

PROTOCOL FOR THE
EXAMINATION OF VALUE
FOR CULTIVATION AND USE
OF CHICORY VARIETIES

2017

Raad voor plantenrassen
(Rvp: Plant Variety Board)

Commissie Samenstelling Aanbevelende Rassenlijst
(CSAR: Recommended List Committee)

February 2017

Contents

- 1. Introduction** 3
- 2. Trial Seed** 3
- 3. Trial sites and sowing time** 3
- 4. Varieties to be tested** 4
- 5. Trial design** 4
- 6. Husbandry and fertilisation** 4
- 7. Observations during the growing season** 4
 - 7.1. Plant emergence 5
 - 7.2. Earliness of ground cover 5
 - 7.3. Bolting resistance 5
 - 7.4. Susceptibility to mildew, *Alternaria* and any other foliar diseases or leaf injuries
..... 5
- 8. Harvest** 5
- 9. Post-harvest observations** 6
 - 9.1. Gross and net root yield 6
 - 9.2. Tare 6
 - 9.3. Root shape and root rot 6
 - 9.4. Inulin content determination 6
- 10. Reporting** 7

- Contact details** 8

1. Introduction

This protocol sets out the procedures to be used for the examination of the Value for Cultivation and Use (VCU) of chicory varieties in the Netherlands.

VCU testing of chicory varieties comprises regional yield trials, consisting of a two-year trial period (NL1 and NL2) for varieties to be included in the National List followed by a third year of testing (RL3) for varieties to be included in the Recommended List.

This protocol is based on the assumption of sufficient basic knowledge of the trial techniques and the husbandry and processing of chicory. Commonly used methods and treatments and techniques are not explicitly described. Unless otherwise indicated it is assumed that the agronomy should follow the best local practice of an average Dutch arable farm.

After NL2, the *Raad voor plantenrassen* (Rvp; Plant Variety Board) decides whether or not the variety can be included in the National List. Varieties included on the National List are approved for marketing.

After RL3, the *Commissie Samenstelling Aanbevelende Rassenlijst* (CSAR; Recommended List Committee) decides whether or not the variety can be included and classified on the Recommended List.

See the annex for contact details.

2. Trial Seed

Coated or uncoated seed is required for all varieties. The seed must comply with the minimum standards for germination rate. The required quantity of seed is established by the Trial Operators.

DUS testing and VCU is based on the same sample that is supplied by the applicant of the variety (or his representative) to the Trials Coordinator.

When commercial seed is marketed, the coated seed is taken from certified seed lots (the lot number concerned should be stated).

The samples must be received by the Trials Coordinator before 20 February. If samples are received after this date, the variety may be removed from the VCU.

3. Trial sites and sowing time

A yield trial is sown in three replicates on three locations which are representative of the growing area: one trial on sandy loam soil, one trial on loamy sand soil and one trial on sandy soil.

The yield trials should preferably be sown between 31 March and 15 April.

Furthermore, a special bolting trial is to be sown as early as possible, but no later than 31 March, preferably on clay soil. If sowing before 31 March is impossible, this trial will be cancelled.

4. Varieties to be tested

The total number of varieties to be included in the trial is a minimum of 7 and a maximum of 13. The following varieties should be tested:

- All A (generally recommended) and N (newly recommended) varieties on the Recommended List. If a standard variety is withdrawn from further testing, the breeder concerned must report this withdrawal to the Trials Coordinator. The variety concerned will then automatically be classified as a B variety in the Recommended List.
- Varieties that have been submitted for testing to the Trials Coordinator by breeders and other interested parties.

5. Trial design

The yield trials must be planted on fields or part of fields that are as regular as possible. There must be no after-effects of any previous trials and patches of persistent weeds must be avoided.

Before sowing, the seedbed must have settled sufficiently.

The net plot area is a minimum of 25 m².

The distance between the rows is 45-50 cm (the number of rows must be adapted to the harvesting system). The trial must be surrounded by discard border strips and/or discard plots on either side of the trial. The sowing distance (within rows) is a maximum of 5 cm. On clay soil, a sowing distance of a maximum of 3 cm must be observed. After emergence, the seedlings must be thinned to a minimum of 150,000 and a maximum of 160,000 plants per hectare. The sowing depth is 0.5-1 cm, depending on the type of seed and the soil structure of the seedbed. Each trial is sown in at least three replicates.

The Trials Coordinator supplies the trial plans.

6. Husbandry and fertilisation

Fertilisation and weed control should follow best local practice for varieties without specific characteristics. Please refer to the chicory cultivation manual of PPO-agv.

7. Observations during the growing season

In addition to keeping cultivation records, the Trial Operator observes the following characteristics:

- Plant emergence
- Earliness of ground cover
- Bolting resistance
- Susceptibility to foliar diseases or foliar infections

7.1. Plant emergence

Emergence is determined by counting the number of seedlings in three rows of three metres per plot immediately before thinning. Emergence is expressed as a percentage of the number of seeds sown.

In addition to emergence, the plant population and uniformity of the plots is scored, by counting the number of plants per plot after thinning and the number of bare patches in a row measuring 0.5 linear metres or more. A regular visit to the trial is organised in June. If problems are observed with the plant population, a decision will be taken during this visit regarding continuation of the trial.

7.2. Earliness of ground cover

Although the weed suppressant capacity of a variety is determined by both early and late ground cover, the early ground cover only is observed.

Early ground cover is established at the moment that the leaf canopy is almost closed between the rows. The observations must be scored on a scale of 1-9 (1 representing the poorest cover and 9 the best cover).

7.3. Bolting resistance

Bolting resistance is established by noting the number of bolters per plot.

A bolting sensitive variety is included in the bolting resistance trial as a reference variety.

The number of bolters is counted in early August and removed. Subsequent bolters are not removed from the plot. The number of bolters is counted again at harvest. If sufficient difference is observed between the varieties, the average bolting resistance in the yield trials and the bolting resistance in the special bolting resistance trial each account for 50% of the final score for bolting resistance. A high score represents a good level of bolting resistance.

7.4. Susceptibility to mildew, *Alternaria* and any other foliar diseases or leaf injuries

Foliar diseases, leaf injuries and any nutrient deficiencies are only observed in the event of a clearly visible infection or deficiency and if differences between the varieties are noticeable. The infection is expressed on a scale of 1-9 (9 representing uninfected /undamaged leaves). If the trial is treated using a fungicide, an observation for any foliar diseases must be performed prior to treatment.

8. Harvest

The yield trials are preferably harvested mechanically in October. Harvesting should take place in accordance with best local practice so as to avoid lifting losses, crown losses and damaged root tips. The net harvested area per plot is a minimum of 20 m².

9. Post-harvest observations

9.1. Gross and net root yield

The gross root yield is determined in the field, immediately after harvest. Three samples of 20 kg are taken from the gross yield and (depending on the trial conditions - to be determined by the Trial Operator) sent to a laboratory for determination of the net root yield (i.e. gross yield minus tare) and to determine the inulin content.

9.2. Tare

The total tare percentage is determined. Tare comprises all types of contamination, such as soil, loose leaf residues and rotten roots. The (green) crown of the root is not removed. The percentage of rotten roots is determined at harvest.

9.3. Root shape and root rot

If the shape of the root is clearly abnormal and this abnormality is such that it influences the lifting losses (e.g. more or less broken tips, sieve throughput, branching, etc.), this is noted so it can be mentioned in the variety recommendation. If root rot is observed, the differences between the varieties are to be observed and recorded.

9.4. Inulin content determination

The inulin content is determined based on Brix measurement, as established in the general terms of delivery agreed between Sensus and the Growers' Association. The inulin content is determined based on refractometric measurement of the Brix value of the total quantity of soluble dry matter. Parallel research performed by Sensus has revealed a strong correlation between the Brix value and the inulin content. Based on this correlation, a conversion factor has been established to convert the Brix value into an inulin content. The correlation is checked daily during the harvest period.

A rotary drum cutter (Venema Automation) is used to prepare the brei (pulp) samples. Random cuts are made in the root samples. The cuttings (brei) are collected and homogenised. The representativeness and homogeneity of the brei sample is monitored using random checks, whereby a limited margin of error is permitted between successive determinations (8) of the same sample.

The methods of preparing brei samples are also described in the regulations of the Dutch sugar industry: "Uniform method for weight determination, sampling and sample testing of sugar beet in the Netherlands".

Current practice in VCU.

The root samples collected in the field trials are analysed per plot based on the standard regulations. Random sub-samples are cut from the root samples in a Venema rotary drum cutter. These sub-samples are homogenised to create a pulp (brei). A robot is used to scrape a sufficient quantity of brei onto a filter paper. This brei is pressed, and the resulting juice is collected and fed into a refractometer. The refractometer measures the Brix value whereby an automatic temperature correction takes place. Based on the correlation mentioned above, the Brix value is converted into an inulin content.

10. Reporting

At the end of November, a minimum of the following characteristics are reported to the partners who are financially supporting the VCU-testing of new chicory varieties:

- emergence (if possible before 1 August)
- earliness of ground cover (if possible before 1 August)
- infection by foliar diseases
- bolting resistance
- soil tare
- rotten roots
- net root yield
- inulin content
- inulin yield = net root yield * inulin content.

Multi-year averages will be released for publication as far as possible before 1 December. If additional (quality) characteristics are determined by Sensus, they will be reported before the annual breeder's meetings.

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