AGROFOOD

MISYA

MICROWAVES:
TECHNOLOGY FOR FOOD SAFETY




Food safety: winning solution to production and trade challenges

Consumers are increasingly concerned about food quality, hygiene and safety and give more and more importance to nutritional properties and all those characteristics making a product unique, different from the other ones.

Product quality and safety not only represent a critical factor for success and competitiveness but are also significant for the survival of companies and brands.

Ensuring food quality and safety, through technology and process innovations, allows the reduction of risks associated with food and represents a winning solution to production and trade challenges.

The use of new process techniques and methodologies permits to:

- gain consumer confidence by proving that food is produced in full safety and hygiene
- respect the primary features of the product
- protect consumer health

Healthy and safe products: from field to table

Food habits are changing. Nowadays, more and more consumers care about what arrives on their tables. Ensuring high levels of safety and quality is also the main **strategy and objective** of companies involved in the agri-food industry.

Biological and microbiological **contamination** is one of the biggest threats for our food products. When purchasing a product, the "aware" consumer demands not only guarantees of safety and hygiene, but also of nutritional and organoleptic-sensory characteristics preservation.

Food should preserve and exalt all features of soil, be healthy and without contaminants deriving from chemical treatments.

Research of quality, **implementation of coherent farm-to-table control measures**, constant focus on ethical issues: these are the main efforts of small and medium companies involved in the increasingly safe distribution of organic food.

The attention to quality pushes consumers to choose healthy and nutritive products free from harmful residues

Between quality and innovation

In recent times **organic farming** has aroused considerable interest in the most careful and exigent consumers. Moreover, companies are also interested in **developing techniques that, despite complying with organic food production standards, permit to reduce production costs**.

The MISYA method: an effective and safe answer from scientific research

In order to meet the needs of a market demanding more and more process innovations, **EMitech**, Italian company involved in the research of non invasive disinfestations techniques in several fields as well as the agri-food sector, has developed the **MISYA method**.

Microwave energy: the clean alternative

The **MISYA method** opens a new era in the food industry applications and organic farming methodologies.
By exploiting the effect of microwaves thermalization, this method allows to disinfest food of vegetable origin like legumes, cereals and dried fruits through a **physical method not affecting the characteristics of products and by respecting the organic agricultural methods**.

MISYA IS

EFFECTIVE
The method is effective against biological contaminants in all life stages

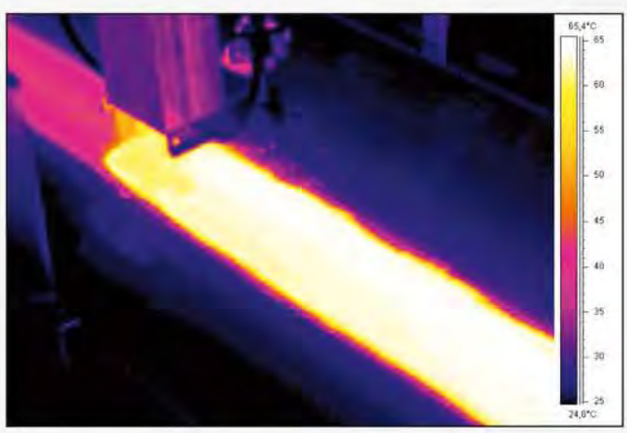
SAFE
No risks of exposure to electromagnetic pollution

CHEAP
All the absorbed energy is rapidly converted into heat

ECO-FRIENDLY
The treatment does not produce any polluting substances

The **disinfestation treatment by microwaves is effective and safe**: it has no significant impacts on the environment and does not leave noxious and dangerous residues in the treated products.

MISYA is a physical method that exploits the thermalization principle of electromagnetic energy for the dielectric heating of products. Its application requires the construction of apposite continuous devices composed of a shielded reverberation chamber endowed with a system for optimizing the electromagnetic field distribution into the treatment area.



Thermo image recorded during a laboratory test: it shows the temperature distribution on the surface of the treated product coming out from the equipment.

Isotropic sensor for measurement of the electromagnetic field in the area surrounding the device.

Through this bland thermal treatment, pests reach lethal temperatures in the range 57 to 60°C and are killed in every life stage, that is egg, larva, pupa and adult. Physical, chemical and sensory analysis have confirmed that **the microwave treatment, by means of MISYA, does not alter the qualitative characteristics of products which keep maintaining their chemical and organoleptic structure.**

Equipments can have a variable installed power according to the desired throughput. The conveying system is also appositely chosen according to the product type to be treated.

Quality, research and technology for innovation

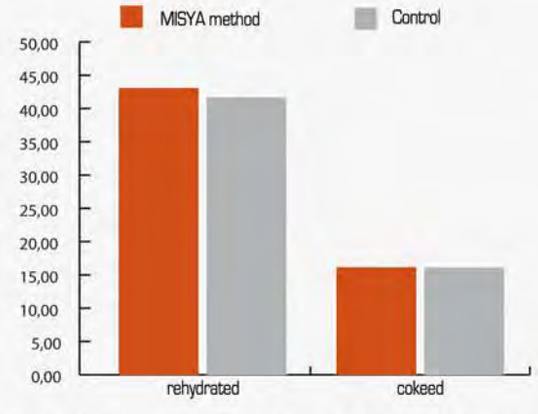
Germinability trials on chickpea seed
There are no differences between treated and untreated seeds

	L		a		b	
	MISYA method	control	MISYA method	control	MISYA method	control
epidermis of dry legume	53,14	53,99	6,03	6,36	12,34	13,63
epidermis of rehydrated legume	52,91	52,86	3,17	3,71	17,91	18,46
epidermis of cooked legume	50,92	50,59	3,33	2,57	15,66	16,28
rehydration water	30,80	37,87	0,19	0,23	- 0,10	- 0,17
cooking water	36,77	36,75	0,18	0,19	0,73	0,88

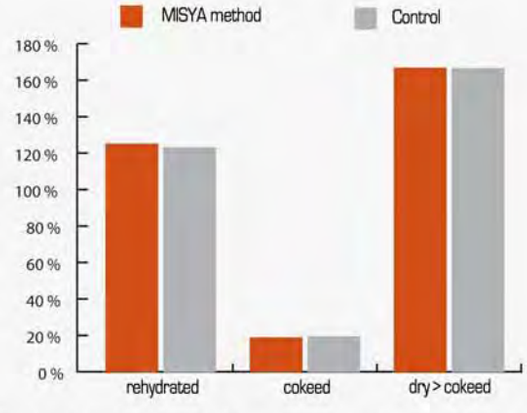
Colorimetric test
The average values of epidermis and water of rehydration and of cooking remain almost unchanged

Research and development of innovative processes are the key factors to enhance the competitiveness of a company. **EMitech considers research a mainstay**. Surveys and studies conducted for several years in collaboration with important research centers have been constantly accompanied by lab tests that EMitech has carried out to determine and widen the knowledge of the MISYA method effects on various kinds of products. The method allows a rapid heating of pests infesting food without altering the product's specific properties: some of the tests conducted on chickpeas are shown below, as an example, in order to emphasize the absence of significant differences between untreated legumes and the ones treated with the MISYA method.

Interesting outcomes have been found in terms of:
- colour of epidermis (from dry to rehydrated and cooked legumes)
- hardness of integument after rehydration and cooking
- weight increase after rehydration and cooking
- rehydration and cooking water



Tests on the integument hardness of legumes subject to rehydration and cooking. Results do not show any significant differences.



Tests on the weight increase of legume samples subject to rehydration and cooking and to the passage from dry to cooked. Results do not show any significant differences.

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EMitech is a leading company in the activities of research, design and construction of multimode reverberation chambers and microwave devices for industrial uses.

Thanks to a multidisciplinary know-how, the company owns several patents in different application fields. Its branches of business bear the name of these sectors:

- ART
- FOOD
- PACKAGING
- ENVIRONMENT

Attention and constant dialogue are the pillars of EMitech's philosophy aiming to develop new applications in those fields where alternative energy sources, like the electromagnetic one, can be used.

EMitech®

ELECTRO MAGNETIC innovative technologies

EMitech Srl
Via A. Olivetti, 28/A z.i.
70056 Molfetta (BA) ITALY
tel: +39 080.99.00.295
fax: +39 080.99.00.297
email: info@emitech.it

www.emitech.it

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