

# **The Breeding Industry in the Region**

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CIOPORA Germany, the national section of CIOPORA (International), represents about 60 breeders of asexually reproduced ornamental and fruit varieties. With this responsibility the activities are focussed on national German obligations containing all aspects of asexually reproduced ornamental and fruit varieties.

The “Region”, as announced in the programme, should cover Germany, the Scandinavian and the Baltic States. As the time to present results is very limited, and detailed information on the situation in Scandinavia and even more from the Baltic States is very limited, we will concentrate on the situation in Germany, and communicate data for the other two parts of the “Region” only in the context of actual existing plant variety rights.

The following presentation includes three topics, namely

1. Development of ornamental and fruit breeding in Germany
2. Actual situation of ornamental and fruit breeding in Germany and
3. Protected ornamental and fruit varieties in the “Region”.
4. Difficulties in enforcement and improvement of the PBR system

## **1. Development of ornamental and fruit breeding in Germany**

Since discovering the world, new plants are brought also to Germany. After a first period of collecting them in monastery and residence gardens between the 15<sup>th</sup> and the late 16<sup>th</sup> century, some of them became, beginning with the 17<sup>th</sup> century, basic material for ornamental breeding programmes. The technical equipment available at that time didn't allow cultivating a large amount of mother plants during the winter season, and marketing restrictions opened only a small local market for mainly vegetatively propagated ornamental species.

Only after reducing the trade restrictions, mainly the customs regulations, at the end of the 18<sup>th</sup> and the beginning of the 19<sup>th</sup> century, the prerequisites for the development of very potent, large and international acting firms were given. Examples are: F.A. Haage, Platz und Sohn, W.G. Leser, Apelius, Benary, Erfurter Samenzucht, Dippe und Haage and Schmidt. These firms concentrated the breeding activities nearly exclusively on seed sown varieties, and the production of seed. Both activities reflect the used company names, namely “Seed Breeder”.

To produce high quality seed, favourable climatic conditions were needed, preferentially close by. These prerequisite was met in Germany mainly in the rain shadow of the mountain region of Harz and Thüringer Wald, where important breeding centres were build up together with the company headquarters in the town of Quedlinburg und Erfurt.

After overcoming the economic recession of the First World War, the Ornamental Breeders had only a very short period of about 10 years to increase breeding as well as the trade activities. Thereafter, increasing political targets limited the concentration on ornamental breeding, and in general the production of ornamentals for the benefit of food production.

With the end of the Second World War the properties of the ornamental breeders in the German Democratic Republic were expropriated. After the reunion of Germany only very few companies used the offered restitution of their possessions. The local advantages, for example the climatic conditions for seed production, lost their importance; world wide superior possibilities were available. There is no longer need to concentrate breeding, seed production and marketing at the same location. However, more decisive are the facts, that most of the “old” traditional companies mentioned terminated their activities and that the market in ornamentals changed from a dominating seed segment to an at least equivalent market in vegetatively propagated ornamental varieties. As outlined in the historical review, in Germany such a turnabout happened already about 200 years ago, although at that time in the opposite direction from vegetatively to generatively reproduced varieties.

Regards fruit breeding, a less spectacular history can be reported. Most of the “old” fruit tree varieties are either spontaneous mutants or seedlings in the offspring of predominantly spontaneous hybridizations. Only after rediscovery of the Mendelian rules of inheritance, an increased number of crossings and exceptional back crosses of selected parents have been performed.

Today fruit tree species overhaul ornamental species: Their complex genotypic situation was and still is the motor to sequence their genome and to find quality markers for a marker based selection. For example, today much more molecular genetic information is known from the peach genome than from the Rose genome.

Other fruit species, as for example strawberry, also profit from the development of molecular and quality markers. Correspondingly is the increase of strawberry breeding activities.

## **2. Actual situation of ornamental and fruit breeding in Germany**

Breeding research and partly development of basic material is in Germany an assignment of public institutions, like Universities, Federal Research Stations etc. These institutions are permanently reorganized with the aim to create synergy effects and to reduce the budget. Correspondingly is the decreasing benefit for practical breeding purposes.

Variety breeding of ornamentals is performed by breeding companies and highly specialized and competent amateurs. In contrast, fruit variety breeding is nearly exclusively carried out in public financed institutions. However, small fruit species, as for example strawberries, raspberries, currants and gooseberries are increasingly bred in private companies.

In breeding of seed propagated ornamentals about ten companies are active. Most of them concentrate in one or a very few species, like *Primula* or *Helleborus*. Only one company covers activities in some hundred species.

In contrast to that, the number of firms running breeding in vegetatively propagated ornamentals is nearly 80, with about 20 of them at the top. The spectrum of species covered, ranges from only one, for example *Rosa*, *Rhododendron*, *Calluna* or *Orchids*, or includes a broad assortment of up to hundred and more species, as for example in bedding plants.

Within the top firms, staffs of more than five breeders together with the same number of laboratory researchers are engaged. These firms run their own biotechnology programme,

inclusive marker assisted selection and gene transfer. All companies in this segment are world wide active and do have international cooperation.

The breeding of ornamental species with a lower market value is the domain of private experts. They very often create the basis for very successful varieties, as for example in *Fuchsia*, *Dahlia*, *Helleborus* and *Paeonia*. These species often become part of the breeding activities and the assortment of breeding companies.


### 3. Protected ornamental and fruit varieties in the “Region”

The following statistics on protected ornamental and fruit varieties shall be used to demonstrate the power and success of ornamental and fruit species breeders in the “Region”, composed of Germany, Scandinavia and the Baltic States.

From the total number of rights in force, about 23% out of 9795 for ornamental, and about 10% out of 1052 for fruit varieties belong to title holders in the “Region” (Table 1). (In comparison with ornamental and fruit species, the total number of rights in force is 4.945 for agricultural and 2.207 for vegetable species.)

Table 1:

Table 1.



## The Breeding Industry in the Region

Rights in Force of Ornamental and Fruit Species Varieties in all Countries and the Region per 10 May 2011

	All countries	Region		Germany		Denmark		Norway	
	Nos	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>
Ornamentals	9795	2225	22.7	1583	16.2	603	6.2	1	< 0.1
Fruit species	1052	104	9.9	97	9.2	0	0	0	0

	Sweden		Finland		Estonia		Latvia		Lithuania	
	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>	Nos	% <sup>1)</sup>
Ornamentals	33	0.3	3	< 0.1	2	< 0.1	0	0	0	0
Fruit species	7	0.7	0	0	0	0	0	0	0	0


1) % of Nos of all countries

Within the “Region” significant contributions to ornamental varieties come from German and Danish breeders. They held nearly all titles in the “Region” and about 16% or 6% of titles of all rights in force under the CPVO regime, respectively. Breeders from Sweden, Finland, Norway, and Estonia follow with less than 1% (Table 1).

Regards fruit species breeding the “Region” is obviously less active. Within the region only German and Swedish breeders own rights, and contribute about 9% and about 1% of the existing titles in all countries, respectively (Table 1).

Looking into the frequency of titles within single ornamental species and German applicants, *Pelargonium* and *Rosa* varieties cover with 343 and 340 titles, respectively, together about 43% of all rights in force. *Impatiens* with 168 titles, about 11%, and *Calibrachoa* with 102 titles, about 6%, take the next positions in the ranking. The 12 ornamental species with a number of titles between 20 and 54 contribute altogether about 25%, whereas all other species with less than 20 rights in force deliver the remaining about 15% (Table 2).


Table 2:

 <h2 style="text-align: center;">The Breeding Industry in the Region</h2> <h3 style="text-align: center;">Frequency of Rights in Force in Ornamental Species of German Applicants per 10 May 2011</h3>			
Species	Number	Frequency <sup>1)</sup>	Frequency <sup>1)</sup>
<i>Pelargonium</i> L'Her.ex Aiton	343		21.7
<i>Rosa</i> L.	340		21.5
<i>Impatiens</i> L.	168		10.6
<i>Calibrachoa</i> Llave & Lex., <i>Petunia</i> Juss.	102		6.4
<i>Euphorbia pulcherrima</i> Willd. Ex Klotzsch	54	3.4	
<i>Calluna vulgaris</i> (L.) Hull	50	3.2	
<i>Osteospermum</i> L.	41	2.6	
<i>Lobelia</i> L.	36	2.3	
<i>Dianthus</i> L.	35	2.2	
<i>Chrysanthemum</i> L.	33	2.1	
<i>Fuchsia</i> L.	27	1.7	
<i>Nemesia</i> Vent.	25	1.6	
<i>Argyranthemum frutescens</i> (L.) Sch. Bip.	23	1.5	
<i>Helleborus</i> L.	22	1.4	
<i>Begonia</i> L.	21	1.3	
<i>Verbena</i> L.	20	1.3	
Total <i>Euphorbia</i> up to <i>Verbena</i>	387		24.6
Other species	243		15.4
Total	1583		100

<sup>1)</sup> % of 1583 rights in force in the Region for German applicants

As in ornamentals also in fruit varieties only three species, namely *Prunus*, *Malus* and *Vitis* varieties dominate the frequency of rights in force. The number of titles is, however, with 23, 22, and 17 less than 10% as compared with the ornamentals (Table 3).

Table 3:



### The Breeding Industry in the Region


Frequency of Rights in Force in Fruit Species of German Applicants per 10 May 2011

Species	Number	Frequency <sup>1)</sup>
<i>Prunus domestica</i> L.	23	23.7
<i>Malus domestica</i> Borkh.	22	22.7
<i>Vitis</i> L.	17	17.5
<i>Pyrus communis</i> L.	7	7.2
<i>Prunus</i> L. (Unterlagen-Sorten)	7	7.2
<i>Fragaria x ananassa</i> Duch.	4	4.1
<i>Rubus idaeus</i> L.	3	3.1
<i>Ribes uva-crispa</i> L.	3	3.1
<i>Lonicera caerulea</i> L. var. <i>kamtschatica</i> Sevast.	2	2.1
Other species	9	9.3
<b>Total</b>	<b>97</b>	<b>100</b>

<sup>1)</sup> % of 97 rights in force in the Region for German applicants

Analyzing the number of protected ornamentals of German title holders, a broad range between less than 10 and more than 200 is found. Very much of the German applicants hold less than 10, six more than 100 titles, with 218 at the top position. Eighteen breeders own between 10 and 100 titles (Table 4).

Table 4:



### The Breeding Industry in the Region

Frequency of Rights in Force in  
**Ornamental Species** of German  
Applicants in Title Holder Classes  
per 10 May 2011

Nos of Rights	Nos of Title Holders
> 200	1
200 – 150	2
150 – 100	3
100 – 50	2
50 – 40	0
40 – 30	4
30 – 20	4
20 – 10	8
< 10	> 50

Frequency of Rights in Force in  
**Fruit Species** of German Applicants  
in Title Holder Classes  
per 10 May 2011

Nos of Rights	Nos of Title Holders
19	1
12	1
9	1
7	2
6	1
4	2
3	2
2	5

In fruit species varieties, the 15 German owners of rights possess between 2 and 19 rights, and two of them together more than 30 (Table 4).


#### 4. Difficulties in enforcement and improvement of the PBR system

In Germany the possibility to protect ornamental and fruit varieties started in 1968 under the UPOV Convention for the Protection of New Varieties of Plants. In the beginning not any ornamentals were affiliated in the list of protectable plant species. It is the merit of two German rose breeders that roses were the first integrated ornamentals, followed by some berry fruits. Only since 1992 varieties of all plant species could be protected.

Before 1968 ornamental and fruit breeders didn't have a secure instrument to prevent infringement. A flood of yearly new varieties and some patents, for example for Roses and *Matthiola*, are examples for the low efficiency of these tools.

The presented data of rights in force in the "Region" clearly indicate that German breeders of ornamental and fruit species varieties use the tool of "Plan Breeders Right" intensively. But as in all other outstanding rules, there remain always approaches for improvement. The following overview summarises wishes und proposals of German breeders how to improve the PBR system and to overcome difficulties in enforcement cases (Table 5).

Table 5:

 <h3>The Breeding Industry in the Region</h3>	
Difficulties in Enforcement of PBR	Possible Approaches / Improvements
<b>Too narrow and thus weak definition of DUS-criteria</b>	<b>Broader distances</b> in phenotype <b>Molecular fingerprints</b> as accompanying criteria
<b>Limited access</b> to technical data of applications and PBR in case of infringement (tedious, especially at some national offices)	<b>Open access</b> - to all files via Internet - to all reference collections at the examination offices - in future: DNA Data bases for application and grants
<b>Unreadiness to enforce PBR</b> due to <b>high costs</b> and <b>time-consuming processes</b> <b>Burden of proof</b> , in case of infringement on breeders side <b>Variety comparison too long</b> , outrun by new varieties	<b>Fast access to plant material</b>  <b>Rapid molecular tests</b> (on the spot of infringement) → <b>Fast reversal of the burden of proof</b> <b>Educational advertising of PBR</b> in the international trade of plant varieties (e. g. retail industry) <b>Intellectual property insurance</b> – defense and recovery or other possibilities of risk coverage
<b>Market/PBR requirements different</b> , depending on.. - the method of propagation (seed, cuttings or tissue culture) - the branch/plant species (e. g. Ornamental Plants, Fruits, Food Plants, Energy Plants)	<b>Readjustment of PBR</b> - to state-of-the-art breeding and propagation systems <b>Breeders requirements towards their markets</b> - stronger consideration by the CPVO

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