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| INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS  |
| Geneva |

Technical working party for fruit cropS

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Method of observation for derived characteristics

Document prepared by New Zealand

# BACKGROUND

 The Technical Working Party for Fruit crops (TWF), at its forty-sixth session in 2015, held in Mpumalanga, South Africa, from August 24 to 28, 2015 , agreed to discuss the item “method of observation for derived characteristics” at its next session (see document TWF/46/29 Rev. “Revised Report”, paragraph 139).

 The TWF at its forty-sixth session, requested the expert from New Zealand to draft a proposal.

# Introduction

## Method of observation for characteristics involving ratios

 Characteristics involving ratios have proven to be useful for the description of a variety and for the determination of distinctness. It is important to recognize that the ratio characteristic is a derived characteristic and cannot be effectively determined without the evaluation of the two component characteristics. In some cases a ratio characteristic can be more reliable and consistent than the individual components.

Examples of ratio characteristics:

Leaf blade: length/width derived from Leaf blade: length and Leaf blade: width

Leaf: length of petiole relative to blade derived from Petiole: length and Leaf blade: length

Fruit height/diameter derived from Fruit: height and Fruit: diameter

Fruit: width of core relative to fruit derived from Fruit: width of core and Fruit: width

Ripe fruit: ratio fruit length/seed length derived from Ripe fruit: length and Seed: length

Fruit: diameter of calyx in relation to fruit derived from Fruit: diameter of calyx and Fruit: width

# EXPLANATION on CURRENT PRACTICES IN NEW ZEALAND

## Derived characteristics such as ratios can be determined using several methods of observation.

 A ratio characteristic may be assessed visually by assessing the individual component characteristics or by observing the characteristic as a whole. For visual assessment to be reliable a set of example varieties would be advantageous.

 The components of a ratio characteristic are often measurable and can be combined to calculate the ratio values. The calculation of the ratio values can be determined by a plot or group approach following the principle of MG or values determined per plant or per organ following an MS approach.

 The collected data can be evaluated in three different ways.

1. A value per plant, where several organs are measured and combined to determine the value per plant and then those are combined to determine the value for the characteristic MS
2. A value per sample, where individual organs are measured to determine a value per organ and those values are combined to determine the value for the characteristic MS
3. A value per plot, where one or more organ measurements are combined to determine the value for the characteristic MG

Example

Apple variety ‘Delblush’

Fruit: height

Fruit: width

Fruit: height/width ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tree | One | Two | Three | Four | Five |
| Sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Fruit height mm | 71 | 81 | 65 | 74 | 76 | 73 | 72 | 76 | 75 | 75 | 74 | 81 | 72 | 75 | 73 |
| Tree mean | 72 | 74 | 74 | 77 | 73 |
| Fruit width mm | 75 | 72 | 68 | 74 | 73 | 72 | 68 | 70 | 76 | 72 | 76 | 78 | 73 | 74 | 73 |
| Tree mean | 71 | 73 | 71 | 75 | 73 |
| Fruit Ratio per sample | 0.95 | 1.13 | 0.96 | 1.00 | 1.04 | 1.01 | 1.06 | 1.09 | 0.99 | 1.04 | 0.97 | 1.04 | .99 | 1.01 | 1.00 |
| Fruit ratio per tree  | 1.01 | 1.01 | 1.04 | 1.03 | 1.00 |

**MS approach**

i. The mean ratio value per tree falls in a range of 1.00 to 1.04

ii. The ratio value per fruit sample falls in a range of 0.95 to 1.09

**MG approach**

The ratio derived from the mean of all fruit height samples and the mean of all fruit width samples

 = 1.02

The above values can then be translated into a state of expression using the authority’s calibration scale established for the characteristic.

# Conclusion

 Based on the above example the ratio values are very similar irrespective of the approach taken and the decision on how to observe the ratio characteristic using MG or MS should be primarily influenced by the authority’s testing practice. The above example provides no evidence to suggest that the method of observation influences or alters the state of expression.

 The method of observation for derived characteristics, such as ratios, should be decided independently of the method used to observe the component characteristics. There may be a connection with respect to the data collection process but there should not be the assumption that the derived characteristic will be the same as the component characteristics.

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