

HACCP Report

Crop 2025

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1 Introduction and Scope

German hop production is subject to clearly defined quality and regulatory requirements. As a cooperative of German hop growers, HVG supports compliance with these requirements through documented processes, an HACCP-based control concept, and analytical quality controls.

German and European food hygiene legislation, including Regulation (EC) No. 852/2004, requires food business operators to implement preventive and risk-based hygiene concepts. Relevant activities and process steps must be assessed with regard to potential biological, chemical, and physical hazards. Where hazards are identified, appropriate preventive, monitoring, and control measures are implemented to ensure that products placed on the market meet the applicable food safety requirements.

HVG fulfils this responsibility through an established monitoring system. This system has been part of the audited quality management system since 1998, is reviewed annually, and is currently certified according to DIN EN ISO 9001:2015. Since the 2011 harvest year, HVG has further expanded its quality standards for pesticide residue analysis. In addition to internal quality controls, a coordinated pesticide residue monitoring programme was established for the hop sector.

In supplying the brewing industry with hop products, HVG Hopfenverwertungsgenossenschaft e.G. fulfils two key roles:

1. **as a trader**



HVG Hop Processing Cooperative
Kellerstraße 1
85283 Wolnzach, Germany
QM: Sabine Spieß
s.spiess@hvg-germany.de

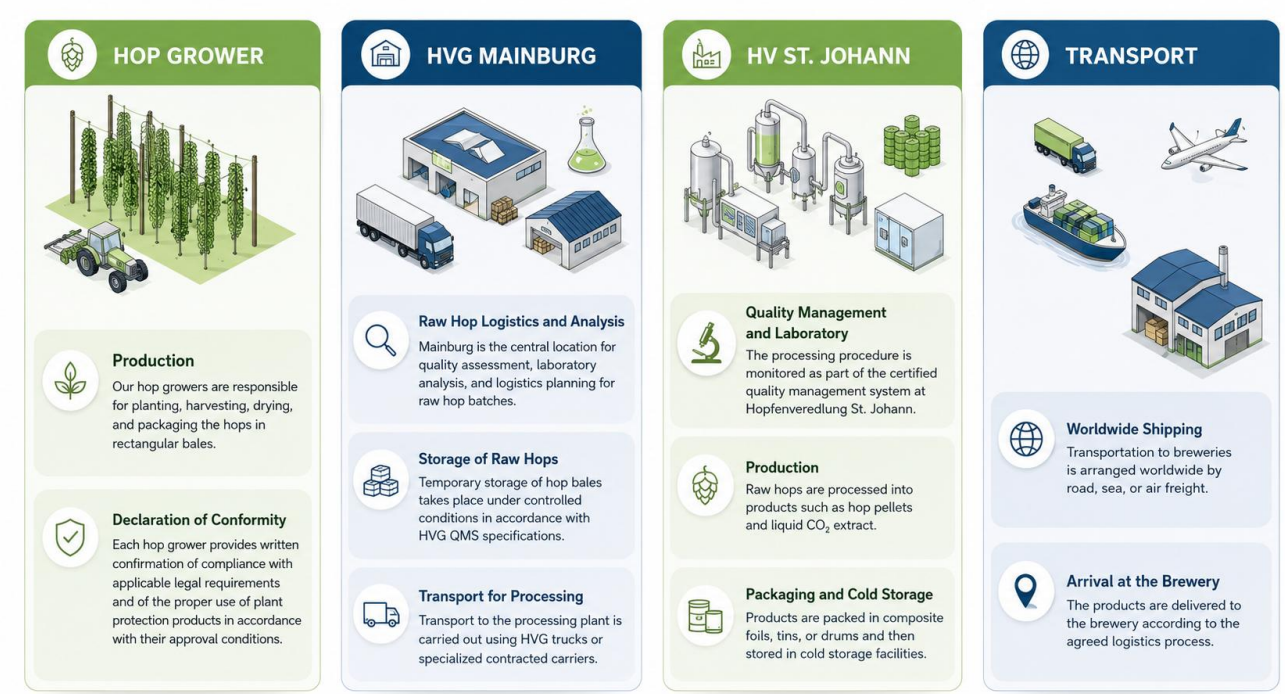
2. **as a processor**



Hopfenveredlung St. Johann GmbH
Mainburger Straße 15, 93358 St. Johann, Germany

For this reason, the HACCP concept is divided into two areas. The processing plant, Hopfenveredlung St. Johann GmbH, operates its own independent HACCP system for processing activities. HVG's HACCP system covers hop procurement and trading activities.

The following diagram illustrates HVG's business process:

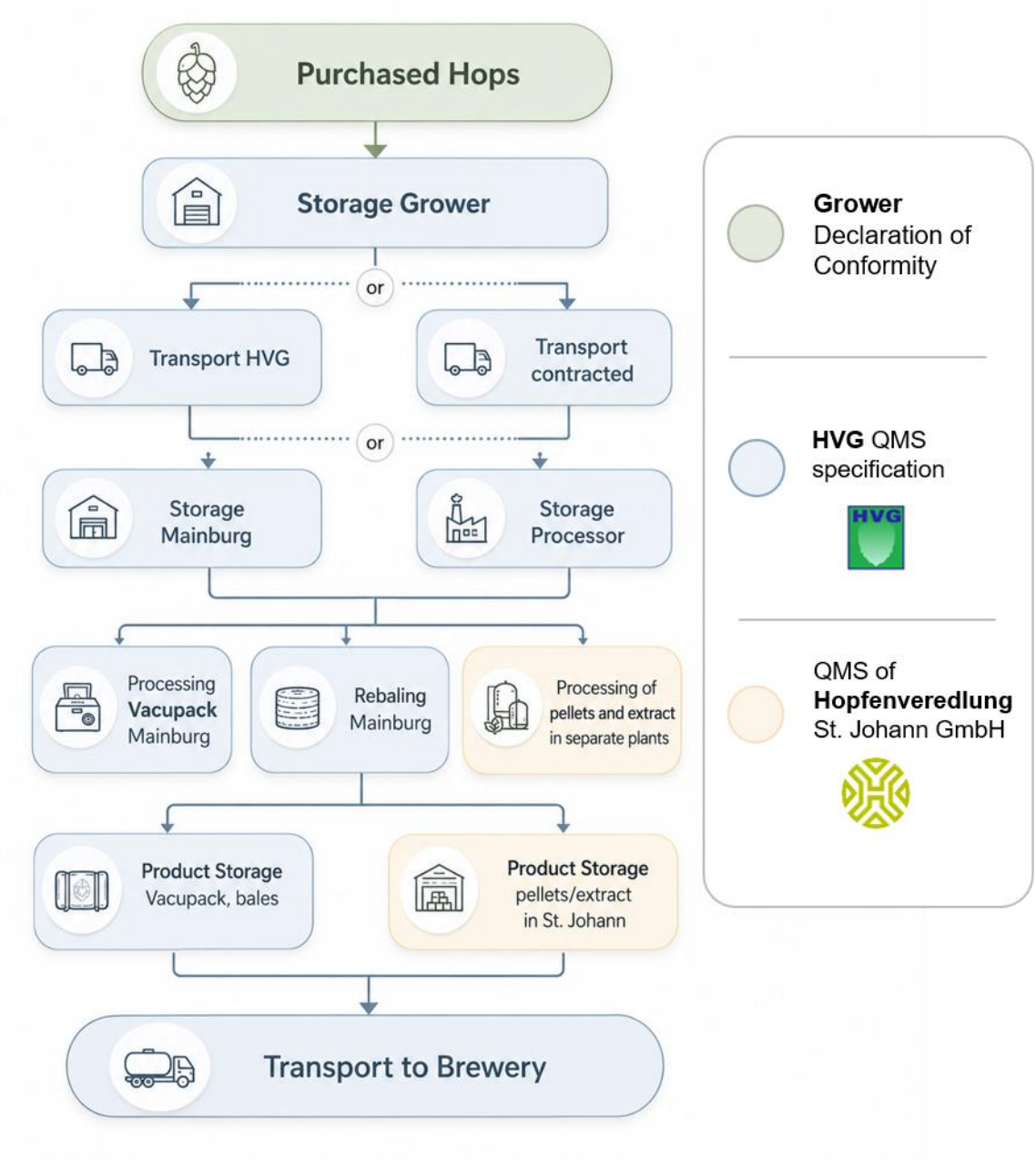


The essential properties of HVG products are described in the relevant product information documents and safety data sheets.
This report documents HVG's HACCP plan and provides a structured summary of the current analytical results for pesticide residues, heavy metals, and nitrate.

All analytical data presented in this report refer exclusively to HVG hops from the 2025 harvest. The data status is June 2026.

2 Hazard Analysis and Control Measures

HVG has assessed the realistically foreseeable biological, chemical, and physical hazards relevant to its activities and process steps. As the processing facilities operate their own HACCP systems, this report focuses on HVG's core activities: hop procurement, trading, and residue monitoring.



The risk assessment is based on the principles and definitions laid down in Regulation (EC) No. 178/2002. This Regulation distinguishes between "hazard", "risk", "risk analysis", "risk assessment", and "risk management". In Article 3(14), a hazard is defined as "a biological, chemical or physical agent in, or condition of, food or feed with the potential to cause an adverse health effect".

Where the HACCP assessment identifies a significant food safety hazard that requires specific control at a defined process step, appropriate control measures are established. If such control is essential to prevent, eliminate, or reduce the hazard to an acceptable level, the process step is defined as a critical control point (CCP).

No food safety hazards requiring the establishment of a CCP were identified within HVG's direct scope of responsibility. Relevant chemical hazards, in particular pesticide residues, are managed through documented prevention, monitoring, and release procedures:

- ✓ **Microbiological criteria**: Regulation (EC) No. 2073/2005 on microbiological criteria for foodstuffs does not define specific microbiological limits for hops or hop products.

  Dried hops and hop products generally have a low susceptibility to microbiological spoilage. Environmental microorganisms may naturally be present on agricultural raw materials; however, dried hops do not provide favourable conditions for the growth of human-pathogenic bacteria in the same way as protein- or carbohydrate-rich foods with higher water activity.

  When hops are added during wort boiling, the boiling process provides a relevant thermal inactivation step. In finished beer, low pH, alcohol content, low oxygen availability, carbon dioxide, and hop-derived antimicrobial compounds contribute to limiting microbial growth.

  For dry hopping applications, no wort boiling step follows the hop addition. Nevertheless, the beer matrix itself, including low pH, alcohol content, carbon dioxide, low oxygen availability, and hop-derived antimicrobial compounds, limits the growth of many microorganisms. From a food safety perspective, dried hops used for dry hopping are therefore considered to represent a low microbiological risk when handled under appropriate hygienic conditions.

  Based on this assessment, microbiological hazards associated with HVG hops are not classified as requiring a critical control point (CCP) within HVG's HACCP plan.

- ✓ **Contaminants**: Regulation (EU) 2023/915 establishes maximum levels for certain contaminants in food. Hops and hop products are not listed as a specific food category with dedicated maximum levels under this Regulation.

  In contrast to cereals and cereal-based products, for example, Fusarium toxins are not considered a typical contaminant of practical relevance in hops. This assessment is supported by previous screening analyses of HVG hops, in which no mycotoxins were detected.

  Based on the available analytical data and the low relevance of mycotoxins for dried hops, mycotoxins are not classified as a hazard requiring a critical control point (CCP) within HVG's HACCP plan.

- ✓ **Heavy Metals**: As agricultural products, hops may be subject to environmental background exposure to inorganic contaminants. In its monitoring activities, HVG focuses on toxicologically relevant elements such as lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg).

  Other elements, including chromium (Cr), cobalt (Co), iron (Fe), molybdenum (Mo), and nickel (Ni), may also be included in analytical screening programmes. However, they are not used as primary toxicological marker elements in this assessment.

  Regular testing of HVG hops has shown consistently low levels of Pb, Cd, As, and Hg. In addition, the use pattern of hops in brewing must be taken into account. Hops are added in

comparatively small quantities, and any potential contribution of these elements to the finished beer is further reduced by dilution during the brewing process.

Based on the available analytical data and the limited contribution of hops to the overall heavy metal load in beer, heavy metals and toxic elements are not classified as hazards requiring a critical control point (CCP) within HVG's HACCP plan.

- ✓ Conventional HVG hop products **contain no added flavorings or other additives**. Hazards from these substances are therefore not identified.
- ✓ **Radioactivity**: Hops are not treated with ionising radiation during production or processing. Based on the origin of HVG hops and the available monitoring data, there is no indication of radiological contamination exceeding normal environmental background levels.

  Analytical testing includes the relevant radionuclides caesium-134 and caesium-137. Previous results for HVG hops have consistently been below 3 Bq/kg.

  Based on the available analytical data and the absence of indications for elevated radiological contamination, radioactivity is not classified as a hazard requiring a critical control point (CCP) within HVG's HACCP plan.
- ✓ **Nitrate:** As with many other agricultural products, hops naturally contain nitrate. Fertilisation is one of the relevant factors influencing nitrate levels in hops. Typical nitrate contents in hops range from approximately 400 to 1,200 mg/100 g. By way of comparison, raw vegetables such as lettuce or spinach may also contain considerable amounts of nitrate.

  For breweries, the nitrate content of the final beer is influenced by several factors, in particular the nitrate content of the brewing water and the hop dosage used in the recipe.

$$\text{mg NO3/l wort} = \frac{hops\ldots g/hl \times NO3\ldots mg/100g}{100\,l/hl}$$

Even with a high aroma hop dosage of 500 g/hl and an assumed nitrate content of 1,200 mg/100 g NO_3, the theoretical nitrate contribution from hops would be 60 mg NO_3/l, assuming complete transfer into the wort. In brewing practice, the actual transfer rate is generally lower and is typically estimated at approximately 60 to 75%. For a conservative risk assessment, HVG nevertheless recommends calculating with a transfer rate of 100%.

Nitrate is toxicologically assessed through established acceptable daily intake values. The ADI established by JECFA/WHO is 0 to 3.7 mg nitrate ion per kilogram of body weight per day. Some breweries voluntarily use 50 mg NO_3/l as an internal orientation value when assessing nitrate levels in beer, as this corresponds to the nitrate limit value for drinking water under the German Drinking Water Ordinance. However, this value should be understood as a voluntary orientation value for beer and does not represent a specific legal limit value for beer.

Based on the available assessment, typical hop dosages, and known transfer rates, the nitrate contribution from hops to beer is considered controllable within the normal brewing process. Nitrate is therefore not classified as a hazard requiring a critical control point (CCP) within HVG's HACCP plan.

- ✓ **Food contact materials**: Regulation (EC) No. 1935/2004 sets out general requirements for materials and articles intended to come into contact with food. Food contact materials must not transfer constituents to food in quantities that could endanger human health, bring about an unacceptable change in the composition of the food, or adversely affect its organoleptic properties.

  Direct product contact materials used in connection with HVG hops, including machinery surfaces, packaging materials, and transport-related contact materials, are selected and used in accordance with the applicable food contact requirements.

  - ➢ **Packaging of raw hops**: Raw hops are packaged in polypropylene bags suitable for food contact. Based on the applicable specifications and the available conformity documentation, this packaging is not classified as a hazard requiring a critical control point (CCP) within HVG's HACCP plan.
  - ➢ **Packaging of hop products**: Hop extract is filled into suitable cans or drums, while hop pellets are packed in protective multilayer barrier films. The packaging materials used for these products are specified for food contact applications and are covered by the HACCP systems and conformity procedures of the respective processing facilities. They are therefore not identified as a separate critical control point within HVG's HACCP plan.
  - ➢ **Lubricants and oils**: Where incidental contact with hops cannot be excluded, only lubricants suitable for food-related applications are permitted. The use of lubricants and oils is controlled through defined specifications and the local HACCP systems of the processing facilities. Lubricants and oils are therefore not classified as hazards requiring a critical control point within HVG's HACCP plan.
  - ➢ **Process gases**: Air, carbon dioxide, and nitrogen may come into contact with hops during processing. Process gases used in the processing facilities are specified as suitable for food applications. This aspect is covered by the local HACCP systems of the respective facilities and is therefore not classified as a separate critical control point within HVG's HACCP plan.

- ✓ **Pesticides**: **Pesticides and plant protection products**: Plant protection products may be used in hop production to protect the crop against relevant pests and diseases. Their use is subject to strict regulatory requirements and must follow the conditions of the respective authorisation, including permitted crops, application rates, timing of application, pre-harvest intervals, and other use restrictions.

  Maximum residue levels for pesticide residues in or on food and feed are regulated in the European Union by Regulation (EC) No. 396/2005. In addition to EU requirements, further country-specific or customer-specific requirements may apply, depending on the intended market.

  The authorisation, placing on the market, use, and control of plant protection products in the European Union are governed by Regulation (EC) No. 1107/2009. In Germany, the Federal Office of Consumer Protection and Food Safety (BVL) is responsible for the authorisation of plant protection products. The national assessment involves the relevant federal authorities, including the Federal Institute for Risk Assessment (BfR), the Julius Kühn Institute (JKI), and the Federal Environment Agency (UBA). Enforcement of correct practical use is carried out by the competent authorities of the federal states.

In practical hop production, the “Grünes Heft” published by the Bavarian State Research Center for Agriculture (LfL) is an important guidance document. It provides current information on integrated plant protection in hops, including legal requirements, authorised plant protection products, and practical recommendations for the respective growing season.

Due to the direct application of plant protection products during cultivation, pesticide residues are considered a relevant chemical hazard for hops. HVG manages this hazard through documented preventive measures, grower information, analytical monitoring, and defined release procedures. The results of the pesticide residue monitoring programme are summarised in the following sections of this report.

Framework conditions and cultivation: The legal framework for the use of plant protection products in hop cultivation is clearly defined. Growers receive information and guidance from the competent authorities, advisory services, and industry organisations on the proper and authorised use of plant protection products in hops. In addition, plant protection measures represent a relevant cost factor in hop production, which supports the targeted and need-based use of authorised products. Compliance with legal requirements is subject to official controls by the competent authorities and is additionally supported by HVG’s internal control and monitoring processes during the growing season.

Documentation and supplier qualification: For each delivered hop batch, growers provide plant protection application records for the relevant fields. Once the batch documentation has been received, HVG reviews the records for plausibility and compliance with the relevant authorisation conditions, including permitted products, application rates, application timing, and pre-harvest intervals. In addition, growers confirm by supplier declaration that the delivered goods comply with the applicable legal requirements. This declaration forms part of HVG’s established supplier qualification system.

Analysis and product release: HVG routinely analyses hops for pesticide residues as part of its monitoring and release procedures. In addition, customers may perform their own residue testing according to their internal quality requirements. Detected residues are assessed against the applicable legal maximum residue levels as well as relevant customer- or country-specific requirements. Any deviations or unusual findings identified in HVG’s monitoring programme are evaluated before the product is released. The specific DFA issue identified for the 2025 harvest year is addressed separately in Section 4 of this report.

Brewing process and scientific assessment: The comparatively low dosage of hops in brewing and the transfer behaviour of individual active substances influence the potential residue contribution to finished beer. Scientific studies on the transfer of pesticide residues from hops into beer are used as supporting information for the exposure assessment. However, this consideration does not replace the legal assessment of hop products against the applicable maximum residue levels.

Conclusion of the risk assessment: Pesticide residues are classified as a relevant chemical hazard for hops. Within HVG’s scope of responsibility, this hazard is controlled through documented preventive measures, supplier qualification, batch documentation, analytical monitoring, and defined release procedures. Based on this control system, no process step requiring classification as a critical control point (CCP) has been identified for pesticide residues within HVG’s HACCP plan.

3 HVG Control System for Pesticide Residues

3.1 Grower information and regulatory framework

Before the start of the growing season, HVG, together with the official advisory services, provides hop growers with detailed information on the plant protection products authorised for use in German hop cultivation for the respective harvest year. This information is based on the applicable authorisations, conditions of use, application rates, pre-harvest intervals, and other relevant restrictions.

Temporary special provisions, in particular emergency authorisations granted under Article 53 of Regulation (EC) No. 1107/2009, are also included where they apply to hop cultivation. HVG growers formally confirm receipt of these binding guidelines.

In the 2025 growing season, a total of 38 active substances were available for use in German hop cultivation through authorised plant protection products or applicable special provisions.

The legal framework for the placing on the market and use of plant protection products is Regulation (EC) No. 1107/2009. The assessment of potential residues in harvested hops is based on the maximum residue levels laid down in Regulation (EC) No. 396/2005, supplemented where necessary by customer- or country-specific requirements.

HVG's analytical screening programme covers a broader spectrum of substances than the active substances authorised for hop cultivation in the respective harvest year. This ensures that residues of non-authorised or unexpected substances can also be detected and assessed.

3.2 Documentation and plausibility checks

German hop growers are required to keep records of all plant protection product applications. Upon delivery of the hops, HVG reviews the submitted application records for plausibility and compliance with the relevant requirements, including authorised products, application timing, application rates, and pre-harvest intervals.

3.3 Pesticide Residue Report 2025

Pflanzenschutzmittelbogen 2025

für Hopfengärten: (Schlagnamen angeben) _____

Name: _____

Straße: _____

PLZ/Ort: _____

Die Partie stammt aus folgender Anzahl von Hopfengärten: (bitte ankreuzen) 1 | 2 | 3 und mehr

Sorte: _____

Firma: HVG e. G. **Code- Nr.:** DE **Ballen-Anzahl:** _____

Einkäufer: _____ **Ballen-Nr.:** _____ — _____

Netto-Gewicht: _____ kg

	Pflanzenschutzmittel	Codenummer	Datum 1. Einsatz Tag Monat	Datum 2. Einsatz Tag Monat	Datum 3. Einsatz Tag Monat	Datum 4. Einsatz Tag Monat	Datum 5. Einsatz Tag Monat	Datum 6. Einsatz Tag Monat	Datum 7. Einsatz Tag Monat
Krankheiten (Peronospora/ Mehltau/ Botrytis)	Airone SC / Grifon SC	27/32	.	.	.	.	.	.	.
	Aktuan	1	.	.	.	.	.	.	.
	Aliette WG	2	.	.	.	.	.	.	.
	Bellis	18	.	.	.	.	.	.	.
	Coprantol Duo	26	.	.	.	.	.	.	.
	Cuprozin Progress	20	.	.	.	.	.	.	.
	Curzate 60 WG	60	.	.	.	.	.	.	.
	Cymbal Flow	78	.	.	.	.	.	.	.
	Delan WG	17	.	.	.	.	.	.	.
	Flint	4	.	.	.	.	.	.	.
	Folpan 80 WDG	30	.	.	.	.	.	.	.
	Folpan Gold	16	.	.	.	.	.	.	.
	Funguran Progress	19	.	.	.	.	.	.	.
	Kumar	22	.	.	.	.	.	.	.
	Kumulus WG/Thiovit Jet/ Microthiol Hopfen	12/73/ 40	.	.	.	.	.	.	.
	Luna Sensation	29	.	.	.	.	.	.	.
	Orondis Evo	83	.	.	.	.	.	.	.
	Ortiva	8	.	.	.	.	.	.	.
	Profiler	25	.	.	.	.	.	.	.
	Revus	21	.	.	.	.	.	.	.
	Thiopron	28	.	.	.	.	.	.	.
	Vivando	23	.	.	.	.	.	.	.
	Sonst._____	99	.	.	.	.	.	.	.
Schädlinge (Blattlaus/ Rote Spinne/ sonst.)	Exirel	79	.	.	.	.	.	.	.
	Kanemite SC	55	.	.	.	.	.	.	.
	Eradicoat Max	10	.	.	.	.	.	.	.
	Karate Zeon	42	.	.	.	.	.	.	.
	Milbeknock Top	53	.	.	.	.	.	.	.
	Movento SC 100	58	.	.	.	.	.	.	.
	Neudosan Neu	61	.	.	.	.	.	.	.
	Ordoval	57	.	.	.	.	.	.	.
	Sivanto prime	80	.	.	.	.	.	.	.
	Teppeki / AFINTO	52/3	.	.	.	.	.	.	.
	Sonst._____	99	.	.	.	.	.	.	.
Hopfen-putzen	Beloukha	91	.	.	.	.	.	.	.
	Quickdown	88	.	.	.	.	.	.	.
	Vorox F	90	.	.	.	.	.	.	.
	Sonst._____	99	.	.	.	.	.	.	.
Ungräser/ Unkräuter	Fusilade Max	82	.	.	.	.	.	.	.
	MCPA Präparate	86	.	.	.	.	.	.	.
	Sonst._____	99	.	.	.	.	.	.	.
	Erntezeitpunkt		von:		bis:		2025		

Ich versichere die Richtigkeit und Vollständigkeit der vorstehenden Angaben, sowie die Einhaltung der maximalen Aufwandmenge pro Hektar der angewendeten Pflanzenschutzmittel.

Ort, Datum _____ **Unterschrift Pflanzer** _____

3.4 HVG participates in the industry-wide pesticide residue monitoring programme of the German hop sector. Within this programme, 5% of all producer batches are analysed for more than 500 active substances. A summary of these results is provided on page 15..

3.5 The analyses for the industry-wide monitoring programme and for selected additional analytical scopes are carried out by the following laboratory:

SOFIA GmbH
Rudower Chaussee 29
12489 Berlin
Germany

3.6 In addition to the industry-wide monitoring programme, HVG arranges for composite samples from processed hop batches to be analysed for the defined relevant analytical scopes. This approach ensures that almost all processed hops are covered by pesticide residue testing. The corresponding results are documented on page 16.

The tables provided in this report include residues of active substances with defined legal maximum residue levels as well as additional substances included in the analytical screening programme.

3.7 Most of HVG's internal pesticide residue analyses are carried out by the laboratory of the processing plant:

Hopfenveredlung St. Johann GmbH
Mainburger Straße 15
93358 St. Johann, Germany

3.8 List of approved plant protection products for the 2025 harvest year in Germany (as of 3.1) and the corresponding maximum residue limits (in ppm) as of December 2025:

				MRL in ppm			
Target	**Product**	**Active ingredient**	**PHI (d)**	**EU**	**USA**	**JAP**	**Registration until**
Hop flea beetle, Shadow tortrix moth, Rosy rustic moth	Karate Zeon (G)	λ-Cyhalothrin	14	10	10	10	31.03.2026
Aphids	Eradicoat Max	Maltodextrin	1	exempt	exempt	-	28.02.2027
	Neudosan Neu (Art. 51)	Potassium salts of fatty acids	F	exempt	exempt	-	01.12,27
	Teppeki / AFINTO	Flonicamid	21	3	20	20	31.08.2027
Twospotted spider mites	Kanemite SC	Acequinocyl	21	20	15	15	15.11.2027
	Milbeknock (Top)	Milbemectin	21	0,2	-	0,1	15.02.2026
	Ordoval	Hexthiazox	28	3	20	25	31.01.2028
Downy mildew (primary infection)	Aliette WG	Al-Fosetyl	14	1500	45	1440	15.03.2026
	Profiler (Art. 51)	Al-Fosethyl + Fluopicolide	F	1500+0,15	45+15	1440+0,7	15.03.2026
Downy mildew (secundary infection)	Aktuan	Dithianon + Cymoxanil	14	100 + 0,1	100+7	300+7	15.08.2027
	Aliette WG	Al-Fosetyl	14	1500	45	1440	15.03.2026
	Bellis	Pyraclostrobin + Boscalid	28	15 + 80	23+35	15+60	15.09.2026
	~~Delan WG~~	~~Dithianon~~	~~14~~	~~100~~	~~100~~	~~300~~	~~31.08.2025~~ [1]
	Folpan 80 WDG	Folpet	21	400	120	120	15.02.2026
	Folpan Gold	Folpet + Metalaxyl-M	14	400+15	120+20	120+10	15.02.2026
	Orondis Evo	Azoxystrobin + Oxathiapiprolin	28	40 + 8	20 + 5	30 + 5	03.03.2028
	Ortiva	Azoxystrobin	28	40	20	30	31.05.2028
	Revus	Mandipropamid	14	90	50	90	31.12.2026
Copper PPP	Gifron SC	Copperoxychloride + -hydroxide	14	1000	exempt	exempt	31.12.2026
	Coprantol Duo	Copperoxychloride + -hydroxide	14	1000	exempt	exempt	31.12.2026
	Cuprozin progress	Copperhydroxide	7	1000	exempt	exempt	30.09.2026
	Funguran progress	Copperhydroxide	7	1000	exempt	exempt	30.09.2026
Powdery mildew	Bellis	Pyraclostrobin + Boscalid	28	15 + 80	23+35	15+60	15.09.2026
	Kumar	Pottasium bicarbonate	1	exempt	exempt	exempt	30.10.2037
	Luna Sensation	Trifloxystrobin + Fluopyram	21	40 + 60	11 + 60	40 + 60	30.06.2027
	Vivando (Art. 51)	Metrafenone	3	80	70	70	15.12.2026
Sulphur PPP	Kumulus WG	Sulphur	8	exempt	exempt	exempt	15.04.2026
	Microthiol Hop	Sulphur	7	exempt	exempt	exempt	15.04.2026
	Thiopron	Sulphur	1	exempt	exempt	exempt	15.04.2026
	Thiovit Jet	Sulphur	8	exempt	exempt	exempt	15.04.2026
Hop defoliation	Beloukha (Art. 51)	Pelargonic acid	F	exempt	exempt	-	01.12.2027
	Quickdown (G)	Pyraflufen-ethyl	F	0,1	0,02 [2]	0,05	31.01.2026
	~~Vorox F (Art. 51)~~	~~Flumioxazin~~	~~F~~	~~0,1~~	~~0,05~~	~~0,05~~	~~30.06.2025~~ [3]
Grass Weeds	Fusilade Max (G)	Fluazifop-P	28	0,05	-	-	31.05.2027
Broad leaf weeds	U46 M-Fluid (G)	MCPA	35	0,1	-	-	15.08.2027
Rodents	Zinc phosphide PPP	Zinc phosphide	F	0,05	-	-	31.12.2027
Slugs	Feric phosphate PPP	Feric phosphate	F	exempt	exempt	exempt	31.12.2031
Game repellent	Trico	Sheep fat	F	exempt	exempt	exempt	31.08.2026

[1] Liquidation period 28.02.2026, Exhaustion period until 28.02.2027

[2] Quickdown US-MRL 0,02 ppm: It is currently unknown whether this value is sufficient.

[3] Liquidation period 30.12.2025, Exhaustion period until 30.12.2026

(G) = Permit under old pesticide legislation; (Art. 51) = Extension permit under new legislation; for crossed-out products, the permission has expired and the sell-off and use-up period applies.

3.9 Results of the hop industry's monitoring system for 2025 (based on 3.4)

In 2025, SOFIA GmbH analysed **104 samples for a total of 589 active substances**. The table below lists only those pesticide residues that were detected in at least one producer batch.

Detected Agents	Number of findings	⌀ Average [ppm]	Max. Value [ppm]	MRL in ppm		
				EU	US	JAP
Azoxystrobin	88	**2,6**	10,0	40	20	30
Boscalid	98	**5,3**	36	80	35	60
Dimethomorph*	7	**0,1**	0,1	80	60	80
Flonicamid (Summe)	94	**0,7**	2,3	3	20	20
Fluopicolid	66	**0,1**	0	0,15	15	0,7
Fluopyram	88	**1,5**	5,7	60	60	60
Flupyradifuron	21	**0,4**	1	10	10	10
Folpet (Summe)	72	**11,6**	140	400	120	120
Hexythiazox	6	**0,3**	1,0	3	20	25
Lambda Cyhalothrin	6	**0,4**	0,8	10	10	10
Mandipropamid	101	**11,6**	51	90	50	90
Metalaxyl	59	**0,1**	1	15	20	10
Metrafenone	99	**8,3**	40	80	70	70
Oxathiapiprolin	14	**0,1**	0	8	5	5
Pyraclostrobin	61	**1,5**	7	15	23	15
Spirotetramat (Summe)	97	**0,2**	2	15	10	15
Trifloxystrobin	73	**0,8**	8	40	11	40
TFNA	81	**0,3**	1			
TFNG	95	**0,5**	2			

* No registration required for hops in 2025 –
Since a maximum residue limit is in place, the product may be placed on the market without restrictions.

3.10 Results of composite samples before processing in 2025 (As referred to in Section 3.6)

As of June 2026, the laboratory of Hopfenveredlung St. Johann GmbH had analysed a **total of 91 composite samples** from hop lots harvested in 2025 for **143 active substances**. The analyses focused on raw hops intended for further processing into pellets and extracts.

As in the previous section, the table below lists only those pesticide residues that were detected in at least one composite sample.

Detected Agents	Number of findings	⌀ Average [ppm]	Max. Value [ppm]	MRL in ppm		
				EU	US	JAP
Acequinocyl	47	**0,55**	1,80	20	15	15
Ametoctradin*	1	**0,06**	0,06	100	100	100
Azoxystrobin	88	**1,96**	8,10	40	20	30
Boscalid	86	**3,92**	27,20	80	35	60
Captan*	1	**0,03**	0,03	150	-	0,01
Cymoxanil	0	**0,00**	0,00	0	7	7
Dimethomorph*	2	**0,08**	0,10	80	60	80
Dithianon	7	**6,20**	17,00	100	100	300
Flonicamid	6	**0,40**	0,55	3	20	20
TFNA	64	**0,33**	1,10			
TFNG	81	**0,39**	0,73			
Flonicamid incl. Metaboliten	76	**0,68**	1,90	3	20	20
Flumioxazin	0	**0,00**	0,00	0,1	0,05	0,05
Fluopicolide	74	**0,06**	0,14	0,15	15	0,7
Fluopyram	83	**1,40**	4,90	60	60	60
Folpet	72	**3,44**	40,20	400	120	120
Folpet incl. Metabolit	82	**6,95**	85,80	400	120	120
fosetyl-aluminium	4	**3,23**	3,80	1500	45	1440
Hexythiazox	23	**0,40**	2,80	3	20	25
Lambda-Cyhalothrin	6	**0,26**	0,60	10	10	10
Mandipropamid	91	**12,64**	27,40	90	50	90
Metalaxyl	20	**0,06**	0,10	15	20	10
Metrafenone	89	**9,56**	22,80	80	70	70
Oxathiapiprolin	28	**0,11**	0,33	8	5	5
Phthalimid (Metabolit Folpet)	75	**2,08**	22,80	400	120	120
Pyraclostrobin	78	**0,95**	9,00	15	23	15
Pyraflufen-Ethyl	0	**0,00**	0,00	0,10	0,02	0,05
Spirotetramat	85	**0,15**	0,42			
Spirotetramat enol-glucoside	87	**0,19**	0,77			
Spirotetramat cis-enol	80	**0,06**	0,35			
Spirotetramat cis-keto-hydroxy	80	**0,06**	0,15			
Spirotetramat mano-hydroxy	1	**0,53**	0,53			
Spirotetramat incl. Metaboliten	72	**0,39**	1,10	15	10	15
Trifloxystrobin	73	**0,48**	1,50	40	11	40

* No registration for hops in 2025 –
Since a maximum residue limit is in place, the product may be placed on the market without restrictions.

Conclusion

Based on the analytical results presented in this report, HVG has not identified any food safety hazards within its scope of responsibility that require the establishment of a critical control point (CCP).

Food safety-relevant parameters, in particular pesticide residues, are controlled through documented preventive measures, supplier qualification, batch documentation, analytical monitoring, and defined release procedures. Analytical findings are assessed on a batch-related basis before product release, taking into account the applicable legal requirements as well as relevant customer- or country-specific specifications.

Further information on pests and diseases in hop cultivation is available from the Bavarian State Research Center for Agriculture (LfL): http://www.lfl.bayern.de/ipz/hopfen/022572/index.php

4 Explanations regarding selected pesticides

Glyphosate is not used as a foliar treatment in hop production. Direct application to hop plants would cause severe crop damage and is therefore not part of normal agricultural practice in hop cultivation. Based on current cultivation practice, glyphosate residues in hop cones are not expected.

Bifenazate and etoxazole: No plant protection products containing the active substances bifenazate or etoxazole are authorised for use in German hop cultivation. Based on the authorised use pattern in Germany, residues of these active substances are not expected in German hops.

Special case: difluoroacetic acid (DFA)

In the 2025 harvest year, the use of Sivanto Prime, containing the active substance flupyradifurone, required specific attention in the German hop sector. The product was granted an emergency authorisation for use in German hop cultivation under Article 53 of Regulation (EC) No. 1107/2009. Such emergency authorisations allow the temporary and limited use of a plant protection product under defined conditions where a danger to plant production cannot be contained by other reasonable means.

Difluoroacetic acid (DFA) is a metabolite/degradation product associated with flupyradifurone and is regulated separately in the EU residue legislation. The residue assessment of harvested hops is therefore carried out independently of the emergency authorisation and is based on the applicable maximum residue levels under Regulation (EC) No. 396/2005.

During routine residue monitoring of the 2025 harvest, DFA levels above the EU maximum residue level of 0.3 mg/kg were detected in individual raw hop batches. Based on the available toxicological and regulatory assessments, these findings were classified as MRL deviations and not as an indication of a consumer health risk.

HVG addressed these findings within its established residue monitoring and release system. The measures included:

- full traceability of the affected raw hop batches,
- targeted analytical monitoring,
- inclusion of DFA in the regular testing protocol, and
- batch-specific assessment before product release.

In addition, accompanying analyses did not indicate an accumulation of DFA during the production of hop pellets or hop extracts.

As a provisional national regulatory measure, the permissible DFA level for hops in Germany has been raised to 3.0 mg/kg. Harmonisation at EU level is pending, but expected by the end of 2026.

This case shows that HVG's monitoring and release procedures are capable of identifying unexpected residue-related issues, assessing them on a batch-specific basis, and defining appropriate control measures before product release.

5 Voluntary assessment of heavy metals

Copper is included in the heavy metal and elemental analysis described in this section. However, the interpretation of copper results differs from that of other toxicologically relevant elements, as copper levels in hops may also be influenced by the authorised use of copper-containing plant protection products. For copper compounds/total copper in hops, an EU maximum residue level is established under Regulation (EC) No. 396/2005.

The voluntary assessment described in this section therefore includes copper analytically, while focusing the toxicological heavy metal evaluation primarily on elements typically associated with environmental background exposure, in particular lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg). For these elements, no specific legal maximum levels are established for hops under the current EU contaminant legislation. Nevertheless, customers regularly request analytical reference data. HVG therefore arranges for selected hop samples to be analysed annually by the following laboratory:

Weihenstephan Research Center for Brewing and Food Quality

Alte Akademie 3, 85354 Freising-Weihenstephan

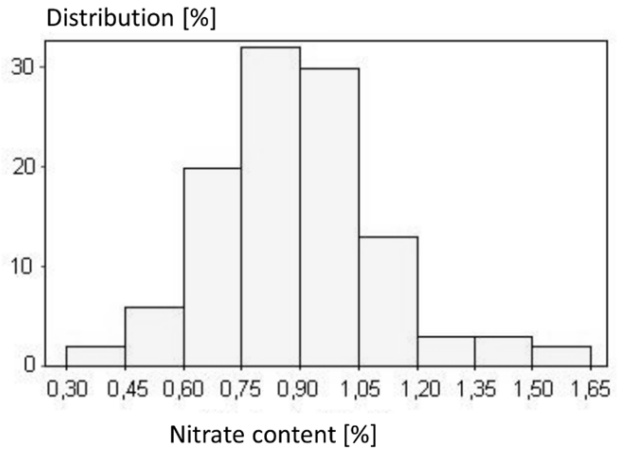
Results for the 2025 harvest year:

Heavy metals Processing batches n=27	Number of findings	⌀ Average [ppm]	Max. Value [ppm]
Arsenic	0	**0**	0
Cadmium	0	**0**	0
Copper	27	**52**	164
Iron	27	**132**	224
Lead	1	**0.19**	0.19
Mercury	0	**0.00**	0.00

Please note:
All analyses of the CO2 extracts were negative for heavy metals, with the exception of traces of copper.

6 Voluntary assessment of nitrates

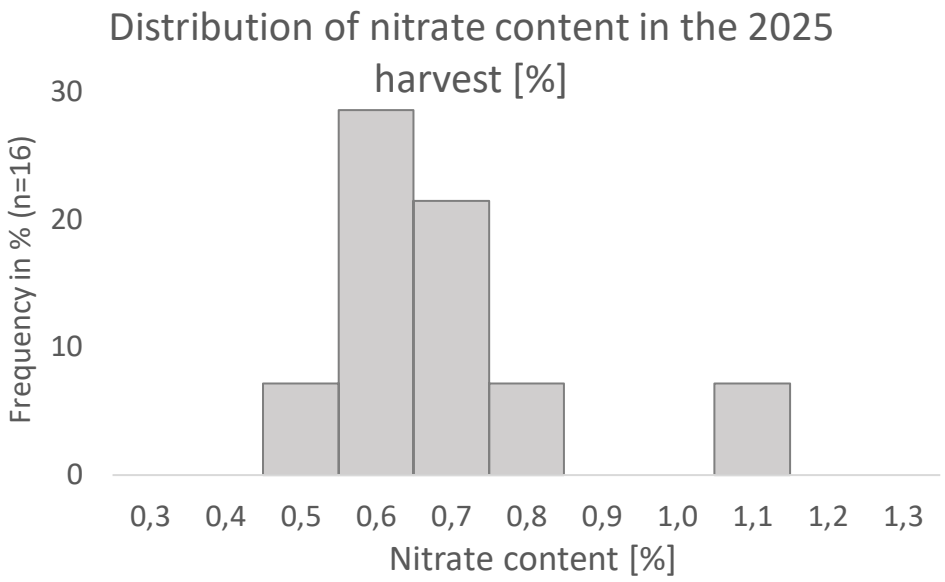
There are no specific legal maximum levels for nitrate in hops. Long-term analyses conducted by the Hop Research Center Hüll showed an average nitrate content of 0.89% (8.9 g nitrate/kg hops), with values ranging from 0.36% to 1.55%. The detailed results of these studies are summarised in the table below:



Source: 2009 Annual Report, Hop Research Institute in Hüll, Germany

As analyses from previous years have shown nitrate levels in hops to remain within a relatively stable and well-characterised range, HVG now performs a limited number of its own nitrate analyses annually on a random sampling basis.

The analyses of HVG pellets conducted in 2025 (n = 16) confirm this general picture. The average nitrate content was 0.55% (5.5 g nitrate/kg hops), with values ranging from 0.42% to 1.04%.



7 Voluntary testing for mycotoxins

There are no specific legal maximum levels for mycotoxins in hops.

Although fungal diseases can occur in hop cultivation, mycotoxin contamination is not considered a typical or practically relevant hazard for dried hops. Nevertheless, HVG performs random sample analyses as part of its voluntary monitoring activities.

In 2025, randomly selected samples were analysed for the following mycotoxins:

- Aflatoxin B1
- Aflatoxin B2
- Ochratoxin A (OTA)

No mycotoxins were detected in the samples analysed in 2025. This is consistent with the results from previous years.

Further industry-wide studies on hops that support the HVG's findings can be found:

Potential environmental contaminants in hops
Ramsauer B., Schmidt R., Biendl M.; Brauwelt No. 30-31 (2014) 905-909.
Environmental contaminants in hops
Schmidt R., Anderegg P., Biendl M.; Brauwelt 143 (2003), 45/03, 1493–1497

8 Quality assurance and prevention of food fraud

8.1 Certification of hops and hop products (Regulation (EU) 2024/601 and Regulation (EU) 2024/602)

EU hop certification provides the basis for the traceability of certified hop batches with regard to growing region, producer, variety, and harvest year. It also verifies compliance with the statutory minimum marketing requirements for hops under EU law. As a general principle, hops and hop products may only be marketed in the European Union if they have been certified, unless a specific exemption applies.

At the beginning of each harvest year, hop growers submit an official cultivation declaration containing details of the cultivated area and the varieties grown. On this basis, the grower receives the relevant grower documentation and the official hop seals for the upcoming harvest from the competent organisation.

After harvest, drying, and weighing, the grower initiates the initial certification procedure. During this process, the hop bales are closed, labelled, sampled, and sealed in accordance with the applicable certification requirements. Official labelling and sampling by the certifier may take place on the farm, upon delivery to the purchasing company, or centrally in the sealing hall. If the batch meets the applicable requirements, an official certificate is issued and the hops may enter the first marketing stage.

Following initial certification, raw hops are typically delivered to processing facilities for further processing into hop products such as pellets or extracts. When the original seals are opened for processing, the traceability of the certified raw hops is maintained through the subsequent certification procedure for hop products. This process is carried out under official supervision and ensures traceability from the certified raw hops through to the finished hop product.

Sources: www.hopfenring.de www.deutscher-hopfen.de

8.2 Risk Assessment of Food Fraud

As part of its food fraud vulnerability assessment, HVG considers potential vulnerabilities in the hop supply chain. These include, in particular, incorrect declaration of hop varieties, inaccurate origin information, unauthorised mixing of batches, incorrect assignment of harvest years, and inconsistencies in accompanying documents.

At the hop farm

The established EU certification system ensures that each certified hop bale is officially labelled and sealed. Samples are taken from certified hop batches and analysed by external laboratories and, where applicable, by the internal HVG laboratory. These controls support verification of the declared hop variety and compliance with the applicable minimum quality requirements.

Based on the certification system, official sealing, batch documentation, and analytical controls, HVG assesses the risk of intentional misrepresentation or substitution at this stage of the supply chain as low.







During Processing and Storage

The certification and traceability system continues during further processing into hop pellets and hop extracts. When certified raw hops are processed, the link between the certified raw material and the resulting hop product is maintained through documented processing records, official supervision where required, and subsequent certification of the hop products.
In addition, targeted analytical controls are used to verify relevant product characteristics. These measures reduce the risk of variety mix-ups, unauthorised blending, incorrect harvest year assignment, or discrepancies between product identity and accompanying documentation.
Based on these controls, HVG assesses the risk of food fraud during processing and storage as low.

Der Weg der Zweitzertifizierung / *The Way to the Second Certification*

1 Die Hopfenballen werden geöffnet und der Verarbeitung zugeführt. Die Siegeletiketten werden dabei zerstört.

The hop bales are opened and fed in for processing. In doing so the seal labels are broken.





2 Der Rohhopfen wird zu Hopfenpellets oder Extrakt verarbeitet. Die Zertifizierung der Hopfenerzeugnisse kann nur dann erfolgen, wenn die Verarbeitung in einem geschlossenen Bearbeitungsvorgang stattfand.

The leaf hops are processed to hop pellets or extract. The certification of the hop products can only be carried out if the processing took place in one complete operation.




3 Die Produkte werden in Einzelpackstücke abgefüllt und in Kartons verpackt. Jedes Packstück weist mindestens folgende Angaben auf:
- Warenbezeichnung /
- Sorte /
- Bezugsnummer der Zertifizierung.

The products are filled into single packets and packed in cardboard boxes. At least the following information is on each packet:
- *Description of goods /*
- *Variety /*
- *Certification reference number.*





4 Jede Partie wird mit einer Bescheinigung versehen. Diese enthält mindestens folgende Angaben:
- Warenbezeichnung /
- Bezugsnummer der Zertifizierung /
- Endgewicht und/oder Rohgewicht /
- Hopfenanbauort /
- Erntejahr /
- Sorte.

Zusätzlich ist der Zeitpunkt der Verarbeitung anzugeben.

Each lot is given a certificate. This contains at least the following information:
- *Description of goods /*
- *Certification reference number /*
- *Final weight and/or gross weight /*
- *Place where the hops were grown /*
- *Crop year / • Variety.*

In addition the date of processing must be stated.






9 Certificates and Product Information

9.1 HVG DIN ISO 9001:2015

HVG is certified according to DIN ISO 9001:2015.



CERTIFICATE

ISO 9001:2015

DEKRA Certification GmbH hereby certifies that the organization

HVG Hopfenverwertungsgenossenschaft e.G.

Kellerstraße 1, 85283 Wolnzach, Germany

for the scope of certification:

Trade in hops and hop-products

(Sites see annex)

has established and maintains a quality management system according to the above mentioned standard.
The conformity was adduced with audit report no. A24041451.

Certificate registration no.:	91118698/2
Validity of previous certificate:	2024-11-13
Certificate valid from:	2024-11-14
Certificate valid to:	2027-11-13

Language translation

Dr. Rolf Krökel
DEKRA Certification GmbH, Stuttgart, 2024-11-11

DEKRA Certification GmbH * Handwerkstraße 15 * D-70565 Stuttgart * www.dekra-certification.de Page 1 of 2

9.2 Hopfenveredlung St. Johann DIN ISO 22000:2018

Hopfenveredlung St. Johann GmbH is certified according to DIN ISO 22000:2018.



ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Management Service

CERTIFICATE

Certificate Registration No.: **12 510 4492 TMS** / Order No.: **70000258**

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that the organization

hopfen veredlung

Hopfenveredlung St. Johann GmbH
Mainburgerstraße 15
93358 Train
Germany

for the scope

Production of hop pellets, hop extract,
cold storage of hops and hop products, product development

(Category ISO 22003:2013: C IV)

has established and applies a Food Safety Management System.

An audit was performed and has furnished proof
that the requirements according to

DIN EN ISO 22000:2018

are fulfilled.

The certificate is valid from **2024-03-19** until **2027-03-18**.

Fred Wenke
Head of Certification Body
Munich, 2024-01-29

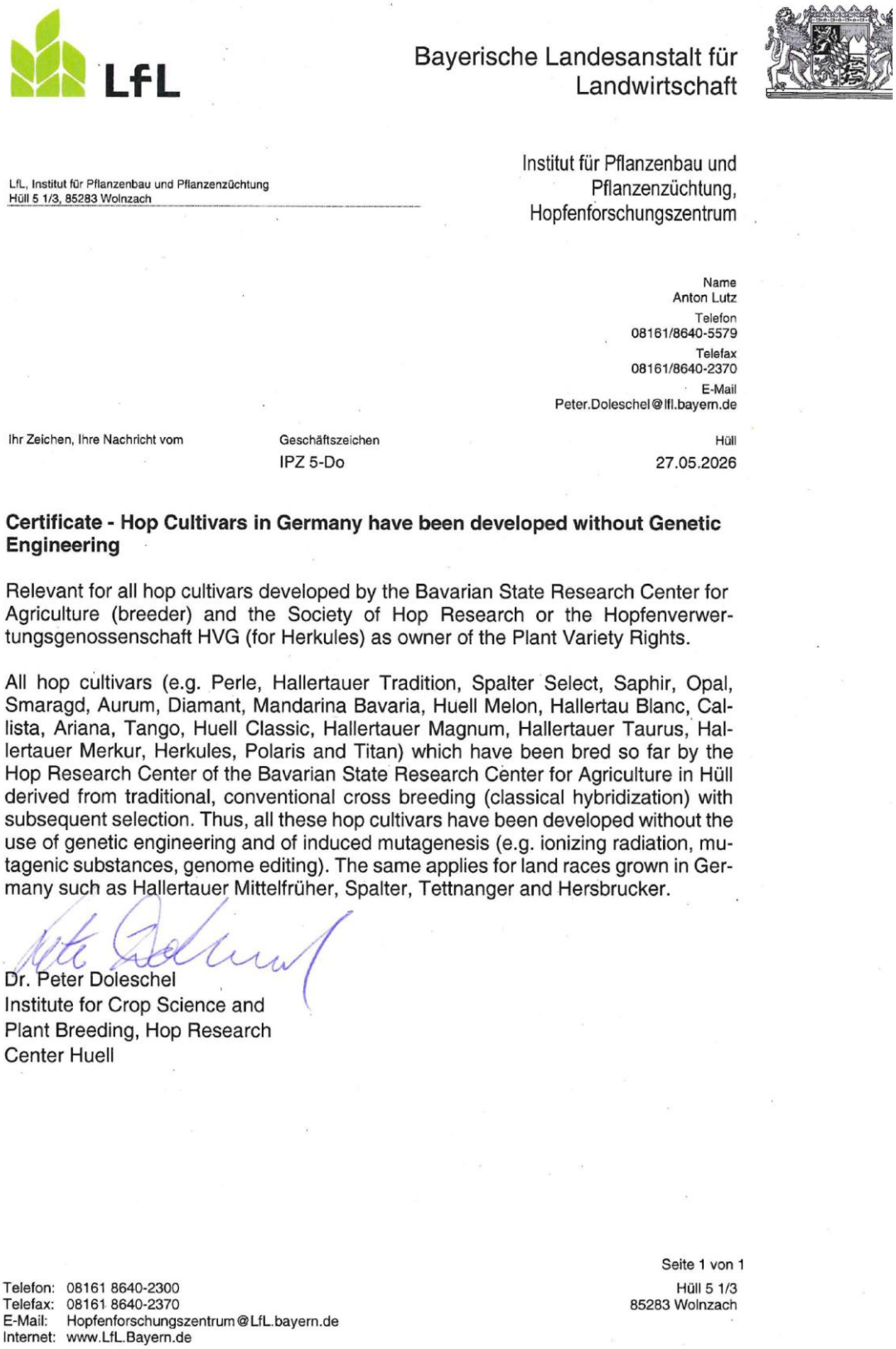
IAF DAkkS

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstrasse 57 • 80339 München • Germany
www.tuvsud.com/de-certificate-validity-check

TÜV®

9.3 GMO Declaration

The hops supplied by HVG are GMO-free.



LfL

Bayerische Landesanstalt für Landwirtschaft

LfL, Institut für Pflanzenbau und Pflanzenzüchtung
Hüll 5 1/3, 85283 Wolnzach

Institut für Pflanzenbau und Pflanzenzüchtung, Hopfenforschungszentrum

Name
Anton Lutz
Telefon
08161/8640-5579
Telefax
08161/8640-2370
E-Mail
Peter.Doleschel@lfl.bayern.de

Ihr Zeichen, Ihre Nachricht vom	Geschäftszeichen	Hüll
	IPZ 5-Do	27.05.2026

Certificate - Hop Cultivars in Germany have been developed without Genetic Engineering

Relevant for all hop cultivars developed by the Bavarian State Research Center for Agriculture (breeder) and the Society of Hop Research or the Hopfenverwertungsgenossenschaft HVG (for Herkules) as owner of the Plant Variety Rights.

All hop cultivars (e.g. Perle, Hallertauer Tradition, Spalter Select, Saphir, Opal, Smaragd, Aurum, Diamant, Mandarina Bavaria, Huell Melon, Hallertau Blanc, Callista, Ariana, Tango, Huell Classic, Hallertauer Magnum, Hallertauer Taurus, Hallertauer Merkur, Herkules, Polaris and Titan) which have been bred so far by the Hop Research Center of the Bavarian State Research Center for Agriculture in Hüll derived from traditional, conventional cross breeding (classical hybridization) with subsequent selection. Thus, all these hop cultivars have been developed without the use of genetic engineering and of induced mutagenesis (e.g. ionizing radiation, mutagenic substances, genome editing). The same applies for land races grown in Germany such as Hallertauer Mittelfrüher, Spalter, Tettnanger and Hersbrucker.

Dr. Peter Doleschel
Institute for Crop Science and Plant Breeding, Hop Research Center Huell

Seite 1 von 1

Telefon: 08161 8640-2300
Telefax: 08161 8640-2370
E-Mail: Hopfenforschungszentrum@LfL.bayern.de
Internet: www.LfL.Bayern.de

Hüll 5 1/3
85283 Wolnzach

9.4 Allergen Information

Based on their natural composition and the manufacturing processes applied, HVG hop products do not contain any intentionally added substances or products listed in Annex II of Regulation (EU) No. 1169/2011. Hop products are not produced from ingredients listed in Annex II, and no such substances are intentionally used in their production.

The production and handling processes for HVG hop products are designed to prevent contact with allergenic substances listed in Annex II of Regulation (EU) No. 1169/2011. Based on the current process assessment, there is no indication of relevant allergen cross-contact.

The following assessment is based on Annex II of Regulation (EU) No. 1169/2011 on substances or products causing allergies or intolerances. On this basis, HVG hop products are not subject to an allergen labelling requirement under this Regulation.

INGREDIENTS
1. Cereals containing gluten, namely: wheat (as spelt and Khorasan wheat), rye, barley, oats, or their hybrid strains, and products derived therefrom, with the exception of: a) wheat-based glucose syrups, including dextrose (1); b) Wheat-based maltodextrins (1); c) Barley-based glucose syrups; d) Cereals used for the production of distillates or ethyl alcohol of agricultural origin for spirits and other alcoholic beverages.
2. Crustaceans and products derived therefrom.
3. Eggs and products derived therefrom.
4. Fish and fish products, except: a) Fish gelatin used as a carrier for vitamin or carotenoid preparations; b) Fish gelatin or sturgeon bladder used as a fining agent in beer and wine.
5. Peanuts and products derived therefrom.
6. Soybeans and products derived therefrom. a) Fully refined soybean oil and fat ([1]); b) natural mixed tocopherols (E306), natural D-alpha-tocopherol, natural D-alpha-tocopherol acetate, natural D-alpha-tocopherol succinate from soy sources; c) phytosterols and phytosterol esters derived from vegetable oils from soy sources; d) plant stanol esters produced from plant oil sterols derived from soy sources.
7. Milk and products derived from milk (including lactose), except: a) whey used in the production of distillates or ethyl alcohol of agricultural origin for spirits and other alcoholic beverages; b) Lactitol.
8. Nuts, i.e., almonds (*Amygdalus communis L.*), hazelnuts (*Corylus avellana*), walnuts (*Juglans regia*), cashews (*Anacardium occidentale*), pecans (*Carya illinoiesis (Wangenh.) K. Koch*), Brazil nuts (*Bertholletia excelsa*), pistachios (*Pistacia vera*), macadamia nuts and Queensland nuts (*Macadamia ternifolia*), and products derived therefrom, except: a) nuts used for the production of distillates or ethyl alcohol of agricultural origin for spirits and other alcoholic beverages.
9. Celery and products derived therefrom.
10. Mustard and products derived therefrom.
11. Sesame seeds and products derived therefrom.

12. Sulfur dioxide and sulfites in concentrations exceeding 10 mg/kg or 10 mg/liter, expressed as SO_2
13. Lupins and products derived therefrom
14. Mollusks and products derived therefrom
15. Albumin and casein

(1) And products derived therefrom, provided that the process to which they have been subjected has the same effect as that EFSA for the respective starting product from which they are derived.

10 Contact Information

If you have any questions regarding this report, please contact:

Dr. Florian Schüll
Technical Director
t +49 8442 957 151
M +49 151 5333 78 25
Email f.schuell@hvg-germany.de
a HVG e.G., Kellerstr. 1, D-85283 Wolnzach