INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

TECHNICAL WORKING PARTY FOR VEGETABLES

Forty-Fourth Session
Veliko Tarnovo, Bulgaria, July 5 to 9, 2010

USE OF LINEAR REGRESSION FOR THE DESCRIPTION OF HERBAGE CROPS
TESTED IN FRANCE

document prepared by experts from France

1.   At its twenty-seventh session, held in Alexandria, Virginia, United States of America, from June 16 to 19, 2009, the Technical Working Party on Automation and Computer Programs (TWC) considered document TWC/27/11 "Document TGP/8: Sections for separate development", as the basis for a future revision of document TGP/8 (document TGP/8/2). The TWC agreed that experts from Finland, France, Germany, Italy, Japan, Kenya and United Kingdom should provide a short description of the principles underlying the detailed methods provided in Part II and that Mrs. Sally Watson (United Kingdom) would provide an example for Section 13.1 (see document TWC/27/21 "Report", paragraph 62).

2.   The Annex to this document contains the text prepared by Mr. Vincent Gensollen (F).

[Annex follows]

ANNEX

USE OF A LINEAR REGRESSION FOR THE DESCRIPTION OF HERBAGE CROPS
TESTED IN FRANCE

Example of "plant: natural height at inflorescence emergence" for tall fescue varieties

1.   Cross-pollinated varieties, like synthetic varieties have important within-variety variability due to the genetic structure of this kind of variety. So the expression of a characteristic should be recorded using more than one observation. Usually in the DUS trials of forage species, records are taken from 60 individual plants.

2.   The example used is the characteristic "plant: natural height at inflorescence emergence" for tall fescue varieties.

Tab 2: Guide line TG/39/8 Meadow Fescue, Tall Fescue, characteristic n°10

TG/39/8
Meadow Fescue, Tall Fescue/Fétuque des prés, Fétuque élevée/Wiesen-, Rohrschwingel/Festuca de los prados, Festuca alta
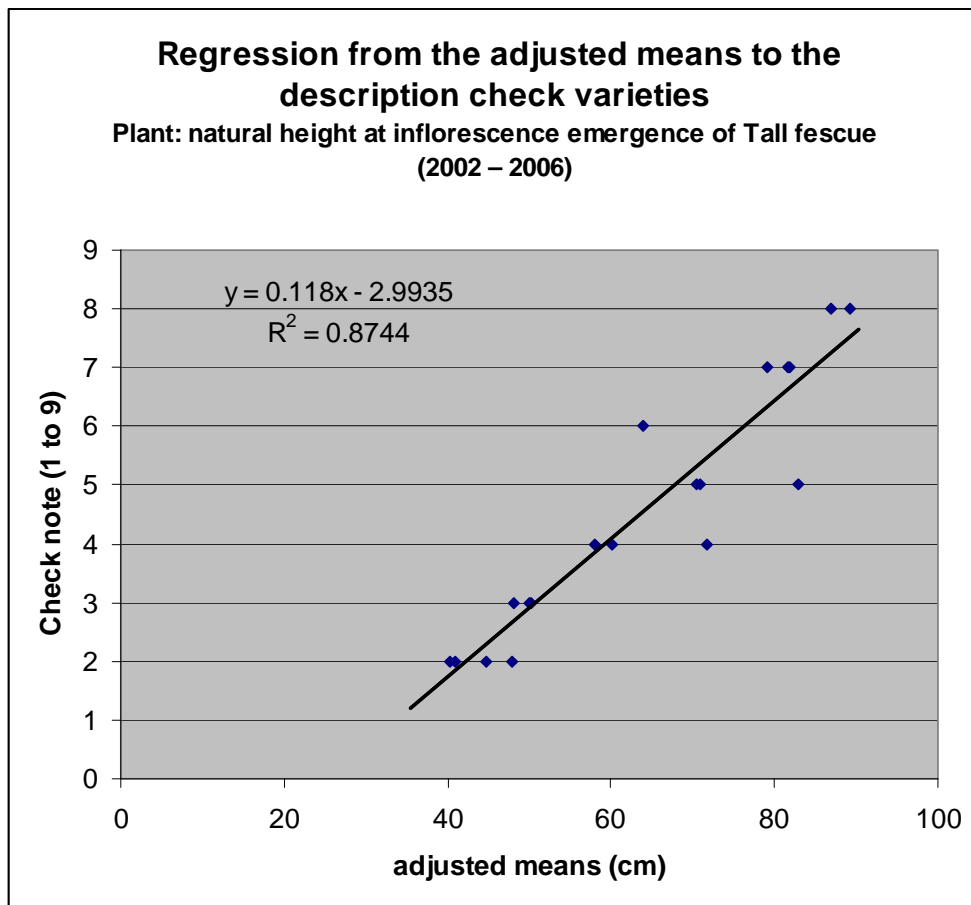2002-04-17
-9-

Plot[1] Parcelle[1] Parzelle[1] Parcela[1] English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. A MS Plant: natural height at inflorescence emergence	Plante: hauteur naturelle à l'épiaison	Pflanze: natürliche Höhe bei Erscheinen der Blütenstände	Planta: altura a la emergencia de la inflorescencia		
short	basse	niedrig	baja	Eldorado (F.a.), Bundy (F.p.)	3
medium	moyenne	mittel	media	Adventure (F.a.), Cosmos 11 (F.p.)	5
long	haute	hoch	alta	Ibis (F.a.), Preval (F.p.)	7

3.   In measurement on Single plant (MS) in spaced plant trials (A), the statistical procedure recommended by UPOV is the Combined Over Years Distinctness (COYD) analysis. This method takes into account variations between years. The COY D provides, for each measured characteristic, adjusted means for the reference varieties and the candidate varieties.

4.   For the purpose of the description, we transform these adjusted means to notes. We use a linear regression from the adjusted means to "description check varieties". The description check varieties are already well described example varieties (i.e. example varieties of the UPOV guide line or national example varieties).

5.   The graph in figure 2 shows the regression from the adjusted means to the description note. In this case 4 varieties had been described with the note 2, 2 varieties with note 3 etc.

Fig. 2: Linear Regression from the adjusted mean to the description check variety

Regression from the adjusted means to the description check varieties
Plant: natural height at inflorescence emergence of Tall fescue
(2002 – 2006)

$y = 0.118x - 2.9935$
$R^2 = 0.8744$

6.   In this example, the regression square (R^2) is equal to 0.8744, which is a good value for this characteristic on tall fescue. Generally we consider the regression valid if R^2 is higher than 0.6. Then, we calculate a predicted note with the equation of the regression (see fig.2 below). In this example the equation is:

Predicted note = 0.118 x adjusted mean - 2.9935.

From this we can compute the description note.

Tab 3: Adjusted mean and description note for the characteristic natural height at inflorescence emergence of tall fescue varieties.

Variety name	Adjusted mean (cm)	Check description note	Predicted note	Description note
C1	35.50	.	1.19423	1
BONAPARTE	44.71	2	2.28068	2
ELDORADO	47.90	2	2.65699	3
C2	48.15	.	2.68648	3
MONTSERRAT	48.15	3	2.68648	3
MURRAY	50.29	3	2.93893	3
C3	52.78	.	3.23266	3
TOMAHAWK	54.80	.	3.47095	3
BORNEO	58.11	4	3.86141	4
C4	58.94	.	3.95932	4
BARDAVINCI	60.28	.	4.11739	4
VILLAGEOISE	62.07	.	4.32855	4
C5	62.13	.	4.33563	4
DANIELLE	63.97	6	4.55268	5
DIVYNA	64.54	.	4.61992	5
C6	69.54	.	5.20975	5
GARDIAN	70.55	5	5.32889	5
EMERAUDE	70.91	5	5.37136	5
CENTURION	71.81	4	5.47753	5
SZARVASI 56	73.18	.	5.63914	6
BARCEL	79.41	.	6.37406	6
DULCIA	81.63	7	6.63594	7
LUNIBELLE	81.85	7	6.66190	7
C7	86.57	.	7.21869	7
BARIANE	87.02	8	7.27177	7
C8	87.44	.	7.32132	7
APRILIA	89.28	8	7.53837	8
C9	89.65	.	7.58202	8
FLEXY	90.31	.	7.65988	8

7.   The procedure described makes it possible to take into account the environmental effect on the expression of the characteristics and also the interaction between variety and environment.

8.   Thus the comparison between varieties tested in different environments and years is made possible. This transformation of measured data into notes makes it possible to store the description in a database and to screen varieties within the reference collection.

[End of Annex and of document]