

The rosehip seeds are dried to a residual humidity of nine to ten percent.

# From Rosehip Seeds

Gentle condensation drying as a technological basis for a new product

**More and more food manufacturers have turned to upcycling their food stuffs. Ideas to repurpose alleged 'waste' parts of their foods often require efficient and gentle drying to become reality. Good upcycled products may be obtained if the right business partners meet to combine their efforts. This is illustrated by a successful development project to produce wild rose oil from rosehip seeds with MAINTAL KONFITUEREN.**

**M**aintal Konfitueren GmbH of Hassfurt, Germany, has an extensive product portfolio that includes products made from rosehips. 'Hiffenmark' (rosehip preserve), which is rich in vitamins, has a long tradition in the owner-managed company. In the past, thoughts kept revolving about the precious seeds which were disposed of as waste. Then, there came the right time and the right idea which was to press the hip seeds to produce premium organic wild rose oil for body care. From the very beginning, Rebecca Riedl, the originator of this innovative idea, was well aware that drying of the seeds and, even more, removal of the tiny hairs would be crucial. In her words: "The obstacles were tremendous because there was no machine on the market which we could have used." The project had to be developed from close to scratch and the right technology partner had to be found.

Having undergone a training to become a food technology specialist, Riedl graduated in food management and is on her way to becoming a doctor in the field of food chemistry. In the run-up for the Powtech 2017, she learned about drying system manufacturer Harter of Stiefenhofen, Germany. Harter's low temperature condensation drying technology appeared promising to her. "From an initial conversation, a successful collaboration developed little by little to result in an overall solution which our two innovation minded companies got off the ground together" explains Jochen Schumacher of Harter Technical

Sales. The task to be fulfilled was to dry the seeds from an initial 25 percent to a final 9 percent residual humidity while separating the tiny hairs in the process. In the end, we arrived at a concept of a continuous barrel dryer with cooling tunnel, conveying system, dispensing hopper and dust separator.

## Exactly Defined Residual Humidity

Harter's drying technology is very different from conventional drying techniques. The so-called heat pump assisted condensation drying was developed by Harter more than 30 years ago. The technology found its way into the pharmaceutical industry some ten years ago, from where it took only a small step into the food industry. Both industrial sectors appreciate the benefits of this gentle and efficient drying method, which is capable of drying at temperatures variable between 10 °C and 90 °C. Low temperatures, quality results, exactly defined residual humidity, reproducible processes and efficient, energy saving technology – this is how this drying method may be summarized. Harter has an in-house pilot plant station to run tests on products to be dried. Schumacher: "This approach is indispensable to obtain a reliable design of a customized system." This approach was also used for the project of the German manufacturer of jams, who started adopting organic products in their assortment in 2000.



The system customized for Maintal Konfitueren is a continuous barrel dryer with a cooling tunnel, conveying system, dispensing hopper and dust separator. The final product is a premium organic wild rose oil.

Harter manufactured a special test barrel with in-built conveying blades. The purpose of these blades was to demonstrate if they were capable of moving the hip seeds from one end of the barrel to the other. A total of 32 kg of seeds was dried with five kg portions of seeds filled in at ten minute intervals. The rotating speed was set at 1.7 revolutions per minute. Various temperatures between 50 °C and 60 °C and various airflow rates produced different results. Harter also modified the design of the conveying blades to obtain better results. The tests also revealed the problem of the system tending to collect dust. The results of all these tests and the parameters determined were used in the design of the overall system which Maintal Konfitueren finally chose to acquire.

Each working day, up to 110 kg of hip seeds per hour may be transported by a screw conveyor from the dispensing hopper to the continuous barrel dryer to be dried therein. The barrel rotates at 4 revolutions per minute. This gentle agitation helps to equally expose the seeds to the airstream in order to obtain a uniformly dried mass of seeds. While the seeds are moved from left to right inside the barrel, the process air is passed through the barrel in the opposite direction absorbing the humidity in the seeds.

The drying temperature is a gentle 60 °C and may be raised to 70 °C max. It took two tweaks to make the seeds automatically leave the barrel upon completion of drying. Firstly, the barrel has conveying blades installed which move the seed towards the barrel exit. Secondly, the barrel was inclined at two degrees. After a drying time of 60 minutes, some 100 kg of seeds dried to between nine and ten percent residual humidity leave the barrel on an exit chute to be transported to the cooling tunnel through a conveyor belt. "As-dried seeds filled in big bags may give off

moisture with resulting condensation. This is why cooling after drying should be used to prevent moulding", explains Schumacher. The seeds move on a conveyor belt through the cooling tunnel. Cold air at 15 °C is blown vertically on the seeds and takes up their heat in the process. Much as the humid air in the dehumidification module, the hot air in a cooling module is cooled and the humidity condensed to form water. After 60 seconds, the cooled seeds leave the tunnel and are transported by an ascending conveyor to the station where they are filled in big bags. Subsequently, the dried seeds are pressed to extract oil

### Hair Separation

Most of us will remember those childhood days when we used hip seeds for the notorious practical joke. The itching was unbearable for the poor sod who got the tiny hairs under their pullover. Those very hairs were also a big challenge in this industrial project. Not for their itching property but because they are unwanted in the final product, the oil, for appearance. Christian Hastedt, Maintal Konfitueren Project Manager was in charge of the practical implementation: "The tiny hairs would also have clogged our oil mill and we wanted to prevent this, of course." To sift out the tiny hairs Harter installed a cyclone type dust separator in the duct returning the process air from the barrel to the dehumidification module. While flowing through the barrel, the extremely dry process air does not only absorb humidity from the hip seeds but also, as an unwanted side effect, the tiny seed hairs. These are sifted out by a cyclone dust collector in a mobile dust separator, which was placed in a separate room for space restrictions.

A control cabinet houses the system controls

and the HMI operating panel. Also, an optical signalling device atop the cabinet indicates the system status showing the respective 'traffic light' colour. The operating panel is used to control the parameters of all system components, which also includes the issue quantity of the dispensing hopper, the rotating speed of the barrel, the speed of the belt conveyor, the temperatures inside the barrel and inside the cooling tunnel, and the fill level of the hairs in the dust separator. The drying process may also be traced and tracked at any time. All system components are easily accessible for servicing or cleaning. Schumacher and Riedl are proud of their joint project and their successful development effort. "It meets our notion of sustainability and future-mindedness that we can now produce such a high quality product from the precious seeds. And the government subsidy for using heat pump technology was, of course, a welcome treat. We have, thus, found an optimal business partner in Harter", resumed Hastedt contentedly.

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