Federal Plant
Variety Office

Federal Plant Variety Office

Plant Breeders' Rights and National Listing

Preface

Dear reader,

agricultural and horticultural crops form the basis for the nutrition of humans and animals. They are also an important source for the production of sustainable bioenergy and an essential part of ours today's biodiversity. Plant variety protection and variety approval - the two core tasks of Federal Plant Variety Office - promote the necessary breeding progress and such a constant improvement of varieties in agriculture and horticulture. This is important in order to meet the increasing demand for food and feed and to meet changing quality requirements. All It is also important to continuously adapt the varieties to changing ones Climate and cultivation conditions.

The granting of plant variety protection forms the basis for protecting intellectual property Ownership of a new plant variety and thus the economic one Protection of complex plant breeding. Admission of a new one agricultural plant variety is only carried out by the Federal Plant Variety Office, if in their entirety their properties are better than those already approved Varieties is. This is an essential driving force for plant breeders, always varieties with higher yields, special quality and improved Resistance to diseases and adapted to environmental conditions Cultivation characteristics to breed.
But breeding is not only essential in the agricultural sector.
The expansion of the variety of species and varieties in the field of ornamental plants is not only something for the eye of the beholder, but it is also more economical Significance for breeding and horticultural companies.

In this brochure we give an insight into the diverse work of the Bundessortenamt and hope you enjoy reading.

View of basil varieties

Calendula trials

Measuring height of maize

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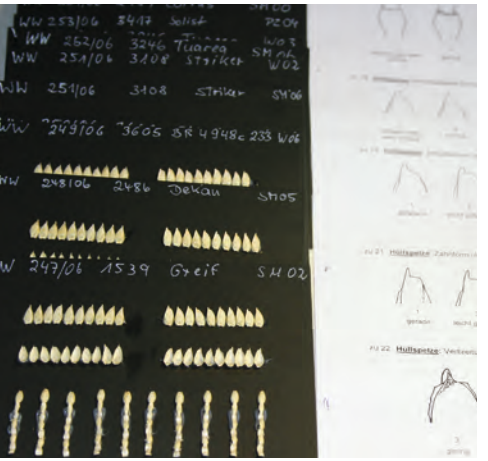


Glume assessment (wheat)

Petunia trials

Testing station Rethmar (1968)

1. Development of the Plant Variety System

Development of plant variety and seed systems is centuries old in Germany, but with the establishment of the first seed control station in Tharandt, Saxony in 1869, its true history in a modern sense began. The first private seed certification system was created in 1896, and the DLG breeding list (= Variety List) was introduced in 1905. By 1902 the Association of Agricultural Testing Stations had already drafted basic rules for uniform seed testing so that by 1928 technical regulations for seed testing were deemed necessary by the Government. Government funding of seed tests, at least in part, was motivation for many universities and agricultural chambers to take part in agricultural trials.

In 1934 the Government took on all responsibility for seed and plant variety systems and the Seed System Ordinance was adopted. As a result of post-World War II conditions, separate regulatory systems were developed in East and West Germany. After the reunification the differences were again coordinated.

In 1949, after an interim solution, the Plant Variety Office for consumer plants was established in the Federal Republic in Rethmar near Hanover. Laws were passed in 1953 for Plant Breeders' Rights and seed regulation of cultivated plants (Saatgutgesetz — Seed Law), and the Plant Variety Office became an independent federal authority and was renamed. Since 1980, the Bundessortenamt headquarters have been in Hanover-Buchholz.

Today the functions of the Bundessortenamt are regulated by the Plant Breeders' Rights Law (Sortenschutzgesetz — SortG) of 1985 (last amended in 1997), by the German Seed Act (last amended in 2016) and by related regulations. Today all statutory provisions are based on internationally adopted guidelines and regulations, which the Bundessortenamt has helped to develop.

2. The Bundessortenamt Introduces Itself

The Bundessortenamt (BSA) with its headquarters in Hanover is, by order of the Federal Ministry of Food and Agriculture (Bundesministerium für Ernährung und Landwirtschaft — BMEL), an independent federal authority managed and represented by its president.

President

Division 1	Division 2	Division 3
Administration	**Testing for Value of Cultivation and Use (VCU), Testing for Distinctness, Uniformity and Stability (DUS), Plant Genetic Resources**	**Trial Management**
→ Organisation → Staff → Budget, Accounting → Legal Affairs → Variety Administration → Information Technology (IT)	→ VCU Testing for National Listing → DUS Testing for Plant Breeders' Rights and National Listing → Descriptive Variety Lists → Gene Banks	→ Laboratory → Testing Station Management → Property Management and Services → Operational Safety

Directly responsible to the President:

→ National and International Variety and Seed Affairs, Coordination Centre for the Ministry of Food and Agriculture (Section P 1)

→ Communication, Biopatent Monitoring, Quality Management (Section P 2)

Decision-making bodies of the Bundessortenamt:

→ Variety Protection: 10 Examination Boards for Plant Breeders' Rights

→ Admission to the National List: 10 Variety Committees

→ Appeal Committees: 9 Committees

Bundessortenamt

BSA headquarters in Hanover

Functions of the Bundessortenamt

- Granting national Plant Breeders' Rights for new varieties
- National listing of plant varieties as a prerequisite for marketing seed and plants, i.e., admission and registration in the National Variety List
- Monitoring the maintenance of protected and listed varieties
- Conservation and sustainable use of genetic resources
- Biopatent monitoring
- Publication of the Descriptive Variety Lists
- Publication of the "Blatt für Sortenwesen", the official gazette of the Bundessortenamt
- Assistance in national seed legislation
- Coordination of seed certification issues and seed marketing control authorities of the Federal States and foreign countries
- Representation of Germany in international boards regulating variety and seed affairs
- Bilateral support of third world countries and especially eastern and southeastern European countries in the development of seed and plant systems
- DUS tests on behalf of the Community Plant Variety Office (CPVO)

Some Figures

Bundessortenamt staff:	300
Annual budget 2016:	23.1 m €
Income in total 2016:	11.7 m €
of that revenues from fees:	11.2 m €

Procedures for National Listing and Plant Breeders' Rights

National Listing		Plant Breeders' Rights
Application at the BSA		**Application at the BSA**
DUS testing: Distinctness, Uniformity, Stability, Variety Denomination	**VCU testing (only for agricultural species):** Value for Cultivation and Use (yield, resistance, quality)	**DUS testing:** Distinctness, Uniformity, Stability, Variety Denomination, Novelty
Trials at BSA and other stations, in Germany and abroad		
Examination report and decision		
Admission to the National List and to the Common Variety Catalogue		Granting Plant Breeders' Rights
Listed variety maintenance		Protected variety maintenance

Registered and Protected Varieties at the Bundessortenamt
(status: 1st July 2016)

Species	Registered Varieties	Protected Varieties
Agricultural Species		
Cereals (incl. maize)	809	139
Grasses	898	247
Oil and fibre plants	266	123
Beets	366	1
Potato	204	36
Vine	128	71
Other agricultural species	-	17
Agriculture	**2.671**	**634**
Horticultural Species		
Vegetables	545	88
Ornamentals (incl. roses)	-	523
Woody ornamentals, forest trees	-	81
Fruits	1	138
Other horticultural species	-	60
Horticulture	**546**	**890**
Agricultural and horticultural species	**3.217**	**1.524**

Rose: DUS testing — Flower colour assessment with RHS Colour Chart

2.1. Plant Breeders' Rights

- → Application for Plant Breeders' Rights at the Bundessortenamt
- → Testing for distinctness, uniformity, stability (DUS), novelty and variety denomination
- → Examination at Bundessortenamt testing stations or foreign partner sites
- → Examination report and decision
- → Granting Plant Breeders' Rights

The Plant Breeders' Right is an exclusive right comparable to a patent for technical inventions. The intellectual property of a clearly defined plant variety can be protected on the basis of the Plant Breeders' Rights Law (SortG). This law ensures that the breeder's work is safeguarded by concession of a private protection right and thus it promotes plant breeding.

On the basis of the Plant Breeders' Rights Law, all plants of the entire plant kingdom, with the exception of micro-organisms, can be submitted for variety protection. A plant variety can be protected when it is new, distinct, uniform and stable. It must also be provided with an approved variety denomination. Any breeder or discoverer of a new plant variety can apply for the national Plant Breeders' Rights.

Granting Plant Breeders' Rights

The decision to grant Plant Breeders' Rights is made by an examining board made up of one expert from the Bundessortenamt. Presently, there are 10 examining boards for the various plant species. The decisions of these boards can be contested. A board of appeals made up of a chairperson, a legal advisor, a plant specialist and two honorary members from outside the Bundessortenamt decides on these cases. Further, the decision of such boards of appeals can be contested at the Federal Patent Court. If this court allows, and the plaintiff wishes, the case can be taken to the Federal Supreme Court.

The Effect of Plant Breeders' Rights

Plant Breeders' Rights provide that only the owner or his/her legal successor has the right to produce, market or import reproductive material (plants, parts of plants, seed) of the protected variety. The use of a protected variety in order to breed a new variety does not require authorisation from the holder of Plant Breeders' Rights (breeder's privilege). Special safeguarding regulations do apply to the use of protected inbred lines for the production of hybrid varieties. Since 1997 distinctive varieties derived from protected varieties, and similar to these varieties, are protected as well so that reproduction even within a breeder's own operation can be, under certain conditions, subject to fee. Plant Breeders' Rights can be granted for 25 years. In the case of vines, tree species and potatoes the protection is for up to 30 years.

Testing Prerequisites for Plant Breeders' Rights

DUS Testing

Testing is done to establish distinctness, uniformity and stability. All those characteristics relevant for distinguishing one variety from others are examined. These characteristics are equally important for assessment of uniformity and stability, so their expression is assessed in the DUS testing.

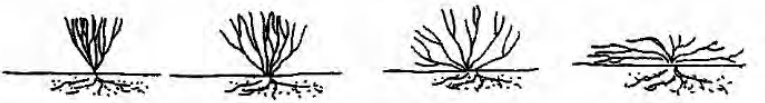
When possible, only those characteristics minimally affected by environmental

factors are examined. The test guidelines are developed nationally or on the EU level and set down not only the characteristics to be examined but also their expression. The guidelines are conform to recommendations and basic principles of UPOV (Union for the Protection of New Plant Varieties). The guidelines also include technical information for trials and for uniformity requirements. Each set of characteristics can be divided into quantitative, qualitative and pseudo-qualitative characteristics.

TG/94/6 Corr.
Ling, Scots Heather, 2001-04-04 + 2009-02-27
-25-

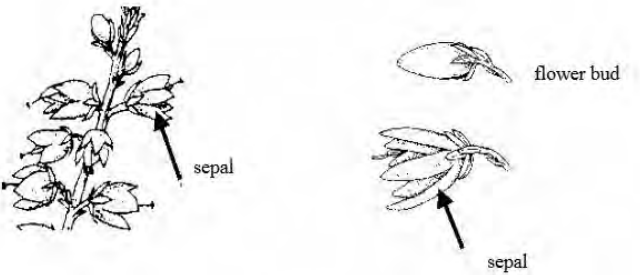
VIII. Explanations on the Table of Characteristics

Ad. 1: Plant: growth habit



1 upright | 2 narrow bushy | 3 broad bushy | 4 creeping

Ad. 17: Varieties with opening buds only: Flower: color of outer side of sepal



Examples for DUS Characteristics:

Quantitative Characteristics:

Flowering time:	Note 1 = very early Note 2 = very early to early Note 3 = early Note 4 = early to medium Note 5 = medium Note 6 = medium to late Note 7 = late Note 8 = late to very late Note 9 = very late	**Plant length:**	Note 1 = very short Note 2 = very short to short Note 3 = short Note 4 = short to medium Note 5 = medium Note 6 = medium to long Note 7 = long Note 8 = long to very long Note 9 = very long

Qualitative Characteristics:

Petiole: anthocyanin colouration	Note 1 = absent Note 9 = present	**Plant sex:**	Note 1 = male Note 2 = female Note 3 = hermaphrodite

Pseudo-Qualitative Characteristics:

Pseudo-qualitative characteristics are characteristics whose expression varies continuously, at least in part, and does not allow a description on a one-dimensional scale. Colours and forms are typical examples.

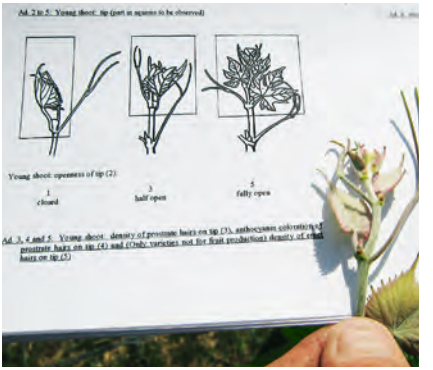
Leaf shape:	Note 1 = ovate Note 2 = elliptic Note 3 = circular Note 4 = obovate	**Flower colour:**	Note 1 = white Note 2 = pink Note 3 = red Note 4 = orange

Depending on the characteristic, its expression is visually assessed or measured (dimensions, counting, weighing). Appropriate devices and procedures are used for each characteristic. For example, the colour of ornamentals' blossoms can be determined by using the RHS Colour Chart (Royal Horticultural Society). Image analysis is used for measurements of leaves or petals.

Distinctness

A plant variety is considered distinct when the expression of at least one of its relevant characteristics differs clearly from the relevant characteristics found in all other varieties of common knowledge. The varieties in DUS testing are compared to other similar varieties for one or more growing cycles.
Two varieties are distinct if the difference of at least one characteristic is clear and stable. In this case “clear” means that the difference between characteristics must be greater than the natural variation of characteristics within the variety.

Test growing of barley



Vine shoot assessment

Pericallis — Flower colour assessment

Uniformity

A variety is sufficiently uniform when variation as a result of particular propagation methods and off-types due to admixtures, mutation or other factors is so minimal that both an exact description as well as the assessment of distinctness is possible, i.e., the essential characteristics are uniform. Therefore the evaluation of uniformity requires a specific tolerance that depends on how the variety is propagated — vegetative propagation, self-pollination or cross-pollination.

The parameters of tolerance for vegetatively propagated and self-pollinated varieties are more stringent than for cross-pollinated varieties. Uniformity of cross-pollinated varieties is assessed in relation to other known varieties. On the basis of population standards, UPOV has developed harmonised principles for the calculation of the number of off-types to be tolerated.

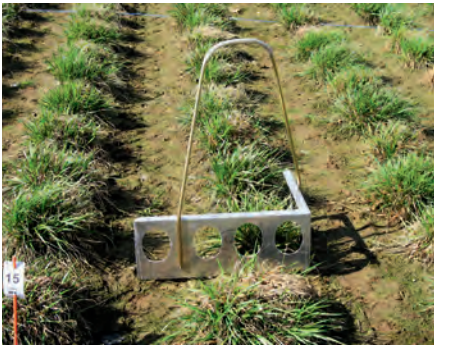
Calibrachoa — Flower assessment

DUS testing of grasses at the Bundessortenamt

1. Greenhouse view of individual plant propagation

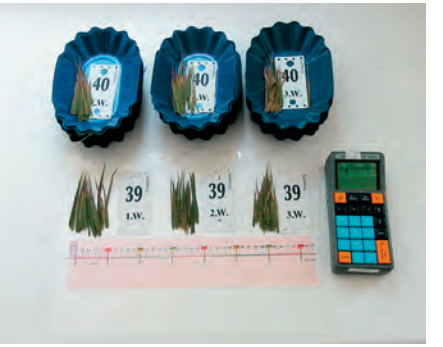
2. Planting in the field

3. Individual plants in April



4. Characteristic “plant width”

5. Preparation for leaf and blade measurement



6. Characteristic “leaf length”

Stability

A variety is considered stable when the expression of its characteristics remains unchanged after repeated propagation or propagation cycles.
In order to test whether or not a variety is stable, newly submitted reproduction material is grown along with known material of the variety, and the expression of the characteristics is compared. If a standard sample is not available, consistency in the expression of characteristics must be evaluated by using the variety description.

Novelty

A variety is considered new when, before the date of application for Plant Breeders' Rights, plants or parts thereof have not been marketed for a period of more than one year within Germany and not more than four years outside of Germany. For vine and tree species a six-year grace period applies outside of Germany.

Variety Denomination

Plant Breeders' Rights can be granted only after a variety denomination has been designated. When Plant Breeders' Rights are approved or a variety has been added to the National List, the variety denomination becomes inseparably linked to this particular variety. Internationally harmonised criteria have been set up within UPOV and the EU so that, among other requirements, the same variety denomination must be used in all countries. The variety denomination for different varieties must not be identical or confusing.
The Bundessortenamt checks proposed variety denominations using national and international databases and various other sources of information on variety denominations of common knowledge.

2.2. Plant Variety Protection in the EU

In 1995 the European Union Variety Protection Ordinance, Regulation (EC) No. 2100/94 was adopted making it possible to apply for Plant Breeders' Rights valid throughout the EU (Community Plant Variety Rights — CPVRs). The Community Plant Variety Office (CPVO) in Angers, France is responsible for granting the rights.

Triticale — Hairiness assessment

Number of Valid Community Plant Variety Rights
(as of 1st December 2016)

Crop sector	Total number
Agricultural species	7.600
Vegetables	3.696
Ornamentals	12.032
Fruits	1.645
Total	**24.973**

Number of Applications to the CPVO for Community Plant Variety Rights (from 1995 to 2015)

Crop sector	No. of applications	Part of total
Agricultural species	13.349	24,4 %
Vegetables	7.051	12,9 %
Ornamentals	30.994	56,6 %
Fruits	3.398	6,2 %
Total	54.792	100 %

(Statistics from: www.cpvo.europa.eu).

Contact:

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http://www.cpvo.europa.eu
Email: cpvo@cpvo.europa.eu

The Bundessortenamt tests numerous plant varieties for distinctness, uniformity and stability on behalf of the CPVO. It also sends representatives to the various expert groups and the Administrative Council of the CPVO.

CPVO Accreditation of the Bundessortenamt as Testing Office

Since a Quality Audit System (QAS) was installed in 2009, all examination offices are obliged to perform technical examinations according to quality criteria adopted by the Administrative Council of the CPVO. At regular intervals audits are made by the CPVO administration to assure that its quality system is intact. Accreditation is granted for three years and can be renewed after a follow-up inspection. The Bundessortenamt has been appointed as Accredited Examination Office of the CPVO for a large number of species.

Number of Applications to the CPVO for CPVRs According to Country (2015)

EU country	No. of application	Part of total
Netherlands	985	40,7 %
France	466	19,3 %
Germany	**464**	**19,2 %**
Spain	110	4,5 %
Denmark	88	3,6 %
Italy	79	3,3 %
Great Britain	73	3,0 %
Belgium	57	2,4 %
Sweden	24	1,0 %
Other EU countries	72	3,0 %
Total EU	**2.418**	**100 %**

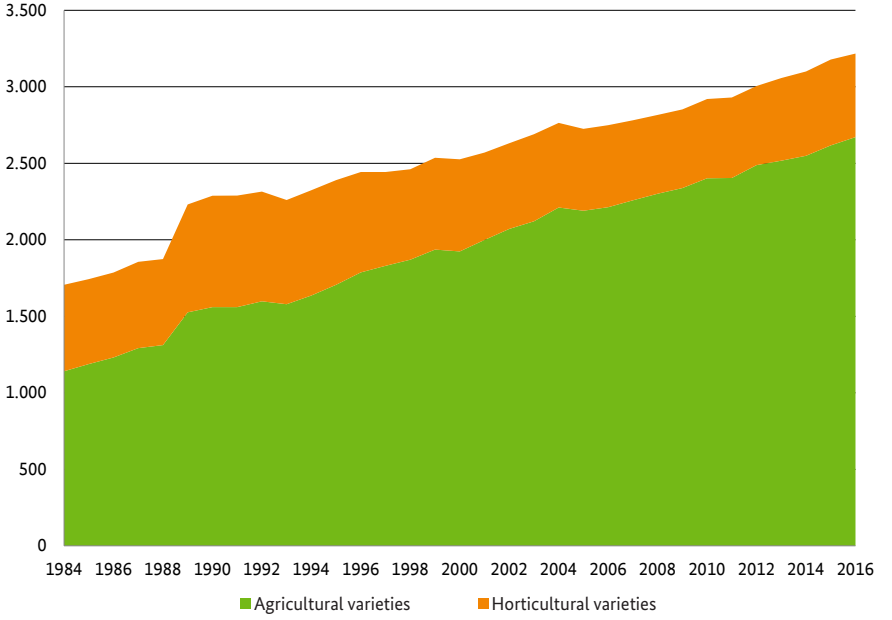
Non-EU country	No. of applications	Part of total
USA	302	43,6 %
Switzerland	188	27,1%
Israel	49	7,1 %
Australia	38	5,5 %
Japan	35	5,1 %
Thailand	21	3,0 %
Taiwan	12	1,7 %
Other Non-EU countries	48	6,9 %
Total Non-EU	**693**	**100 %**

Wheat trials

2.3. National Listing

Admission to the National List is a prerequisite for marketing of seed and plant material of agricultural plant species, vegetable species and vines. The National List ensures that only the highest quality of seed and plant material is available for agriculture, horticulture and vineyards. Not only varieties listed in Germany, but also those listed in other EU countries (Common Variety List) can be marketed. A consumer law (SaatG — Seed Act) regulates national listing.

Number of Registered Varieties in Germany
(status: 30th June 2016)



Potato flower

Decisions on National Listing

The prerequisites for admission to the National List are distinctness, uniformity, stability as well as issuance of a variety denomination. Trials for the National List are the same as those for Plant Breeders' Rights (see 2.1.). Agricultural plant varieties must also show proof of their value for cultivation and use (VCU).

Variety committees consisting of three experts from the Bundessortenamt make all decisions on admission to the National List as well as on renewals and terminations. There are ten such variety committees for the various plant species. The decisions of these committees can be contested. There are nine boards of appeal that decide in these cases. Each board is made up of a chairperson and a legal advisor from the Bundessortenamt as well as five honorary members from outside the Bundessortenamt. A further appeal can be made to an administrative court (Verwaltungsgericht — VG). Although its ruling is binding, this court can allow a case to be taken to the Federal Administrative Court (Bundesverwaltungsgericht — BVG).

Value for Cultivation and Use (VCU)

A variety has value for cultivation and use if all its value features give reason to believe its performance in the field will be superior to listed varieties or the utilisation of its yield, or products thereof, will be decidedly better than those of previously listed varieties.

The characteristics defining value are tested in the field and in lab tests. Tests are done to find data on cultivation, resistance, yield, quality and use. The trials are carried out throughout Germany at Bundessortenamt testing stations and at other sites working for the Bundessortenamt — Federal State facilities, plant breeders' facilities and partner testing facilities.

The VCU tests for each variety are done at approximately 14 individual facilities every year. Varieties of some species can be approved after two years and others after three years of testing. Mutual guidelines and file formats have been agreed upon by both the Bundessortenamt and the Federal States in order to ensure an unobstructed process from application to approval to recommendation. This testing system not only supports diversity maintenance but also promotes variety and species diversity. It also backs small- and medium-sized private breeders and guarantees fair competition, ecological agricultural practices, sustainable use and consumer protection.

Quality and Resistance

Field trials alone are not enough to determine the value of a variety. They are often supplemented by special tests for resistance and quality. For example, wheat and rye must undergo milling and baking tests; barley must go through malting tests; potatoes are even boiled and eaten to test food quality.

Depending on whether the harvest is to be used as food or fodder, the contents must be examined. Much of the resistance testing of agricultural and horticultural species done under controlled conditions for the Bundessortenamt is the responsibility of the Federal Research Institute, Julius Kühn-Institut (JKI). Pest and disease resistance is especially important in light of the need

for environmentally friendly plant production methods.

Variety Suitability for Organic Farming

Normally the Bundessortenamt carries out VCU testing without the use of pesticides and herbicides so that the true varietal values for cultivation, resistance, yield and quality can be assessed. Nonetheless, as a result of the increasing importance of organic farming, VCU testing procedures have been set up for this area. The testing is done in individual Federal States at State Organic Variety Trials (Öko-Landessortenversuche/Öko-LSV) and at private facilities in cooperation with organic farmers.

Registration of Wheat Varieties — Value Features

Cultivation Characteristics	Disease Resistance Characteristics
Ripening	Stem diseases (root rot, eyespot)
Lodging	Leaf diseases (powdery mildew, brown and yellow rust, Septoria)
Winter hardiness	Ear diseases (Septoria ssp., Fusarium ear blight)
Yield Characteristics	**Quality Characteristics**
Grain yield	Hagberg falling no., protein content, sedimentation value
Plant density	Milling qualities (mineral nutrient, flour yield)
Thousand-grain mass	Baking qualities (Rapid Mix Test, dough characteristics)

Every year the variety committees at the Bundessortenamt decide on 200 to 300 of the 900 agricultural varieties submitted. Approximately 150 of these are registered and added to the National List. Approximately 50 vegetable varieties are also submitted each year.

The varieties are on the National List for ten years and registration can be renewed. The Forest Seed and Plant Law regulates testing of forest species and is the responsibility of the Federal States.

Registration of Fruit Varieties

Normally, marketing propagation material of fruit varieties does not require seed regulatory registration of the variety. Listing is optional, not a requirement, and can be applied for. The varieties must also meet certain phytosanitary requirements. However, if certified propagation material is to

Altenburg melon cherries

be produced and marketed, fruit varieties must be protected (according to the PBR Law), listed (according to the Seed Act) or generally have been familiar before 1st October 2012 and on a special list of these varieties at the Bundessortenamt. In addition, a list of all marketable fruit varieties, including plant genetic resources, is maintained at the Bundessortenamt.

The list of all marketable fruit varieties and plant genetic resources can be accessed on the BSA website:
www.bundessortenamt.de > Sorteninformationen > Administrative Daten > Vertriebsfähige Obstsorten

2.4. Variety Control

The renewal of national listing or the privilege of maintaining Plant Breeders' Rights is possible only if the variety remains uniform and stable. Therefore the breeder must carry out systematic maintenance breeding. The Bundessortenamt is responsible for supervision. In the case of seed-propagated varieties, the breeder sends in seed samples or they are taken from the market and the Bundessortenamt does testing along with reference seed samples in the field or in the lab. To this end standard samples of each variety are stored in climate chambers. In the case of vegetatively propagated varieties, samples of planting material must be compared to that from existing reference varieties or to the official variety description, i.e., to all information that is available about the significant characteristics.

Removal from the National List or cancellation of Plant Breeders' Rights may result if a variety no longer meets the necessary requirements.

2.5. Regulations for Conservation Varieties

Conservation of biodiversity and protection of genetic resources have become more and more important in the past years. Therefore, European directives

have been enacted for in-situ and on-farm conservation of plant genetic material in order to promote its sustainable use. Germany implemented these European directives on 21st July 2009 with its own law, the Ordinance for the Registration of Conservation Varieties. The ordinance was amended on 5th November 2010 to include registration of not only agricultural but also vegetable species as well as so-called amateur varieties of vegetable species.

Landraces and varieties naturally adapted to particular local and regional conditions and significant for the conservation of plant genetic material can be accepted for inclusion in the National List as conservation varieties. Vegetable varieties with no intrinsic value for commercial crop production can be registered as amateur varieties. These varieties may be suitable for increasing genetic diversity in the area of hobby and small-scale gardening. Less stringent uniformity requirements apply to such varieties and they need not go through VCU testing.

Only limited amounts of seed of these varieties can be marketed. The seed does not require official certification but must meet the requirements for certified seed (agricultural varieties) or standard seed (vegetable varieties).

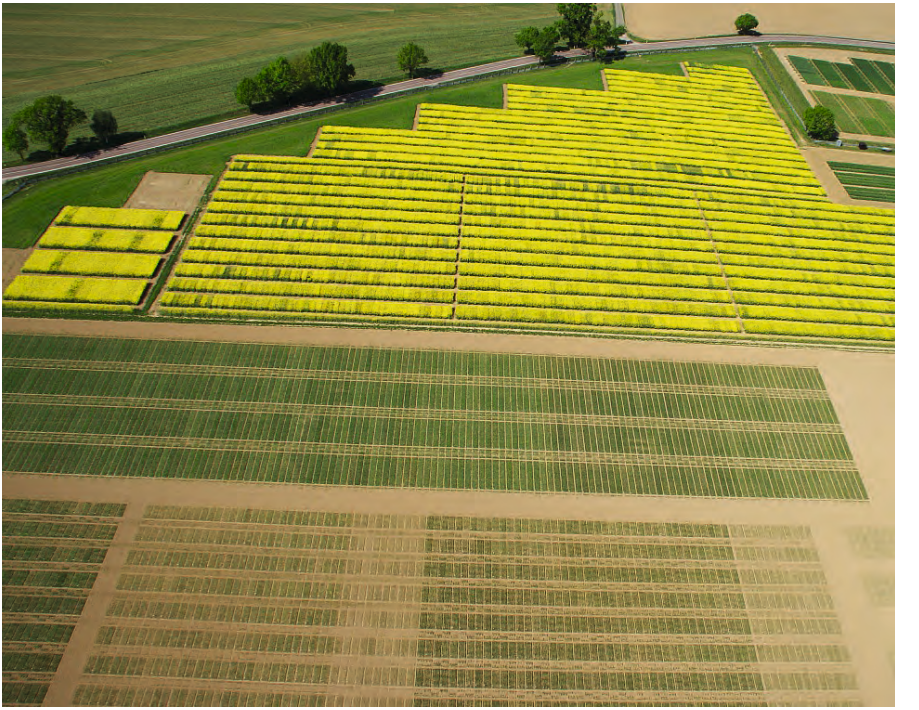
Germinating maize plants

Maize kernel on the cob

Cereal disease assessment

Flax trials

Sowing with plot sowing machine



Test fields at the testing station in Nossen

3. Conducting Tests

Throughout Germany there are 7 testing stations where the Bundessortenamt has about 407 ha of open field testing area and 6,700 m^2 of greenhouse space. Between 2014 and 2015 more than 17,000 varieties were tested in growing trials. Of these, 2,000 varieties were in VCU testing.

The testing stations are equipped with large farm machines, some of them very highly specialised, which are necessary for soil cultivation and for harvesting and processing of the harvest. Each station is equipped according to the specific requirements of the species being tested there.

Having to function more cost-effectively at its stations, the Bundessortenamt is implementing more and more highly technical processes and lean organisation. Constantly the processes are being improved, automated, accelerated and, in general, made easier (e.g., automatic corn analysis machines and weighing systems, NIRS-analysis of raw protein and dry matter directly on green fodder harvesters, GIS-supported precision steering systems for field trials).

The testing stations have workshops where necessary repairs can be made quickly and technical standards maintained. If machines or equipment are not otherwise available, they are developed and constructed in these workshops.

4. Variety Diagnostics

In some procedures for national listing and for granting Plant Breeders' Rights, the Bundessortenamt uses not only morphological criteria but also biochemical characteristics to describe the varieties

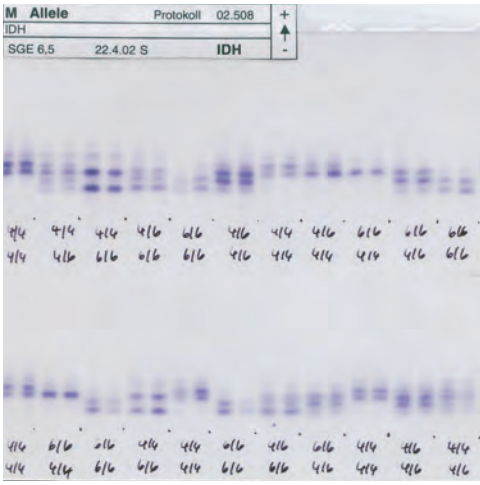
Electrophoresis makes biochemical characteristics visible to the human eye as protein patterns. A particular gene or combination of genes generates a certain protein pattern. Each variety exhibits its own proteins and protein patterns. The procedures make it possible to identify these so that a distinctive description of the variety can be made from the data. The type and number of protein patterns tested for each plant species varies.

Biochemical characteristics also help to identify varieties quickly and to support tests for variety identity and varietal purity. The speed and reliability of these testing methods make them indispensable for seed and quality control authorities.

Winter wheat standard samples

Maize kernel preparation

Gels for electrophoresis



Maize alleles

Furthermore, the lab at the Bundessortenamt analyses the chemical structure and concentration of various plant substances in order to describe and verify a number of quality characteristics important for VCU.

Chives

Mature flax

Black cumin flower

Lettuce trials

5. Information Technology

A normal day's work at the Bundessortenamt is no longer possible without electronic data processing. All of the testing stations and the Bundessortenamt headquarters in Hanover are connected online and 250 employees use their computers on the job daily. When necessary, telework stations can be set up.

During the trials every year 20 million separate entries (measurements, observations etc.) are noted, evaluated and prepared for decision-making. These are stored in central databases that can be accessed online by all of the testing stations.

Standard software is used for everything from budgeting to cost-performance accounting. In the IT department electronic workflow already allows for fast and flawless data processing from one medium to another and will be introduced into more departments in the future. Information technology makes communication easier for all involved. Applications are made online and variety files have been computerised. At the moment all other files (paper) are being computerised as well. All in all workflow is being made easier.

A separate back-up system in another building assures availability of data even in the case of a catastrophic event such as fire.

As a result of the Federal Green IT Initiative the Bundessortenamt strives to conserve energy and therefore uses energy-efficient computers, computer screens and server systems.

Administrative Variety Data

All administrative variety data (e.g., applicants' names, application dates, procedural representatives, variety denomination) and results from value and DUS tests, whether from the Bundessortenamt or other facilities (CPVO or other foreign test offices), are stored in the central administrative database. All administrative data is closely linked to other systems which store variety and trial information (e.g., entry and exit of seed samples for various test purposes, variety denomination tests and automatic drawing up of sowing lists for DUS and VCU tests, computerising variety data automatically, billing notifications). Currently, more than 73,000 varieties with up to 600 administrative entries each are stored in the central database.

Variety Denomination Test

Variety denomination is required for Plant Breeders' Rights and National Listing and must not be ambiguous. There should be no cause for confusion with other approved variety denominations in the same species group. Presently there are approximately 34,000 domestic and 311,000 foreign variety denominations stored in the administrative variety database, and every year approximately 3,500 variety denominations are tested.

Labels for the rose reference collection

Data Processing in DUS Tests

Annually 480,000 individual plants with an average of 13 characteristics each undergo DUS tests. In total an average of 36 characteristics are observed and analysed on 36,000 plots. As a result, approximately 7.5 million single values are documented and reduced to a manageable number of statistics (averages, variance and deviations).

The test data serve as the basis for subsequent decisions on DUS and for procedural reasons are stored in the database for many years. Mobile data loggers are used in the field or greenhouse for recording data on site.

Mobile data recording devices

Working with e-filing

Data Processing in VCU Tests

VCU tests are laid out in random blocks or incomplete balanced block designs and analysed statistically. If tests for reactions to differing treatments are necessary, split plots and grids are used. These tests as well as other variety tests are performed for up to 50 individual characteristics on about 100,000 plots annually. The result is approximately 5 million findings that must be recorded and evaluated. The data reaches headquarters by email. Sometimes it is even noted and checked in observation books. Compatibility of information from the Federal States and other licensed testing facilities throughout Germany is made possible by a special system (PIAF-System).

The statistical analysis of VCU test results is done in three stages. An analysis of variance is done separately according to trial design. Then a yearly summary for all of the trial sites is made. And finally the variety committee makes a decision on the basis of a summary report combining the results of the whole testing period.

Annually, the Bundessortenamt prepares about 100 data reports based on the results of the VCU tests. Applicants and other participants can access the reports, which are provided in three different data formats, online. Each year applicants can also access about 30 to 40 reports made for trial periods covering several years.

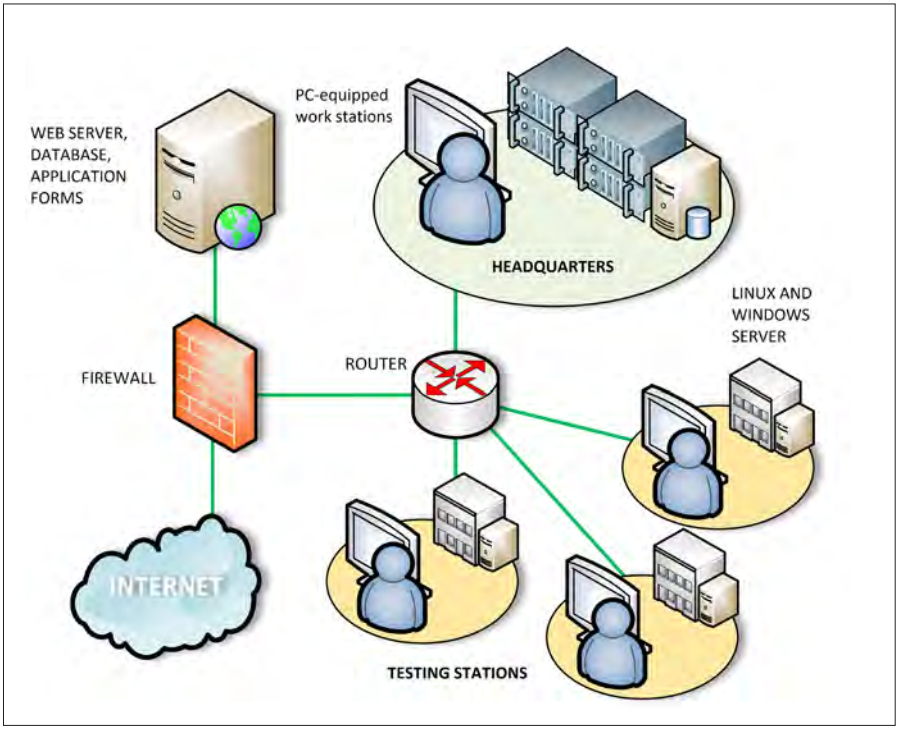
Office Communication

An integrated office communication system manages the vast number of documents and reports that must be processed every day. The workload is considerably lighter because of access to integrated databases, e.g., for creating variety descriptions and sending breeders information.

New variety files are recorded electronically only and older paper files are transformed as necessary.

Preparation for photographing roses

Photographing roses for the databases



BSA data processing network

Image Analysis and Archives

During variety tests various characteristics are observed or assessed. For example, the length and width of a leaf are determined and then recorded on mobile data loggers or noted in observation books. Images typical of the variety plant part being studied are taken with digital cameras or scanned and stored in image databases. This information is then available in databases where automatic image analysis can be used for documentation of measured characteristics. Special image analysis routines for these characteristics have been developed for each species and can be used directly for DUS evaluation.

Image analysis is used

- → to reduce the workload on varieties with large numbers of variables (e.g., rape petals and cotyledons)
- → to assess those characteristics exactly that are almost impossible to assess manually (e.g., measuring the distance from the base to the widest point of pea leaves)

Rape assessment

- to assess characteristics that can otherwise be estimated visually only (e.g., the depth of indentation of leaves)
- to assess objectively (e.g., units to analyse grain number and grain diameter)

Image archives are used for variety documentation and for finding suitable comparative varieties for testing.

Fields with grass trials

The Bundessortenamt Online

The Bundessortenamt can be visited online at **www.bundessortenamt.de**. Users will find general information, procedural status and summaries of protected and registered varieties. Breeders with the necessary password can access annual reports on performance tests. As of 2007 all information for applicants as well as official application forms can be signed and submitted online.

Bundessortenamt online
For further information please visit our website:
www.bundessortenamt.de

6. National Cooperation

The Bundessortenamt supports the BMEL in preparing legal drafts for variety and seed legislation. It is therefore essential for the BSA to maintain constant discussions and cooperation with seed and breeding trade associations and with special authorities in the Federal States. In this capacity it works closely with corresponding special departments at the BMEL.

In both the fields of resistance and of quality assessment the Bundessortenamt continues to work closely with the JKI, the Federal Office for Agriculture and Food (BLE), with other BMEL research institutes and with various institutes in the Federal States and at universities. The testing procedures are developed further in cooperation with the Federal States, breeders and other stakeholders.

In cooperation with the Federal States the Bundessortenamt is responsible for monitoring varietal identity and purity of certain defined categories of marketed seed and planting material and in some cases does extra growing trials as well as other necessary testing. The Bundessortenamt is the representative of the Federal Government and acts as coordinator in the seed certification and seed regulatory agencies of the Federal States.

7. International Cooperation

The Bundessortenamt represents Germany in various international bodies and as such speaks on behalf of Germany in variety and seed legislation. In its capacity as member of the Administrative Council of the CPVO, it negotiates long-term and strategic resolutions for EU variety protection. It also negotiates on other administrative boards in order to develop EU variety and seed legislation further and to coordinate it within the community. The Bundessortenamt is a member of various UPOV boards engaged in ongoing development of present systems.

Methods of seed propagation and certification aligned with those of the Organisation for Economic Co-operation and Development (OECD) are equally important for trade on the international seed market. The Bundessortenamt uses these so-called OECD Seed Schemes for further development of seed certification systems of the plant species covered by this system.

Furthermore, the Bundessortenamt supports third party countries in the development and installation of variety and seed systems within the framework of the BMEL cooperation projects. In recent years special attention has been paid to advancement and integration of eastern and southeastern EU countries as well as of particular countries in Africa and Asia.

7.1. Common Variety Catalogues

In 1972 the EU started publishing Common Variety Catalogues for vegetable species and for agricultural plant species. The catalogues are based on the National Variety Lists of EU members. Seed of varieties listed in the catalogues can be traded freely within the EU. There are over 21,000 varieties in the vegetable species catalogue and over 23,000 varieties in the agricultural plant species catalogue.

VCU testing exchange in France

Visitors at cultivar trials in Scharnhorst

7.2. Cooperation in Plant Breeders' Rights

The UPOV member countries have been working closely in DUS testing of new plant varieties for many years. Thus far the Bundessortenamt has signed bilateral agreements with 21 UPOV members for more than 250 species. There are 30 more countries that accept German test results. Every year approximately 1,000 test reports are forwarded to foreign countries.

In order to become a member of UPOV, a country must ratify the International Convention for the Protection of New Varieties of Plants. The secretary general in Geneva works closely with the secretary of the World Intellectual Property Organization (WIPO), a subsidiary organisation of the United Nations. UPOV was established in 1961 by the International Convention for the Protection of New Varieties of Plants (UPOV Convention).

Colour Chart of the Royal Horticultural Society (RHS)

The UPOV Convention commits its members to granting Plant Breeders' Rights. It requires its members to regulate the conditions for granting a Plant Breeders' Rights title and defines the rights inherent in the title. The UPOV Convention was last revised in 1991.

Beyond the convention itself, UPOV has developed comprehensive recommendations supporting an internationally harmonised implementation of the convention. These recommendations focus, in particular, on how to perform DUS tests. To this purpose test guidelines have been adopted for many species and comprehensive specifications for the test methods have been developed. This is done by work groups made up of representatives from UPOV member countries. Experts from the Bundessortenamt represent Germany in these groups. As of April 2016 the organisation had 74 members.

More information can be found at **www.upov.int**.

8. Public Relations

8.1. Official Gazette

“Blatt für Sortenwesen” is the Bundessortenamt’s official gazette. It is issued monthly and contains all Bundessortenamt announcements concerning the National List and Plant Breeders’ Rights. All other information about plant varieties, seeds and their regulations can be found here as well. Newly registered and protected varieties from the past year are always published in the April issue. Surveys of individual plant groups are published in August.

The “Blatt für Sortenwesen” is published by
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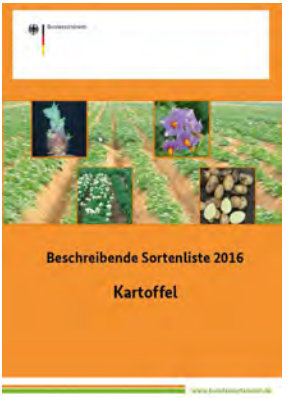
P. O. Box 61 04 40, 30604 Hannover, Germany
Phone: +49 511 9566-50
Fax: +49 511 9566-9600
Email: bsl@bundessortenamt.de
http://www.bundessortenamt.de

A yearly subscription to the gazette, without shipping and handling, costs €57.00 in Germany; a single issue costs €5. All of the official Bundessortenamt announcements from January 2008 to the present can be downloaded as PDF files from the Bundessortenamt website.

8.2. Descriptive Variety Lists

The descriptive variety lists describe the characteristics of cultivation and use for all nationally registered varieties as well as for all other important varieties, even for those not registered in Germany but listed in the Common Catalogue. These lists serve as a source of information for seed and plant consumers, for official advisors and for the food industry and its consumers.

Agricultural plant species, including vines, amenity grasses and fruits are on the descriptive variety lists. The lists can be ordered from the Bundessortenamt or downloaded from the Bundessortenamt website. The office itself distributes the print version. Contact address: see above “Blatt für Sortenwesen”.



Test results of ornamental shrubs and street trees can be ordered from Bund deutscher Baumschulen e. V., BdB (German Nurseries Association), Bismarckstraße 49, 25421 Pinneberg, Germany.
www.bund-deutscher-baumschulen.de

8.3. Press Announcements

Regularly, Bundessortenamt press announcements about current affairs are made public. Special reports from the Bundessortenamt departments or its experts are often printed in agricultural, horticultural or scientific publications.

8.4. Events and Trade Fairs

The Bundessortenamt takes part in various trade fairs and events in Germany, e.g., at the International Green Week (IGW) in Berlin with a special BMEL exhibit, at the International Plant Fair (IPM) in Essen, at the Agritechnica in Hanover and at the DLG-Feldtage (German Agricultural Society Field Days). It also participates in other trade exhibitions such as the Federal and State Garden Shows, tree nursery exhibitions etc.

Regularly the Bundessortenamt testing stations also have open day presentations for interested people such as hobby gardeners, breeders and farmers. The purpose is to provide information and give insight into testing status. The Bundessortenamt informs on its website and in local newspapers about upcoming events.

BSA exhibit at the Agritechnica 2015

Joint exhibit with CPVO at the IPM 2016

Tasting various tomato varieties at open house in Hanover on 25th June 2016

Joachim Gauck, Germany's President, and Christian Schmidt, Minister for Food and Agriculture, visit the BSA exhibit at the IGW 2016 in Berlin

9. Job Training at the Bundessortenamt

The Bundessortenamt provides vocational training for the following jobs:

- Gardener (specialisation: ornamentals and fruits)
- Farmer
- Agricultural services specialist
- Administrative secretary
- IT specialist (specialisation: application development and system technology)

Please visit the Bundessortenamt website or enquire at the Human Resources Section (section 102) for more information about training for the above-mentioned jobs.

Young people can also participate in a Voluntary Ecological Year (Freiwilliges Ökologisches Jahr — FÖJ) at the testing station in Dachwig. This programme is organised by the Internationale Jugendgemeinschaftsdienste (ijgd – an international work camp programme). During this voluntary year participants have the opportunity to learn about variety testing, biodiversity and its significance and benefits, e.g., for vegetable, herb and medicinal species.

During the past few years both headquarters and some of the testing stations have been taking part in a national school programme called “Future Day” (formerly “Girls’ and Boys’ Day”). The Bundessortenamt takes part in this programme to help school children to learn about job opportunities and vocational training at the Bundessortenamt.

Job training for fruit gardening in Wurzen

Voluntary Ecological Year in Dachwig — Official opening of an “insect hotel”

Agricultural services job training in Magdeburg

10. Other Tasks

“Grüner Beschaffen” (= Ecological Supplies)

As a sustainability measure the German government has declared that by 2020 95 % of the paper used by all federal agencies and ministries must be recycling paper. The Bundessortenamt already fulfils and exceeds this goal, 97 % of the paper used has the “Blue Angel” certificate. Such paper is 100 % recycled paper. At the moment 25 other agencies fulfil or exceed this goal and publish their quotas online at “Grüner Beschaffen für Bundesbehörden”.

Preservation of Genetic Resources

The Bundessortenamt contributes in many ways to the preservation of plant genetic resources. For example, it sends seed samples and descriptions to the gene bank in Gatersleben for further preservation of varieties no longer listed and used for official variety testing.

Presentation of various apple varieties at the IGW 2016

German Gene Bank for Fruits

In conjunction with the German Gene Bank for Fruits (DGO) the Bundessortenamt is responsible for DGO networks of berries, pears and wild fruits. It is also a collection-keeping partner for strawberries, cherries, apples, plums, raspberries, blackberries and pears. It works closely with the JKI in Dresden-Pillnitz. Its Institute for Breeding Research for Horticultural Crops and Fruits acts as a coordinator for the DGO. The Bundessortenamt has the task of preserving and documenting plant genetic material of apples, stone fruits, berries and all types of wild-growing fruits and therefore has a large selection of this material stored at the Wurzen testing station where it is open for public use.

German Gene Bank for Vines

The Bundessortenamt is also a collection-keeping partner for genetic material of vines and contributes to the conservation of valuable genetic material of both grapevines and rootstocks.

Vine field trials

Bunch of grapes

German Gene Bank for Ornamentals

The German Gene Bank for Ornamentals (DGZ) was created in 2009 in order to preserve diverse ornamental genetic material and provide for future availability. The Bundessortenamt is coordinator of the DGZ for the BMEL and works closely with the Information and Coordinating Centre for Biological Diversity (IBV), a subsidiary of the BLE. At the moment the DGZ is made up of five individual gene banks with differing collections and inventory of genetic material for seed and vegetatively propagated ornamentals. The Bundessortenamt oversees both the gene bank for rhododendron and the gene banks for seed and for vegetatively propagated ornamentals. The European Rose Garden in Sangershausen, Germany is responsible for the German gene bank for roses. The German Garden Association 1822 has set up a network for private plant collections. As of 1st July 2017 the Bundessortenamt will begin its administration of this network as part of the DGZ.

Biopatent Monitoring

Since 2012 the BMEL has a monitoring system to identify at early stages the impacts of biopatents on agriculture. The BLE is responsible for livestock patents and the Bundessortenamt for plant patents. Every month they jointly

Rose bud assessment

View of Calluna DUS testing

compile lists of biopatents and biopatent applications and note problem areas for the BMEL. In 2016 the German Government's second biopatent report was published for the time span of 2014 — 2015. The need for future political action due to the nebulous state of legal affairs concerning patenting of conventionally bred plants and animals was one implication of the report.

The biopatent report can be viewed online at
www.bmjv.de > Ministerium > Fachpublikationen.

Testing of Genetically Modified Varieties

The testing criteria for genetically modified varieties are essentially the same as those for conventionally bred varieties. It is not possible to begin testing these varieties at the Bundessortenamt before the Federal Office for Consumer Protection and Food Safety (BVL) has issued a permit for open field tests. The legal basis for the decision is the Genetic Engineering Act. In order to avoid delays in the authorisation process both the Bundessortenamt and the BVL are coordinating their processes.

11. Legal Basis

Legal basis and guidelines of Bundessortenamt responsibilities and functions:

- Seed Act (SaatG)
- Species List in the Seed Act Ordinance (SaatArtV)
- Seed Regulation (SaatgutV)
- Vegetative Propagation Material Ordinance for Vines (RebPflV)
- Seed Potato Ordinance (PflKartV)
- Plant Breeders' Rights Act (SortG)
- Operations Ordinance for the Bundessortenamt (BSAVfV)
- Conservation Varieties Ordinance (ErhaltungsV)
- Preservation Seed Mixtures Ordinance (ErMiV)
- German Planting Material Ordinance (AGOZV)
- Seed Records Ordinance (SaatAufzV)
- UPOV Convention
- EU Directives and Regulations

You can find the above-mentioned German legislation online at **www.gesetze–im-internet.de**.

12. Fees

Fees for applicants are calculated according to the Operations Ordinance for the Bundessortenamt (BSAVfV).
The fee structure varies for individual services:

- → Application for and decisions on Plant Breeders' Rights and national listing
- → DUS and VCU testing according to variety and test year
- → Acceptance of existing test results
- → Annual and supervision fees

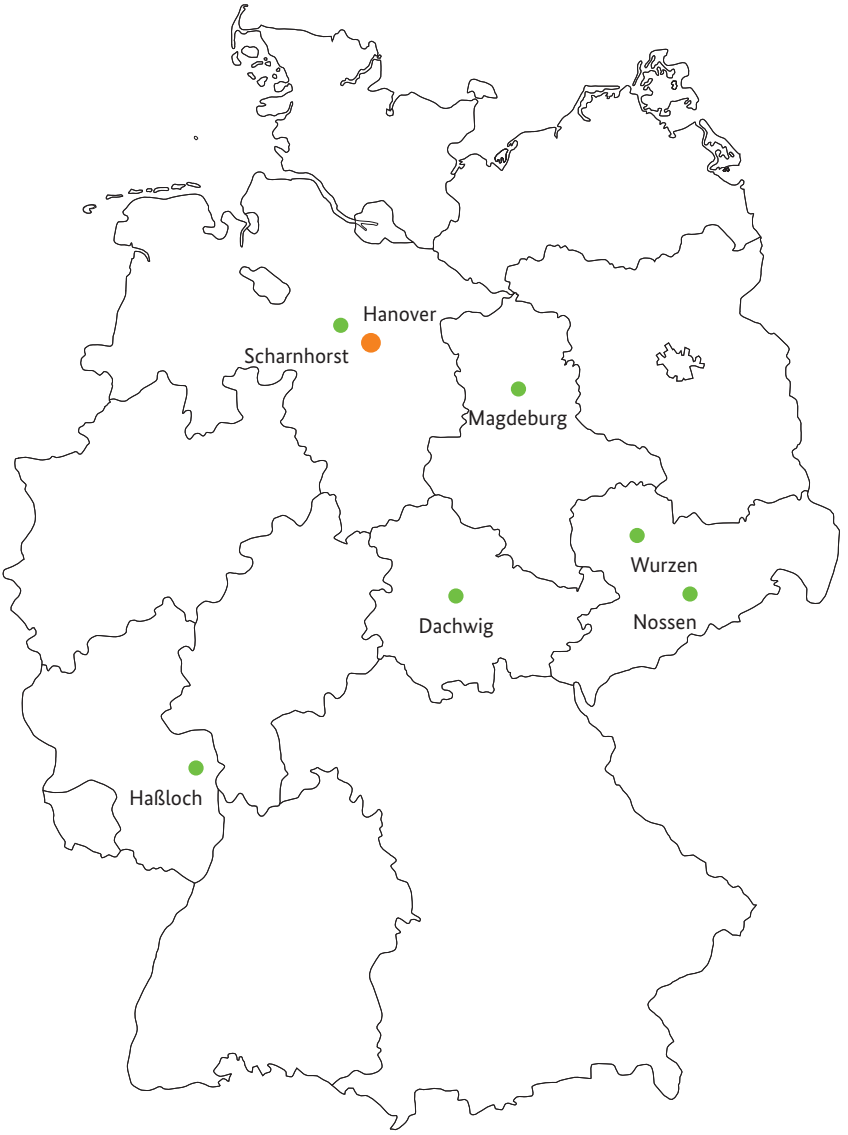
General information concerning fees and a fee table can be found under "Services for Applicants" on the Bundessortenamt website at:
www.bundessortenamt.de > Service > Antragsteller > Gebühren

Annuals trials at the testing station in Hanover

Herb garden at the testing station in Dachwig

Testing station in Scharnhorst

13. Bundessortenamt Testing Stations



13.1. Testing Station Addresses

Testing Station Dachwig: Kirchstraße 28, 99100 Dachwig, Germany
Phone: +49 36206 245-0, Fax: +49 36206 245-99
Cereals, Maize, Legumes, Oil Plants, Vegetables, Medicinal and Aromatic Plants

Testing Station Hannover: Osterfelddamm 80, 30627 Hannover, Germany
Phone: +49 511 9566-50, Fax: +49 511 9566-9600
Ornamentals, Woody Ornamentals and Forest Plants, Gene Banks

Testing Station Haßloch: Böhler Straße 100, 67454 Haßloch/Pfalz, Germany
Phone: +49 6324 9240-0, Fax: +49 6324 9240-30
Cereals, Maize, Oil and Fibre Plants, Beets, Potatoes, Vines, Hops, Tobacco

Testing Station Magdeburg: Hohendodeleber Weg 65, 39110 Magdeburg, Germany
Phone: +49 391 504545-0, Fax: +49 391 504545-111
Cereals, Legumes, Beets, Potatoes

Testing Station Nossen: Waldheimer Straße 221, 01683 Nossen, Germany
Phone: +49 35242 453-0, Fax: +49 35242 453-20
Cereals, Maize, Potatoes, Oil and Fibre Plants, Beets, Legumes, Grasses

Testing Station Scharnhorst: In Scharnhorst Nr. 2, 31535 Neustadt, Germany
Phone: +49 5032 961-0, Fax: +49 5032 961-199
Grasses, Legumes, Oil and Fibre Plants, Beets, Potatoes, Grasses, Woody Ornamentals

Testing Station Wurzen: Torgauer Straße 100, 04808 Wurzen, Germany
Phone: +49 3425 9040-0, Fax: +49 3425 9040-20
Fruits, Gene Banks

How to get there: Instructions available online at:

www.bundessortenamt.de > About us > Addresses/Directions

Aerial view of the testing station in Magdeburg

Aerial view of the testing station in Nossen

Aerial view of the testing station in Wurzen

Entrance of the testing station in Haßloch

List of Abbreviations

AGOZV	German Planting Material Ordinance
BdB	German Nurseries Association
BLE	Federal Institute for Agriculture and Food
BMEL	Federal Ministry of Food and Agriculture
BSA	Bundessortenamt — Federal Plant Variety Office
BSAVfV	Federal Plant Variety Office Operations Ordinance
BVG	Federal Administrative Court
BVL	Federal Office for Consumer Protection and Food Safety
CPVO	Community Plant Variety Office
CPVRs	Community Plant Variety Rights
DGO	German Gene Bank for Fruits
DGZ	German Gene Bank for Ornamentals
DLG	German Agricultural Society
DUS test	Test for Distinctness, Uniformity and Stability
EC	European Commission
ErhaltungsV	Conservation Varieties Ordinance
ErMiV	Preservations Seed Mixtures Ordnance
EU	European Union
FÖJ	Voluntary Ecological Year
GIS	Geographical Information System
IBV	Information and Coordination Centre for Biological Diversity
IGW	International Green Week (Berlin)
ijgd	International Youth Services
IPM	International Plant Fair (Essen)
IT	Information Technology
JKI	Julius Kühn-Institute (Federal Research Institute)

Öko-LSV	State Organic Variety Trials
NIRS	Near-infrared Spectroscopy
OECD	Organisation for Economic Co-operation and Development
PBR	Plant Breeders' Rights
PflKartV	Seed Potato Ordinance
PIAF	Planning, Information and Evaluation System for Field Trials
QAS	Quality Audit System
RebPflV	Vegetative Propagation Material Ordinance for Vines
RHS	Royal Horticultural Society
SaatArtV	Seed Act Species List Ordinance
SaatAufzV	Species Index Ordinance
SaatG	Seed Act
SaatgutV	Seed Ordinance
SortG	Plant Breeders' Rights Law (PBR Law)
UPOV	Union for the Protection of New Plant Varieties
VCU	Value of Cultivation and Use
VG	Administrative Court
WIPO	World Intellectual Property Organization

Notes

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