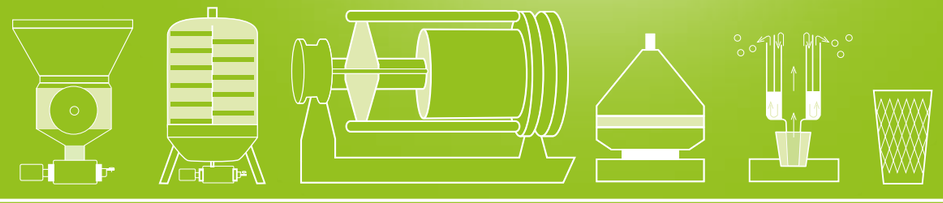
Cider and fruit wine

	Product	Description	Application	Dosage (g or mL per 100 kg/L)
Yeast	**Oenoferm®**	Dry selected pure yeast for clean fermentation	Cider, German Apfelwein	20 – 30
	Oenoferm® Bio	Organic pure yeast	Cider, mead, red fruit wines	20 – 40
	Oenoferm® Freddo	Fast-fermenting Bayanus yeast	Cider/Perry	20 – 30
	Oenoferm® X-treme	Fast-fermenting hybrid yeast	Cider, mead, fruit wine	20 – 30
Yeast nutrition	**VitaDrive® F3**	Yeast activator	Rehydration	See product data sheet
	Vitamon® Liquid	Liquid yeast nutrition	Continuous dosage during fermentation	Up to 200
	Vitamon® Plus	Nutrition complex	Cider fermentation	20 – 100
	VitaFerm® Ultra F3	Multi-nutrition complex	Difficult to ferment media	30 – 40
	VitaFerm® Bio	Deactivated organic yeast	Yeast nutrition for organic fruit wine	30 – 40
Stabilisation & organoleptics	**Kadifit**	Potassium metabisulphite, powder	Oxidation prevention and microbiological stabilisation	5 – 25
	Solution Sulfureuse P15	Liquid SO_2, 15% SO_2	Oxidation prevention and microbiological stabilisation	5.5 – 55
	Blancobent UF	Special bentonite, no particles	Fining, in-line stabilisation in crossflow filter systems	5 – 200
	FloraClair®/LittoFresh®	Vegetable fining protein	Tannin adsorption, fining	10 – 40
	Tannivin® Galléol	Fully hydrolysable tannin from oak galls	Beverage fining and flavour enhancement	3 – 20
	Tannivin® Structure	Oenological tannin from quebracho	Improved structure and oxidation prevention	3 – 20
	Granucol® GE	Granulated activated plant charcoal	Adsorption of bitter notes	30 – 150
	Ercarbon SH	Powdered plant charcoal	Odour and flavour harmonisation	30 – 100
	Akticol FA-UF	Highly active powdered plant charcoal	Defined particle size for colour reduction/use in crossflow filter systems	50 – 250
	Boerovin	Biological L(+) lactic acid	Natural acidifying agent E270	See product data sheet
	LittoFresh® Sense	Vegetable organoleptic product	Adsorption of undesirable phenolic compounds	5 – 30
Filtration	**Erbslöh filter sheet J-7S**	Sterilising filtration	Separation rate 0.8 – 0.5 µm	
	Erbslöh filter sheet J-12	Fine filtration	Separation rate 1.5 – 0.6 µm	
	VarioFluxx® M	Cellulose-perlite mix for pre-coat filtration	Clarifying filtration	
	VarioFluxx® F	Cellulose-perlite mix for pre-coat filtration	For filter cake compaction	
Enzymes	**Fructamyl® FCT**	Alpha-amylase	Degradation of starches in cider/Apfelwein	0.5 – 1
	Fructozym® FLUX	Broad-spectrum pectinase	Pectin degradation and improved filtration	1 – 2
	Fructozym® UF	Acid protease + arabanase	Reduction of foaming in kiwi and cherry	4
	Distizym® FM-TOP	Broad-spectrum pectinase	Pectin degradation and improved filtration	1 – 2



- **Fermentation**
- **Enzymation**
- **Clarification and stabilisation**
- **Processing diagram**

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Progress is our future

Fermentation

Fermentation

Cider and fruit wines are dependent on alcohol, acids, glycerine, carbon dioxide from fermentation and secondary aromatics from fermentation. Provided that the products concerned are not flavoured, fermentation is the most important component in determining the finished beverage's flavour and aroma, in addition to the substrate to be fermented.

- **Greatest possible alcohol yield**
- **Retention of fruit aroma, "clean" fermentation**
- **Suppression of secondary flora (bacteria, wild yeasts)**

As a rule, pure yeasts for alcoholic fermentation are selected from wine yeasts and habituated to higher alcohol contents through targeted adaptation.

All Erbslöh yeasts ferment to at least 15-16% ABV in appropriate fermentation conditions. High-performance yeasts, such as Oenoferm® X-treme can generate 17% ABV if there is a good nutrient supply.

Different yeast strains vary with regard to formation of fermentation by-products (volatile alcohols, esters), how they behave during fermentation and tolerance to adverse external conditions (low temperatures, poor nutrient supply). Bayanus-type yeasts need fewer nutrients and are more alcohol-tolerant than other yeasts. This is why these are particularly suitable for fermenting high-alcohol bases and restarting stuck fermentation.

Characteristics

Characteristics of yeasts

		Oenoferm®	Oenoferm® Bio (DE-ÖKO-003)	Oenoferm® Freddo	Oenoferm® X-treme	Oenoferm® CHA
Use	Product type	Cider, German Apfelwein	Cider, mead, red fruit wines	Cider, German Apfelwein, red fruit wines	Cider, mead, fruit wine	Cider, mead, bottle fermentation
	Aroma	Fresh, fruity apple	Balanced expression of varietal aroma	Fresh and fruity; citrus notes	Intensive fruity, spicy notes	Neutral
	Fruit	Apple, pear, kiwi	Apple, pear, honey, all coloured fruit	Apple, pear, kiwi, all coloured fruit	Apple, pear, honey, kiwi	Apple, pear, honey, sparkling fruit wine
	Oenological yeast type	Cerevisiae	Bayanus	Bayanus	Bayanus	Bayanus
Fermentation speed	Inoculation concentration in g/100 L	20 – 30	20 – 40	20 – 30	20 – 30	20 – 30
	Fermentation onset in h	10 – 20	10 – 15	25 – 40	30	10 – 20
	Fermentation progress	Rapid under normal conditions	Continuous fermentation process	Fast and safe even at low temperatures	Fast and safe even at low temperatures	Continuous fermentation process
	Degree of final fermentation	Complete	Complete	Complete	Complete	Complete
Influencing parameters	Nitrogen content required	High / Slight	High / Slight	High / Slight	High / Slight	High / Slight
	Recommended temperature range in °C	16 – 22	20 – 26	13 – 22	10 – 22	14 – 26
	Alcohol tolerance in % vol.	Up to 17	Up to 15	Up to 15	Up to 17	Up to 16

Yeast nutrition

Yeast nutrition

A yeast can suffer catastrophic damage during rehydration. Swelling at too high temperature (> 45 °C) impairs the yeast's vitality, but swelling for too long also reduces activity. Important amino acids and trace elements are washed out of the yeast during pre-swelling and are therefore no longer available for metabolism.

The trace elements in particular that are important for yeast cell wall construction and function are affected by this. The yeast cell wall is key, as sugar has to be transported into the cell and alcohol out of the cell. Yeast is ideally equipped by using VitaDrive® F3 during rehydration to ensure rapid, guaranteed fermentation.

Rehydration and nutrition

The content of nitrogen that can be used by yeast is greatly reduced in many fruit juices as a result of clarification and stabilisation. Trace elements such as zinc, magnesium and vitamins thiamine, biotin, niacin and panthotenic acid are virtually non-existent. Many apple juices are inherently low in these fermentation promoting substances. The rehydrated yeast requires the correct food to facilitate rapid fermentation without forming undesirable components (e.g. volatile acids).

Enzymes

Enzymes

Enzymes are proteins which act as biocatalysts because of their structure. This special property ensures that certain biochemical reactions can be accelerated or elapse. No metabolic or digestive processes would function without enzymes. In addition to the enzymes which work naturally in organisms, there are also enzymes obtained from bacteria or moulds through fermentation. They are used in many ways, such as in food production, in detergents and leather processing. On the one hand, enzyme activity depends on the degree of concentration, on the other on external factors such as the pH value and temperature. As proteins, enzymes are denatured at high temperatures and lose their efficacy as a result. It is therefore important for the desired processes to meet a specific pH and temperature range at which the enzymes are correspondingly effective. As a rule, technical enzymes are used in beverage production to support the fruit's own enzymes, for a faster biochemical process.

Amylases (starch-degrading enzymes)

Pome fruit contain varying degrees of starch depending on the variety and ripeness. A proportion of the starches always transfers to the juice and can lead to problems during clarification and filtration. Degradation must therefore be enzymatic, using amylases. Starches are partly present in undissolved form and must be released for degradation by heating to > 80 °C (Flash pasteurisation) before enzymatic treatment. We recommend dosing 0.5 – 1 mL/100 L of Fructamyl® FCT amylase before fermentation, to ensure complete starch degradation.

Pectinases (pectin-degrading enzymes)

Pectins are the supporting substance in fruit and are therefore present in virtually all types of fruit.

Pectin in fruits

Apricots, plums and blackcurrants have the highest absolute pectin content. Where sugar content is concerned, fruits such as blackberries and raspberries have a higher pectin content than apples and pears. Due to different pectin contents and pectin branching, the need for pectolytic enzymes varies depending on the fruit and degree of ripeness. Apple juice concentrates obtained by leaching in particular have a higher residual branched pectin content. Like starches, these pectins inhibit clarification and filtration and therefore have to be degraded enzymatically. Crossflow filters in particular are very sensitive even to low contents of pectin and its side chains. In this case it essential to dose 10 – 20 mL/100 L of a broad spectrum enzyme preparation such as Distizym® FM-TOP or Fructozym® FLUX during fermentation.

Clarification and stabilization (fining)

Cider and fruit wines are separated from the yeast after fermentation by separator or racking. This is followed by the addition of 50 – 100 mg/L SO_2. On the one hand this is necessary to ensure adequate oxidation prevention, on the other it inhibits acetic and lactic acid bacteria and prevents them harming the product. Actual fining now takes place. FloraClair® (pea protein) is used to adsorb polyphenols, Blancobent UF (bentonite) to adsorb protein and Tannivin® Galléol (fining tannin) as a flocculation partner are dosed in succession. These three fining agents react after 1 hour of mixing and bind the particles in the beverage. The fining agents deposit together with the turbidity-causing particles and the residue can be filtered. If particularly neutral and/or colourless cider bases are to be produced, a suitable activated charcoal (e.g. Akticol FA-UF) may be dosed before fining.

FloraClair®
Vegetable fining protein for tannin adsorption and fining.
Dosage: 10 – 40 g/100 L

Akticol FA-UF
Highly active, powdered vegetable charcoal for colour reduction and for use in crossflow filter systems.
Dosage: 50 – 250 g/100 L

Before fining, 200 g/100 L Ercarbon SH can be dosed for flavour neutralisation and 200 g/100 L Akticol FA-UF dosed for decolouration when producing cider bases.

Cider processing diagram

	Cider, perry, German Apfelwein, German Birnenwein		
	Processing stages	**Products used**	**Recommended dosage**
Raw materials	Juices, juices diluted from concentrate, sugar or glucose syrup, water and edible acids		
Producing onset of fermentation	Nutrient additive	VitaFerm® Ultra F3	40 – 60 g/100 L*
		Vitamon® Liquid Also for fermentations > 14%. vol	Dose up to 200 mL/100 L when fermentation is in progress*
	Enzyme dosage	Fructozym® FLUX	2 mL/100 L
		Fructamyl® FCT	1 mL/100 L
Fermentation	Rehydration	VitaDrive® F3	Yeast: VitaDrive® F3 1:1
	Neutral cider 20 – 25 °C	Oenoferm®	20 – 30 g/100 L
	Fruity, fresh cider/perry 18 – 22 °C	Oenoferm® Freddo	20 – 30 g/100 L
	Bittersweet cider	Oenoferm® X-treme	20 – 30 g/100 L
Racking and fining	Sulphurisation	Kadifit or Solution Sulfureuse P15*	10 – 15 g/100 L or 33 – 50 mL/100 L
	Vegan fining*	FloraClair®	10 – 40 g/100 L
		Tannivin® Galléol	2 – 5 g/100 L
		Blancobent UF	100 – 200 g/100 L
Filtration	Pre-coat filtration	VarioFluxx® M and VarioFluxx® F	See product data sheet for details
	Sheet filtration	Erbslöh filter sheet J-12	
Storage	Regularly check free SO_2 and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P15*	Adjust to 40 – 50 mg/L free SO_2
	Removal of off notes and flavours	Granucol® GE	20 – 500 g/100 L
		LittoFresh® Sense	5 – 30 g/100 L
Bottling	Regularly check free SO_2 and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P15*	Adjust to 30 – 40 mg/L free SO_2
	Sterilising filtration	Erbslöh filter sheet J-7S	
	Harmonisation	Tannivin® Structure*	5 – 30 g/100 L
		Boerovin*	See product data sheet for details

*In Germany, treatment agents and maximum values must comply with the regulations for wine-like and sparkling wine-like beverages.

Mead

Honey wine processing diagram

	Mead/honey wine		
	Processing stages	**Products used**	**Recommended dosage**
Raw materials	Honey, water, edible acids	Boerovin*	2 – 4 g/L
Producing onset of fermentation	Nutrient additive	VitaFerm® Ultra F3	40 – 100 g/100 L*
Fermentation	Rehydration	VitaDrive® F3	Yeast: VitaDrive® F3 1:1
	Rapid fermentation at 20 - 25 °C	Oenoferm® X-treme	25 – 35 g/100 L
Racking and fining	Sulphurisation	Kadifit or Solution Sulfureuse P15*	10 – 15 g/100 L or 33 – 50 mL/100 L
	Vegan fining*	FloraClair®	10 – 40 g/100 L
		Tannivin® Galléol	2 – 5 g/100 L
		Blancobent UF	100 – 200 g/100 L
Filtration	Pre-coat filtration	VarioFluxx® M and VarioFluxx® F	See product data sheet for details
	Sheet filtration	Erbslöh filter sheet J-12	
Storage	Regularly check free SO_2 and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P15*	Adjust to 40 – 50 mg/L free SO_2
	Removal of off notes and flavours	Granucol® GE	20 – 500 g/100 L
		LittoFresh® Sense	5 – 30 g/100 L
Bottling	Regularly check free SO_2 and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P 15	Adjust to 40 – 50 mg/L free SO_2
	Sterilising filtration	Erbslöh filter sheet J-7S	
	Harmonisation	Boerovin*	See product data sheet for details

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Fruit wine

Fruit wine processing diagram

	E.g. cherries, strawberries, blueberries, blackcurrants, kiwi, sloes, gooseberries and other coloured fruit		
	Processing stages	**Products used**	**Recommended dosage**
Raw materials	Juices, juices diluted from concentrate, sugar or glucose syrup, water and edible acids.		
Producing onset of fermentation	Nutrient additive	Vitamon® Liquid Cherries, strawberries, blackcurrants, kiwi, gooseberries	120 – 400 mL/100 L*
		VitaFerm® Ultra F3 Difficult to ferment fruit such as blueberries and sloes	40 – 100 g/100 L*
	Enzyme dosage	Fructozym® FLUX	2 mL/100 L
		Fructamyl® UF To reduce foaming in cherries and kiwi	4 mL/100 L
Fermentation	Rehydration	VitaDrive® F3	Yeast: VitaDrive® F3 1:1
	Easy to ferment fruit, such as cherries, strawberries, blackcurrants 20 - 25 °C	Oenoferm® X-treme	15 – 25 g/100 L
	Difficult to ferment fruit such as blueberries and sloes	Oenoferm® Freddo	20 – 35 g/100 L
Racking and fining	Sulphurisation	Kadifit or Solution Sulfureuse P15*	10 – 15 g/100 L or 33 – 50 mL/100 L
	Vegan fining*	FloraClair®	10 – 40 g/100 L
		Tannivin® Galléol	2 – 5 g/100 L
		Blancobent UF	100 – 200 g/100 L
Filtration	Pre-coat filtration	VarioFluxx® M and VarioFluxx® F	See product data sheet for details
	Sheet filtration	Erbslöh filter sheet J-12	
Storage	Regularly check free SO_2 and and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P15*	Adjust to 40 – 50 mg/L free SO_2
	Removal of off notes and flavours	Granucol® GE	20 – 500 g/100 L
		LittoFresh® Sense	5 – 30 g/100 L
Bottling	Regularly check free SO_2 and and if necessary re-sulphurise	Kadifit or Solution Sulfureuse P15*	Adjust to 30 – 40 mg/L free SO_2
	Sterilising filtration	Erbslöh filter sheet J-7S	
	Harmonisation	Boerovin*	See product data sheet for details

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