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GUIDANCE FOR DEVELOPMENT OF VARIETY DESCRIPTIONS: THE ITALIAN EXPERIENCE

Document prepared by an expert from Italy

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INTRODUCTION

1. This document is mainly based on TWC/32/PRESENTATION/4 made at the thirty-second session of the TWC held in Helsinki, Finland, on June 3 to 6, 2014. The method is still in progress and slightly different from last version. This method is based on partitioning into states of Total range of expression and Total range of historical averages. It is applied to varieties of grass species especially for quantitative continuous data but also for quantitative discrete data.

TOTAL RANGE OF EXPRESSION

2. The total range of expression of a quantitative characteristic includes samples of values observed during past trials. This range of values is the difference between the largest and the smallest item in past data and it represents the dispersion of observations. Historical data do not cover all the possible range and different phenological characteristics could be expected in the future where plant breeding might produce new or different characteristics.

TOTAL RANGE OF HISTORICAL AVERAGES

3. Reference and candidate varieties can be tested over two or more years, producing means. Therefore each characteristic is represented by the range of historical averages that covers the intermediate part of Total range of expression. The method includes data from all varieties tested during 8-10 years' trials. Because each variety must contribute equally the average of its past means is used.

PARTITIONING OF TOTAL RANGES INTO NOTES AND MID REFERENCE

4. For each characteristic the range can be represented by a different number of states. The smallest note (e. g. 1) and the largest note (e.g. 9) are the **extreme notes** that cover the tails of "Total expression range". Extreme notes might be equally or not equally spaced according to the symmetry of range histogram. The other notes are **intermediate notes** (e.g. 2…,8) equally spaced, as submultiples of the length of "Total range of historical averages".

5. The midpoint of Total range of historical averages is considered a good reference for the purpose of dividing this range and it normally divides note 5 in half.

6. After calculation of extreme notes the next step is the division of "Total range of historical averages" into intermediate notes as spaces of equal width. If the range is not an exact multiple of notes number an adjustment of the range could be necessary.

7. The partitioning of the Total range of historical averages after some years from the beginning of the construction appears stable.

TRANSFORMATION OF VARIETY MEANS INTO NOTES

8. For each quantitative characteristic the average of past trials means of each variety is transformed into notes according to values that limit each note.

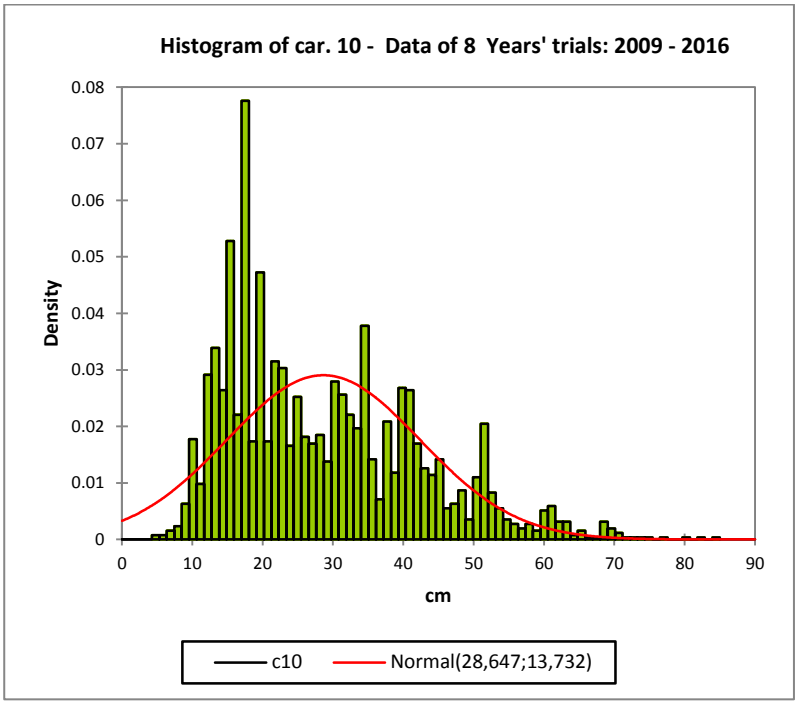
UPDATE OF TOTAL RANGES

9. The total range of expression and the total range of historical averages could be **updated** (for example every "n" years). In this case the mid reference (midpoint) and some varietal descriptions could change slightly.

Example of transformation into notes in case of skewed distribution

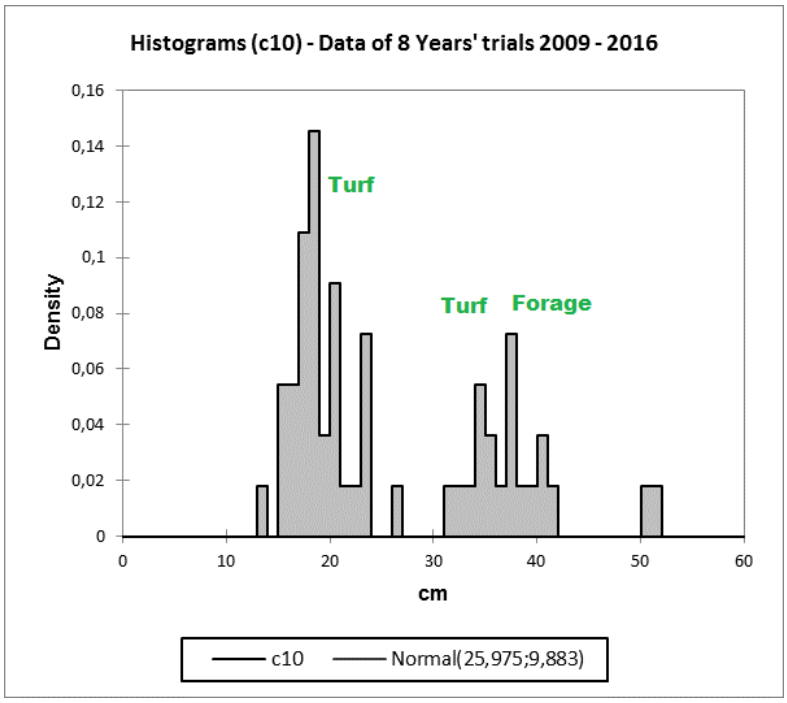
10. The species Tall fescue includes both turf varieties (usually not very tall) and forage varieties which are taller than the previous ones. The distribution of the two types of varieties (turf and forage) is shown in Figure 2. The data of character 10 "Plant: natural height at inflorescence emergence" are continuous values with a non-symmetrical distribution (positively skewed distribution).

Figure 1 – Histogram of TOTAL RANGE OF EXPRESSION
car. 10 Tall fescue - Plant: natural height at inflorescence emergence



Data of 8 years' trials: from 2009 to 2016
Total range of expression: 5.0 - 84.0 cm

Figure 2 – Histogram of TOTAL RANGE OF HISTORICAL AVERAGES
car. 10 Tall fescue - Plant: natural height at inflorescence emergence



Total range of historical averages: 13.9 – 51.4 cm = 37.50 cm
Total range of historical averages adjusted: 14.00 - 52.50 cm = 38.50 cm
Midpoint: 33.25 cm

EXTREME NOTES
Note 1: up to 14.00 cm
Note 9: more than 52.50 cm

INTERMEDIATE NOTES
Notes between 2 and 8: 5.5 cm in length (equally spaced)
Note 2: 14.1 – 19.5 cm
Note 3: 19.6 – 25.0 cm
Note 4: 25.1 – 30.5 cm
Note 5: 30.6 – 36.0 cm
Note 6: 36.1 – 41.5 cm
Note 7: 41.6 – 47.0 cm
Note 8: 47.1 – 52.5 cm

Figure 3 - Partitioning of "Total range of historical averages adjusted" to notes

Table 1 - List of varieties of Tall fescue – car. 10 – Data of Years' trials and Notes appointed

Variety	Type	2009	2010	2011	2012	2013	2014	2015	2016	Car 10	Note
FA 72	turf	13.9	14.0							13.9	1
FA 50	turf	17.1	13.1							15.1	2
FA 55	turf	15.9								15.9	2
FA 66	turf	17.3	14.6							15.9	2
FA 73	turf	17.3	15.4							16.3	2
FA 75	turf	19.1	14.1							16.6	2
FA 68	turf	19.2	14.7							16.9	2
FA 77	turf	17.4	16.9							17.2	2
FA 67	turf	18.8	16.2							17.5	2
FA 82	turf	17.4	17.7							17.6	2
FA 52	turf		17.6							17.6	2
FA 63	turf	17.8								17.8	2
FA 71	turf	19.1	16.9							18.0	2
FA 59	turf		18.0							18.0	2
FA 78	turf	20.7	15.4							18.0	2
FA 76	turf	19.5	16.9							18.2	2
FA 74	turf	18.7	18.4							18.6	2
FA 80	turf	22.0	15.3							18.6	2
FA 89	turf			13.7	23.9					18.8	2
FA 70	turf	21.1	16.5							18.8	2
FA 84	turf			12.9	24.9					18.9	2
FA 81	turf	24.2	15.0							19.6	3
FA 61	turf	19.7								19.7	3
FA 56	turf	20.0								20.0	3
FA 60	turf	20.4								20.4	3
FA 85	turf			13.7	27.2					20.4	3
FA 58	turf	20.6								20.6	3
FA 79	turf	25.1	16.5							20.8	3
FA 83	turf			13.6	29.4					21.5	3
FA 87	turf			15.8	26.7				23.7	22.1	3
FA 54	turf	23.3								23.3	3
FA 62	turf	23.4								23.4	3
FA 88	turf			14.1	33.0					23.6	3
FA53	turf	27.6	20.3							24.0	3
FA 86	turf			14.6	37.8					26.2	4
FA 64	turf	19.4				41.4	36.2	34.6	24.6	31.2	5
FA 94	turf				29.3	43.1			25.4	32.6	5
K 504	turf	28.4	15.1	18.6	40.9	49.5	47.4	36.0	31.5	33.4	5
FA 69	forage	47.6	21.0							34.3	5
FA 97	turf				29.7	39.0				34.4	5
FA 101	turf					38.8	37.6		28.4	34.9	5
FA 103	turf						37.0	33.5		35.2	5
FA 99	turf					38.0	34.0			36.0	5

FA 100	**turf**					**39.7**	**32.5**			**36.1**	**6**
FA 95	**turf**				**31.6**	**42.6**				**37.1**	**6**
FA 98	**turf**				**34.5**	**40.1**				**37.3**	**6**
K 501	**turf**			**21.1**	**39.3**	**48.6**	**42.2**			**37.8**	**6**
FA 96	**turf**				**34.0**	**42.0**				**38.0**	**6**
K 480	**forage**								**38.3**	**38.3**	**6**
FA 92	**forage**			**36.4**	**35.1**	**46.1**				**39.2**	**6**
FA 93	**turf**				**35.9**	**44.2**				**40.1**	**6**
FA 111	**forage**								**40.8**	**40.8**	**6**
FA 57	**forage**	**41.2**								**41.2**	**6**
FA 90	**forage**			**35.9**	**64.2**				**50.0**	**50.0**	**8**
FA 65	**forage**	**54.3**						**50.4**	**49.7**	**51.4**	**8**

Table 2 - Example of transformation into notes of candidate varieties (mean of year 2015 and year 2016)

Candidate variety	Type	Car 10: Mean of year 2015 and year 2016 (cm)	Note
VARIETY 107	*turf*	26.7	**4**
VARIETY 108	*turf*	28.7	**4**
VARIETY 106	*forage*	43.2	**7**
VARIETY 110	*forage*	48.6	**8**
VARIETY 109	*forage*	50.4	**8**
VARIETY 104	*forage*	51.6	**8**
VARIETY 105	*forage*	52.8	**9**

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