

# Long Range Interaction within the System 'Semiconductor Generator - Matrix - Seeds'

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## Extended Abstract

### 1 Introduction

The long range interaction (LRI) is understood in this work<sup>1</sup> as a non-local phenomenon, determined by two following effects: a) appearing of an entanglement between two macroscopic objects; b) modulation of the high-penetrating emission of the semiconductor generators [1] by a 'matrix' and influencing one of these macroscopic objects by this emission.

Questions about achieving an entanglement between macroscopic objects [2] as well as the phenomenon of LRI [3] is currently in a theoretic and experimental research. Different experiments pointing to LRIs between technological and biological macroscopic objects are demonstrated [4], [5], [6].

In this work we briefly represent several research results of achieving LRI in the framework of 'semiconductor generator  $\rightarrow$  matrix  $\rightarrow$  seeds'. Macroscopic entanglement between generators and seeds is created by using an approach with an object's digital representation; a digital image of seeds was placed at 20cm away from the generator. Real distance between seeds and their digital representation is about 1475.8km corresponding to the google map<sup>2</sup>. Two kinds of 'matrices' are used: **real substance** (*penicillin* as a nonspecific stimulator of biological processes) and **digital image** (two images are used: a) the fungus *Helminthosporium avenae* as a specific inhibitor of seeds' growth; b) seeds infected by this fungus). It must be pointed out that the approach with a digital representation was utilized twice within one

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<sup>2</sup>Distance Measurement Tool at [maps.google.com](https://maps.google.com).

experiment: as a 'matrix' and as an element, which 'transmits the interaction'.

The LEDs and semiconductor elements operating in a high-power mode [1] are utilized as a source of high-penetrating emission. Hardware part of the work, i.e. operating the system 'generator  $\rightarrow$  matrix (a substance or an image)  $\rightarrow$  image of germinated seeds' was performed in Stuttgart, the biological part of the work, i.e. preparation seeds and measurements of seed's parameters as well as statistical analysis is done in Kishinev. Additionally in Stuttgart several biological experiments 'generator  $\rightarrow$  nonlocal matrix  $\rightarrow$  local seeds' are performed. All experiments are done in January-February 2013.

Seeds of triticale (of the type *Ingen-93*) and maize (of the type *Hybrid Debut*) are soaked for 24 hours, digital images of seeds were taken at this time. Generators influenced seeds in the LRI way between two and four days. Seeds are germinated in Petri dishes at the temperature of 22C. At the third day the germination rate (GR), the root length (RL) and at the seventh day – the isometry of plantlets (bending of young leafs CW or CCW) – are estimated and counted. The plantlets isometry is correlated with the vital activity and the growth at all phases of ontogenesis (even in adult plants) [4]. In particular the number of acrospires bending right (NBR) was counted. The number of seeds in each attempt varies between 150 and 900.

## 2 Short overview of the main results

### 2.1 Control attempt 'generator $\rightarrow$ no matrix $\rightarrow$ seeds'

1. The attempt with not-infected seeds triticale, whose image was affected by the semiconductor (not LED) generator demonstrated a significant increase of NBR (control and attempt<sup>3</sup> – 44.8% and 53.6%), however no changes in GR are observed.
2. The attempt with not-infected seeds from the same group<sup>4</sup>, however not stressed directly, demonstrated a significant increase of GR (control and attempt – 84.0% and 93.6%).
3. The attempt 'isolated, closed and grounded generator  $\rightarrow$  no matrix  $\rightarrow$  local seeds of wheat' demonstrated non-significant changes of GR between -4.0% and +8.0%.

### 2.2 Attempt 'generator $\rightarrow$ stimulating matrix $\rightarrow$ seeds'

1. Experiments with non-local triticale seeds within the system 'gener-

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<sup>3</sup>It means the control experiment and the performed LRI attempt

<sup>4</sup>The expression – seeds from the same group – means here and further those seeds, which are jointly soaked for 24 hours.

ator → stimulating matrix (penicillin) → image of seeds' point to a strong LRI effect. All parameters such as GR, RL and NBR are significantly increased on 10.8%; 13.0% and 11.8% correspondingly (control and attempt are  $81.8 \pm 1.64\%$  and  $89.0 \pm 1.90\%$ ;  $11.3 \pm 0.27$  and  $14.7 \pm 0.40\text{mm}$ ;  $50.1 \pm 1.44\%$  and  $59.0 \pm 1.54\%$ ).

2. A significant stimulation of GR and RL is also observed for the seeds from the same group but which are not directly impacted by the generator and 'matrix' (control and attempt are  $81.8 \pm 1.64\%$  and  $90.1 \pm 1.51\%$ ;  $11.3 \pm 0.27$  and  $14.4 \pm 0.71\text{mm}$ ).
3. When the digital representation of triticale seeds undergone a mechanical and temperature stress (e.g. cutting and boiling), the original triticale seeds also demonstrated a significant stimulation of GR and NBR (on  $+10.7\%$   $+11.0\%$ ), which is comparable with the impact from the system 'generator → matrix → seeds'.

### **2.3 Attempt 'generator → inhibiting matrix → seeds'**

1. Infecting the triticale seeds by the fungus *Helminthosporium avenae*, no differences between the control and the attempt are discovered within first 18 hours.
2. Using an inhibiting 'matrix' – image of the fungus – in the system 'generator → matrix → image of seeds', no differences between the control and the attempt are discovered.
3. Using an inhibiting 'matrix' – image of seeds infected by the fungus – in the system 'generator → matrix → image of seeds', the significant decrease of GR and NBR by  $-11.2\%$   $-11.0\%$  (control and attempt –  $78.8\%$  and  $66.8\%$ ,  $58.4\%$  and  $53.3\%$ ) is observed.
4. Impact of the 'matrix' - image of the infected seeds by the fungus – on the image of non-infected seeds led to some decrease of GR and NBR by  $-7.9\%$  and  $-10.5\%$  in relation to the control.
5. Seeds from the same group, but not impacted directly, demonstrated only a small decreasing of GR.

## 2.4 Attempt 'generator $\rightarrow$ depleted<sup>5</sup> inhibiting matrix $\rightarrow$ seeds'

1. The experiment with LED and semiconductor generators with the 'matrix' – **infected but to that time already grown plantlets** – and local seeds of wheat demonstrated a significant stimulation of GR by +9.0% (control and attempt – 79% and 88%) and by 15.0% (control and attempt – 79% and 94%). Simultaneously, the lengths of plantlets was decreased by -3.6% and -10.1% in relation to the control.
2. The experiment with LED and semiconductor generators with the 'matrix' – **infected but to that time already destroyed plantlets** – demonstrated a significant stimulation of NBR by 13.1% (control and attempt – 44.8% and 58.8%), however without any essential change of the germination rate.
3. Not infected seeds from the same group, which are not impacted by the system 'generator  $\rightarrow$  matrix (infected but to that time already destroyed plantlets)  $\rightarrow$  image of seeds' also demonstrated a significant stimulation of NBR by +12.8% (control and attempt – 44.8% and 57.2%).

## 2.5 LRI between infected and non-infected seeds from the same group

1. When infecting the triticale seeds by the fungus, we observed a significant decreasing of GR and RL (by 10.9%) within first three days.
2. Not infected seeds from the same group demonstrated a stimulation of NBR by 12.5% (control and attempt –  $44.1 \pm 1.02\%$   $55.0 \pm 3.67\%$ ).

## 2.6 Attempt 'generator $\rightarrow$ stimulating matrix $\rightarrow$ seeds with different spatial orientation'

1. In the attempt 'generator  $\rightarrow$  stimulating matrix  $\rightarrow$  maize seeds oriented to each other by embryo side' a significant increasing of NBR by +11.3% (control and attempt – 47.2% and 53.4%) is observed.
2. In the attempt 'generator  $\rightarrow$  stimulating matrix  $\rightarrow$  maize seeds oriented to each other by endosperm side' a non-significant increasing of NBR by +4% is observed.

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<sup>5</sup>It means a digital representation of the original object at later time, e.g. when the original object is changed or destroyed. For instance, the digital image of the infected seeds, taken at  $t = 0$  hours, was used three times: 1) at  $t = 0$  hours, i.e. the entangled object are infected seeds; 2) at  $t = 72$  hours, i.e. the entangled object are young plantlets; 3) at  $t = 168$  hours, i.e. the entangled object is destroyed.

### 3 Short Conclusion

1. We observed a statistically significant and well repeatable effect of a nonlocal interaction within the system 'generator  $\rightarrow$  matrix  $\rightarrow$  seeds' at the distance 1475.8km between the source and the receiver of interaction.
2. In the LRI experiments, a real 'matrix' (e.g. a physical substance) can be replaced by its digital representation.
3. Biological effects appeared in the seeds and plantlets correspond to the stimulating or inhibiting effects of the 'matrix'.
4. Generators without the 'matrix', when impacting the digital representation of seeds, caused a small stimulation of the germination process in these seeds.
5. The depleted 'matrix' – e.g. a digital representation of a dead object – loses its functionality. In both cases when it impacted another object, e.g. 'grown triticale seeds  $\rightarrow$  wheat seeds' or 'a dead triticale seeds  $\rightarrow$  triticale seeds' we observed different biological reactions. It seems that the 'matrix' – 'digital representation of a real object' – is to some extent a 'reference' to this object at the current moment independently when the image was taken. To understand this effect further experiments are required.
6. The degree of LRI effect depends on the spatial orientation – active embryo side or passive endosperm side – of the target. It is assumed the reason consists in different degree of entanglement within the pair 'object and its digital representation'.
7. It seems, a joint soaking of seeds created an entanglement effect between plants. It can be demonstrated in the following way. When one part of seeds from the same group is moved at a large distance and undergoes some stress, the second part of these seeds will also react on this stress by changing its morpho-physiological state. Mostly a stimulating effect is observed here.

In our experiments the semiconductor generators appeared as such a stress factor. By using these generators, an inhibiting effect with the inhibiting 'matrix' (e.g. infected seeds) can be archived. It is assumed, the impact caused in the targeted seeds consists of a superposition of two effects: inhibiting impact from the 'matrix' and an impact created by the semiconductor generator.

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