Biophotonic evaluation of water treated by biodynamization: comparison of ultra-low emission levels in the 380–630 nm and 435–500 nm bands on different types of water and on germinated seeds

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ABSTRACT

This study investigates the ultra-weak photon emission (UPE) arising from spontaneous photonic reactions in different water types — tap water, bottled mineral water, reverse-osmosis water, and water treated by the Biodynamizer dynamization system (SA Dynamized Technologies). The objective was to evaluate potential differences in their photon emission characteristics and their influence on the germination and early development of seeds. Measurements were conducted using a Berthold Lumat LB 9508 luminometer, equipped with borosilicate glass test tubes and an optical bandpass filter (435–500 nm), covering the spectral range 380–630 nm and the subrange 435–500 nm. All experiments were performed under controlled laboratory conditions at Enerlab (Nice, France) on November 4–6, 2025. Photon emission intensities are expressed in Relative Light Units (RLU). The results show no emissions (0 RLU) for mains water, bottled mineral water, and reverse osmosis water, while biodynamically treated mains water shows 519 RLU (380–630 nm) and 272 RLU (435–500 nm) immediately after dynamization treatment. After 24 hours, the values remain significant (184 and 168 RLU, respectively) for biodynamically treated mains water, indicating a partial decrease but persistence of the biophotonic emission phenomenon. Measurements of ultra-weak photons in the blue-green spectral range (≈435–500 nm) highlight a better persistence of the biophotonic emission phenomenon (-38% instead of -65% in the 380-630 nm spectral range) over 24 hours after biodynamized treatment of water. This spectral range is known to correspond to electronic transitions of flavins and cytochromes, involved in mitochondrial respiration and, in plants and photosynthesis. However, interpreting these variations as an increase in photonic coherence requires further investigation. The particularly marked emission in the 435–500 nm band highlights a possible link between biodynamization, photobiological coherence and cellular energy processes. In the Integrating study Ultra -Weak Photon Emission Analysis in Mitochondrial Research (Van Wijk & Van Wijk 2020), UPE is mentioned in the **300–900 nm range**, without exclusive or claimed details on 435,500 -nm. PMC +2 PubMed +2. In the study Spectral Distribution of Ultra -Weak Photon Emission as a Response to Wounding in Plants (Prasad *et al*. 2020), the authors indicate that photon emission covers from ~350 nm to ~1300 nm. MDPI. "UV-visible absorption spectrum of FAD and its reduced forms embedded in a cryptochrome protein" — Physical Chemistry Chemical Physics (RSC Publishing) DOI:10.1039/D0CP01714K RSC Publishing. Abstract: The authors show that for the coenzyme flavin adenine dinucleotide (FAD), in its oxidized form, a $\pi_2 \rightarrow \pi_3$ transition is observed around 450 nm (blue-green). The emission fluorescence is around ~510-520 nm in this context. This result therefore confirms that FAD has maximum absorption in the ~450 nm range, which falls well within the 435-500 nm band. Note: "For the oxidized form of FAD… the first band in the blue visible light region… centered around 450 nm." RSC Publishing. "Ultrafast dynamics of flavins in five redox states" — PMC, 2009/2010 (approximately) PMC. Summary: Study on the absorption and emission spectra of flavins (FAD, FMN) in several redox states. It reports that the absorption for the oxidized form of FAD is at ~450

nm, emission at ~530 nm. Note: “Oxidized FAD in solution exhibits two broad absorption bands… with the peaks at 450 nm for $S_0 \rightarrow S_1$ and at 375 nm for $S_0 \rightarrow S_2$.” PMC. This supports the fact that the blue-green region (≈450 nm) is a relevant signal for flavins involved in respiration. “Why Flavins Are Not Competitors of Chlorophyll in the Evolution of Biological Converters of Solar Energy” — International Journal of Molecular Sciences, 2013 (MdPI). Abstract: This article mentions that flavins absorb “photons from the blue area… the long-wave absorption maximum of flavin is 450 nm.” Quote: “…Neutral solutions of riboflavin, FMN, and FAD have a long-wave absorption maximum of 450 nm…” MDPI. This further confirms that 450 nm is a peak absorption for flavins—a key element in mitochondrial energy metabolism. “Absorption and Luminescence Spectroscopy of Mass-Selected Flavin Adenine Dinucleotide Mono-anions” — The Journal of Chemical Physics, 2018 DOI:10.1063/1.5024028. Abstract: Researchers measured the optical transitions of FAD mono-anions from 210 to 550 nm. They show that one of the transitions ($S_0 \rightarrow S_2$) is strongly linked to ~450 nm under gas-phase conditions. Quote: “The measurements cover the first four optical transitions of FAD… excitation energies from 2.3 to 6.0 eV (210–550 nm)…This reinforces the idea that the ~435–500 nm range is relevant for flavins. “Circular spectropolarimetric sensing of chiral photosystems in decaying leaves“ — arXiv, 2017 arXiv.

Keywords: Biophotons, Biodynamized Water Germinated Seeds, Spectral Range, Bio Luminometer, RLU.

1 INTRODUCTION

1.1 WATER

Water is at the heart of all biological processes. It is not only the main constituent of living things, but also an essential energy and information mediator in biological systems.

Water quality directly influences the vital functions of plants, animals and humans: nutrient absorption, redox regulation, cellular hydration, and enzymatic metabolism (Pollack, 2013; Chaplin, 2021).

Beyond the classic criteria for potability (absence of chemical and microbiological contaminants), a growing number of studies are exploring the notion of "biological quality" of water, including subtle parameters such as molecular structure, redox potential, surface tension, or even the ultra-weak emission of photons — biophotons — sensitive indicators of the energy state and coherence of the environment (Popp, 1992; Van Wijk & Van Wijk, 2015).

In this context, water plays a fundamental role. Beyond its role as a solvent, it acts as a quantum electrodynamic matrix for living organisms (Del Giudice & Preparata, 1988; Pollack, 2013).

According to the work of Del Giudice, water can form coherent domains — regions where molecules oscillate in unison with the surrounding electromagnetic field, allowing the accumulation and coherent re-emission of photonic energy (Del Giudice *et al*., 2010).

Several experimental studies have shown that the physico-chemical quality and energetic quality of water influences biological processes:

In biophotonics, it is recognized that the ultra-weak emission of photons reflects the internal coherence of an aqueous or biological system and can serve as an indicator of energy quality or vitality (Cordeiro *et al*., 2017; Benfatto *et al*., 2023).

Water assessment using ultra -weak bioluminescence (Cordeiro A. C. *et al*., 2017) — PubMed ID: 29049939. Link https://pubmed.ncbi.nlm.nih.gov/29049939/ PubMed +1

Biophotons: New Experimental Data and Analysis (Benfatto M. *et al*., 2023) — PubMed ID: 37895552. Link: https://pubmed.ncbi.nlm.nih.gov/37895552/ PubMed +1

It is from this perspective that this study evaluated the impact of the Biodynamizer dynamization system on the biophotonic capacity of water.

The objective of this study is therefore to experimentally compare the biophotonic emission level of biodynamized water and several control waters, focusing particularly on the biologically significant 435–500 nm spectral band. and to see if this biophotonic energy is transmitted to the plant kingdom, in this case to germinated seeds.

1.2 BIOPHOTONS

The photon is an elementary particle that mediates the electromagnetic interaction.

The discovery that all living systems constantly emit specific photonic radiation also called biophotons or UPE (Ultra-weak photon emission) has inspired many researchers to consider the informational potential of these biological photons as vectors of inter- and intracellular communication.

Biophotons have been the subject of several hundred publications to date, all validated in leading peer-reviewed scientific journals.

This phenomenon, highlighted by Fritz-Albert Popp in the 1970s, paved the way for a new understanding of biology as a coherent electrodynamic system (Popp, 1979; Van Wijk, 2001).

Biophotonic emissions are directly linked to the cellular oxidation state (natural process by which cells convert energy from nutrients using oxygen, which is essential for the production of ATP (cellular energy), mitochondrial activity and electronic transitions of bioactive molecules (Kobayashi *et al*., 1999; Rastogi & Pospíšil, 2011).

This biophotonic light plays a major role at different levels of life processes within cells and biological tissues (Scientific biophotons reference Table 1).

Numerous studies have demonstrated that biophotons play a role in regulating the biological clock, DNA and protein function, particularly in DNA replication, ATP production as an energy reserve, protein synthesis, oxidative phosphorylation, and photosynthesis.

These biophotons, re-emitted within cells, are coupled to free radical reactions and are also linked to DNA as a significant source of emission.

In living systems, biophoton emission can originate either from **active metabolic processes** (such as mitochondrial respiration or photosynthesis) or from **oxidative stress reactions** involving reactive oxygen species (ROS). In contrast, water is not a metabolic medium; its photon emission does not reflect biochemical activity but rather an **electrodynamic or coherent organizational state**.

Therefore, an increased and stable ultra-weak photon emission observed in biodynamically treated water should not be interpreted as a stress-related signal, but as an indicator of **enhanced photon coherence** and **improved energy transfer capacity**. Such a state may facilitate **resonant coupling** with biological systems, supporting more efficient redox and energetic interactions at the cellular level.

Table 1

Scientific biophotons reference

Study	Summary of what she shows	Link
Biophoton emission. New evidence for coherence and DNA as source (Popp *et al*., 2001) – *Biophoton emission…*	This shows that ultraweak -photon emission (UPE) is linked to DNA (conformational changes modify the emission). PubMed	PubMed
Ultra -weak photon emission of human body (2004) – Kobayashi *et al*.	A study on ultraweak -photon emission in humans, suggesting a link with cellular metabolism and oxidation. PubMed	PubMed
Spectral Distribution of Ultra -Weak Photon Emission as a Response to Wounding in Plants (Prasad & Pospíšil, 2020)	Shows that plant systems exhibit increased photon emission, linked to ROS and oxidative metabolism. MDPI +1	MDPI
Biophotons: A Hard Problem (Cifra *et al*., 2024)	A critical review stating that biophotons are "chemically produced during oxidative metabolism" and mentioning DNA as a possible source. MDPI	MDPI

Source: Prepared by the authors

These biophotons are recognized as energy released in the form of light by changes in energy metabolism.

Research since the 1960s shows that in addition to the chemical composition of our food, light energy in the form of biophotons is also an important factor in the level of **food quality assessment**.

1. **Mould, R. R. *et al*. (2024) — *Ultra Weak Photon Emission: A Brief Review***

This recent review summarizes the mechanisms underlying ultra-weak photon emission (UPE), current measurement technologies, and potential applications in agriculture and food quality assessment.

It provides an updated conceptual framework linking UPE intensity and spectral features to the physiological state and freshness of biological materials.

2. **Cifra, M., Van Wijk, E., & Scholkmann, F. (2014) — *Ultra-weak photon emission from biological systems: Mechanisms and applications. Journal of Photochemistry and Photobiology B: Biology.***

A comprehensive review describing how UPE reflects metabolic activity and oxidative stress in living systems. The authors discuss potential applications of biophoton analysis in evaluating food freshness, spoilage, and overall biological quality.

3. **Nematollahi, M. A., *et al*. (2020) — *Ultra-weak photon emission: A nondestructive detection tool for food quality and safety assessment. Quality Assurance and Safety of Crops & Foods.***

This article explores UPE as a non-invasive analytical method for assessing food quality and safety. It reports correlations between photon emission intensity and parameters such as rancidity, microbial degradation, and oxidative stability in stored foods.

4. **Prasad, A. & Pospíšil, P. (2020) — *Spectral Distribution of Ultra-Weak Photon Emission as a Response to Wounding in Plants. Biology (MDPI).***

An experimental study analyzing the spectral profile of UPE in wounded plants. The findings show that spectral shifts and emission intensities vary with physiological state, supporting the idea that UPE spectra can serve as indicators of plant vitality and biochemical integrity.

5. **Jócsák, I., Gyalog, H., Hoffmann, R., & Somfalvi-Tóth, K. (2023) — *In-Vivo Biophoton Emission, Physiological and Oxidative Responses of Biostimulant-Treated Winter Wheat. Plants (MDPI).***

This study demonstrates a strong correlation between beneficial biostimulant treatments, enhanced physiological performance, and increased UPE in winter wheat. It supports the hypothesis that higher UPE can signify improved metabolic efficiency and vitality in plants.

6. **Shi, W. *et al*. (2024) — *An Effective Method for Detecting Wheat Freshness by Integrating Machine Learning with Biophoton Analytical Technology. Scientific Reports (Nature Publishing Group).***

This study combines biophoton emission measurements with machine learning algorithms to predict wheat freshness. The approach confirms that UPE parameters can accurately classify food freshness and quality, providing a robust non-destructive evaluation method.

7. **Prasad, A. & Pospíšil, P. (2012); Rastogi, A. & Pospíšil, P. (2011) — *Studies on UPE and Reactive Oxygen Species (ROS) in Biological Systems.***

These foundational studies establish that UPE intensity and spectral distribution correlate with ROS dynamics and oxidative processes in biological tissues. They provide theoretical and experimental bases to distinguish UPE arising from oxidative stress versus that linked to normal metabolic activity.

8. **Benfatto, M. *et al*. (2023) — *Biophotons: New Experimental Data and Analysis. Frontiers in Physiology / PMC.***

A recent experimental investigation of biophoton emission from germinating seeds and biological samples. The authors analyze emission spectra and kinetics, demonstrating that UPE can reflect biological vitality and structural order in living systems.

9. **De Paolis, F. *et al*. (2024) — *Biophotonics in Food Technology: Quo Vadis? Trends in Food Science & Technology.***

A broad review summarizing modern optical and photonic techniques in food science. It highlights UPE as a promising method for non-destructive assessment of food freshness, microbial contamination, and biochemical stability.

10. **Various applied reports (2020–2024) — *Correlation between Ultra-Weak Photon Emission and Food Shelf-Life in Fruits and Grains.***

Several experimental studies cited in the above reviews demonstrate practical correlations between UPE intensity and food quality parameters such as storage time, oxidation level, and germination potential. These findings collectively support the interpretation of UPE as an indicator of biological quality rather than degradation alone.

1.3 PUBLISHED STUDIES

- Fritz -Albert Popp *et al*. (“Properties of biophotons and their theoretical implications”) mention that “biophotonics … provide a new powerful tool for assessing the quality of food (like freshness and shelf life)…”. PubMed.
- A study on the show photonics in wheat: “ Quantum agriculture and experimental detection of wheat flour quality using thermal image technology” (2023) shows that “the luminescence of biophotons … is useful for rapid and accurate measurement of the relationship between the quality of wheat and photon emission parameters. » PMC.
- In -Vivo Biophoton Emission, Physiological and Oxidative Responses of Biostimulant -Treated Winter Wheat (Triticum eastivum L.) as Seed Priming Possibility, for Heat Stress Alleviation (Jócsák I., Gyalog H., Hoffmann R., Somfalvi -Tóth K., 2022) — Shows that in wheat, after treatment with a biostimulant, biophoton emission decreases under heat stress and that this

measurement is correlated with lipid oxidation and antioxidant capacity. PubMed Link: https://pubmed.ncbi.nlm.nih.gov/35270110/.

- Effect of cadmium stress on certain physiological parameters, antioxidant enzyme activities and biophoton emission of leaves in barley (Hordeum vulgare L.) seedlings (2020) — Study on barley exposed to cadmium: biophoton emission increases in response to metal stress, suggesting a link between oxidative stress, antioxidant activity and UPE. PubMed

1.4 ORIGIN OF BIOPHOTONS: ULTRA-WEAK EMISSIONS FROM REDOX REACTIONS

Biophotons (or ultraweak photon emissions, UPE for Ultraweak *Photon Emission*) are spontaneously emitted photons by biological systems, generally in the 200–800 nm range.

They do not originate from classical fluorescence, but from radical recombination reactions and excited molecular states created during:

- lipid peroxidation,
- the reduction of oxygen,
- and mitochondrial energy redox reactions.

These processes generate **excited molecules** (e.g. *triplet carbonyls*, *singlet oxygen*), which release a **photon** when they return to the fundamental state.

1.5 FUNCTIONAL LINK: MITOCHONDRIA ↔ ATP ↔ BIOPHOTONS

- The higher the mitochondrial activity, the higher the ATP production and redox tension.
- This activity leads to an increase in electron flux and therefore an increased probability of biophotonic emissions.
- Thus, the level of biophotons is often considered an indirect indicator of mitochondrial energy efficiency and cellular vitality.
- Conversely, a redox imbalance or oxidative stress (too much ROS: Reactive Oxygen Species) can also transiently intensify these emissions.

These studies confirm that:

Mitochondrial activity and ATP production are closely linked to cellular respiration and ROS generation. Ultra-weak photon emissions (biophotons) are correlated with oxidative state, ROS production, and can serve as a non-invasive marker of cellular metabolism.

- The increase in ultra-weak photon emission observed in seeds watered with biodynamized water is interpreted as a marker of functional vitality.

1.6 PHOTOBIOMODULATION, CELLULAR RESPIRATION, ATP AND BIOPHOTONS: A COHERENT BIOENERGETIC INTERACTION

Photobiomodulation (PBM) refers to the influence of low-intensity light, typically in the 380–900 nm wavelength range, on cellular biological processes. Its primary effect is based on the absorption of photons by intracellular chromophores, most notably cytochrome **c oxidase (CCO)**, the terminal enzyme of the mitochondrial respiratory chain.

Photonic activation of this enzyme promotes more efficient electron transfer within mitochondrial complexes, leading to an increase in the **electrochemical gradient** and, consequently, in **ATP synthesis** by ATP synthase.

Several studies have shown that the intensity and temporal dynamics of photon emission (UPE/biophotons) correlate with the metabolic status of plant organs and seed germination capacity: higher UPE levels have been associated with increased metabolic activity, improved germination capacity, and/or greater physiological resilience in non-stressful environments. Therefore, in experimental settings where seedling growth and physiological indicators are enhanced, a measurable increase in biophotons is a favorable indicator of the bioenergetic state and overall health of the system.

Biophotons, or ultra-weak light emissions (generally in the 200–800 nm range), represent a quantifiable manifestation of these mitochondrial redox processes. They result from the de-excitation of excited electronic states produced during oxidation reactions, particularly those involving free radicals and lipid peroxidation.

Thus, endogenous cellular luminescence (to be distinguished from the biophotonic luminescence contained in water!) can be interpreted as a direct reflection of the energy dynamics and level of oxidative stress of a biological system.

The spectral bands between 380 and 630 nm encompass the fluorescent and photonic emissions associated with mitochondrial coenzymes and cytochrome complexes. NADH fluorescence appears mainly around 450 nm, FAD fluorescence around 520 nm, while cytochromes exhibit transitions in the visible red (~500–600 nm).

These spectroscopic signals partially reflect the redox states of these molecules and can be used as indirect indicators of mitochondrial activity.

Relevant scientific studies:

- Quantitative auto -fluorescence Quenching of free and bound NADH in HeLa cell line model: shows that the autofluorescence -of NADH/ NAD (P)H is measured after excitation at ~340 nm, with emission detected in the ~400–550 -nm range. PubMed
- Transient absorption spectroscopy and imaging of redox in muscle mitochondria: uses pump and probe wavelengths in the visible range (450, 490, 620 nm) to detect the redox state of mitochondria. PMC
- Characterization of NADH fluorescence properties under one -photon excitation with respect to temperature, pH, and binding to lactate dehydrogenase: characterizes the fluorescence properties of NADH after excitation at 375 nm, with a spectral response in the visible range. PubMed
- Spectroscopic identification of the catalytic intermediates of cytochrome c oxidase in breathing heart Mitochondrial: demonstrates specific absorbances in the Soret (~ -420–450 nm) and α (~560–630 nm) regions for cytochrome c oxidase. PubMed
- UV -visible absorption spectrum of FAD and its reduced forms embedded in a cryptochrome protein: describes the UV- visible spectrum of FAD and its reduced forms in a protein context. RSC Publishing

More generally, these photonic emissions appear to be correlated with mitochondrial function—via ATP, ROS, and oxidative phosphorylation—suggesting that a photonic emission spectrum could reflect the bioenergetic state of a biological system.

However, the precise classification of wavelengths (e.g., 380–435 -nm vs. 435–500 nm vs. 500–630 nm) as markers of an “intense oxidative state” or a “stable energy state” remains to be experimentally validated.

During oxidative phosphorylation, a significant proportion of -electrons circulating in the respiratory chain can "leak" to oxygen to form reactive oxygen species (ROS). These radicals and lipid peroxidations generate excited states in mitochondrial membranes, resulting in ultra- -weak photon emission (UPE, typically in the ~200–800 nm range). Several studies suggest that this photon emission could serve as a non-invasive indicator of mitochondrial redox state and cellular metabolism (Van Wijk *et al*., 2020; Rastogi & Pospíšil, 2013).

Thus, the **biophotonic emission rate** directly reflects metabolic activity and **ATP turnover**. This emission correlates with **mitochondrial potential**, ROS production, and oxidative phosphorylation efficiency, constituting a non-invasive marker of cellular metabolism. Thus, photobiomodulation acts both as a modulator of energy metabolism and as a regulator of oxidative stress, indirectly influencing the

biophotonic profile of cells. This coherent link between incident light, mitochondrial respiration, ATP production, redox balance and biophotonic emissions suggests the existence of a light and energy continuum at the heart of life.

Biophotons thus appear as potential non-invasive markers of bioenergetic state and level of cellular vitality.

Role of biophotons on a biological, biochemical and physiological level, both in plants and in human beings by wavelength bands, from 380 to 630 nm (Scientific reference table 3), specifying for each:

- the corresponding spectral zone,
- the biological role in plants,
- the biochemical or physiological effects in humans,
- and the possible significance in the context of biophotons (ultra-weak emission linked to oxidative metabolism).

Table 2

Detailed analysis of wavelengths 380–630 nm and their bio-biochemical effects

Spectral band	Wavelengths (nm)	Main effects on the plant	Main effects on human beings	Biochemical mechanisms
Violet–Near-UV	380–420 nm	photoprotective responses (synthesis of flavonoids, anthocyanins). Stimulates morphogenesis and antioxidant defense (activation of PAL, CHS genes).	Regulates circadian rhythms via melanopsin ; may stimulate alertness. Prolonged exposure = ocular oxidative stress.	Excitation of flavin chromophores and activation of regulated ROS pathways (Nrf2, peroxidases).
Blue-green	420–500 nm	Activates phototropin, cryptochrome and zeaxanthin → stomatal opening, inhibition of elongation, stimulation of photosynthesis. Induces the accumulation of chlorophyll and antioxidants.	Activates cytochrome c oxidase (CcO_2) at low doses (blue photobiomodulation). Regulates the biological clock, melatonin and dopamine secretion.	Absorption by flavoproteins and cryptochromes → modulation of NADH/ NAD^+ and mitochondrial ATP production.
Cyan-Green	500–570 nm	It penetrates deep into the canopy, influencing morphology (phototropin / phytochrome balance). It has little direct photosynthetic effect but regulates the chlorophyll a/b ratio.	Modifies the circadian response, influences autonomic tone and hormonal regulation. Moderate tissue penetration, moderate action on ROS.	GPx enzymes via photo-oxidative signals.
Yellow-Orange	570–600 nm	Stimulates carotenoid synthesis, regulates photomorphogenesis, influences flowering and hormonal signaling (ABA, GA).	Psychoneurological influence (stimulation of alertness and mood). Weak direct effect on mitochondria.	Secondary activation of carotenoid pigments and modulation of the NADPH/ROS ratio.
Red	600–630 nm	Phytochrome activation (Pr ↔ Pfr): controls germination, flowering, photoperiodism and starch synthesis. Maximum stimulation of photosynthesis (peak around 620–680 nm).	Key wavelength of photobiomodulation: activation of cytochrome c oxidase, increase in ATP, reduction of inflammation, tissue stimulation and healing.	Absorption by the cytochrome c oxidase → mitochondrial electron transfer, increased $\Delta\psi m$, ATP production and

Spectral band	Wavelengths (nm)	Main effects on the plant	Main effects on human beings	Biochemical mechanisms
				modulation of physiological ROS.

Source: Prepared by the authors

435–500 nm spectral window corresponds to the blue- -green region and includes wavelengths absorbed by certain mitochondrial chromophores, notably heme transitions and cytochrome c oxidase, as well as by chlorophyll in plants, contributing partially to photosynthesis.

Photobiomodulation studies indicate that exposure to these photons can influence mitochondrial function, modulate enzymatic activity and redox signaling, with potential effects on ATP production, reactive oxygen species (ROS), and cellular homeostasis (Karu, 2010; Hamblin, 2018; Rastogi & Pospíšil, 2013; Wang *et al*., 2021; Johansson *et al*., 2012).

1.7 IN-DEPTH DISCUSSION: SPECIFIC ROLE OF THE 435–500 NM SPECTRAL BAND

The spectral range 435–500 nm, corresponding to blue-green, is a region of interest in the biophysics of living systems. This range of wavelengths is absorbed by various biological chromophores and can modulate photobiological processes, influencing the conversion of light energy into biochemical and bioenergetic signals.

1. **Rastogi & Pospíšil (2011) —** *Spontaneous ultraweak photon emission imaging of oxidative metabolic processes in human skin*

   Journal: J. Biomed. Opt., 16(9): 096005

   Objective: To study the ultra-low photon emission (UPE) of human skin as a function of oxidative activity and antioxidant defenses.

   Methods: Measurement of photons emitted by the skin under controlled conditions of oxygen and antioxidants.

   Results: Photon emission increases with oxidation and decreases in the presence of antioxidants. The authors establish a direct link between ROS and biophotons.

   Significance: Shows that UPE can serve as a non-invasive indicator of oxidative metabolism and oxidative stress in living tissues.**Link:** PubMed

2. **Prasad & Pospíšil (2012) —**

   Ultra-weak photon emission induced by visible light and ultraviolet-A radiation via photoactivated skin chromophores

   Journal: Journal of Biomedical Optics, 17(8): 085004

Objective: To study the effect of visible and UVA light on the photonic emission of the skin via photoactivated chromophores.

Methods: Skin irradiation and measurement of UPE in specific spectral bands.

Results: Exposure to light induces an increase in UPE, mainly through the excitation of flavins and other photoactive chromophores.

Importance: Illustrates the link between light, biological chromophores and photon production, applicable to mitochondrial flavoproteins**.**

Link: SPIE Digital Library

3. **Mould *et al*., 2024 —** *The application and trend of ultra-weak photon emission in biology and medicine*

Journal: Frontiers in Physiology

Objective: Recent review of UPE applications in biology and medicine.

Content: Presents examples of UPE measurement in different living systems (plants, animal cells, human tissues).Describes how UPE can serve as a marker of oxidative stress, metabolism, and mitochondrial activity.

Importance: Updates the state of the art of UPE, highlighting potential applications in photobiomodulation and non-invasive bioenergetic analysis.

Link: Frontiers

The photonic emission observed in the 435–500 nm range could reflect a modification of the electrodynamic properties of water after treatment with the Biodynamizer. Several theoretical models (Del Giudice & Preparata, 1988; Del Giudice *et al*., 2010; Vitiello, 2012) suggest that collective interactions between water dipoles can give rise to coherent domains capable of storing and transferring electromagnetic energy.

Although direct experimental evidence of the causal influence of these structures on mitochondrial or metabolic processes remains to be established, numerous studies show that water acts as a photodynamic interface and energy carrier in living systems (Cifra *et al*., 2014; Pospíšil, 2012; Rastogi & Pospíšil, 2011; Shen *et al*., 2022).

In this context, it is plausible that biodynamized water, by exhibiting increased photonic coherence, facilitates the transmission or resonance of biological light signals (biophotons), thus contributing to a more efficient regulation of the metabolic and energetic processes of germinated seeds.

Further studies are needed to establish a causal link.

2 OBJECTIVE

To measure the intensity and rate of biophotonic emission from different waters and to evaluate their correlation with the biophotonic response of germinated seeds.

The objective of this study is to quantify the effect of biodynamized treated water on the biophotonic emission of water (bands 380–630 nm and 435–500 nm), to evaluate the temporal stability of the observed phenomenon and to interpret the biophotonic results in regard of the proven scientific interpretations of the wavelengths filtered during this analysis.

An observation of the correlation between the rate of biophotonic emission of water and that of germinated seeds is also made in parallel in order to see to what extent the biophotonic energy of water is transmitted to the plant kingdom.

3 MEASURING EQUIPMENT

To ensure the most comprehensive measurements possible, several high-tech tools were selected to cross-reference the results and verify measurement consistency.

No reagents were used in the measured samples, so only the natural autoluminescence of each product was detected.

A high-sensitivity photomultiplier tube (PMT) luminometer.

3.1 THE LUMINOMETER (PHOTO 1AND 2)

It is important to note that the optical systems of the luminometers used in this study consist of two key components:

- a light-tight chamber to read the signal
- a PMT to detect it.

A luminometer is a device used primarily in molecular biology to measure light intensity. It is notably used for the study of bioluminescence reactions as well as for ATPmetry.

Light can be quantified and its intensity can be expressed in terms of the number of photons.

The small number of photons to be measured requires several characteristics:

- The emitted photons must be captured efficiently and transmitted almost entirely to the detector: this is the role of the photomultiplier tube, which "multiplies" the photons using several dynodes;
- The measurement must be carried out in absolute darkness to avoid any interference;
- The detector's sensitivity must be as high as possible to detect even the smallest photon.

A "luminometer" consists of:

- a light detector that counts photons (photomultiplier tube);
- a light-tight measuring chamber, in which the sample is placed;
- one or more reagent injectors to trigger the reaction (not used in our case);
- an electronic system to convert and display the photon measurement in Relative Light Units (RLU) on a screen. The RLU value indicates the number of photons emitted per second, per cm^2.

A Berthold luminometer, model LB 9508 (Figure 1), was used for the measurements in this study. This model incorporates a high-sensitivity PMT.

This is a low-noise photomultiplier tube operating in single-photon counting mode in the spectral range: 380-630 nm.

The units of measurement are expressed in RLU (Relativ Light Units).

The Berthold Lumat LB 9508 luminometer, equipped with a high-sensitivity photomultiplier, capable of detecting light intensities below 10^{-16} W/cm^2.

The water samples were placed in borosilicate glass test tubes to avoid any optical interference or spectral contamination.

A specific 435–500 nm optical filter was installed on a cuvette of the Lumat LB 9508 to target the blue-green range, the area corresponding to flavin fluorescence (FAD) and mitochondrial photoenergetic response.

- Sensitivity: High-sensitivity model: <1 amol of ATP/tube, <1 zmol of firefly luciferase
- Optical system: Photomultiplier tube
- Detector(s): Low-noise photomultiplier tube operating in single-photon counting mode
- Dimensions: (LxWxH) 24 x 28 x 22 cm (or 9.4 x 11 x 8.7 in)
- Temperature control: Operates at 15-35°C

The unit is controlled via ICE software **(Photos 3)**. Single and multiple endpoint readings are possible, as well as kinetic and scanning measurements.

Data is displayed numerically and graphically and can be exported to EXCEL or printed.

Figure 1

Berthold Lumat 9508 Luminometer

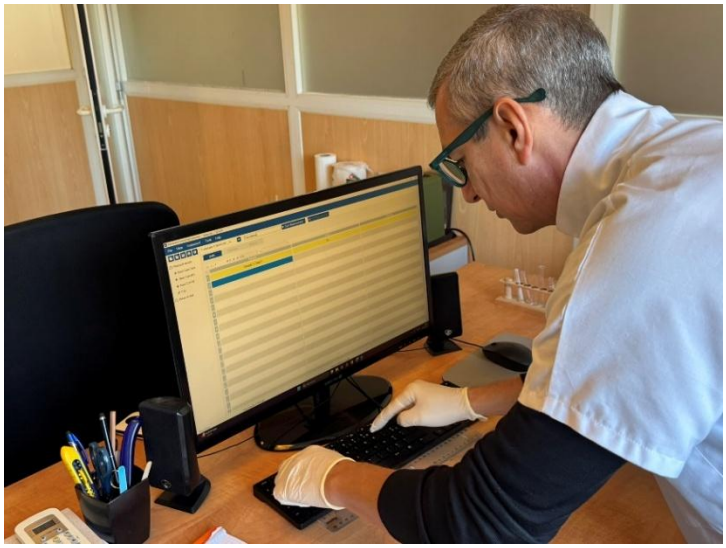
Source: Prepared by the authors

Figure 2

Berthold Lumat 9508 Luminometer

Source: Prepared by the authors

Figure 3



Source: Prepared by the authors

Figure 4

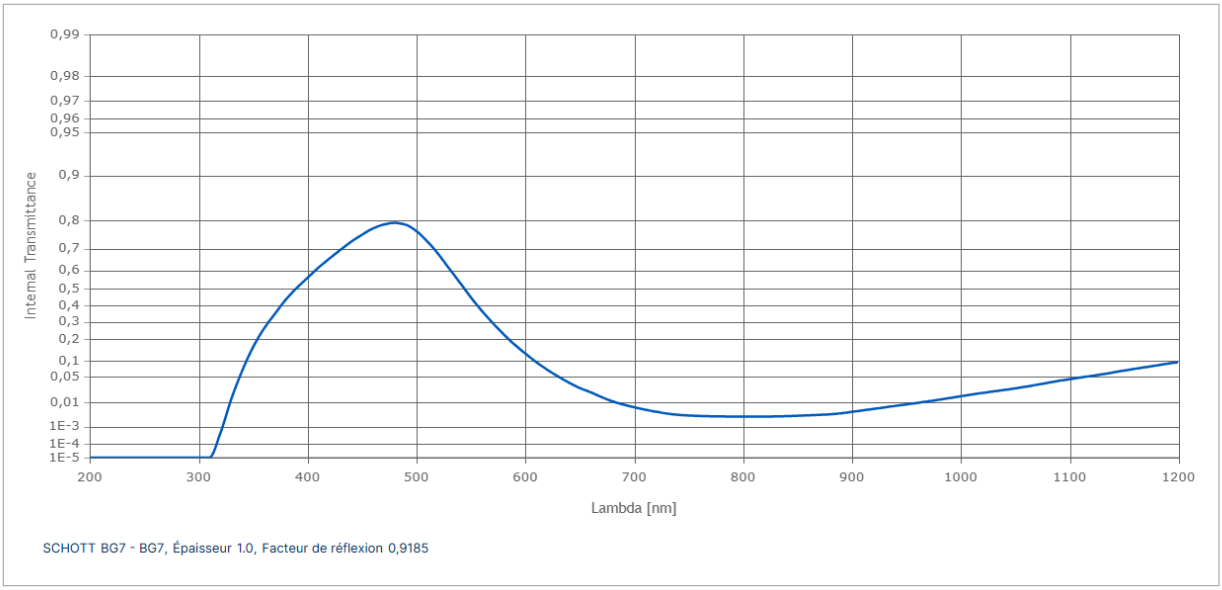
Source: Prepared by the authors

Figure 5

Source: Prepared by the authors

Figure 6

Quantum efficiency of Schott BG -7 glass in the 435-500nm spectrum



Source: Prepared by the authors

3.2 BIODYNAMIZER (PHOTO 7)

The core of this system is inspired by natural water regeneration processes—vortices, magnetism, mineral interactions, and photonic resonances (21 dynamization principles are integrated into the device). It is from this perspective that our study evaluated the impact of the Biodynamizer dynamization system on the biophotonic radiation of water and germinated seeds.

The Biodynamizer obtained in April 2025 the gold medal with the congratulations of the jury at the International Exhibition of Inventions in Geneva, Switzerland in the exhibition class: Beverages, Health, Paramedical, Food, Cosmetics, Hygiene as well as the ISTA Award (International Strategy & Technology Alliance)– Hong Kong, presented by Prof. Christopher CHAO, Vice President (Research and Innovation) of the Hong Kong Polytechnic University.

Figure 7

Biodynamizer

Source: Prepared by the authors

Figure 8

Test tube: Borosilicate *test tubes low fluorescence interference*

Source: Prepared by the authors

Samples: mains water, bottled mineral water, reverse osmosis water, biodynamized mains water (by the Biodynamizer dynamization system).

Sprouted seeds and tiered germinator (**Photo 9**)**: 10 grams of** Germline organic Alfalfa seeds per tray containing the different waters (**Photo 10-13**)

- Germination capacity greater than 90%.
- Start germination in each tray of seeds with 100 ml of water (4)
- Water the seeds daily by spraying 10 ml per tray (4)
- Germination time: 6 days

Figure 9

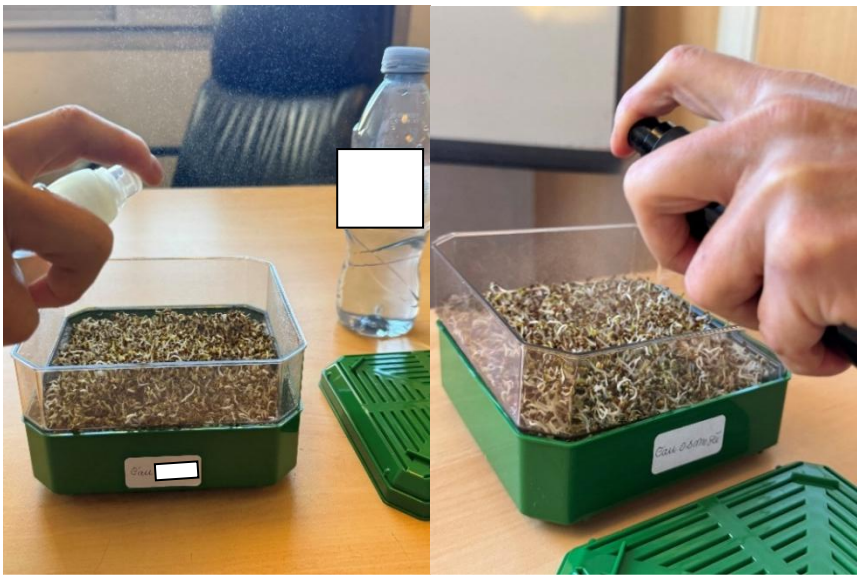
Sprouted seeds and tiered germinator

Source: Prepared by the authors

Figure 10

Source: Prepared by the authors

Figure 11



Source: Prepared by the authors

Figure 12

Source: Prepared by the authors

Figure 13

Source: Prepared by the authors

4 METHODS AND PROTOCOL

- **Sample tested:** domestic network water subjected to a biodynamization process (tap fully open, 100%).
- **Repeatability:** Eleven independent measurements were performed for each sample to ensure statistically significant reproducibility.
- **Signal correction:** the raw values have been corrected for background noise associated with the test tube and spectral filter (435–500 nm).
- **Optical equipment:** measurements were carried out in non-fluorescent borosilicate glass test tubes to avoid any parasitic emission or photonic disturbance.
- **Experimental environment:** the ENERLAB laboratory is isolated from external electromagnetic interference, guaranteeing optically and electromagnetically stable measurement conditions.

The experiments were conducted in a laboratory room maintained at a minimal ambient light level to reduce any external optical interference. The water samples (3.5 mL) were transferred into borosilicate glass test tubes and then individually introduced into the luminometer for recording biophotonic emissions.

Each test tube underwent a preliminary measurement under vacuum to determine its own photon background noise. This value was then subtracted from the experimental measurements for each sample.

The luminometer's dark chamber was previously calibrated to ensure the stability, linearity, and reproducibility of measurements over time.

5 RESULTS

5.1 WITH THE TDS (TOTAL DISSOLVED SOLIDS) METER:

TDS of water is an English acronym for Total Dissolved Solids, which means: total dissolved solids. In other words, it measures the quantity of solid particles other than the water molecule (H2O).

This is expressed in PPM (parts per million).

These particles are of all types: minerals, bacteria, viruses, heavy metals, chlorine, other organic and inorganic particles.

1. Tap water:
   Conductivity: 216 PPM
   Temperature: 18°C
2. Energized water using the Biodynamizer system:
   Conductivity: 223 PPM
   Temperature: 18°C
3. Bottled mineral water:
   Conductivity: 385 PPM
   Temperature: 18°C
4. Osmosis Water:
   Conductivity: 35 PPM
   Temperature: 18°C

5.2 WITH THE LUMINOMETER, VALUE EXPRESSED IN RLU (RELATIVE LIGHT UNITS, TABLE 3, FIGURE 23-24) WITH PMT (FIGURE 14)

The luminometer allows us to have a representation of the emission level and intensity of light of biophotons (quantities of biophotons emitted per cm2 / second) contained in water.

RLUs are universal units of measurement used for most luminescence measurements.

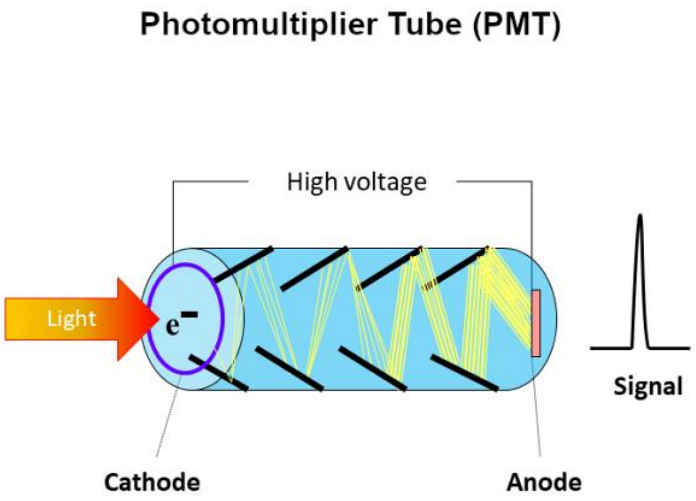
The luminometer is equipped with a photomultiplier tube (PMT) used to detect individual photons. When photons strike the photocathode located at the PMT's input window, they release electrons through the photoelectric effect.

These electrons are then accelerated by a high-voltage field and multiplied through a series of dynodes by secondary emission before reaching the anode connected to the readout circuit.

The signal collected at the anode is converted either into discrete pulses when the PMT operates in photon counting mode, *or into* a continuous analog current when the device is used in *current mode*.

Figure 14

Photomultiplier Tube (PMT)



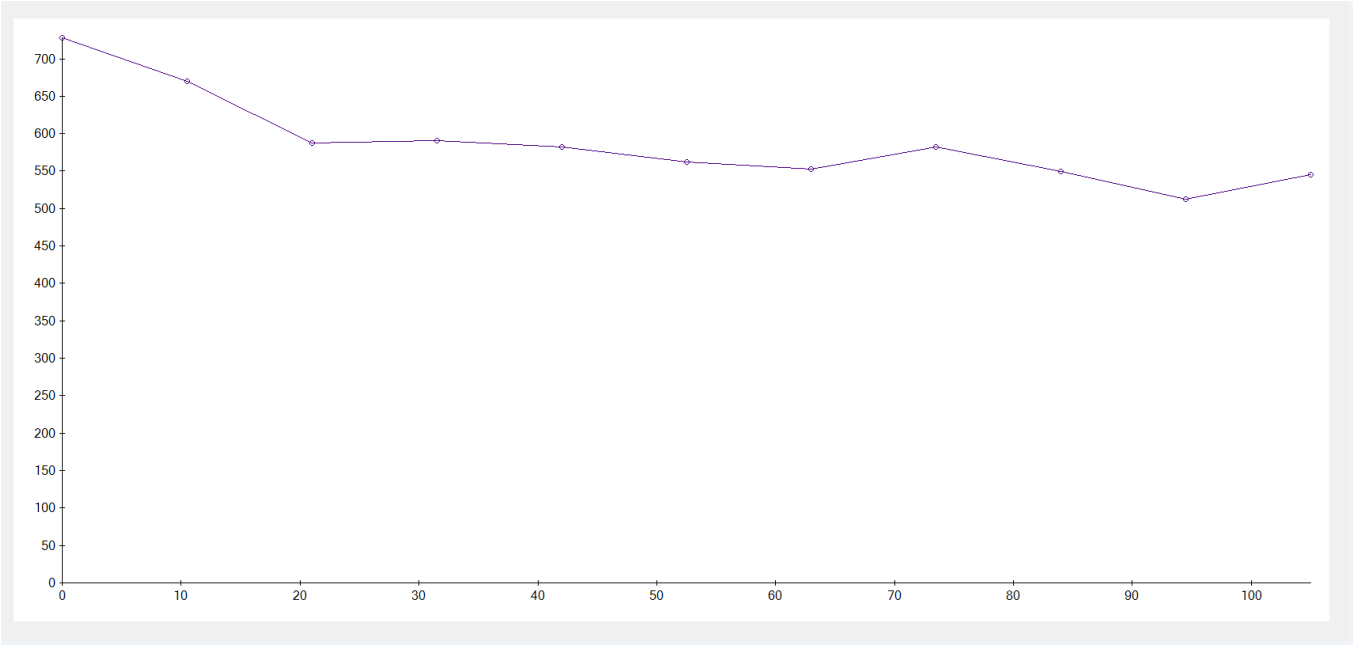
Source: Prepared by the authors

While the use of relative units may be problematic in some areas, it is perfectly acceptable in most life science applications because they are primarily linked to a control and treat all results in relation to that value (e.g., values in condition B may be 50% of the control value, while values in condition C are 12 times higher than those in the control).

Measurement diagram (based on the.wgd files from the Berthold Luminometer). X-axis: Biophoton value in RLU, Y-axis: Time in seconds. **(Figure 15-22).**

Figure 15

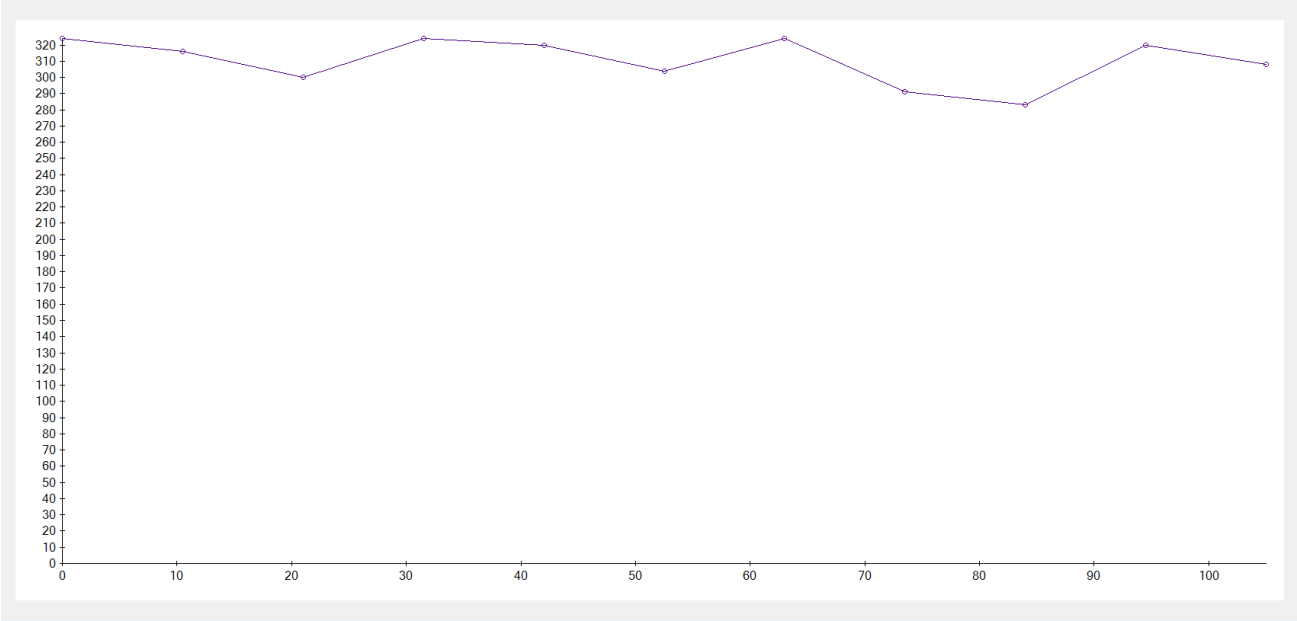
Biodynamized *tap water using the Biodynamizer at* ***T=0****. Spectral range* ***380-630nm***



Source: Prepared by the authors

Figure 16

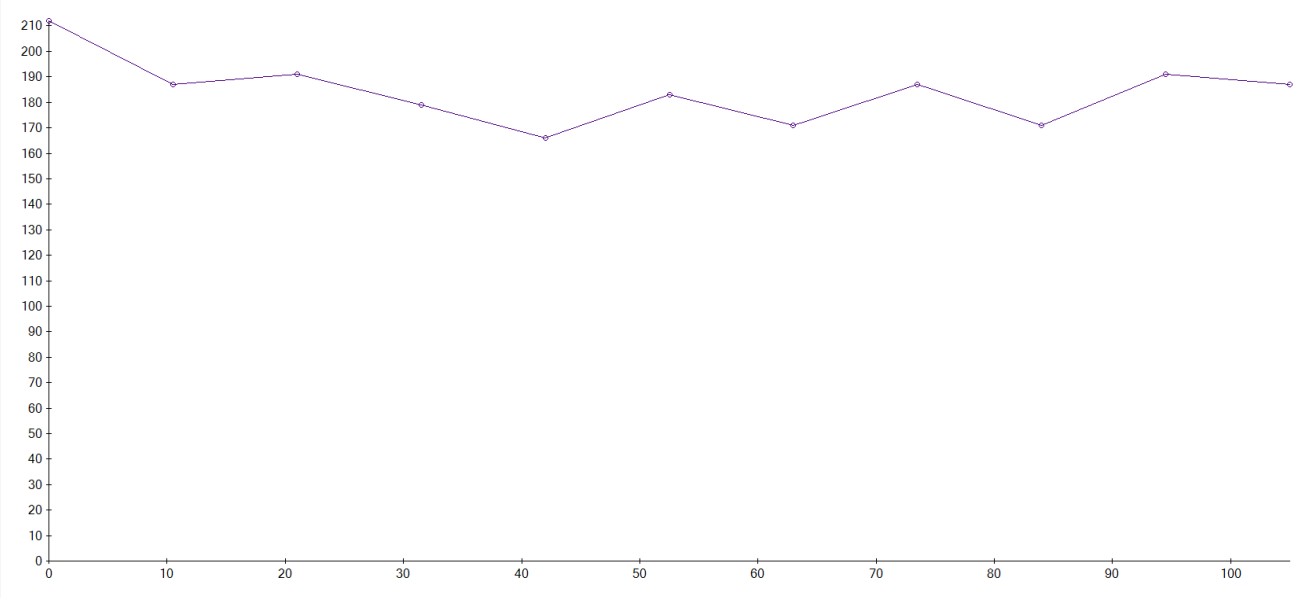
Biodynamized *tap water using the Biodynamizer at* ***T=0****. Spectral range* ***435-500 nm*** *(specific filter).*



Source: Prepared by the authors

Figure 17

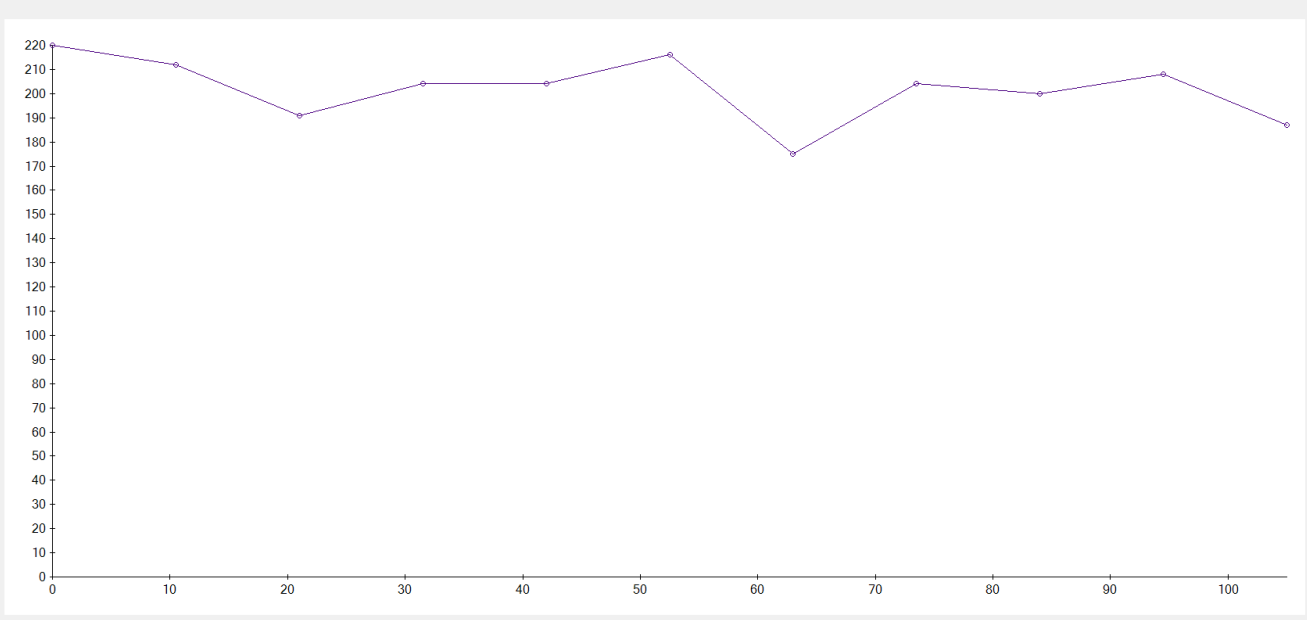
Tap water biodynamized by the Biodynamizer after 24 hours. Spectral range 380-630nm



Source: Prepared by the authors

Figure 18

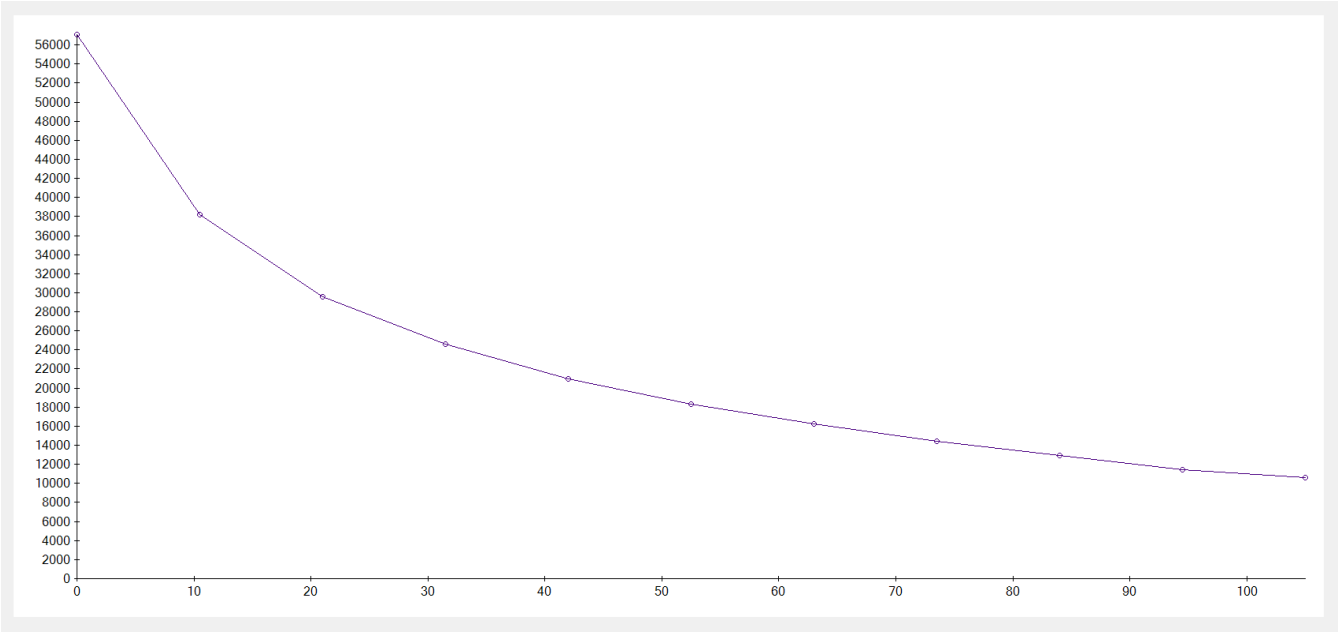
Tap water biodynamized by the Biodynamizer after 24 hours. Spectral range 435-500 nm.



Source: Prepared by the authors

Figure 19

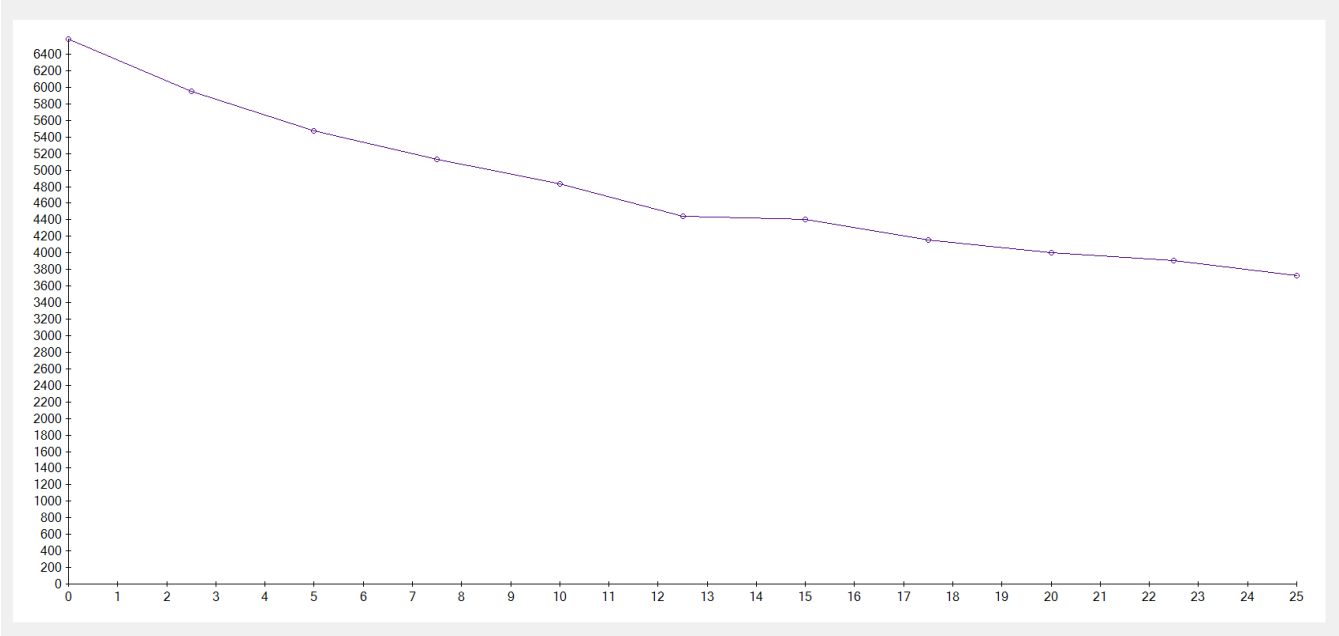
Seeds germinated *with tap water b****iodynamized*** *by the Biodynamizer. Spectral range* ***380-630nm***



Source: Prepared by the authors

Figure 20

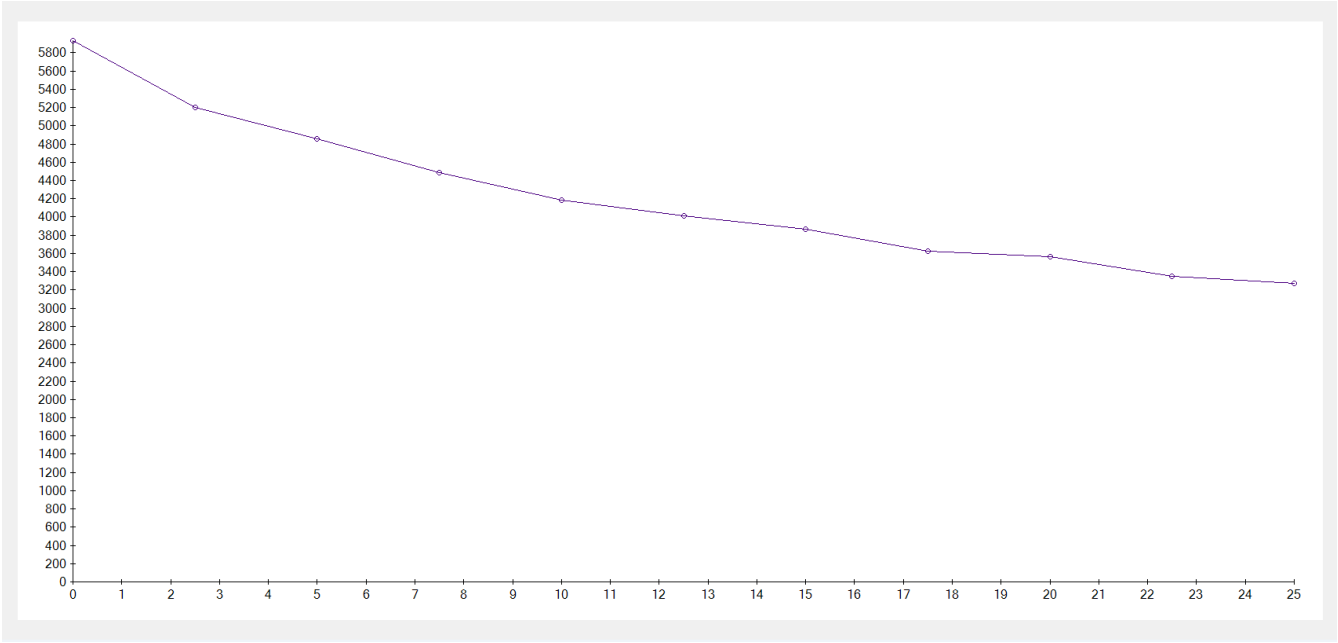
Seeds germinated with untreated tap water. Spectral range 380-630nm



Source: Prepared by the authors

Figure 21

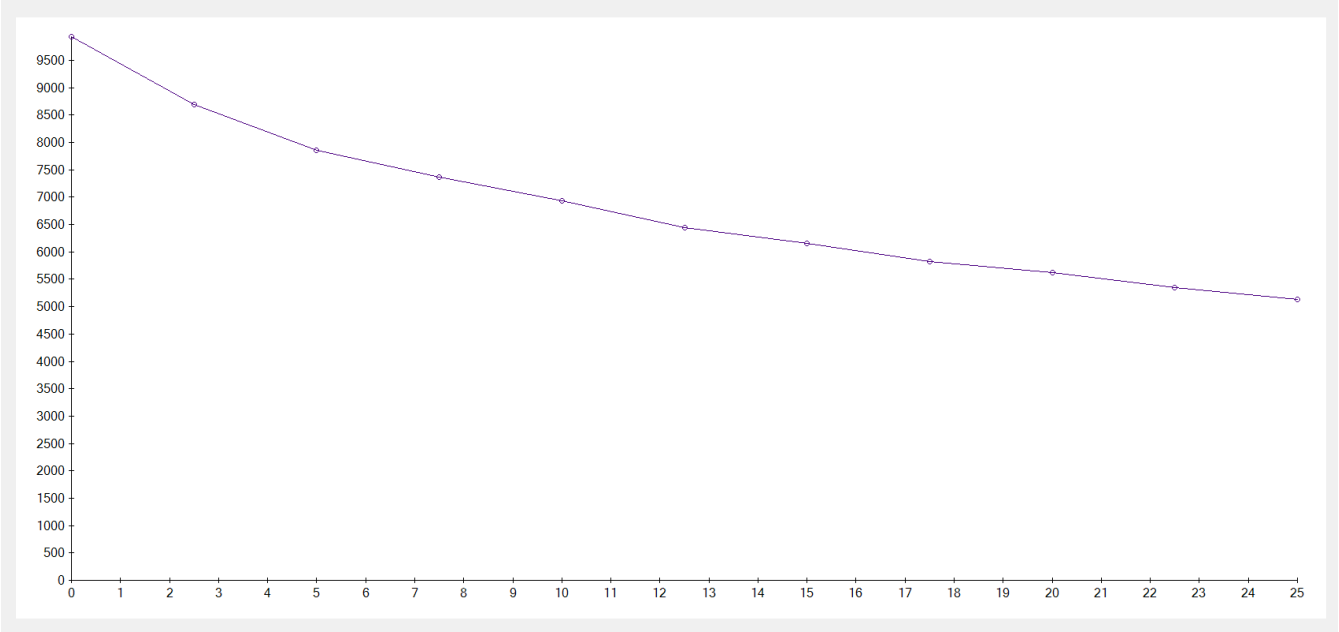
Seeds germinated with reverse osmosis water. Spectral range 380-630nm



Source: Prepared by the authors

Figure 22

Sprouted seeds with bottled mineral water. Spectral range 380-630nm

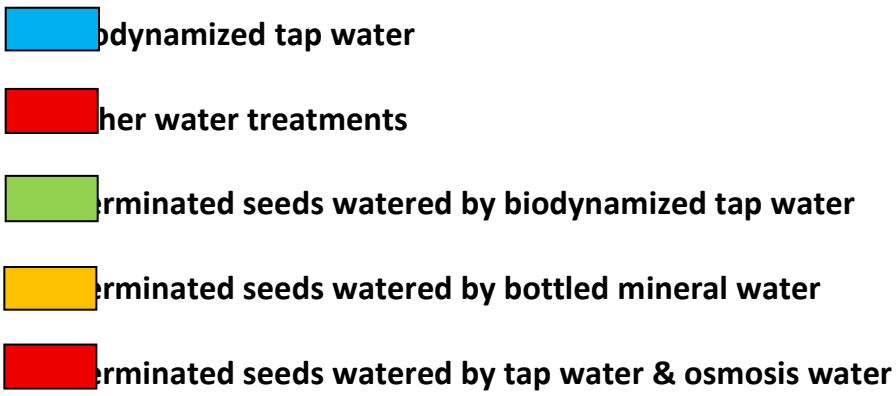


Source: Prepared by the authors

Table 3

Comparison of biophoton emissions in different types of water and its biophotonic consequences
Interpretation of the metabolic functions of the additional vital energy, translated by biophotons, found in biodynamized treated water and other waters

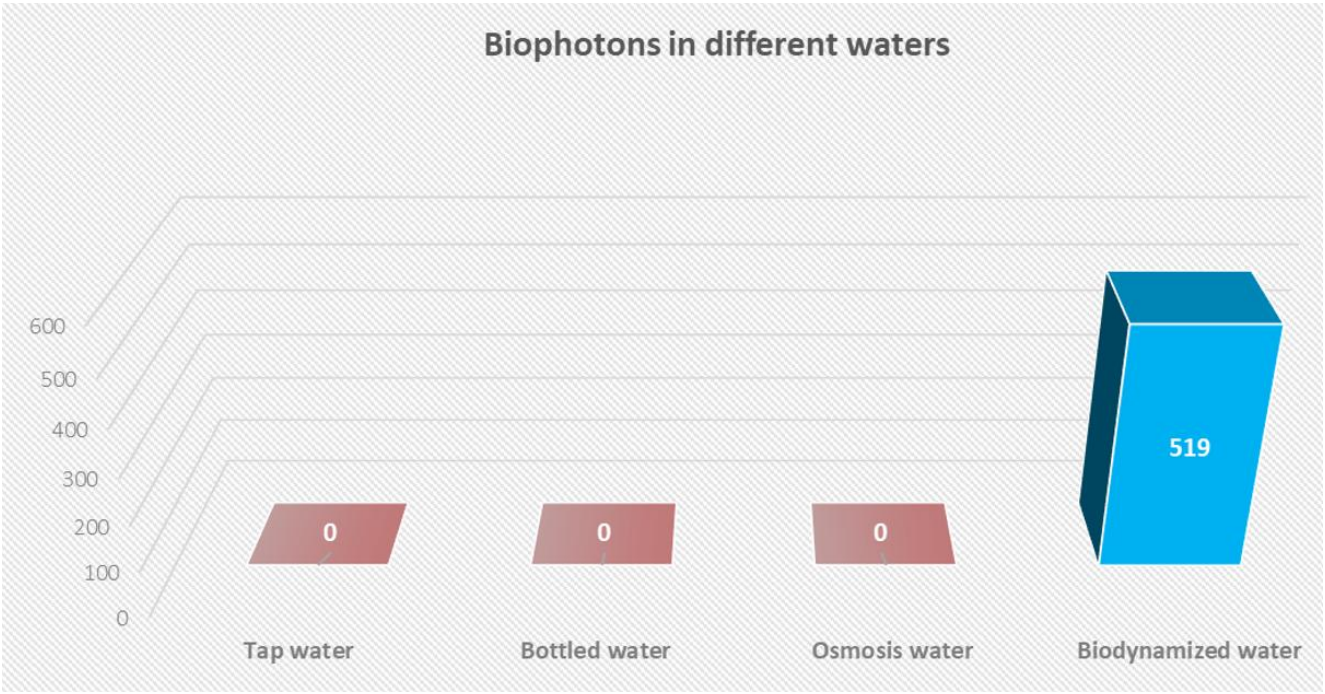
	Comparison of biophoton emission in different types of water and its biophotonic consequences Interpretation of the metabolic functions of the additional vital energy, translated into biophotons, found in biodynamically treated water >< other waters		
	Average values of biodynamized Water T= 0 after subtracting noise (from the test tube/filter)		
	Quantity of Biophotons emitted in RLU (per second per cm²)		
	519	**Biodynamized tap water** (using the Biodynamizer) **without filter** (spectral range **380-630 nm**)	based on an **average** of **11 measurements/sample**
52%	272	**Biodynamized tap water** (using the Biodynamizer) **with a filter** (spectral range **435-500 nm**)	
	0	Untreated **tap water**; without filter (spectral range 380-630 nm)	
	0	**Osmosis** water; unfiltered (spectral range 380-630 nm)	
	0	**Bottled mineral** water; unfiltered (spectral range 380-630 nm)	
	Average values of biodynamized Water T + 24H00 after noise subtraction (Test tube/filter)		
Δ	**Quantity of Biophotons emitted in RLU (per second per cm²)**		
-65%	184	**Biodynamized tap water** (using the Biodynamizer) **without filter** (spectral range **380-630 nm**)	based on an **average** of **11 measurements/sample**
-38%	168	**Biodynamized tap water** (using the Biodynamizer) **with a filter** (spectral range **435-500 nm**)	
	Values of germinated seeds after 6 days of germination after noise subtraction (from the test tube)		
	Quantity of biophotons emitted in RLU (per second per cm²) ; spectral range 380-630 nm		
Δ	31260	**Germinated seeds** watered with **biodynamized tap water**	measured after **6 days of germination** based on an average of **11 measurements**/sample
-73%	8367	**Germinated seeds** watered with **bottled mineral water**	
-84%	5044	**Germinated seeds** watered with **tap water**	
-83%	5337	**Germinated seeds** watered with **osmosis water**	



Source: Prepared by the authors

Figure 23

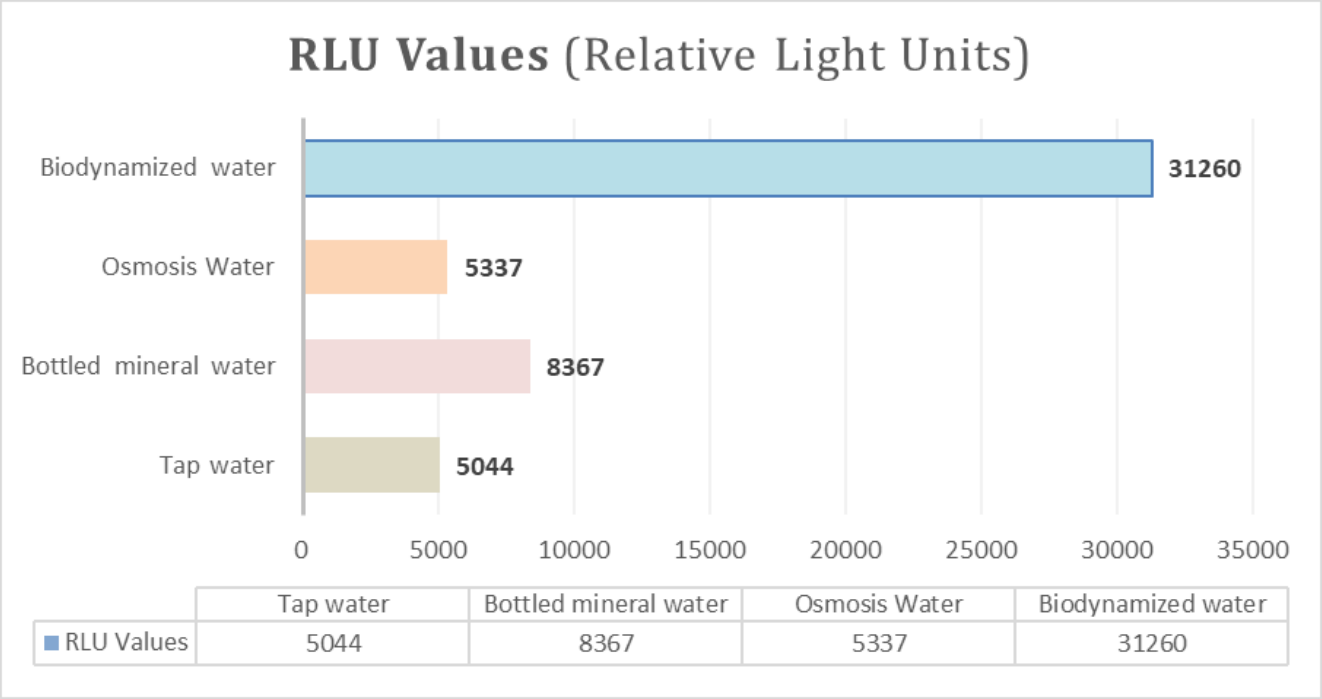
RLU (Relative Light Units) in different types of waters T=0



Source: Prepared by the authors

Figure 24

RLU (Relative Light Units) of germinated seeds after 6 days of germination



Source: Prepared by the authors

5.3 KEY OBSERVATIONS

Biodynamized water emits a significant amount of biophotons, with 50% of the RLU (reactive light intensity) emitted in the 435-500 nm spectral band. We have never observed such a high level of bioluminescence in water. In the visible spectrum, shorter wavelengths, such as those in the 435-500 nm range, correspond to higher frequencies and therefore carry more energy per photon (in electron volts, eV). These high-energy photons can interact with cellular photoactive systems and help stimulate ATP production by mitochondria, the organelles responsible for metabolic energy conversion.

Another source of biophoton absorption and re-emission is DNA. This molecule acts as a kind of electromagnetic antenna, capturing energy from the environment and sending it back into the body as coded information via nucleotide sequences (A, T, G, C) in a coherent and structured way.

This information activates and coordinates the billions of chemical reactions occurring in our cells every second (cell communication), reactions essential for cell growth, homeostasis, the immune system, and more. This biological information is carried by biophotons, which act as vectors. DNA, therefore, functions as a kind of quantum antenna, absorbing, informing, and re-emitting light in the form of biophotons. These biophotons serve as vectors of electromagnetic energy or as a medium for quantum informational communication between the cells of the human body and living organisms in general.

The control waters (tap, osmosis, bottled) show no photonic emission at all (0 RLU).

Biophotons decrease but nevertheless persist in biodynamized water after 24 hours (a decrease of 65% in the 380-630 nm light spectrum and a decrease of 38% in the 435-500 nm light spectrum)

Germinated seeds watered with biodynamized water exhibit significantly higher biophoton emission, while the use of other types of water results in a reduction of biophoton emission of approximately 73% to 84%. Given that biophotons predominate in spectral ranges known to stimulate mitochondrial activity, it is plausible that biodynamized water promotes mitochondrial activation in seeds. Mitochondria themselves constitute sources -of biophotons detectable by the luminometer.

These results demonstrate a clear and reproducible effect of photonic emission linked to the action of the Biodynamizer.

6 CONCLUSION

Living organisms are open systems in the thermodynamic sense: they constantly exchange matter, energy, and information with their environment. Beyond the chemical substrates necessary for metabolism, they also appear to capture and emit informational signals, among which biophotons play a special role.

High biophotonic emission, in terms of intensity and coherence, may reflect a state of internal organization that favors more ordered interactions with the environment.

Energy carries information, water acts as a vector or encoding medium, and biological systems — including humans — ensure its reception, transformation and functional interpretation.

While numerous studies have characterized the biophotonic emission levels of various organisms or biological materials, few have systematically explored the relationship between biophoton intensity and spectral quality, the energy potential of water or other food products, and their implications for the physiology of living organisms. Our results provide initial experimental data contributing to this integrative approach.

Experimental results indicate that water treated with the Biodynamizer device (SA Dynamized Technologies, Belgium) displays a significantly enhanced ultra-weak photon emission signal, whereas control water samples exhibited no detectable emission within the same measurement parameters.

This emission, concentrated mainly in the 435–500 nm band (at +/- 50%), corresponds precisely to the spectral areas involved in the energy mechanisms of living things, directly linked to mitochondrial and photosynthetic chromophores.

Research perspectives include:

- Time-correlated measurements, T=0 & T after 24 hours (photon decay kinetics),
- Analyses were used to verify the transmission of this energy to living organisms; in this case, we opted for sprouted alfalfa seeds.

Thus, biodynamized water positions itself as a coherent water containing more energy and information, illustrating the convergence between the quantum physics of water, biophotonics, and mitochondrial bioenergetics.

The results of this study show a significantly higher biophotonic emission for the biodynamized treated water, while all control waters remain at zero levels.

The very high initial emission (519 RLU in the broad spectrum and 272 RLU in the blue-green spectrum) indicates an organized energy state and increased photonic coherence.

After 24 hours, the reduction in values indicates a temporal relaxation of this structure, probably linked to the progressive dissipation of coherent domains (-65% in the broad spectrum 380-630 nm and -38% in the blue-green spectrum 435-500 nm).

These observations suggest that water subjected to biodynamized treatment exhibits a measurable, ultra-weak photon emission, potentially indicating a change in its electrodynamic properties.

Although the interpretation of this phenomenon as a transfer or storage of light energy remains hypothetical, these results open up avenues for studying potential interactions between biodynamized treated water and biological systems.

Links are envisaged with the scientific validation of the electrophotonic analysis (EPA) method accepted for publication in the University of Florence journal SUBSTANTIA: "*ElectroPhotonic Analysis (EPA) of tap water droplets versus hydroalcoholic solutions*" https://riviste.fupress.net/index.php/subs/article/view/3597

Publication prepared by Professor Marc Henry (✠). This article was accepted for publication on 14.10.2025 and has undergone full peer review (Its publication in the journal SUBSTANTIA of the University of Florence is scheduled for March 2026). Through repeated measurements on the same tap water and ethanol solutions, the article demonstrates the reproducibility of the Electrophotonic Analysis (EPA) method, which is thus scientifically validated by a peer-reviewed publication.

Therefore, the conclusions of the analyses carried out with this method are also validated, namely, the Electrophotonic Analysis (EPA) applied to tap water droplets compared to biodynamized water droplets, performed by the Coramp laboratory in 2019 (G. Vieilledent & R. Herren), the expert review of this analysis using a photodiversity approach by Prof. M. Henry (✠) in 2019, and the statistical approach of the electrophotonic images by Dr. M. van Wassenhoven in 2025.

All these approaches highlighted, for the "dynamized" tap water sample compared to the untreated tap water sample, a measured increase in light intensity (expressed in lumens/m² or pixels/cm²), a decrease in the surface tension of the water droplet (spreading on the electrode), and an interpretation of greater electron availability and a broadening of the frequency amplitude of the photonic emission. (FFT image analysis).

6.1 GENERAL DISCUSSION

Several exploratory studies have suggested that water, subjected to certain dynamizing or electromagnetic treatments, could form metastable states of supramolecular coherence. For example, Elia & Napoli (2010) proposed that the coherence domains of water (coherence) domains (CD) can be excited and stabilized by a range of weak perturbations, paving the way for expanded water structuring. Furthermore, Musumeci *et al*. (2010) observed delayed luminescence in ionic aqueous solutions under specific conditions, which could indicate alterations in the molecular organization of water. Although experimental demonstration of vortexing or low-frequency excitation applied to water remains limited, this work provides a conceptual framework for considering that magnetic fields or weak excitations could influence the coherent state of water.

- A publication entitled *"Aqueous "Ionic Solutions Investigated by Time- Resolved Delayed Luminescence"* by Musumeci F., Grasso R., Lanzanò L., *et al*., published in *WATER Vol. 2 Suppl. 1, 2010.* It focuses on ionic water solutions and time-resolved luminescence. Water Journal

- A review by Elia & Napoli (2010) entitled *"Water Dynamics at the Root of Metamorphosis in Living Organisms"* In *Water* 2010, 2, 566-586 -. This article discusses the coherence domains of water and a supramolecular organization of water. Emmind

From a biophysical perspective, these states are interpreted as ordered configurations of photons and water dipoles, capable of storing energy information (Popp & Beloussov, 2003).

The fact that biodynamized water preferentially emits in the 435–500 nm band reinforces the idea that this water interacts with the natural frequencies of living organisms, in connection with the mitochondrial and redox processes.

These results open up important perspectives for understanding the quantum role of water in bioenergetics, metabolic regulation, and intercellular photonic communication.

Hypothesis that the Biodynamizer system emits more biophotons.

The emission of biophotons is generally associated with processes of order, coherence, and energetic relaxation in structured biological or fluid systems.

Several scientific hypotheses can explain the stronger emission observed with the Biodynamizer system:

1. Increased water structuring

- Dynamization devices, such as the Biodynamizer system, can induce a reorganization of H_2O molecular clusters.
- A more ordered structure promotes resonance and electromagnetic coherence between water molecules, facilitating photonic emission.

2. Increase in quantum coherence

- According to the work of Del Giudice, Preparata and Montagnier, water can form coherence domains where molecules oscillate in unison.
- More coherent water can accumulate more energy in the form of internal electromagnetic fields, then release that energy as coherent photons.

3. Reduction of thermal noise and energy inefficiencies

- The mains water, subjected to pressure, chlorine and electromagnetic disturbances, presents a more chaotic state.
- Vitalized or dynamized water, on the other hand, shows better stability and a more structured photonic field, which results in increased and more harmonious emissions.

4. Role of the Biodynamizer system

- The device could act as a transmitter of energy or frequency information, modulating the internal electromagnetic field of the water.

- This “information” stimulates the photonic resonance capacity of water, increasing its spontaneous emission in the visible or near UV range.

The results (**Synthesis 1)** put in evidence that biodynamized water by the Biodynamizer generates more biophotons than tap water. The difference is very significant; the results confirm, from a biophotonic point of view, the effect of dynamization on water.

Table 4

Synthesis 1

Water type	**Internal structure**	**Consistent potential**	**Presence of biophotons**	**Interpretation**
Mains water	Chaotic, ionized, chlorinated, without biophotons	Very low	Absence	Dissipative, non-resonant medium, no biophotonic presence
Reverse osmosis water	Pure but energetically “ *without biophotons* ”	Weak	Absence	Lack of minerals and structure, no biophotonic presence
Mineral water	Stable but without biophotons	Average	Absence	A static system devoid of electrodynamic activity, with no biophotonic presence.
Biodynamically treated mains water	Structured, vortexed, coherent and luminous (with biophotons)	Pupil	Presence (380–630 nm)	electrodynamically organized system Very significant biophotonic presence

Source: Prepared by the authors

Proposed interpretation for understanding the results observed on germinated seeds?:

1. The water is absorbed by the seed.
2. Mitochondria **and membranes** excite surrounding water via **electrodynamic resonances and dipolar interactions**.
3. Water becomes **structured into coherent domains**, capable of **storing and releasing energy in the form of photons**.
4. The **emitted biophotons** reflect the **active metabolism and energy potential of the seeds**.

Germinated seeds appear to modify absorbed water, even when its initial photonic activity is low, into a medium exhibiting measurable biophotonic emission.

This suggests that living systems can amplify or rearrange the photonic properties of water, leading to the emergence of a coherent optical signal, independent of the initial state of the medium. Water with higher intrinsic biophotonic activity appears to facilitate this transfer more efficiently.

We interpret the amplification of photonic radiation from germinated seeds watered with biodynamized treated water as a reflection of a higher level of energetic organization and functional vitality of the system, possibly linked to its metabolic activity and redox balance.

The experiment suggests a transfer of photonic information from the biodynamized treated water to the germinated seeds, which appear to retain it in proportion to the energy transmitted. Conversely, for waters with low or no biophotonic emission, the photons are likely produced by the seed's own biochemical activity, potentially diverting energy away from other biological processes. Further analysis will be needed to clarify this mechanism.

Biophotons, defined as ultra-weak photon emissions in the visible to near-ultraviolet range spontaneously generated by biological systems, constitute a sensitive biophysical indicator of the state of organization and functional coherence of living systems (Popp & Li, 1992; Cifra *et al*., 2015; Van Wijk & Van Wijk, 2005).

These emissions result primarily from redox reactions and electronic transitions within biomolecules, reflecting the internal energy dynamics and the degree of thermodynamic order of the system (Cifra & Pavlík, 2019).

In this study, comparative analysis of different water samples reveals a correlation between the intensity of intrinsic biophotonic radiation in the water and that subsequently measured on germinated seeds hydrated by these same samples.

This observation suggests a partial transfer or induction of photonic coherence between the water environment and the biological system, a mechanism consistent with electrodynamic coupling models described in the biophysics of coherent fields (Del Giudice *et al*., 1988; Fels, 2009).

In this context, water can be considered a structured dipolar medium capable of forming quantum coherence domains where electromagnetic oscillations and molecular dipoles interact in a synchronized manner (Del Giudice *et al*., 2010).

Water exhibiting higher photonic emission could thus demonstrate an increased degree of molecular order and a strengthened capacity to interact coherently with living systems.

These results support the hypothesis that biophotonic radiation is not just a by-product of metabolism, but a revealing parameter of the electrodynamic coherence and energy potential of a biological system (Popp *et al*., 2011; Van Wijk *et al*., 2014).

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