

The protection of tobacco varieties with the UPOV system in EU

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Abstract

In 1961, an International Convention for the Protection of New Varieties of Plant was adopted in Paris in order to protect them by an adapted intellectual property right. This text was gradually adopted in EU for some plant species, but tobacco was not included in the list then and the protection of new tobacco varieties was still based on plant patents.

Since 1996, all plant species are concerned by the International Convention and tobacco varieties can be protected by a system adapted to the plant kingdom, called "New plant variety certificate"(COV). Therefore, the use of patents is no longer possible in EU to protect tobacco varieties.

The COV gives the breeder an exclusive right of exploitation for his variety during a limited time, which allows him to recover his research investment. However, it remains possible for other breeders to use the protected variety for experimental or breeding purposes, which permits to keep a free access to genetic variability. The COV is delivered after a technical examination, following guidelines established by International Union for the Protection of New Varieties of Plant (UPOV) in 2002. If the variety is new, distinct, uniform, and stable and if it has an approved denomination, then it can be protected by a COV. The Certificate may only concern France or the protection may be extended to the whole European Community.

The first COV for commercial tobacco varieties have just been obtained in 2006, for two Burley varieties with low nicotine content, created at the Bergerac Tobacco Institute (Altadis). Because they permit the identification of tobacco varieties, COV will entail a better traceability for the whole European tobacco industry.

Introduction

Since plant breeding has been considered as an activity in the 19th century, the question of breeding research reward and new variety protection began to emerge. In the beginning of the 20th century, the first protection systems started to appear, but it is only in the middle of the 20th century that was created a protection system adapted to plant protection by UPOV. This communication presents the UPOV system, its setting, evolution and principles in a first part. Then it describes the UPOV protection system applied to industrial tobacco varieties, the steps and conditions to protect a new tobacco variety. Finally, the application of UPOV protection system to tobacco is illustrated by the presentation of the first two industrial tobacco varieties to have obtained a UPOV protection.

Presentation of the UPOV system

Setting of UPOV and former protection system

UPOV is an International Union for the Protection of New Varieties of Plants, based in Geneva (Switzerland) and created in 1961. At this date, an international convention for the protection of new varieties of plants is adopted in Paris (UPOV, 1961). A variety is defined in this text as "a plant grouping within a single botanical taxon of the lowest known rank" [i.e. species], recognizable by its characteristics, different from any other variety and unchanged

through the process of propagation. This first convention permits to protect varieties for some species by an adapted intellectual property right, but is not applied to all species yet and tobacco is not in the scope of this protection system. In 1968, the convention is ratified by the United Kingdom, the Netherlands and Germany and the first New Plant Variety Certificate (COV: Certificat d'Obtention Végétale) is obtained (Figure 1). France joins UPOV in 1971 (Journal officiel de la République Française, 1970). The UPOV convention has been revised in 1972, 1978 and 1991, to adapt the protection system to new developments in plant breeding field (UPOV site).

During all this period, tobacco is not in the scope of this protection system. One main system is therefore in European Union (EU) to protect tobacco varieties: the variety patent system. It permits to protect a tobacco variety from commercialization or use by another person than the patent owner. In 1991, one of the first patents for a male sterile tobacco variety is obtained for ITB 1000, a dark Paraguay tobacco type created at Bergerac Tobacco Institute, France (Figure 2). ITB 1000 is an early flowering and maturing variety, characterized by its purplish-red flowers. It has good yield and combustibility, and entails a good coloration of dry tobacco. ITB 1000 is resistant to Blue Mold (*Peronospora tabacina*), black root rot (*Thielaviopsis basicola*), Tobacco Mosaic Virus (TMV) and Potato Virus Y (PVY^N) (European Patent Office site).

Extension of UPOV system and first protections for tobacco

The 1991 revision of UPOV convention entails and enlargement of species and varieties that can be protected by a New Plant Variety Certificate (COV). The 1991 convention specifies that all plant species can now be protected by COV, and that each UPOV member shall extend UPOV protection system to the whole plant kingdom within five years (UPOV, 1991). Actually, tobacco protection by COV becomes effective a few years later, when UPOV members progressively adopt the new convention. In 1994, EU joins UPOV and adopts 1991 convention (Journal officiel des Communautés Européennes, 1994). Tobacco protection by Community COV becomes therefore possible. In France, a decree comes into force to extend UPOV protection to all plant species, including tobacco, in 1996 (Journal officiel de la République Française, 1996). For that moment, tobacco variety protection by a patent system is not possible anymore neither in France, nor in EU. Therefore, the patent protection obtained in 1991 for ITB 1000 is not available since 1997.

The first New Plant Variety Certificate (COV) concerning tobacco are obtained in 1999 for 3 ornamental tobacco varieties created at Bergerac Tobacco Institute from Altadis, former Seita (Bulletin officiel du Comité de la Protection des Obtentions Végétales, 1999). French COV are obtained at this date, and in 2000 Community COV are obtained too. Altadis then decides to keep Community COV and to cancel to French ones, for the scope of Community COV is wider and already permits to protect varieties in France. The 3 Altadis varieties protected in 1999, Seisuave, Seigrande and Seiverde are ornamental varieties, belonging to *Nicotiana* genus (Figure 3). Seisuave is an ornamental tobacco variety from *Petunioides* sub-genus and *Suaveolentes* section. It has numerous small and flavoring white flowers. Seigrande belongs to *Petunioides* sub-genus and *Alatae* section. It has numerous large white flowers with curved petals, green on their back side. Seiverde belongs to the same sub-genus and section as Seigrande: sub-genus *petunioides*, section *Alatae*. It has yellow green flowers, with blue pollen, that do not close in sunny conditions. Protection by New Plant Variety Certificate (COV) is abandoned in 2001 for Seigrande and Seiverde because they are not commercially produced anymore. Nevertheless, Seisuave is still used by Altadis and its protection by Community COV runs until 2025 (it is a 25 year-long protection).

In 2006, the first New Plant Variety Certificate (COV) for industrial tobacco varieties are obtained for 2 Altadis varieties, created at Bergerac Tobacco Institute. These varieties will be presented in the third part of this communication.

Today, UPOV has 61 members in the whole world. Only 4 EU members out of 25 have not join UPOV yet: Cyprus, Greece, Luxembourg and Malta (UPOV site).

Principles of protection by a New Plant Variety Certificate (COV)

A New Plant Variety Certificate is a system that protects the breeder's rights and gives him an exclusive right of exploitation for his variety. One cannot produce protected variety seeds or cultivate the protected variety without the agreement of its owner. The repeated use of the variety to produce seeds (as a genitor of a F1 hybrid variety for e.g.) is not allowed either. Seed production and variety cultivation by another person are however possible providing the owner has given his agreement and an arrangement between the two parties has been found. Variety protection by COV therefore permits the breeder to get royalties in order to recover his research investment. Variety protection is limited in time from 20 to 25 years for tobacco variety protection, according to the UPOV member which delivers the certificate.

UPOV protection by a New Plant Variety Certificate (COV) is a system adapted to plant kingdom, which presents some specificity.

- The breeder's rights on his variety can be applied on seeds or by defaults on the harvested or transformed product of the seeds.

- Breeder exemption:

The main particularity of the UPOV protection by COV, called breeder exemption, is to keep a free access to genetic variability for research or breeding purposes, contrary to a plant patent system. One can use a protected variety as a source of improvement for a new breeding scheme. However, other measures protect breeder's rights: as indicated above, the repeated use of the protected variety to produce new varieties is forbidden.

- Protection of essentially derived varieties:

Since the 1991 convention, essentially derived varieties are protected with the same New Plant Variety Certificate as the protected variety, also named initial variety. An essentially derived variety is a variety obtained from the initial variety, which is similar to it except for a few characteristics. This new measure increases the breeder protection. It prevents from the use of the protected variety as a recurrent parent in a backcross breeding scheme for e.g., and covers also a variety obtained by mutation or genetic transformation from the protected variety.

Variety protection system for industrial tobacco

Steps for the grant of French or Community New Plant Variety Certificate (COV)

In France, a New Plant Variety Certificate (COV) may be obtained for a protection only in France or in the whole EU. Differences between French and Community COV only lie in the scope and duration of the protection. A French COV gives a 20 year-long protection for tobacco, while the protection lasts 25 years for a Community COV, from the year of the

grant. For a French protection only, the authority in charge with registration and deliverance of a New Plant Variety Certificate is the CPOV (Comité pour la Protection des Obtentions Végétales) a comity for plant variety protection, whereas CPVO (Community Plant Variety Office) is in charge with registration and deliverance of a Community COV available in every countries belonging to EU.

Steps to obtain a COV are the same in both cases (Figure 4).

To obtain a protection by a COV, a breeder first has to apply to the corresponding authority and fulfill a document to describe his variety. Once the application is registered by one of the relevant authorities, it is transmitted to GEVES, a French study group dedicated to varieties and seeds (Groupe d'Etude et de contrôle des Variétés Et des Semences) or to another competent organism as NIAB in the UK or the Bundessortenamt in Germany (Kiewiet, 2005). GEVES has in charge the technical examination of the applicant variety. For some species, GEVES itself achieves the examination, but for others, the technical examination is confided to an organism specialized in that plant species.

For tobacco, technical examination is conducted by Bergerac Tobacco Institute, Altadis tobacco plant research center.

Technical examination of industrial tobacco varieties for COV grant

Technical examination is conducted following UPOV guidelines that have been set up in 2002 in collaboration between tobacco breeders and official instances for plant protection (UPOV guidelines, 2002). This examination is adapted to describe industrial tobacco varieties of *Nicotiana tabacum* L. species.

Tobacco varieties are tested in one location at Bergerac Tobacco Institute, Dordogne, France, in comparison with standards during at least 2 years. The field trial must involve at least 2 repetitions and forty plants for each variety and standard. UPOV guidelines define that 35 characteristics have to be observed or measured to describe an industrial tobacco variety and distinguish it from standards. For each trait, a notation scale has been set up in comparison with standards (Figure 5). Descriptions should be made after the beginning of flowering. There are mainly based on general characteristics, leaf characteristics and flower characteristics (Figure 6). For general characteristics, traits such as plant shape, plant height, color of stem, number of leaves and angle of leaf insertion are described. Leaf observations are made on the largest fully developed leaf in the middle third of the main stem and mainly focus on length, width, angle of veins, shape and color of blade, shape of tip and auricles. As far as the flower description is concerned, traits such as length, diameter and swelling of tube, size, tips and color of corolla and form of the fruit are described.

Conditions to obtain a New Plant Variety Certificate protection

After the technical examination, several conditions are required for the grant of the New Plant Variety Certificate. First of all, the variety has to comply with DUS conditions which are Distinctness, Uniformity and Stability.

- **Distinctness:** the new variety must be distinct of any common known variety in some of the 35 characteristics described in the technical exam.

- **Uniformity:** no more than 2 off types out of 40 plants should be observed to declare the variety as uniform.

- **Stability:** variety characteristics must be stable from a generation to another.

In addition to these DUS conditions, the applicant variety must have an accepted denomination, which must not be confusing about variety properties and must differ from any other denomination within the plant species or related species. Furthermore, the criteria of novelty must be observed. A variety is considered as new if it has not been proposed for sale for more than one year prior to the application for a New Plant Variety Certificate in the country where the application has been done, and for more than four years in another country. Nevertheless, the variety can have been diffused for research or experimental purposes without breaking the novelty condition.

If all these conditions are fulfilled, then the variety can be protected by a New Plant Variety Certificate (COV), for the whole duration of the protection (20 or 25 years), providing the owner pays the required fees. The New Plant Variety Certificate is then delivered to the breeder by the authority that had registered the application and the COV grant is published in an official bulletin. French COV grants are published in the Bulletin officiel du Comité de la Protection des Obtentions Végétales, published every month, and Community COV grants are published in the Official Gazette of CPVO that is published every two months. Community COV grants and applications can also be found in CPVO website, but the information published on the web has no official status.

UPOV protection for 2 industrial tobacco varieties

In 2006, the first New Plant Variety Certificates (COV) are delivered for two industrial tobacco varieties, ITB 5748 and ITB 270 (Figure 7). ITB 5748 and ITB 270 are *N. tabacum* varieties that have been created at Bergerac Tobacco Institute. They are protected by Community COV until 2031 (Figure 8). These varieties have been created in order to have varieties with low alkaloid content. They are close from each other because they correspond to a fertile and sterile form of a tobacco line. These varieties are used by a biotechnology company to produce pharmaceutical proteins, and the low alkaloid content is a practical characteristic for this use. ITB 5748 and ITB 270 are also used At Bergerac Tobacco Institute as a source of improvement for the tobacco breeding program.

ITB 578 and ITB 270 have been studied following UPOV guidelines at Bergerac Tobacco Institute in 2004 and 2005. They have been compared to 3 main standards during the two years: TN90, Burley 21 and Burley 21 LA, a variety with low alkaloid content. Varieties have been described for the 35 characteristics mentioned in UPOV guidelines, and alkaloid content of median leaves have been measured by hplc method after air-curing in garlands.

Means of the two years expressed in dry matter percentage for nicotine, nor nicotine, anatabine and anabasine are shown in Table 1. ITB 5748 and ITB 270 have low alkaloid content, more than 10 times lower than classical varieties such as TN90 or Burley 21. Their alkaloid content is slightly higher than the one of Burley 21 LA, but this variety differs from ITB 5748 and ITB 270 in the fact that it almost completely converts nicotine into nor nicotine.

Morphological description of ITB 5748 and ITB 270 following UPOV guidelines permits to characterize these varieties in comparison with standards. ITB 5748 and ITB 270 are early flowering varieties with a higher tendency to produce suckers. They have light green leaves with a medium pointed tip and a low length/width leaf ratio. ITB 5748 and ITB 270 are very similar, but they may be considered as two different varieties because of some morphological differences, in leaf and flower characteristics. The main differences between the two varieties are due to the sterility of ITB 270. In consequence, ITB 270 do not have any stamen, its flower is shorter than ITB 5748's, and the swelling of its flower tube is weaker than the one of ITB 5748 (Figure 9).

CONCLUSIONS

Since the mid 90s, UPOV protection system by a New Plant Variety Certificate (COV) is available for tobacco varieties in EU. This system, fully adapted to plant kingdom, is an effective *sui generis* protection system for plant varieties. It permits to protect breeder's rights, which can be exerted either on variety seeds, or by default on the harvested or transformed product, because plants are often used as raw material for industry. A technical examination has been set up for each plant species, in order to be able to distinguish one variety from another. This examination involves 35 specific characteristics to describe a tobacco variety. The conditions to obtain a COV lie on novelty, accepted denomination, but COV grant mainly depends on the respect of DUS conditions, which are specific to new plant varieties, defined as a grouping of plants with the same phenotype and autoreproducible. A new plant variety has to be Distinct from the others, Uniform, and Stable through its reproduction to be protectible by a COV. The main advantage and particularity of UPOV protection system is the breeder exemption, which allows a free access to genetic variability and permits to enhance plant improvement through the sharing of genetic resources. Because UPOV protection is an international system, it is a very useful tool for variety description and can entail a better traceability for the whole European tobacco industry.

Figure 1: Chronology of tobacco protection in EU

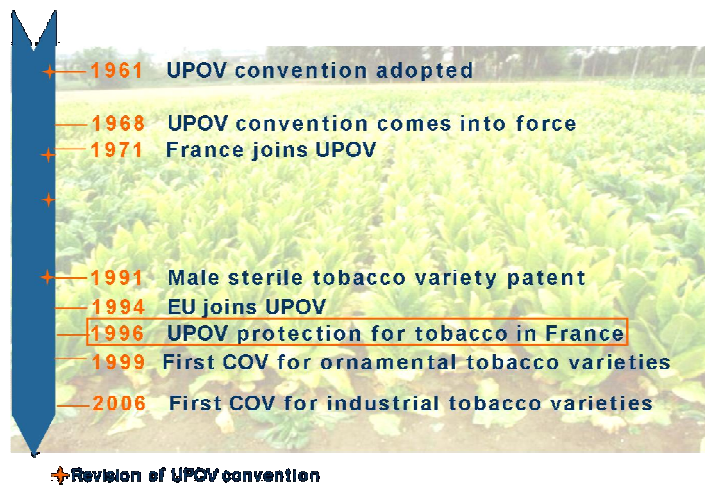


Figure 2: ITB 1000, a dark Paraguay tobacco variety



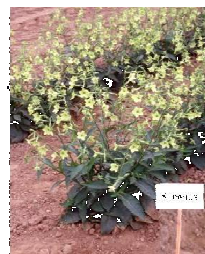
Figure 3: Seisuave, Seigrande, Seiverde, first tobacco varieties to be protected by COV



Seisuave



Seigrande



Seiverde

Figure 4: Steps to obtain a New Plant Variety Certificate (COV)

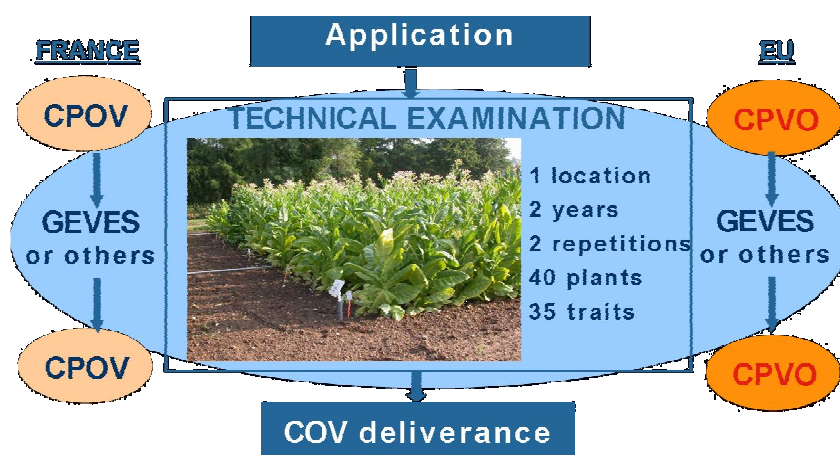


Figure 5: Example of notation scale for tobacco plant shape

Ad. 1: Plant: shape

Source : UPOV

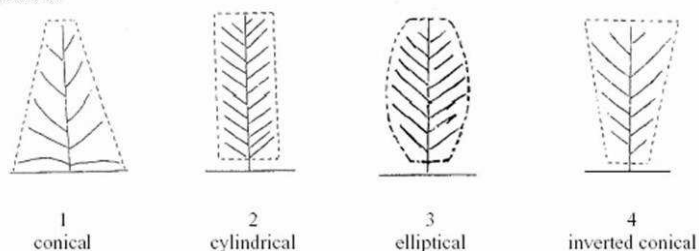
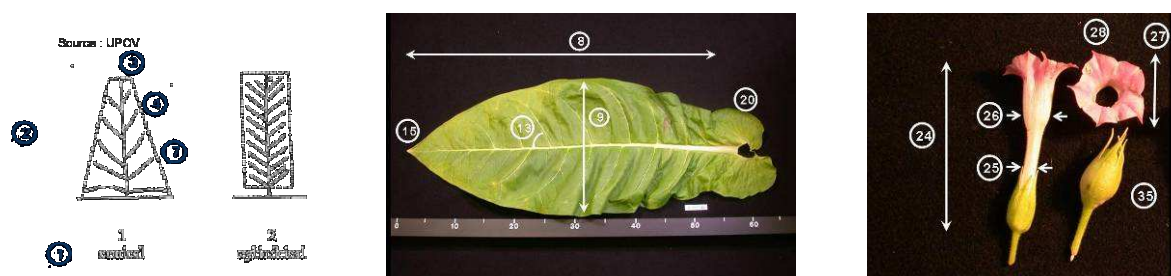


Figure 6: Main general, leaf and flower characteristics observed in industrial tobacco variety technical examination following UPOV guidelines



1- Plant shape; 2- Plant height; 3- Color of stem; 4- Number of leaves; 7- Angle of leaf insertion; 8- Leaf length; 9- Leaf width; 13- Angle of veins; 14- Shape of blade; 15- Shape of leaf tip; 20- Auricles; 21- Color of blade; 24- Flower length; 25- Diameter of flower tube; 26- Swelling of flower tube; 27- Size of corolla; 28- Tips of corolla; 29- Color of corolla; 35- Form of fruit.

Figure 7: ITB 5748 and ITB 270, first industrial tobacco varieties to be protected by COV

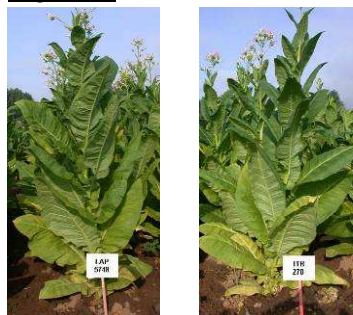


Figure 8: Protection of 2 industrial tobacco varieties by Community COV
CPOV Website: www.cpvo.fr/module_tech/rights_granted.php?SPECIEID=NICO2

Applications & Rights granted							
Nicotiana L.(1)							
File number	Application date	Denomination	Grant number	Grant date	End of protection	TRExamOffice	Holder
19970673	15-MAI-1997	SEISUAVE	6321	19-JUIN-2000	31-DÉC.-2025	No	90014
							HOLDER

Species

Botanical Name of Species :

Applicants / Holders

Applicants name containing :

Table 1: Alkaloid content of ITB 5748, ITB 270 and standards

VAR	Nicotine %	Nornicotine %	Anatabine %	Anabasine %	Total Alkaloids %
TN 90	2,35	0,23	0,14	0,02	2,74
BURLEY 21	1,91	0,34	0,11	0,02	2,38
BURLEY 21 LA	0,01	0,11	0,01	0,00	0,13
ITB 270	0,13	0,06	0,01	0,00	0,20
LAP 57-48	0,14	0,05	0,01	0,00	0,20

Means of 2004-2005 for median leaves, obtained with hplc method, expressed in % dry matter

Figure 9: Floral differences between ITB 5748 and ITB 270



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