MODERN TECHNOLOGIES FOR AGRICULTURE

PHOTOACTIVATION OF SEEDS

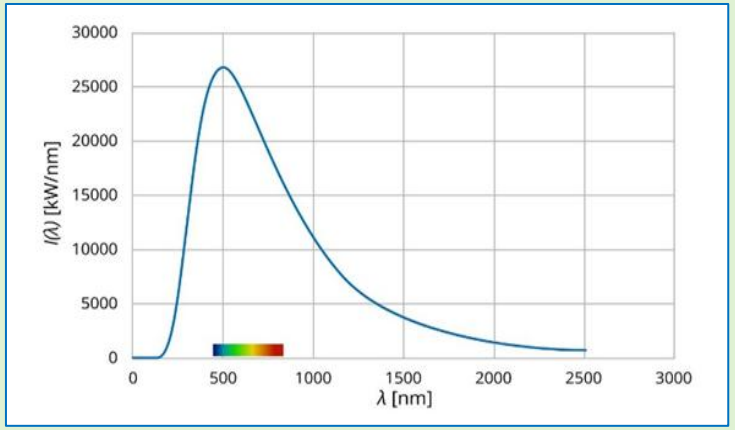
PHOTOACTIVATORS PHOTOZONE

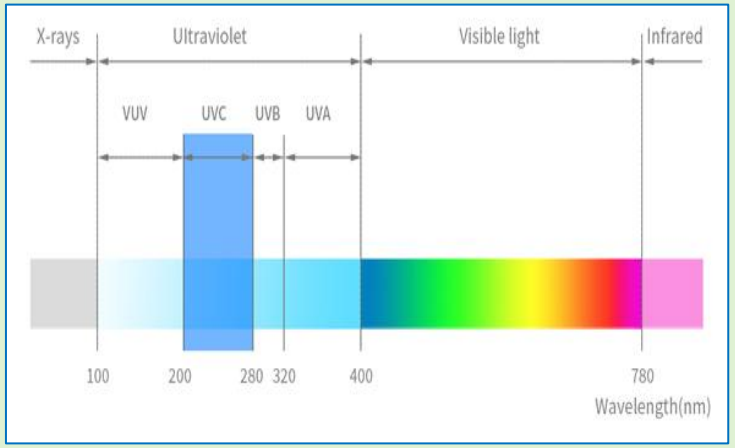
Kharkiv Engineering Company LLC (1994)

What is photoactivation?

PHOTOACTIVATION – a technological process involving UV irradiation of seeds to accelerate plant development, increase their resistance to drought, reduce fertilizer use, and increase yields.

UV radiation is a part of natural sunlight with a wavelength in the range λ = 205 ... 365 nm.





The essence of the method

UV radiation intensifies biological processes such as photosynthesis and phototropism.

UV radiation effectively destroys microorganisms on the surface of seeds that cause plant diseases such as net blotch, powdery mildew, yellow and brown rust, root rot, fusarium wilt, and others.

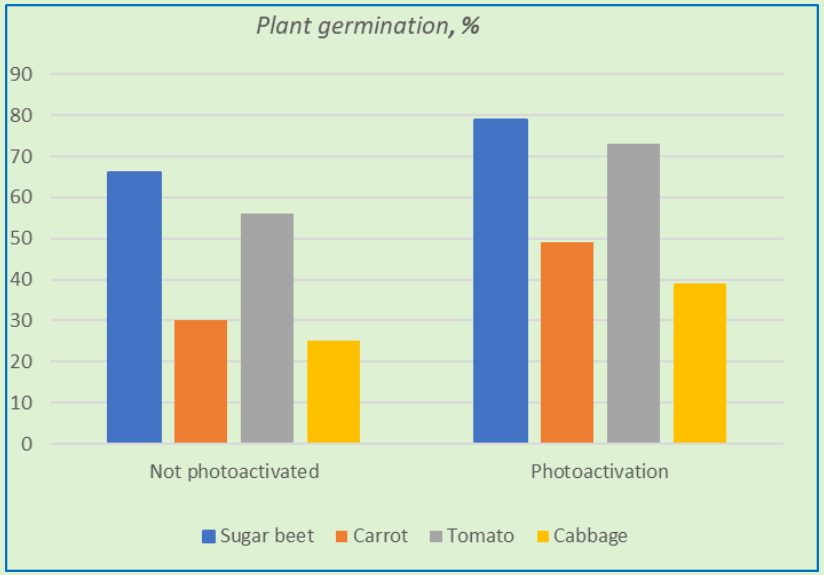
The method is fully compatible with traditional pre-sowing seed treatment with fungicides. At the same time, it provides the possibility of a significant reduction (several times) in the use of pesticides.

Technology capabilities

- *Research conducted by the Institute of Bioenergy Crops and Sugar Beets of the National Academy of Agrarian Sciences (NAAS) of Ukraine has demonstrated the high efficiency of the technology, namely, thanks to photoactivation, an increase in yield was achieved: grain crops - by 10...11%, oilseeds and melons - by 20...35%, vegetables - by 12...35%; sugar beets - by 20...22%.*
- *Research conducted at the Yuryev Institute of Plant Growing of the NAAS of Ukraine showed that photoactivation of substandard seeds makes it possible to obtain high yields.*
- *Research conducted at the Kuprevich Institute of Experimental Botany (Belarus) showed that photoactivation of potato seeds increases potato yields by 20–25%.*
- *At the Scientific Research Institute of Agriculture (Tajikistan), photoactivation was used to increase cotton yields by 44–48%.*

Plant similarity

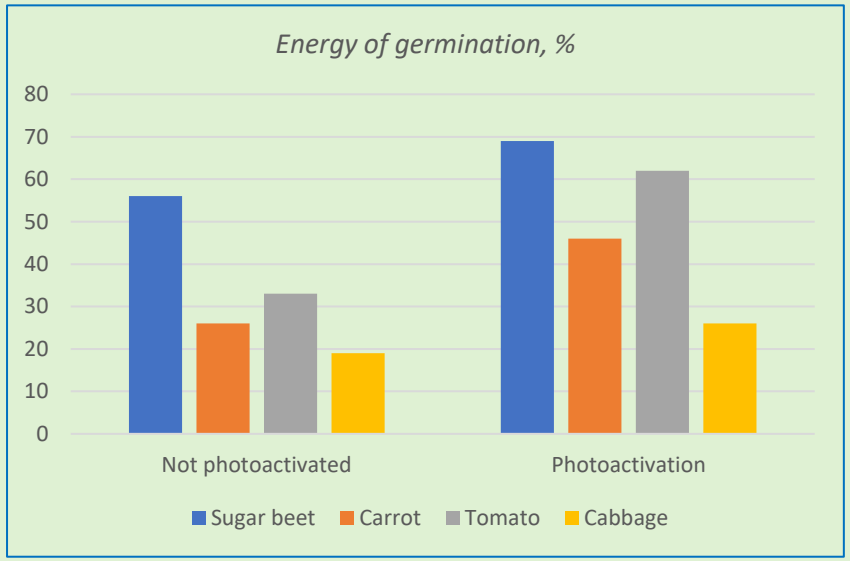
Photostimulation increases the germination rate of vegetable crops by 13–19%.



Results obtained at the Yuryev Institute of Plant Production of the National Academy of Agrarian Sciences of Ukraine

Germination energy

Photostimulation increases the germination energy of vegetable crops by 7-29%.



Results obtained at the Yuryev Institute of Plant Production of the National Academy of Agrarian Sciences of Ukraine

Photoactivators PHOTOZONE

PHOTOZONE rotary photoactivators are designed to activate seeds using UV radiation.

They ensure both the activation of biological processes and the disinfection of seeds.

Photoactivators PHOTOZONE F250R

Seed processing is carried out in a special chamber that rotates around its axis. This ensures high efficiency of seed processing.

Technical specifications

Parameter for model	Unit	PHOTOZONE PZ125R	PHOTOZONE PZ250R	PHOTOZONE PZ750R	PHOTOZONE PZ1250R	PHOTOZONE PZ1750R	PHOTOZONE PZ2500R
Load volume	m^3	0,025	0,05	0,15	0,25	0,35	0,5
Nominal productivity	kg/h	50	100	250	500	650	1000
Power	kW	0,25	0,35	0,75	1,35	1,5	2,0
Duration of the photoactivation cycle	min	15	15	15	15	15	15
Dimensions	m	1,6x1,0x1,7	2,0x1,4x2,1	2,5x1,4x2,1	3,4x1,4x2,3	3,4x1,4X2,5	3,4x1,4X2,6

Advantages

- *PHOTOZONE photoactivators provide environmentally safe stimulation of biological processes in seeds by treating them with UV rays and ozone produced by the photoactivators.*
- *Photoactivation is carried out without the use of pesticides.*
- *Seeds are loaded into the photoactivation chamber using a screw conveyor.*
- *The cost of photoactivation of 1 ton of seeds is USD 0.5–0.75. PHOTOZONE photoactivators can be used to disinfect dry feed, nuts, dried fruits, etc.*

Effectiveness

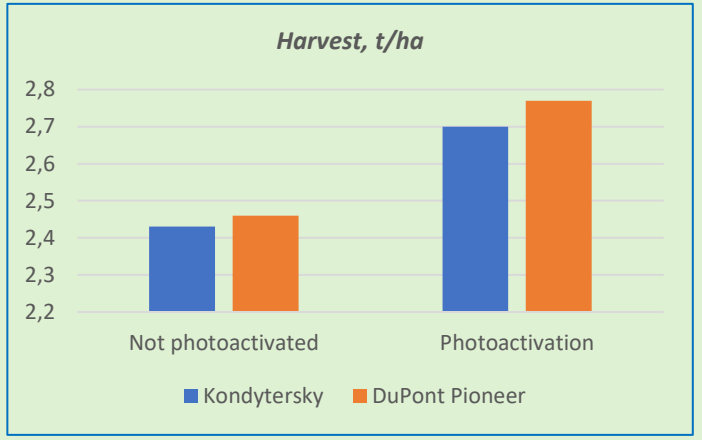
- *PHOTOZONE photoactivators ensure effective activation and disinfection of seeds, which leads to increased plant resistance to adverse weather conditions and increased yields of grain and vegetable crops.*
- *The effectiveness of seed photoactivation has been confirmed by research conducted at the Veselopodilsk Experimental and Selection Station of the Institute of Bioenergy Crops and Sugar Beets of the National Academy of Agrarian Sciences of Ukraine.*

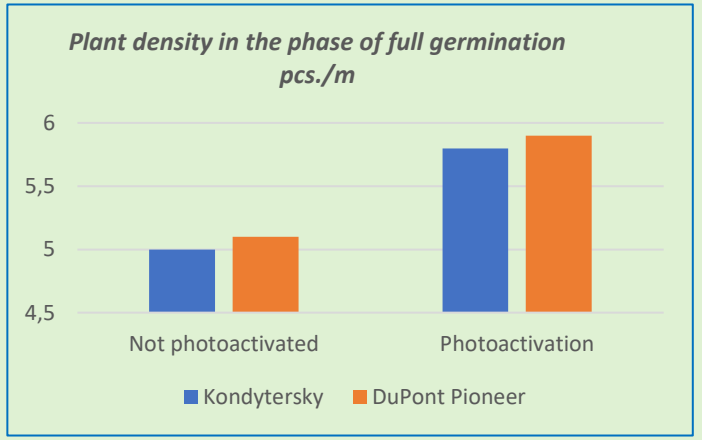
More details about the effectiveness of photoactivation on our website:
https://www.waterlight.pro/silske-gospodarstvo/fotoaktyvacziya/

Sunflower

- *Seeds of the Konditersky and Pioneer hybrids from DuPont were selected for comparative analysis. No fertilizers were applied. Photoactivation of seeds increased sunflower yield by more than 10%, from 2.7 to 2.77 t/ha, which is 0.27 and 0.31 t/ha, respectively.*
- *Photoactivation reduced gray and white rot diseases by 2.37 to 2.53 times, and phomosis by 1.79 to 1.88 times.*

Details here :
https://www.waterlight.pro/wp-content/uploads/2024/01/sonyashnyk-nano-hvylovyj-metod.-vytyag.pdf





Corn

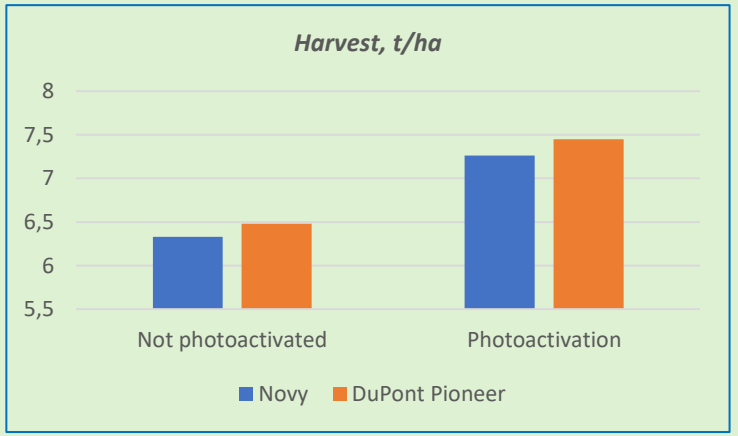
Seeds of the Novy and Pioneer hybrids from DuPont were selected for comparative analysis. No fertilizers were applied.

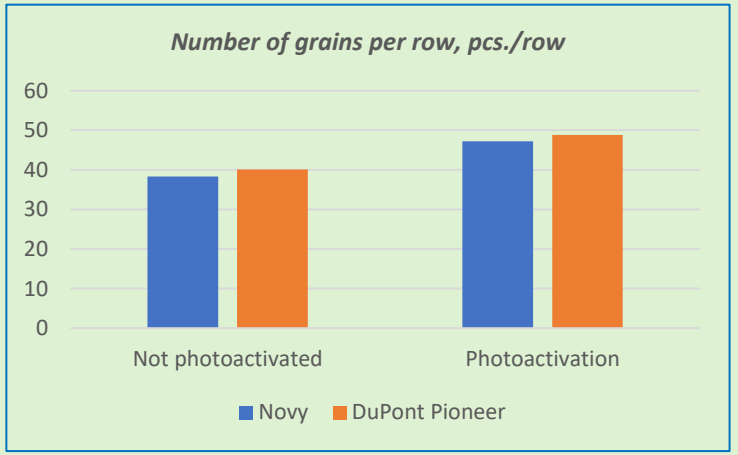
Photoactivation ensured:

- *a 13% increase in corn yield—from 6.33 to 7.26 t/ha and from 6.48 to 7.45 t/ha, respectively;*
- *a 1.52 to 1.57-fold reduction in helminthosporiosis, a 1.52 to 1.54-fold reduction in rust, and a 1.6 to 1.57-fold reduction in smut.*

Details here :
https://www.waterlight.pro/wp-content/uploads/2024/03/z_kak-povisit-urojaynost-kukuruzy.pdf

https://www.waterlight.pro/wp-content/uploads/2024/01/kukurudza-na-zerno-nano-hvylovyj.pdf





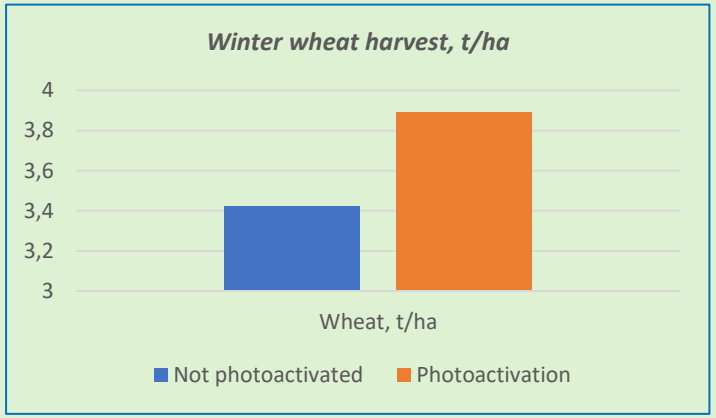
Wheat

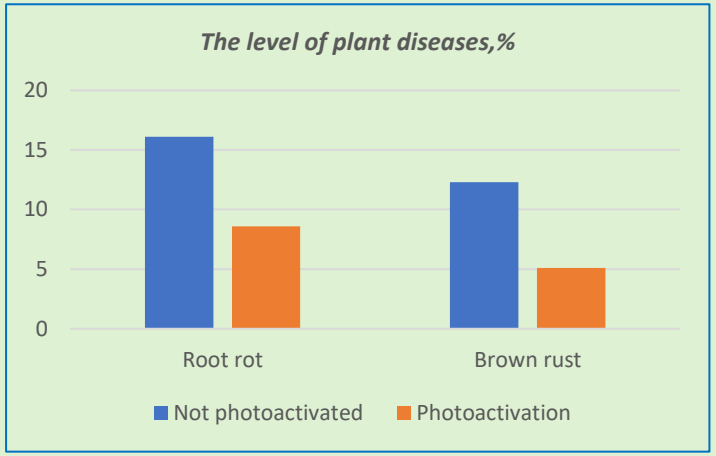
Photoactivation of winter wheat seeds resulted in:

- *a 13.7% increase in yield (from 3.42 to 3.89 t/ha);*
- *a 5% increase in the weight of 1,000 seeds (from 40.2 to 41.6 g);*
- *a 7.5% reduction in root rot diseases (from 16.1 to 8.6%) and a 7.2% reduction in brown rust (from 12.3 to 5.1%).*

Details here:
https://www.waterlight.pro/wp-content/uploads/2024/03/z_oshhutimaja-pribavka_03-16.pdf

https://www.waterlight.pro/wp-content/uploads/2024/01/oz.-pshenyczya-nano-hvylovym-metodom.pdf



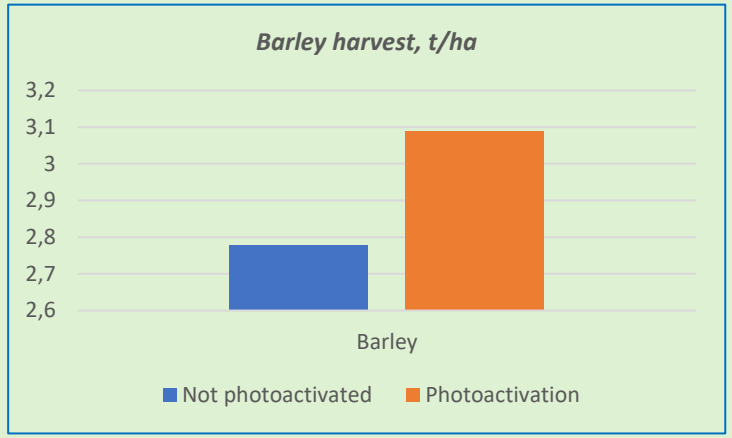


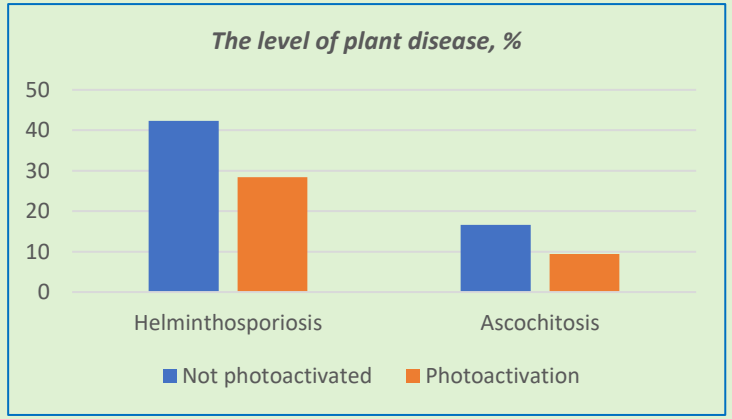
Barley

Photoactivation of barley seeds resulted in:

- *an 11% increase in yield (from 2.78 to 3.09 t/ha);*
- *a 13.9% reduction in barley diseases caused by helminthosporiosis (from 42.3 to 28.4%) and ascochytosis (from 16.6 to 9.4%);*
- *an increase in the weight of 1,000 seeds by 5% (from 41.7 to 43.8 g).*

Details here:
https://www.waterlight.pro/wp-content/uploads/2024/01/yachmin-nano-hvylovyj-metod.pdf

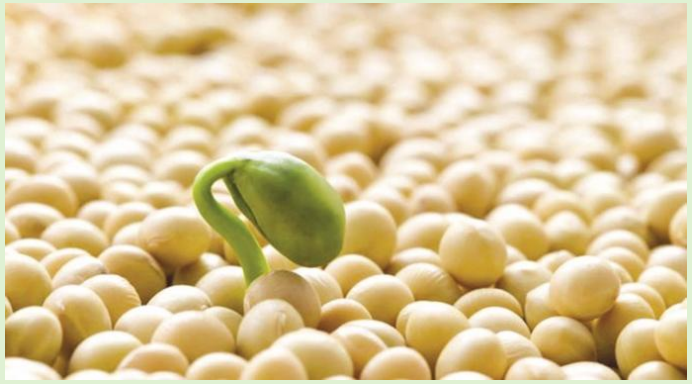




Soybean

Photoactivation of soybean seeds resulted in:

- *a 12% increase in soybean yield from 2.83 to 3.17 t/ha;*
- *a 1.42-fold reduction in peronosporosis, a 1.76-fold reduction in septoria, and a 1.65-fold reduction in anthracnose.*



Details here:
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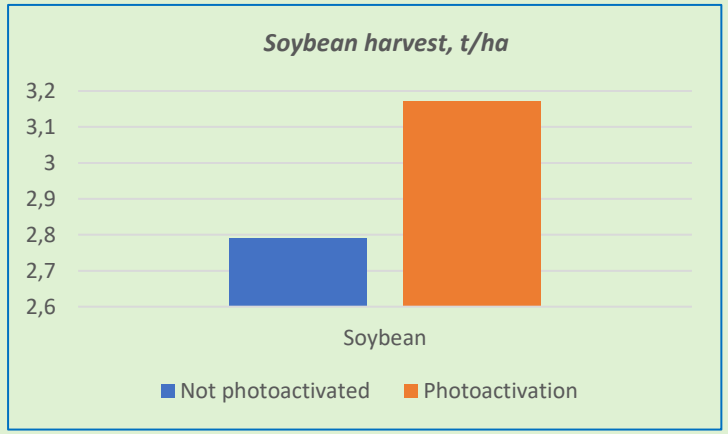
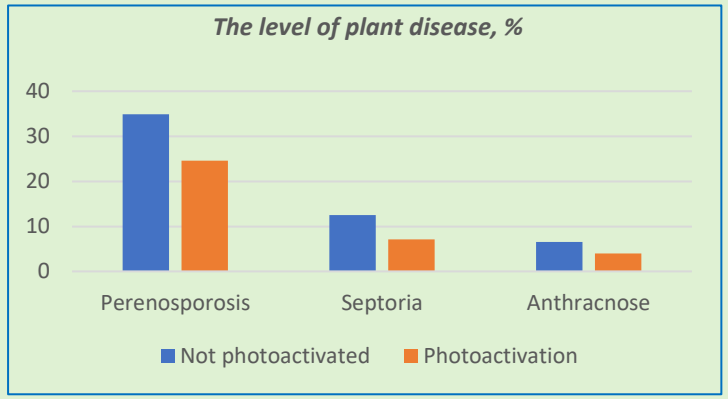
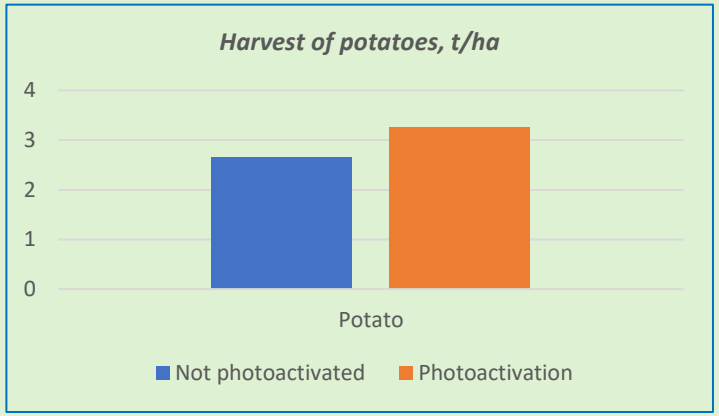


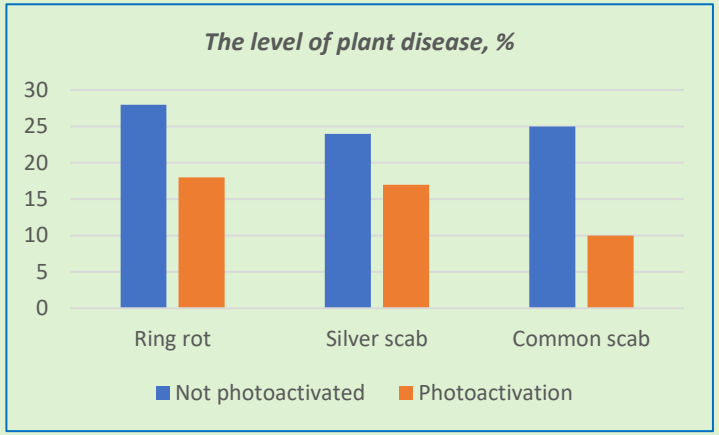


Potatoes

- *Photoactivation provided (Kuprevich Institute of Experimental Botany of the National Academy of Sciences of Belarus):*
  - *a 23% increase in potato yield—from 20.5 t/ha to 25.3 t/ha;*
  - *a 2 to 2.5-fold reduction in mineral fertilizer consumption;*
  - *a 30 to 35% reduction in potato tuber damage from ring rot, a 25 to 28% reduction from silver scurf, and a 56 to 62% reduction from common scurf.*

Details here:
https://botany.by/about-institute/struktura/otdel-ekologicheskoj-fiziologii-rastenij/laboratoriya-vodnogo-obmena-rastenij/



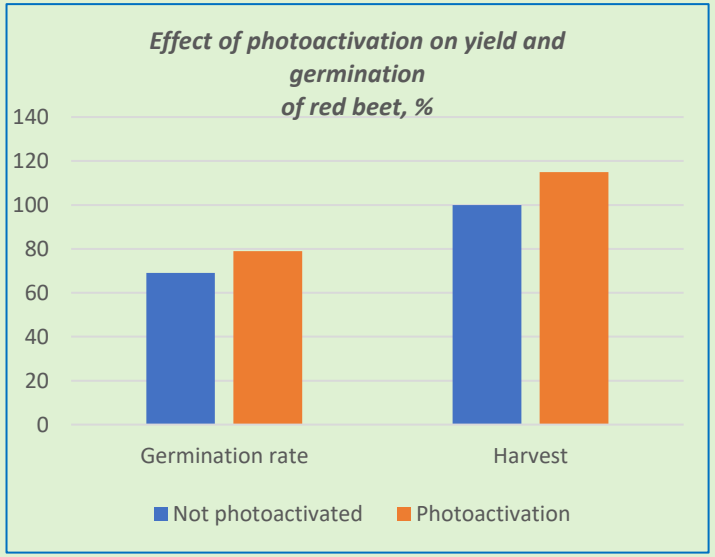


Red beetroot

Photoactivation of table beet seeds (Delikatesny variety) with reduced initial germination of 69% (instead of 75% according to DSTU 2240) ensured:

- *a 10% increase in plant germination, exceeding the standard requirements;*
- *an increase in yield by 14–15%.*

Details here :
https://yuriev.com.ua/ua/



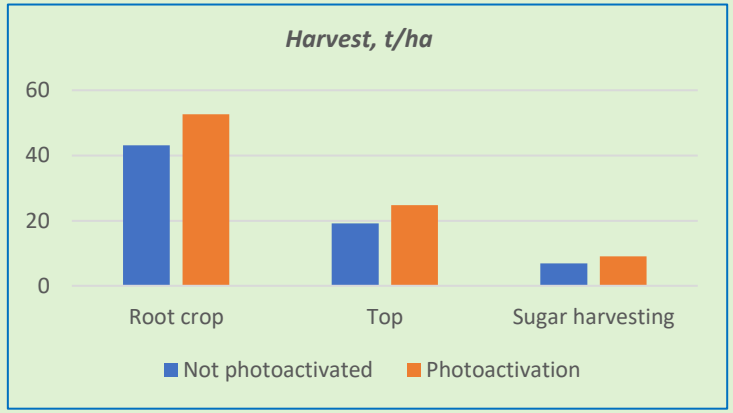
Sugar beet

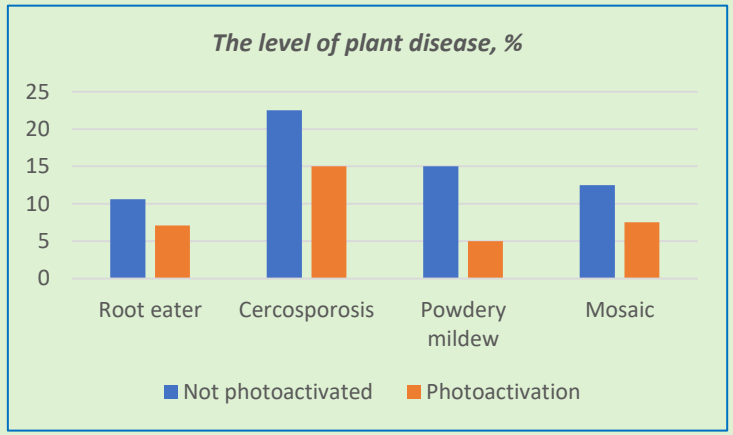
Photoactivation of sugar beet seeds (Bulava hybrid) ensured (no fertilizers were applied):

- *a 22% increase in root crop yield—from 43.1 to 52.6 t/ha;*
- *a 67% reduction in the number of sugar beet seedlings affected by rootworm;*
- *a 31% increase in sugar yield, from 6.9 t/ha to 9.05 t/ha.*

Details here :
https://www.waterlight.pro/wp-content/uploads/2024/03/43-45_tn_po-vole-nanovoln.pdf

https://www.waterlight.pro/wp-content/uploads/2024/01/buryak-nano-hvylovyj-metod.pdf



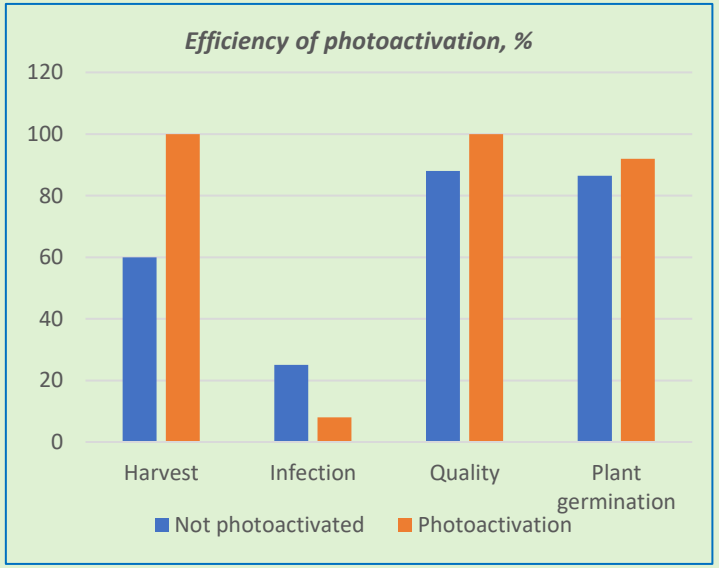


Cotton

The positive effect of photoactivation on the yield and quality of cotton and fiber was experimentally established.

Photoactivation of cotton seeds provided:

- *increased seed germination from 86.5 to 92%;*
- *reduction of seed infection by 30...32%;*
- *increase in yield by 1.68...1.81 t/ha (i.e. by 44...48.1%);*
- *improvement of technological quality of cotton fiber: increase in breaking load by 4.4...6.7% and breaking length by 10.5...11.3%.*



Advantages

- *The quality of plants grown from photoactivated seeds exceeds the quality of plants grown from non-activated seeds in all respects;*
- *Photoactivation significantly reduces the use of mineral fertilizers and chemical plant protection products, which is the basis of organic farming;*
- *Photoactivation protects the environment from pesticide pollution;*
- *PHOTOZONE increases seed germination and energy, which accelerates plant development and helps reduce crop losses due to insufficient soil moisture during sowing.*
- *Photoactivation of seeds increases plant resistance to drought, early frosts, and various diseases.*

PHOTOZONE photoactivators are:

- *Guaranteed ADDITIONAL yield.*
- *ADDITIONAL profit of 100-150 USD per hectare.*
- *Versatile use: photoactivation + disinfection.*
- *Cost-effective, specific energy consumption does not exceed 5 kWh/t. The cost of pre-sowing seed treatment does not exceed 0.5–0.75 USD/t.*
- *Simple and reliable design. To perform photoactivation, simply connect the photoactivators to the electrical network.*
- *The cost of the photoactivators is fully offset by the ADDITIONAL yield from a sowing area of 100–200 hectares.*

WHAT WE DO TODAY DETERMINES OUR FUTURE

Seed photoactivators
PHOTOZONE
Ukrainian patent No. 73663
dated October 10, 2012

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