UPOV

International Union for the Protection of New Varieties of Plants

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Technical Working Party on Automation and Computer Programs **TWC/36/7 Add.**

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ADDENDUM TO RISKS ASSOCIATED WITH ASSESSMENT OF UNIFORMITY BY OFF-TYPES ON THE BASIS OF MORE THAN ONE GROWING CYCLE

Document prepared by experts from Germany and the United Kingdom

Disclaimer: this document does not represent UPOV policies or guidance

The Annex to this document contains a copy of a presentation on "Risks associated with assessment of uniformity by off-types on the basis of more than one growing cycle", made at the thirty-sixth session of the Technical Working Party on Automation and Computer Programs (TWC).

[Annex follows]

ANNEX

RISKS ASSOCIATED WITH ASSESSMENT OF UNIFORMITY BY OFF-TYPES ON THE BASIS OF MORE THAN ONE GROWING CYCLE

Presentation prepared by experts from Germany and the United Kingdom

Assessing uniformity by off-types on the basis of more than one growing cycle

Risks

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Report from the last TWC meeting

TWC/35/21:

26. The TWC agreed that the different results obtained using the different approaches for the assessment of off-types on the basis of more than one growing cycle were due in part to the different risks of type I and type II errors associated with each approach. The TWC agreed to invite the experts from Germany, the United Kingdom and other members of the Union to submit papers on the analysis of risks associated with each approach to be considered at its thirty-sixth session.;

Background

Population Standard

maximum acceptable proportion of off-types for a variety

Maximum is over all individuals of a variety

- Hypothetical – cannot assess all individuals
- Instead we look at a sample

Sampling variability

Example:

- *Variety has 5%*
- *Look at sample of size 500 individuals*

29

Sampling variability

Example:

- *Variety has 5%*
- *Look at sample of size 500 individuals*

29, 19

Sampling variability

Example:

- *Variety has 5%*
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29, 19, 21

Sampling variability

Example:

- *Variety has 5%*
- *Look at sample of size 500 individuals*

29, 19, 21, 27

Sampling variability

Example:

- *Variety has 5%*
- *Look at sample of size 500 individuals*

29, 19, 21, 27, 30

Sampling variability

Example:

- *Variety has 5%*
- *Look at sample of size 500 individuals*

29, 19, 21, 27, 30, 29, 32, 28, 21, 22

Sampling variability

Example:

- *Variety has 5%*
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29, 19, 21, 27, 30, 29, 32, 28, 21, 22

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On average 50%-ish will be above 5%

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TESTS SET UP TO GIVE MARGIN OF SAFETY TO ALLOW FOR SAMPLING

Setting up tests for samples

- Allow for sampling variability
- Account for two types of risks due to sampling "errors"

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Type II error: declare variety uniform when population is non-uniform

Setting up tests for samples

- Allow for sampling variability
- Account for two types of risks due to sampling "errors"

Type I error: declare variety non-uniform when population is uniform

In example, chance of this is 50%!!!!!

Type II error: declare variety uniform when population is non-uniform

Type I and type II errors

Tests are set up to achieve a set type I error

- Type I error = 1 – acceptance probability
- 5% in example
- In relation to population standard

Different test can then be compared through the type II errors

- Type II errors are calculated at different levels of off-types in population
- e.g. 2 , 5 and 10 times the population standard

Example

- *Population standard is 5%*
- *Acceptance probability is 95%*

Maximum allowable number of off-types and type II errors from TGP/8/3

Sample size = 500 individuals

Maximum allowable off-types is 33 (6.6% of 500)

Type II error: chance of variety with 10% off-types having a uniform sample = 0.5%

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Maximum allowable off-types is 33 (6.6% of 500)

Type II error: chance of variety with 10% off-types having a uniform sample = 0.5%

Sample size = 50 individuals

Maximum allowable off-types is 5 (10% of 50)

Type II error: chance of variety with 10% off-types having a uniform sample = 63%

Errors for off-type test over two cycles

See TWP/1/17 for example approaches

Can set type I error for each growing cycle **or** for the overall test

Errors for off-type test over two cycles

See TWP/1/17 for example approaches

Can set type I error for each growing cycle **or** for the overall test

Which is better?

Set type I error for each stage

Advantages:

- Easy to work out maximum number of off-types for each stage (TGP/8/3)
- Tends to give (even) more benefit of doubt to applicant?

Set type I error for the whole test

Advantages:

- Correct acceptance probability for whole test
- Lower chance of type II errors
- Ensures standards for assessment of uniformity more consistent between members, whatever approach they use

Example

- *Population standard is 1%*
- *Acceptance probability is 95%*
- *50 plants in each cycle*
- *Approach 1*
  - *Two cycles assessed separately*
  - *If same verdict in both* ✓
  - *If different, third cycle to decide*

Based on type I error for each cycle
Maximum allowable off-types in each cycle is 2 (4%)

Type II error: chance of variety with 5% off-types having a uniform sample = 56%

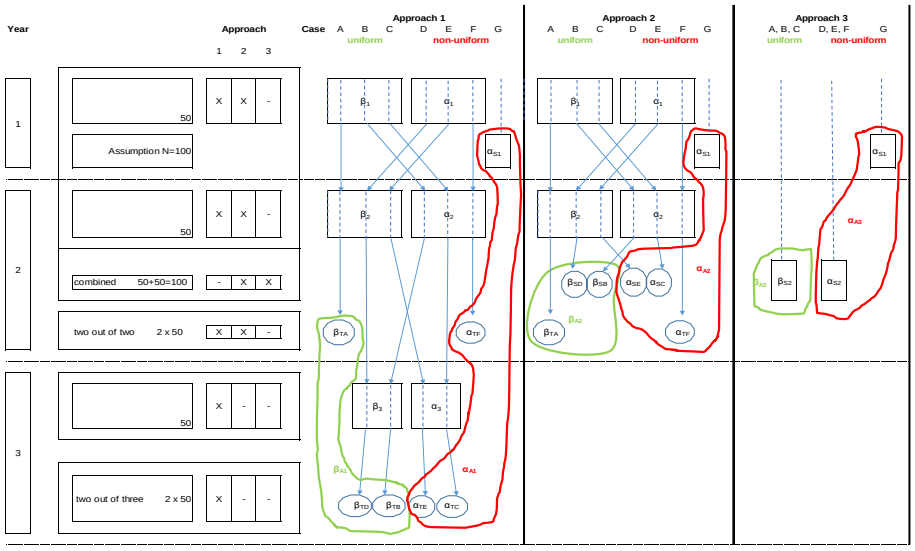
Based on type I error for each cycle
Maximum allowable off-types in each cycle is 2 (4%)

Type II error: chance of variety with 5% off-types having a uniform sample = 56%

Based on overall type I error
Maximum allowable off-types in each cycle is 1 (2%)

Type II error: chance of variety with 5% off-types having a uniform sample = 19%

CALCULATION OF OVERALL RISKS



Legend:

α_1	type I error for the first year	stagewise
α_2	type I error for the second year	stagewise
α_3	type I error for the third year	stagewise
β_1	type II error for the first year	stagewise
...		
α_{A1}	Type I error for approach 1	overall
β_{A1}	Type II error for approach 1	overall
...		

T stands for two out of two or three years
S1 stands for the assumption to have 100 plants instead of 50 for example
SD stand for Sum over two years but with looking on year1 and year2for case D
S2 stands for Sum over two years without looking on year 1 or year 2
A,B,C,D,E,F,G are different cases

Recommendation

For uniformity over two or more cycles, base the acceptable number of off-types on the overall type I error

– Whichever approach is used

Consider development of tables or software to support this

[End of Annex and of document]