken from crucial regions within and outside the Colts Neck, crop formation, data were obtained which provide clear evidence that very complex magnetohydrodynamic interactions occurred over a much larger area than that involved in the visible, downed plant region of the formation. This is the first study in which sufficient data were available for analytically demonstrating that magnetic particles held within opposing, rotating vortices are, at least in this case, deposited in a precise mathematical pattern.

References:

1) W.C. Levengood & N.P. Talbott, *Dispersion of Energies in Worldwide Crop Formations.* Physiologia Plantarum 105, 615-624 (1999)

2) T.C. Cowling, Magnetohydrodynamics, Interscience Pub. Inc., New York, 1957

3) L. Spitzer Jr., Physics of Fully Ionized Gases, Interscience Pub. Inc. New York, 1956

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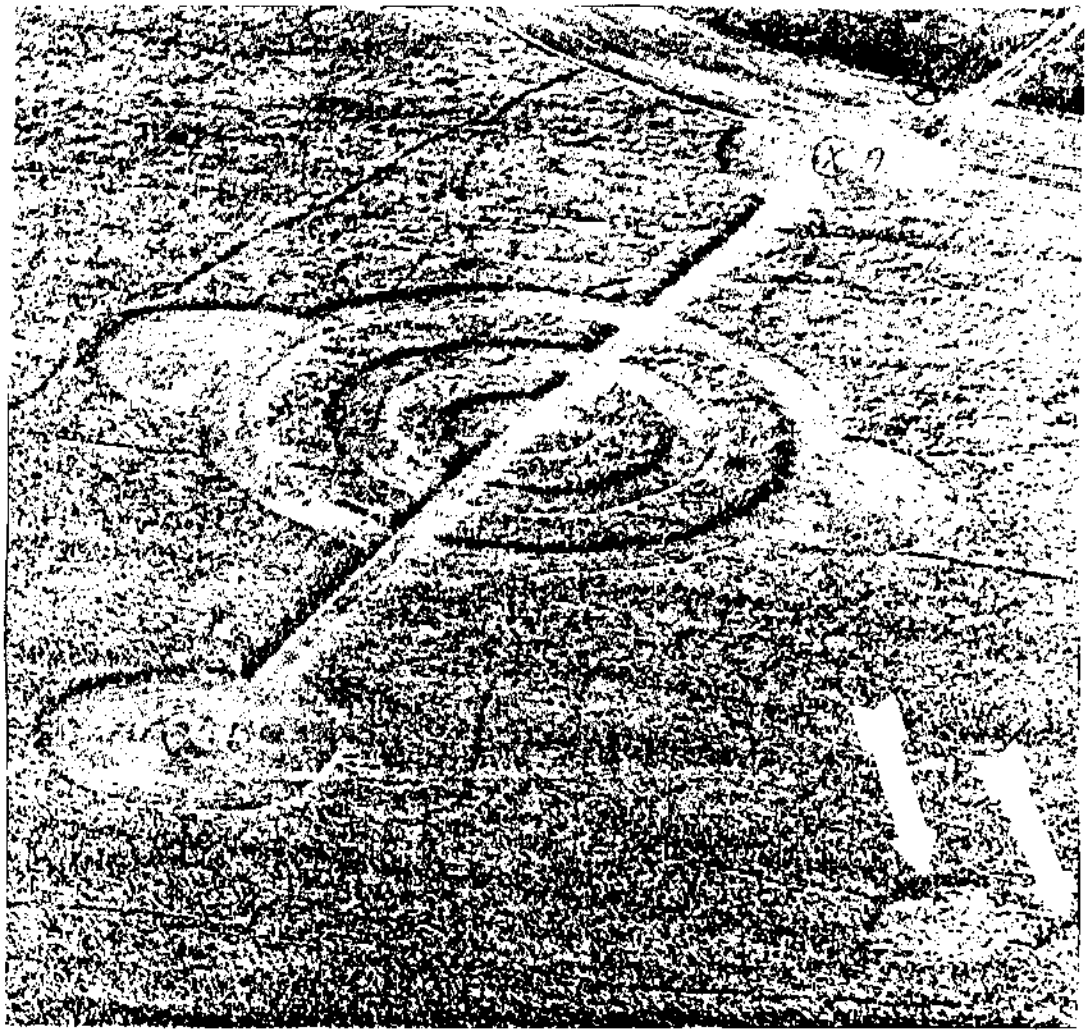


FIG.1 Aerial photo of Crop Formation at Colts Neck, NJ

(KS-05-124)

Fig. 2

Distribution of magnetic particles in west radius soil samples from Crop Formation KS-05-124, at Colts Neck, New Jersey 2002 (Pinelandia Biophysical Lab. 10-17-02)

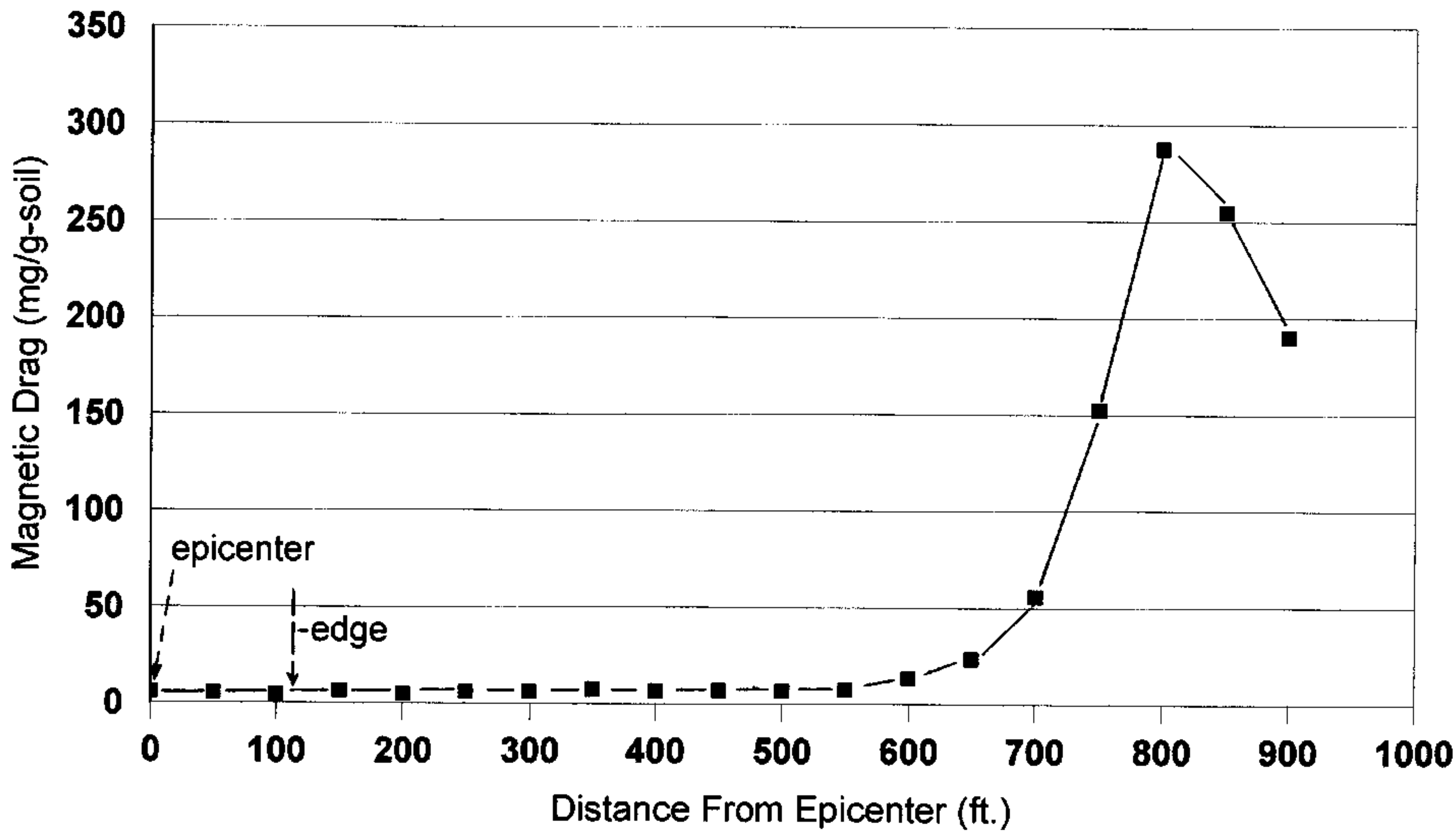
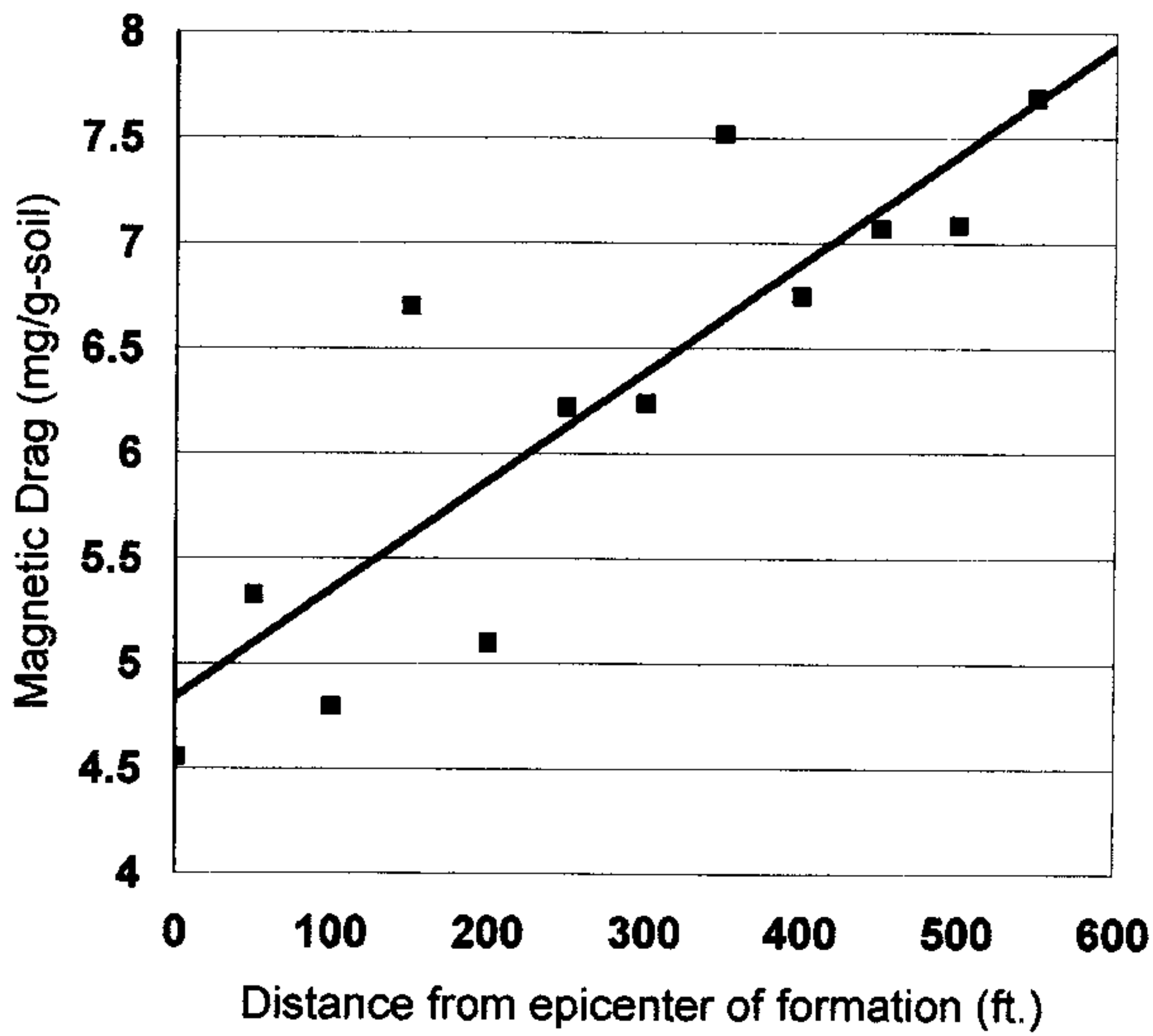


Fig.3

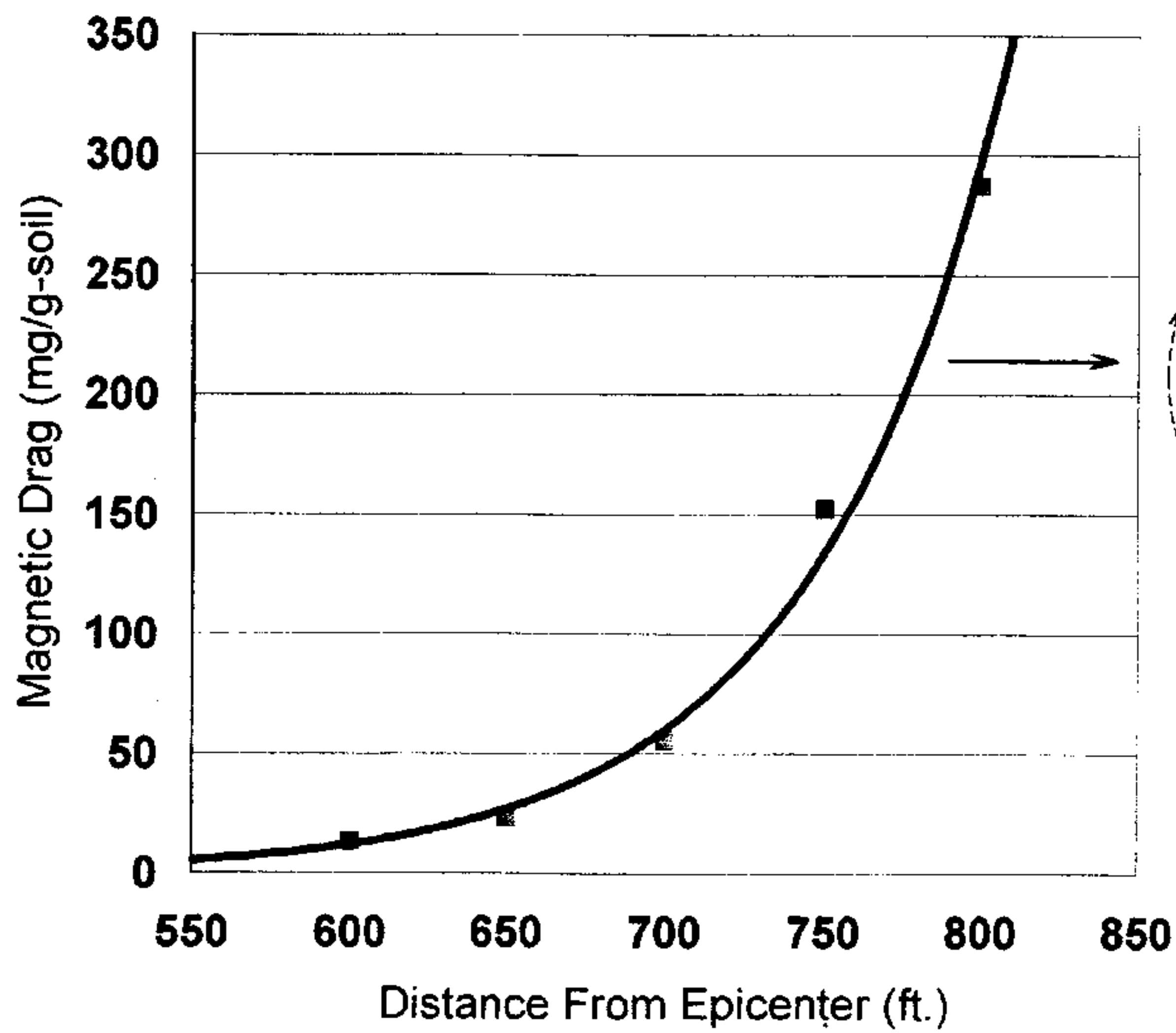
Distribution of magnetic particles extending from center to 550 ft. West of Colts Neck, NJ, formation (Pinelandia Biophysical Lab. 10-17-02)

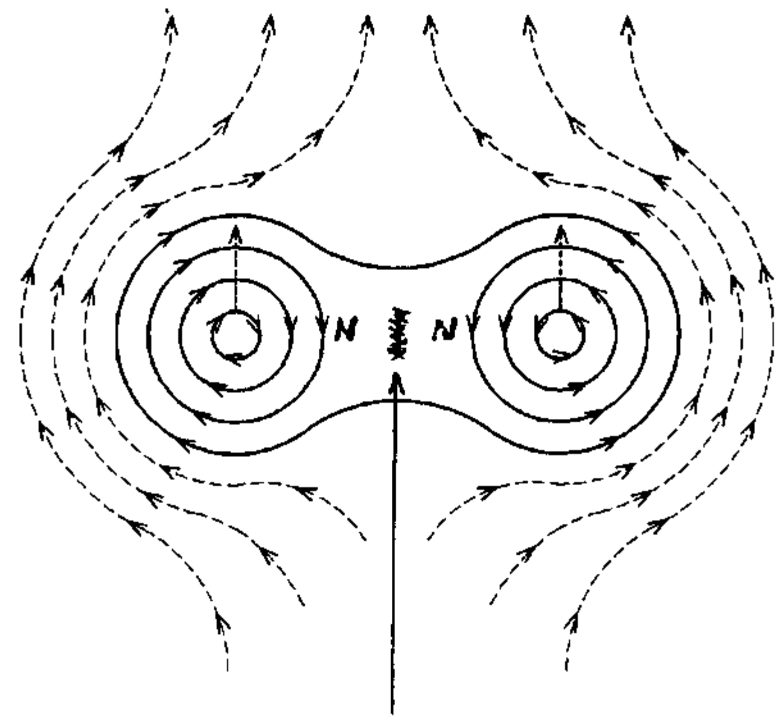


R-square = 0.751   # pts = 12
y = 4.84 + 0.00515x

Fig. 4

Distribution of magnetic particles extending from 600 to 800 ft West of Colts Neck, NJ, Crop Formation (Pinelandia Biophysical Lab. 10-17-02)





R-square = 0.992 # pts = 5
$y = 0.000826e^{0.016x}$