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Tel. 07 91 - 9 71 91-0 • Fax 9 71 91-25
C. Schliessmann Kellerei-Chemie GmbH & Co.KG
Auwiesenstr. 5 • D-74523 Schwäbisch Hall

Brennereitechnologie

Instructions for processing topinambour (Jerusalem artichoke) in a small distillery

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Technical informations and use instructions

Special features of the topinambour tuber:

The potato-like tuber of the topinambour plant, which is related to the sunflower, assumes a special status among the raw materials used in a small distillery: in contrast to common raw materials such as pome or stone fruit, with topinambour the carbohydrates in the fruits are not available in directly fermentable form (glucose, fructose), but they are fixed in the underground tuber as a long-chained polymer, the so-called "inulin". As a result, the following difficulties are associated: Since inulin is not directly fermentable, it first has to be split into the fermentable sugars fructose, glucose and sucrose through inulinases. Topinambour tubers are similar to potatoes in terms of their consistency. Without appropriate processing they would yield low-juice, dry mashes which are difficult to ferment and can only be poorly distilled. Due to their irregular, rough surface and the occasionally branched shape, the tubers are also tainted with earth and can only be cleaned with great effort. The risk of bacterial infections of the mash is correspondingly high.

The previously common mashing process:

Up until the end of the last millennium it was customary to liquefy topinambour mashes to some extent by adding up to 50% water. Moreover, in the absence of technical enzymes there was no other possibility than to utilize the enzymes formed in the topinambour tuber in the spring for the saccharification of inulin. But since this natural inulinase is acid-sensitive, in contrast to fruit mashes topinambour mashes could ultimately not be protected against bacterial infections by means of artificial acidification with sulphuric acid to pH 3. Despite careful lowering of the pH level to just under 5, this frequently led to faulty fermentations as well as losses in yield and aroma.

The modern mashing process:

TOPIZYM® is a two-component enzyme preparation for liquefaction and saccharification of topinambour mashes that has been tried and tested for almost 20 years. It contains highly effective pectinases, cellulases and hemicellulases for decomposition of cellular material, for liquefaction of the mash without addition of water and for releasing the tuber's own inulin. Inulinolytic enzyme activities simultaneously split the inulin and release the fermentable sugars. The broad pH optimum and the high efficacy of the enzyme preparation at pH 3-4 allow the acidification of topinambour mashes to pH 3 (fermentation under "acid protection"). **TOPIZYM®** has an optimal temperature range of 20-35 °C and is therefore geared to the mashing and fermenting conditions in a small distillery. **TOPIFERM®** is a particularly active, fermenting dry pure culture yeast from the strain *Saccharomyces cerevisiae*. It enables a rapid primary fermentation and the efficient, complete secondary fermentation of topinambour mashes within roughly one week. The result is high yields in clean, aroma-typical alcohol from which the best drinking quality can be produced.

"Topinambour" - ready-made spirits:

Regulation (EC) No. 110/2008 on Spirit Drinks defines "topinambour" or "spirits from Jerusalem artichoke" in Category 14. These spirits may not contain anything but the distillate from a fermented topinambour mash, blended water, up to 10 grams of sugar per litre ('if the label does not mention a geographical origin') and some caramel (only for standardization of color after storage in a wooden barrel). The minimum alcohol content of this spirit is 38% alcohol by volume. Excellent topinambour distillates are described as fresh, fruity and flowery in terms of aroma, and as fruity, slightly earthy and slightly like raspberry in terms of taste.

Working instructions for processing topinambour tubers in a small distillery according to the modern mashing process by using TOPIZYM® and TOPIFERM®

- Thoroughly wash the topinambour tubers with a brush and high-pressure cleaner or in the apple wash, if necessary by adding an odorless dishwashing detergent;
- Thoroughly rinse tubers with clean water; in case of tubers harvested during particularly cold weather, heat to at least 20 °C for a final rinsing with hot water;
- Shred or grind tubers with the aid of masher, milling machine or mincer;
- Transfer topinambour mash into the fermenting vessel while adding auxiliary materials (as described in the following):
 - Add **TOPIZYM®** enzyme preparation; dosage: 20-30 ml/100 kg of topinambour;
 - Rehydrate **TOPIFERM®** dry pure culture yeast as usual in water and add; dosage 20-30 g/100 kg of topinambour;
 - Adjust mash to pH 3 with **sulphuric acid**; dosage: approx. 100-150 ml/100 kg mash; as usual, dilute sulphuric acid (1:10) beforehand by carefully stirring into water;
- If necessary, raise the temperature of the mash to 15-25 °C by adding hot water;
- Fill the fermenting vessel to at most 70% with mash;
- To reduce foaming, spread 10 ml of **SILICON-Antischaum US (silicone anti-foaming agent)** on the surface of the mash with a sprayer.

Information for fermentation management:

The material and size of the fermenting vessel, mash quantity, ambient temperature and set temperature of the mash should be ideally coordinated so that the temperature in the fermenting mash increases within 30-36 hours after addition of yeast to 30 to a maximum 36 °C, measured inside the mash. Under these circumstances and based on experience, the fermentation period is about 5-7 days.

Occasional stirring of the mash up until primary fermentation accelerates fermentation, while lower temperatures accordingly decelerate it.

Review of completed fermentation:

Thoroughly fermented topinambour mashes prepared without addition of water have a final fermentation degree of 1-1.5% mass, measured with a **saccharimeter**.

The **residual sugar test** indicates a maximum of 2-4 grams of sugar per litre of mash. Depending on the quality of raw material, the alcohol content of the mash can be up to 10% alcohol by volume.

Information for distillation:

Fermented topinambour mashes have a very poor shelf life due to their high protein content, the relatively high fermentation temperature and their bacterial load. Therefore, they should be immediately distilled in order to prevent alcohol losses and undesirable changes in aroma.

To attain a distillate in the cleanest possible drinking quality it is advisable to distil the mash under high intensification and with careful fractionation. Particularly in case of doubt, switch from heart to tails should be made rather sooner than later.

TOPIZYM®		TOPIFERM®	
100 ml bottle	(No. 5057)	100 g tin	(No. 5824)
500 ml bottle	(No. 5058)	500 g vacuum	(No. 5823)
1 l bottle	(No. 5059)	packing	
5 l can	(No. 5060)		
20 l can	(No. 5061)		

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