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GENEVA

TECHNICAL WORKING PARTY FOR VEGETABLES

Thirty-Seventh Session
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COMMENTS ON TEST GUIDELINES FOR INDUSTRIAL CHICHORY (TG/172/3)

prepared by an expert from Belgium

Introduction

1. The Technical Committee, at its 36th session in April 2001, adopted Test Guidelines for Industrial Chicory, subject to the provision of explanation on Characteristic 17: Root: inulin content. Upon the completion of the explanation by Mr. Nico van Marrewijk (Netherlands, leading expert for Test Guidelines for Industrial Chicory), Test Guidelines for Industrial Chicory were published and placed on the UPOV Website as follows:

http://www.upov.int/en/publications/tg-rom/index.html

2. In the meantime Mr. Johan van Waes (Head of Section Crop Husbandry, Department of Crop Husbandry and Ecophysiology (DFE), Agricultural Research Centre - Ghent (CLO), Ministry of the Flemish Community, Belgium) sent remarks on the said Test Guidelines by his electronic mail on January 6, 2003.

3. The Annex to this docment reproduces Mr. van Waes remarks.

[The Annex follows]

ANNEX

Comments on UPOV Test Guidelines for Industrial Chicory

Sent by Dr. Ir. Johan Van Waes, Head of Section Crop Husbandry
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The remarks, given hereafter, are mainly based on the discussions held at the International Meeting for Industrial Chicory held on the December 17, 002 at Merelbeke (Belgium)

GENERAL REMARK ON THE UPOV- GUIDELINE

The guideline is mainly based on different chicory types while for industrial chicory specific characteristics are more important to characterise a new variety

For the actual characteristics in the Test Guidelines we propose the following modifications (see the table below):

UPOV TEST GUIDELINES FOR INDUSTRIAL CHICORY AND PROPOSED MODIFICATIONS

Number	**Characteristic**	**Actual situation in TG/172/3**	**Proposed modification**
1	Ploïdy	*	None
2	Plant: height	*	To remove *
3	Foliage: attitude	*	None
4	Leaf : length	*	None
5	Leaf: width	*	None
6	Leaf: intensity of green color	*	To remove *
7	Leaf: glossiness		None
8	Leaf: shape in cross section		None
9	Leaf: blistering	*	To remove *
10	Leaf: anthocyanin coloration of midrib		None
11	Leaf: undulation of margin		None
12	Leaf: number of incisions of margin		None
13	Leaf:depth of incisions of margin		None
14	Root: length	*	None
15	Root: maximum width	*	None
16	Root: shape of shoulder	*	To remove *
17	Root: inulin content		To add *
18	Bolting tendency (from an early sowing)		To add *
19	Flowering stem: height		None
20	Flowering stem: branching		None
21	Flower: color		To add *

(*): characteristic obligatory for description

22 : to add : Degree of Polymerisation (DP) : * or not (still to discuss + method for evaluation)

Comments on proposed modifications:

Characteristics 2, 6, 9 and 16 : more variation within variety then between varieties ; not very stable characteristics
Characteristics 17 , 18 and 21 + new (22): very high hereditary

Comments on trial conditions:

- plant density: best compromise: between 100.000 and 130.000 plants/ha → each plant must have the possibility for a good development to express all his characteristics
- number of growing dates (for analyses): between 165 and 180 (this is very important to see to verify the differences between the varieties)
- specific trial for bolting resistance : sowing date between end of February and 15th of March

Comments on analyses of characteristic 17 : "inulin content" and new characteristic
" degree of polymerisation"

- ***proposed sampling method :***
  - to analyse a sample per replicate (at least 2 analyses per variety)
  - per replicate to make the following procedure
    1) to collect 20 roots
    2) to wash the roots (elimination of tare)
    3) to cut by taking a longitudinal quarter of each root (a longitudinal cutting is important due to the gradient in inulin)
    4) to prepare a pulp of the 20 quarters (mixer)
    5) to homogenize and taking a representative sub sample of about 250 g
    6) to put the sample in a plastic bag and to freeze it immediately at –20 °C
- ***proposed analyse method*** : as described in J. Sci.Food Agric. 1998, 76, 107-110. "A rapid determination of the total sugar content and the average inulin chain length in roots of chicory"; determination is executed on pulp and not on juice

  remark : determination of the inulin content, using a refractometer is not very accurate; for variety comparison a very reliable method is necessary to distinguish new varieties from the reference collection

- ***proposed calculations***
  - (% fructose + % glucose) / 1.1 = carbohydrate content
    - fructose and glucose after hydrolysis
    - the term carbohydrate is much used in the industry
    - this factor gives a good prediction of the inulin content
  - degree of polymerisation(DP) = (% fructose / % glucose) + 1
    - fructose and glucose after hydrolysis

DUS RESEARCH FOR INDUSTRIAL CICHORY

DFE – CLO – GENT (Belgium)

Values for inulin content of different years and transformation into UPOV-scale 1-9

Variety	Inulin content						
	2000		2001		2002		UPOV – value (*)
Absylle	21	7	20.4	6	18.2	5	
Apolina	19.5	5	20.5	6	18.4	5	
Arancha	19.6	6	20.2	6	17.9	4	
Bazooka	20.8	7	19.8	6	18.4	5	
Bergues	19.7	6	19.6	5	19.3	6	
Beryl	20.3	6	20.9	7	17.7	4	
Brinco	17.7	4	17.4	3	17.2	3	**5**
Cassel	20.6	7	18.4	4	17.8	4	
Dageraad	20.4	6	20.1	6	19.6	6	**7**
Diamant	17.2	3	19.2	5	16.7	3	
Eva	20	6	21.5	7	19.5	6	
Halle	20.3	6	22.3	8	19.8	6	
Hera	20.2	6	20.0	6	18.5	5	
Inula	18.3	4	18.8	5	17.4	4	
Katrien	19.4	5	20.1	6	19.8	6	**7**
Madona	19.7	6	19.4	5	18.4	5	
Markise	19.3	5	20.3	6	18.1	4	**5**
Marlene	20	6	18.8	5	18	4	**7**
Maurane	20.9	7	20.1	6	19	5	
Melci	21.5	7	20.3	6	19.2	6	
Nickel	20.4	6	21.5	7	19.1	5	
Novipa	20.5	6	21.5	7	21.5	8	
Orchies	19.3	5	19.7	5	17.9	4	**3**
Regalo	18.8	5	19.3	5	16.7	3	
Rubis	19.7	6	18.2	4	17.5	4	
Tilda	19	5	19.7	5	17	4	
Vivace	19.1	5	19.4	5	18.2	5	
Wixor	18.8	5	18.8	5	17	3	
Nausica	-	-	22.1	8	18.7	5	
Min.	17.2		17.4		16.7		
Max.	21.5		22.3		21.5		
Difference	4.3		4.9		4.8		

(*) : based on ref. Varieties of UPOV scale

Comments on this table

All values are per year based on the average of 3 replications (analysis with ion chromatography – method described in J. Sci. Food Agric. 1998,76, 107-110)

The general inulin content can vary per year, depending on the climatological conditions, sowing and harvest date.
Concerning the number of growing days it is worthful to fix it in the protocol for execution of the field trials (between 165 and 180 days)

Proposed scale to use for DUS industrial cichory for inulin content:

1) To evaluate the absolute value per year : minimum, maximum and difference
2) To convert absolute value to scale 1-9 ; between 2 values a difference of at least 1 unit is proposed

For the 3 years the following scales were used :

Table for convertion of absolute values for inulin content into a scale 1-9

Scale 1-9	**Inulin content**		
	2000	**2001**	**2002**
1	14.6-15.5	14.8-15.7	14.2-15.1
2	15.6-16.5	15.8-16.7	15.2-16.1
3	16.6-17.5	16.8-17.7	16.2-17.1
4	17.6-18.5	17.8-18.7	17.2-18.1
5	18.6-19.5	18.8-19.7	18.2-19.1
6	19.6-20.5	19.8-20.7	19.2-20.1
7	20.6-21.5	20.8-21.7	20.2-21.1
8	21.6-22.5	21.8-22.7	21.2-22.1
9	22.6-23.5	22.8-23.7	22.2-23.1

Comments on the variation between the varieties over the years :

In the general the varieties with the lowest and highest potential inulin content are stable over the years (f.e. Brinco : low; Melci : high). However for a lot of varieties the classification can change a lot over the years (f.e. Nausica : 8 in 2001 ; 5 in 2002).

In comparison with the reference varieties of the UPOV-guideline we see a great difference for 2 varieties :

Brinco = is classified as 5 but is in the 3 years trials always very low
Orchies= is classified as 3 but is in the 3 years trials always moderate

For other varieties the classification according to the UPOV-scale is corresponding with the 3 years results of the trials in Belgium (f.e. Dageraad, Markise)

[End of the Annex and of document]