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Exploring the Parameters of Paramagnetic Forces

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Prior to importing and applying paramagnetic rock to the certified organic vegetable garden I maintain in the Midwest, where soil samples range from 31 to 63 $x10^{-6}$ CGS paramagnetism per 25 grams, I wanted to define parameters of expectation using pot studies in the greenhouse. There are numerous articles and books extolling the potential impact of paramagnetic rock, but there is a dearth of published, replicated experimental results to illustrate the responses of plants to the paramagnetic forces.

To initiate my studies, I was provided with two buckets of fine to coarse rocks sourced from Lake Havasu City, Arizona. The paramagnetic readings of this source averaged 1,250 $x10^{-6}$ CGS paramagnetism per 25 grams of rocks, using a Bartington MS2 System. There were sufficient amounts of fine particles and rock dust to raise the question of whether my rock sample might also have some fertilizer value. I sent a sample to the Country Extension Service for soil testing. The results are tabulated in Table 1 and compared to the existing garden soil. These data indicate that the rock sample would contribute a major fertilizer component.

To work exclusively with the force field, the paramagnetic source material was sequestered in diamagnetic plastic film canisters to eliminate any contribution of fertilizer from the rocks to the experimental plants. I followed this procedure in all experiments. During three winters, I conducted pot studies in the greenhouse. The results have been consistent. I will discuss four experiments, each with different time durations and each addressing different parameters.

In Experiment 1, the question of speed of germination and plant growth within 10 days was evaluated. Canisters filled with paramagnetic rock expressing 0, 500, 1,000, and 1,500 $x10^{-6}$ CGS were buried 1 inch deep in the middle of separate 20-inch flats filled with Scotts Terra-Lite Redi-Earth Peat-Lite Mix (a mixture of horticultural vermiculite and Canadian sphagnum peat moss with no amendments). Three rows of radish seeds (variety, French Breakfast) were planted from end to end across each flat and canister. The rows were a half-inch apart and 39 seeds were planted per row. Within each row, the seeds were also a half-inch apart. The germination date of each seedling was recorded.

More than 95 percent of the seeds germinated within two to four days, and there was no pattern of faster germination over the canisters. The plants in half of each flat were also scored on Day 10 for whole-plant wet weight, length of root, hypocotyl length, cotyledon width, and root wet weight. There was no statistical evidence that seedlings near or over the canisters exhibited preferential growth.

The critical considerations in this experiment were: (1) the seeds used were fresh and viable; (2) the potting mixture was uniform in all treatments; and (3) the growth period was only 10 days. This is in contrast to other published results where seeds with low viability were used and germinated on paramagnetic rocks or soil (see Gary Wilson, "Seed Germination with Paramagnetic Rock," *Acres U.S.A.*, January 2002; and P.H. Patrick, *et al.*, "Seed Germination with Paramagnetic Rock," *Acres U.S.A.*, March 2003). Viable seeds do not appear to require additional paramagnetic force to germinate. Since oxygen has also been shown to be very paramagnetic, the friability or available aeration of the growth medium is very critical, and the growth medium within experiments must be kept uniform for comparisons.

In Experiment 2, the growth of radish and wheat (variety, Onaga) seedlings was compared in paired-pot plantings. Both pairs had canisters either at the bottom of 8-inch plastic pots or in the middle of the pot. In one pot the canister was empty, and in the other, the canister had rocks measuring 1,500 $x10^{-6}$ CGS. Also compared were Peat-Lite Mix and garden soil. No fertilizer was applied in this experiment. Seeds were placed at 14 equidistant points around the edge of the pot. After germination the seedlings were thinned to one seedling per pot. At day 21, the 14 seedlings were scored for the average weight of the aboveground plant, the average weight of the roots, as well as the average length of the longest leaf and the average length of the roots.

The radish results in Table 2 are expressed as the percent influence of 1,500 $x10^{-6}$ CGS, *i.e.*, the average value for the 0 $x10^{-6}$ CGS plants was divided into the average value for the 1,500 $x10^{-6}$ CGS plants. The conclusions to be drawn are that the group with 1,500 $x10^{-6}$ CGS at the bottom of a pot demonstrated increased plant growth in weight and size by 7 to 36 percent for the measurements taken. The paramagnetic force was stimulating in garden soil and in Peat-Lite mix. If the paramagnetic force was in the middle of the pot, growth promotions were reflected only in the roots, while the aboveground plant parts expressed inhibition. In discussions at the 2001 Acres U.S.A. Conference in Minneapolis, this phenomenon was referred to as a "condenser effect" and is beyond the scope of this discussion except to point out that the responses were consistent in both garden soil and the soilless potting mix.

Table 3 gives the results for wheat. The wheat response was similar to that of radishes. These data indicated that both monocotyledonous and dicotyledonous plants respond similarly to paramagnetic forces.

In Experiment 3, the growth parameters and mineral uptake of radish seedlings were measured. Four-inch plastic pots filled with the soilless potting mix had canisters inserted in the middle, with the lid of the canister level with the surface of the mix. The paramagnetic value in the canisters ranged from 0 to 10,000 $x10^{-6}$ CGS, with the gradient being 0, 100, 200, 300, 500, 1,000, 2,000, 3,000, 5,000, and 10,000 $x10^{-6}$ CGS. To create the highest levels, paramagnetic rock from Nuthin' but Rock, Scarborough, Ontario, was used. Four radish plants were grown per pot. Each pot was fertilized on days 11 and

CGS Measurements

Any substance, including soil or rock, that will move toward a magnet is classified as paramagnetic. The CGS of a substance is the measure of its attractant force to a magnet. *CGS* stands for "Centimeter, Grams, Seconds" — and refers to the fraction of one second it takes one gram of a substance, placed one centimeter away from a magnet, to move to the magnet — or alternately, to the weight of a paramagnetic material that will move one centimeter to a magnet in one second.

Table 1. Nutritional Content: Garden Soil vs. Paramagnetic Rock

Element	Brightspot Garden Soil W/2	Brightspot Garden Soil E/2	Rock from Havasu City
pH	7.1	7.0	7.6
Organic matter	5.00%	5.00%	0.50%
Calcium (ppm)	3652	3784	3451
Magnesium (ppm)	543	485.7	91.6
Nitrogen (ppm)	30	52	31
Phosphorus (ppm)	91	100	7
Potassium (ppm)	500	500	117
Boron (ppm)	2.01	2.35	0.78
Chlorine (ppm)	23	20	20
Copper (ppm)	1.09	0.96	0.2
Iron (ppm)	48	47	4
Manganese (ppm)	13.1	13.2	1.9

Table 2. Influence of Paramagnetism on Radish Growth

	Paramagnetism 10^{-6} CGS		Radishes, n=11-14 Plant	Root	Longest leaf	Root
Parameters	0	1500	(g)	(g)	(cm)	(cm)
Bottom, peat	Pot 1 vs Pot 2		1.192	1.336	1.068	1.085
Bottom, soil	Pot 7 vs Pot 8		1.124	1.099	1.101	1.355
Middle, peat	Pot 3 vs Pot 4		0.808	1.098	0.983	1.075
Middle, soil	Pot 9 vs Pot 10		0.921	1.190	0.919	1.07

Table 3. Influence of Paramagnetism on Wheat Growth

	Paramagnetism 10^{-6} CGS		Wheat, n=11-12 Plant	Root	Longest leaf	Root
Parameters	0	1500	(g)	(g)	(cm)	(cm)