



International Community of Breeders of Asexually Reproduced Ornamental and Fruit Plants

Views of CIOPORA on essentially derived varieties

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EDV as part of the horizontal protection of Plant Breeders' Rights

Article 14 Scope of the Breeder's Right

(1) [Acts in respect of the propagating material] (a) Subject to Articles 15 and 16, the following acts in respect of the propagating material of the protected variety shall require the authorization of the breeder:

- (i) production or reproduction (multiplication),
- (ii) conditioning for the purpose of propagation,
- (iii) offering for sale,
- (iv) selling or other marketing,
- (v) exporting,
- (vi) importing,
- (vii) stocking for any of the purposes mentioned in (i) to (vi), above.

(2) [Acts in respect of the harvested material] ...

(3) [Acts in respect of certain products] ...

(4) [Possible additional acts] ...

EDV as part of the horizontal protection of Plant Breeders' Rights

(5) [*Essentially derived and certain other varieties*]

(a) The provisions of paragraphs (1) to (4) shall also apply in relation to

- (i) varieties which are **essentially derived** from the protected variety, ...,
- (ii) varieties which are **not clearly distinguishable** in accordance with Article 7 from the protected variety and
- (iii) varieties whose production requires the **repeated use** of the protected variety.

EDV as part of the horizontal protection of Plant Breeders' Rights

➡ Art.14 (5) = Extension of the protection to

- varieties not clearly distinguishable from the protected variety and
- **EDVs of the protected variety**
- [Hybrids]

➡ Corresponding provision ➡

Article 15 Exceptions to the Breeder's Right

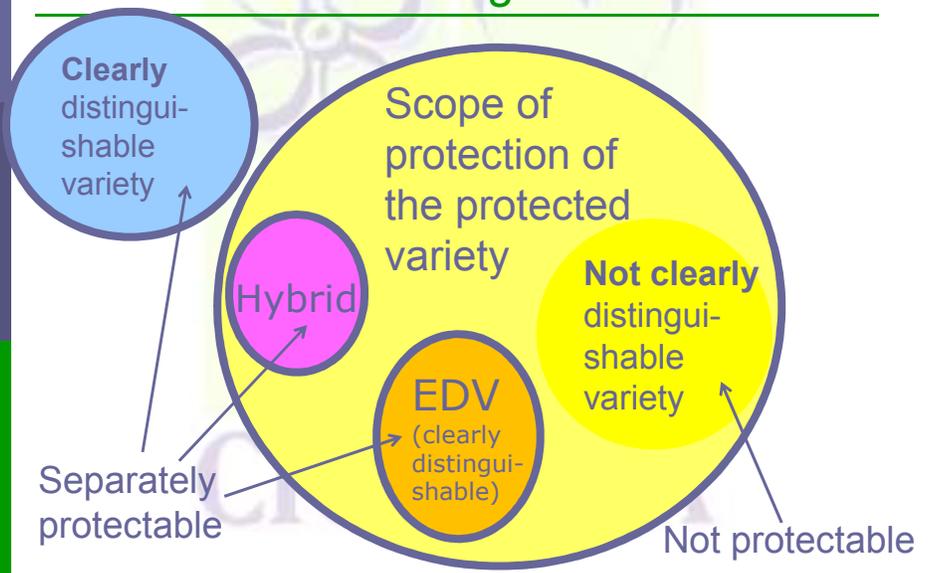
(1) [*Compulsory exceptions*] The breeder's right shall not extend to (i) ..., (ii) ... (iii) acts done for the purpose of breeding other varieties, and, **except where the provisions of Article 14 (5) apply**, acts referred to in Article 14 (1) to (4) in respect of such other varieties.

EDV as part of the horizontal protection of Plant Breeders' Rights

In other words:

- The scope of protection covers
 - (of course) the protected variety,
 - varieties not clearly distinguishable from it
 - and EDV [and hybrids] thereof.
- Everybody can breed new varieties by using a protected variety, but shall not commercialize these new varieties if they are
 - not clearly distinguishable from it, or
 - EDV [and hybrids] thereof.

EDV as part of the horizontal protection of Plant Breeders' Rights



Essentially Derived Varieties

- The commercialization of an EDV requires the authorization of the title-holder of the Initial Variety.
 - ➔ The concept of the Essentially Derived Variety (EDV) limits the breeders' exemption
- Is it fair that a new and unique variety is dependant from a protected initial variety?
- Main issue: mutants and GMO

Essentially Derived Varieties

- New mutations are often developed on the basis of new varieties
- Advantages of mutations:
 - Not much discovering and developing work required
 - Short process of evaluation
 - Takes the benefit of the already known variety
 - Easy to launch

Essentially Derived Varieties

- Mutations of an innovative initial variety can take a big market share of the initial variety, with low costs
- The breeder of the innovative initial variety will not earn a similar return on investment, if his market is shared by low-cost mutations
- It is therefore fair that the original breeder of the innovative variety receives his share from the commercialization of the mutations
- A good protection system protects the innovative breeder, but also allows EDV to be developed - for the benefit of the original breeder, the developer of the EDV and the growers!

Essentially Derived Varieties

- The breeders of vegetatively reproduced ornamental and fruit varieties need clarity in regard to EDV
- It is not acceptable that two courts judging about the same varieties come to different results
- For breeders of vegetatively reproduced ornamental and fruit varieties it is of importance that the EDV-concept covers all mutations and GMO (i.e. varieties originating from one variety) of the protected initial variety (see CIOPORA EDV position paper of 2008)
- The main open question is whether there is an upper limit for the differences between an EDV and its Initial Variety? „One or a few“ only?

Essentially Derived Varieties

Basis for future discussions in UPOV:

[Extract of the explanatory notes on Article 5 “Effects of the Right Granted to the Breeder” presented in document IOM/IV/2, “Revision of the Convention”]

“(ii) the derived variety must retain almost the totality of the genotype of the mother variety and be distinguishable from that variety by a very limited number of characteristics (typically by one)”

c. Conformity to the initial variety

ISF is fully supportive of the statement in UPOV document IOM/IV/2 that an EDV will have a difference of only one or a few phenotypic characteristics compared to the initial variety*.

*ISF View on Intellectual Property, Adopted in Rio de Janeiro, Brazil, 28 June 2012

Essentially Derived Varieties

- „One difference“ limits the EDV concept as far as even possible
- „One or a few“ [differences] is directed solely towards preventing plagiarism
- Linking EDV with plagiarism is erroneous, because for the holder of a protected variety it makes no difference whether the plagiaristic variety originates from his variety or from other varieties.
- Plagiarism is a matter of Minimum Distance, and not a matter of EDV
- UPOV and its members must clarify this!

Essentially Derived Varieties

Other open issue: non-protected EDV

- Proper variety denomination of non-protected EDV
- Description for non-protected EDV
- Register for non-protected EDV
- Varieties, which are not clearly distinguishable from non-protected EDV

Essentially Derived Varieties

Article 14 (5) (b) of the UPOV 1991 Act

A variety shall be deemed to be essentially derived from another variety ('the initial variety') when

- it is predominantly derived from the initial variety, or from a variety that is itself predominantly derived from the initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety
- it is clearly distinguishable from the initial variety
- except for the differences which result from the act of derivation, it conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.

Essentially Derived Varieties

What was in the mind of the founding fathers

- Nobody knows...
- Probably they were “confused”, especially if one looks now back on UPOV IOM/6/2 (1992), especially to the examples detailed in the annex...
- No such “nice” examples anymore in UPOV/EXN/EDV/1 (2009), so maybe they were really confused...

What I was told EDV was about...

- Mutants and somaclonal variants in fruit and ornamentals
- Short cut breeding upto “midnight breeding”
- Plagiarism (?)
- Genetic transformation

And... EDV is all about genetic conformity !!!

Mutants, mutation breeding...

➤ What are mutants?

- a mutation is a change in the nucleotide sequence of the genome of an organism
- A mutant implicates a wild type, the common situation
 - recurrent flowering in roses is considered to be a recessive mutation

➤ Different classes of mutations

- spontaneous mutations (molecular decay);
- mutations due to error prone DNA replication;
- errors introduced during DNA repair;
- induced mutations caused by mutagens.

Different “types” don’t support EDV versus non-EDV

Is there a functional ranking for mutations supporting *small* (EDV) versus *large* (non-EDV)?

- **(Small) point mutations might lead to a different species**
 - e.g. when flowering time is altered; annual versus bi-annual
- **(Large) whole genome duplications are much more common than supposed**
 - All know species incorporate ancient whole genome duplications
 - Ploidy differences are common within a same species e.g. wild rose species like dogrose (infertile even...)
- **Ranking implies a set of “essential characteristics”**
 - UPOV, VCU, etc. – functionally, according to VCU definitions?
 - Phenetically, as a breeder experiences them?
 - Genetically, as phylogeny and speciation define them?

Mutants, mutation breeding...

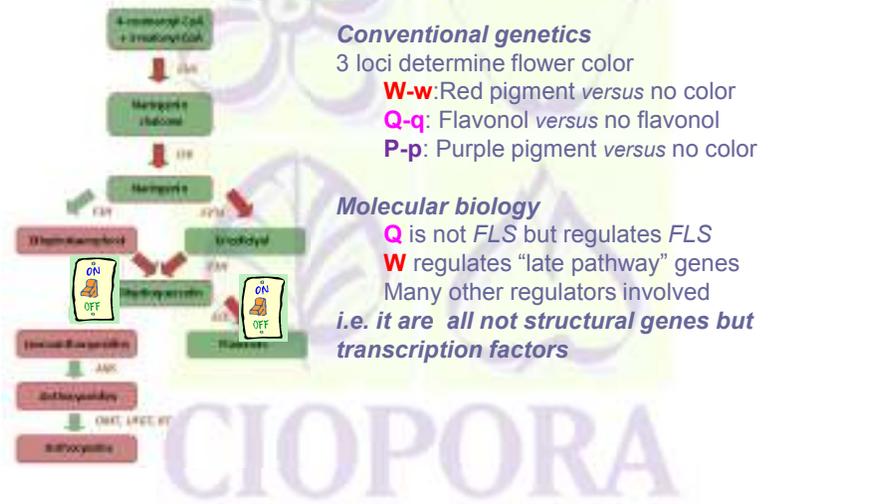
- **Link between mutation and phenotype**
 - Also “monogenic” traits are most of the time not the effect of 1 single gene e.g. flower color genes
 - Mutations in regulatory elements like transcription factors are per definition influencing many traits (pleiotropic effect)

CIOPORA

Genetics in azalea to elucidate bud sporting phenomenon



Genetics in azalea to elucidate bud sporting phenomenon



Conventional genetics
 3 loci determine flower color
W-w: Red pigment *versus* no color
Q-q: Flavonol *versus* no flavonol
P-p: Purple pigment *versus* no color

Molecular biology
Q is not *FLS* but regulates *FLS*
W regulates “late pathway” genes
 Many other regulators involved
i.e. it are all not structural genes but transcription factors

Chrysanthemum mutation breeding



Mandarin case



Mutation breeding creates the world's most perfect orange

The Kinnow5 mandarin orange, pictured at right, is incredibly sweet, has almost no seeds, a skin so thin it's easily peeled, and can grow in the desert. And it's a mutant created almost the same way thick was. Today the Plant Biology department at the University of California at Riverside announced the successful creation of Kinnow5, a genetic mutation based on the seedy Kinnow orange commonly grown in India and Pakistan. The Kinnow, pictured above at left, is also a genetic mutation, developed nearly a century ago at UC Riverside. Kinnow5 oranges are the result of "mutation breeding," a genetic engineering technique that sounds like something right out of a comic book. Researchers bombard young plants with X-rays, gamma rays, or mutagenic chemicals. As a result, they often get plants that are superpowered, just like the Kinnow5, which is exceptionally hardy, tasty, and nearly seedless (the 5S stands for "low-seeded"). You won't be able to buy Kinnow5 oranges for about five years in the supermarket because they're still in the beta breeding stage. A few farms in the hot fields of central California have been licensed to breed the trees that will eventually produce Kinnow5 in roughly three years. Once these trees are producing oranges, the university will start licensing its new fruit abroad.



Genetic transformation?

- **The flowering behavior of *Osteospermum* transgenic clones carrying either 35SroIC or rolABC genes**
 - The transgenes induced in *Osteospermum*
 - early flowering,
 - profuse flowering
 - longer pot life
 - It is considered to be a completely new ornamental product with
 - a smaller flower head size
 - the bushy phenotype
 - the upright growth habit and
 - the higher number of flower heads per plant
- **In the view of some people probably no EDV because it no longer retains the expression of the “essential characteristics” of the IV**

Spontaneous (tissue culture) variants?

- **Somaclonal variation by epigenetics**
 - Ivy if propagated from adult or juvenile leaves maintains its phenotype
- | | |
|--|---|
|  <p>Adult leaves</p> <ul style="list-style-type: none"> • Elliptic • Not climbing |  <p>Juvenile leaves</p> <ul style="list-style-type: none"> • Hand shaped • Climbing |
|--|---|
- Rambling roses start from non-ramblers
 - Variegated plants derived from tissue culture (or vice versa)
- **In the view of some people probably no EDV because it no longer retains the expression of the “essential characteristics” of the IV**

Change of chromosome number?

- **Already in 1992 UPOV IOM/6/2 it was very unclear**
 - *“The opinions differ on whether varieties resulting from the doubling or halving of the chromosome number should or should not be regarded as retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.”*
 - **OK, this can be understood**
 - *“It is suggested that the criteria of essential derivation can be applied where the breeding technique involves a change in chromosome number in exactly the same way as with other breeding techniques.”*
 - **After rereading, I think, it means that if there are more than a few differences it is no EDV...**
- **In the view of some people probably no EDV because it no longer retains the expression of the “essential characteristics” of the IV**
 - *Gypsophila case...*

CIOPORA – vegetatively propagated crops

- **Legal framework since 1991 has been turned upside down in practice**
 - Arbitration is rare
 - Existing court cases are in conflict with reality
 - Not all mutants are apparently EDV...
 - Short-cut breeding is not discouraged
- **Need for a clear definition**
 - “except for the differences which result from the act of derivation, it conforms to the initial variety in the expression of the essential characteristics that result from the genotype”*

CIOPORA – Proposal for a better terminology

“it conforms to the initial variety in the expression of the essential characteristics that result from the genotype”

What is meant?

Is it the genotype i.e. aiming at genetic conformity,
or, because of the use of the word “expression”, the phenotype?

The EDV definition should aim at varieties sharing a high genetic conformity with the Initial Variety

Are the set of “essential characteristics” limited to major or important characteristics?

The wording essential characteristics is in the Convention to indicate any characteristic that is typical to the Initial Variety and not to differentiate them from any kind of non-essential ones.

Conclusion

Breeders of vegetatively reproduced ornamental and fruit varieties need clarity about what is an EDV

The EDV concept need to be sufficiently broad, and must at least cover mutants and GMO



Thank you
for your attention

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