



Experts Speak...

Our organisation DFRL Mysore has independently tested the SHF system for disinfestation of Rice, offered by Enerzi Microwave Systems Pvt Ltd, continually since 2009 and has achieved success first time in our country. We believe that microwave technology is a very novel, effective, fast and State-of-the-Art technology to treat rice and other grains without harming the nutrients and thereby retaining the food value unaltered.

-Dr. Prakash Patki, Scientist, DFRL Mysore, India.

The properties of rice after microwave irradiation were evaluated by means of amylograph and enzymic determination of the total and the damaged starch. The content of the total starch was not affected by the immediate energy output used for irradiation...Amylographic characteristics suggest minimal changes resulting in MW treatment of rice at moisture below 23%.

-Dr. Jitka Pinkrova & Team, Institute of Chemical Technology, Prague, CZ

Microwave irradiation conditions affecting rice temperature and pest mortality were studied. Adults and eggs of rice weevils suffered 100% mortality when final rice temperature was above 55 C, while the corresponding energy consumption of the microwave was above 0.017kWh/kg. Eggs were more susceptible to temperature than adults.

-Dr. Siming Zhao and Team, College of Food Science, Hubei, China

Insecticide residues have adverse effects on humans, and insects develop resistance to insecticides. Hence there is a need for an alternate method for disinfestation of grains. Disinfestation of grains using microwaves can be an alternate method to insecticides for killing insects.

-Dr. N. D. White, Sr. Research Scientist, Cereal Research Centre, Canada

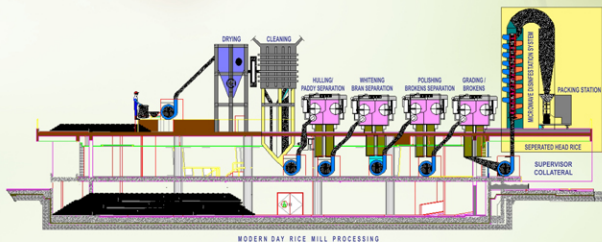
Alternatives to milled rice disinfestation with methyl bromide have to be found due to prohibition of the use of chemicals....In conclusion, microwave energy is an effective and clean alternative to rice grain chemical disinfestation.

-Dr. Marzal A., Universidad Politécnic de Valencia, Spain.

The presence of pathogenic organisms in foods, agricultural products and in the environment constitutes a threat to human safety. In addition, the presence of insect pests in produce limits imposes market restrictions (quarantine) needing technical interventions

-Dr. Manual C. Lagunas Solar-Emerging non chemical Disinfection & Disinfestation processes for Food & Agriculture University of California, USA

UHF Disinfestation System - MicroClean



Enerzi Microwave Systems Pvt. Ltd.

"Creintors Compound"

Plot No. : 99/107, Survey No. : 343A/335,
Udyambag, Belgaum-590 008, Karnataka, INDIA.
www.enerzi.co | marketing@enerzi.co
+91-9886772784 | +91-9035067289

Authorised Representative



enerzi.com

* Process Involves no addition of Preservatives, Chemicals or Stabilizers



Come Let us
Eat a more Healthy,
Nutritious & Chemical Free*
Processed Rice



Why Rice is Important to us?

- Rice production in India is an important part of the national economy.
- India is one of the world's largest producer of white rice, accounting for 20% of Global rice production.
- Rice is India's preminent crop, and is the staple food of the country.
- Rice is one of the richest source of carbohydrates, low fat, low salt devoid of cholesterol and filled with numerous nutrients and hence is a major part of the diet around the world.

Why Disinfestation?

The Post Harvest Losses (PHL) have been recorded as about 10 Million Tonnes of Rice out of total 104.32 Mt rice produced in the recently ended FY-2011-12. Of These Losses more than 5 Mt loss is due to Infestation from the eggs, larvae & adults of the burrowing pests.

Other Grains that suffer similar Problems are Paddy, Wheat, Corn, Maize, Spices & Cereals.

Reasons to inculcate UHF technology for Disinfestation

Disinfestation : refers to the regulation or management of a species defined as a pest, usually because it is perceived to be detrimental to a person's health, the ecology and the economy.



The female rice weevil lays around 400 eggs during her five months of life.



The female places them one at a time into a small hole she bores into each grain kernel.



She covers each hole with a film of gelatinous secretin to seal a single egg inside each kernel.



When rice weevils are larvae they are only able to feed from within whole, unbroken grains of rice of other seeds.



Larval development lasts about one month and adult rice weevils bore a ragged hole in the grain to emerge.

A total of 4 to 6 weeks from Egg to Adult Insect

It is difficult and next to impossible to detect infestations at early stages because they cannot be seen.

Current Disinfestation Techniques

- Irradiation
- Thermal Heating
- Pesticides
- Ultra High Frequency (UHF) Technology

Of which Pesticides is the most abundantly used technique in INDIA

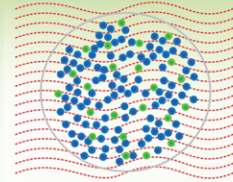
Disadvantages of Chemical Disinfestation Technique

- Redundant & Ineffective
- Reduced Shelf Life
- Resistance to Chemicals
- No Respiration for Grains
- Health Hazards (Ill Effects)
- Increasing Post Harvest Loss

Ill Effects of Chemical Disinfestation Technique

Name of Insecticide	Dosage	How ofte?/ Frequency	Health Hazards & Ill Effects
Malathion	3 Litres/100 sqm	Every Fortnight	Turns highly toxic after 3 months Immune System weakens after exposure. Intestinal Disorders in Children born after. Child Leukemia & Aplastic Anemia after Exposure Kidney Failure at exposure & Consumption More Severe problems passed on to second generation Negative effect on Human Genes " Broken Olf" DNA effect
Dichlorovinyl Dimethylene Phosphate (DDVP)	3 Litres/100 sqm	Every Fortnight	Inhalation causes Ocular & Respiratory problems Ingestion causes Gastrointestinal problems Skin Absorption causes localised sweating & muscle twitching Carcinogenic (declared by DHHS, USA)
Aluminium Phosphide	1kg/100 MT of Rice	As per observation of pests	Inhalation causes irritation of nose, Mouth, throat & respiratory tract. Also causes chest pain, Cough, Nausea, Vomiting, Diarrhoea, Muscle pain & headache dizziness & confusion may occur. Ingestion also causes chest tightness, Cough, Headache, Dizziness, Anxiety & restlessness may also occur. Contact with skin cause sweating and irritation.

UHF Technology & PESTS!



A uniform field is applied affecting the Rice (blue) as well as pathogens (green) throughout the commodity. The moisture content in weevils & eggs is much higher than moisture in Rice, hence rapid heating of weevils (pathogens) takes place without heating rice to higher temperatures.

As a result of its dielectric difference, the pathogens (green) are heated at a higher rate than the Rice (blue) resulting in thermal disinfestation without harming the host material (Rice)

Advantages of UHF Technology & the Collaboration

Enerzi Microwave Systems Pvt. Ltd. has in collaboration with DFRL Mysore, developed a completely innovative disinfestation system incorporating UHF Technology which has pioneering advantages as listed below;

- Chemical Free Post Harvest Management of Rice-*for the 1st Time in India*;
- Increased Shelf Life – 24 to 30 months;
- Retention of all Food Value nutrients;
- No change in Colour & Flavour, Odour, Texture and Fresh like appearance;
- Helps in Enhancing Ageing process of Rice;
- Helps in Enzyme Inactivation;
- Ensures Microbial Stability;
- Reduction in Free Fatty Acid Formation (eliminates smell);
- 100% Mortality (Killing) for all stages of infestation;
- Fast cooking (reduction in cooking time);

A Comparison Table of Disinfestation Techniques

	UHF	Irradiation	Pesticides	Thermal Heating
Measure of Effectiveness at Destroying Pests & Pathogens	4	4	2	3
Cost Advantage Per Unit mass of grains	4	1	2	2
Environment Friendly	4	0	1	4
Appearance / Taste Applicability :	4	4	2	0
Applications from food and non-food to Pre & Post harvest commodities	4	4	1	1

Commercial Rice Processing

