

# "ProEMgen" - new technology for higher efficiency in various economic areas using EMF (electromagnetic pulse field)

- ▶ PRESENTED BY
- ▶ INTER-TRADE PRAHA Ltd.
- ▶ Prague, Czech Republic
- ▶ e-mail: [itp@webint.cz](mailto:itp@webint.cz)

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# ProEMgen - EMF GENERATOR



# ABOUT ProEMgen EMF GENERATOR APPLICATION



## An affordable solution for improvement of:

1. Chlorophyll level in field and in greenhouse conditions, and its retention in stress
2. Acceleration of germination of seeds of various crops such as cotton, wheat, oat, barley, cucumbers, poppies, and soybeans
3. Root and shoot growth (weight) in good conditions and in stress
4. Absorption and content of NITROGEN (protein) in the plant and in the seeds
5. Yield quantity and quality

# Automated and Remote Control of the EMF System Using the ProEMgen Generator

- ▶ The potential of the automated and remote control of the EMF system using the ProEMgen generator will lead to further improvements of the remote control system according to the requirements of the practical application in future versions:
- ▶ adding a humidity sensor
- ▶ adding a radio module for LoRaWAN for wireless communication - for the installation of the generator in greenhouses or in the field
- ▶ adding consumption measurement to detect possible problems and malfunctions

# MODIFIED ProEMgen-3

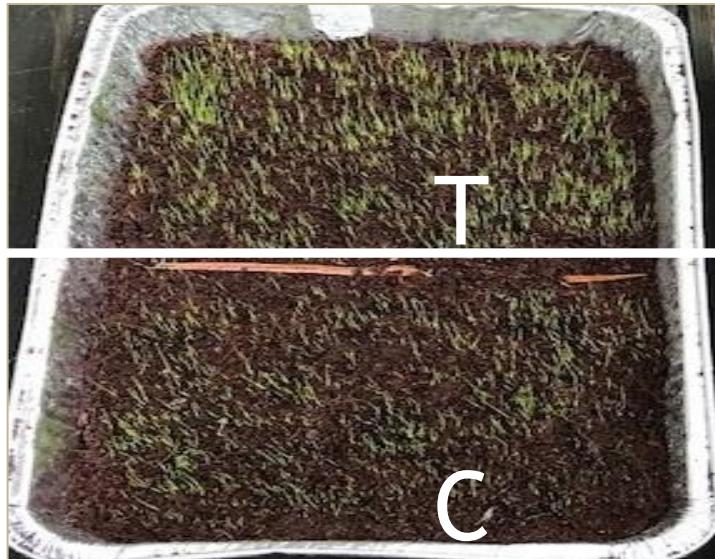


► The inside of an EMF generator assembled with a module controlled via the Internet

## APPLICATION OF EMF ON SEED GERMINATION

- ▶ TREATMENT OF SEEDS BY EMF 4 Hz 20 MIN BEFORE PLANTING
- ▶ C – CONTROL, UNTREATED
- ▶ T- TREATED SEEDS

BARLEY



CUCUMBERS



# MICROGREENS

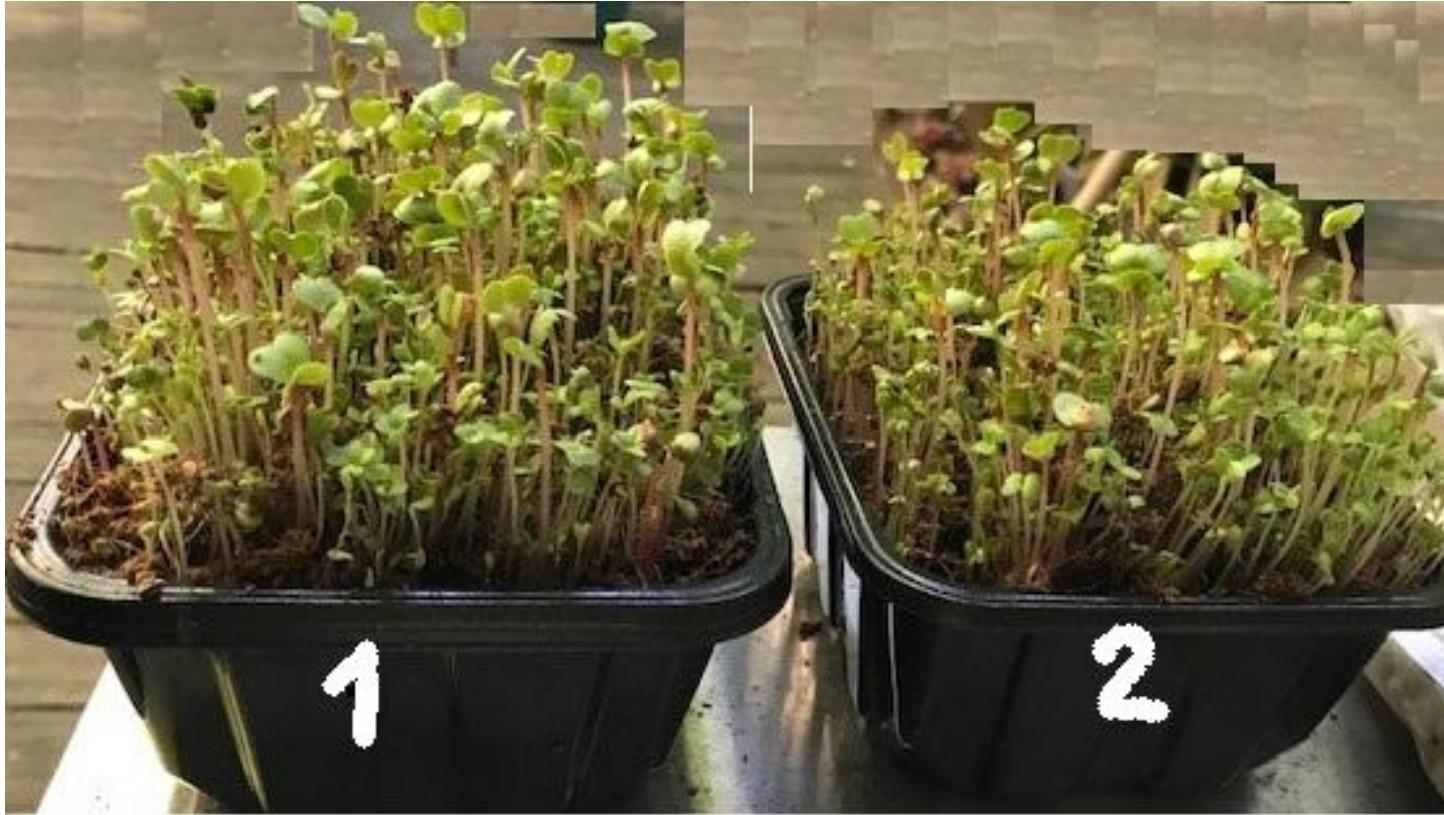
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ACCELERATION OF SEEDS GERMINATION AND GROWTH OF SEEDLINGS

1- EMF TEST

2 - CONTROLS UNTREATED



# CZECH BLUE POPPY

FLOWER



BULBS



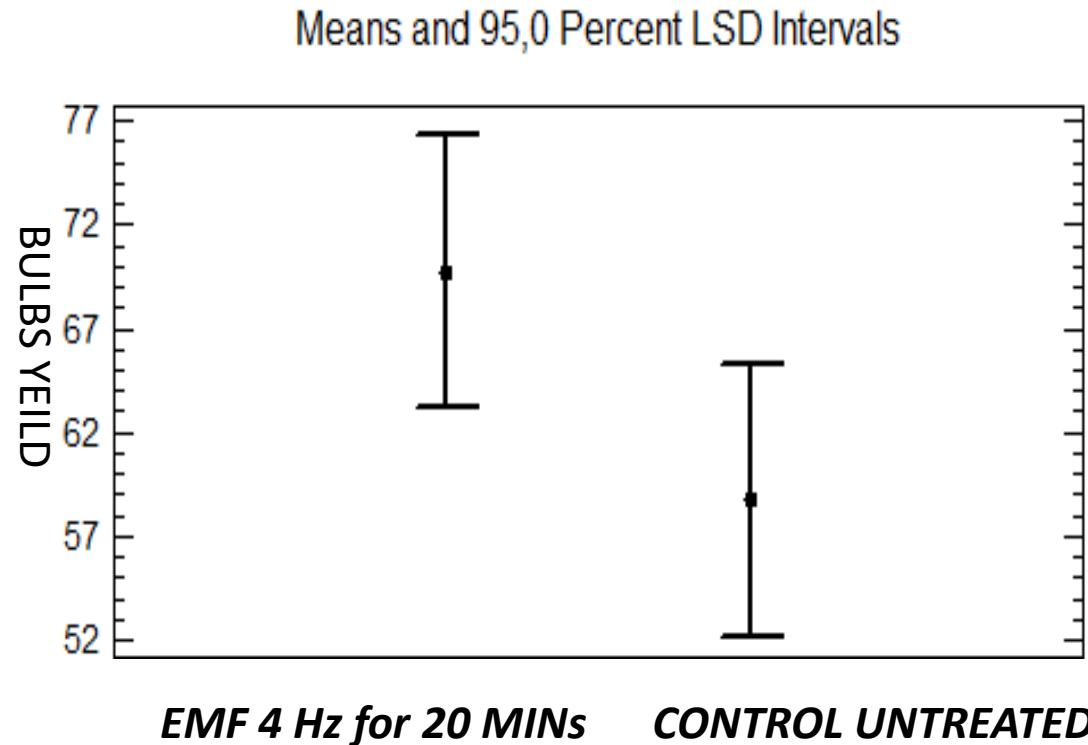
**LEFT PHOTO – UNTREATED SEEDS BY EMF**



**RIGHT PHOTO – TREATED SEEDS WITH EMF 4 HZ FOR 20 MINS**



THREE YEARS TESTS OF ProEMgen GENERATOR ON POPPY SEEDS  
CONFIRM THE INCREASE OF BULB YEILD FROM 126 kg/ha TO 172  
kg/ha, THEREBY CREATING ADDITIONAL INCOME OF SOME  
10,000.00 CZK per hectare, OR \$440.00 per hectare



## SOYBEAN

THE SEEDS WERE TREATED BY EMF BEFORE PLANTING IN SOIL AT 4 Hz DURING 25 MIN



- ▶ The grain yield was 274 kg/ha higher in the treated variant compared to untreated control.
- ▶ This is equivalent to additional income of \$6,000.00 per hectare.

# COTTON

THE SEEDS WERE TREATED BY EMF AT 4 HZ DURING 25 MINS BEFORE PLANTING IN SOIL



# BENEFITS

- ▶ Cotton varieties have various level of sensitivities to the electromagnetic seed treatment.
- ▶ Increase in yield for different varieties ranges from 10 % to 37 %.

# Effect of EMF on Vegetative Plants in the Field

- ▶ **HOPS**
- ▶ **EMF GENERATOR POWERED FROM SOLAR PANEL**



- ▶ **GRAPES**
- ▶ **EMF SIGNAL PROPAGATES THROUGH ANTENNA**



# BENEFITS OF APPLICATION OF ProEMgen GENERATOR ON VEGETATING PLANTS



## ***HOPS***

- ▶ ***THE APPLICATION OF EMF RESULTED IN THE HOPS YIELD INCREASE FROM 5 % TO 11 %***
- ▶ ***WEATHER CONDITIONS OF THE YEAR IMPACTED THE EFFECT OF THE EMF***

## ***GRAPES***

- ▶ ***THE APPLICATION OF EMF RESULTED IN THE GRAPES YIELD INCREASE FROM 10 % TO 20 %***

# Effect of LF EMF on Lettuce Cultivation under Hydroponic Conditions

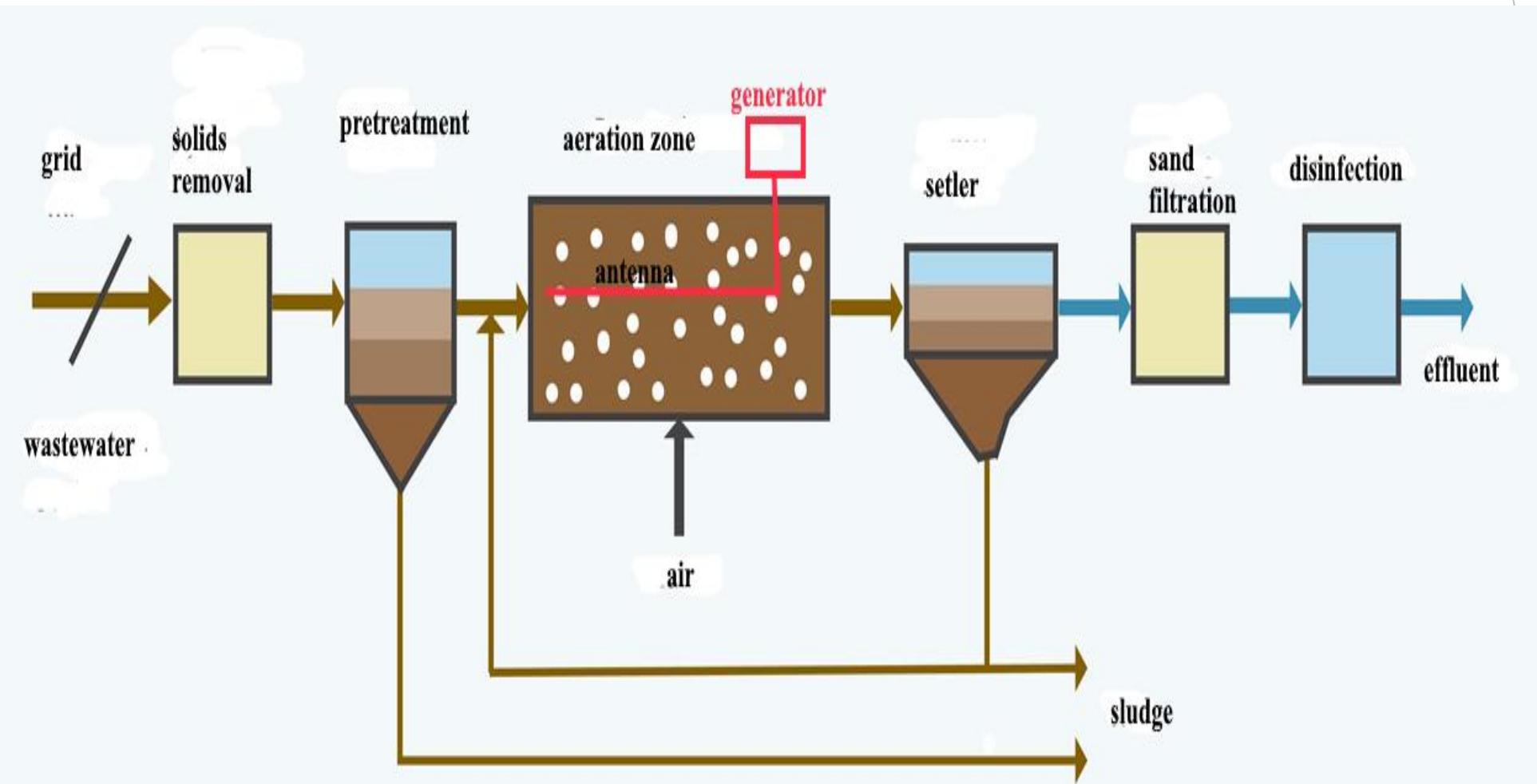
## LETUCE REDIN



A fluorometer PhotosynQ (USA) was used for the measurements of Photosynthesis.

- ▶ In plants treated with EMF, a higher value of stomatal openness increased not only the rate of photosynthesis, but also transpiration.
- ▶ Plants treated with EMF showed a higher content of chlorophylls and carotenoids compared to untreated plants. However, this difference was not statistically significant.

# WASTE WATER TREATMENT WITH EMF APPLICATION USING ProEMgen



# BENEFITS OF EMF APPLICATION IN WASTE WATER TREATMENT

- ▶ In addition to the ecological and social impact of wastewater treatment, an economic effect can also be achieved due to energy savings in the operation of blowers.
- ▶ During the testing of ProEMgen generator at the waste water treatment plant in Moravičany, Czech Republic, an energy saving of 6.5 percent was recorded.
- ▶ With a monthly energy consumption of approximately 11,4 MWh, 720 kWh were saved, and with an annual energy consumption of 136.8 MWh, about 8.8 MWh were saved.

# ACCELERATION OF BACTERIAL LEACHING OF ORES BY USING ProEMgen EMF GENERATOR

- ▶ According to experts, over 40 percent of the world's gold reserves are in the ground found in sulfide ores: pyrite (FeS<sub>2</sub>), chalcopyrite (CuFeS<sub>2</sub>), chalcocite (Cu<sub>2</sub>S), etc. Moreover, gold in these deposits is in submicroscopic, finely disseminated, difficult to open condition. These ores are therefore called refractory. Mining gold from such ores is profitable if copper, nickel, zinc and silver are extracted first, and gold is used as an accompanying metal.
- ▶ Dumps of abandoned metal deposits and flotation waste contain on average about 0.1-0.2 percent base metal and 0.3-0.6 g/ton gold. At such concentrations of base metal and gold, it is cost-effective to process waste with bacterial leaching.

# KNOW-HOW OF EMF APPLICATION IN GOLD LEACHING

- ▶ The essence of our know-how is that during leaching of an ore heap, an EMF antenna is installed in it and emanates pulses to the ore.
- ▶ These pulses increase the oxygen concentration in leach solution and thereby the increase of bacterial activity.
- ▶ As a result, the leaching rate can increase by 20-30 %.

# SUMMARY OF APPLICATION OF ProEMgen EMF GENERATOR IN VARIOUS AREAS



## STIMULATION OF SEED GERMINATION AND INCREASING OF YIELD IN THE FOLLOWING CROPS:

- ▶ WHEET AND BARLEY      YEILD INCREASED FROM 10 % TO 25 %
- ▶ CZECH BLUE POPPY      YEILD INCREASED FROM 120 KG/ha TO 170 KG/ha
- ▶ SOYBEAN                  YEILD INCREASED FROM 180 KG/ha TO 270 KG/ha
- ▶ HOPS                      YEILD INCREASE FROM 4 % TO 11 %
- ▶ GRAPES                   YEILD INCLRESE FROM 15 % TO 20 %
- ▶ ACCELERATION OF WASTE WATER TREATMENT: SOCIOECONOMIC IMPACT AND ENERGY SAVING
- ▶ ACCELERATION OF THE GROWTH OF LETUCCE IN HYDROPONICS BY 20 %

# Patent protection

- ▶ Industrial Property Office, Czech Republic, According to the provisions of § 34 paragraph 1 letter 3 of Act No. 527/1990 Coll., on inventions and improvement proposals, as amended.
- ▶ **PATENT:**
- ▶ **"Method of electromagnetic stimulation of vegetative plants"**
- ▶ **PATENT:**
- ▶ **"Method of electromagnetic activation of microbiological processes in a liquid medium"**

# THANK YOU FOR YOUR ATTENTION

