THE BARTH REPORT

HOPS 2015/2016

BARTH-HAASGROUP
FOR YOUR SUCCESS

CONTENTS

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 2015	on 1 June 2016		on 1 June 2015	on 1 June 2016
Australia	1.4341 AUD	1.5370 AUD	Poland	4.1335 PLN	4.3978 PLN
China	6.7807 CNY	7.3498 CNY	Russia	58.2567 RUB	74.7806 RUB
United Kingdom	0.7192 GBP	0.7736 GBP	Switzerland	1.0331 CHF	1.1055 CHF
Japan	135.7900 JPY	122.0700 JPY	Czech Republic	27.4400 CZK	27.0270 CZK
Canada	1.3673 CAD	1.4586 CAD	USA	1.0944 USD	1.1174 USD

Conversion table

Area:

1 hectare (ha) = 10,000 m²	= 2.471 acres
1 acre	= 0.4047 ha

Volume:

1 hl = 100 l	= 26.42 gall = 0.8523 bbl (US)
1 hl = 100 l	= 22.01 gall = 0.6114 bbl (GB)
1 barrel (bbl/USA)	= 31 gall = 1.1734 hl
1 barrel (bbl/GB)	= 36 gall = 1.6365 hl

Weight:

1 metr. ton (mt) = 1,000 kg	= 20 Ztr. (DE) = 2,204.6 lbs
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.
1 centner (GB)	= 100 lbs = 45.36 kg
	= 0.9072 Ztr.
1 kg	= 2.20462 lbs
1 lb	= 0.45359 kg

PUBLISHING DETAILS

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Nuremberg, July 2016

FOREWORD

How hops have changed the world of beer, and vice versa...

The central task of hop research used to be "quite simple". The breeding of new hop varieties focused on yield, alpha acid content and resistance to diseases and pests. This met most of the requirements of both the hop and brewing industry. When, after many years, a new hop variety was finally licensed, the brewing industry accepted it and brewed its beers with it – mostly with success.

This went on for years – until a completely new generation of brewers grew up in the United States. More and more breweries were built and more and more people took an interest in brewing beer – not only on a small scale for their own consumption, but also on a large scale for sale to others. Suddenly, hop aroma acquired a totally new standing. The craft brewers had taken a fancy to the aroma varieties in particular. Gradually, they developed their own ideas, philosophies, techniques and innovations with regard to brewing which have meanwhile found their way into the world at large. Almost forgotten beer styles, such as India Pale Ale (IPA), were rediscovered and redeveloped (e.g. Cream Ale, Double IPA). At the same time, there arose a growing desire for unusual hop aromas, and within a relatively short period of time new hop varieties with a wide range of flavours appeared.

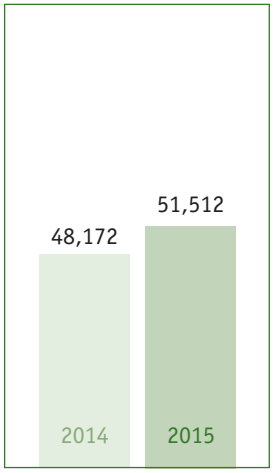
In 2012, there were 180 different hop varieties, whereas now there are 250, with the number set to rise even further. Each of these varieties has its own character, which makes it all the more difficult to describe them and, above all, to distinguish between the individual varieties.

We have therefore come up with roughly 100 different descriptors with the aid of which the differences between the individual hop varieties can be made clear. These descriptors have been drawn from the fields of spices, herbs, flowers, teas and fruits. This allows the brewer to form an idea of which hop variety he can use for which of his wonderful beers.

First, hops changed the world of beer, and then beer changed the world of hops – but two things have remained the same. Without hops all those – characteristic as well as refreshing and expressive beers – would be unthinkable. And we at BARTH-HAAS have partnered with and supported the brewing trade with our products and innovations for generations. Your beer is our passion!

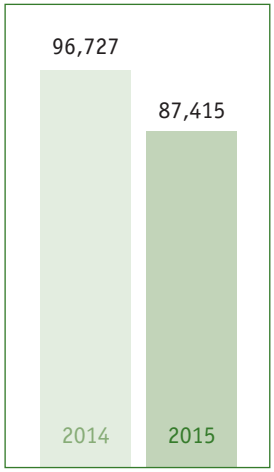
WORLD MARKET KEY DATA

Hop area under cultivation in ha



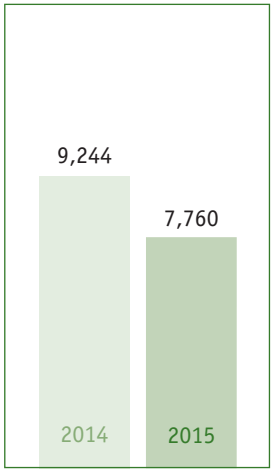
4.2 % 6.9 %

Hop production in mt



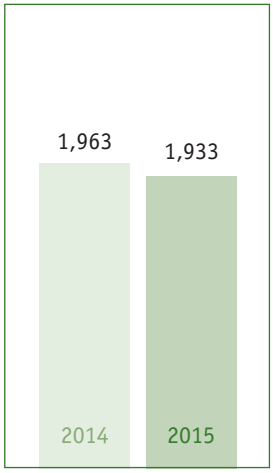
16.2 % -9.6 %

Hop alpha production in mt



13.1 % -16.1 %

Beer production in mill. hl



-0.5 % -1.5 %

POLITICAL SITUATION

The political situation is characterised by a massive increase in geopolitical risks. The number of so-called "failed states" is growing, particularly in the Arab region, with devastating effects on the inhabitants of the countries concerned. The result is an exodus of refugees streaming through all parts of the world and undermining political stability and solidarity in the process.

In **Syria**, the civil war has entered its sixth year. Parts of the country are controlled by the Assad regime, the north by Kurdish groups and the east by the terror organisation Islamic State (IS). In between there are small areas controlled by local militias. Together with **Russia**, which entered the civil war with air strikes in late September 2015, **Iran** and **Iraq** support the Syrian ruler **Bashar al-Assad**. A ceasefire negotiated under the auspices of the **USA** and **Russia** began in February 2016, but has held only to a certain extent. Twelve million Syrians have lost their homes due to that conflict.
Also in **African countries**, the **Western Balkans**, **Kosovo** and **Albania**, a great many people have abandoned their homes on account of what they see as an economically hopeless situation offering no prospects. According to UNO statistics, the number of internal and external refugees meanwhile exceeds 60 million.

The terror militia **"Islamic State (IS)"** has declared a caliphate in large areas of Syria and Iraq and is attempting to establish provinces in other states by means of brutal methods. Various militias and a number of nations are fighting against **IS**. The latter has announced that it will carry out terrorist attacks beyond its territorial borders in countries participating in the fight against it. In the meantime, inhuman terror attacks for which the jihadist militia has claimed responsibility have taken place in **Europe (France, Belgium)** and the **Middle East**.

Two countries in South America are creating a stir. In **Venezuela** the ruling Socialists led by President **Nicolás Maduro** and the opposition alliance **Mesa de la Unidad Democrática (MUD/Democratic Unity Roundtable)** are at loggerheads. Despite having not only South America's but also the world's largest oil reserves, the country is on the brink of an economic collapse after 16 years of socialist government. **Brazil** has plunged into a serious political crisis as a result of allegations of corruption against high officials, nepotism and social injustices. President **Dilma Rousseff** of the social democratic **Workers' Party** (PT) was temporarily suspended from office by the Brazilian Senate on 12 May 2016. She was succeeded by her vice-president **Michel Temer** of the **Democratic Movement Party (PMDB)**.

During the period under review, several important elections took place, some of which are mentioned briefly below.
In the **United States of America** the primaries for the presidential election began on 1 February 2016. The election of the 45th President of the United States will be held on 8 November 2016.
The general election in **Turkey** in June 2015 resulted in the conservative Islamic **AKP** losing the absolute government majority it had held for ten years. Due to the failure of coalition negotiations, a new election was held in November 2015 in which President **Recep Tayyip Erdoğan**'s party, the **AKP**, once again secured an absolute majority.
In the parliamentary election in **Poland** in October 2015 the right-wing nationalist conservative party "**Law and Justice (PiS)**" won an absolute majority of seats. Since taking office, the government led by Prime Minister **Beata Szydło** has used its powers to pass a series of controversial changes in the law despite international protests.
The influx of refugees is one of the reasons for the growing success of right-wing and right-wing populist parties in various European countries.

Following confirmation by the **International Atomic Energy Agency (IAEA)** that **Teheran** had fulfilled its obligations and had radically cut back its nuclear programme, the wide-ranging international sanctions imposed on **Iran** in connection with the nuclear dispute were lifted in January 2016.

EUROPEAN UNION (EU)

European currency union (ECU)

In March 2016, after only three years, **Cyprus** was able to exit the bailout provided by the **Euro rescue fund (ESM)**. **Ireland** had already been released from its EU obligations in December 2013, **Spain** in January 2014 and **Portugal** in May 2014. However, **Spain** and **Portugal** have once again been placed under strict observation by the **EU** as a result of their failure to reduce their deficits in 2015. This leaves **Greece** as the only country still dependent on financial support from the **European Union (EU)** rescue fund, the **European Central Bank (ECB)** and the **International Monetary Fund (IMF)**.
After winning the election in **Greece** in January 2015, the new socialist Prime Minister **Alexis Tsipras** was initially unable to reach an agreement with the **EU-COM/ECB/IMF** troika on spending cuts. However, these cuts were the prerequisite for further money being provided by the EU rescue fund. There was a risk of state bankruptcy. In the end, the conflict was resolved with a new aid and

EUROPEAN UNION (EU)

reform programme. **Greece** received further billions from the **Euro rescue fund (ESM)** and the Greek parliament passed several controversial austerity measures. Nevertheless, the crisis-ridden eurozone member is unable to bring its state finances under control. In 2015 its budget deficit rose to 7.2 % of GDP.

As never before in its history, the **EU** faces huge political and economic challenges. One indication of this is Prime Minister **David Cameron's** decision to ask the British people to vote on 23 June 2016 on whether or not the UK should leave the EU. At the time of going to press, the outcome of the so-called "**Brexit referendum**" remains unclear and will therefore by examined in next year's report.

Refugee crisis

More than 1.5 million refugees entered the EU illegally in 2015. Many people did not make it that far and paid with their lives for fleeing their native countries. There was disunity among the countries of the EU with regard to the distribution of the asylum seekers. In order to stem the influx of refugees, the Shengen Agreement was suspended and controls reintroduced at the national borders affected. On 25 October 2015 the heads of state and government of the EU and other states involved agreed to take emergency measures to reduce the number of refugees on the main transit routes between the Middle East and Europe (the Balkan route). In November 2015 it was resolved to combat the causes of the refugee exodus in Africa by means of an action plan aimed at reducing poverty there by creating new jobs and more educational opportunities. This is intended to discourage people from fleeing to Europe by improving their prospects at home. Since most of the refugees enter the EU via Turkey, an agreement to manage the refugee crisis was concluded between the EU and Turkey in March 2016.

The Common Agricultural Policy (CAP)

Currently there are approx. 400 sets of rules in effect in connection with the **Common Market Order for agricultural produce** (Regulation (EU) No. 1308/2013). The European Commission has set itself the goal of reducing this number to a minimum for the purposes of simplification and debureaucratisation. The **Directorate-General for Agriculture and Rural Development (DG AGRI)** has therefore been assigned the task in 2015 and the years following to examine the legislation in its area of responsibility with a view towards possible simplification. Agriculture commissioner **Phil Hogan** and the **DG AGRI** have called upon member states and all stakeholders to participate in this effort at national level.

Effects on hops as a speciality crop

In the hop sector, there are five sets of rules in addition to the regulations contained in the **Common Market Order** mentioned above. These sets of rules deal with the issues of "Registration of contracts", "Certification of hops and hop products", "Importation of hops from non-member countries", "Recognition of producer groups" and "Support payments to producer groups". In February 2015, the **DG AGRI** initiated a dialogue between the national ministries of agriculture and the stakeholders in the hop sector. These parties have been asked to investigate at national level the extent to which individual provisions can be dropped completely, shortened or combined with others in order to simplify and reduce the administrative burden in the hop sector. In January 2016 the **EU Commission** published a first draft of a working document on rules for the marketing of agricultural produce. This includes rules covering "Certification of hops and hop products" and "Importation of hops from non-member countries" for which previously there had been separate sets of rules. It was explicitly stated that this working document was subject to further consultation.

ECONOMIC SITUATION

The development of the world economy in 2015 was positive, if somewhat weaker than in the previous year. World **gross domestic product (GDP)** grew by 3.1 % (2014: 3.4 %).

In the **USA**, GDP growth remained stable at 2.4 %. The European economy profited from the loose monetary policy of the **European Central Bank (ECB)** and was able to gather pace somewhat. After three years of weak growth, GDP rose in 2015 by 2 % in the **EU** as a whole and by 1.7 % in **Germany**. In **China**, on the other hand, growth slowed. GDP fell below 7 % – its lowest level since 1990. Due to economic sanctions and the fall in commodity prices, **Russia** plunged into a deep recession **Brazil** is in the grip of a serious crisis in both political and economic terms. After posting zero growth in 2014, the world's seventh-largest economy went into reverse, contracting by 3.5 % in 2015.

In structural terms, the world economy is still in a phase in which many economies are in a position of worryingly high indebtedness or even over-indebtedness. To combat the consequences of this situation, central banks have for many years been flooding the capital markets with liquidity and pursuing a state-sanctioned low and zero-interest policy. For many commodity-exporting countries, the collapse in commodity prices has further aggravated the situation.

In order to stimulate their economies, 14 of the world's 20 most important central banks lowered their interest rates in 2015. As in 2014, Europe and the USA continued to go their separate ways in monetary policy in 2015.

ECONOMIC SITUATION

The **European Central Bank (ECB)** has taken a series of new monetary policy decisions. Most recently, in March 2016, the ECB Council passed the following measures: the interest rate at which commercial banks borrow from the ECB was reduced to 0.00 %; the negative rate for bank deposits with the ECB was further reduced to -0.40 %; and the volume of monthly purchases of public and private sector securities within the framework of the asset purchase programme was increased to 80bn euros. The public sector purchase programme has been in operation since March 2015. By the time the programme ends in March 2017, 1.74 trillion euros will have been spent.

In contrast, in response to positive economic developments, the **US Federal Reserve (FED)** raised interest rates in December 2015 for the first time in nine years, lifting them by 0.25 basis points to 0.25 to 0.5 %. **The People's Bank of China (PBC)** lowered its benchmark rate several times, most recently being at 4.35 % (October 2015). At the same time, the government responded to the economic turndown by spending huge sums to support the financial markets and the currency. In mid-June 2015 the **Shanghai Stock Exchange Composite (SSEC)** index was above the 5,000-point mark. By the end of May 2016, following losses in August 2015 and January 2016, it had fallen below 3,000 – a decline of 40 % within a year.

The movement of the **Dow Jones (DJIA)** was influenced by the events in the Far East. Losses were posted both in the summer of 2015 and at the beginning of the new year. On 30 May 2016 the exchange closed at 17,870 points – almost exactly the figure posted on the same date one year before. The **German share index (DAX)** trended downwards, with periodic swings, from 11,500 points at the end of May 2015 to 10,330 points on 30 May 2016.

In the period between 30 May 2015 and 30 May 2016 the **euro**-to-**dollar** exchange rate moved in a range between 1.1578 USD (day's high on 24.08.2015) and 1.0572 (day's low on 30.11.2015). The closing rate at the end of May 2016 was 1.12 USD.

With the lifting of the international sanctions against **Iran**, the country was able to return to the world market as an oil supplier in January 2016, placing momentary further pressure on an **oil price** already suffering from excess supply. At the end of May 2016 the price of Brent crude oil was 50.00 USD, which was 23 % down on the price one year earlier of 65.00 USD. The low oil price is causing enormous problems for the state budgets of many oil-exporting countries.

In February 2016, after six years of negotiations, twelve Pacific Rim states signed a treaty creating the world's largest free-trade zone. Before the **Trans-Pacific Partnership (TPP)** can come into force, the treaty has to be ratified by the parliaments of all twelve countries. In addition to the **USA**, **Canada** and **Japan**, the participating countries are **Australia**, **Brunei**, **Chile**, **Malaysia**, **Mexico**, **New Zealand**, **Peru**, **Singapore** and **Vietnam**, and together they stand for roughly 40 % of the global GDP.

The **USA** and the **EU** have been negotiating a bilateral free-trade treaty since June 2013. The treaty provisions of the **Transatlantic Trade and Investment Partnership (TTIP)** are causing serious controversy in several **EU** countries. The negotiating parties hope to conclude their negotiations within the course of 2016.

The table below shows the development of the key economic indicators for the world's four largest economies in the last three years.

KEY DATA

The figures for 2013 and 2014 have been revised according to the latest statistics and subsequent recalculation.

**) Interest rate for 10-year 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	2013	1.5 %	-376.8	-702.6	1.5 %	2.35 %	7.4 %
	2014	2.4 %	-389.5	-741.5	1.6 %	2.54 %	6.2 %
	2015	2.4 %	-466.4	-759.3	0.1 %	2.14 %	5.3 %
China	2013	7.7 %	148.2	359.0	2.6 %	6.55 %	4.1 %
	2014	7.3 %	219.7	435.0	2.0 %	6.48 %	4.1 %
	2015	6.9 %	217.0	567.0	1.4 %	5.46 %	4.0 %
Japan	2013	1.4 %	40.0	-89.9	0.4 %	0.70 %	4.0 %
	2014	0.0 %	26.1	-98.3	2.7 %	0.53 %	3.6 %
	2015	0.5 %	119.4	-5.5	0.8 %	0.35 %	3.4 %
Germany	2013	0.1 %	252.8	281.1	1.5 %	1.63 %	6.9 %
	2014	1.5 %	282.4	300.9	0.9 %	1.24 %	6.7 %
	2015	1.7 %	285.1	292.3	0.2 %	0.52 %	6.4 %

Mergers & acquisitions

There was little change in the rankings of the world's top 40 brewers from 2014 to 2015. However, everything else was overshadowed by the announcement by **AB InBev** that it had reached an agreement to take over its competitor **SABMiller**. The acquisition is expected to be completed in or before the 3rd quarter of 2016 once some major assets have been divested in order to overcome the reservations of various national regulatory agencies. (The assets in question are **SABMiller's** shares in **MillerCoors** in the USA, **CRB** in China, as well as the **Grolsch**, **Peroni** and **Meantime** brands and breweries in Western Europe and, ultimately at the urging of the EU Commission, all the Eastern European brewing interests.)

We expect the situation to look very different by the end of 2016, by which time **MolsonCoors** will be the sole owner of **MillerCoors** and **Asahi** will have acquired **SABMiller**'s European assets.

The world's 40 biggest brewery groups as at 31 December 2015

Ranking	Brewery	Country	Beer output 2014 in mill. hl	Share of world beer production
1	AB InBev	Belgium	409.9	21.2 %
2	SABMiller 1)	United Kingdom	191.3	9.9 %
3	Heineken	Netherlands	188.3	9.7 %
4	Carlsberg	Denmark	120.3	6.2 %
5	China Res. Snow Breweries	China	117.4	6.1 %
6	Tsingtao Brewery Group	China	70.5	3.6 %
7	Molson-Coors	USA/Canada	58.1	3.0 %
8	Yanjing	China	48.3	2.5 %
9	Kirin	Japan	43.1	2.2 %
10	BGI / Groupe Castel	France	29.8	1.5 %
11	Petropolis	Brasil	23.0	1.2 %
12	Efes Group	Turkey	20.7	1.1 %
13	Asahi	Japan	20.5	1.1 %
14	Gold Star	China	18.0	0.9 %
15	San Miguel Corporation	Philippines	16.7	0.9 %
16	Polar	Venezuela	16.5	0.9 %
17	Constellation Brands	USA	16.5	0.9 %
18	Singha Corporation	Thailand	16.0	0.8 %
19	Diageo (Guinness)	Ireland	15.5	0.8 %
20	Saigon Beverage Corp. (SABECO)	Vietnam	14.0	0.7 %
21	Grupo Mahou - San Miguel	Spain	12.3	0.6 %
22	Pearl River	China	12.2	0.6 %
23	Radeberger Gruppe	Germany	11.8	0.6 %
24	CCU	Chile	10.8	0.6 %
25	United Brewery	India	10.5	0.5 %
26	Oettinger	Germany	9.3	0.5 %
27	Damm	Spain	9.3	0.5 %
28	Sapporo	Japan	8.6	0.4 %
29	Suntory	Japan	8.5	0.4 %
30	TCB Group	Germany	8.0	0.4 %
31	Hitejinro	South Korea	7.4	0.4 %
32	Bitburger Brewery Group	Germany	7.1	0.4 %
33	Beer Thai (Chang)	Thailand	7.0	0.4 %
34	Hanoi Beverage Corp. (HABECO)	Vietnam	6.6	0.3 %
35	Bavaria N.V.	Netherlands	5.9	0.3 %
36	Krombacher	Germany	5.8	0.3 %
37	Brau Holding International	Germany	5.7	0.3 %
38	Obolon	Ukraine	5.5	0.3 %
39	Yunnan Lancang River	China	4.0	0.2 %
40	Warsteiner	Germany	4.0	0.2 %
TOTAL			1,614.7	83.5 %
World beer production 2015			1,932.9	100.0 %

The data were taken from the brewers' own annual reports. In other cases, the production volume had to be estimated after different sources had reported differing figures, or where no figures were available.

1) Not including the 57.5 m hl from the share-holding in China Resources Snow Breweries.

TOP 40 BREWERIES

In addition, attention centred on the craft market in the USA where a number of surprising deals came about: **Heineken** acquired 50 % of the fast-growing **Lagunitas Brewing Company** based in Petaluma, California, **Constellation Brands** purchased **Ballast Point** and **AB InBev** continued to expand its own footprint in this segment with the takeover of the **Elysian Brewing Company**, Seattle, Washington, **Golden Road Brewing**, Los Angeles, California and **Devils Backbone**, Roseland, Virginia, thus bringing its count of craft breweries in the USA up to nine.
The Belgian brewer **Duvel Moortgat** acquired **Firestone Walker**, Paso Robles, California, and is establishing a presence in the US craft brewing market along with **Ommegang**, Cooperstown, New York and **Boulevard**, Kansas City, Missouri.

MillerCoors made an offer for **Saint Archer**, San Diego, California.

Considerable sums of private equity capital continued to flow into the craft market. **Fireman Capital Partners**, for example, acquired a majority stake in **Oscar Blues Brewery**, Longmont, Colorado.

AB InBev was no less active outside the USA, buying the brewers **Camden Town** in London, UK, **Cervejaria Colorado** in Ribeirão Preto, Brazil, **Wäls** in Belo Horizonte, Brazil and finally – at the time of writing of this report in the spring of 2016 – **Birra del Borgo** in Borgorose, Italy. **Meantime**, based in Greenwich, UK currently belongs to **SABMiller** – but is soon to be sold to **Asahi**, along with **Peroni** and **Grolsch**.

BEER OUTPUT DEVELOPMENT

As a result of adjustments to the output figures for 2014, world beer output was in fact slightly higher than the volume stated in last year's report. However, these adjustments led to more significant shifts within the continents themselves.

	2014 1,000 hl	2015 1,000 hl	2014 +/- % rel.	2015 +/- % rel.
European Union	387,927	391,772	1.4 %	1.0 %
Rest of Europe	139,330	130,054	-6.7 %	-6.7 %
Europe total	**527,257**	**521,826**	**-0.9 %**	**-1.0 %**
North America	323,043	316,963	-0.9 %	-1.9 %
Central America/Caribbean	17,509	17,652	0.7 %	0.8 %
South America	226,014	221,975	-0.6 %	-1.8 %
America total	**566,566**	**556,590**	**-0.7 %**	**-1.8 %**
Asia	**708,415**	**692,121**	**-0.9 %**	**-2.3 %**
Africa	**139,760**	**141,957**	**5.2 %**	**1.6 %**
Australia/Oceania	**21,083**	**20,367**	**-3.0 %**	**-3.4 %**
WORLD TOTAL	1,963,081	1,932,861	-0.5 %	-1.5 %

World beer production in 2015 fell by 30.2 million hectolitres, or 1.5 %, compared with output volume in 2014. Factors contributing to this outturn were increasing unrest, exertion of political influence and difficult economic conditions in several important beer-producing countries. Since records of the development of world beer output began in 1950, declines were recorded in 2014, 1992 and 1984, but never before had declines been registered in two years in succession and neither had there ever been a fall of comparable magnitude to that of 2015. The increase in output in 91 countries was insufficient to compensate for the decrease in 38 others.

The list of the most important beer nations is led by **China**, followed by the **USA**, **Brazil**, **Germany** and **Russia**. Beer output fell in all of these countries, with the exception of Germany where it remained stable.

In **Europe**, the decline in output amounted to 5.4m hl. As in the previous year, Ukraine and Russia posted significant declines of 4.7m hl and 4m hl respectively. The countries of the European Union as a whole registered a slight increase.

In **America**, beer production decreased by 10m hl. The shortfall was most marked in Mexico (-3.5m hl) and the USA (-2.6m hl) in **North America** and in Brazil (-2.8m hl) and Venezuela (-2.5m hl) in **South America**.

In **Asia**, there was a drop in output in China (-25.1m hl) and Japan (-2.7m hl) on the one hand and an increase in Vietnam (+7.8m hl) on the other, resulting in a substantial decline of 16.3m hl.

The growth seen in **Africa** in previous years stalled severely and amounted to only 2.2m hl.

WORLD BEER PRODUCTION 2014/2015

Europe

R**	Country	2014	2015
4	Germany	*95,274*	95,623
5	Russia	*82,188*	78,200
9	United Kingdom	*44,336*	44,054
10	Poland	*39,520*	39,800
11	Spain	33,535	34,775
14	Netherlands	23,696	23,700 *
17	France	*20,485*	20,520
19	Czech Republic	19,648	20,076
20	Ukraine	24,200	19,460
22	Belgium	*18,207*	18,250 *
27	Romania	*14,750*	16,100
28	Italy	*13,873*	15,397 *
32	Austria	*9,229*	9,287
33	Turkey	*9,384*	9,020
36	Ireland	*7,288*	7,300 *
38	Hungary	6,239	6,500 *
39	Portugal	7,290	6,465
40	Denmark	*6,119*	6,100 *
44	Serbia	4,865	4,850 *
45	Bulgaria	*4,890*	4,750 *
48	Sweden	*4,643*	4,690 *
51	Belarus/ White Russia	4,346	4,098
52	Finland	4,010	4,000 *
53	Greece	*3,750*	3,700 *
57	Switzerland	3,432	3,438
58	Croatia	*3,405*	3,400 *
60	Lithuania	*3,172*	3,200 *
70	Norway	*2,525*	2,554
72	Slovakia	*2,648*	2,435
76	Slovenia	2,004	2,000 *
88	Estonia	*1,608*	1,398
96	Moldavia	1,150 *	1,050 *
98	Georgia	1,010 *	990 *
103	Bosnia-Herzegovina	767 *	925
105	Latvia	968	856
112	Macedonia	*641*	650 *
114	Albania	590 *	610 *
120	Montenegro	388	380 *
123	Cyprus	323	341
128	Luxembourg	*271*	287
134	Iceland	202	223 *
135	Armenia	237	206
141	Malta	151	168
	TOTAL	527,257	521,826

Australia/Oceania

R**	Country	2014	2015
26	Australia	16,910	16,180
65	New Zealand	2,820	2,817
109	Papua New Guinea	700 *	710 *
138	Fiji Islands	*191* *	192 *
139	Tahiti	190 *	192 *
147	New Caledonia	137 *	139 *
155	Solomon Island	65 *	67 *
157	Samoa	60 *	60 *
168	Vanuatu	10 *	10 *
	TOTAL	21,083	20,367

America

R**	Country	2014	2015
2	USA	*226,099*	223,513
3	Brazil	*141,370*	138,575
6	Mexico	*78,000*	74,500
21	Canada	18,944	18,950 *
23	Venezuela	20,650 *	18,200
24	Colombia	*17,200*	17,400
25	Argentina	16,500 *	16,800
30	Peru	12,960	13,100
35	Chile	7,000 *	7,500
42	Ecuador	5,804	5,840
55	Dominican Republic	3,500 *	3,550 *
69	Cuba	2,600 *	2,600 *
75	Panama	2,150 *	2,200 *
80	Costa Rica	1,700 *	1,700 *
85	Paraguay	1,450 *	1,480 *
87	Guatemala	1,450 *	1,450 *
89	Bolivia	1,320 *	1,300 *
94	El Salvador	1,200 *	1,200 *
97	Honduras	1,050 *	1,050 *
99	Uruguay	970 *	980 *
101	Nicaragua	950 *	950 *
102	Jamaica	950 *	950 *
107	Puerto Rico	750 *	780
118	Trinidad	430 *	430
124	Belize	330 *	340 *
130	Guyana	270 *	270
140	Haiti	190 *	190 *
143	Bahamas	150 *	150 *
144	Dutch Antilles	140 *	140 *
150	Suriname	90 *	100 *
153	Barbados	80 *	80 *
154	St. Lucia	75 *	75 *
158	Martinique	60 *	60 *
159	Aruba	*50* *	50 *
161	St, Vincent	45 *	45 *
163	Grenada	30 *	30 *
164	St. Kitts	23 *	25 *
165	Antigua	19 *	20 *
167	Dominica	12 *	12
171	Cayman Islands	5 *	5 *
	TOTAL	566,566	556,590

Asia

R**	Country	2014	2015
1	China	*496,713*	471,572
7	Japan	56,450	53,800
8	Vietnam	38,900	46,700 *
15	Thailand	*22,144*	23,562
16	South Korea	20,750	21,300
18	India	20,000	20,500 *
29	Philippines	15,000 *	14,000 *
41	Cambodia	4,800 *	6,000 *
43	Taiwan	*5,299*	5,360
46	Kazakhstan	4,716	4,739
56	Laos	2,800 *	3,500 *
61	Malaysia	2,950	3,040 *
62	Myanmar	2,700 *	3,030
64	Uzbekistan	2,850 *	2,950 *
77	Iran	1,980	2,000 *
78	Indonesia	2,800 *	1,980
84	Israel	1,200 *	1,500 *
91	Sri Lanka	*1,245*	1,256
92	Singapore	1,200 *	1,235 *
104	Mongolia	800 *	880 *
111	Nepal	600 *	678
115	Turkmenistan	445 *	500
116	Hong Kong	464	464 *
119	Azerbaidjan	524	420
121	Tajiksistan	355 *	370 *
126	Lebanon	275 *	300 *
127	Kirgisistan	270 *	290 *
151	Jordan	90 *	95 *
152	Pakistan	80 *	85 *
166	Bangladesh	15 *	15 *
	TOTAL	708,415	692,121

Africa

R **	Country	2014	2015
12	South Africa	31,500 *	32,130 *
13	Nigeria	27,000 *	27,000 *
31	Angola	11,000 *	11,000 *
34	Cameroon	7,800 *	7,557
37	Ethiopia	5,625	6,800 *
47	Kenya	4,300 *	4,736
49	Dem. Rep. of the Congo (Zaire)	6,000 *	4,500 *
50	Tanzania	4,300 *	4,300 *
54	Zambia	3,503	3,650 *
59	Uganda	3,470 *	3,270 *
63	Congo (Brazzaville)	3,000 *	3,000 *
66	Mosambique	2,200 *	2,717
67	Ghana	2,750 *	2,700 *
68	Ivory Coast	2,260	2,650
71	Namibia	2,500 *	2,525 *
73	Burundi	2,300 *	2,350 *
74	Zimbabwe	2,200 *	2,250 *
79	Tunisia	1,800	1,800
81	Burkina Faso	1,600	1,700
82	Gabon	1,500	1,500
83	Algeria	1,390	1,500
86	Botswana	1,372	1,467
90	Madagascar	1,200	1,300
93	Rwanda	1,200 *	1,200 *
95	Benin	1,100	1,110
100	Egypt	1,000 *	950 *
106	Malawi	830	835 *
108	Morocco	750	770
110	Chad	650	700
113	Togo	540	650
117	Lesotho	376	441
122	Guinea Conakry	300 *	350 *
125	Mauritius	356	302
129	Swaziland	221	271
131	South Sudan	235	270
132	Réunion	240 *	250
133	Central African Republic	200	250
136	Eritrea	200 *	200 *
137	Sierra Leone	200 *	200 *
142	Senegal	150	150
145	Mali	140	140
146	Liberia	126	140
148	Seychelles	110	110
149	Equatorial Guinea	100	100
156	Niger	65	65
160	Guinea Bissau	45 *	45 *
162	Gambia	40	40
169	Cape Verde	8 *	8 *
170	Palestine	8 *	8 *
	TOTAL	139,760	141,957

World total

	2014	2015
TOTAL	1,963,081	1,932,861

figures in 1,000 hl

in italics: corrections for 2014 as stated in last year´s report.

** estimate*

*** Ranking*

MARKET ANALYSIS

The 2015 harvest will undoubtedly be long remembered as a highly problematic one by all the market participants involved in the hop industry. Although the cultivation area worldwide had risen by seven per cent compared the previous year to 51,500 hectares, the volume harvested was only 87,400 mt. This year-on-year decline in production volume of nearly ten per cent was mainly caused by adverse weather conditions and a drought accompanied by a record number of days with maximum temperatures exceeding 30°C in Central Europe in July/ August 2015. As alpha contents were additionally very low, particularly among the aroma varieties, the German hop industry found itself in a state of emergency lasting several months from September onwards. Thanks to close cooperation in a spirit of trust between the brewing and hop industries, however, it was possible to resolve all the supply and delivery problems. The availability of stocks from previous crop years helped to overcome the supply shortages. In the USA, on the other hand, the crop yield volume was average. The harvested yield worldwide of 1.7 mt per hectare in crop year 2015 was the second-lowest in the last 15 years.

World alpha acid production plunged to 7,760 mt. For the 2016 brewing year, this means a supply shortfall totalling approx. 2,550 mt. The alpha surplus of approx. 8,000 mt built up in crop years 2008 to 2012 has shrunk significantly over the last three years as a result of the low harvested volumes in crop years 2013 and 2015. Consequently, the prices for all varieties have risen sharply in both the spot and forward contract markets. The supply situation varies from balanced, with regard to the high alpha and aroma varieties, to negative, with regard to the fine aroma and flavour varieties. The continuing development of the market therefore depends very strongly on the outcome of the 2016 harvest. Another below-average crop would lead to significant supply shortages which could only partly be met with available stocks from previous crop years.

Due to the low crop volume in 2015, hardly any or only little attention has been paid to certain quite remarkable trends. The first of them is that world beer output has fallen in two years in succession for the first time since the Second World War and that this will also be the case in 2016. Secondly, for the first time since 1967 the USA is the world's biggest hop-growing country in terms of cultivation area. This trend is unlikely to be reversed for the time being. The expansion in the US hop industry is driven by the craft beer movement's appetite for US flavour hops. In the meantime the number of varieties cultivated in the USA has risen to 83. In Germany, by comparison, there are 32 varieties. This clearly shows where the action is in today's hop market.

China, on the other hand, has failed to live up to the expectations it aroused 15 years ago and is gradually withdrawing from hop growing. The cultivation area there has dwindled to only 2,300 hectares. Having been let down by both the domestic brewing industry and the state, the hop industry in China is leading an increasingly miserable existence.

The eyes of all the participants in the hop market (producers, marketers and brewers) are now directed anxiously to the coming 2016 harvest. In America a large crop is expected, which ought to ease the pressure in the overheated market for flavour hops, while in Europe not only the growers are hoping for at least a normal crop. May all their wishes be fulfilled!

HOP ALPHA ACID PRODUCTION

Alpha acid production world-wide has been divided into variety groups:

Varieties with a long-term average alpha of up to 4.5 %

Varieties with a long-term average alpha of over 4.5 %

GROUP I: Fine aroma hops	such as Hallertau Mittelfrueh, Hersbruck Spaet, Klon 18, Lublin, Saaz, SA-1, Spalt, Savinjski Golding, Styrian Golding (Celeia), Strisselspalt, Tettnang.
GROUP II: Aroma hops	such as Aurora, Bobek, Cascade, Chinook, Cluster, First Gold, Fuggle, Golding, Hallertau Tradition, Mount Hood, Opal, Perle, Saphir, Smaragd, Spalt Select, Sterling, Wakatu, Warrior, Willamette.
GROUP III: Bitter hops/ High Alpha hops	such as Admiral, Chelan, Columbus/Tomahawk/Zeus (CTZ), Galena, Hallertau Magnum, Hallertau Merkur, Hallertau Taurus, Herkules, Kirin Flower, Marco Polo, Marynka, Millennium, Northern Brewer, Nugget, NZ Pacific Gem, Phoenix, Pride of Ringwood, Super Pride, Target, Tsingtao Flower, Victoria.

HOP ALPHA ACID PRODUCTION

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

	2014					2015				
Group	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share
I	12.8 %	12.420	3.1 %	383	4.1 %	11.4 %	9.934	2.4 %	237	3.1 %
II	39.5 %	38.182	7.1 %	2.728	29.5 %	43.8 %	38.333	7.1 %	2.726	35.1 %
III	47.7 %	46.125	13.3 %	6.133	66.4 %	44.8 %	39.148	12.3 %	4.797	61.8 %
TOTAL	100.0 %	96.727	9.6 %	9.244	100.0 %	100.0 %	87.415	8.9 %	7.760	100.0 %

Corrections have been made to the 2014 figures for crop and alpha volume quoted in last year´s report.

Group I - Fine aroma hops
Czech Republic 34.6 %
(previous year 38.1 %),
Germany 30.6 %
(previous year 37.2 %)

Group II - Aroma hops
USA 71.6 %
(previous year 50.1 %),
Germany 17.3 %
(previous year 35.1 %)

Group III - Bitter hops/ high alpha hops
USA 38.9 %
(previous year 35.4 %),
Germany 38.8 %
(previous year 46.9 %)

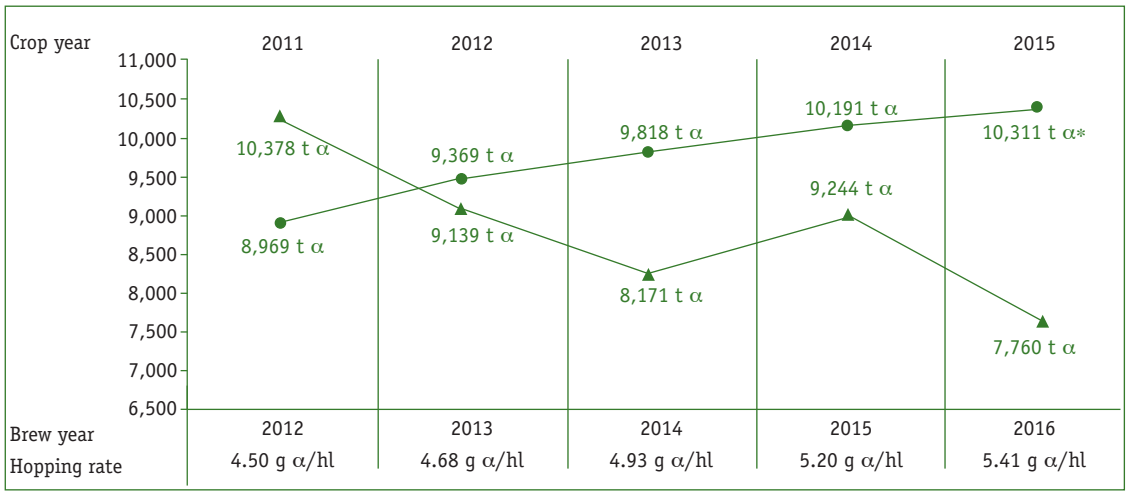
Due to weather conditions, virtually all the countries in the European Union registered lower harvested yields and significantly lower alpha acid contents than in the previous year – particularly among varieties in Groups I and II. Nevertheless, a continuing shift away from bitter/high alpha hops towards aroma hops is clearly recognizable.

Some corrections have been made to the 2014 figures for crop and alpha volume quoted in last year's report. In particular, the recategorization of the Chinook and Warrior® varieties, which had previously been included in Group III (bitter/high alpha hops) in the USA, but have now been allocated to Group II (aroma hops), resulted in a shift within these two variety groups.

The country with the largest share of world alpha production in 2015 was the **USA**, with 49.5 % (2014: 38.5 %). As a result of low production volume and low alpha acid contents, **Germany** saw its share fall to only 31.0 % (2014: 42.4 %). Between them, the world's two biggest hop-growing nations accounted for 80.5 % as opposed to 80.9 % in crop year 2014.

All alpha acid values were calculated using the method of EBC analysis 7.4 – % as is at the time of processing (ToP).

ALPHA ACID BALANCE



Alpha supply

Brew year	Surplus / Deficit
2012	+1,409 t α
2013	- 230 t α
2014	- 1,647 t α
2015	- 947 t α
2016	- 2,551 t α

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

The demand for hops and hop alpha acids continues to grow. For the 2015 brewing year (crop year 2014) there was a deficit in the supply balance once again. As a result of continually rising demand on the one hand and low production volume on the other, this deficit will be even greater in the 2016 brewing year (crop year 2015).

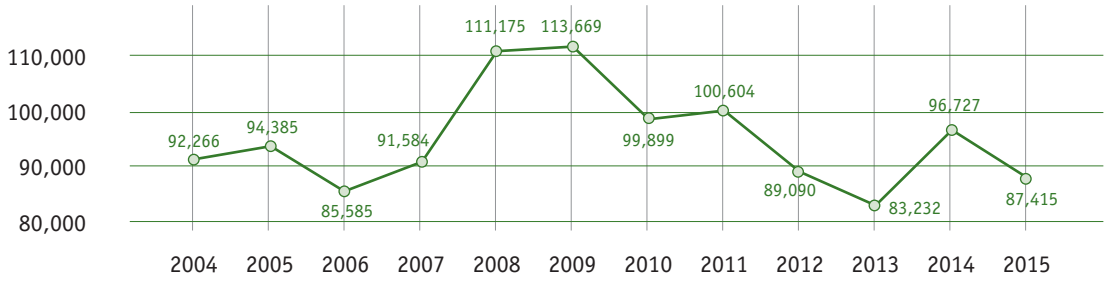
The demand for hops beyond the brewing industry has been taken into consideration in the alpha surplus/ deficit calculation.

The estimated alpha demand for the 2016 brewing year is based on the assumption of a further reduction in beer output volume of approx. 2.7 %, as output expectations in the five biggest brewing countries have turned negative – in some cases significantly so.

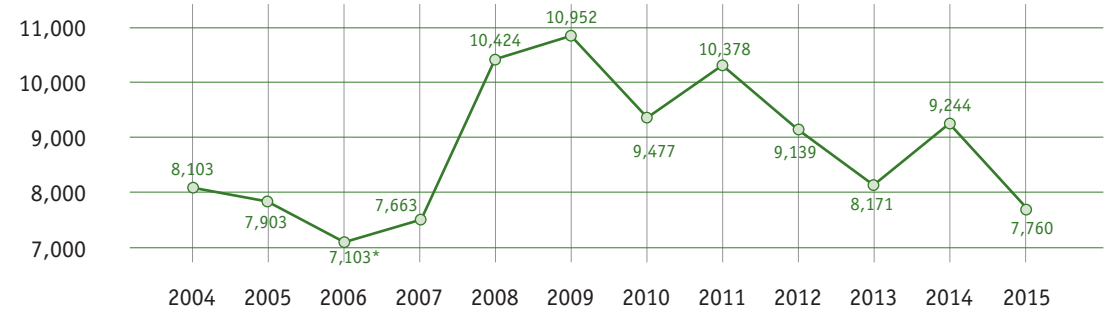
DEVELOPMENT 2004 – 2015

HOP AREA UNDER CULTIVATION IN HA

HOP PRODUCTION IN MT

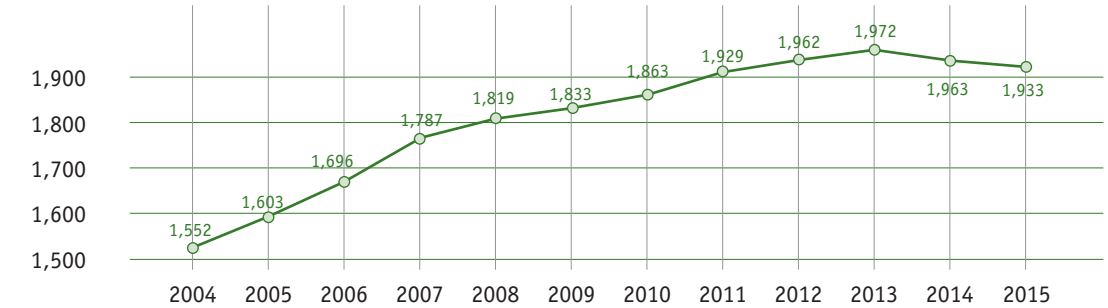


HOP ALPHA PRODUCTION IN MT



** 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 2016)

Country	2016	2017	2018	2019
Germany	95 %	90 %	85 %	75 %
Czech Republic	100 %	100 %	100 %	90 %
Poland	85 %	85 %	85 %	70 %
Slovenia	80 %	70 %	60 %	50 %
England	95 %	95 %	95 %	80 %
France	75 %	70 %	65 %	60 %
USA	100 %	90 %	85 %	50 %
Australia	95 %	90 %	85 %	80 %

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

		2014				2015			
		Acreage ha	Production mt	Ø-Alpha %	Alpha mt	Acreage ha	Production mt	Ø-Alpha %	Alpha mt
Germany	Hallertau	14,467	33,173.1	10.5 %	3,468	14,910	23,874.0	8.8 %	2,089
	Elbe-Saale	1,265	2,567.9	10.6 %	273	1,325	2,355.3	9.3 %	220
	Tettnang	1,209	2,022.4	6.4 %	130	1,237	1,694.9	4.6 %	79
	Spalt	348	688.7	6.1 %	42	363	376.6	4.0 %	15
	Other	20	47.7	7.8 %	4	20	35.8	6.5 %	2
	Total	**17,308**	**38,499.8**	**10.2%**	**3,916**	**17,855**	**28,336.5**	**8.5 %**	**2,405**
Czech Republic	Saaz	3,451	4,688.8	3.4 %	159	3,576	3,468.6	2.8 %	97
	Tirschitz	535	843.8	3.2 %	27	549	777.4	2.5 %	19
	Auscha	474	669.4	3.4 %	23	497	596.7	2.9 %	17
	Total	**4,460**	**6,202.0**	**3.4 %**	**209**	**4,622**	**4,842.6**	**2.7 %**	**133**
Poland		1,410	2,072.3	7.6 %	157	1,444	2,242.0	7.3 %	164
Slovenia		1,296	2,318.8	7.6 %	177	1,406	1,677.6	5.2 %	87
England		929	1,456.8	6.3 %	91	895	1,356.5	6.2 %	84
Spain (2015 incl. Galicia)		535	935.8	12.0 %	112	543	1,029.4	11.4 %	118
France		431	636.1	3.8 %	24	440	554.6	3.1 %	17
Romania		250	172.0	9.3 %	16	270	195.0	10.3 %	20
Austria		247	491.6	8.2 %	40	249	298.2	6.8 %	20
Belgium		143	186.6	9.4 %	18	143	208.3	9.7 %	20
Slovakia		134	178.0	3.2 %	6	137	94.0	2.9 %	3
Bulgaria		14*	30.0*	8.7 %	3	14	26.0*	7.9 %	2
Portugal		12	18.6	10.5 %	2	12	22.8	9.7 %	2
Netherlands		4	3.6	11.2 %	0	4	3.2*	10.0 %	0
European Union		**27,173**	**53,202.0**	**9.0 %**	**4,771**	**28,034**	**40,886.8**	**7.5%**	**3,075**
Ukraine		380*	400.0*	6.5 %	26	380*	380.0*	6.5 %	25
Turkey		333	300.0	9.1 %	27	320	212.0	9.3 %	20
Russia		*242*	145.0*	5.0 %	7	242	194.0*	5.5 %	11
Belarus/White Russia		53	52.0	9.6 %	5	58	54.0	9.5 %	5
Switzerland		17	31.6	10.5 %	3	16	20.9	8.2 %	2
Rest of Europe		**1,025**	**928.6**	**7.3 %**	**68**	**1,016**	**860.9**	**7.3 %**	**63**
EUROPE		28,198	54,130.6	8.9 %	4,839	29,050	41,747.7	7.5 %	3,138
USA	Washington	*11,681*	25,338.0	11.4 %	2,888	13,012	26,967.3	11.0 %	2,958
	Oregon	*2,190*	3,728.8	8.9 %	332	2,678	4,838.9	8.7 %	423
	Idaho	*1,514*	3,135.9	10.3 %	321	1,968	3,957.4	10.4 %	412
	PNW-States	***15,385***	**32,202.7**	**11.0 %**	**3,541**	**17,658**	**35,763.6**	**10.6 %**	**3,792**
	Other States	*322*	*250.0*	*6.8 %*	*17*	820	625.0	7.5 %	47
	Total	***15,707***	***32,452.7***	***11.0 %***	***3,558***	**18,478**	**36,388.6**	**10.6 %**	**3,839**
Argentina		182	226.1	7.4 %	17	146	219.8	7.9 %	17
Canada		85*	100.0*	9.0 %	9	105*	120.0*	9.0 %	11
AMERICA		*15,974*	*32,778.8*	*10.9 %*	*3,584*	18,729	36,728.4	10.5%	3,867
China	Xinjiang	1,567	3,920.0	6.5 %	256	1,290	3,345.0	6.5 %	217
	Gansu	1,088	2,967.0	7.6 %	226	1,030	2,609.0	7.5 %	196
	Total	**2,655**	**6,887.0**	**7.0 %**	**482**	**2,320**	**5,954.0**	**6.9 %**	**413**
Japan		154	264.7	5.9 %	16	141	275.5	5.8 %	16
ASIA		2,809	7,151.7	7.0 %	498	2,461	6,229.5	6.9 %	429
South Africa		413	822.0	13.7 %	112	395	769.4	12.0 %	92
AFRICA		413	822.0	13.7 %	112	395	769.4	12.0 %	92
Australia		408	1,078.8	13.1 %	141	488	1,200.5	13.6 %	164
New Zealand		370	765.0	9.2 %	70	389	739.6	9.5 %	70
AUSTRALIA/OCEANIA		778	1,843.8	11.4 %	211	877	1,940.1	12.1 %	234
WORLD		***48,172***	***96,726.9***	**9.6 %**	***9,244***	**51,512**	**87,415.1**	**8.9 %**	**7,760**

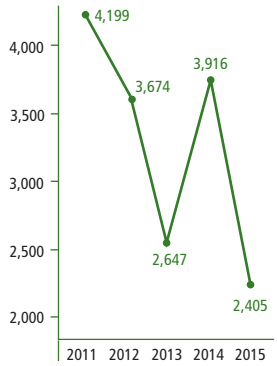
** estimate*

in intalics:
corrections for 2014 as stated in last year´s report.

Rounding differences of the acreage may cause differences in addition.

GERMANY

Alpha production in mt



There may be differences in the sum totals due to acreage figures being rounded up or down.

Varieties with an acreage less than 100 ha are included in 'Other aroma varieties' or 'Other high alpha varieties' in 2015.

Area	Variety	Development of acreage Acreage ha			Development of production Ø Yield mt/ha		Production t	
		2014	+/-	2015	2014	2015	2014	2015
Hallertau	Perle	2,857	11	2,868	2.14	1.37	6,102.96	3,917.76
	Hallertau Tradition	2,696	94	2,790	2.05	1.39	5,521.44	3,882.79
	Hersbruck Spaet	919	31	950	2.07	1.43	1,900.59	1,361.72
	Hallertau Mittelfrueh	623	-66	557	1.65	1.11	1,026.73	618.58
	Spalt Select	434	9	443	2.21	1.41	957.30	625.77
	Saphir	360	27	387	2.04	1.40	734.29	541.56
	Mandarina Bavaria	86	85	171	1.36	1.40	117.28	239.66
	Opal	61	66	127	0.94	0.76	57.26	96.25
	Other Aroma	152	110	262	1.46	1.29	222.59	336.72
	Total Aroma	**8,188**	**367**	**8,555**	**2.03**	**1.36**	**16,640.44**	**11,620.81**
	Northern Brewer	173	-23	150	2.02	1.20	349.68	180.23
	Brewers Gold	17	0	17	2.60	1.69	44.21	28.75
	Total Bitter	**190**	**-22**	**168**	**2.07**	**1.24**	**393.89**	**208.98**
	Herkules	3,345	491	3,836	3.08	2.10	10,290.71	8,062.26
	Hallertau Magnum	1,934	-263	1,671	2.08	1.73	4,029.24	2,891.98
	Hallertau Taurus	564	-124	440	2.22	1.56	1,253.65	685.38
	Nugget	145	-8	137	2.58	1.82	373.64	249.35
	Other High Alpha	75	-4	71	2.20	1.79	165.32	126.80
	Total High Alpha	**6,063**	**93**	**6,156**	**2.66**	**1.95**	**16,112.56**	**12,015.77**
	Other	**26**	**6**	**32**	**1.01**	**0.89**	**26.18**	**28.42**
	Total Hallertau	14,467	443	14,910	2.29	1.60	33,173.07	23,873.98
Elbe-Saale	Perle	199	24	223	1.70	1.53	338.30	340.77
	Other Aroma	59	70	129	1.49	0.75	87.65	96.61
	Total Aroma	**258**	**94**	**352**	**1.65**	**1.24**	**425.95**	**437.38**
	Northern Brewer	94	-6	88	2.13	1.57	199.78	138.50
	Total Bitter	**94**	**-6**	**88**	**2.13**	**1.57**	**199.78**	**138.50**
	Hallertau Magnum	704	-27	677	2.02	1.98	1,425.40	1,340.68
	Herkules	149	1	150	2.70	2.12	402.69	317.77
	Other High Alpha	58	0	58	1.94	2.04	112.75	118.18
	Total High Alpha	**911**	**-26**	**885**	**2.13**	**2.01**	**1,940.84**	**1,776.63**
	Other	**2**	**-1**	**1**	**0.67**	**2.75**	**1.34**	**2.75**
	Total Elbe-Saale	1,265	60	1,325	2.03	1.78	2,567.91	2,355.26
Tettnang	Tettnang	762	-18	744	1.40	1.17	1,063.83	869.99
	Hallertau Mittelfrueh	171	-16	155	1.69	1.42	289.63	220.47
	Other Aroma	173	20	193	2.18	1.55	377.41	299.88
	Total Aroma	**1,106**	**-13**	**1,093**	**1.56**	**1.27**	**1,730.87**	**1,390.34**
	Herkules	94	39	133	2.81	2.13	264.45	282.87
	Other High Alpha	9	-2	7	2.58	2.40	23.22	16.79
	High Alpha	**103**	**37**	**140**	**2.79**	**2.14**	**287.67**	**299.66**
	Other	**0**	**5**	**5**	**0.00**	**1.05**	**3.82**	**4.88**
	Total Tettnang	1,209	28	1,237	1.67	1.37	2,022.36	1,694.88
Spalt	Spalt	113	1	114	1.36	0.78	154.21	88.93
	Other Aroma	197	15	212	2.14	1.07	421.15	227.00
	Total Aroma	**309**	**17**	**326**	**1.86**	**0.97**	**575.36**	**315.93**
	High Alpha	**38**	**-1**	**37**	**2.97**	**1.63**	**112.95**	**60.36**
	Other	**1**	**-1**	**0**	**0.75**	**1.10**	**0.41**	**0.33**
	Total Spalt	348	15	363	1.98	1.04	688.72	376.62
Rhen.-P./ Bitburg	**Aroma**	**15**	**-1**	**14**	**2.34**	**1.82**	**36.08**	**25.68**
	High Alpha	**4**	**2**	**6**	**2.72**	**1.81**	**11.63**	**10.10**
	Total Rhen.-P./Bitburg	20	0	20	2.42	1.82	47.71	35.78
Total Aroma		**9.876**	**455**	**10,340**	**1.97**	**1.33**	**19,408.70**	**13,790.14**
Total Bitter		**284**	**-29**	**255**	**2.09**	**1.36**	**593.67**	**347.48**
Total High Alpha		**7.119**	**104**	**7,223**	**2.59**	**1.96**	**18,465.65**	**14,162.52**
Total Other		**28**	**9**	**37**	**1.12**	**0.98**	**31.75**	**36.38**
GERMANY TOTAL		17.308	547	17,855	2.22	1.59	38,499.77	28,336.52

Farm structure

Although the decline in the number of hop farms in Germany had slowed somewhat, there were still 21 farms fewer in crop year 2015 than in the previous year, in spite of the fact that acreage increased by 3 % year on year. The hop-growing area cultivated by the 1,172 producers averaged 15.2 ha per farm (2014: 14.5 ha). The average hop acreage cultivated by growers in the Hallertau region was 15.7 ha per farm (2014: 15.0 ha).

Acreage

Continuing the trend from 2014, a further increase in hop acreage was registered in crop year 2015. The cultivation area increased by 3.2 % (547 ha). Among the aroma varieties, the German flavour hop **Mandarina Bavaria** saw its acreage doubled by the addition of 108 ha. The area planted with **Hallertau Mittelfrueh**, on the other hand, shrank by 87 ha. Altogether, the acreage cultivated with aroma varieties expanded by 4.7 % (464 ha). There was also an overall increase in high alpha hop acreage of 1.5 % (104 ha). While **Herkules** acreage grew by a further 530 ha, the acreage planted with **Hallertau Magnum** and **Hallertau Taurus** hops declined by 289 ha and 129 ha respectively. The top three German hop varieties, with their market share, are **Herkules** (23 %), **Perle** (18 %) and **Hallertau Tradition** (16 %). Together, they account for 57 % of the total hop acreage. In October 2015 two new flavour hop selections were released for cultivation. They were registered for variety protection according to EU law under the following names: Selection 2010/08/33 = **Callista** and Selection 2010/72/20 = **Ariana**. Planting is permitted only under licence and only in Germany.

In the last five years hop acreage developed as follows:

Variety	2011 ha	2012 ha	2013 ha	2014 ha	2015 ha
Perle	3,396	3,203	3,048	3,154	3,187
Hallertau Tradition	2,757	2,748	2,661	2,825	2,914
Hersbruck Spaet	776	785	847	924	955
Hallertau Mittelfrueh	1,065	1,012	925	838	751
Tettnang	776	790	787	762	744
Spalt Select	719	538	496	523	534
Saphir	225	253	324	381	423
Mandarina Bavaria	-	-	35	99	207
Opal	33	33	28	63	130
Spalter	91	106	112	112	114
Hallertau Blanc	-	-	12	48	109
Huell Melon	-	-	14	56	101
Other Aroma	57	62	63	90	170 [1)]
Total Aroma	**9,895**	**9,530**	**9,352**	**9,876**	**10,340**
Northern Brewer	345	296	281	267	238
Brewers Gold	25	22	19	17	17
Total Bitter	**370**	**318**	**299**	**284**	**255**
Herkules	2,614	2,642	3,086	3,622	4,152
Hallertau Magnum	4,039	3,509	3,102	2,642	2,353
Hallertau Taurus	953	821	709	594	465
Nugget	244	207	184	173	162
Other High Alpha	75	51	85	88	91 [2)]
Total High Alpha	**7,924**	**7,231**	**7,166**	**7,119**	**7,223**
Other	**39**	**49**	**31**	**28**	**37** [3)]
GERMANY TOTAL	18,228	17,128	16,849	17,308	17,855

Share per variety group in 2015:
Aroma varieties 58 %
Bitter varieties 1 %
High alpha varieties 41 %

1) Other aroma varieties include: Cascade, Hersbruck Pure, Monroe, Saaz and Smaragd
2) Other high alpha varieties include: Comet, Hallertau Merkur, Polaris 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.

Crop volume

The 2014/2015 winter season began with mild temperatures. Conditions in January were very mixed, ranging from spring-like warm periods to short wintry spells. In mid-January it was decidedly too mild, with above-average precipitation. In spite of cooler temperatures in February, on the whole the winter was too mild. Precipitation levels, on the other hand, were relatively well balanced. The low precipitation levels from March to late April allowed the soil to dry out, making it very suitable for vehicles. All the spring work in the hop gardens could be completed in ideal conditions within the usual time frame. The growers began training the hop shoots in late April and on most of the farms they were able to complete the work within the normal time frame, i.e. by the second week of May. Sufficient rainfall in late April / early May ensured normal plant growth and, as a result, plant development by the end of May was within the long-term average.

In the period from late May to early July a total of three hail events caused damage to the hop plants in various areas of the Hallertau hop-growing region. Altogether, an area of approx. 2,300 to 2,500 ha suffered varying degrees of damage. However, those plants which were unaffected were able to develop very well thanks to the favourable growing conditions. By the end of June most of the plants had reached trellis height and the early varieties had started flowering. What had by far the most adverse effect upon the growth of the hop plants in crop year 2015 was the weather pattern in the months of July and August. Unusually high temperatures, with 33 days with maximum temperatures of > 30°C, in these two months caused damage during the plants' flowering and cone development phases. At the same time, there was only 35 % of the multi-year median rainfall during this period. These lasting dry and hot weather conditions delayed the hop plants' development and drought damage became increasingly visible. The plants responded to the conditions with sparse flowering and insufficient cone development. The extreme dry conditions continued until picking began in early September, resulting in low yields, particularly among the aroma varieties. Especially in sites where the soil's water retention capacity was low, yield shortfalls amounted to 50 % and more. In contrast, the visual quality of the hops was very good in most cases. Apart from a few isolated cases of hop gardens showing signs of mite infestation, there were no major problems with pests or diseases.

The harvested volume of 28,300 mt was very close to the figure estimated when picking began. Crop year 2015 saw a year-on-year decline in harvested volume of 10,163 mt, or 26.4 %.

Market situation

Spot market crop 2015

The 2015 market for non-contracted hops opened in the last days of September. As a result of the high forward contract ratio and the low yields caused by the weather conditions, trading volume was extremely negligible. In addition to fixed-price purchase offers, growers again received offers of down-payments for non-contracted hops given to pools or marketers' initiatives.

In the Tettnang growing region the producers had already received the first bids on 1 September. They were offered 10.00 EUR/kg for **Hallertau Mittelfrueh** hops and 11.00 EUR/kg for the **Tettnang** variety. Soon afterwards the growers received alternative offers for their non-contracted hops from pools or purchasing initiatives offering down-payments. While the fixed price for **Hallertau Mittelfrueh** remained unchanged, the price offered for the **Tettnang** variety steadily increased. The highest bid was 18.00 EUR/kg. In both the Hallertau and Tettnang growing regions virtually all the non-contracted hops had been sold by mid-November.

According to the crop report submitted to the European Union by the Bavarian State Institute of Agriculture, the German hop growers sold their non-contracted hops at an average price of 6.50 EUR/kg, with aroma varieties fetching 9.09 EUR/kg and bitter/high alpha varieties 5.48 EUR/kg. According to the same report,

Forward contract offers for the main varieties in the Hallertau region

Variety names:
HA – Hallertau Mittelfrueh
HE – Hersbruck
PE – Perle
SE – Spalt Select
SR – Saphir
HM – Hallertau Magnum
TU – Hallertau Taurus
HS – Herkules

Price basis
1: EUR/kg
2: EUR/kg α

Variety	Time	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Price basis
HA	Sept. 2015	8.50	8.60	8.70	8.80	8.90	9.00	9.00	9.00	9.00	9.00	1
	Oct. 2015	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	1
	Jan. 2016	10.00	10.00	10.00	10.00	10.50	10.50	10.50	10.50	10.50	10.50	1
	Apr. 2016	10.70	10.70	10.70	10.70	10.70	11.00	11.00	11.00	11.00	11.00	1
HE	Sept. 2015	6.00	6.00	6.00	6.00	--	--	--	--	--	--	1
	Oct. 2015	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	1
PE	Sept. 2015	6.50	6.00	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	1
	Oct. 2015	7.00	6.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	1
SE	Sept. 2015	6.00	5.50	--	--	--	--	--	--	--	--	1
	Oct. 2015	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	1
	Jan. 2016	7.00	7.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	1
SR	Sept. 2015	6.00	6.00	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	1
	Oct. 2015	7.00	6.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	1
	Jan. 2016	7.00	7.00	6.50	6.50	6.00	6.00	6.00	6.00	6.00	6.00	1
HM /TU	Sept. 2015	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	1
	Oct. 2015	5.50	5.50	5.50	5.50	5.50	5.60	5.70	5.80	5.90	6.00	1
HM	Apr. 2016	5.70	5.70	5.70	5.70	5.70	5.80	5.90	6.00	6.00	6.00	1
TU	Apr. 2016	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	1
HS	Sept. 2015	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	2
	Oct. 2015	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	2
	Apr. 2016	38.00	35.00	34.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	2

the average price paid for hops from the 2015 crop sold through forward contracts was 4.34 EUR/kg (aroma varieties 4.92 EUR/kg, bitter/high alpha varieties 3.74 EUR/kg).

Contract market

As a result of the low 2015 crop yield, at the same time as the spot market opened, hop growers were offered forward contracts with significantly higher prices being quoted than recently.

It was not until prices rose again in October that any great willingness to sell was shown by those growers who had not yet sold their hops. Many parties made use of the option of extending the contracted quantities into crop year 2025, particularly for hops of the high alpha variety **Herkules**. For the most part, the contract market was quiet from December onwards until prices for individual varieties rose again in late January and in April. However, the already high contract ratio limited the growers' sales potential to a great extent.

The contracts offered in early September for Tettnang hops from crop year 2016 to 2020 contained prices of 8.00 EUR/kg and 9.50 EUR/kg for the **Hallertau Mittelfrueh** and **Tettnang** varieties respectively. This was followed by several price increases and extensions of contract periods. By the end of April 2016 prices of between 10.70 and 11.00 EUR/kg were being offered for **Hallertau Mittelfrueh** hops from crop years 2016 to 2025. Prices offered for the **Tettnang** variety were 12.00 EUR/kg for crop years 2016 and 2017 and between 11.00 and 11.50 EUR/kg for crop years 2018 to 2025.

Alpha content:

The alpha acid contents in nearly all varieties in crop year 2015 were the lowest recorded during the ten-year period shown in the graph. The aroma varieties in particular were far below the multi-year median values.
The lower production volume and the lower alpha acid values led to an overall decline in alpha yield amounting to 1,511 mt. The volume of alpha harvested was 2,405 mt, which represents a year-on-year fall of 39 %.
A closer look at the crop result for the aroma hops reveals the full extent of the situation. The alpha yield was nearly 50 % below that of the previous year.

The alpha acid table shows the average alpha acid values measured in freshly harvested hops by members of the working team Hop Analysis "Arbeitsgruppe Hopfenanalyse (AHA)" on the fixed date of 15 October. The members of AHA are the in-house laboratories of the German hop-processing plants, the Bavarian State Institute of Agriculture's hop department (Hüll), BLQ Weihenstephan, VLB Berlin and Labor Veritas (Zurich).
These values constitute the basis for any adjustments of supply contracts containing "alpha clauses" between the brewing industry and the hop industry. The alpha clause was devised jointly by the German brewers' association and the hop industry association and was applied for the first time as a result of the 2003 harvest. It is a contractual provision used solely in forward contracts for aroma varieties. The average values serve as the basis for parties concluding new supply contracts containing an alpha clause.

The main German hop varieties had the following alpha acid contents:
Alpha acid values as is, as per EBC 7.4, in **freshly harvested hops**. 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).

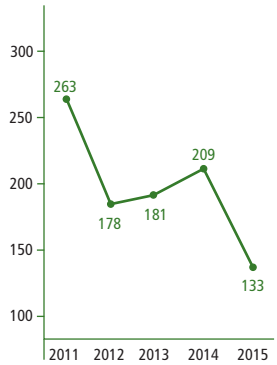
Area	Variety	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Ø 5 Years	Ø 10 Years
Hallertau	Hallertau Mfr.	2.4	3.9	4.4	4.2	3.8	5.0	4.6	3.3	4.0	2.7	3.9	3.8
	Perle	6.2	7.9	8.5	9.2	7.5	9.6	8.1	5.4	8.0	4.5	7.2	7.5
	Hallertau Tradition	4.8	6.0	7.5	6.8	6.5	7.1	6.7	5.0	5.8	4.7	6.0	6.1
	Northern Brewer	6.4	9.1	10.5	10.4	9.7	10.9	9.9	6.6	9.7	5.4	8.7	8.9
	Hersbruck Spaet	2.2	2.6	2.9	3.4	3.5	4.5	3.0	1.9	2.1	2.3	2.8	2.8
	Saphir	3.2	4.6	5.1	4.5	4.5	5.3	4.4	2.6	3.9	2.5	3.7	4.1
	Spalt Select	4.3	4.7	5.4	5.7	5.7	6.4	5.1	3.3	4.7	3.2	4.5	4.9
	Hallertau Magnum	12.8	12.6	15.7	14.6	13.3	14.9	14.3	12.6	13.0	12.6	13.5	13.6
	Nugget	10.2	10.7	12.0	12.8	11.5	13.0	12.2	9.3	9.9	9.2	10.7	11.1
	Hallertau Taurus	15.1	16.1	17.9	17.1	16.3	17.4	17.0	15.9	17.4	12.9	16.1	16.3
	Herkules	--	16.1	17.3	17.3	16.1	17.2	17.1	16.5	17.5	15.1	16.7	--
Tettnang	Tettnang	2.2	4.0	4.2	4.2	4.0	5.1	4.3	2.6	4.1	2.1	3.6	3.7
	Hallertau Mfr.	2.6	4.3	4.7	4.5	4.2	5.1	4.7	3.3	4.6	2.9	4.1	4.1
Spalt	Spalt	2.8	4.6	4.1	4.4	3.7	4.8	4.1	2.8	3.4	2.2	3.5	3.7
Elbe-Saale	Hallertau Magnum	12.4	13.3	12.2	13.7	13.1	13.7	14.1	12.6	11.6	10.4	12.5	12.7

There were wide variations in the alpha acid values of most of the varieties in crop 2015, particularly on the part of the aroma varieties.

Values in %

CZECH REPUBLIC

Alpha production in mt



Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
	2014	+/-	2015	2014	2015	2014	2015
Saaz	3,894	145	4,039	1.32	0.97	5,157.4	3,903.4
Sládek	270	-3	267	2.01	1.82	542.3	485.2
Premiant	187	-7	180	1.89	1.49	353.9	267.5
Other Aroma	57	27	84	1.05	1.24	59.7	104.6
Total Aroma	**4,408**	**162**	**4,570**	**1.39**	**1.04**	**6,113.3**	**4,760.7**
Agnus	40	-2	38	1.96	1.84	78.4	70.0
Other High Alpha	2	1	3	1.30	1.69	2.6	5.1
Total High Alpha	**42**	**-1**	**41**	**1.93**	**1.83**	**81.0**	**75.1**
Other	**10**	**1**	**11**	**0.77**	**0.62**	**7.7**	**6.9**
CZECH REPUBLIC TOTAL	4,460	162	4,622	1.39	1.05	6,202.0	4,842.6

Farm structure

In crop year 2015, hops were grown in the Czech Republic by 113 producers, two fewer than in the previous year. As there was also an increase in total acreage, the average hop acreage per farm rose from 39 ha to 41 ha.

Acreage/crop volume/alpha content

As was the case in crop year 2014, hop acreage increased in all three Czech growing regions, with total acreage growing by four percent. 90 % of the increase in acreage was accounted for by the **Saaz** variety.

By mid-July 2015 the prospects of a normal vegetation period for the hops were excellent and the crop forecast on the basis of expectations at that stage was average to slightly above average. The ensuing persistently dry conditions – especially the protracted heat wave, with maximum temperatures of between 35°C and slightly over 40°C – caused problems for the traditional local variety **Saaz** in particular. Due to the dry, hot weather conditions, fungal disease infestation was very minor. Also, animal pests were kept under control by means of plant protection measures, with the result that the visual quality of the hops was very good. The crop yield of 1.05 mt/ha, however, was significantly below the long-term average.

Alpha content was below average for the third year in succession (values from crop year 2014 in brackets): **Saaz** 2.1 % (2.8 %), **Sládek** 4.2 % (5.2 %) and **Premiant** 6.8 % (7.0 %). As a result of the modest production volume and the low alpha content, the alpha yield was 36 % lower than in crop year 2014.

Market situation

When picking began, 95 % of the crop volume anticipated for 2015 had already been contracted. The prices ranged between 160 and 220 CZK/kg (5.90 to 8.10 EUR/kg) for hops of the **Saaz** variety and between 90 and 120 CZK/kg (3.30 to 4.45 EUR/kg) for **Premiant** and **Sládek** hops. The hop growers were unable to honour a large proportion of their contracts in full. In extreme cases, the supply level for hops of the **Saaz** variety was below 50 %. As a result of the contract ratio being excessively high in general, there were also underdeliveries of other contracted varieties. The spot market was virtually non-existent. The small quantities of non-contracted hops available were sold at prices of 350 CZK/kg (12.90 EUR/kg) for **Saaz** hops and from 150 to 170 CZK/kg (5.50 to 6.30 EUR/kg) for the **Premiant** and **Sládek** varieties. There are no unsold stocks. After the harvest, due to the poor crop and the consequently low revenues for the growers, the Czech growers' cooperative announced that particularly low contract prices for **Saaz**, **Sládek** and **Premiant** hops would be increased and that for contracts with alpha scales the alpha levels would be adjusted to the actual crop year alpha of the respective variety. Other hop marketers also adjusted the alpha levels in favour of the hop growers.

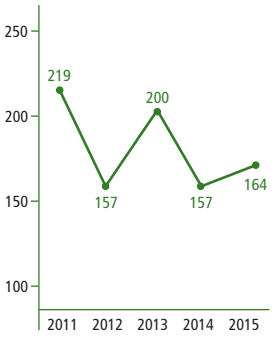
The forward contract market started in late November 2015. The prices offered for hops of the **Saaz** variety were 270 CZK/kg (10.00 EUR) for crop years 2016 to 2020, 295 CZK/kg (10.90 EUR) for 2021 and 300 CZK/kg (11.10 EUR) for crop years 2022 to 2024. As the sales potential for crop years 2016 to 2019/2020 was virtually exhausted, about 25 CZK/kg (0.92 EUR) more was paid for contracts connected with new plantings. The actual contracting activity was confined principally to the extension of contracts to crop year 2021 and even to 2024.

The hop growers intend to invest more in harvesting technology again. As a result of the low revenue from the 2015 crop, however, some of these investments have been postponed into next year.

Acreage is expected to increase by approx. 160 ha in crop year 2016, with most of the plantings being **Saaz** hops for which demand is particularly high. However, this expansion remains insufficient to meet demand. About 95 % of the production volume expected in crop year 2016 had already been sold in the spring. The contract ratio remains high.

Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
	2014	+/-	2015	2014	2015	2014	2015
Lubelski	369	24	393	1.35	1.38	498.7	540.1
Hallertau Tradition	80	0	80	1.52	1.28	121.5	101.6
Sybilla	71	9	80	0.98	1.30	69.8	103.6
Perle	62	-1	61	1.46	1.25	90.8	76.2
Other Aroma	4	2	6	0.83	0.70	3.3	4.3
Total Aroma	**586**	**33**	**619**	**1.34**	**1.33**	**784.2**	**825.8**
Magnum	506	-4	502	1.66	1.91	841.1	957.0
Marynka	302	-9	293	1.45	1.50	438.3	438.4
Magnat	1	13	14	1.90	0.51	1.9	7.0
Other Bitter/High Alpha	15	1	16	0.45	0.86	6.8	13.9
Total Bitter/High Alpha	**824**	**1**	**825**	**1.56**	**1.72**	**1.288.1**	**1,416.2**
POLAND TOTAL	1,410	34	1,444	1.47	1.55	2,072.3	2,242.0

Alpha production in mt



The addition of rounded acreage figures leads to differences in totals in some cases.

Farm structure

Following the resumption of hop production by three farms in crop year 2014, a further four did the same in crop year 2015. As hop acreage increased at the same time, the average area farmed by the 638 hop growers remained constant at 2 ha per farm.

Acreage/crop volume/alpha content

Many of the hop gardens damaged by flood water in 2014 were cleared and replanted in the spring of 2015. As new planting was also carried out at the same time, total acreage increased by 2 %. The main beneficiaries of this increase were the aroma varieties **Lubelski** and **Sybilla**, while bitter/high alpha hop acreage remained virtually unchanged. However, some of the replanting showed a shift to the new high alpha variety **Magnat**. The weather pattern in the winter months of 2014/15 was comparable to that seen in the Hallertau region. Conditions were warm and dry in April, but turned slightly cooler in May. Spring work was completed within the usual time frame. There was no major rainfall until late May/early June. In spite of the hot and dry conditions, by the end of July the majority of the hop plants had developed relatively normally, with the exception of the **Marynka** variety which had an underdeveloped appearance. The quality of the harvested hops could be described as average. However, due to the lack of rainfall and the high temperatures the cones were relatively small and in some cases were not completely closed. The Polish aroma varieties **Lubelski** and **Sybilla** had comparatively better harvested yields than the **Perle** and **Hallertau Tradition** varieties imported from Germany. Altogether, the harvested yield in Poland of 1.55 mt/ha was within the long-term average. In terms of alpha acid content, results varied: **Lubelski** was slightly below the long-term average with 3.3 %, but had improved year on year (2014: 2.2 %); **Magnum** likewise was below average with 10.2 %, but was also down year on year (2014: 11.3 %); **Marynka** was not only above average with 8.1 %, but was also up on 2014 (7.5 %). Thanks to the improvement in production volume compared with the previous year, the alpha yield was 4 % higher.

Market situation

At the time of picking, approx. 80 % of the 2015 harvest volume was already accounted for by forward contracts, including the delivery obligations entered into by the producers. Spot hop prices ranged between 15 and 20 PLN/kg (3.50 to 4.70 EUR) for **Lubelski** hops and between 12 and 15 PLN/kg (2.80 to 3.50 EUR) for the other varieties. Despite the comparatively good production volume, there were still underdeliveries of contracted quantities on the part of the growers. Although the domestic brewing industry continues to be the most important buyer of Polish hops, interest returned from other European countries. This had an effect on price bidding. 30 PLN/kg (7.00 EUR) was paid for **Lubelski** hops and 20 PLN/kg (4.70 EUR) for all the other varieties. The crop is sold out.

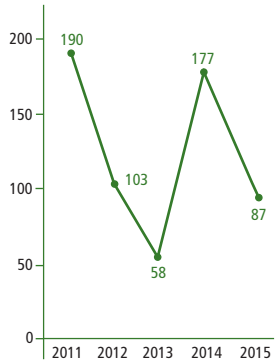
By September 2015 the hop producers had already received offers of new forward contracts for **Lubelski** hops at prices between 28 and 31 PLN/kg (6.55 to 7.25 EUR), depending on the crop year. Price offers for all the other varieties followed in January 2016. The prices quoted ranged from 17.50 to 20 PLN/kg (4.10 to 4.70 EUR) according to variety and crop year. Although the producers had never previously had the chance to contract their hops at such high prices and on such a long-term basis, their willingness to conclude contracts was very limited. With nearly all the marketers actively seeking purchases, there appears to be no cause for haste on the part of the farmers.

Acreage will probably increase by roughly 60 to 70 ha in 2016. Most of the new plantings will be **Magnat** hops, although this will depend greatly on the number of rhizomes available from the Polish breeding institute IUNG.

The contract ratio for all varieties for crop year 2016 is estimated at approx. 85 %. The hop market would be prepared to buy additional quantities. This would require farms to increase acreage, which would in turn necessitate major investments in equipment. There is enough area available, but very few farms are willing to take this step.

SLOVENIA

Alpha production in mt



Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
	2014	+/-	2015	2014	2015	2014	2015
Aurora	578	-50	528	2.03	1.18	1,175.6	622.7
Celeia	403	92	495	1.70	1.46	683.5	720.3
Savinjski Golding	147	5	152	1.34	0.75	196.7	113.6
Bobek	104	34	138	1.75	1.03	182.0	142.7
Other Aroma	42	23	65	0.80	0.70	33.2	45.5
Total Aroma	**1,274**	**104**	**1,378**	**1.78**	**1.19**	**2,271.0**	**1,644.8**
Hallertau Magnum	10	5	15	2.62	1.14	26.2	17.1
Other High Alpha	12	1	13	1.76	1.21	21.6	15.7
Total High Alpha	**22**	**6**	**28**	**2.14**	**1.17**	**47.8**	**32.8**
SLOVENIA TOTAL	1,296	110	1,406	1.79	1.19	2,318.8	1,677.6

There may be differences in the sum totals due to acreage figures being rounded up or down.

Farm structure

The number of active hop farms in Slovenia increased by one in 2015, bringing the total up to 111. At the same time there was an increase in acreage. The area planted with hops grew by an average of 1 ha per farm from 12 ha in crop year 2014 to 13 ha per farm in 2015.

Acreage/crop volume/alpha content

Total acreage increased by 8 %. Although 50 ha of **Aurora** hops were cleared, the acreage of all the other varieties was expanded. The greatest change was seen with **Celeia** hops whose acreage increased by 23 %.

The temperatures in autumn 2014 and winter 2014/2015 were more than 3 °C higher than the long-term average. The volume of precipitation, mainly in the form of rain, was twice as high as normal. All in all, it remained too warm. The hop plants initially developed normally. By June, however, there were already noticeable differences in development among the individual varieties. Heavy rainfall in early July brought cooler temperatures and provided the plants with an urgently needed supply of water. Nevertheless, the hops of the **Savinjski Golding** variety failed to reach trellis height and were extremely below-average in terms of development. The state of development of **Aurora** hops was also significantly below average. This was noticeable in their very thin bines and very small cones. The extreme weather conditions were responsible for wide variations in ripening among the hop plants and for the ultimately low yields. Severe red mite infestation in many hop gardens led to production volume being further decimated. In spite of determined efforts and the use of expensive plant protection agents, in many cases it proved impossible to control the infestation. The visual quality of those hops not infested by red mite on the other hand could be described as extremely good.

Rainfall in the third week of August ensured good conditions for alpha acid development. 2015 crop results in year-on-year comparison (2014 values in brackets): **Aurora** 8.1 % (10.0 %), **Celeia** 3.0 % (4.6 %), **Savinjski Golding** 2.2 % (4.4 %) and **Bobek** 4.7 % (6.2 %). In contrast to the above-average production volume with very high alpha content in crop year 2014, the alpha yield in 2015 was only around 51 %.

Market situation

Before picking began, it was already clear not only that there would be no non-contracted quantities of **Savinjski Golding** hops available, but also that growers would not be able to honour existing forward contracts for that variety in full. Yields were also correspondingly low for other varieties. Many producers had to use the hops originally intended for the spot market to fulfil their delivery obligations from the forward contracts which had been concluded at the following average prices: **Savinjski Golding** 6.50 EUR/kg, **Aurora** 4.50 EUR/kg, **Celeia** 4.80 EUR/kg, **Bobek** 4.50 EUR/kg. Only few growers who had speculated on the spot market for individual varieties were able to offer sizeable quantities of non-contracted hops. The demand for these hops was immense. Most of the non-contracted hops sold quickly at the following average prices: **Savinjski Golding** 14.00 EUR/kg, **Aurora** 10.00 EUR/kg, **Celeia** 16.00 to 18.00 EUR/kg, **Bobek** 14.00 EUR/kg. Hop growers who failed to take advantage of this short-lived and buoyant spot market were unable to sell their produce afterwards. In spring 2016 growers still held unsold stocks of approx. 20 to 30 mt of various varieties of hops.

The forward contract market got off to a very slow start in October 2015 because the growers were speculating on better prices. In spite of a price rise in March 2016, the situation has not changed. The most recent prices offered per kilogram of hops from crop years 2016 to 2022 were as follows: **Aurora** 6.00 EUR, **Celeia** 7.50 EUR, **Bobek** 6.50 EUR, **Savinjski Golding** from 9.60 to 10.00 EUR according to crop year.

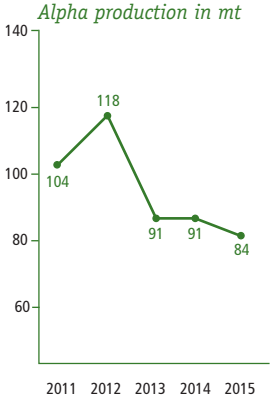
Two new flavour varieties registered under the names of **Styrian Wolf** and **Styrian Cardinal** have been released by the Slovenian hop breeding institute IHPS. In 2015 these varieties accounted for some 15 ha of new plantings. The first plants of another three new varieties were delivered for field tests in the autumn of 2015. Planting of the new varieties may add 20 to 25 ha

to hop acreage in crop year 2016. In total, hop acreage could increase by about 80 ha, most of which will probably be planted with **Celeia** hops, as was the case in crop year 2015. Assuming an average yield, approximately 75 % of the coming crop had already been sold in the spring of 2016. The contract ratio was highest for **Savinjski Golding** hops, with 90 %.

ENGLAND

Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
	2014	+/-	2015	2014	2015	2014	2015
Golding	136	-14	122	1.56	1.52	212.1	185.1
First Gold	107	-5	102	1.36	1.21	145.9	123.8
EK Golding	94	4	98	1.74	1.54	163.9	151.4
Fuggle	84	0	84	1.55	1.48	129.8	123.9
Progress	59	1	60	1.69	1.81	99.8	108.4
Sovereign	57	-1	56	1.36	1.10	77.3	61.6
Challenger	57	-4	53	1.84	1.85	105.0	97.9
Other Aroma	112	8	120	1.53	1.53	171.3	183.6
Total Aroma	**705**	**-10**	**695**	**1.57**	**1.49**	**1,105.1**	**1,035.7**
Target	86	-5	81	1.75	1.79	150.7	144.6
Pilgrim	86	-18	68	1.61	1.62	138.5	110.0
Other High Alpha	52	-1	51	1.20	1.30	62.5	66.2
Total High Alpha	**224**	**-24**	**200**	**1.57**	**1.60**	**351.7**	**320.8**
ENGLAND TOTAL	929	-34	895	1.57	1.52	1,456.8	1,356.5

Alpha production in mt



There may be differences in the sum totals due to acreage figures being rounded up or down.

Farm structure

The number of hop farmers in England rose by one to 53 in crop year 2015. At the same time there was a reduction in acreage. The area planted with hops decreased from an average of 18 ha per farm in crop year 2014 to 17 ha per farm in 2015.

Acreage/crop volume/alpha content

In the four-year period following the last increase in hop-growing acreage in 2011, acreage declined by 219 ha, or 20 %. The reduction in acreage mainly affected the **Pilgrim** and **Golding** varieties between crop years 2014 and 2015.

Unlike their counterparts in other European hop-growing countries, England's farmers could be satisfied with the weather conditions and the development of their hops. However, red mite infestation and elimination did cause them problems. The average yield of the English hop crop in 2015 was down year on year, but remained significantly higher than the long-term average. In fact, yields of high alpha varieties were even slightly higher than in crop year 2014.

Alpha content varied. While the figures for most of the aroma varieties showed a year-on-year increase and were within the 5-year average, the alpha content of **Target** hops was the same as in 2014 at 9.8 %, which was below the long-term average. Individual results for the main aroma varieties (2014 in brackets): **Golding** 5.0 % (4.4 %), **EK Golding** 5.6 % (4.7 %), **First Gold** 7.3 % (6.8 %), **Fuggle** 4.8 % (4.5 %). The year-on-year decrease of 8 % in alpha yield is due to the lower production volume.

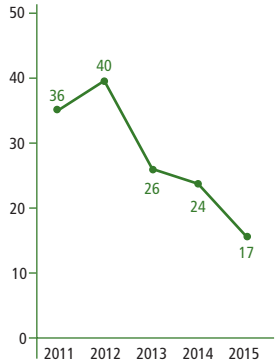
Market situation

At the time of picking, the contract ratio of approx. 95 % for hops harvested in crop year 2015 was very high. Depending on the variety, hops were contracted at prices between 6.50 EUR/kg for **Target** and up to 10.00 EUR/kg **(Golding, EK Golding, Fuggle)**. The few non-contracted hops remaining were placed in the hands of the growers' organisation. With the crop effectively sold out, there was no spot market activity. Although hop marketers have shown interest in new contracts, the growers' cooperatives are only able to offer hops from crop year 2019 onwards. The prices demanded are very high and it remains to be seen whether the customers will accept them. Originally, it had been expected that **Target** acreage would be replanted with more marketable varieties. Now that none of the hops harvested in 2015 have remained unsold, the replanting process is set to stall.

The mood of the hop farmers in England has been buoyed by the development of the craft beer segment and its effects on hop demand and prices. Many farms have successors in place who intend to continue with hop growing. However, after many years of cutbacks, high investments are now required in harvesting equipment in particular. Acreage will probably increase by approximately 10 ha. The contract ratio for crop year 2016 is 95 %.

FRANCE

Alpha production in mt



The addition of rounded acreage figures leads to differences in totals in some cases.

Area	Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
		2014	+/-	2015	2014	2015	2014	2015
Alsace	Strisselspalt	180	2	182	1.16	1.20	208.0	219.2
	Aramis	47	-1	46	2.03	1.56	95.6	71.7
	Fuggle	31	7	38	1.41	0.89	43.8	33.7
	Savinjski Golding	32	5	37	1.36	1.03	43.6	38.0
	Hallertau Tradition	35	-3	32	1.95	1.40	68.2	44.7
	Triskel	22	-1	21	1.42	0.92	31.2	19.4
	Other Aroma	19	4	23	1.34	0.96	25.5	22.0
	Total Aroma	**366**	**13**	**379**	**1.41**	**1.18**	**515.9**	**448.6**
	Bitter/High Alpha	**39**	**-5**	**34**	**2.32**	**2.05**	**90.6**	**69.8**
	Total Alsace	405	8	413	1.50	1.26	606.5	518.4
North	**Aroma**	**12**	**-1**	**11**	**1.16**	**1.34**	**13.9**	**14.7**
	Bitter/High Alpha	**15**	**1**	**16**	**1.05**	**1.34**	**15.8**	**21.5**
	Total Nord	26	1	27	1.14	1.34	29.7	36.3
FRANCE TOTAL		431	9	440	1.48	1.26	636.1	554.6

Farm structure

In crop year 2015, the number of hop farmers fell from 54 to 53. The average area planted with hops remained unchanged at 8 ha per farm.

Acreage/crop volume/alpha content

The change of the varietal mix in response to market demand continues. In the Alsace growing region, 28 ha were planted with young hops. The varieties planted were mainly **Fuggle**, **Strisselspalt**, **Savinjski Golding** and the new French flavour variety **Mistral**. In total, hop-growing acreage increased by 2 %. **Strisselspalt** is by far the most widely grown variety in France. In crop year 2015 it accounted for 42 % of the total acreage.

As in other Central European countries, the hop crop was affected by insufficient rainfall and excessively high temperatures, which was reflected in the production volume. Both the yield per hectare and the alpha acid content were below the long-term average. The alpha content of the **Strisselspalt** hops was only 1.2 % and was thus below the ten-year average of 2.1 % for the third year in succession.

Low yield and below-average alpha acid content combined to bring the alpha yield down by 28 % year on year.

Market situation

At the time of picking, approx. 75 % of the 2015 production volume had already been contracted at an average price of 4.00 EUR/kg. Growers were paid an average price of 8.00 EUR/kg for non-contracted hops. The crop is sold out.

The hop producers' aim is to continuously replant acreage with aroma varieties. An increasing area is to be devoted to the new flavour varieties **Barbe Rouge** and **Mistral** in particular. The hop-growing area in Alsace is to be increased by roughly 13 ha in crop year 2016. In addition, 14 ha of **Columbus** and **Nugget** hops are to be cleared and replaced with aroma varieties. No significant changes are known to be planned in Northern France. In spring 2016, the forward contract ratio for the coming crop was 75 %.

USA

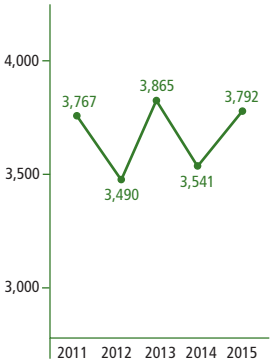
The summary below pertains to the traditional growing regions of Washington, Oregon, and Idaho or Pacific Northwest (PNW) states. New developments outside the PNW states are reported in a separate section (page 27).

Farm structure

The US grower base in the Pacific Northwest continues to be shaped by the steadfast growth of the craft beer segment. However, growers are faced with many challenges in keeping up with the increased demand and many are reaching the capacity limits of their farms. Capacity pressures come from the overall need for additional hop supply, but also from the changing mix of varieties and the dramatic shift away from high alpha hops in favor of aroma varieties desired by craft brewers. Aroma varieties generally need to be harvested in the early to middle portion of harvest which effectively is narrowing the harvest window for the US crop as over 70 % of the acreage is now cultivated with aroma hops. As a result, the increasing acreage base must be harvested in a shorter period of time.

Area	Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
		2014	+/-	2015	2014	2015	2014	2015
Washington	Cascade	1,958	39	1,997	2.04	2.17	4,001.9	4,333.7
	Centennial	1,148	378	1,526	1.51	1.28	1,732.8	1,958.0
	Simcoe®	736	444	1,180	1.73	1.73	1,272.3	2,036.9
	Citra®	676	269	945	1.76	1.73	1,189.3	1,632.1
	Mosaic®	272	346	618	2.49	2.28	677.2	1,411.1
	Chinook	525	1	526	2.03	2.01	1,067.8	1,057.3
	Amarillo®	340	93	433	2.09	1.64	709.1	708.6
	Willamette	241	41	282	1.27	1.13	305.0	318.8
	Cluster	295	-25	270	2.04	1.91	602.6	515.1
	Palisade®	90	94	184	2.77	2.18	249.7	401.6
	Other Aroma	996	445	1,441	1.68	1.77	1,674.2	2,547.9
	Total Aroma	**7,277**	**2,125**	**9,402**	**1.85**	**1.80**	**13,481.9**	**16,921.1**
	CTZ	2,069	-182	1,887	3.05	3.04	6,308.3	5,737.0
	Summit™	1,021	-365	656	2.36	2.21	2,408.0	1,446.9
	Apollo™	284	2	286	2.96	3.07	841.1	879.3
	Bravo™	236	-8	228	3.11	3.20	733.2	728.9
	Super Galena™	245	-103	142	2.87	3.06	704.2	434.5
	Galena	124	-5	119	2.02	2.21	250.0	263.3
	Other High Alpha	425	-133	292	1.44	1.91	611.3	556.3
	Total High Alpha	**4,404**	**-794**	**3,610**	**2.69**	**2.78**	**11,856.1**	**10,046.2**
	Total Washington	11,681	1,331	13,012	2.17	2.07	25,338.0	26,967.3
Oregon	Cascade	389	50	439	1.57	2.24	611.1	981.3
	Willamette	228	40	268	1.63	1.37	371.7	367.6
	Centennial	179	76	255	1.23	1.52	220.0	387.0
	Crystal	106	47	153	2.11	2.25	223.2	343.9
	Mount Hood	109	8	117	1.62	1.42	176.9	166.7
	Citra®	15	85	100	1.14	1.09	17.1	109.4
	Other Aroma	490	140	630	1.37	1.56	669.0	983.2
	Total Aroma	**1,516**	**446**	**1,962**	**1.51**	**1.70**	**2,289.0**	**3,339.1**
	Nugget	552	49	601	2.22	2.11	1,222.9	1,270.9
	Other High Alpha	122	-7	115	1.78	1.99	216.9	228.9
	Total High Alpha	**674**	**42**	**716**	**2.14**	**2.09**	**1,439.8**	**1,499.8**
	Total Oregon	2,190	488	2,678	1.70	1.81	3,728.8	4,838.9
Idaho	Cascade	332	-20	312	1.96	1.83	650.2	570.3
	Citra®	37	130	167	1.34	1.42	49.5	237.5
	Chinook	139	6	145	1.88	2.07	261.0	300.4
	Mosaic®	0	110	110	0.00	2.55	0.0	281.0
	Simcoe®	27	54	81	1.09	1.76	29.4	142.2
	Other Aroma	480	169	649	1.49	1.49	713.2	968.2
	Total Aroma	**1,015**	**449**	**1,464**	**1.68**	**1.71**	**1,703.3**	**2,499.6**
	CTZ	268	0	268	3.24	3.25	868.1	872.2
	Apollo™	115	1	116	2.25	2.31	259.0	267.5
	Bravo™	51	16	67	2.89	2.95	147.4	197.7
	Super Galena™	65	-28	37	2.43	2.47	158.1	91.4
	Other High Alpha	0	16	16	0.00	1.81	0.0	29.0
	Total High Alpha	**499**	**5**	**504**	**2.87**	**2.89**	**1,432.6**	**1,457.8**
	Total Idaho	1,514	454	1,968	2.07	2.01	3,135.9	3,957.4
Total Aroma		**9,808**	**3,020**	**12,828**	**1.78**	**1.77**	**17,474.2**	**22,759.8**
Total High Alpha		**5,577**	**-747**	**4,830**	**2.64**	**2.69**	**14,728.5**	**13,003.8**
USA Pacific Northwest		15,385	2,273	17,658	2.09	2.03	32,202.7	35,763.6
Other States		322	498	820	0.78	0.76	250.0	625.0
USA TOTAL		15,707	2,771	18,478	2.07	1.97	32,452.7	36,388.6

Alpha production in mt (PNW)



Due to the conversion of acres to 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.

However, US growers have responded to these challenges with continued expansions of acreage and farm infrastructure, although these expansions have required a significant capital investment and have strained cash flow positions and leveraged many farms as a result. Harvesting equipment is also taking on some different shapes, with several German-manufactured pickers and dryers going in on several farms, an indication of tightness and competition in the equipment-supply market, but also a shifting emphasis toward harvesting flavour-rich aroma hops. As most of the acreage expansion is occurring on existing farms, the average farm size continues an upward trend and is now at a level of 268 ha. As the average farm size increases, so does the need for a larger supply of labor and the associated administration and regulatory requirements of employing a very large labor force. The availability of labor and rising labor costs remain two of the greatest concerns for growers in the near term.

Despite the challenges, the current profitability of growing hops has continued to attract new growers, with one additional grower added for 2015 crop which places the total number at 66 growers (discrete decision-making entities) for the PNW. Some of these are next generation growers starting up their own operations but essentially sharing the harvesting facilities of the family farm, while others are established growers of other crops but new to hops and therefore currently without harvesting facilities. These new entrants to hop growing typically contract harvesting services with neighboring hop growers in the near term until they can build their own harvesting facilities in the future.

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

There may be differences in the sum totals due to acreage figures being rounded up or down.

Variety	2011 ha	2012 ha	2013 ha	2014 ha	2015 ha
Cascade	1,002	1,343	2,140	2,679	2,748
Centennial	308	720	880	1,357	1,807
Simcoe®	200	382	527	763	1,338
Citra®	97	218	533	727	1,211
Mosaic®	-	36	155	272	728
Chinook	-	-	-	712	723
Amarillo®	185	308	558	582	683
Willamette	677	646	435	469	550
Cluster	195	221	325	299	274
Crystal	54	118	169	191	246
Palisade®	129	111	57	90	184
El Dorado®	-	-	39	59	181
Mount Hood	125	140	157	170	169
Golding	94	111	121	133	118
Other Aroma	670	769	966	1,305	1,868
Total Aroma	**3,736**	**5,123**	**7,062**	**9,808**	**12,828**
Columbus-Tomahawk-Zeus (CTZ)	3,203	2,512	2,493	2,337	2,154
Nugget	999	1,009	834	659	682
Summit™	1,004	1,102	1,151	1,021	656
Apollo™	358	354	404	399	402
Bravo™	240	214	241	287	295
Super Galena™	498	459	491	361	206
Galena	614	427	210	124	136
Magnum	26	23	77	115	124
Chinook	308	619	722	-	-
Other High Alpha	1,069	1,081	569	274	175
Total High Alpha	**8,319**	**7,800**	**7,192**	**5,577**	**4,830**
USA TOTAL	12,055	12,923	14,254	15,385	17,658

Acreage and variety development

As reported by the USDA, the US hop acreage for the PNW growing region expanded from 15,385 ha in 2014 to 17,658 ha in 2015, an increase of 2,273 ha (15 %) which comes predominantly from aroma varieties.

The US acreage has now seen annual increases in the range of 7 % to 15 % over the past four crops collectively adding 5,603 ha (46 %) since crop 2011. Idaho and Oregon expanded by 30 % and 22 %, respectively, while Washington expanded by 11 % resulting in a drop in overall share from 76 % to 74 % for the acreage-leading state.

The dramatic shift toward aroma hops also continued with an increase from 9,808 ha in 2014 to 12,828 ha in 2015, an increase of 3,020 ha (31 %) for this category. Conversely, high alpha acreage dropped from 5,577 ha to 4,830 ha, a decrease of 747 ha (-13 %). Since crop 2011 high alpha acreage has declined by 3,489 ha (-42 %). Aroma hops now represent 73 % of the total US acreage in the PNW, a complete reversal of acreage share for these primary categories since crop 2011 and a trend that comes as a direct result of continued strong growth in the craft segment.

For a second consecutive year **Cascade** holds the top spot in terms of total acreage at 2,748 ha, and while it saw the largest acreage gain of all varieties last season it increased by only 69 ha (+3 %) with crop 2015 dropping it from 17 % to 16 % overall acreage share. **Centennial** continued its upward trend with an increase of 450 ha (+33 %) which puts it at 10 % share and keeps it in third place just slightly behind **Columbus-Tomahawk-Zeus (CTZ)**. However, the largest acreage gainers for crop 2015 were the proprietary varieties of **Simcoe®** at 575 ha (+75 %), **Citra®** at 484 ha (+67 %), and **Mosaic®** at 456 ha (+168 %). Proprietary aroma varieties increased by 1,904 ha from crop 2014 and accounted for 63 % of the total aroma acreage increase for crop 2015. Furthermore, proprietary aroma acreage represented 36 % of the total crop 2015 aroma acreage and 26 % of the overall total PNW acreage. In the high alpha segment **Summit™** led the decrease by shedding 365 ha (-36 %), followed by reductions in **CTZ** of 183 ha (-8 %) and **Super Galena®** of 155 ha (-43 %). **Nugget** on the other hand ended its recent downward trend with relatively no change from a year ago.

Crop volume

As with Germany, the PNW experienced challenging growing conditions for crop 2015 with growers having to cope with water shortages and record high temperatures throughout the growing season. With 74 % of the US acreage growing in Washington, overall US hop production is therefore heavily influenced by crop performance in this growing region that depends upon mountain snowpack and water reservoirs to irrigate the crop. Unfortunately, normal mountain snows over the 2014/2015 winter did not materialize due to the occurrence of an "El Niño" in the Pacific Ocean. The warmer ocean currents associated with an El Niño typically result in moderate winters with much lower precipitation and mountain snows in the PNW. Snowpack levels at end of the 2015 winter were far below normal and provided a preliminary warning for a difficult water season in the Yakima Valley. To compensate for the lean water forecast, irrigation districts initiated water rationing measures via rotational water schedules. Growers with junior water rights received only 47 % of normal water supply. Furthermore, the rotational schedules presented additional issues for drip irrigation systems which require a steady supply of water to operate efficiently. Several growers, however, have the benefit of supplemental emergency wells which helped to offset a portion of the water rationing.

In addition to the water challenges, by mid-summer the PNW was hit with a significant heat wave that brought record high temperatures to the hop growing region lasting for several weeks in July and August with 16 days above 40 °C and several additional days not far below this level. The combination of water rationing and record temperatures negatively affected crop yields in Washington, while conditions in Oregon and Idaho were not as extreme and with water supply close to normal. In **Washington** many of the new plantings ("babies") suffered in yield as well as early-maturing varieties such as **Cluster**, **Willamette**, and **Centennial** in particular which experienced yield losses of 30 % or greater for some growers. However, the mid-to-late season aroma varieties performed much closer to average including **Cascade**, **Citra®**, **Mosaic®**, and **Simcoe®**. Yields were inconsistent across the growing areas in the Yakima Valley with generally good yields in the Moxee area. On the other hand, farms on the Yakama Reservation had more difficulty achieving normal yields due to additional water challenges, while yields in the Lower Valley were variable. High alphas generally performed well overall with yields at average to slightly above average for **CTZ** although **Summit™** yields were off somewhat. Alpha acid levels were down as well, with **CTZ** being 0,5 to 1 point below long term averages.

While the overall average yield/ha for Washington was down about 5 % from the previous season, **Oregon** fared much better with average yields up 6.5 % overall. A few exceptions were some of the smaller niche aroma varieties including **Golding** and **Mt. Hood** which were down considerably, while others such as **Cascade**, **Centennial**, and **Crystal** had excellent yields. **Nugget**, however, was slightly below average although its alpha acid content was at long term averages. Yields in **Idaho** were fairly consistent and normal across the board with long term averages achieved collectively for both aromas and high alphas. Despite the difficult growing conditions, the overall average yield/ha for the PNW was down only 3 % from the prior season, a moderate decrease considering that 13 % of the acreage (2,273 ha) was made up of lower yielding "baby" or first year acreage. Overall production for the PNW increased by 3,561 mt (11 %) over crop 2014 with a total production of 35,764 mt, the largest crop on record since 2009. Commensurate with the acreage shift from high alpha to aroma, the production of aroma hops was up 5,286 mt (30 %) to 22,760 mt total, whereas high alpha production dropped by 1,725 mt (-12 %) to 13,004 mt. Furthermore, excluding the alpha produced from aroma varieties, alpha production from the traditional high alpha category decreased by 315 mt from the prior year to 1,855 mt alpha from crop 2015.

Hop quality generally was normal to above normal this season despite the heat and water stress placed upon the crop. Good control of downy mildew was aided by the warm temperatures while powdery mildew and mites were held in check. Visually the hop quality was generally unaffected by disease and insect damage, and was perhaps a slight improvement over the prior crop. With the influx of aroma varieties, growers have become highly sensitized to the need for good harvest practices and proper timing of harvesting to ensure true-to-type aroma and optimal quality for each variety grown on their respective farms.

Alpha acid table

Variety	2011	2012	2013	2014	2015	Average
Nugget	13.2 %	13.8 %	14.4 %	13.5 %	13.6 %	13.7 %
Columbus/Tomahawk/Zeus (CTZ)	14.7 %	15.3 %	15.5 %	14.5 %	13.8 %	14.8 %
Bravo™	15.0 %	15.0 %	15.2 %	14.6 %	14.4 %	14.8 %
Summit™	16.1 %	15.9 %	16.7 %	15.8 %	15.9 %	16.1 %
Apollo™	16.7 %	17.5 %	17.9 %	18.2 %	17.5 %	17.6 %

Market situation

Contract market

The US contract market has remained very active over the past two years, pausing only slightly during harvest each season and quickly resuming shortly thereafter. Demand for aroma varieties has remained strong as a result of the bull market in the craft segment with varieties in highest demand including **Cascade**, **Centennial**, **Citra®**, **Simcoe®**, and **Mosaic®**. While the 2015 crop acreage expansion of **Cascade** has slowed somewhat, the other four varieties are the top expanding varieties in the US for a second consecutive year. Contracting for these varieties remained active after the crop 2014 harvest and continued into spring of 2015. The majority of the new contracts written were for new crop 2015 plantings rather than contract renewals of existing acreage. Because of the investment and development of new acreage, contract terms typically were from 4 to 5 years out for new plantings but also for contract renewals. Late in 2014 a few **Cascade** contracts were extended at prices in the range of 11.00 to 11.60 USD/kg but then activity slowed significantly for this variety until after crop 2015 harvest. Post-harvest pricing bumped to the 13.25 USD/kg range with a few prices reported at 13.80 to 14.00 USD/kg and slightly higher. Similarly, **Centennial** saw some market activity early in 2015 at prices in the 15.60 to 16.10 USD/kg range over 3 to 4 year term contract extension, but activity then quieted until after the crop 2015 harvest. Crop 2015 harvest brought poor yields, shortages, and high spot prices for this inconsistent variety. When contracting resumed post-harvest, prices spiked up to 17.50 to 18.40 USD/kg range or even higher, again typically for 4 year contract terms and including some new crop 2016 plantings. Additional contacts for aroma varieties were written throughout 2015 including **Chinook**, **Crystal**, **Willamette**, **Golding** and others, although generally all being contract extensions on existing acreage and for smaller quantities. Depending upon yields, contract pricing for many of the public aroma varieties will provide growers with returns ranging between 26,000 and 31,000 USD/ha.

Contract activity for proprietary varieties including **Citra®**, **Mosaic®**, **Simcoe®**, **HBC 366**, and **Amarillo®** continued at a steady pace throughout most of 2015. Most all of the contracting was for new crop 2016 plantings and for contract terms of 4 to 5 years. Contracts for proprietary hops are also always written for full production as the owner of the variety controls the rootstock as well as all production yielding from the plant material. Pricing structures can vary with proprietary varieties, with some based on convention fixed pricing while others are contracted under a pool or other non-traditional pricing arrangement. Late in 2014 contract pricing for many of the proprietary varieties would provide grower returns in the range of 27,000 to 28,500 USD/ha depending on yield and variety. However, high demand and competition for acreage and harvest windows pressed pricing upward by end of the calendar year to levels that will provide grower returns in the range of 29,000 to 35,000 USD/ha. Several other proprietary varieties are also appearing on the landscape including **El Dorado®**, **Azacca®** and others which have been developed by private breeding programs owned by merchants as well as growers.

The grower market for high alpha varieties remained quiet with only a few contracts being concluded in 2015. Many of the high alpha fields coming open in 2015 were converted to aroma varieties providing growers much higher returns relative to keeping the high alphas in the ground and seeking new contracts. For the few contracts written, mainly for **CTZ**, prices did not move much beyond the range of 33.00 to 35.00 USD/kg alpha until some selective post-harvest activity bumped up pricing into the 42.00 to 50.00 USD/kg alpha range, although overall activity was quite small in comparison to aromas. Activity was also light for **Nugget** with a few purchases made late in 2014 at prices in the range of about 9.80 to 10.40 USD/kg for two to three year contracts on existing acreage. Pricing dropped into the 9.50 to 10.00 USD/kg level midway into 2015, but activity also was generally very light and short-lived.

Spot market crop 2015

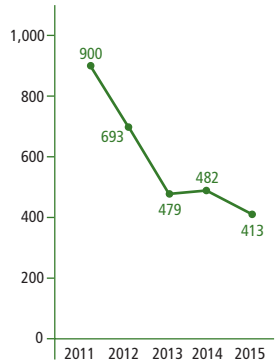
The availability of spot hops fluctuated widely due to the challenging growing conditions which caused inconsistent yields across most varieties. With the large acreage base and average yields, a reasonable supply of **Cascade** spots was available and sold at prices that fluctuated in the 13.25 to 16.50 USD/kg range, with most sold during or shortly after harvest. Despite the general poor performance of **Centennial**, pockets of spots materialized in Oregon where yields were better as well as in Washington where some acreages likely were grown for the spot market. For a second consecutive year demand for **Centennial** spots was quite strong and caused prices to spike up to 33.00 to 35.50 USD/kg, with all volumes being sold shortly after harvest despite the high prices. Smaller quantities of spots existed for **Chinook**, **Crystal**, **Galena**, **Sterling**, **Willamette** and others, all being sold during the harvest period. A decent quantity of **CTZ** spots were available as yields were average to slightly above average, with most being sold shortly after harvest in the range of 41.00 to 44.00 USD/kg alpha. **Nugget** spots were also in plentiful supply, with some being purchased shortly after harvest in the range of 8.80 to 11.00 USD/kg, while other volumes were left unsold in the months following harvest as the spot demand for this variety diminished.

Outside the Pacific Northwest

The expansion of US hop acreage continues to develop beyond the traditional growing region in the Pacific Northwest (PNW). The farms generally are very small with the average farm size ranging from less than one hectare to about 80 ha, with a few larger operations nearing 150 hectares. A wide mix of varieties is being grown, although the more popular varieties continue to include **Cascade**, **Chinook**, **Centennial** and **Nugget**. Several new breeding programmes are underway at local universities and private propagators with a focus on developing varieties suited for the non-PNW climates. However, such varietal development work naturally takes time and in all likelihood will not produce new commercial varieties in the near term. The regions outside the PNW currently do not participate in the traditional USDA acreage and production surveys making it challenging to obtain accurate estimates on hop growing data from these areas. Nonetheless, efforts are underway to bring some of the larger areas into the USDA reporting programme in the future. It is currently estimated that 800 to 900 ha were grown and harvested outside of the PNW for crop 2015, with about 30 to 35 % of the acreage grown in Michigan, followed by New York, Wisconsin, Colorado and smaller acreages across approximately 20 non-PNW states and a few Canadian provinces. Several of the larger growers in states such as Michigan and New York are investing heavily in harvesting infrastructure typical of what is seen on the large commercial farms in the PNW. However, most of the small farms remain without harvesting equipment and continue to supply only 'wet hops' (undried hops used within hours of harvest) to local breweries.

CHINA

Alpha production in mt



Area	Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
		2014	+/-	2015	2014	2015	2014	2015
Xinjiang	Tsingtao Flower	923	-235	688	2.38	2.51	2,195.0	1,725.0
	Marco Polo	247	-14	233	3.00	3.09	740.0	720.0
	SA-1	200	0	200	2.50	2.50	500.0	500.0
	Kirin Flower	173	-28	145	2.49	2.38	430.0	345.0
	Other Aroma	24	0	24	2.29	2.29	55.0	55.0
	Total Xinjiang	1,567	-277	1,290	2.50	2.59	3,920.0	3,345.0
Gansu	Tsingtao Flower	783	-48	735	2.79	2.71	2,183.0	1,994.0
	Nugget	90	-3	87	1.52	1.03	137.0	90.0
	High Alpha	196	-5	191	3.12	2.58	610.6	492.0
	Aroma	19	-2	17	1.92	1.94	36.4	33.0
	Total Gansu	1,088	-58	1,030	2.73	2.53	2,967.0	2,609.0
Total Aroma		**243**	**-2**	**241**	**2.43**	**2.44**	**591.4**	**588.0**
Total Bitter		**1,879**	**-311**	**1,568**	**2.56**	**2.59**	**4,808.0**	**4,064.0**
Total Hochalpha		**533**	**-22**	**511**	**2.79**	**2.55**	**1,487.6**	**1,302.0**
CHINA TOTAL		2,655	-335	2,320	2.59	2.57	6,887.0	5,954.0

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 the **Xinjiang** growing region, hop production ceased on four farms. As in the previous year, the remaining 20 producers cultivated an average area of 65 ha per farm. The number of farms in the **Gansu** region remained unchanged at 13. As a result of a year-on-year reduction in acreage, the average hop-growing area farmed fell from 84 ha to 79 ha per farm in crop year 2015. In total, there were 33 producers cultivating hops in China in crop year 2015 (2014: 37 producers). As a result of the reduction in acreage, the average area under hops declined from 72 ha to 70 ha per farm.

Acreage/crop volume/alpha content

Between 2009 and 2015 hop acreage declined by 61 %. In crop year 2015, it fell by 13 % year on year. As in the previous years, the most widely grown variety **Tsingtao Flower** bore the brunt of the reduction. In crop year 2015, the reduction amounted to 283 ha (17 %). However, although this variety's suitability for machine harvesting is limited, it still accounted for 61 % of acreage. Hop acreage decreased by a total of 18 % in **Xinjiang** and 5 % in **Gansu**.

During the 2015 vegetation period there were many peculiarities in the climate in the **Xinjiang** region. The mean temperatures in the north and in the mountains of Tianshan were lower than normal. In the south, on the other hand, it was warm. The average annual precipitation was slightly lower than that of previous years, but on a regional basis levels ranged widely from high to low. Regardless of that, the hops required irrigation. The average harvested yield was higher than in crop year 2014, but nevertheless remained below the long-term average. In the **Gansu** growing region, temperatures at the beginning of the vegetation period were below normal. This was followed by severe swings in temperature, which was not conducive to hop growth. The average yield per hectare was down 7 % year on year, bringing it below the multi-year average.

The average alpha acid content in the hops picked in 2015 was 6.9 % (2014: 7.0 %). The average content measured in the **Tsingtao Flower** hops was 5.9 % (2014: 5.8 %). The alpha yield fell by 14 %. This was primarily due to acreage reduction.

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.

Xinjiang hop region: Purchase agreements had been concluded for some 30 % of production volume in August 2015. The agreed delivery volume was subsequently reduced by the breweries, as a result of which the ratio fell below 20 %. Taking all varieties into consideration, the average settlement price was 25.00 CNY/kg (3.60 EUR/kg). The 2015 crop was not sold completely, which added to the surpluses from the previous years. Some farms are reducing acreage and at least one farm is going to discontinue hop production entirely. Crop year 2016 will see a further year-on-year reduction in acreage of approximately 22 %.

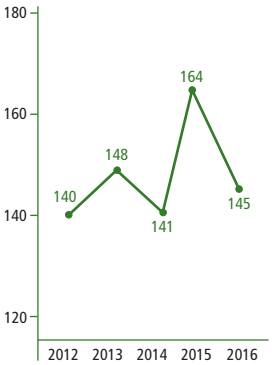
Gansu hop region: The proportion of hops from the 2015 crop covered by purchase agreements at the time of harvest was 70 %. The farmers were paid approximately 23.50 CNY/kg (3.40 EUR) for **Tsingtao Flower** hops and 25.00 CNY (3.60 EUR) for high alpha hops. Approximately 700 mt of hops harvested in 2015 remained unsold, adding to the stocks already in storage.

As there is no prospect of settlement prices rising, hop acreage in the Gansu region is expected to be reduced. For the country as a whole, we expect acreage to be roughly 2,000 ha in crop year 2016.

CROP 2016: AUSTRALIA

Area	Variety	Development of acreage Acreage ha			Development of production Ø Yield t/ha		Production mt	
		2015	+/-	2016	2015	2016	2015	2016
Tasmania	Galaxy™	53	34	87	2.52	1.87	134.5	162.8
	Super Pride	50	-3	47	2.27	2.80	113.6	131.4
	Ella™	37	0	37	3.14	2.33	115.9	85.9
	Pride of Ringwood	29	-16	13	2.68	3.71	77.6	47.9
	Other	71	1	72	1.44	1.42	102.4	102.7
	Total Tasmania	240	16	256	2.27	2.07	544.0	530.7
Victoria	Galaxy™	77	28	105	3.34	2.04	257.3	213.1
	Super Pride	51	0	51	2.45	1.99	125.0	101.3
	Vic Secret™	36	15	51	1.76	1.69	64.0	86.6
	Pride of Ringwood	47	0	47	2.02	2.02	95.0	95.0
	Topaz™	20	0	20	3.53	2.56	70.5	50.1
	Ella™	13	0	13	3.04	1.78	39.7	23.0
	Other	4	0	4	1.35	1.35	5.0	5.0
	Total Victoria	248	42	290	2.65	1.98	656.5	574.1
AUSTRALIA TOTAL		488	58	546	2.46	2.02	1,200.5	1,104.8

Alpha production in mt



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

Farm structure

Although one grower discontinued hop production, there was an overall increase in acreage in crop year 2016. The remaining growers farmed an average hop area of 91 ha per farm, as opposed to 69 ha per farm in crop year 2015.

Acreage/crop volume/alpha content

The acreage planted with the varieties **Galaxy**™ and **Vic Secret**™ increased by 48 % and 42 % respectively. **Pride of Ringwood** on the other hand, saw its acreage decline by 21 %. The total acreage planted with hops rose by 12 %.

In the two hop-growing regions Tasmania and Victoria, yields failed to meet expectations, albeit for different reasons. At Bushy Park Estates in Tasmania, spring temperatures were in some cases very high, which promoted vigorous plant development. However, this unusually warm weather was interrupted by cold fronts, bringing occasionally near-freezing temperatures and difficult windy conditions. This had a significant impact on the various hop varieties. **Galaxy**™ hops, for example, which usually do not flower until January, already did so in November. Among **Enigma**™ hops, the onset of terminal burr halted vegetative growth at an early stage. Despite the difficult conditions, varieties such as **Helga**™, **Summer**™ and **Cascade** surpassed yield expectations, whereas varieties such as **Galaxy**™, **Vic Secret**™, **Ella**™, **Enigma**™ and **Topaz**™ suffered from the unusual weather pattern. In some areas, yields fell by as much as 50%. In Victoria, at Rostrevor Hop Gardens, the growing season got off to an excellent start. However, early in December, a hail storm of the like "never seen before" devastated most of the farm in a mere 15 minutes. Even though the weather during the following two months was quite favourable for plant development, this was insufficient to compensate for the impact of the storm and the yield results turned out as anticipated. As a result, the volume produced in Australia fell approx. 300 mt short of expectations.

While average alpha content in the **Pride of Ringwood** variety of 9.4 % (2015: 9.0 %) exceeded the long-term median, alpha content in **Super Pride** hops was below average at 13.8 % (2015: 14.1 %). The alpha yield was 11 % down year on year.

Market situation

As a consequence of the very high forward contract rates, delivery commitments for **Galaxy**™, **Vic Secret**™ and **Enigma**™ hops could not be met in full. In order to be able to meet the generally buoyant demand for Australian hops in the future, growers are continuing to invest in hop-farming equipment and acreage expansion. The forward contract rate for hops picked in crop year 2017 already stands at 90 %.

HOP PLANT DEVELOPMENT 2016

Germany (Hallertau)

The 2015/2016 winter was virtually frost-free and very mild, and by the end of the winter there were sufficient reserves of water in the soil. As in the preceding years, the spring work in the hop gardens began in good conditions. With the mild, mainly dry weather conditions continuing in early April, the ground remained suitable for vehicles and allowed all the work to be done. The first of the growers began training the hop shoots towards the end of the month. Plant growth was held up sharply by night frosts between 26 and 28 April. Training consequently extended over a comparatively long period and was not completed on most of the farms until the middle of May. Relatively cool temperatures, combined with a brisk north-easterly wind, held back plant growth until well into the second half of May, resulting in growth retardation of approximately one week compared with the long-term average.

In the evenings of 29 May and 4 June, thunderstorms passed over the Hallertau growing region, bringing heavy rain and hail in places. An area of 350 to 400 ha suffered varying degrees of damage. The resulting shortfall in yield will depend greatly on the weather and growth patterns during the rest of the season.

USA (PNW)

In stark contrast to the previous year, the 2015/2016 winter provided plentiful snowfall to the Cascade Mountains in the Pacific Northwest region. Temperatures were above normal, while precipitation levels were below the long-term average. Although the temperatures were indeed mild, especially on the valley floors, the mountain regions received higher snow volume than usual, which greatly eased the growers' fears of a second consecutive short-water year. However, the early spring months were unusually warm, which led to accelerated snowmelt in the mountains. Nevertheless, water supply for crop 2016 is still expected to be adequate. The higher-than-normal spring temperatures accelerated the growth of several hop varieties, with baby hops growing at a significantly faster rate. In the Washington, Oregon and Idaho growing regions training was completed at the normal times. Some early bloom has occurred in a number of varieties, although it is too early to tell to what extent this will have an impact upon yields. On the whole, at the end of May hop growth was ahead of normal.

OUTLOOK 2016

Germany

According to the 2016 survey, planted area has increased year on year by 743 ha to stand at 18,598 ha. The area planted with aroma varieties has grown by 174 ha (1.7 %) to 10,514 ha. Their share of total acreage has dropped from 58 % to less than 57%. While the area planted with the four main aroma varieties **Perle**, **Hallertau Tradition**, **Hersbruck** and **Hallertau Mittelfrüh** decreased by a total of 214 ha, **Mandarina Bavaria** saw its planted area increase by 139 ha (67 %) and thus by more than any other aroma variety. The area planted with bitter/high alpha varieties went up by 548 ha (7 %) to 8,026 ha. As a result, their share of total acreage has risen from 42 % to 43 %. The variety with the greatest increase was **Herkules** with 732 ha (18 %). The other main high alpha varieties **Hallertau Magnum** and **Hallertau Taurus** shrank by 265 ha. As in the preceding year, the top three varieties grown in Germany are: **Herkules** (4,884 ha), whose share of total planted area is now 26 %, **Perle** (3,093 ha) with 17 % and **Hallertau Tradition** (2,827 ha) with 15 %.

USA

As reported by the US Department of Agriculture (USDA), the total hop acreage in the traditional Pacific Northwest growing region for crop 2016 increased by 3,028 ha to 20,686 ha. This represents an increase of 17 %. Aroma/flavour acreage increased by 3,346 ha (26 %) and now stands at 16,175 ha, which represents 78 % of the total US hop acreage. Conversely, high alpha varieties continued to decline, dropping by 318 ha (-7 %) for crop 2016, which continues the slide of this once-dominant category to a share of only 22 % of the total US acreage today. The varieties seeing the largest increases for crop 2016 are **Citra®** at +582 ha (48 %), followed by **Simcoe®** at +426 ha (32 %), **Mosaic®** at +371 ha (51 %), and a close grouping of **Chinook**, **Centennial**, and **Cascade** each with increases in the range of 235 to 272 ha. The high alpha variety in greatest decline is **CTZ** at -333 ha (-15 %) while other high alpha varieties had only small acreage reductions. For a third consecutive year **Cascade** will retain its position as the leading variety in the US at 2,983 ha (14 % share), while yet another aroma variety, **Centennial** (2,053 ha), has overtaken **CTZ** (1,822 ha) in the second position.

World

The total global area under hops in 2016 is estimated at approx. 55,400 ha. This represents acreage growth of roughly 3,900 ha, or 7.5 %, year on year. The massive expansion of acreage under flavour and aroma-intensive hop varieties in particular should suffice – assuming average production volume – to meet the demand from the brewing industry.

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What are we going to brew today?

Just as there are countless hop varieties and flavours, there are also countless beer styles and recipes that can be used for the vast range of hops. That is why in 2010 Joh. Barth & Sohn first published "The Ultimate Almanac of World Beer Recipes" in collaboration with Weyermann®, Kaspar Schulz and the author Horst Dornbusch. The almanac was very soon out of print and there were many ideas for an expanded version of the almanac.

Supported by the BARTH-HAAS GROUP, Horst Dornbusch spared no effort in writing a new book "Beer Styles from around the World" which appeared in 2015. This work comprises a collection of more than 150 beer recipes, with historical insights and tricks of the trade of brewing. The book is a voyage of sensory discovery, taking the reader to Great Britain, Ireland, the Czech Republic, Austria, Belgium, France, Poland, Sweden, Finland and, of course, Germany.

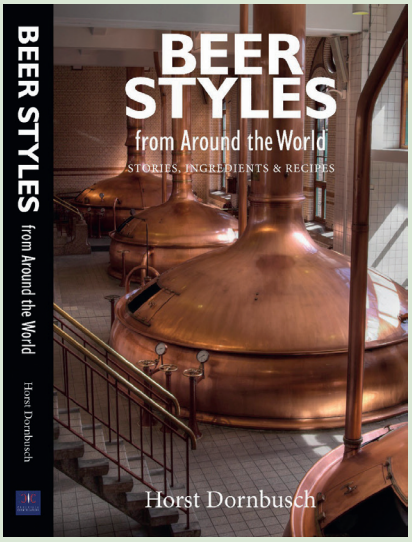
In addition to traditional recipes from the so-called "Belle Epoque" in the 19th century – a time of innovations in beer styles – the latest recipe developments of the craft beer revolution are also described. These are joined by beers created at the time of the Industrial Revolution or beers that only became known and were defined as a result of trade relations with various colonies in all parts of the world.

Horst Dornbusch went out in search of beer recipes which had long been forgotten, whose documentation is contradictory and which have to be approached with educated assumptions if one is to be able to describe them. Perhaps with the aid of this book, these beers will be rediscovered and will find their way into today's diverse beer landscape.

But does a "recipe book" for beer even make sense, considering that every brewery is different? There are breweries with two-vessel or three-vessel brewhouses; some use decoction mashing and high gravity, some don't; some swear by the use of a mash filter instead of a lauter tun; and the use of a whirlpool is also a question of philosophy. In this book, however, the recipes are presented in such a way that they are easy to follow and can be used in any system.

There is no right or wrong way to brew beer; but there is also creativity and innovativeness – and that is what this book conveys. Beer styles are also an expression of the spirit of their time. Historical context and anecdotes are therefore important sources to help make the sociological and cultural context of each beer understandable.

This book is full of surprises. After reading it, you will not only easily be able to answer the opening question "What are we going to brew today?" You will also be able to tell at least one story that other people don't know about virtually every beer.



The book
„BEER STYLES from Around the World"
by Horst Dornbusch
can be ordered through
simplyhops.de

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