

# CitruPar and OikoSan

The fascinating CitruPar story deserves to be recounted in greater detail in another context. Suffice it to say that it involves a German scientist, Dr. Jacob Harich, who settled in Florida and whose passion was the investigation of the germicidal properties of grapefruit seeds. Before dying a few years ago, he had obtained a number of U.S. patents and was honored by the Pasteur Institute of Paris.

It was later found that the germicidal properties found in grapefruit seeds are also present in the seeds of other citric fruits, and even in the pulp of such fruits. New extraction methods had to be developed, arriving at a compound, generically called Citrex. This was done in Brazil.

While the exact composition of "Citrex" has not yet been determined, it is known that it is composed of glucosides, among them citrus flavonoids and limonoids. There is a great diversity in the modes of action, one of the identified modes occur at the level of the cytoplasmic membrane where the uptake of aminoacids is prevented and disorganization of the cytoplasmic membrane and leakage of the low molecular weight cellular contents take place. Likewise, there is evidence regarding the activity of endoelicitors that activate the defense mechanisms, in particular that of phytoalexins.

CitruPar and OikoSan display antimicrobial activity at very low concentrations. In the case of **CitruPar-80**, most microbes are inhibited in the range of 10 ppm to 1000 ppm (9 drops in a liter is 100 ppm).

**CitruPar-80** is the full strength product of the line (80% active), indicated for agricultural (pre-harvest) indications thanks to its activity against many bacteria, including Erwinia, Pseudomonas, and Xanthomonas, as well as many fungi, such as Fusarium, Botrytis, Alternaria, Rhizoctonia, Cercospora, Septoria and Pythium.

For preventive purposes, it is recommended to apply 0.75 to 1.5 liters per hectare, diluted in a sufficient quantity of water. Apply in cycles of 10 to 20 days.

For control purposes, apply 1.5 liters per hectare in a sufficient amount of water. Apply in cycles of 5 to 7 days. After successfully dominating the infestations, it may be desirable to make a final application 10 to 20 days after the previous one.

Last application: Can be as late as day of harvest.

**CitruPar-40** (in some countries also known as **OikoFresh**) is basically indicated for post-harvest treatments to protect against harmful microorganisms (such as the fungi that cause the crown rot in bananas) thereby prolonging the shelf life of the treated fruits and vegetables which are immersed in water containing 5 ml of CitruPar-40 per liter. The direct spraying of this solution on the fruits and vegetables will also give good results.

**OikoSan** is a 20% solution of CitruPar, formulated as an all-purpose germicide that can be used in all kinds of establishments, hospitals and clinics, hotels and restaurants, supermarkets, etc. One of its important indications is the disinfecting of fruits and vegetables in households and markets.

The normal application rate is 10 ml of OikoSan per liter of water. If a very rapid disinfection is desired, the application rate should be increased to 20 –25 ml per liter of water.

This is an excellent product to prevent against *Vibrio cholerae*, *Escherichia coli* and *Salmonella*.