

New protective packaging for conservation of Rice



Conservation issues

Rice is a product that can be kept quite easily for an extended period without significant loss of quality. Only specific rice (like brown rice or (semi-)processed rice) may be sensitive to oxidation (rancidity). Quality is jeopardized mainly by moisture/humidity and insects. Very specific rice varieties, like brown rice or (semi-)processed rice, is known to be sensitive to oxidation.

The longer the grain needs to be stored, the lower the required moisture content will need to be. Grain and seed stored at moisture contents above 14% may experience the growth of molds, rapid loss of viability and a reduction in eating quality.

Quote from, IRRI, Rice storage, Martin Gummert & Chris Cabardo

Prevailing insect problem is the Rice Weevil. This insect is increasingly resistant to Phosphine treatments (chemical) and reports from inspection agencies in EU confirm a dramatic increase of rejection of incoming rice, as a result of ineffective treatments. This causes extra handling and treatment cost at the destination, or even rejections, but can also cause infestations in complete warehouses with all associated problems and cost. An extra complication is when rice is infested with "travelling" insects that are even more resistant to chemical treatments, like the cigarette beetle that cannot be killed with tradition chemical fumigants. For organic rice, the above problems apply in a even bigger magnitude with more financial consequences. Cause: poor, non-controlled organic treatments (non-chemical) in country of origin, high treatment cost in Europe of organic treatments + higher handling cost. Therefor you can pack your rice under a high CO₂ concentration to kill every insect inside and make sure there is no re-infestation. This treatment is also suitable for organic rice.



	<i>Vacuum only</i>	<i>N₂ flushed and vacuum</i>	<i>N₂ no vacuum</i>	<i>Co₂ flushed and vacuum</i>	<i>CO₂ flushed no vacuum</i>
Quality preservation	V	V	V	V	V
Stable humidity	V	V	V	V	V
Insect treatment	X	V	V	V	V
No re-infestation	V	V	V	V	V

V proven beneficial

X Not beneficial

Ok No big advantaged

Not rec Not recommended

Optimum conservation conditions

The combination of the vQm valve, sealed inside a vacuum-proof, high-barrier liner, along with the vQm vacuum unit allows you to:

- **Vacuum pack** your peanuts on pallet size: in a FIBC with vacuum-liner or smaller bags inside a wrapping liner
- Create **modified atmosphere (MAP), anoxic conditions**: by connecting an external nitrogen (or CO₂) supply, the vQm unit can be easily programmed for multiple cycles of vacuum followed by injection of nitrogen. By doing so, an increased nitrogen concentration can be achieved with every cycle, reducing the residual oxygen concentration inside the packaging. By doing so an anoxic environment can be created that effectively minimizes the oxidation/rancidity. When the vQm protocol “MAP vacuum” is selected, the packaging remains under vacuum, while the protocol “MAP no vacuum” will leave the packaging at (ambient) pressure once the last cycle of gas injection has been completed.



For what food applications the vQm used in general?

- The high barrier properties of the film that is used for the liner, in combination with the hermetic closure, allows you to **maintain the moisture content** of your product during the complete supply chain, from the moment of packaging. Minimize external influences on you product due to high humidity, condensation or direct water contact. If packed under vacuum, no condensation will occur on the inside of the packaging.
- By creating MAP conditions of extreme low oxygen or high CO2 concentration or by maintaining vacuum over an extended period of time, **all insects in all life stages can be eradicated**. Most quick and easy is high CO2, if the product can endure these conditions. Otherwise low-oxygen in combination with vacuum is the most applied alternative. Since the packaging is hermetic, **no re-infestation** can occur as long as it remains intact.
- Often, the quality of products is negatively affected by oxidation. By reducing the number of oxygen molecules in the packaging, this **oxidation can be minimized**. Oxidation of (lipid) fats and oils in e.g. nuts, powders, seed or brown rice is known as **rancidity**. Oxidation is also causing **decolorization** of products, e.g. dried chilies, spices or herbs.
- **Preservation of taste and aroma's**. Aroma (or smell or odor) is the sensation perceived when volatile compounds are sniffed through the nose and directly impact on the perceived taste. These volatile compounds can best be preserved in hermetic, anoxic or vacuum conditions. Products that can benefit from are e.g. dried spices, dried herbs and tea.
- Other additional benefits could be e.g. **reduction of breakage** (nuts), as the product is fixated under vacuum, **volume reduction** (fluffy powders, tea, chilies etc), **reduced temperature fluctuations** during the supply chain (under vacuum: temperature transfer is inhibited; particularly useful for e.g. green coffee when shipped in containers with big temp fluctuations inside the container (day/sun vs night).

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