"Residual" Crop Formation: Nevada, Iowa, 1997

Laboratory Codes: KS-04-29
Location: Brett Anderson farm Near Nevada, Iowa
Material: Soybeans *(Glycine max)*
Discovered: On 9-30-97 at same location as corn formation in 1996 (see Report No.88)
Sampled: By Beverly Trout, Altoona, Iowa (10-29-97)
Formation Characteristics: The plant stems were still slightly green and somewhat reduced in height (seed pods were mature).

Relevant Findings:

1) - root nodules significantly increased (+236%) in formation plants.
2) - seed pods significantly reduced (-47%) in formation plants.
3) - in normal plants, *Rhizobium japonicum* induced root nodules increase seed pod development and final seed yields. This situation is diametrically opposite the responses in normal plants.
4) - distribution of magnetic particles very similar to data discussed in Report No.88

Results and Discussion:

Five plants were taken from within the formation (see Fig.1) and five control plants from 35 to 800 ft. from the formation. Plants from the formation appeared to have more green tissue showing on the stems although the leaves had abscised (sloughed off) and the seed pods were mature. There also appeared to be differences in seed pod and root nodule densities. The data below were taken as the plants were removed from the shipping container.

Table 1.
Comparison of root nodule and seed pod densities in formation plants with controls.

	Plant ht. cm		Nodules/plant		Pods/plant		
Sample	ave.	s.d.	ave.	s.d.	ave.	s.d.	N-plants
Controls	68.9	6.4	7.2	3.5	24.6	7.5	5
Formation	63.8	8.4	*24.2	4.1	*13.0	7.0	5

*- $P<0.05$

Ordinarily one would expect that *Rhizobium japonicum* root nodules would influence plant growth in a positive manner, that is, increased nodules per plant should result in an increase in pod formation. Here we find quite the opposite situation.

The remnant energy remaining in the field appeared to have influenced the positive symbiotic relationship between the soy bean plants and the soil microorganisms. This disruption in the normal metabolism was further indicated in redox tests[1] conducted on several seeds at the initial stages of germination. The data in Fig. 3 show the higher redox activity (more high

amplitude pulses than in the Fig. 2 control curve) in the formation seed. This means that the formation plants produce higher levels of free radicals which are the damaging and vigor reducing metabolites.

The magnetic particle densities in the soil samples are plotted in Fig.4, using the same method of diagramming the results as used in Report No.88. It is interesting to note that the pattern of distribution is similar to that found in the 1996 soybean field. See Report No. 88 for a discussion of the implications pertaining to the magnetic particle findings

Nancy Talbott
Cambridge, Mass.

W.C. Levengood
Pinelandia Biophysical Lab.

John A. Burke
Am-Tech Lab.

Office:
P.O. Box 127
Cambridge, MA 02140

Phone: 617 492 0415
Fax: 617 492 0414

Reference

1) Levengood, W.C., *Redox-responsive electrodes applied during plant morphogenesis.* Bioelectrochem. & Bioenergetics, **19**, pp. 461-476 (1988).

NEVADA, IOWA NS-04-89 N ILLINOIS

1996 CORNFIELD
1997 BEAN FIELD

W

E

S-1

S-2

S-3

S-4

S-5

200 FT.
C-3

220 FT.
C-4

800 FT.
C-5

35 FT.
C-1
C-2

Fig 2.

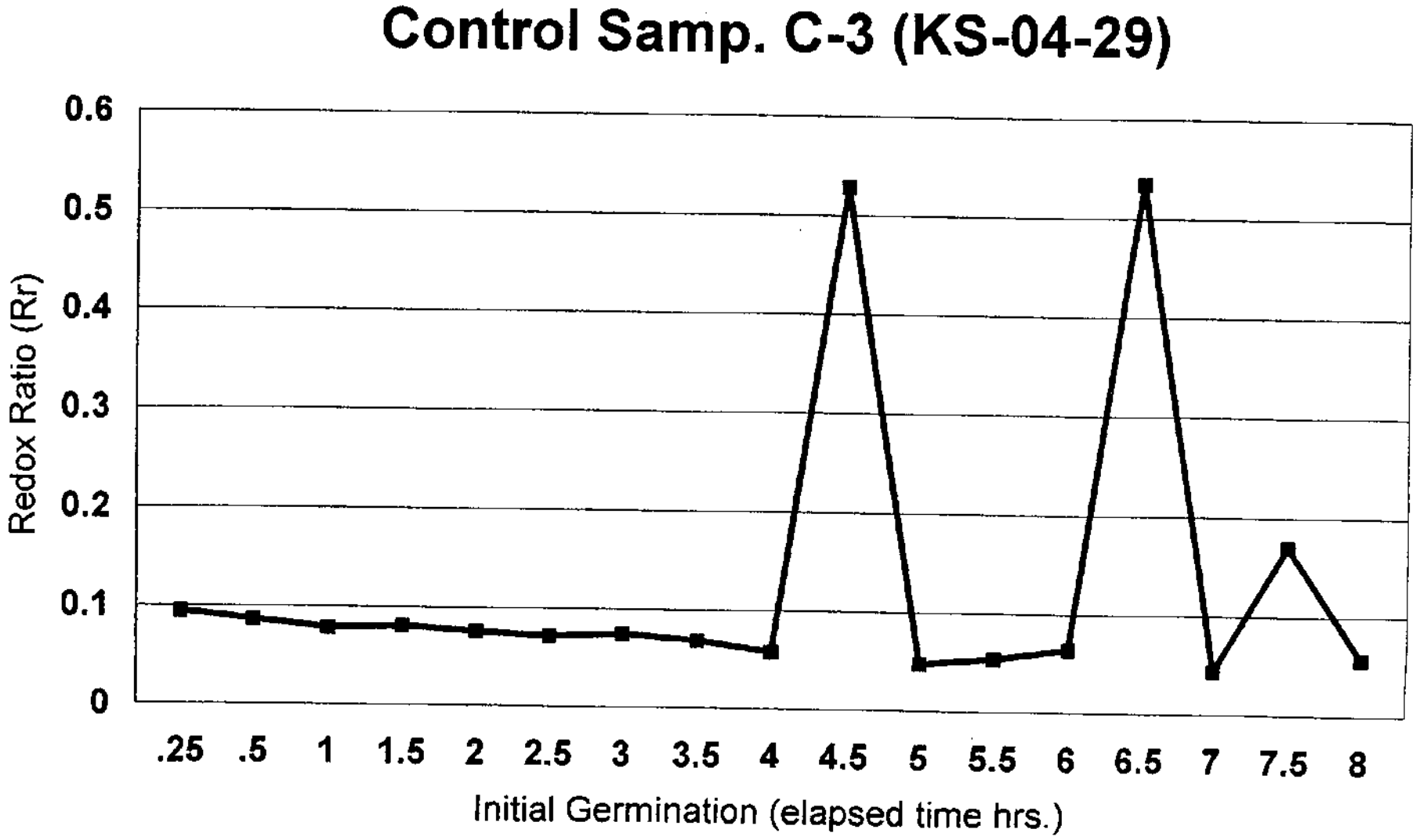

Control Samp. C-3 (KS-04-29)
Redox Ratio (Rr)
0.6
0.5
0.4
0.3
0.2
0.1
0
.25
.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
Initial Germination (elapsed time hrs.)

Fig 3.

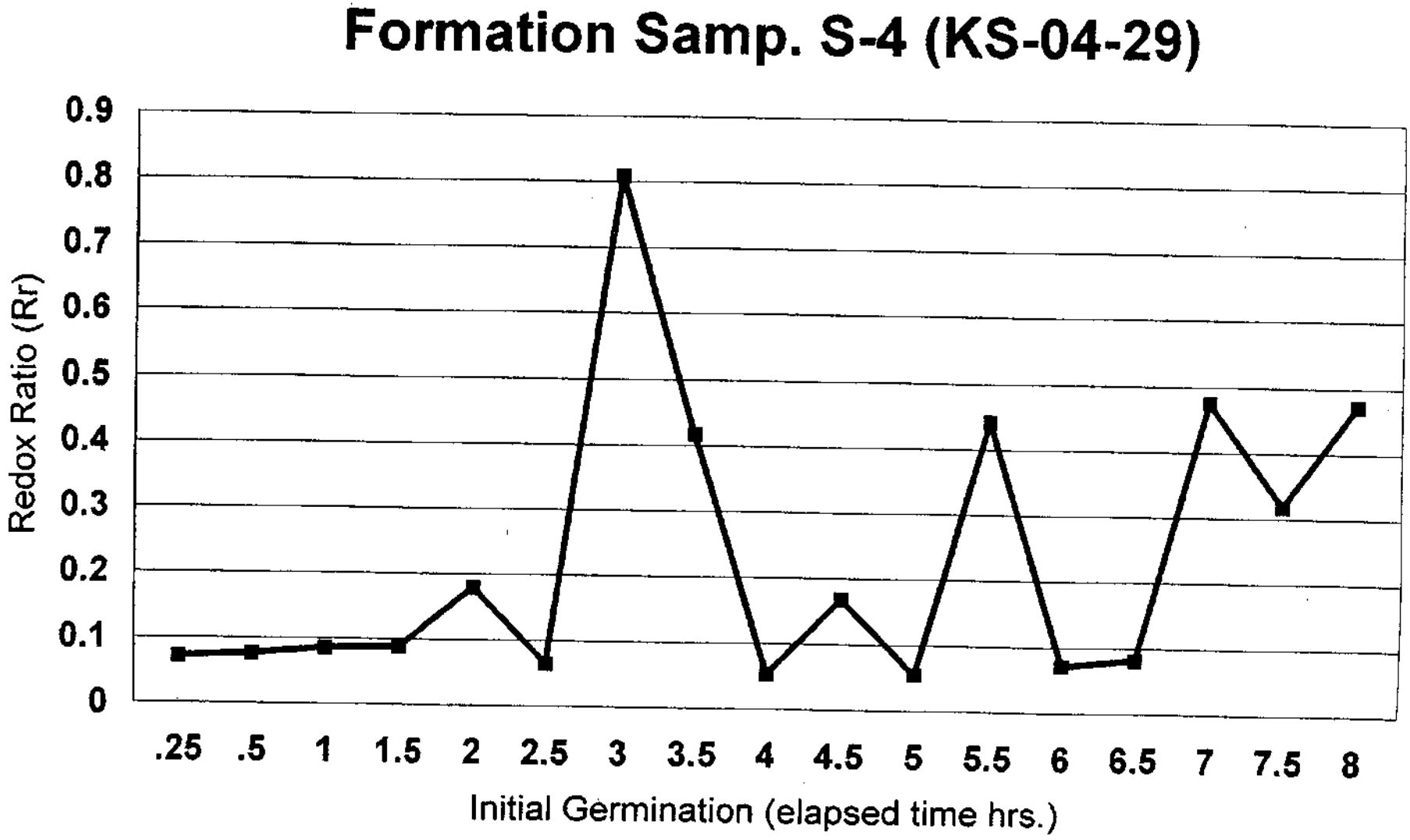
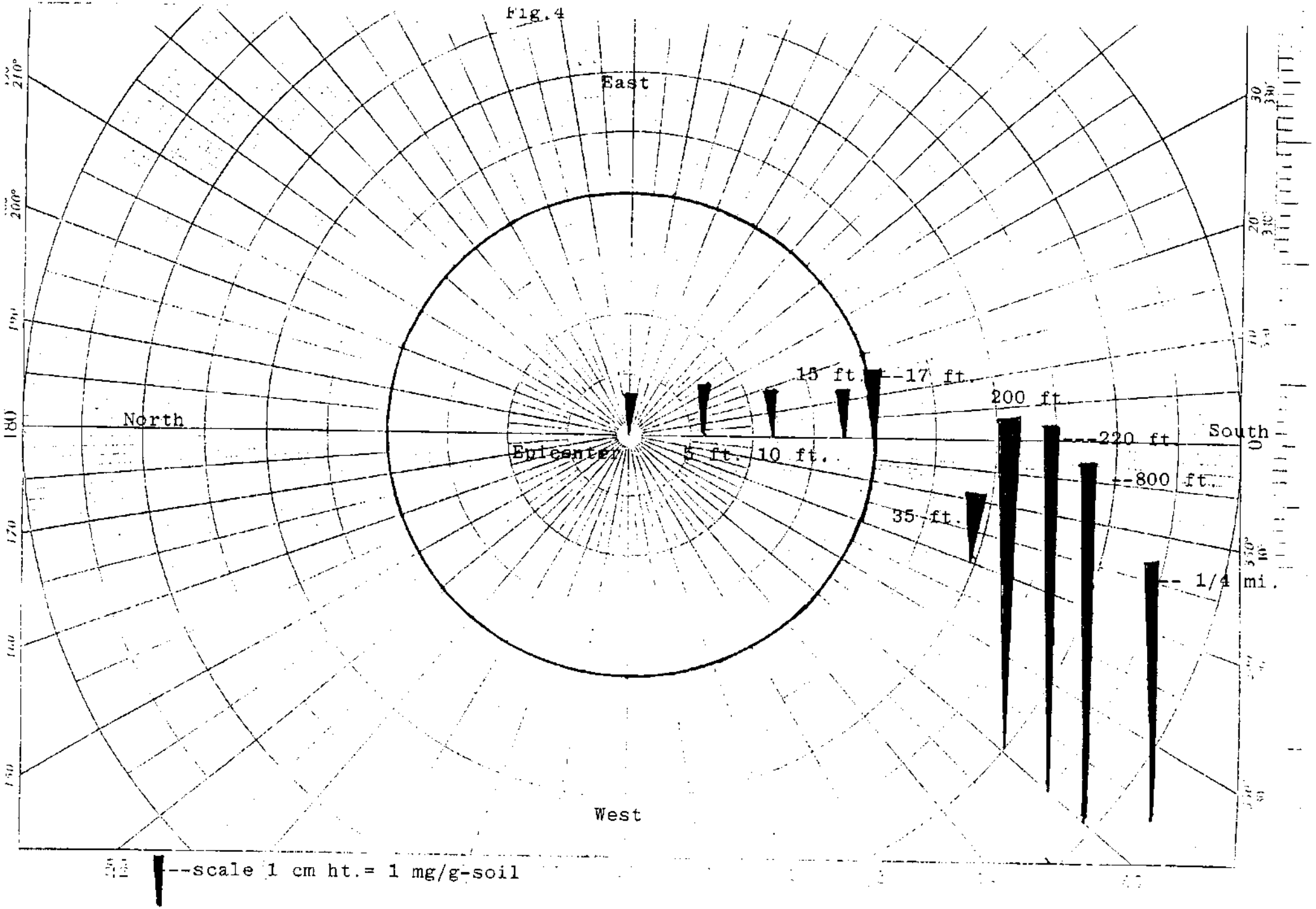

Formation Samp. S-4 (KS-04-29)
Redox Ratio (Rr)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
.25
.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
Initial Germination (elapsed time hrs.)

Fig. 4


East
North
South
West
Epicenter
5 ft.
10 ft.
15 ft.
17 ft.
200 ft.
220 ft.
800 ft.
35 ft.
1/4 mi.
--scale 1 cm ht.= 1 mg/g-soil