

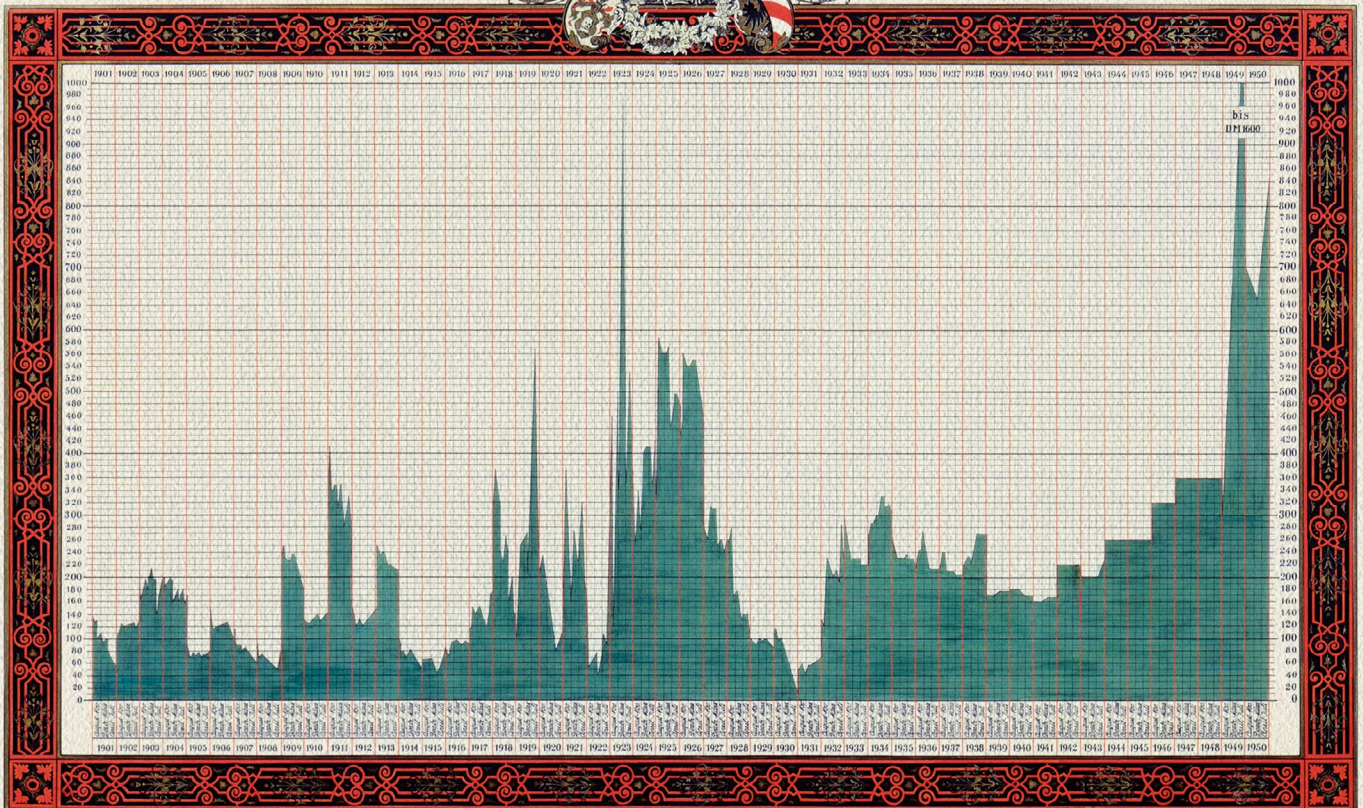
THE BARTH REPORT

140 YEARS BARTH-REPORT



Hopfen-Preise
in den Jahren
Joh. Barth
Hopfenhandlung

1876
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& Sohn
Nürnberg



HOPS 2016/2017

BARTH-HAAS GROUP
FOR YOUR SUCCESS

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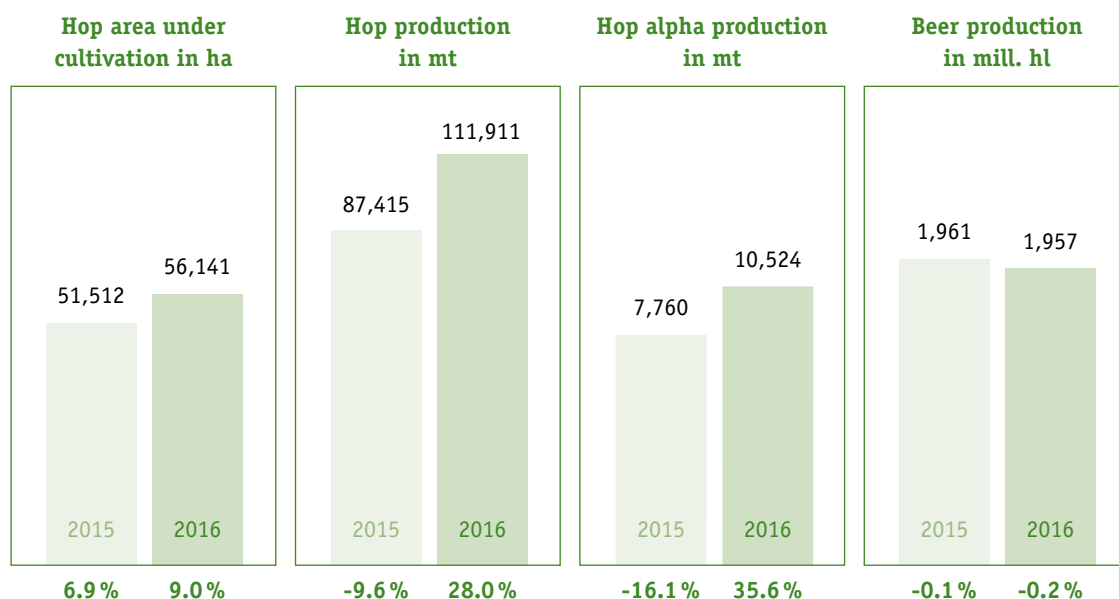
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WORLD MARKET BASIC DATA





“Buy your supplies now; this is our sincere and best-intentioned advice” – this was the tip given in 1878 by Johannes Barth, the then managing director, to the readers of the 2nd Barth Report. It is also the oldest copy that we have in our archive. The first Barth Report was published in 1877. Therefore, in this edition we are celebrating the 140th anniversary of its publication.

In addition to purchasing recommendations, the merely 29-year-old managing director made an early attempt to publish international hop and beer statistics, as well as making reliable statements on hop harvests. For 140 years now, the Barth Report has been a lasting constant in an industry that has gone through a process of change again and again. Our collection of quotations from these 140 years illustrates how erratic its development has been.

The 1926/1927 Barth Report already contained this warning: **“The German brewer will continue to look for first-class quality abroad if he cannot obtain it at home. (...) The hop growers therefore have to adapt to the needs of the market, (...) in order to recapture lost markets.”** One example of adjustment to changes in the laws of the marketplace was the need to get used to forward contracts in the 1960s, as **“an automatic adaptation of acreage to actual demand will thus take effect, which can only be welcomed”**. (Barth Report 1963/1964).

Progress was not to be held back. This also applied to the increasing mechanisation of hop growing. The reason for this was quite simply the blatant lack of hop pickers in the 1950s who left agriculture for manufacturing as a result of the economic miracle: **“The growth of employment in industry is tying up workers in permanent positions, and so the previously available gangs of pickers are staying away.”** (Barth Report 1955/1956).

Another milestone, of course, was **“the rapid advance of processed products”**, for **“the brewing industry will probably use about 1/3 of the 1971 world hop crop in processed form”**. (Barth Report 1971/1972).

Our predecessors had to discover in a tragic fashion that the rules of the game in the hop industry are always determined by world events. In the face of the Great Depression of 1929 that left six million people unemployed in Germany, we expressed our **“heartfelt sympathy (...) for the hop growers (...), most of whom have been tied to the economic ups and downs of their hop gardens for generations and who are now suffering in an unprecedented price crisis caused by overproduction which may even go beyond their means to survive”**. (Barth Report 1930/1931). Some 70 years later, the mood of crisis began to spread once more: **“Finally, the shock of 11 September pushed the already sliding world economy completely into recession.”** (Barth Report 2001/2002). The Barth Report is therefore always a chronicle of its time, too.

One question, however, has remained constant throughout these 140 years: **“What will the hop industry be like in the future?”** (Barth Report 2001/2002) Surely the answer is not that **“the activities of the merchant [are] increasingly [determined] by the study of and the responsibility to comply with all the regulations concerning import, export, payment and transfer that so many countries around the world invent in continually new variations”**, as we complained as long ago as in 1934/1935. That statement may be more than 80 years old, but it somehow seems familiar. On the contrary, the future lies in the responsible use of resources, **“for thinking and acting sustainably has always been part of our company’s philosophy”**. (Barth Report 2011/2012). As in the 2010/2011 report, it is with great concern that we observe: **“It remains absolutely unclear what effect climate change will have on hop growing (...). But it certainly will be an issue in the future.”** The challenges for the hop industry, therefore, are not diminishing. And we will certainly keep on reporting... .

The world is in the throes of a political reorientation process. The increasingly more complex and unpredictable geopolitical situation has given rise to a longing for simple solutions and supposedly strong leaders. This is reflected in the appeal of rightist and right-wing populist parties in many European countries, in Brexit (see EU) and, since the election of Donald Trump, in the new politics in the USA.

Never has a presidential election in the **United States of America** made such waves before it had even officially begun as the one between **Hillary Clinton** of the **Democratic Party** and **Donald Trump**, the **Republican** candidate. Donald Trump was elected as the 45th President of the USA on 8 November 2016. Elections to the House of Representatives and the Senate took place on the same day. The **Republican Party** took the majority of seats in both chambers.

Since taking office on 20 January 2017, Donald Trump has issued a number of controversial decrees and has caused uncertainty worldwide with his statements and his conduct of office.

The results of the elections in **Europe** were very important for the political course of that part of the world. **Spain's** **parliamentary** elections in June 2016 failed once again to produce a clear majority. In October 2016, **Mariano Rajoy** of the conservative party **Partido Popular** was re-elected prime minister at the head of a minority government.

In a re-run of the final ballot in the presidential election in **Austria** in December 2016, the independent candidate **Alexander Van der Bellen** repeated his victory over the right-wing populist **Norbert Hofer (FPÖ)**.

In a constitutional referendum in **Italy** in December 2016, the electorate was asked to vote on an amendment to the constitution already passed by parliament. The amendment provided for a reorganisation of the Italian parliament, involving in particular a far-reaching reform of the Senate and a return of powers from the regions to the state. Following the failure of the referendum, Prime Minister **Matteo Renzi** resigned. However, he remained in office as acting prime minister after his resignation.

In the general election in the **Netherlands** in March 2017, an unexpectedly large number of the electorate voted for the right-wing liberal People's Party (VVD) of the incumbent prime minister **Mark Rutte**. In order to govern he has to form a coalition. The Freedom Party led by the right-wing populist **Geert Wilders** received the second highest share of the votes. In the final ballot of the presidential election in **France** in May 2017 the independent social-liberal ex-economics minister **Emmanuel Macron** clearly defeated the right-wing populist **Marine Le Pen**. The **British Parliament** voted in favour of the motion proposed by the Prime Minister

Theresa May for an early election on 8 June 2017. In this election the British will also decide on the course to be taken in the negotiations of the country's withdrawal from the EU.

In **Germany**, the SPD politician **Frank-Walter Steinmeier** succeeded the independent **Joachim Gauck** as Federal President in February 2017.

In the night of 15 to 16 July 2016, members of the Turkish armed forces attempted to violently overthrow the **Turkish government** and President **Recep Tayyip Erdoğan**. The bloody attempted coup d'état failed. Tens of thousands of people in the armed forces and state institutions were subsequently arrested and nearly one hundred thousand civil servants were dismissed. A state of emergency allowing the president to rule by decree was declared on 20 July 2016 and has been extended several times. In a referendum on 16 April 2017, a narrow majority of Turkish voters voted in favour of a constitutional reform that provides for a presidential system.

In **Syria** there is still no end in sight to the crisis six years after the outbreak of the civil war. On the contrary: although peace talks have taken place, there have been repeated incidences of heavy fighting and aerial bombardment with many, mostly civilian, casualties. The conflict in Syria is increasingly turning into a proxy war in which various countries are involved.

In the **Ukraine conflict**, there has been a stand-off between pro-Russian separatists backed by Moscow and the troops of the government in Kiev since 2014. Despite a cease-fire agreement, fighting in eastern Ukraine has continued. According to UNO figures, the war has claimed about 10,000 lives to date.

In March 2017, the president of **South Korea Geun-hye Park** was removed from office because of a corruption scandal. The left-liberal **Moon Jae-In** became the new head of state.

In **Venezuela** the socialist government is locked in a fierce power struggle with the opposition-controlled parliament. The country is also plagued by high criminality and a severe economic crisis.

The growing tensions between **North Korea** and the **USA** are causing world-wide concern. After two atomic tests and numerous rocket tests, with which North Korea has violated UNO resolutions, the situation has been very dangerous since last year.

Across the globe there have been a great number of **terrorist attacks** with many casualties and a predominantly Islamist background. In addition to **Afghanistan, Iraq, Pakistan, Syria** and **Turkey**, the targets of these attacks have also been European countries such as **France, Germany, Belgium**, the **UK** and **Sweden**.



Personnel decisions

The current president of the European Parliament, Italian conservative politician **Antonio Tajani**, has been in office since 17 January 2017. He succeeded **Martin Schulz**, a German Social Democrat.

The EU Council president **Donald Tusk** was elected for a second term on 9 March 2017. The only country to oppose his re-election was his native one Poland due to a political feud between the liberal Tusk and the right-wing conservative government party PiS.

Brexit

In a referendum on 23 June 2016 a narrow majority of British citizens voted in favour of the **United Kingdom** leaving the **European Union** ("**Brexit**"). Prime Minister **David Cameron** subsequently resigned on 13 July 2016. He was succeeded in office by **Theresa May**, the former Home Secretary. On 29 March 2017, the British government officially informed the European Council of the country's intention to leave the EU. Article 50 of the Lisbon Treaty provides for the negotiation of a withdrawal agreement within two years. The effects of this step will ultimately depend on the results of these negotiations. Never before in the history of the EU a member state has left the community. Following the **UK's** vote to leave the EU, the economic development of the Single Market depends more than ever on **Germany, France, Italy and Spain**. The four largest economies in the EU represent roughly 2/3 of the total GDP of the economic area.

Refugee crisis

The **Balkan route** to Western Europe (the route between the Middle East and Europe via the Balkans, where parts of the EU's external border run) was officially closed from March 2016. As a result, there was a significant year-on-year fall in the number of asylum-seekers.

Asylum procedures within the EU are conducted in accordance with the Dublin Regulation. This regulation determines which state is responsible for processing an application for asylum within that EU. A refugee has to request asylum in the state in which he or she first entered EU territory. Notwithstanding this regulation, the EU Commission is looking for new and more just distribution procedures. Some Eastern European countries, however, are refusing to accept the contingents of refugees allocated to them.

The Common Agricultural Policy (CAP)

On 2 February 2017, the **European Commission** initiated the first phase of modernisation and simplification of the **Common Agricultural Policy (CAP)** with a three-month public consultation period. Its purpose is to give farmers, citizens, organisations and all other stakeholders the

opportunity to express their opinions on the future of the Common Agricultural Policy.

Although the most recent reform was only enacted in 2013, there have in the meantime been several fundamental developments to which the Common Agricultural Policy has to respond, such as the increasing insecurity in the markets and falling prices, as well as new international obligations with regard to climate change and sustainable development.

In view of this and other challenges, the Common Agricultural Policy has to be modernised and simplified in order to reduce its administrative workload. In addition, it is necessary to ensure greater coherence with other areas of EU policy in order to make an optimum contribution to the Commission's political priorities and to the objectives of achieving sustainable development and complying with the Paris climate protection agreement.

In connection with its review of the simplification and debureaucratisation of the **Common Market Order for agricultural produce** (Regulation (EU) No. 1308/2013), the **EU Commission** published a first draft of a working document on rules for the marketing of agricultural produce in January 2016.

Effects on hops as a special form of cultivation

This working document includes what were previously separate sets of rules for hops covering the "Certification of hops and hop products" and the "Importation of hops from non-member countries". Following fierce resistance from the EU wine industry, the Commission put this working document on hold in April 2016. At the moment it remains open as to if and when the Commission will submit new proposals on marketing regulations.

On the working level, the Commission takes the view that Regulation (EC) No. 1299/2007 regarding the recognition of producer groups in the hop sector should be revoked without substitution. That would leave producer organisations in the hop sector only with the general regulations of the Common Market Order for agricultural produce (Regulation (EU) No. 1308/2013) at EU level. These regulations may be amended at national level either by legal provisions or by resolutions on the part of the producer organisations.

As far as the registration of hop delivery contracts is concerned, Regulation (EC) No. 1557/2006 has already been superseded by Regulation (EU) No. 1308/2013 and is to be replaced by a horizontal implementing regulation or a delegated regulation under ISAMM with regard to market notifications to the Commission by member states. The acronym ISAMM stands for "Information System for Agricultural Market Management and Monitoring".

KEY DATA

Development of the key economic indicators for the world's four largest economies in the last three years

The figures for 2014 and 2015 have been revised in some cases according to the latest statistics and subsequent recalculation

*) Interest rate for (10-year) public sector bonds. China: lending rate for long-term loans

		GDP growth (real)	Balance of payments in USD bn	Balance of trade in USD bn	Inflation rate Ø	Interest rate Ø*	Unemployment (as of 31.12.)
USA	2014	2.4%	-392.1	-752.2	1.6%	2.21%	6.2%
	2015	2.6%	-463.0	-762.6	0.1%	2.24%	5.3%
	2016	1.6%	-481.2	-749.9	1.3%	2.49%	4.9%
China	2014	7.3%	277.4	367.4	2.0%	6.48%	4.1%
	2015	6.9%	330.6	608.0	1.4%	5.46%	4.0%
	2016	6.7%	282.7	515.2	2.0%	4.90%	4.0%
Japan	2014	0.3%	24.6	-121.1	2.8%	0.53%	3.6%
	2015	1.2%	136.7	-23.1	0.8%	0.35%	3.4%
	2016	1.0%	190.9	36.7	-0.1%	-0.07%	3.1%
Germany	2014	1.6%	289.3	303.0	0.9%	1.24%	6.7%
	2015	1.7%	288.3	289.7	0.2%	0.52%	6.4%
	2016	1.9%	289.0	300.4	0.5%	0.13%	6.1%

ECONOMIC SITUATION

Regardless of the increasingly volatile geopolitical situation, world economic growth remained positive at roughly 3.1 % (2015: 3.35 %). In the industrial countries, private consumption was one of the main stabilising factors.

Despite declining growth rates, **Asia** remained the fastest-growing region in the world, with **India** and **China** leading the field with gross domestic product (GDP) growth rates of 7 % and 6.7 % respectively. The GDP growth rate in the **USA** and **Europe** was a moderate 1.6 %. In spite of the many economic-policy challenges, the development of the economy in the **eurozone** was relatively stable. However, there were great differences between the individual countries. In **Germany**, for years now the economic powerhouse in the eurozone, GDP rose by 1.9 %. The worries in the BRIC states **Brazil** and **Russia** persisted.

In terms of monetary policy, the USA and Europe continued to go separate ways. While the **US central bank, the Federal Reserve (Fed)**, responded to the economic recovery by raising its base interest rate by 0.25 % in December 2016 and March 2017 respectively, bringing it to 1.00 %, the **European Central Bank (ECB)** left its lending rate unchanged at 0.00 %. In addition, it has been purchasing bonds on a large scale on the international finance markets since the beginning of 2015. This programme has been extended until the end of 2017. The **People's Bank of China (PBC)** left its benchmark interest rate unchanged at 4.35 %.

On the whole, political events caused greater volatility in the finance markets and continue to be regarded as a risk factor. In February 2017, the newly-elected US president Donald Trump issued a decree ordering the

regulations for the financial sector to be eased. As a result, several important rules applying to financial institutions that had been introduced in the wake of the last financial crisis ten years ago were rescinded. Bank shares subsequently rose sharply. In addition, the economic stimulus programme announced by Donald Trump and positive data on the American economy stimulated the **Dow Jones (DJIA)**. The leading US index rose from 17,870 points at the end of May 2016 to an all-time high of 21,144 points on 31 May 2017. The leading **German share index (DAX)** also profited. On 31 Mai 2017 it stood at 12,615, which was significantly above the year-earlier level of 10,330 points.

As a result of the Federal Reserve's rate rise in mid-December 2016, the exchange rate of the **euro** against the **US dollar** fell to 1.039 USD, its lowest level in 14 years. At the end of May 2016, the exchange rate had stood at 1.12 USD, and on 31 May 2017 it closed at 1.12 USD once again.

In the commodities market, all eyes were on **oil**. Excess supply had driven down the price. An agreement reached between the OPEC members and Russia to limit oil production in November 2016 and May 2017 brought about only a brief recovery in the oil price. At the end of May 2017, the price for a barrel of Brent crude oil was unchanged at 50.00 USD, as it had been exactly one year before.

Due to the imminent change of administration in Washington, the negotiations between the **EU** and the **USA** on the **Transatlantic Trade and Investment Partnership (TTIP)** were suspended by the EU until further notice in November 2016.

The consent by the parliament of the **European**

ECONOMIC SITUATION

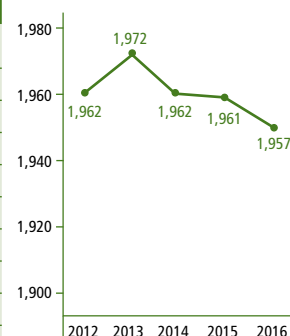
Union (EU) on 15 February 2017 cleared the way for the CETA treaty to come into force provisionally. **CETA (Comprehensive Economic and Trade Agreement)** puts the economic relations between the **EU** and **Canada** on a new footing. The abolition of customs duties and other trade barriers is supposed to result in more growth on both sides of the Atlantic. The member states are now required to ratify the agreement in national procedures. In February 2016, twelve Pacific Rim states signed the **Trans-Pacific Partnership (TPP)** agreement to form a free trade zone. The partners to the agreement are

Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam and the **USA**. The TPP will not come into force until it has been ratified by all the participating states or until at least six states representing at least 85 % of the gross domestic product of all the participating states have ratified the agreement after a period of two years. One of US President Donald Trump's first official acts was to issue a decree ordering the withdrawal of the **USA** from the TPP free trade agreement.

BEER OUTPUT DEVELOPMENT

	2015 1,000 hl	2016 1,000 hl	2015 +/- % rel.	2016 +/- % rel.
European Union	397,416	401,517	2.4 %	1.0 %
Rest of Europe	130,688	129,320	-6.2 %	-1.0 %
Europe total	528,104	530,837	0.2 %	0.5 %
North America	340,195	345,353	5.3 %	1.5 %
Central America/Caribbean	19,202	19,717	9.7 %	2.7 %
South America	227,960	215,676	0.9 %	-5.4 %
America total	587,357	580,746	3.7 %	-1.1 %
Asia	682,314	680,557	-3.7 %	-0.3 %
Africa	142,849	145,041	2.2 %	1.5 %
Australia/Oceania	20,367	20,296	-3.4 %	-0.3 %
WORLD TOTAL	1,960,991	1,957,477	-0.1 %	-0.2 %

Beer output in million hl



Viewed retrospectively, beer output declined by only 5m hl in the period from 2012 to 2016

As a result of information belatedly received from various countries and corrections made known to us after last year's report went to press, **the 2015 beer production volume figures** required some adjustment. Accordingly, the year-on-year decline in output amounted to only slightly less than 2m hl, or 0.1 %*.

Compared with the output volume in 2015, **world beer production in 2016 fell by 3.5 million hectolitres, or 0.2 %**, which was less sharp a fall than expected. The most important beer-producing nations are **China**, the **USA**, **Brazil**, **Mexico** and **Germany**. In terms of global beer output, they account for a combined share of 52 %.

The output in **Europe** remained stable, with the coun-

tries in the European Union achieving a slight increase (among them Italy, with +1.5m hl, and Spain, with +1.4m hl), while the output in the rest of Europe fell slightly (for example in Ukraine, with -1.5m hl).

In **America** there was a decline in beer production of just below 7m hl. While the countries of North and Central America/Caribbean posted an increase in their output (among them Mexico, with +7.9m hl), the countries of South America saw their output fall by 12m hl (among them Venezuela, with -10.2m hl, and Brazil, with -5.2m hl).

In **Asia**, both Vietnam (+4.1m hl) and the Philippines (+2.4m hl) posted strong growth, while China's output fell further (-11.6m hl).

In **Africa** growth continued to slow down with an increase of only 2.2m hl.

*The adjustments of the 2015 figures also led to major shifts within the continents themselves

TOP 40 BREWERIES

Mergers & acquisitions

In 2016 the long-announced brewing giant takeover of **SABMiller (SABM)** by **Anheuser-Busch InBev (ABI)** finally came about. Thus, the previous numbers one

and two merged to become one group that produces a good 25 % of all beer brewed worldwide. The output volume of 433.9m hl quoted in the list of the top

TOP 40 BREWERIES

40 brewers is taken from the **ABI** annual report. It comprises only the consolidated volume up to the time of the takeover in September 2016. The output for the full year was probably just below 500m hl. In order to obtain approval for the takeover from the competition authorities, **ABI** was required to sell significant parts of the **SABM** group: in China, the shares in **China Res. Snow Breweries** held by **SABM** were sold to the Chinese state; the shares in the US joint venture

MillerCoors went to **Molson-Coors**; and all the European breweries, with the exception of **Compañía Cervecería de Canarias (CCC)** on the Canary Isles, were sold to Japan-based **Asahi**, which thus moves up from number 13 to number 7, almost trebling its output in the process.

Now that the list no longer includes the **SABM** group, Germany's **Karlsberg Brewery** in Homburg enters at number 40.

The world's top 40 brewing groups as of 31 December 2016

The data were taken from the brewers' own annual reports.

In other cases, after different sources had reported differing figures, or where no figures were available, the production volume had to be estimated

Ranking	Brewery	Country	Beer output 2016 in mill. hl	Share of world beer production
1	AB InBev	Belgium	433.9	22.2%
2	Heineken	Netherlands	200.1	10.2%
3	China Res. Snow Breweries	China	118.8	6.1%
4	Carlsberg	Denmark	116.9	6.0%
5	Molson-Coors	USA/Canada	95.2	4.9%
6	Tsingtao Brewery Group	China	79.2	4.0%
7	Asahi	Japan	59.0	3.0%
8	Yanjing	China	45.0	2.3%
9	Kirin	Japan	42.5	2.2%
10	BGI / Groupe Castel	France	32.9	1.7%
11	Petropolis	Brasil	21.4	1.1%
12	Constellation Brands	USA	21.0	1.1%
13	Efes Group	Turkey	19.5	1.0%
14	Gold Star	China	18.0	0.9%
15	San Miguel Corporation	Philippines	16.3	0.8%
16	Saigon Beverage Corp. (SABECO)	Vietnam	16.0	0.8%
17	Diageo (Guinness)	Ireland	15.0	0.8%
18	Singha Corporation	Thailand	13.7	0.7%
19	Grupo Mahou - San Miguel	Spain	12.5	0.6%
20	Radeberger Gruppe	Germany	11.9	0.6%
21	Pearl River	China	11.6	0.6%
22	United Brewery	India	11.0	0.6%
23	CCU	Chile	10.9	0.6%
24	Beer Thai (Chang)	Thailand	10.6	0.5%
25	Polar	Venezuela	9.5	0.5%
26	Damm	Spain	9.5	0.5%
27	Oettinger	Germany	9.2	0.5%
28	Sapporo	Japan	8.6	0.4%
29	TCB Beverages	Germany	8.5	0.4%
30	Suntory	Japan	8.3	0.4%
31	Bitburger Brewery Group	Germany	7.0	0.4%
32	Bavaria N.V.	Netherlands	6.9	0.4%
33	HiteJinro	South Korea	6.8	0.3%
34	Hanoi Beverage Corp. (HABECO)	Vietnam	6.5	0.3%
35	Krombacher	Germany	5.9	0.3%
36	Paulaner Brewery Group	Germany	5.7	0.3%
37	Obolon	Ukraine	5.0	0.3%
38	Warsteiner	Germany	4.0	0.2%
39	Yunnan Lancang River	China	3.5	0.2%
40	Karlsberg Brewery	Germany	2.9	0.1%
TOTAL			1,540.7	78.7%
World beer production 2016			1,957.5	100.0%

WORLD BEER PRODUCTION 2015/2016



Europe			
R**	Country	2015	2016
5	Germany	95,623	94,957
6	Russia	78,200	78,200
8	United Kingdom	44,054	44,000 *
10	Poland	40,900	40,731
11	Spain	34,775	36,200
14	France	24,020	24,680 *
15	Netherlands	24,012	24,559
18	Czech Republic	20,091	20,476
20	Belgium	19,811	20,000 *
24	Ukraine	19,460	17,980
26	Italy	14,671	16,218
27	Romania	15,950	16,000
33	Austria	9,292	9,497
34	Turkey	9,020	8,939
36	Ireland	7,755	7,880 *
38	Portugal	6,465	6,475
40	Denmark	5,970	5,900 *
41	Hungary	5,965	5,700 *
43	Serbia	5,521	5,563
46	Bulgaria	4,960	5,240
48	Sweden	4,690 *	4,700 *
52	Belarus/ White Russia	4,098	4,300
53	Finland	3,970	3,930 *
54	Greece	3,820	3,850 *
58	Switzerland	3,438	3,422
59	Croatia	3,379	3,400 *
63	Lithuania	3,108	3,100 *
71	Norway	2,566	2,720
75	Slovakia	2,435	2,415
79	Slovenia	2,029	2,000 *
88	Estonia	1,398	1,416
100	Moldavia	1,050 *	950 *
103	Georgia	990 *	941 *
104	Bosnia- Herzegovina	925	915
109	Latvia	856	762
113	Macedonia	650 *	630
114	Albania	610 *	610 *
122	Cyprus	341	375
124	Montenegro	360 *	340
129	Luxembourg	287	290
135	Iceland	215	225 *
141	Armenia	206	185
143	Malta	168	166
	TOTAL	528,104	530,837

Australia/Oceania			
R**	Country	2015	2016
28	Australia	16,180	15,944
67	New Zealand	2,817	2,921
110	Papua New Guinea	710 *	750 *
136	Tahiti	192 *	207 *
139	Fiji Islands	192 *	193 *
147	New Caledonia	139 *	141 *
154	Solomon Islands	67 *	69 *
156	Samoa	60 *	60 *
168	Vanuatu	10 *	11 *
	TOTAL	20,367	20,296

America			
R**	Country	2015	2016
2	USA	224,122	221,353
3	Brazil	138,575	133,346
4	Mexico	97,100	105,000
21	Colombia	18,100	19,100
22	Canada	18,973	19,000
23	Argentina	16,800	18,000
29	Peru	13,100	13,500
32	Venezuela	19,740	9,500
35	Chile	7,500	8,000
44	Ecuador	5,840	5,500
49	Dominican Republic	4,500 *	4,600 *
55	Bolivia	3,800	3,800
62	Panama	2,800 *	3,200
68	Paraguay	2,500 *	2,900
73	Cuba	2,600 *	2,600 *
83	Costa Rica	1,700 *	1,700 *
87	Guatemala	1,450 *	1,450 *
94	El Salvador	1,200 *	1,200 *
96	Honduras	1,050 *	1,050 *
97	Uruguay	980 *	1,000
98	Nicaragua	950 *	960 *
102	Jamaica	950 *	950 *
108	Puerto Rico	780	780
116	Guyana	495	500
118	Trinidad	430	430 *
125	Belize	340 *	340 *
140	Haiti	190 *	190
145	Bahamas	150 *	150 *
148	Dutch Antilles	140 *	140 *
149	Suriname	100 *	100 *
152	Barbados	80 *	80
153	St. Lucia	75 *	75 *
157	Martinique	60 *	60 *
158	Aruba	50 *	55 *
160	St. Vincent	45 *	45 *
164	Grenada	30 *	30 *
165	St. Kitts	25 *	25 *
166	Antigua	20 *	20 *
167	Dominica	12	12 *
171	Cayman Islands	5 *	5
	TOTAL	587,357	580,746

Asia			
R**	Country	2015	2016
1	China	471,572	460,000 *
7	Japan	53,800	55,150
9	Vietnam	36,700 *	40,800 *
16	Thailand	23,562	24,036
17	India	21,200 *	22,100 *
19	South Korea	20,563	20,000 *
25	Philippines	14,000 *	16,400
39	Cambodia	6,000 *	6,300 *
45	Taiwan	5,370	5,453
47	Kazakhstan	4,739	4,958
56	Laos	3,500 *	3,675 *
61	Myanmar	3,030	3,280
64	Malaysia	3,040 *	3,100 *
70	Uzbekistan	2,950 *	2,750 *
78	Indonesia	1,980	2,210
80	Iran	2,000 *	2,000 *
91	Israel	1,500 *	1,300 *
92	Sri Lanka	1,256	1,270 *
93	Singapore	1,235 *	1,250 *
99	Mongolia	880 *	960 *
106	Nepal	678	830
115	Turkmenistan	500	550
119	Hong Kong	464 *	400 *
121	Bangladesh	300 *	380 *
123	Tajikistan	370 *	365 *
126	Azerbaijan	420	337
130	Kirgistan	290 *	285 *
133	Lebanon	250 *	250 *
150	Jordan	95 *	98 *
161	Bhutan	35 *	35 *
162	Pakistan	30 *	30 *
170	Palestine	5 *	5 *
	TOTAL	682,314	680,557

Africa			
R**	Country	2015	2016
12	South Africa	32,130 *	32,000 *
13	Nigeria	27,000 *	26,000 *
30	Angola	11,000 *	11,000 *
31	Ethiopia	8,200 *	9,947
37	Cameroon	6,657	6,635
42	Kenya	4,736	5,590 *
50	Dem. Rep. of the Congo (Zaire)	4,500 *	4,560 *
51	Tanzania	4,300 *	4,300 *
57	Zambia	3,650 *	3,650 *
60	Uganda	3,270 *	3,300 *
65	Congo (Brazzaville)	3,000 *	3,000 *
66	Mozambique	2,717	3,000 *
69	Ghana	2,700 *	2,800 *
72	Namibia	2,525 *	2,700 *
74	Ivory Coast	2,650	2,500 *
76	Burundi	2,350 *	2,350 *
77	Zimbabwe	2,250 *	2,300 *
81	Tunisia	1,800	1,800 *
82	Burkina Faso	1,700	1,750
84	Rwanda	1,500 *	1,700 *
85	Botswana	1,467	1,500 *
86	Algeria	1,500	1,460
89	Gabon	1,500	1,400
90	Madagascar	1,300	1,400
95	Benin	1,110	1,090 *
101	Egypt	950 *	950 *
105	Malawi	835 *	840 *
107	Morocco	770	810
111	Chad	700	700
112	Togo	650	650
117	Lesotho	441	440 *
120	Mauritius	302	386
127	Guinea Conakry	350 *	330 *
128	Equatorial Guinea	200 *	300
131	Swaziland	271	270 *
132	Central African Republic	250	260
134	Réunion	250	250 *
137	Sierra Leone	200 *	200 *
138	Senegal	150	200
142	Eritrea	200 *	180 *
144	Liberia	140	155
146	Mali	140	150
151	Seychelles	110	90 *
155	Niger	65	65 *
159	Guinea Bissau	45 *	45 *
163	Gambia	40	30
169	Cape Verde	8 *	8 *
172	South Sudan	270	0
	TOTAL	142,849	145,041

World total		
	2015	2016
TOTAL	1,960,991	1,957,477

It is becoming increasingly difficult to obtain figures for beer output volume in individual countries. In addition, there are often significant differences in the production figures provided by different sources. The output volumes here, which in some cases are estimates, are based on close scrutiny of all available data and our own judgement

All figures in 1,000 hl

** Estimate*

*** Ranking*

Italics: corrections of figures for 2015 as stated in last year's report. These figures only became known after going to press or were subsequently corrected

HOP ALPHA ACID PRODUCTION

The working group "Arbeitsgruppe Hopfenanalyse" (AHA) reports the average alpha acid values measured in **freshly harvested hops**. These values constitute the basis for any adjustments of supply contracts containing "alpha clauses" between the brewing industry and the hop industry. The average values serve as the basis for parties concluding new supply

contracts containing an "alpha clause". The members of AHA are the in-house laboratories of the German hop-processing plants, HVG Mainburg, the Bavarian state institute of agriculture and hop research (Hüll), BLQ Weihestephan, VLB Berlin, Labor Veritas (Zurich), TU Berlin and IHPS Žalec.

Alpha acid values as is, as per EBC 7.4, in freshly harvested hops from crop years 2007 to 2016 and the 5-year and 10-year averages:

All other alpha acid values mentioned in the Barth Report were recorded on the basis of % as is, EBC 7.4 ToP (Time of Processing)

Area	Variety	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Ø 5 Years	Ø 10 Years
Hallertau	Hallertau Mfr.	3.9	4.4	4.2	3.8	5.0	4.6	3.3	4.0	2.7	4.3	3.8	4.0
	Hersbruck Spaet	2.6	2.9	3.4	3.5	4.5	3.0	1.9	2.1	2.3	2.8	2.4	2.9
	Saphir	4.6	5.1	4.5	4.5	5.3	4.4	2.6	3.9	2.5	4.0	3.5	4.1
	Opal	7.4	9.4	9.0	8.6	9.7	9.0	5.7	7.3	5.9	7.8	7.1	8.0
	Smaragd	6.1	6.7	6.4	7.4	8.0	6.0	4.3	4.7	5.5	6.2	5.3	6.1
	Perle	7.9	8.5	9.2	7.5	9.6	8.1	5.4	8.0	4.5	8.2	6.8	7.7
	Spalt Select	4.7	5.4	5.7	5.7	6.4	5.1	3.3	4.7	3.2	5.2	4.3	4.9
	Hallertau Tradition	6.0	7.5	6.8	6.5	7.1	6.7	5.0	5.8	4.7	6.4	5.7	6.3
	Mandarina Bavaria							8.8	7.4	7.3	7.0	8.7	7.8
	Hallertau Blanc							9.6	7.8	9.0	7.8	9.7	8.8
	Huell Melon							7.3	5.3	5.4	5.8	6.8	6.1
	Polaris							20.0	18.6	19.5	17.7	21.3	19.4
	Northern Brewer	Northern Brewer	9.1	10.5	10.4	9.7	10.9	9.9	6.6	9.7	5.4	10.5	8.4
Hallertau Magnum		12.6	15.7	14.6	13.3	14.9	14.3	12.6	13.0	12.6	14.3	13.4	13.8
Nugget		10.7	12.0	12.8	11.5	13.0	12.2	9.3	9.9	9.2	12.9	10.7	11.4
Hallertau Taurus		16.1	17.9	17.1	16.3	17.4	17.0	15.9	17.4	12.9	17.6	16.2	16.6
Herkules		16.1	17.3	17.3	16.1	17.2	17.1	16.5	17.5	15.1	17.3	16.7	16.8
Elbe-Saale	Hallertau Magnum	13.3	12.2	13.7	13.1	13.7	14.1	12.6	11.6	10.4	13.7	12.5	12.8
Tettnang	Tettnang	4.0	4.2	4.2	4.0	5.1	4.3	2.6	4.1	2.1	3.8	3.4	3.8
	Hallertau Mfr.	4.3	4.7	4.5	4.2	5.1	4.7	3.3	4.6	2.9	4.4	4.0	4.3
Spalt	Spalt	4.6	4.1	4.4	3.7	4.8	4.1	2.8	3.4	2.2	4.3	3.4	3.8
Slovenia	Aurora	7.4	9.0	7.8	8.3	9.1	8.0	6.1	10.2	8.5	8.7	8.3	8.3
	Savinjski Golding	2.6	3.4	4.0	2.7	3.8	2.6	2.1	3.9	2.0	3.4	2.8	3.1
	Bobek	4.8	5.6	5.0	4.8	6.0	4.0	2.1	6.4	5.0	4.4	4.4	4.8
	Celeia	4.1	4.2	4.2	4.0	4.1	3.2	2.2	4.7	3.2	3.2	3.3	3.7
Czech Rep.	Saazer	2.9	3.7	3.9	3.2	4.0	3.8	2.9	2.9	2.1	3.4	3.0	3.3
	Sládek	5.3	6.2	7.5	7.2	7.9	7.0	7.0	6.6	5.0	6.5	6.4	6.6
	Premiant	7.9	9.3	10.0	9.3	9.8	8.5	8.0	7.6	7.0	8.5	7.9	8.6
Poland	Lubliner	3.3	4.3	4.6	2.6	3.8	4.7	4.3	2.3	3.4	3.2	3.6	3.7

Alpha acid production world-wide is measured according to the following variety groups:

Long-term average alpha of up to 4.5 %

Long-term average alpha of above 4.5 %

GROUP I: Fine aroma hops	such as Celeia, Hallertau Mittelfrueh, Hersbruck Spaet, Lublin, SA-1, Saaz, Saphir, Savinjski Golding, Spalt, Strisselspalt and Tettnang.
GROUP II: Aroma hops	such as Aramis, Aurora, Bobek, Cascade, Chinook, Citra®, Cluster, First Gold, Fuggle, Golding, Hallertau Tradition, Mandarina Bavaria, Mosaic®, Mount Hood, Perle, Simcoe®, Spalt Select, Sterling, Warrior and Willamette.
GROUP III: Bitter hops/ high alpha hops	such as Chelan, Columbus/Tomahawk/Zeus (CTZ), Galena, Hallertau Magnum, Hallertau Taurus, Herkules, Kirin Flower, Marco Polo, Marynka, Millennium, Northern Brewer, Nugget, Phoenix, Pilgrim, Pride of Ringwood, Southern Star, Summit™, Super Pride, Target, Tsingtao Flower and Victoria.

HOP ALPHA ACID PRODUCTION

The alpha acid production of the world hop crop, divided into the three groups below, was as follows:

Group	2015					2016				
	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share
I	11.4%	9,934	2.4%	237	3.1%	13.4%	14,936	3.3%	495	4.7%
II	43.8%	38,333	7.1%	2,726	35.1%	47.3%	52,978	8.0%	4,246	40.3%
III	44.8%	39,148	12.3%	4,797	61.8%	39.3%	43,997	13.1%	5,783	55.0%
TOTAL	100.0%	87,415	8.9%	7,760	100.0%	100.0%	111,911	9.4%	10,524	100.0%

Group I – Fine aroma hops
Czech Republic 43.6 %
(previous year 34.6 %),
Germany 31.5 %
(previous year 30.6 %)

Group II – Aroma hops
USA 61.4 %
(previous year 71.6 %),
Germany 28.1 %
(previous year 17.3 %)

Group III – Bitter hops/high alpha hops
Germany 54.5 %
(previous year 38.8 %),
USA 24.6 %
(previous year 38.9 %)

The crop and alpha volume totals in 2016 were determined on the one hand by the increase in acreage worldwide and, on the other, by the significant rise in production volumes over 2015 in most of the countries in the European Union.

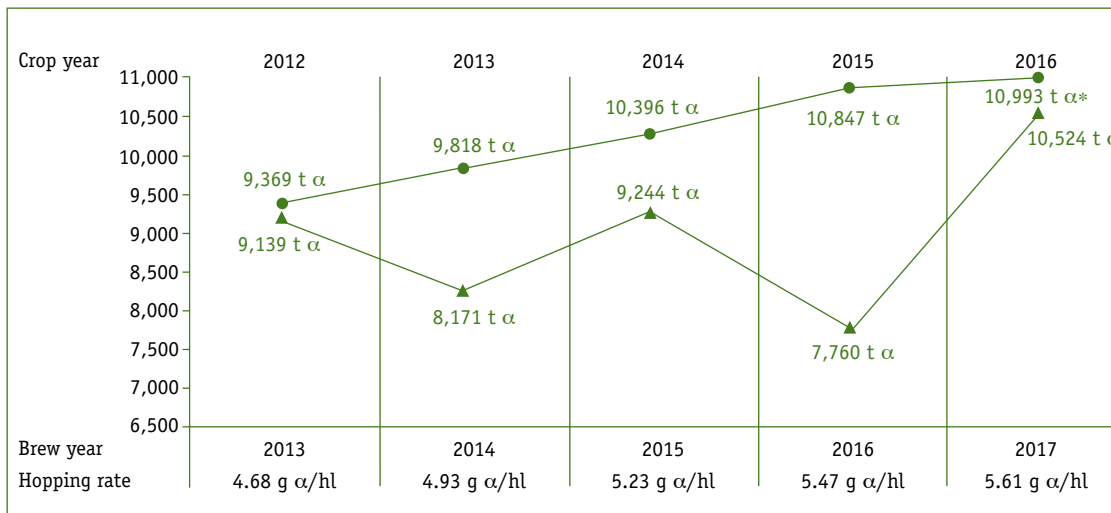
There was a noticeable shift in the share of alpha yield of the aroma varieties versus that of the bitter/high alpha varieties, taking the ratio to 45 : 55 %.

The two biggest hop-growing nations **Germany** and the **USA** further increased their share of the world alpha production. The two countries had a combined share

of 81.3 %, compared with 80.5 % in crop year 2015. While **Germany** increased its share to 42.8 % (2015: 31.0 %) thanks to very good crop and alpha yields, the rebalancing of the varietal mix in the **USA** from high alpha to aroma hops was already having an impact. The latter's share of the world alpha production was 38.5 % (2015: 49.5 %).

The alpha acid values upon which the calculations are based are recorded using the method of EBC analysis 7.4 - % as is at the Time of Processing (ToP).

ALPHA ACID BALANCE



Alpha supply

Brew year	Alpha supply [t α]
2013	- 230
2014	- 1,647
2015	- 1,152
2016	- 3,087
2017	- 469

- Alpha demand (Brew year)
- ▲ Alpha production (Crop year)
- * Estimated demand

The demand for hops beyond the brewing industry has been taken into consideration in the alpha supply calculation

The effects of the growth in demand from the craft beer segment are clearly visible. Although average world beer output has remained virtually unchanged in the last five years, there has been a rise of almost one gram alpha per hectolitre in the hopping rate and

of 1,600 mt in the alpha requirement of the brewing industry as a whole. In this period, production has fallen short of demand, with the result that the alpha balance shows a cumulative deficit of 6,600 mt.

MARKET ANALYSIS

After the seriously below-average world hop harvest in 2015 which produced the greatest alpha acid deficit ever

recorded, the hop and brewing industries both needed a good harvest to follow.

MARKET ANALYSIS

The crop 2016 harvest brought above-average yields and alpha contents in virtually all the hop-growing regions worldwide. The results in the USA, however, remained below the long-term averages. This applied to the yields and alpha contents of the high alpha varieties in particular. The alpha volume produced worldwide will still not be sufficient to meet the alpha requirement in the 2017 brewing year. With an arithmetical deficit amounting to 468 mt, this marks the fifth consecutive year with a structural deficit in the supply of alpha acid to the brewing industry. The cumulative surplus of approx. 8,000 mt that weighed upon the market for some time after the crop 2011 harvest will probably have been fully used up by the end of the 2017 brewing year.

Developments in the world market continue to have a conflicting influence on the hop demand. On the one hand, consumption of mainstream beers in major beer nations such as China, the USA, Brazil and Russia is declining or stagnating, while on the other hand the craft segment with its high hopping rates continues to grow worldwide. As a result, the alpha dosage per hectolitre has risen by 35 % in nine years. As the beer output has risen by more than 6 % in the same period, the total volume of alpha acid required has increased by 44 % to 11,000 mt alpha.

The global hop market as a whole is increasingly being influenced by the development of the US craft industry and its 5,000 brewers. Since 2012, the cultivation area in the US hop-growing regions of Washington, Oregon and Idaho has enlarged by almost 60 %, accompanied by a massive switch in planting in favour of aroma varieties. Historically, 75 to 80 % of the cultivation area in the USA has been devoted to bitter and high alpha hops. In 2016, the ratio of aroma to high alpha acreage was completely reversed to stand at 78 % : 22 %. The three main hop-growing regions in the USA have expanded

their cultivation area by a total of 7,659 ha since 2012. This makes the USA undisputedly the biggest hop-growing country in the world. However, several key figures indicate that the cultivation of aroma hops, and in particular of the flavour hops sought after by the craft brewers, has exceeded the requirement of the craft sector since the crop 2015 harvest. This observation applies to specific varieties, however.

While all efforts in the USA in recent years have concentrated on expanding aroma (flavour) acreage (+10,969 ha to 16,092 ha since 2012), high alpha and bitter hop acreage has been reduced by 3,310 ha to 4,490 ha in the same period. Growers in Germany in particular have profited from the fact that their American counterparts have increasingly cut back on their cultivation of high alpha hops.

The most significant spot market price increase was seen for the high alpha varieties. The rise in forward contract prices for crop 2016 hops pointed to a shortage even before the 2016 harvest had begun. The supply of German high alpha hops was insufficient to compensate for the continuing contraction in US alpha acreage and the below-average crop volume in 2016. As a result of good crop yields the supply of hops belonging to the Saaz variety group was very high. Nevertheless, the market was quickly sold out at high prices. The same applied to fine aroma varieties such as Hersbruck or Saphir. The varieties Perle, Hallertau Tradition and Spalt Select were also in great demand at rising prices.

As the 2016/2017 marketing season draws to a close, the hop and beer industries are once again looking ahead expectantly to the coming 2017 harvest. With the exception of aroma/flavour varieties that are primarily used in craft beers, the supply situation for the brewing industry regarding high alpha hops and conventional aroma and superfine aroma varieties is tense.

CROP PROTECTION - MAXIMUM RESIDUE LEVELS

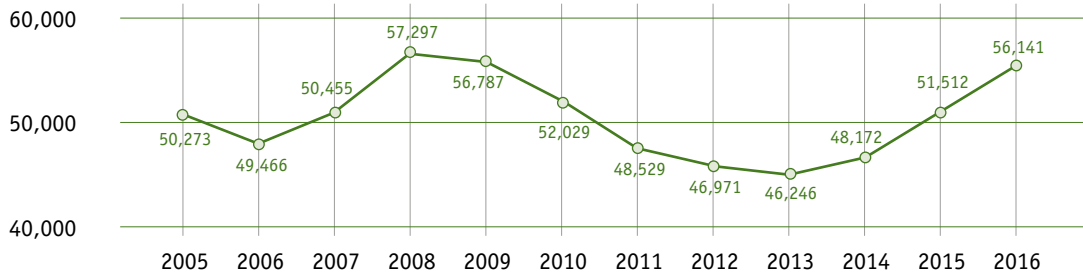
The different international regulations regarding the permissible residue levels of plant protection agents in hop products are increasingly becoming a critical bottleneck in the hop marketing process. In recent years, the hop industry has already had to adapt to differences in plant protection standards between the EU, the USA and Japan, but now more and more countries are beginning to introduce their own national regulations on maximum residue levels. A recent example is South Korea which has hitherto referred to the international regulations of the Codex Alimentarius (Food Code) when assessing residue levels in hops. Now, South Korea has set a deadline of 1 January 2019 for applications regarding maximum residue levels for each foodstuff and for each individual plant protection agent. This time-consuming and costly procedure can

only be completed successfully in close cooperation with the plant protection agent manufacturers and those responsible in the hop-growing countries. The lead role has been taken here by the USHIPPC (United States Hop Industry Plant Protection Committee) in conjunction with the German hop industry association (DHWV).

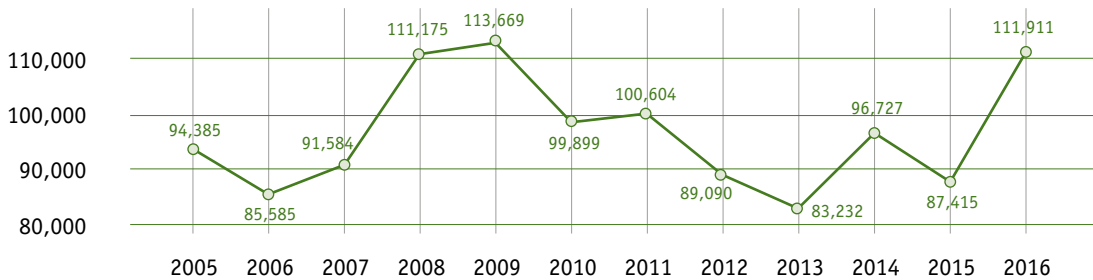
Vietnam and China are also currently working towards the introduction of national standards, with other countries likely to follow. Due to the fact that hops are cultivated in only a few countries, but are used in nearly all countries, this constitutes an increasingly great challenge for hop producers and marketers alike. They have to meet an increasingly wide range of different requirements with a constantly shrinking range of available plant protection agents.

DEVELOPMENT 2005 - 2016

HOP AREA UNDER CULTIVATION IN HA



HOP PRODUCTION IN MT

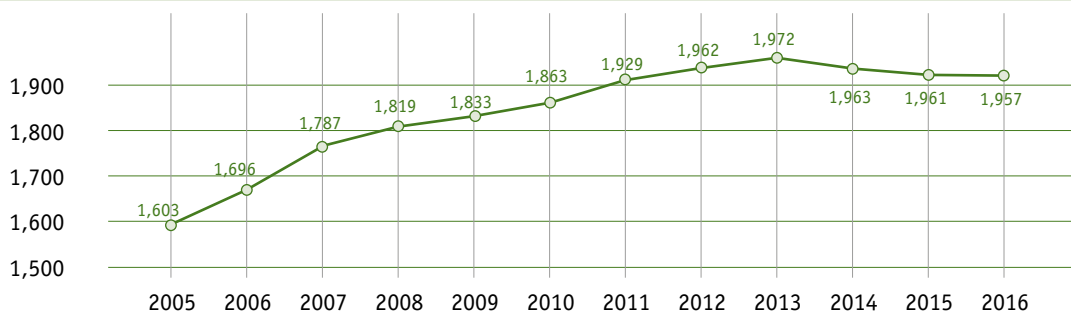


HOP ALPHA PRODUCTION IN MT



* not taking into consideration the quantities destroyed in warehouse fires

BEER PRODUCTION IN MILLION HL



HOP FORWARD CONTRACT RATES

Forward contract rates (as per spring 2017)

Country	2017	2018	2019	2020
Germany	95%	95%	90%	85%
Czech Republic	98%	95%	95%	90%
Slovenia	85%	85%	75%	70%
Poland	75%	75%	65%	60%
England	98%	90%	90%	90%
France	95%	90%	80%	70%
USA	98%	90%	65%	40%
Australia	90%	80%	50%	40%

Due to insufficient availability of official data, the forward contracting rates are based on estimates and have been calculated on the long-term average yield

WORLD HOP ACREAGE AND CROP

		2015				2016			
		Acreage ha	Production mt	Ø-Alpha %	Alpha mt	Acreage ha	Production mt	Ø-Alpha %	Alpha mt
Germany	Hallertau	14,910	23,874.0	8.8 %	2,089	15,510	36,953.5	10.8 %	3,984
	Elbe-Saale	1,325	2,355.3	9.3 %	220	1,409	2,845.4	11.0 %	312
	Tett nang	1,237	1,694.9	4.6 %	79	1,282	2,194.2	6.9 %	151
	Spalt	363	376.6	4.0 %	15	376	730.0	6.8 %	50
	Other	20	35.8	6.5 %	2	22	43.0	8.9 %	4
	Total	17,855	28,336.5	8.5 %	2,405	18,598	42,766.1	10.5 %	4,501
Czech Republic	Saaz	3,576	3,468.6	2.8 %	97	3,692	5,799.8	4.1 %	239
	Tirschitz	549	777.4	2.5 %	19	570	1,092.5	3.8 %	42
	Auscha	497	596.7	2.9 %	17	513	819.3	4.5 %	36
	Total	4,622	4,842.6	2.7 %	133	4,775	7,711.6	4.1 %	317
Slovenia		1,406	1,677.6	5.2 %	87	1,484	2,475.5	5.3 %	131
Poland		1,444	2,242.0	7.3 %	164	1,475	3,043.6	8.3 %	254
England		895	1,356.5	6.2 %	84	920	1,423.9	7.4 %	105
Spain (incl. Galicia)		543	1,029.4	11.4 %	118	540	947.5	11.6 %	110
France		440	554.6	3.1 %	17	459	771.8	3.8 %	29
Romania		270	195.0	10.3 %	20	260	180.0	10.0 %	18
Austria		249	298.2	6.8 %	20	249	479.4	8.5 %	41
Belgium		143	208.3	9.7 %	20	147	197.9	9.3 %	18
Slovakia		137	94.0	2.9 %	3	147	186.6	3.4 %	6
Bulgaria*		14	26.0	7.9 %	2	22	40.0	10.4 %	4
Portugal		12	22.8	9.7 %	2	12	13.7	10.7 %	1
Netherlands		4	3.2	10.0 %	0	2	2.1	12.5 %	0
	European Union	28,034	40,886.8	7.5 %	3,075	29,090	60,239.6	9.2 %	5,535
Ukraine*		380	380.0	6.5 %	25	380	380.0	6.0 %	23
Russia		242	194.0	5.5 %	11	300	214.0	4.2 %	9
Turkey		320	212.0	9.3 %	20	297	260.5	10.3 %	27
Belarus/White Russia		58	54.0	9.5 %	5	58	86.0	9.5 %	8
Switzerland		16	20.9	8.2 %	2	17	29.3	9.2 %	3
	Rest of Europe	1,016	860.9	7.3 %	63	1,052	969.8	7.2 %	70
	EUROPE	29,050	41,747.7	7.5 %	3,138	30,142	61,209.4	9.2 %	5,605
USA	Washington	13,012	26,967.3	11.0 %	2,958	15,153	29,686.2	10.5 %	3,104
	Oregon	2,678	4,838.9	8.7 %	423	3,143	5,622.1	8.5 %	478
	Idaho	1,968	3,957.4	10.4 %	412	2,286	4,217.4	10.0 %	424
	PNW-States	17,658	35,763.6	10.6 %	3,792	20,582	39,525.7	10.1 %	4,006
	Other States	820	625.0	7.5 %	47	988	680.4	7.1 %	48
	Total	18,478	36,388.6	10.6 %	3,839	21,570	40,206.1	10.1 %	4,054
Argentina		146	219.8	7.9 %	17	167	232.4	8.3 %	19
Canada*		105	120.0	9.0 %	11	137	155.0	8.9 %	14
	AMERICA	18,729	36,728.4	10.5 %	3,867	21,874	40,593.5	10.1 %	4,087
China	Xinjiang	1,290	3,345.0	6.5 %	217	1,647	4,752.0	6.0 %	284
	Gansu	1,030	2,609.0	7.5 %	196	992	2,349.4	7.5 %	176
	Total	2,320	5,954.0	6.9 %	413	2,639	7,101.4	6.5 %	460
Japan		141	275.5	5.8 %	16	133	244.6	6.9 %	17
	ASIA	2,461	6,229.5	6.9 %	429	2,772	7,346.0	6.5 %	477
South Africa		395	769.4	12.0 %	92	395	863.5	14.9 %	129
	AFRICA	395	769.4	12.0 %	92	395	863.5	14.9 %	129
Australia		488	1,200.5	13.6 %	164	546	1,104.8	13.1 %	145
New Zealand		389	739.6	9.5 %	70	412	794.0	10.2 %	81
	AUSTRALIA/OCEANIA	877	1,940.1	12.1 %	234	958	1,898.8	11.9 %	226
	WORLD	51,512	87,415.1	8.9 %	7,760	56,141	111,911.2	9.4 %	10,524

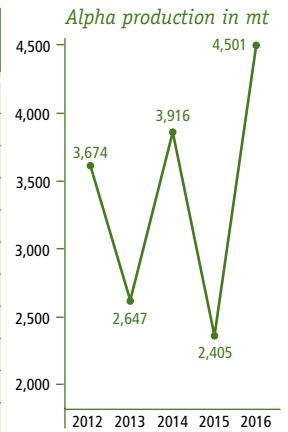
* estimate

Rounding differences of the acreage may cause differences in addition

GERMANY



Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield mt/ha		Production t	
		2015	+/-	2016	2015	2016	2015	2016
Hallertau	Perle	2,868	-88	2,780	1.37	2.32	3,917.76	6,461.58
	Hallertau Tradition	2,790	-86	2,704	1.39	2.31	3,882.79	6,234.23
	Hersbruck Spaet	950	-16	934	1.43	2.05	1,361.72	1,913.98
	Hallertau Mittelfrueh	557	-4	553	1.11	1.78	618.58	982.93
	Spalt Select	443	-3	440	1.41	2.27	625.77	999.10
	Saphir	387	13	400	1.40	2.19	541.56	876.57
	Mandarina Bavaria	171	131	302	1.40	1.90	239.66	574.29
	Opal	127	10	137	0.76	1.97	96.25	271.25
	Hallertau Blanc	97	34	131	1.17	2.12	113.00	277.61
	Huell Melon	90	21	111	1.29	2.24	116.53	248.40
	Other Aroma	75	116	191	1.43	1.28	107.19	244.13
	Total Aroma	8,555	128	8,683	1.36	2.20	11,620.81	19,084.07
	Northern Brewer	150	6	156	1.20	1.95	180.23	304.69
	Brewers Gold	17	0	17	1.69	2.15	28.75	37.33
	Total Bitter	168	6	174	1.24	1.97	208.98	342.02
	Herkules	3,836	704	4,540	2.10	2.87	8,062.26	13,019.27
	Hallertau Magnum	1,671	-145	1,526	1.73	2.13	2,891.98	3,254.90
	Hallertau Taurus	440	-100	340	1.56	2.22	685.38	753.62
	Nugget	137	-9	128	1.82	2.50	249.35	320.91
	Other High Alpha	71	12	83	1.79	1.92	126.80	159.29
Total High Alpha	6,156	461	6,617	1.95	2.65	12,015.77	17,507.99	
Other	32	4	36	0.89	0.54	28.42	19.43	
Total Hallertau	14,910	600	15,510	1.60	2.38	23,873.98	36,953.51	
Elbe-Saale	Perle	223	-4	219	1.53	2.17	340.77	475.38
	Other Aroma	129	64	193	0.75	1.35	96.61	259.75
	Total Aroma	352	60	412	1.24	1.78	437.38	735.13
	Northern Brewer	88	21	109	1.57	1.93	138.50	211.32
	Total Bitter	88	21	109	1.57	1.93	138.50	211.32
	Hallertau Magnum	677	-14	663	1.98	2.16	1,340.68	1,434.63
	Herkules	150	-15	135	2.12	2.39	317.77	322.33
	Other High Alpha	58	25	83	2.04	1.68	118.18	139.90
	Total High Alpha	885	-4	881	2.01	2.15	1,776.63	1,896.86
	Other	1	5	6	2.75	0.36	2.75	2.10
Total Elbe-Saale	1,325	84	1,409	1.78	2.02	2,355.26	2,845.41	
Tettngang	Tettngang	744	-12	732	1.17	1.41	869.99	1,032.26
	Hallertau Mittelfrueh	155	-13	142	1.42	1.87	220.47	264.50
	Other Aroma	193	22	215	1.55	2.05	299.88	441.46
	Total Aroma	1,093	-4	1,089	1.27	1.60	1,390.34	1,738.22
	Herkules	133	40	173	2.13	2.56	282.87	442.50
	Other High Alpha	7	-3	4	2.40	3.07	16.79	12.91
	High Alpha	140	37	177	2.14	2.57	299.66	455.41
	Other	5	10	15	1.05	0.03	4.88	0.53
Total Tettngang	1,237	45	1,282	1.37	1.71	1,694.88	2,194.16	
Spalt	Spalt	114	5	119	0.78	1.41	88.93	168.35
	Other Aroma	212	5	217	1.07	2.12	227.00	459.06
	Total Aroma	326	10	336	0.97	1.87	315.93	627.41
	High Alpha	37	1	38	1.63	2.67	60.36	102.22
	Other	0	2	2	1.10	0.24	0.33	0.40
Total Spalt	363	13	376	1.04	1.94	376.62	730.03	
Rhen.-P./	Aroma	14	0	14	1.82	2.04	25.68	29.91
Bitburg	High Alpha	6	2	8	1.28	1.68	10.10	13.07
Total Rhen.-P./Bitburg	20	2	22	1.63	1.91	35.78	42.98	
Total Aroma	10,340	194	10,534	1.33	2.11	13,790.14	22,214.74	
Total Bitter	255	28	283	1.36	1.96	347.48	553.34	
Total High Alpha	7,223	499	7,722	1.96	2.59	14,162.52	19,975.55	
Total Other	37	22	59	0.98	0.38	36.38	22.46	
GERMANY TOTAL	17,855	743	18,598	1.59	2.30	28,336.52	42,766.09	



The addition of rounded acreage figures may lead to differences in totals in some cases

Varieties with acreage of less than 100 ha are included in 'Other aroma' varieties or 'Other high alpha' varieties in 2016

GERMANY

Farm structure

Although hop farming has become more lucrative and there has been further expansion of hop-growing acreage in Germany, another 18 farms stopped producing hops in 2016. The remaining 1,154 hop producers cultivated an average of 16.1 ha per farm (2015: 15.2 ha). In the Hallertau growing region, the area cultivated by the 931 (-16) hop producers increased by an average of one hectare to 16.7 ha per farm.

Acreage

Hop acreage in Germany increased for the third year in succession and reached its highest level since crop year 2008. The increase in acreage from 2015 to 2016 amounted to 743 ha (4.2 %). While the acreage cul-

tivated with aroma varieties expanded by 194 ha (1.9 %), the increase in high alpha hop acreage was 499 ha (6.9 %).

The increase in acreage applied to two varieties in particular: the high alpha variety **Herkules**, with 732 ha (17.6 %), and the German flavour variety **Mandarina Bavaria**, with 139 ha (67.1 %). The acreage of the following varieties, however, was reduced: **Hallertau Magnum** (-157 ha/6.7 %), **Hallertau Taurus** (-108 ha/23.2 %), **Perle** (-94 ha/2.9 %) and **Hallertau Tradition** (-87 ha/3.0 %). **Herkules**, **Perle** and **Hallertau Tradition** are still the three most important hop varieties in Germany. Together they account for 58 % of the total hop acreage.

In the last five years hop acreage developed as follows:

- 1) Other aroma varieties include: Ariana, Callista, Cascade, Hersbruck Pure, Monroe, Relax, Saaz, and Smaragd
 2) Other high alpha varieties include: Comet, Hallertau Merkur, and Target
 3) Others include: Record, others/selections

There may be differences in the sum totals due to figures being rounded up or down after the decimal point

Variety	2012 ha	2013 ha	2014 ha	2015 ha	2016 ha	Percentage of acreage 2016
Perle	3,203	3,048	3,154	3,187	3,093	16.6%
Hallertau Tradition	2,748	2,661	2,825	2,914	2,827	15.2%
Hersbruck Spaet	785	847	924	955	940	5.1%
Hallertau Mittelfrueh	1,012	925	838	751	733	3.9%
Tettnang	790	787	762	744	732	3.9%
Spalt Select	538	496	523	534	534	2.9%
Saphir	253	324	381	423	450	2.4%
Mandarina Bavaria	-	35	99	207	346	1.9%
Opal	33	28	63	130	140	0.8%
Spalt	106	112	112	114	119	0.6%
Hallertau Blanc	-	12	48	109	154	0.8%
Huell Melon	-	14	56	101	134	0.7%
Other Aroma	62	63	90	170	331 ¹⁾	1.8%
Total Aroma	9,530	9,352	9,876	10,340	10,534	56.6%
Northern Brewer	296	281	267	238	266	1.4%
Brewers Gold	22	19	17	17	17	0.1%
Total Bitter	318	299	284	255	283	1.5%
Herkules	2,642	3,086	3,622	4,152	4,884	26.3%
Hallertau Magnum	3,509	3,102	2,642	2,353	2,196	11.8%
Hallertau Taurus	821	709	594	465	357	1.9%
Nugget	207	184	173	162	152	0.8%
Polaris	-	43	53	60	106	0.6%
Other High Alpha	51	42	35	31	28 ²⁾	0.2%
Total High Alpha	7,231	7,166	7,119	7,223	7,722	41.5%
Other	49	31	28	37	59³⁾	0.3%
GERMANY TOTAL	17,128	16,849	17,308	17,855	18,598	100.0%

Crop volume

As in the previous year, the winter of 2015/2016 began with an unusually mild December. Temperatures in January ranged from extremely wintry to mild and were accompanied by above-average precipitation. February was characterised by mostly very mild weather, with spring-like temperatures at times and plentiful rainfall. By the end of the winter there were sufficient reserves of water in the soil. For the third year in succession there was no deep ground frost. Conditions were cool at the beginning of March, but

by mid-month the spring work in the hop gardens was able to begin in good conditions. With the mild, mainly dry weather conditions continuing in early April, the ground remained suitable for vehicles for all the necessary work. The first of the growers began training the hop shoots in the fourth week of April. However, plant growth was held up abruptly due to night frosts between 26 and 28 April, with temperatures falling as far as minus 3°C. As a result, training extended over a comparatively long period and could not be com-



pleted on most farms until the middle of May. The relatively cool temperatures, combined with a brisk north-easterly wind, held back plant growth until into the second half of May. This resulted in growth retardation of approx. one week compared with the long-term average.

In late May and early June, localised hailstorms affected an area of approx. 350 to 400 ha in the Hallertau growing region, causing varying degrees of damage to the hop plants.

By the beginning of June the hop plants had reached 30 % to 40 % of trellis height. Continuing favourable weather conditions with above-average precipitation encouraged good further development of the hop plants and by mid-June the earlier retardation had already been made up for, with the plants growing to between 70 % and 100 % of trellis height. A warm July with continuing above-average rainfall provided ideal growing conditions. The stage was therefore set for a long flowering period. By the end of July all the hop plants displayed very full, above-average flowering. Even those plants which had suffered hail damage recovered well. On the other hand, the warm, humid conditions also encouraged the development of fungal disease, particularly of downy and powdery mildew. This meant that intensive plant protection measures had to be taken. Red spider mite control also required considerable attention.

The weather conditions changed in mid-August, and a period of dry weather began. This no longer affected the development of the early-harvest varieties, and from early September excellent yields were harvested. The dry weather conditions and continuing midsummer temperatures lasted for an unusually long period until mid-September. This led to accelerated ripening among the late-harvest varieties, and particularly among **Herkules** hops. In addition, signs of drought damage began to appear in hops on soils with low water storage capacity. Despite the unfavourable conditions for the final stage of ripening, the late-harvest varieties still produced slightly above-average yields, but not the record yields produced by the early-harvest varieties. While the visual quality of the hops was very good

when picking began, the quality of the late-harvest varieties, especially of **Hersbruck Spaet** and **Herkules** hops, was increasingly impaired by late powdery mildew infection and spider mite infestation.

The harvested volume of 42,766 exceeded the figure estimated when picking began by 3 % and was thus the highest quantity ever harvested and certified in Germany. Crop year 2016 produced a year-on-year increase in harvested volume of 14,430 mt, or 51 %.

Alpha acid content

In terms of alpha acid values, the results of the 2016 harvest were very good. They were well above those from the previous crop year, exceeding the median values from the last five crop years in all varieties and even exceeding the 10-year median in almost all varieties.

Together, the greater crop volume and the higher alpha acid values led to an increase in alpha yield of 2,096 mt. The volume of alpha harvested was 4,501 mt, which represents a year-on-year increase of 87 %.

Market situation

Spot market crop 2016

As in previous years, the first fixed-price bids were received towards the end of September. Immediately following this, growers received offers for their hops to be marketed in pools or other initiatives. In the Hallertau region the spot market gathered pace, with prices rising into the first week of October. In the end, upfront payment prices of 42.00 EUR/kg alpha and fixed prices of 47.00 EUR/kg alpha were paid for **high alpha varieties**. Fixed prices reached 7.50 EUR/kg for **Hersbruck Spaet** hops, 8.30 EUR/kg for **Spalt Select** and 6.70 EUR/kg for **Perle**. Despite the particularly large crop volume and the considerable quantities of non-contracted hops associated with it, the market was largely sold out by the end of October.

In the Tettang region substantial quantities went into the pools. Where hops were sold at fixed prices, individual marketers paid 12.00 EUR/kg for **Hallertau Mittelfrueh** hops and 12.50 EUR/kg for the **Tettang** variety.

Alpha acid content overview for individual varieties, page 10

Forward contract offers for the main varieties in the Hallertau region

Variety	Time	2017	2018	2019	2020	2021	2022	2023	Price basis
HS+PA	Oct. 2016	42.00	40.00	38.00	34.00	--	--	--	2
	Nov. 2016	45.00	45.00	45.00	45.00	32.00	32.00	32.00	2
HM	Oct. 2016	6.20	6.20	6.20	--	--	--	--	1
	Oct. 2016	6.20	6.10	6.00	6.00	--	--	--	1
	Nov. 2016	6.35	6.35	6.35	6.35	--	--	--	1
	Nov. 2016	6.35	6.35	6.35	6.35	--	--	--	1
HE	Nov. 2016	7.00	7.00	7.00	7.00	7.00	7.00	7.00	1
	Jan. 2017	7.50	7.20	7.20	--	--	--	--	1
SE + SR	Nov. 2016	7.00	7.00	7.00	7.00	7.00	6.50	6.50	1
	Jan. 2017	7.50	7.00	7.00	7.00	--	--	--	1
PE	Jan./Mar. 2017	7.00	6.50	6.30	6.30	6.30	6.30	6.30	1
NU	Jan. 2017	5.00	5.00	5.00	5.00	5.00	5.00	--	1

Variety names:

HE – Hersbruck Spaet

PE – Perle

SE – Spalt Select

SR – Saphir

HM – Hallertau Magnum

TU – Hallertau Taurus

HS – Herkules

NU – Nugget

PA – Polaris

Price basis

1: EUR/kg

2: EUR/kg α

GERMANY

Contract market

Immediately following the spot market, a new round of forward contract activity began in the **Hallertau** region in late October. However, unlike the offers made before the 2016 harvest, with periods extending until crop year 2025, the new contracts had shorter periods and initially were only for **high alpha varieties**. When prices for high alpha varieties were raised in late November 2016, growers with contract potential showed great interest in selling. In January 2017 purchasing of the high alpha varieties **Herkules**, **Polaris** and **Hallertau Taurus** ceased, but then new offers came in for contracts for some **aroma varieties** and for **Hallertau Magnum** and **Nugget** hops. In March purchasing activities largely came to a standstill not least because of the high forward contract ratio.

Forward contract rates up to crop year 2020, page 13

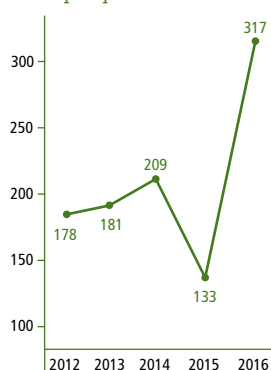
Growers in the **Tett nang** region were also able to sign forward contracts. The price for hops of the **Hallertau Mittelfrueh** variety for crop years 2018 to 2022 was 13.00 EUR/kg. Forward contracts were also signed for the **Tett nang** variety at 15.00 EUR/kg for crop years 2017 to 2020 and at 13.50 EUR/kg for crop years 2021 to 2025.

Hop research

The German hop research institute "Gesellschaft für Hopfenforschung (GfH)" is funding a project for the prevention of hop wilt (*Verticillium nonalfalfae*) with 300,000 EUR over a period of three years. The project also has the prospect of being extended by two years.

CZECH REPUBLIC

Alpha production in mt



Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha Production mt			
	2015	+/-	2016	2015	2016	2015	2016
Saaz	4,039	151	4,190	0.97	1.52	3,903.4	6,366.5
Sládek	267	0	267	1.82	2.39	485.2	639.4
Premiant	180	-5	175	1.49	2.42	267.5	423.9
Other Aroma	84	8	92	1.24	1.88	104.6	173.4
Total Aroma	4,570	154	4,724	1.04	1.61	4,760.7	7,603.2
Agnus	38	1	39	1.84	2.37	70.0	92.6
Other High Alpha	3	0	3	1.69	2.07	5.1	6.2
Total High Alpha	41	1	42	1.83	2.35	75.1	98.8
Other	11	-2	9	0.62	1.07	6.9	9.6
CZECH REPUBLIC TOTAL	4,622	153	4,775	1.05	1.61	4,842.6	7,711.6

Farm structure

Despite the increase in acreage, the number of hop farms decreased further by two. The remaining 111 producers cultivated an average hop acreage of 43 ha per farm in 2016, up from 41 ha in 2015.

**Alpha acid table, page 10*

Acreage/crop volume/alpha content

Total acreage increased by 3.3 %, spread fairly evenly across the three Czech hop-growing regions. The new plantings were almost exclusively the traditional **Saaz** variety.

An unusually mild winter, with only a light snowfall and little frost, was followed by ideal weather conditions for the hop plants lasting until harvest time. Most of the shoots had been trained by the end of the third week of May. From June onwards the weather was warm and sunny, with more than enough rainfall. By mid-July the plants had reached, and in some cases exceeded, trellis height. The tropical weather conditions throughout the month of August increased susceptibility to fungal disease, with downy mildew in particular becoming widespread. The ground conditions, however, were unsuitable

for repeated application of crop protection agents. Picking began on or around 20 August. The yield exceeded the long-term average by nearly 30 %.

The levels of alpha content* measured were above the average for the last five crop years. As a result of the particularly good crop volume and the high alpha content, the alpha yield in 2016 was about 2.4 times above the previous year's yield.

Market situation

Assuming an average yield, the 2016 crop was considered to be almost completely sold out by the growers. Prices ranged from 175 to 270 CZK/kg (6.50 to 10.00 EUR/kg) for **Saaz** hops and from 90 to 160 CZK/kg (3.35 to 5.90 EUR/kg) for **Premiant** and **Sládek** hops. The very high yield made it possible to purchase non-contracted hops. The combination of below-average crop volume in 2015 and the generally excessive forward-contracting rates had prevented some contracts for that crop year from being honoured in full. As a result, the demand for hops harvested in 2016 was extremely

CZECH REPUBLIC

high. The prospect of a good crop led to growers receiving their first purchase offers as early as July. Purchasing of non-contracted hops began in earnest in September. Within only a few weeks, the growers sold their entire stock at prices ranging from 250 to 295 CZK/kg (9.25 to 10.90 EUR/kg) for **Saaz** hops and from 170 to 195 CZK/kg (6.30 to 7.20 EUR/kg) for the **Premiant** and **Sládek** varieties. Despite the very considerable volume of non-contracted hops available, prices remained steady at a high level. At the same time, with the demand for Czech hops persisting, growers received additional offers of contracts with similarly high prices.

Acreage is set to increase further. However, in spite of the very lucrative contract prices, this increase will be

small. There is very little free acreage available in the Czech Republic and it is extremely difficult to obtain long-term tenancy agreements. Of the approximately 170 ha expected to be added in crop year 2017, **Saaz** hops alone will account for about 130 ha. The forward contract rate for this year's crop amounts to almost 100 %.

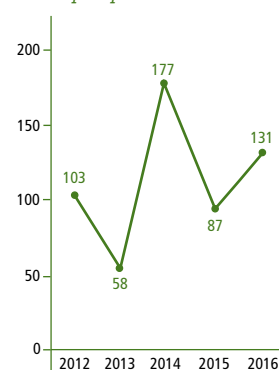
The growers are investing in long-needed new hop farming equipment in order to reduce their production costs and meet their customers' demands for quality in fine Czech aroma varieties. Both the income from the 2016 crop and the high forward-contract rates for the years ahead provide the growers with the necessary planning security for the major investments required.

Forward contract rates up to crop year 2020, page 13

SLOVENIA

Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha Production mt			
	2015	+/-	2016	2015	2016	2015	2016
Celeia	495	78	573	1.46	1.76	720.3	1,006.2
Aurora	528	-54	474	1.18	1.72	622.7	813.1
Savinjski Golding	152	16	168	0.75	1.26	113.6	211.3
Bobek	138	9	147	1.03	1.86	142.7	272.9
Other Aroma	65	20	85	0.70	1.34	45.5	113.8
Total Aroma	1,378	69	1,447	1.19	1.67	1,644.8	2,417.3
Hallertau Magnum	15	0	15	1.14	1.40	17.1	21.0
Other High Alpha	13	9	22	1.21	1.69	15.7	37.2
Total High Alpha	28	9	37	1.17	1.57	32.8	58.2
SLOVENIA TOTAL	1,406	78	1,484	1.19	1.67	1,677.6	2,475.5

Alpha production in mt



Farm structure

As in the previous year, there were 111 active hop growers in crop year 2016. In spite of the slight increase in total acreage, the average area cultivated with hops remained constant at around 13 ha per farm.

Acreage/crop volume/alpha content

As a result of 10 % of **Aurora** acreage being cleared and **Celeia** acreage being increased by 16 % at the same time, the **Aurora** variety lost its status as the most widely grown hop variety in Slovenia. In total, acreage increased by nearly 6 % over 2015.

During the winter of 2015/2016 temperatures repeatedly exceeded the long-term average. From late April to mid-May, however, it was unusually cold. As the season progressed, growing conditions became more favourable for hop development. However, the northern part of the hop-growing region was affected by extremes of weather that led to shortfalls in yield. Towards the end of April, frost and snow destroyed shoots that in some cases had already been trained. There were also hail showers in June and August.

Nevertheless, the yield per hectare for the crop as a

whole was 10 % above the long-term average. The alpha content in crop year 2016 was varied. While the **Aurora** and **Savinjski Golding** varieties exceeded their ten-year averages, the **Bobek** and **Celeia** varieties remained below average. Thanks to the year-on-year increase in crop volume, the alpha yield was 51 % higher.

Market situation

When picking began, roughly 80 % of the 2016 crop volume had already been contracted. Prices were between 4.20 and 7.50 EUR/kg for **Celeia** hops, between 3.50 and 6.00 EUR/kg for **Aurora** and between 5.50 and 9.00 EUR/kg for **Savinjski Golding**. Thanks to stable demand for Slovenian hops, spot prices were between 8.00 and 9.00 EUR/kg for **Celeia** hops, between 6.00 and 8.00 EUR/kg for **Aurora** and between 8.50 and 10.00 EUR/kg for **Savinjski Golding**. Growers were able to sell the entire quantity on hand. When contract market activity subsequently set in, demand for long-term contracts focused principally on **Aurora** hops. The contract prices offered for **Celeia** hops fell short of growers' expectations.

Alpha acid table, page 10

SLOVENIA

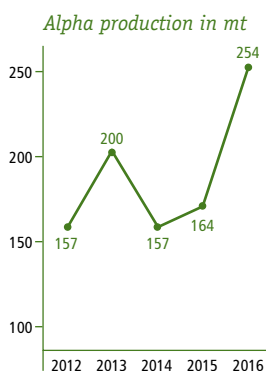
The situation in hop farming has become stable. In addition, the Slovenian Institute of Hop Research and Brewing (IHPS) is doing very good work in helping growers with prevention measures against virus, viroid and verticillium infestation. For some farms, viroid infestation has become a serious threat to their future economic viability. Up to 10 % of hop acreage has already been infected or is within the reach of this disease.

*Forward contract rates up to crop year 2020, page 13

In February 2017 a new flavour cultivar was registered under the name of **Styrian Kolibri**.

Acreage is expected to increase by a further 7 % to approx. 1,590 ha. The new plantings include plants of the **Celeia** variety as well as those of the now numerous new flavour varieties. About 85 % of the volume expected for crop year 2017 had already been sold* in the spring, with the main Slovenian varieties accounting for the majority.

POLAND



The addition of rounded acreage figures may lead to differences in totals in some cases

Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha Production mt			
	2015	+/-	2016	2015	2016	2015	2016
Lublin	393	22	415	1.38	1.66	540.1	688.7
Sybilla	80	5	85	1.30	1.87	103.6	159.2
Hallertau Tradition	80	-7	73	1.28	2.12	101.6	154.8
Perle	61	-12	49	1.25	2.00	76.2	98.2
Other Aroma	6	4	10	0.70	1.64	4.3	16.4
Total Aroma	619	13	632	1.33	1.77	825.8	1,117.3
Magnum	502	-8	494	1.91	2.41	957.0	1,191.9
Marynka	293	-20	273	1.50	2.10	438.4	572.6
Magnat	14	48	62	0.51	2.11	7.0	130.7
Other Bitter/High Alpha	16	-2	14	0.86	2.22	13.9	31.1
Total Bitter/High Alpha	825	18	843	1.72	2.29	1,416.2	1,926.3
POLAND TOTAL	1,444	31	1,475	1.55	2.06	2,242.0	3,043.6

Farm structure

The number of hop growers rose for the third year in succession. In 2016, there were 644 registered producers, six more than the year before. As there was also an increase in total acreage, the average area cultivated with hops remained constant at 2 ha per farm.

*Alpha acid table, page 10

Acreage/crop volume/alpha content

Although acreage increased by only 2 %, there were significant changes to the varietal mix, however: **Lublin** +6 %, **Perle** -20 %, **Marynka** -7 %, **Magnat** +340 %.

The winter of 2015/2016 began with unusually warm and dry conditions. A period of frost set in in January and lasted into February. Due to the much too wet and cold conditions in March, the spring work could not begin until early April. Although precipitation volume varied widely from region to region, rainfall was insufficient from April to June and only came just in time for the hop plants in July. In addition, both

daytime and nighttime temperatures ensured ideal growing conditions. The hops proceeded to develop surprisingly well, resulting in an above-average crop volume for both the aroma and the bitter/high alpha varieties.

On the whole, alpha acid levels* were higher year on year (2016: 8.3 % / 2015: 7.3 %), although the main variety **Lublin** fell slightly short of the previous year's level of 3.4 %, with 3.2 %.

The very high yield per hectare and the year-on-year increase in average alpha content resulted in an increase in alpha yield of 55 % in 2016.

Market situation

At the time picking began, approx. 75 % of the crop volume had probably been sold forward or was bound by supply commitments. Prices ranged from 17 to 28 PLN/kg (3.95 to 6.50 EUR) for **Lublin** hops and between 14 and 20 PLN/kg (3.30 to 4.70 EUR) for the other varieties. Certification is a comparatively slow

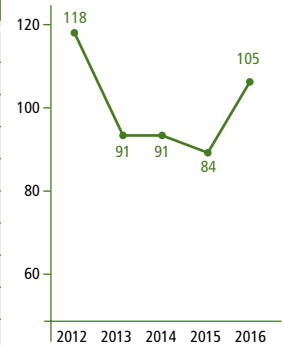
and protracted process in Poland. Purchasing of non-contracted hops did not begin until October/November. As a result, the Polish producers profited from the relatively high price levels in the other European countries. The last stocks were not marketed until January/February, with prices remaining stable. Prices ranged from 25 to 30 PLN/kg (5.85 to 7.00 EUR) for **Lublin** hops and between 18 and 25 PLN/kg (4.20 to 5.85 EUR) for all the other varieties. Offers of new contracts were received as early as

December. The hop marketers were particularly interested in high alpha varieties. **Marynka** hops, which had been cut back severely in recent years, were once more in demand. Some producers are speculating on rising prices. By the spring, some 75 % of the average crop volume expected in 2017 had already been sold forward or committed through supply agreements. The estimated expansion of the hop-growing area for 2017 amounts to 130 to 150 ha. The **Magnat** variety is expected to see the greatest increase.

Forward contract rates up to crop year 2020, page 13

Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha Production mt			
	2015	+/-	2016	2015	2016	2015	2016
Golding	124	9	133	1.53	1.91	189.5	254.0
First Gold	102	-5	97	1.21	1.21	123.8	117.8
EK Golding	98	-4	94	1.54	1.74	151.4	163.2
Fuggle	84	2	86	1.48	1.47	123.9	126.4
Progress	60	7	67	1.81	1.39	108.4	93.1
Sovereign	56	1	57	1.10	1.11	61.6	63.3
Challenger	53	0	53	1.85	1.74	97.9	92.3
Other Aroma	118	8	126	1.52	1.54	179.2	193.8
Total Aroma	695	18	713	1.49	1.55	1,035.7	1,103.9
Target	81	-5	76	1.79	1.57	144.6	119.3
Pilgrim	68	4	72	1.62	1.64	110.0	118.1
Other High Alpha	51	8	59	1.30	1.40	66.2	82.6
Total High Alpha	200	7	207	1.60	1.55	320.8	320.0
ENGLAND TOTAL	895	25	920	1,52	1,55	1,356.5	1,423.9

Alpha production in mt



Farm structure

Hops were grown on 55 farms in crop year 2016, two more than in the previous year. As there was also an increase in total acreage, the average area cultivated with hops remained constant at 17 ha per farm.

Acreage/crop volume/alpha content

The 3 per cent increase in hop-growing acreage marked the end of a decline in acreage that had persisted since 2012. There was planting and clearing of almost all varieties.

Due to weather conditions, training was delayed by two weeks. It was not until the first week of May that all varieties began to show signs of robust growth. Weather conditions were hot and dry throughout the maturation period. In the end, the aroma varieties produced a slightly above-average yield, while the high alpha varieties remained within the long-term

average at 1.55 mt/ha.

The average alpha acid content recorded for the two variety groups in crop year 2016 was as follows: 6.4 % (2015: 5.5 %) for the aroma varieties and 10.8 % (2015: 8.7 %) for the high alpha varieties. The alpha yield rose by 25 %.

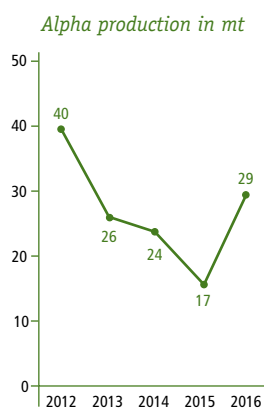
Market situation

At the time of harvest, the 2016 hop crop had been sold almost in its entirety at an average price of 8.00 GBP/kg (9.00 EUR). Hop breeding activity is focused mainly on developing disease-resistant varieties and introducing new flavour varieties.

Acreage is expected to increase further by approx. 25 ha. Growers had already sold forward almost the entire 2017 crop by the end of the spring.

Forward contract rates up to crop year 2020, page 13

FRANCE



The addition of rounded acreage figures may lead to differences in totals in some cases

Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield t/ha		Production mt	
		2015	+/-	2016	2015	2016	2015	2016
Alsace	Strisselspalt	182	4	186	1.20	1.79	219.2	332.1
	Aramis	46	2	48	1.56	1.91	71.7	91.5
	Fuggle	38	6	44	0.89	1.45	33.7	63.6
	Savinjski Golding	37	5	42	1.03	1.45	38.0	60.9
	Hallertau Tradition	32	-1	31	1.40	2.04	44.7	63.1
	Triskel	21	1	22	0.92	1.44	19.4	31.7
	Other Aroma	23	13	36	0.96	1.09	22.0	39.3
	Total Aroma		379	31	410	1.18	1.66	448.6
	Bitter/High Alpha	34	-12	22	2.05	2.20	69.8	48.5
	Total Alsace	413	19	432	1.26	1.69	518.4	730.7
North	Aroma	11	0	11	1.34	1.59	14.7	17.5
	Bitter/High Alpha	16	0	16	1.34	1.48	21.5	23.6
	Total Nord	27	0	27	1.34	1.52	36.2	41.1
FRANCE TOTAL		440	19	459	1.26	1.68	554.6	771.8

Farm structure

Although two growers discontinued hop production, there was an overall increase in acreage in crop year 2016. The remaining 51 growers farmed an average hop area of 9 ha per farm, compared with 8 ha per farm in the crop year 2015.

Acreage/crop volume/alpha content

In the Alsace growing region, the process of change in the varietal mix continued. Marketable aroma varieties were planted on an area of 45 ha, partly replacing bitter and high alpha varieties. There was no change in the hop region in Northern France. In total, hop-growing acreage increased by 4 %.

The situation in the hop gardens of Alsace caused widespread alarm due to heavy rainfall and localised hail showers from late May to early July. However, from early July onwards the weather conditions improved, with a positive effect on plant development. In the end, the harvest was brought in in very good

conditions. The yield was about 8% higher than the long-term average.

The average alpha content measured for the main variety **Strisselspalt** came to 1.8 %. Although this level was higher than the average alpha content in the last five crop years (1.6 %), it was below the average for the last ten (2.0 %).

The year-on-year increase in crop volume and alpha content was reflected in the alpha yield which was up by 68 %.

Market situation

Approx. 90% of the volume produced in 2016 had been sold forward. The growers earned between 10,000 and 13,500 EUR per hectare, depending on the yield. At the time of reporting, 15 mt of **Strisselspalt** hops remained unsold. The net acreage expansion for crop 2017 is an estimated 16 ha. About 90 % of the coming crop had already been sold by spring*.

*Contract rates up to crop year 2020, page 13

USA

The summary below pertains to the traditional growing regions of Washington, Oregon, and Idaho which are also referred to as the Pacific Northwest (PNW) states. New developments outside the PNW states are reported in a separate section (page 27)

Farm structure

The continued rise in US acreage brought 3 new growers to the Pacific Northwest (PNW) region for crop 2016. The total number of PNW hop growers now stands at 67 (discrete decision-making entities), with an average cultivation area of 307 ha (2015: 268 ha). Within the PNW region, the average hop acreage was 421 ha in Washington, 286 ha in Idaho and 137 in Oregon.

In addition to the new entrants, the existing PNW growers have continued to invest heavily in land, trellises, irrigation and harvest infrastructure to

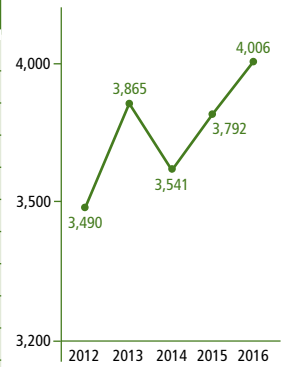
support the 2,924 ha expansion for crop 2016. Several new harvest facilities were installed to support the new acreage and to accommodate optimal harvest timing for the mix of varieties being grown.

Approximately 26 other states outside of the PNW are now growing hops. While industry data is not readily available from these other areas, the average farm size for these new hop growers is generally quite small relative to the PNW, with only a few exceptions.



Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield t/ha		Production mt	
		2015	+/-	2016	2015	2016	2015	2016
Washington	Cascade	1,997	262	2,259	2.17	1.94	4,333.7	4,372.7
	Centennial	1,526	238	1,764	1.28	1.52	1,958.0	2,679.1
	Simcoe®	1,180	345	1,525	1.73	1.88	2,036.9	2,860.1
	Citra®	945	376	1,321	1.73	1.73	1,632.1	2,284.5
	Mosaic®	618	203	821	2.28	2.61	1,411.1	2,140.7
	Amarillo®	433	324	757	1.64	1.52	708.6	1,151.0
	Chinook	526	47	573	2.01	1.59	1,057.3	911.4
	Ekuanot™	182	229	411	1.44	2.40	262.5	987.6
	Willamette	282	13	295	1.13	1.43	318.8	421.7
	Cluster	270	-18	252	1.91	1.91	515.1	480.4
	Palisade®	184	51	235	2.18	2.27	401.6	533.5
	Azacca®	71	134	205	2.09	2.09	148.6	429.2
	Other Aroma	1,188	195	1,383	1.80	1.79	2,136.8	2,476.5
	Total Aroma	9,402	2,399	11,801	1.80	1.84	16,921.1	21,728.4
	CTZ	1,887	-301	1,586	3.04	2.56	5,737.0	4,068.0
	Summit™	656	60	716	2.21	1.85	1,446.9	1,322.4
	Apollo™	286	11	297	3.07	2.50	879.3	741.8
	Bravo™	228	4	232	3.20	2.99	728.9	694.2
	Super Galena™	142	-17	125	3.06	2.81	434.5	351.7
	Other High Alpha	411	-15	396	1.99	1.97	819.6	779.7
	Total High Alpha	3,610	-258	3,352	2.78	2.37	10,046.2	7,957.8
Total Washington	13,012	2,141	15,153	2.07	1.96	26,967.3	29,686.2	
Oregon	Cascade	439	51	490	2.24	1.79	981.3	877.2
	Willamette	268	69	337	1.37	1.76	367.6	594.3
	Centennial	255	38	293	1.52	1.38	387.0	405.0
	Citra®	100	165	265	1.09	1.17	109.4	310.6
	Crystal	153	18	171	2.25	2.49	343.9	425.2
	Simcoe®	77	57	134	1.89	2.20	145.4	294.7
	Mt. Hood	117	14	131	1.42	1.64	166.7	215.0
	Other Aroma	553	66	619	1.52	1.61	837.8	995.2
	Total Aroma	1,962	478	2,440	1.70	1.69	3,339.1	4,117.2
	Nugget	601	-10	591	2.11	2.16	1,270.9	1,274.8
	Other High Alpha	115	-3	112	1.99	2.05	228.9	230.1
Total High Alpha	716	-13	703	2.09	2.14	1,499.8	1,504.9	
Total Oregon	2,678	465	3,143	1.81	1.79	4,838.9	5,622.1	
Idaho	Cascade	312	7	319	1.83	1.78	570.3	566.5
	Amarillo®	242	28	270	1.49	1.34	359.4	362.4
	Citra®	167	66	233	1.42	1.36	237.5	316.9
	Mosaic®	110	91	201	2.55	2.47	281.0	495.9
	Chinook	145	24	169	2.07	1.92	300.4	324.6
	Other Aroma	488	171	659	1.54	1.48	751.0	972.8
	Total Aroma	1,464	387	1,851	1.71	1.64	2,499.6	3,039.1
	CTZ	268	-33	235	3.25	3.09	872.2	726.4
	Apollo™	116	-21	95	2.31	2.12	267.5	201.8
	Other High Alpha	120	-15	105	2.65	2.38	318.1	250.1
Total High Alpha	504	-69	435	2.89	2.71	1,457.8	1,178.3	
Total Idaho	1,968	318	2,286	2.01	1.84	3,957.4	4,217.4	
Total Aroma	12,828	3,264	16,092	1.77	1.79	22,759.8	28,884.7	
Total High Alpha	4,830	-340	4,490	2.69	2.37	13,003.8	10,641.0	
USA Pacific Northwest	17,658	2,924	20,582	2.03	1.92	35,763.6	39,525.7	
Other States	820	168	988	0.76	0.69	625.0	680.4	
USA TOTAL	18,478	3,092	21,570	1.97	1.86	36,388.6	40,206.1	

Alpha production in mt



Due to the conversion of acres into ha and from lbs into mt, there may be minor statistical deviations and differences in the sum totals caused by figures being rounded up or down

Acreage and variety development

The acreage expansion in the USA accelerated in 2016, with another large increase of 17 % (2,924 ha) in the traditional growing region of the Pacific Northwest (PNW). This follows a 15 % increase in the previous year. The total US acreage for crop 2016 is reported at 21,570 ha, including nearly 1,000 ha outside the PNW, which is a new record for US hop acreage and reflects a 79 % increase over the past five-year period. Aroma acreage increased by 25 % (3,264 ha) and now makes up 78 % of the PNW acreage, while high alpha acreage shed another 7 % (340 ha). **Cascade** increased by 12 % (320 ha) and remains the lead variety in the USA for a third consecutive year with a share of 15 % (3,068 ha). As expected, **Centennial** has overtaken **Columbus-Tomahawk-Zeus (CTZ)** as the second most widely grown variety with an increase of 16 % (288 ha), bringing its share up to 10 %. The largest acreage gainers for crop 2016 were again craft-popular proprietary varieties including **Citra**[®] (+50 %, 608 ha), **Simcoe**[®] (+31 %, 415 ha), **Mosaic**[®] (+48 %, 353 ha)

and **Amarillo**[®] (+52 %, 352 ha). These four proprietary varieties along with **Cascade** and **Centennial** make up the top six aroma varieties and account for 53 % (10,851 ha) of the total PNW acreage. Furthermore, proprietary varieties accounted for over 70 % of the expansion for crop 2016, thus continuing the upward trend for these high-demand varieties developed in private breeding programmes. In the high alpha segment, acreage declined in nearly all of the top commercial varieties, led by **CTZ** with a decrease of 16 % (334 ha). **CTZ** has now fallen to third position on the US acreage list with a 9 % share. Other reductions also were seen with **Apollo**[™], **Bravo**[™] and **Super Galena**[™] which collectively dropped by 203 ha. **Nugget** again remained relatively flat, decreasing by 2 % (16 ha). The exception to the high alpha decline was **Summit**[™] which experienced a slight increase of 9 % (60 ha), while there are also some promising signs in new proprietary high alpha varieties that are beginning to appear.

Acreage for the main varieties in the PNW has developed as follows over the past five years:

Variety	2012 ha	2013 ha	2014 ha	2015 ha	2016 ha
Cascade	1,343	2,140	2,679	2,748	3,068
Centennial	720	880	1,357	1,807	2,095
Citra [®]	218	533	727	1,211	1,819
Simcoe [®]	382	527	763	1,338	1,753
Mosaic [®]	36	155	272	728	1,081
Amarillo [®]	308	558	582	683	1,035
Chinook*	-	-	712	723	785
Willamette	646	435	469	550	646
Ekuanot [™]	-	-	-	182	438
Crystal	118	169	191	246	298
Cluster	221	325	299	274	259
El Dorado [®]	-	39	59	181	252
Palisade [®]	111	57	90	184	237
Azacca [®]	-	-	-	71	205
Mt. Hood	140	157	170	169	171
Sterling	-	-	-	85	144
Mt. Rainier	-	-	-	116	144
Warrior ^{®*}	-	-	78	92	108
Golding	111	121	133	118	106
Other Aroma	769	966	1,227	1,322	1,448
Total Aroma	5,123	7,062	9,808	12,828	16,092
Columbus-Tomahawk-Zeus (CTZ)	2,512	2,493	2,337	2,154	1,820
Summit [™]	1,102	1,151	1,021	656	716
Nugget	1,009	834	659	682	666
Apollo [™]	354	404	399	402	301
Bravo [™]	214	241	287	295	219
Super Galena [™]	459	491	361	206	180
Galena	427	210	124	136	122
Chinook*	619	722	-	-	-
Other High Alpha	1,104	646	389	299	466
Total High Alpha	7,800	7,192	5,577	4,830	4,490
USA TOTAL	12,923	14,254	15,385	17,658	20,582

The addition of rounded acreage figures may lead to differences in totals in some cases



Crop volume

The crop 2016 growing season began with sufficient supplies of water in the mountain reservoirs as a result of normal snowfall over the winter. An early spring followed, which allowed growers to commence with root digging and planting new fields earlier than usual. Weather conditions during the growing season in the PNW were nearly ideal and dramatically improved in comparison with the hot, dry summer of 2015. There were only nine days on which the temperature in Yakima reached 38°C or above, whereas in 2015 there were 31 days with such temperatures. The only exception to the ideal conditions was a short period of unseasonably warm weather in April that triggered early growth in some of the varieties. As a result, growers had to prune back the premature growth, which ultimately led to reduced yields in some of the early-harvest aroma varieties and also caused some problems for high alpha varieties. Despite the few early issues, plant development appeared to be slightly ahead of normal for most varieties as the growing season entered its final stages. High alpha hops in particular looked strong, as did baby acreages which were predominantly planted with aroma varieties.

In early August, results of the USDA pre-harvest grower survey projected the crop at 41,640 mt for the PNW, which indicated a solid average crop when the 17 % acreage increase had been factored in. However, as harvesting commenced, it became apparent that the early-season heat had led to some inconsistent yields in the early-harvest varieties. Consequently, many aroma varieties achieved only average yields, including **Centennial**, **Citra®** and **Ekuanot™**, while others, including **Amarillo®**, **Cascade**, **Cluster**

and **Willamette**, were 5 to 10% below average. A few aroma varieties, including **Mosaic®**, **Simcoe®**, **Azacca®** and **Crystal**, produced above-average yields. However, overall yield for the aroma category was very close to long-term averages.

While the high alpha category looked strong throughout the growing season, an aggressive incidence of powdery mildew in the Yakima region occurred early in the harvest period, which slowed final development of the crop in both yield and alpha content. As a result, high alpha yields faded at harvest and were down 10 to 15 % from normal overall. Likewise, alpha contents were down a full percentage point or more, depending on the variety.

The overall production volume of 39,526 mt for the PNW reported by the USDA after harvest was up 11 % (3,762 mt) over crop 2015, despite being 5 % below the pre-harvest projection. The production of aroma hops was up a sizeable 27 % (6,125 mt) over the previous crop while high alpha production decreased by 18 % (2,363 mt), which reflects the dramatic acreage shift into aroma varieties.

Overall hop quality was normal to above normal as the crop was not subjected to heat or water stress and was generally unaffected by disease and insect damage. Mites and aphids were kept in check throughout the season. Aroma hops had a good colour and aroma, although seed content was slightly above normal for some varieties. Late-season high alpha hops showed some powdery mildew damage and lower alpha contents.

Alpha acid table

Variety	2012	2013	2014	2015	2016	Average
Nugget	13.8%	14.4%	13.5%	13.6%	12.6%	13.6%
Columbus/Tomahawk/Zeus (CTZ)	15.3%	15.5%	14.5%	13.8%	15.0%	14.8%
Bravo™	15.0%	15.2%	14.6%	14.4%	15.5%	14.9%
Summit™	15.9%	16.7%	15.8%	15.9%	16.7%	16.2%
Apollo™	17.5%	17.9%	18.2%	17.5%	17.5%	17.7%

Market situation

Contract market

The US grower market remained active coming out of the crop 2015 harvest, with momentum continuing throughout the winter months. Contracts continued to be written for new plantings, which ultimately led to the 17 % acreage increase for crop 2016. The contracting activity continued to centre around aroma varieties

for the craft sector and pricing remained high due to demand and the need to support further investment in land, trellises and harvest infrastructure. Because of the grower investments needed for the additional volumes, contracts were usually written for terms of at least four years.

With over 70 % of the crop 2016 acreage expansion planted with proprietary varieties, much of the contracting activity following the crop 2015 harvest focused on the high-demand varieties **Citra**[®], **Simcoe**[®], **Mosaic**[®], **Ekuanot**[™], **Amarillo**[®] and some others. Volumes were contracted in late 2015 and into early 2016 at prices that would provide grower returns in the range of 30,000 to 35,000 USD/ha. Market activity then slowed typically in early spring as growers locked down their plans for the new crop 2016 plantings.

Contracting activity for several public aroma varieties continued after the crop 2015 harvest, albeit not at the pace of the proprietary varieties, with contracts being written for both new acreages and extensions to existing contracts. **Cascade** prices in late 2015 remained around 13.50 USD/kg and moved up slightly to about 14.25 USD/kg for a few multi-year contracts. However, pricing appeared to peak for **Cascade** and began to drop off to 12.50 USD/kg and below as demand slowed considerably by early 2016. The trend of escalating prices over contract terms also appeared to level off for **Cascade**, with a few contracts in early 2016 reported to have declining prices. Despite **Centennial** now being the second most widely grown variety in the USA, contract activity slowed after crop 2015, with prices reaching a high of 17.50 USD/kg for forward contracts. Market activity came primarily from brewer-direct purchases rather than the hop dealer trade. Contracts were also offered on minor varieties in late 2015 including **Chinook**, **Cluster**, **Willamette**, **El Dorado**[®], **Mt. Hood** and a handful of others. Most of these were written as contract extensions and not for new plantings. **Chinook** pricing hovered in the 12.00- to 13.25 USD/kg range into early 2016, while **Cluster** was slightly lower at 11.25 to 12.00 USD/kg for multi-year contracts. By mid-2016 grower contracting activity for aroma varieties slowed considerably as attention shifted to crop 2017, including rebalancing varieties and further acreage expansion.

The high alpha market remained relatively quiet following the crop 2015 harvest. A small amount of grower activity occurred for **CTZ** late in 2015 at prices ranging from 42.00 to 46.25 USD/kg alpha, but volumes were negligible. Sporadic activity continued into 2016, with prices remaining at around 44.00 USD/kg alpha, but with varying scales of pricing. **Nugget** activity remained nearly absent from the market following crop 2015 due to uncertain future market conditions for this variety. The grower market for high alpha hops generally appeared hesitant throughout the first half of 2016 as overall alpha market demand remained unclear. Additionally, with the decline in performance of **CTZ** in recent years, the grower market has been anticipating the release of some new, higher-yielding alpha varieties from private breeding programmes

which will likely have an impact in the forward alpha market.

Spot market crop 2016

The spot market for crop 2016 was somewhat subdued as average yields led to reduced volumes of spot hop availability. Demand for spot volumes generally developed more slowly and at lower prices compared to recent crops. The market also did not appear to be aggressively chasing after the moderate volumes that were available. An additional feature here is that the acreage planted to licensed proprietary varieties, such as **Citra**[®], **Simcoe**[®], **Mosaic**[®], **Amarillo**[®] and others, now accounts for 35 to 40 % of the total PNW acreage. Contracts for these licensed varieties are usually written for 'full production' volumes, which eliminates the possibility of spot hops regardless of actual crop yields.

A moderate supply of **Cascade** spots became available early in the harvest, with most being sold at prices near 11.60 USD/kg. Remaining quantities were negligible and slow to move after harvest. Over the past few crop years, **Centennial** spots have been in high demand, with spot prices ranging from 22.00 to as much as 35.00 USD/kg. However, spot demand appeared to drop off considerably this season, with prices reportedly in the range of 16.50 to 17.50 USD/kg, dropping further to 12.00 USD/kg for volumes remaining a month or more after harvest. **Chinook** yields were below average and produced low spot volumes which were sold in the 11.50 USD/kg range. In contrast, **Crystal** yields were quite strong, but there was no market for the excess spots. A small amount of **Willamette** spots was available and brought prices in the range of 14.50 to 15.50 USD/kg, while other smaller niche varieties with minor spot volumes included **Mt. Hood**, **Fuggle** and **Sorachi Ace**. **CTZ** spot volumes were down considerably from previous years due to poor yields caused mainly by powdery mildew. With the **Herkules** crop in Germany also below pre-harvest projections, spot prices for US high alpha hops (mainly **CTZ**) started initially at about 44.00 USD/kg alpha, but moved up to 55.00 USD/kg alpha as low yields became more apparent. Most of the **CTZ** spot volumes were purchased shortly after harvest, with a few tranches remaining into the late autumn. **Nugget**, primarily only an Oregon variety, yielded well and produced decent volumes of spot hops. However, demand was very quiet for this variety, which led to spot volumes being held for several months following harvest, with a portion of these volumes later being sold at about 44.00 USD/kg alpha, similar to the spot price level paid for **CTZ**.

Forward contracting activity following the crop 2016 harvest was also similarly slow. Very few forward contracts were written for aroma hops as changing market conditions caused uncertainty with regard to

forward supply balances. There was a small amount of activity in the alpha market towards the end of the calendar year, with contracts written for only 1 to 2-year terms in the range of 44.00 to 48.50 USD/kg alpha. Overall market activity following the crop 2016 harvest was relatively light compared to recent years.

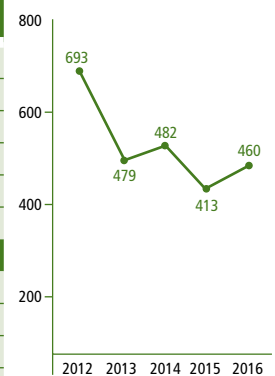
Outside the Pacific Northwest

Beyond the traditional growing region comprising Washington, Oregon and Idaho, it is estimated that an additional 26 states throughout the USA are now commercially growing hops for the brewing industry. Many of the states are in the Midwest and Eastern regions of the USA. These non-PNW states are not yet included in the USDA industry reporting programme; therefore, annual acreage and production data can only be estimated. Nonetheless, industry estimates put the non-PNW acreage at approximately 988 ha harvested for crop 2016, with production at about 680 mt. Crop yields and quality continue to improve as growers gain more experience while also collaborating with universities and industry experts. Michigan remains the clear acreage leader beyond the

PNW, with about 325 ha harvested for crop 2016, or about 2 % of the total US acreage. New York, Wisconsin and Colorado are each around half the acreage of Michigan, while the other 22 states have much smaller acreages. The mix of varieties grown in the non-PNW states continues to be quite wide and includes many of the larger US aroma varieties such as **Cascade**, **Centennial** and **Chinook**, as well as high alpha varieties including **Nugget** and **CTZ**. It is reported that yields of particular varieties in a few of the Midwest states are nearing some of the long-term averages achieved in the PNW, although aromatic differences remain inherent within the various growing regions. Given the large geographical area over which the non-PNW areas are spread, the annual weather, disease and pest issues can vary widely. With crop 2016, the Michigan area experienced good growing conditions, although yields were reported to be somewhat variable while quality was good. Other states had problems with above-normal precipitation, while others were challenged with extremely high temperatures and drought conditions.

Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield t/ha		Production mt	
		2015	+/-	2016	2015	2016	2015	2016
Xinjiang	Tsingtao Flower	688	166	854	2.51	3.18	1,725.0	2,716.0
	SA-1	200	267	467	2.50	1.80	500.0	840.0
	Kirin Flower	145	48	193	2.38	3.61	345.0	696.0
	Marco Polo	233	-100	133	3.09	3.76	720.0	500.0
	Other Aroma	24	-24	0	2.29	0.00	55.0	0.0
	Total Xinjiang	1,290	357	1,647	2.59	2.89	3,345.0	4,752.0
Gansu	Tsingtao Flower	735	-53	682	2.71	2.41	1,994.0	1,642.0
	High Alpha	191	-16	175	2.58	3.03	492.0	530.0
	Nugget	87	19	106	1.03	1.37	90.0	145.0
	Aroma	17	12	29	1.94	1.12	33.0	32.4
	Total Gansu	1,030	-38	992	2.53	2.37	2,609.0	2,349.4
	Total Aroma	241	255	496	2.44	1.76	588.0	872.4
	Total Bitter	1,568	161	1,729	2.59	2.92	4,064.0	5,054.0
	Total Hochalpha	511	-97	414	2.55	2.84	1,302.0	1,175.0
	CHINA TOTAL	2,320	319	2,639	2.57	2.69	5,954.0	7,101.4

Alpha production in mt



There are no reliable statistics on acreage and production volume in China. The figures presented here which, due to the size of the Chinese hop-growing regions, are often based on estimates, have been gathered using our own sources

Farm structure

In crop year 2016, the number of hop farmers declined from 33 to 25. The average cultivated area per farm rose from 70 ha in crop year 2015 to 106 ha in 2016. In the **Xinjiang** growing region, 15 farms continued hop production (2015: 20 farms). Hops were grown on

an average area of 110 ha per farm (2015: 65 ha). There were only 10 hop farms left in the **Gansu** growing region (2015: 13 farms). Despite the decline in total acreage, the average hop-growing area per farm increased to 99 ha (2015: 79 ha).

CHINA

Acreage/crop volume/alpha content

Hop acreage in China rose again for the first time since 2009. There was a 14 % year-on-year increase in acreage, bringing it back to its 2014 level. Initially, a further decline in acreage had been expected. The expansion of the area cultivated with the **SA-1** variety can be seen as an attempt to offset the rise in the increasing volume of Czech Saaz hops imported in recent years. There also was an expansion of **Tsingtao Flower** acreage. This is intended to compensate for the harvest losses of up to 30 % due to machine picking on the one hand and for the lack of pellet plant capacity utilisation on the other. In the **Xinjiang** growing region, acreage rose by 28 %. In the **Gansu** region on the other hand, it declined as expected by 4 %.

The weather conditions in the two growing regions varied. While the climate in **Xinjiang** was favourable for hop growing and led to an above-average harvested yield, high temperatures in **Gansu** in July and a protracted rainy period during the harvest had an adverse effect on the crop yield.

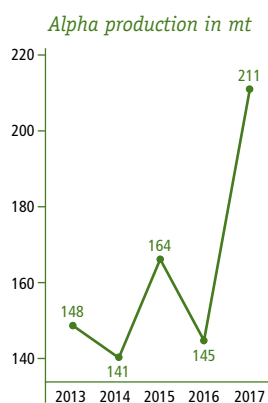
The hops harvested in 2016 produced an average alpha acid content of 6.5 %, compared with 6.9 % the year before. The average alpha acid content of **Tsingtao Flower** hops was 5.7 %, as opposed to 5.9% in crop year 2015. However, the higher crop volume led to an increase of 11 % in alpha yield.

Market situation

In China there is nothing comparable to the forward contract market in Europe or the USA. Instead, it is customary for farmers and buyers to conclude purchase agreements. These agreements only contain specifically defined quantities and qualities. The actual price is settled at a later date and was around the same level as in the previous year.

According to the information we have obtained, crop 2017 acreage will increase again slightly in **Xinjiang** and will decline further in **Gansu**. For the country as a whole, this will mean a slight decline in acreage.

CROP 2017: AUSTRALIA



The addition of rounded acreage figures may lead to differences in totals in some cases

Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield t/ha		Production mt	
		2016	+/-	2017	2016	2017	2016	2017
Tasmanien	Galaxy™	87	17	104	1.87	2.56	162.8	265.8
	Super Pride	47	-7	40	2.80	1.83	131.4	72.5
	Ella™	37	0	37	2.33	2.50	85.9	92.4
	Pride of Ringwood	13	0	13	3.71	3.33	47.9	43.0
	Other	72	10	82	1.42	1.55	102.7	127.2
	Total Tasmania	256	20	276	2.07	2.18	530.7	600.9
Victoria	Galaxy™	105	65	170	2.04	2.07	213.1	351.8
	Super Pride	51	1	52	1.99	2.42	101.3	127.0
	Vic Secret™	51	0	51	1.69	2.90	86.6	149.0
	Pride of Ringwood	47	0	47	2.02	2.02	95.0	95.0
	Topaz	20	2	22	2.56	3.33	50.1	72.6
	Ella™	13	0	13	1.78	3.26	23.0	42.0
	Other	4	-4	0	1.35	0.00	5.0	0.0
	Total Victoria	290	65	355	1.98	2.36	574.1	837.4
AUSTRALIA TOTAL		546	85	631	2.02	2.28	1,104.8	1,438.3

Farm structure

The number of hop farmers remained unchanged year-on-year. As a result of an increase in total acreage over crop year 2016, the average hop-growing area farmed by the six producers rose from 91 to 105 ha per farm.

Acreage/crop volume/alpha content

Total acreage increased for the third year in succession, rising by 16 % from 2016 to 2017. This increase is accounted for almost exclusively by **Galaxy™** hops. In the meantime, this variety's share of Australian hop acreage amounts to 43 %.



Despite a significantly colder and wetter spring than usual, growth conditions throughout most of the growing season were favourable. The crop developed very well both in Tasmania and in Victoria and when harvesting began in early March high yields were expected for crop year 2017. In Tasmania, yields were within reasonable bounds, with the sole exception of those for **Super Pride** hops. In Victoria, at Rostrevor Hop Gardens, small cones were abundant across all varieties, but cool and humid conditions took their toll on the medium to late season varieties which consequently failed to mature as expected. Cone weights were significantly below average and as a result the crop fell short of expectations, with the variety most severely affected by the weather conditions being **Galaxy™**.

The average alpha content in the three main varieties was as follows: **Galaxy™** 15.4 % (2016: 14.4%), **Super Pride** 14.4 % (2016: 13.8%), **Pride of Ringwood** 9.5 % (2016: 9.4 %). The higher alpha levels and the better crop yield led to a year-on-year increase in alpha yield of 45 %.

Market situation

The volume of **Galaxy™** hops produced is sufficient for all contracts to be fulfilled. Crop year 2017 saw the **Helga™**, **Willamette** and **Summer™** varieties being harvested for the last time. Demand for Australian hop varieties can only be met to a limited extent. However, the removal of some varieties will create space for a further increase in production volumes of **Galaxy™**, **Enigma™** and some new varieties that are still at an experimental stage.

The new production facility in Victoria is now complete, which will double the harvest capacity at Rostrevor Hop Gardens. This new facility, in conjunction with new plantings and the maturation of existing gardens, will ensure that volumes of HPA proprietary hop varieties will continue to increase in crop years 2018–2020. At the time of reporting in May 2017, the forward contract rate for hops picked in 2018 was roughly 80 %.

Contract rates up to crop year 2020, page 13

HOP PLANT DEVELOPMENT 2017



Germany (Hallertau)

Winter 2016/2017 began with average temperatures and only little precipitation in December. 2017, however, began with wintry, frosty conditions. In February, it was comparatively mild and dry. The winter drew to a close with the soil in good condition due to frost action. March 2017 drew level with March 1994 as the hottest since weather records began. As a result, it was possible to begin the spring work in the hop gardens towards the middle of the month. Weather conditions changed in mid-April, with typical April weather bringing heavy rainfall in places. Conditions deteriorated towards the end of the month, however, with continued cool to wintry temperatures combining with late frosts to bring hop plant development to a halt. Consequently, training of the hop vines was delayed, with most farms unable to start before the beginning of May, i.e. roughly one week later than usual. Growing conditions improved from mid-May and summery temperatures persisted until the end of the month, providing ideal conditions for the hop plants to develop. This almost entirely made up for the early setback, with the result that most of the plants had

reached an average stage of development by the time of reporting at the end of May.

USA (PNW)

The winter of 2016/2017 provided above-average snowfall that will ensure sufficient water supply for irrigation of the 2017 crop. In addition to the plentiful mountain snows, there was significant rainfall throughout the spring in all three of the major growing regions in the Pacific Northwest. Spring temperatures overall were very close to long-term averages, with a few periods dipping slightly below average. No extreme temperatures were experienced during the early-season months. The generally cool and moist ground conditions provided hop roots with the proper environment for strong growth and normal plant development in the early stages of the growing season. Baby plantings are slightly behind in development while most mature fields are on schedule. Training of the vines was completed within the normal timeframe. Overall, the crop looks very good in the early stages, with all indications of a good crop at this point.

Germany

Although acreage has increased significantly by 945 ha (+5.1 %), there has been a further decline in the number of hop growers. A year-on-year fall of 22 has brought the number of hop farms in Germany down to 1,132 in 2017.

The acreage of **aroma varieties** has increased by only 233 ha (+2.2 %). This variety group's share of total acreage has fallen to 55 %. The two most widely grown varieties **Perle** and **Hallertau Tradition** have seen their acreage reduced by 127 ha (-4.1 %) and 123 ha (-4.4 %) respectively, which has been more than offset by the new plantings of **Amarillo**® hops, however.

The acreage of **high alpha varieties** has increased by 700 ha (+9.1 %), bringing their share of total acreage to 43 %. The variety with the greatest change in acreage is **Herkules**, with an increase of 913 ha (18.7 %). This variety now accounts for nearly 30 % of total hop acreage in Germany. **Polaris** has also seen its acreage expand by 68 ha (+64.2 %). All the other varieties in this variety group have lost acreage.

USA (PNW)

As reported by the US Department of Agriculture (USDA), the total hop acreage in the Pacific Northwest (PNW) growing region for crop 2017 increased by 1,326 ha, which puts the total PNW acreage at 21,908 ha. While still an increase of 6.4 % over crop 2016, the rate of increase has slowed from the annual increases of 8 - 17 % experienced over the past five years.

The acreage of **aroma/flavour varieties** has increased by 988 ha (+6 %) to 17,080 ha and continues to account for 78 % of the total US acreage. **High alpha varieties** have increased by 338 ha (+7.5 %), ending seven consecutive years of acreage decline for this category and keeping its share of US acreage at 22 %.

Varieties with the largest increases for crop 2017 are no longer only **aroma/flavour varieties**, but now include some **high alpha varieties** as well. The largest increases include **Citra**® at 308 ha (+16 %) and **HBC 682**, a new proprietary **high alpha variety** soon to be commercially named, at 290 ha (+264 %). Other increases have been seen with **Chinook** at 198 ha (+25 %), **Columbus-Tomahawk-Zeus (CTZ)** at 184 ha (+10 %) and **Centennial** at 144 ha (+7 %). **Amarillo**® acreage has also increased moderately, while **Simcoe**®, **Ekuano**t™ and **Mosaic**® have remained relatively flat. Varieties seeing the largest reductions include **Cascade** at 172 ha (-6 %) and **Nugget** at 74 ha (-11 %). Despite the 6 % reduction, **Cascade** remains the leading variety in the US for a fourth consecutive year at 2,896 ha, but its share has dropped slightly to 13 % of the US acreage. **Centennial** remains the number two variety at 2,240 ha (10.2 % share), although it is nearly equal to **Citra**® which has overtaken **CTZ** for a close third position at 2,219 ha (10.1 % share).

World

The two main hop-growing countries, the USA and Germany, are responding to market demand by expanding acreage in the **high alpha segment**, thus ensuring a necessary increase in supply. In the **flavour segment**, on the other hand, the newly-planted acreage seems to have finally relieved the tight market. World acreage is set to increase by approx. 3,060 ha (+5.4 %) to 59,200 ha. Overall, this acreage ought to restore the balance between supply and demand. However, it is becoming increasingly necessary to view each market individually. In the end, as every year, the weather and growing conditions will determine the actual crop results and thus the supply situation.

These exchange rates can only serve as an indication. They vary from bank to bank and are not binding

Currency exchange rates

1 EUR equals (reference by ECB):

	on 1 June 2016	on 1 June 2017		on 1 June 2016	on 1 June 2017
Australia	1.5370 AUD	1.5182 AUD	Poland	4.3978 PLN	4.1830 PLN
China	7.3498 CNY	7.6389 CNY	Russia	74.7806 RUB	63.5329 RUB
United Kingdom	0.7736 GBP	0.8723 GBP	Switzerland	1.1055 CHF	1.0883 CHF
Japan	122.0700 JPY	124.5300 JPY	Czech Republic	27.0270 CZK	26.3970 CZK
Canada	1.4586 CAD	1.5155 CAD	USA	1.1174 USD	1.1219 USD

Conversion table weights and measures

Area:	Weight:
1 hectare (ha) = 10,000 m ² = 2.471 acres	1 metr. ton (mt) = 1,000 kg = 20 Ztr. (DE) = 2,204.6 lbs
1 acre = 0.4047 ha	1 Zentner Ztr. (DE) = 50 kg = 110.23 lbs = 1.102 cwt (US) = 110.23 lbs = 0.984 cwt (GB)
	1 hundredweight (cwt/USA) = 100 lbs = 45.36 kg = 0.9072 Ztr.
	1 hundredweight (cwt/GB) = 112 lbs = 50.800 kg = 1.0160 Ztr.
Volume:	1 centner (GB) = 100 lbs = 45.36 kg = 0.9072 Ztr.
1 hl = 100 l = 26.42 gall = 0.8523 bbl (US)	1 kg = 2.20462 lbs
1 hl = 100 l = 22.01 gall = 0.6114 bbl (GB)	1 lb = 0.45359 kg
1 barrel (bbl/USA) = 31 gall = 1.1734 hl	
1 barrel (bbl/GB) = 36 gall = 1.6365 hl	

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WHAT HAPPENED IN 1877 (...140 YEARS AGO)?

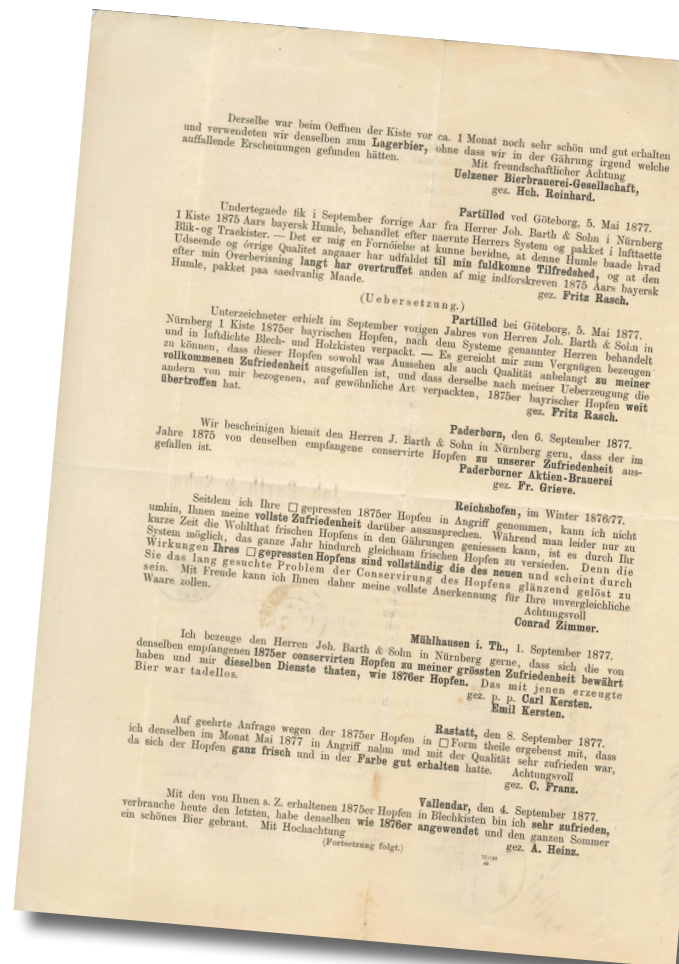
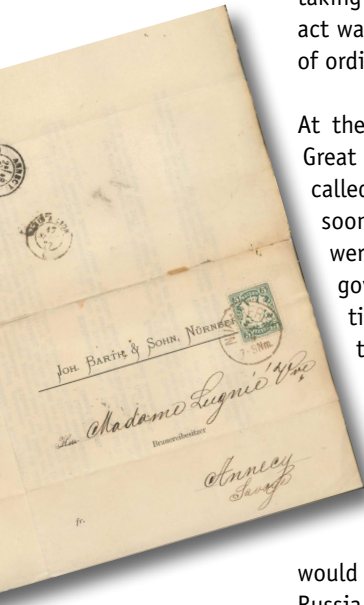
In the **German Empire** the Conservatives won seats in the parliamentary election of January 1877. These gains were at the expense of the Liberal Party. The Social Democrats were also successful. The German Empire was gradually taking shape in all areas. In the same month a judicature act was passed which standardised the rules for a system of ordinary courts throughout the German Empire.

At the same time, trouble was brewing in Europe. The Great Powers signed the **London Protocol** in which they called on the Ottoman Empire to introduce reforms as soon as possible. The representatives of the Great Powers announced their intention to oversee the Turkish government's compliance with its promises in Constantinople. Should the situation of the Sultan's Christian subjects fail to improve sufficiently, they went on, this would be considered not to be compatible with European interests. On 9 April 1877, the Ottoman Empire announced its refusal to accept the London Protocol. This was on the grounds that Turkey as an independent state could not allow itself to be placed under surveillance, which would be a violation of its sovereignty. Shortly thereafter, Russia declared war on the Ottoman Empire. Finally, the crossing of the Danube by Russian troops on 27 June marked the beginning of another Turkish war.

In November 1877, **Thomas Alva Edison** (1847-1931) presented his phonograph, by means of which it was possible to make sound recordings and reproduce them. This device was indeed a new invention and not the further development of existing technology. He registered his "talking machine" for patent protection that same year. The French inventor **Charles Cros** (1842-1888) had invented his "Paléophone", also a device for sound recording, at the same time. However, he did not have the means to have his invention patented.

And then there was **Johannes Barth** (1849-1907). In 1872, following the deaths of his father Johann and his elder brother Wilhelm, he took over the running of the hop-trading business **Joh. Barth & Sohn, Nuremberg** at the age of only 23. The Franconian metropolis was at that time one of the centres of the Industrial Revolution in the German Empire. Undoubtedly also because of its good transport connections – by then Nuremberg already had rail links to all the major cities of Central Europe – numerous industrial pioneers had settled in Nuremberg and helped the city to experience an enormous econo-

mic boom. The young entrepreneur Johannes Barth was very much a "child of his time" and pressed ahead with industrialisation in his own company. He had the hop warehouses completely modernised and introduced several innovations. For example, he thought up new forms of marketing, creating awareness for his company by means of newspaper advertisements and trade fairs. **In 1877 Johannes Barth first published what has now become an institution – the "Annual Hop Report/Barth Report"**. Johannes Barth was also particularly interested in hop preservation. He devised the double-galvanised tin can for shipping hops, particularly overseas, which received great praise. Documentary evidence of this is provided by a letter acquired at a stamp auction and dated 25.09.1877 from Joh. Barth & Sohn, Nuremberg, to Madame Lugnie in Annecy, a town in south-east France. The envelope contained recommendations from satisfied customers. In this way, a letter also served as an advertising brochure (marketing in the year 1877!).



Our thanks go to all those bodies and individuals who provide us with information and thus contribute to the success of the Barth Report



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