DENMARK'S HOP GARDEN

AN IMPORTANT PIECE IN THE ILLUSTRATION OF THE UTILITY PLANT'S SIGNIFICANCE IN THE RURAL HOUSEHOLD

In recent years, conserving the Danish nature and the Danish cultural heritage has been in focus. The Danish improvement of hop ceased more than 20 years ago. This means that the supply of new material e.g. for commercial growing has to come from material of foreign varieties. It is a dismal development. The greater diversity among the varieties the greater chance we have of restraining problems such as disease and pests in the crops and ensuring variation in the production of beer. It is therefore important to conserve, protect and develop as many plant varieties as possible.

GITTE KJELDSEN BJØRN, M.SC. (HORT.), UNIVERSITY OF AARHUS, AND BETTINA BUHL, CURATOR OF THE DANISH AGRICULTURAL MUSEUM, GL. ESTRUP.

RESEARCH ON DANISH HOP

The purpose of conserving plant material for posterity is that future generations will have access to at least as great a diversity of species and varieties as today's users. They are designated collectively as 'plant genetic resources for agriculture'. It is a national responsibility to conserve plant collections, also called clone collections, of hop, among other things. The formal responsibility of conserving the genetic resources of perennial vegetables and hop is managed by the Faculty of Agricultural Sciences, Department of Horticulture in Aarslev. M.Sc. (Hort.) Gitte Kjeldsen Bjørn is responsible for the clone collections. With others, she has formulated several projects; the latest being the hop project which 'recreates the basis for hops production in Denmark with specific Danish flavour and aroma characteristics'. This hop project is a collaboration between a microbrewer (Fuglebjerggaard), the Jacobsen Brewhouse and University of Copenhagen (see more on the website: www.danskhumle.dk – in Danish only). In this project, hop from all over Denmark is collected and tested. Several of the varieties have some special characteristics and a good history which means that they will also be conserved in the clone collection in Aarslev.

Up till 2006, there have been no doublets of the collections in Aarslev and should any abnormal conditions befall the collections, we could risk that vital plants were lost for posterity. In 2006, the Danish Agricultural Museum in Gl. Estrup therefore applied for and received public funding from the Ministry of Food, Agriculture and Fisheries in order to set up a hop garden containing doublets of the clones held in Aarslev.

The idea was that 25 different clones are to be conserved in the hop garden. In 2008, 21 clones have been planted at

ABOUT CLONES

A clone is characterised by, for instance, a cut off piece of hop root with small shoots on it. These shoots will eventualy become a new plant. The new plant is completely identical to the mother plant. A clone is 'elevated' to a variety when it has undergone a SES approval in Germany which has demonstrated that it is independent, homogeneous and stable.

Rhizomes (roots with small shoots) can become new hop plants.

the museum. The remaining four will be chosen when the aforementioned project ends in 2009, so that it is the most important clones with the best history that will be conserved for posterity in both Aarslev and at Gl. Estrup. In Aarslev, the number of clones will be a little higher, though. In the table to the right, the composition of the chosen plants is shown.
As can be seen in the table, the chosen plants do not constitute a geographically representative collection. At the Department of Horticulture, there are at present more than 50 plants from several locations in Denmark and some of these will eventually enter into the Agrobotanical Garden of the museum. The collected plants are also chosen on the basis of culture-historical and geographical criteria. It is therefore vital with regard to the collection and the futher documentation of the plants to accumulate knowledge of hop and the history and distribution of the hop gardens in Denmark.

HOP AT THE MUSEUM

Simultaneously with the setting-up of the hop garden, the specialist staff of the museum work with the culture-historical basis for the project; partly in relation to the hop as an important plant in the kitchen garden of the farmer society, and partly in relation to the self-sufficient aspect of the 17th century where beer played a major factor in the rural household. In relation to the hop garden project, a side benefit to the Danish Agricultural Museum has been new communication initiatives. The museum now has its own hop weekend where the mistress' old directions for brewing beer come to life; to this, culture-historical lectures and exhibitions are attached. The Danish Agricultural Museum's brewers guild, which only consists of women, brews with the tools, raw materials and methods that characterised beer brewing on the Danish farms through the 17th century. 'The beer girls' brew beer three to four times a year. They use Danish, organic raw materials and the brewing takes place in wooden vessels with a strainer of straw and open fermentation.
To test the usage characteristics of the individual hop plants, the museum chose to enter into cooperation with Raasted Bryghus at Randers where the first beer from Gl. Estrup was brewed in 2006, counting 1,200 bottles. This gave the museum a new medium where marketing of the hop garden project in Gl. Estrup and not least the account of the beer brewing history provided new opportunities to communicate to existing and, especially, new target audiences.
With regard to the culture-historical part of the hop garden project in Gl. Estrup, curator Bettina Buhl has worked intensely in the last years with the cultural history of beer in connection with a research project. The old history books store many interesting accounts of the prevalence of hop gardens in Denmark, of regional differences in how to brew beer, and, not least, how beer was part of many of the traditions and customs of the time, among other things. The source material for clarifying the abovementioned topics are very scattered and an insight into the topics has been gained primarily via the multifarious agricultural publications and journals from the end of the 16th century to the beginning of the 18th century. Finally, local historical accounts and almanacs provide knowledge of the work in the hop garden; including hop crops, the many applications of hop and not least hop as a sideline occupation and commodity.

THE HOP PLANT (HUMULUS LUPULUS L.)

Hop is a perennial plant that grows as a feral plant in most of Denmark. It is characterised by its rapid, twining growth. It is one of the two genuses which belong to the hemp ➜

OVERVIEW OF THE HOP PLANTS IN THE HOP GARDEN AT THE DANISH AGRICULTURAL MUSEUM

No. 1	Selected clone from the Carlsberg Breweries
No. 2	Selected clone from the Carlsberg Breweries
No. 4	Selected clone from the Carlsberg Breweries
No. 5	Selected clone from the Carlsberg Breweries
No. 6	Selected clone from the Carlsberg Breweries
No. 7	Selected clone from the Carlsberg Breweries
No. 8	Selected clone from the Carlsberg Breweries
No. 9	Selected clone from the Carlsberg Breweries
No. 10	Selected clone from the Carlsberg Breweries
No. 11	Selected clone from the Carlsberg Breweries
No. 12	Selected clone from the Carlsberg Breweries
No. 13	Selected clone from the Carlsberg Breweries
No. 15	Selected clone from Humlemagasinet at Harndrup, Funen
No. 16	Selected clone from Hjemstavnsgården at Gummerup, Funen
No. 18	Selected clone from Holbæk Museum, Zealand
No. 48	Selected clone from Avernakø
No. 53	Selected clone from Søvind at Horsens, Jutland
No. 56	Selected clone from Vitskøl Kloster at Ranum, Jutland
No. 78	Selected clone from Valby Overdrev, Zealand
No. 80	Selected clone from Nørrekær at Gl. Estrup, Jutland
No. 81	Selected clone from the area at Fåborg, Funen

THE PURPOSE OF THE HOP PROJECT

M.Sc. (Hort.) Gitte K. Bjørn has formulated the specific purpose of the hop project as follows: 'The aim of the project is to recreate the basis for growing and producing as well as using Danish hop for an original Danish beer production. Hop plants from all over the country are collected and described. The plants are evaluated with regard to growing characteristics, resistance to serious diseases, as well as flavour, bitterness and expected brewing characteristics'.

Gitte K. Bjørn in the hop garden in Funen.

family (Cannabaceae). Hop is also one of the few climbing plants which are indigenous to Scandinavia. It has a very great growth rate and a stem growth of up to 18 centimetres a day has been measured. The stems can become more than 10 metres long during a season of growth. The hop plant is an herbaceous perennial – it dies back in autumn. In addition to the plant having a strong growth rate, the stem twines clockwise. The plant has coarse, almost thorn-like hairs that enable the shoots to attach themselves to trunks, branches, trellises and to the strings which are used in professional growing.

The plant is dioecious, meaning that there are both male and female plants; when growing hop, it is normally only the female plants which are interesting. The female flowers (hops) form rounded, complex inflorescences that look like small cones when they are ripe. At the base of the flower and at the bracts, a lot of yellow glands develop; these glands produce a yellow dust and it is here the aromas and flavours are formed. Hop is found as an indigenous plant in most of Denmark, but some the plants are probably feral originating from former hop gardens or private gardens.

Hops are predominantly used in connection with brewing beer, as hops give the beer a fresher taste and bitterness; and hops also contribute to the clarifying and preservation of the beer.

THE CULTURAL HISTORY OF HOP

It is unknown at what time the use of hops in brewing started. In medieval times, hop was initially known as a medicinal plant and was exclusively grown in the gardens of the convents.

By the means of linguistic archeology, Viggo Brøndal (1887-1942; Danish professor in Romance linguistics) has attempted to establish where and when growing hop began in Denmark. His conclusion is that hop growing is first found at the convents. In a European perspective, the author mentions that the Carolingian period's French Benedictines in the 7th century were among the first who brought the wild hop into the gardens, grew it and utilised its plant parts in beer brewing. Viggo Brøndal wishes to test the relationship between hop and the Danish place names. He demonstrates that towns with names in which hop is part of the name are younger than the Viking Age. In addition, a picture is drawn of the 'hop locations' being close to the convents; often in the neighbouring parish. The old Benedictine, Augustine and Cistercian convents in Denmark have thus grown hop in a nearby hop garden or in hop gardens with a connection to a trade route. Viggo Brøndal is certain that the monks in Denmark brewed beer with their own hops; tied to this are written sources that mention a scullery in the convent of Esrom. The conclusion of the account is that the hop growing must be seen in connection with Denmark being directly attached to France under the Bishops Eskil and Absalon, since the convents of this time were so manifold and rich that gardening and trade were realistic.

A friend of Absalon, the Frenchman Abbot Vilhelm, is linked to the hop culture's introduction to Denmark. He arrived in Denmark in 1165 and lived at the convent in Aebelholt.

From the convent gardens, the hop plants went to the common farmers. In the society of medieval times, it was important that the farms were self-sufficient with hops, as beer brewing was a regular part of the household. Both children and adults would quench their thirst in beer. Fairly large quantities were drunk, because the food of that time was very salty and the physically hard work made people thirsty. Furthermore, beer was nutritious and somewhat healthier to drink compared to for instance the water from the filthy wells.

The kings tried to facilitate the growing of hop through laws and regulations in order to reduce the German import: In 1473, Christian I required the farmers in Funen to dig 60 hop pits; in other words blocks with seven to eight roots with shoots, per year. In 1553, Christian III ordered all farmers in the entire

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Hop plants in the greenhouse at Aarslev; ready to be planted out.

The hop garden is established at the Danish Agricultural Museum, June 2006.

country to dig at least five hop pits, and in Christian V's Danish Law of 1683, five pits annually were commanded. The significance attached to the hop garden can be seen in the punishment for stealing hop from another man's hop yard which was being put in the stocks in the town square for three long hours!

In 1665, Arent Berntsen (1610-1680; Norwegian topographical-statistical author) wrote in his account of plant growing in the different parts of the country that hop growing in Zealand was the most widespread. Hop was grown partly for one's own consumption and partly for sale or the copyholder's annual rent; examples are thus given of farms in the environs of Copenhagen that were to pay their annual rent in hop.

After 1660, hop growing appears to be declining; not in Funen, though, where even hop districts with the oldest and largest hop gardens of the country are mentioned, and where hop gardens still existed at every farm around the 18th century. Several times in the used source material, Funen is termed 'Home of the Hop'. It is written about the region that there was a 'delightful' variation of hop, kitchen and flower gardens with belonging cherry trees. The hop districts are specified in a source from 1910 as the parishes around *'Braenderup and Bro, – a Hop Town in the Parish of Braenderup – and along to Middelfart and up towards Bogense constitute the most familiar District of Hop where the largest Hop Gardens exist. There are Gardens of Sizes up to 5,516.2 Squaremetres (1 Tønde Land), perhaps even more, on which roughly 800 Kilogrammes (100 Lispund) are grown'*. The hop growing in Funen is said to be established by Mrs. Anne Trolle Bille of Kaersgaard in the parish of Braenderup who, in 1700, sent her two farmers to Prussia for a period of two years to learn about the circumstances of hop growing. The same source mentions that *'in 1896, the cultivated Acreage of Hop roughly came to the four Fifths of Land of Funen'*, but that hop growing, at the time of publication, was declining, as the factories preferred German hops which were more aromatic and less bitter than the Danish hops. The reason for this could in part be due to the bad reputation that the hops from Funen were suffering from at that time, since different sorts were grown and hence resulted in a variable product.

If one was not self-sufficient with hops, one had to turn to the hops pedlar who came from the north-western part of Funen, where hop growing, as already mentioned, was an important sideline occupation. In 1910, Christine Reimer (1858-1943; Danish folklorist and author) writes the following about the hops pedlars from Funen: *'When the Hops were dried, one of the Natives from Funen would go to Jutland in the Autumn and sell the Wares there. The Hop Pedlars from Funen were well-known among the Natives of Jutland. One of the old Traders, who managed Sale in a truly old Fashion and in grand Style, only died recently; active to the finish'*.

In a written recollection from Western Jutland, it is stated that they bought hops from a travelling hops pedlar from Funen. They were, in return, self-sufficient with malt from the cabbage yard.

At the end of the 17th century, half a kilo of hops cost the same as half a kilo of butter. The price was about one Danish mark (an old Danish coin) conditional on, of course, locality, quality and yield. You see, the turn out of the hop crop could easily be very different. A single night with frost could turn the female flowers brown and thereby influence the crop results. A very dry summer was also harmful. If the late summer had been windy, they said that the 'hop butcher' had paid a visit to the farm, which meant that the hop stems with the ripe flowers were broken or blown down.

ARE THERE DIFFERENCES BETWEEN HOP PLANTS?

Many of the visitors at the Danish Agricultural Museum wish to know how many varieties or clones of hop there are in Denmark and how different these are from eachother. In

the research project which Gitte K. Bjørn conducts with the breweries, an approximate answer to this will be available in the future, as DNA analyses will be done in 2009 on parts of the collected hop plants. To the naked eye, however, it is clear that there are differences in the development, colour, predisposition to disease, etc., and this is also evident from the plants in the hop garden at Gl. Estrup. The colour shades of the female flowers range from spring green to slight reddish and the shape of the flowers vary from round/plump to oval/oblong. There is no doubt that there are many different hop plants. The challenge is to select the right plants for conservation in Aarslev and at Gl. Estrup.

The appearance and diversity of the hop plants are only sparsely illustrated in the source material. In 1796, Hornemann (1770-1841; Danish professor of botany) writes the following about the many hop varieties in the country: 'early and late, brown and white'. He writes that Denmark predominantly grows the German Braunschweig hop, which is characterised by carrying larger flowers at the top of the plant, and the English hop, which has smaller and more flowers on the entire stem.

Professor Olufsen (1763-1827; Danish agronomist and author) writes in 1812 that the English hop and the German Braunschweig hop are considered the best. In addition, the American hop is mentioned, which the farmers at that time had embarked on growing. It is described as good, though hops from this variety needed to boil for a longer time than the others.

In 1843, Jacob Aall Hofmann (?-?; Danish agronomist and author) writes about the old Danish hop that it was originally a German Braunschweig hop which had been brought to the country. It is characterised by square female flowers, primarily positioned at the top of the stem, and as the most hardy.

In addition, there is the 'grey root', possibly a cutting from the German Braunschweig, which received a lot of attention at that time in the hop districts in Funen. Several hop gardens were established with this type of hop. It does not have as large female flowers, but a greater profusion of these which appear on the entire stem. Finally, the source mentions the English hop with long, loose female flowers and a short growth.

In the research project, which Gitte K. Bjørn manages, the Carlsberg Laboratory has made aroma profiles of the collected hop plants. The results show that the hop clones are very much different, even though they have grown close to eachother.

In 1862, C.A. Nielsen (?-?) published a book on hop growing in which he discusses the planting and care of the hop. Here the different hop plants are described which, overall, are classified as wild hop and as garden hop, of which there were two types: '*The early hop, or August hop, which has half red clusters, long closed bines, and golden yellow, glistening hop mould. It blossoms early and ripens in August. The late hop which blossoms two to three weeks later than the previous variety. It has green stems and gives a more reliable and ample yield*'.

HAVE A TASTE OF HISTORY – THE DISSEMINATION CAN BE DRUNK

At the Danish Agricultural Museum, we still have a relatively modest experience of procuring the cultural history of hop and beer brewing. As mentioned, the garden was established in June, 2006, and already in the autumn, in connection with the hop crop, we could present the first beer from the museum. It was called 'Gl. Estrup Øl' and was exclusively brewed with hops from Danish hop. It only amounted to 1,200 bottles, but the interest from the media and the sale was great and in that way, the history of hop and the hop gardens and, not least, beer brewing and the significance of beer in the rural household were disseminated.

We chose an experimenting approach for our beer brewing weekend in September, 2006, under the headline: 'Historical →

Hop and beer was previously used a lot in cooking; both in everyday meals and festive meals which have long been forgotten. Curator Bettina Buhl has looked in the old cookery books from the 17th century and invites the taste buds to meet the past.

experiment with Danish hops'. We provided the visitors of the museum the opportunity to follow and taste the same hops in two different brewing processes:

• The brewers guild of Gl. Estrup which brews from old recipies from about the 1850s. Following the instructions of the mistress which would be passed on for generations on the Danish farms.

• Raasted Bryghus at Randers with regard to a modern industrial process.

In addition, the weekend offered a garden walk with hop experts, the 'mystery wokshop' of the hop, the cultural history of hop with myths and superstition, and, not least, we invited the visitors to a hop festival where the hop was harvested and picked. The festival ended, as they did it back then; with bine feast and barley porridge with pear gruel and doughnut holes (æbleskiver)!

The museum's activity calendar still prioritises the hop garden and beer brewing. In March, 2007, we invited for 'Taste the history of beer'. The starting point was that based on the appearance of the hop plants, we could see variation in the growth pattern, but the question is whether we can taste a difference in the individual hop plants?

Since the growth yield of the hop garden was modest, we supplemented with hops samples from Aarslev. They were sorted in three groups according to whether they originated from Jutland, Funen or Zealand, and based on this, three types of beer were brewed in the spring of 2007. A series of beer which we called 'The history of beer in Denmark'. The beer was produced by Raasted Bryghus where brewmaster Martin Jensen guaranteed that productionwise the three brews would be treated the same. It is the hops alone that determine the flavour variations. Furthermore, the brewers guild tested recipies of old beer and the use of the old instructions on seasoning in beer.

Beer from Gl. Estrup.

The hop garden project and the dissemination of beer brewing in the countryside are regularly added new initiatives, since we would like to link a culture-historical dimension to the plants. In connection with the collection and selection of the plants that are to be a part of the research project, we have chosen to work parallel to the Department of Horticulture where our work will be to document the plants' geographical affiliation, history and use in relation to beer brewing. In that connection, the museum and the Department of Horticulture have taken home a hop plant from the southern part of Funen. We were contacted in 2006, in connection with the media attention at the last beer brewing arrangement, by a woman who was the fifth generation on a farm in the south of Funen. The woman told that they had an old hop garden as a part of the farm's kitchen garden. The task of the museum is to secure recollections of the hop garden's use in beer brewing in the home, the aroma, the flavour and, not least, the procedure of the homebrewed beer. The Department of Horticulture has taken home a clone and in the spring of 2007, it was planted out in the mould at Gl. Estrup and in Aarslev. The professional staff of the museum the made a documentation of the farm's hop garden, the farm and the farm's many residents over the years. Interveiws, photos, records, etc. help securing that the history of beer brewing on this farm adds yet another tale to the research of the cultural history of the homebrewed beer in the countryside.

Humlemagasinet (The Hop Storeroom) at Harndrup in the north-western part of Funen is also visited. The museum holds a lot of history and is an important piece in the documentation of the history of beer brewing in Denmark. The tale from Humlemagasinet is so extensive, interesting and unique that the subject requires an article on its own.

The hop conservation and hop garden projects will run until the end of December 2009, and at that time, we will follow up with an article on the findings of the hop analyses.

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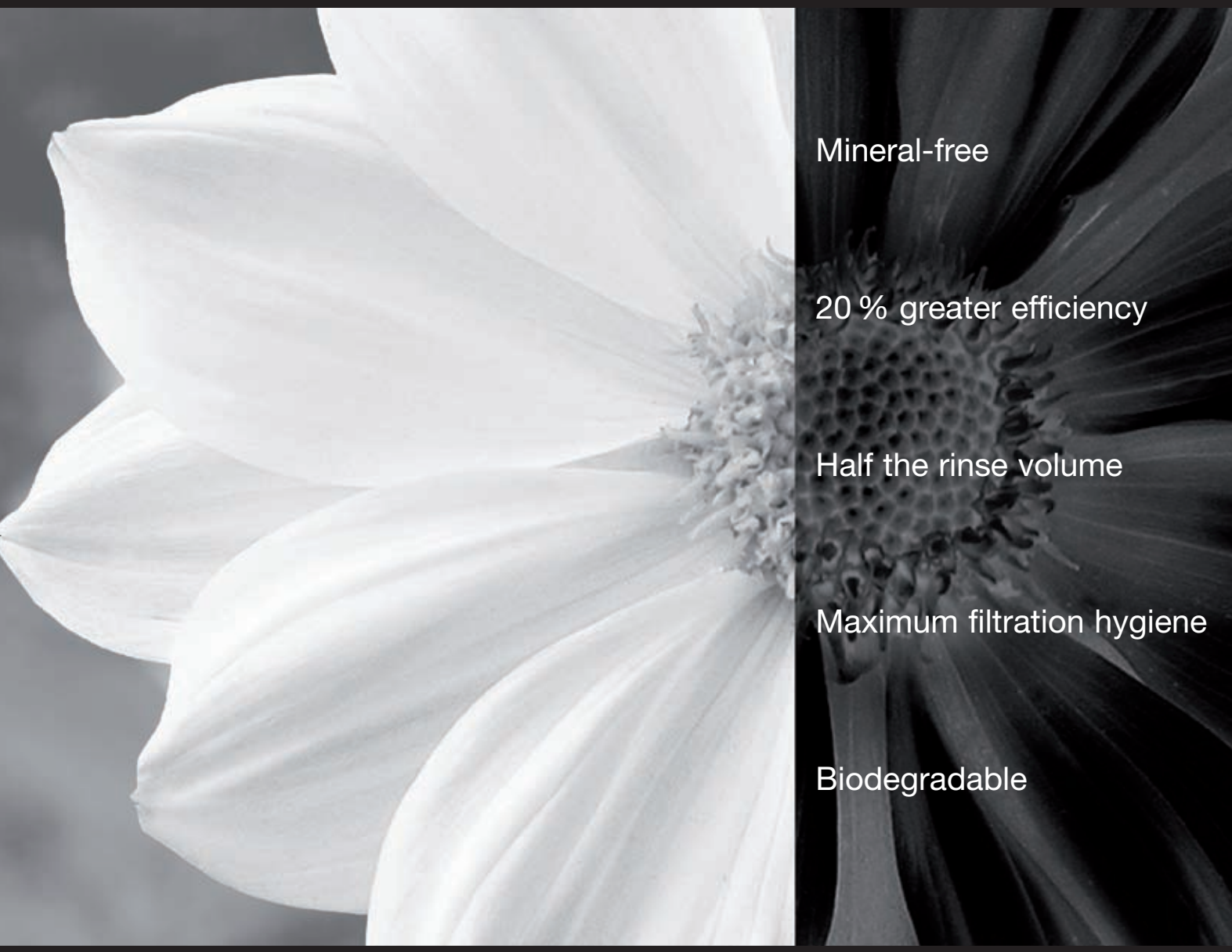

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