

# Evaluation of the Value for Cultivation, Use, and Sustainability (VSCU) of new varieties for listing the French Catalogue



## Sugar beet

To be proposed for listing on *List A* of the French Catalogue, a new variety must meet the following three conditions:

1. Be recognized as Distinct, Uniform and Stable. The DUS guarantees the identity of the variety and is the basis for plant variety protection and seed certification.
2. Provide an improvement in agronomic value or use, as judged in VSCU tests.
3. Be designated by an approved denomination in accordance with the applicable rules.

*Variety listing is decided by the Ministry of Agriculture after consultation with the CTPS, based on summaries presented by GEVES.*

VSCU studies make it possible to describe the **cultivation value** of a variety in the main soil and climate conditions that it will encounter in France, as well as the **use value** of harvested products from the variety. To limit the negative impact of agricultural production on the **environment**, particular attention is paid to the variety's adaptation to environmental and growing conditions, its efficiency with regard to water and nitrogen, and pest resistance.

To be proposed for listing, the new variety must provide an improvement over current varieties: it is therefore compared to market reference controls. The variety is studied for 2 years, sometimes 3.

**Listing in the French Catalogue therefore allows the entire plant sector to have shared references, acquired over two seasons, as soon as the variety is launched in France.**

The 3 main sections in the Catalogue are as follows:

-varieties tolerant to **rhizomania** (main category).

-varieties tolerant to **rhizomania** and to **cyst-nematodes**

-varieties tolerant to **rhizomania** and to **rhizoctonia solani**.

## → The experimental set-up for VSCU studies:

5 types of protocols are used in the field. Some apply to all varieties, regardless of the section (but the controls are based on the corresponding section); others are trials or tests specific to a section.

### 3 protocols common to all sections

#### Field trials with and without rhizomania

Field trials with or without rhizomania BNYVV; some trials with high rhizomania pressure (called FPR in French). These trials are conducted with **control modules** of leaf diseases, used to trigger a fungicide treatment only if the threshold is reached for the disease on a variety chosen for its low sensitivity to this disease.

8 to 10 trials / year. **The samples required for technological analysis** (sugar content, impurity content) are taken from these trials.

#### Field trials with co-inoculation of yellow viruses

Field trials conducted in parallel the other trials with or without rhizomania. Setting up a co-inoculated level with the 3 main yellow viruses (BChV, BMV and BYV). Same technological analyses. Comparison of sugar yield between losses at each level. 4 trials / year.

#### Bolting observatories – leaf diseases

Trials sowed in place and not harvested. Not fungicide treatments. Counting of bolting beets in some early sowed trials (Normandy, Pas-de-Calais). Regular scoring of present leaf diseases. 4 trials in the first year then 3 trials the second year.

*These trials are carried out by ITB, breeders (UFS), sugar industries (included SNFS and Tereos) and farmers association (CGB).*



## Specific protocols

### ▪ *Rhizoctonia solani* trials with artificial infection

After stabilization of beets populations, inoculation with *rhizoctonia solani* inoculum.

Harvesting and individual scoring of the roots; distribution into 4 classes according to the intensity of the symptoms (healthy roots, with damages > 20% of the surface; 20 to 50%, >50%) and counting of dead plants.

A **disease index** (called "IM" in French) integrating the above elements with a weighting according to the severity of the symptoms is calculated. 2 trials / year.

### ▪ Field trials with nematodes

Yield trials in fields with *Heterodera schachtii* nematodes. Setting up a sensitive control on the border; soil tests in the sensitive control (initial and final nematodes population). Comparison of the yield results of these trials with those obtained in the basis study allow to assess variety tolerance. 10 trials / year.

## → Characteristics assessed:

Yield	Technological value	Physiological characteristics	Pests resistance
- Root yield (t/ha) - <b>Sugar yield (t/ha)</b>	- Sugar content (%) - SM/POL = molasses sugar / sugar content = industrial quality indicator	- Bolting resistance	- soil pests - leaf diseases - yellow viruses

## → Judgement of varieties after two years of study:

The decision to accept the VSCU is taken considering all the important characteristics of the interest of the variety for the sector. It is a decision based on many criteria. There are also rules for admission to the 2<sup>nd</sup> year, which are not described here. Their principles are the same for registration with a less requirement about the thresholds.

		Tolerant to rhizomania	+ tolerant to nematodes	+ tolerant to <i>rhizoctonia solani</i>
Determination of the value 100:		<i>genetic progress objective</i>		<i>controls</i>
Decision based on:		<i>lowered threshold value if bonus activation</i>		
Trials with and without rhizomania	<i>Sugar yield</i>	≥ 100	≥ 100	≥ 100
	<i>Sugar content</i>	≥ 97	≥ 97	≥ 97
	<i>Industrial quality : SM/POL</i>	≤ 106	≤ 106	≤ 106
<b>Bolting</b>		not significantly higher to the controls average in more than half of the trials		
<b>Performance about leaf diseases and / or high rhizomania pressure</b>		bonus* if tolerant		
field with nematodes	Sugar yield		≥ 100	
Specific trials <i>Rhizoctonia solani</i>	<b>Desease index <i>Rhizoctonia solani</i></b>			IM var <IM controls + 1 lsd

\*There are 3 kind of bonus: (1) for varieties with good tolerance at least one leaf disease; (2) for varieties with very good behavior in a situation of high rhizomania pressure; (3) for varieties with a high level of tolerance to cercosporia. In the first two cases, varieties receive a point on the yield and a point on the SM/POL to each bonus activated. For the last case, the candidate variety receives 4 points on the yield, a point on the sugar content and 3 points on the SM/POL. Different bonuses are cumulative.

**VSCU test procedures**, which are set out in the technical regulations for registration, are **not fixed in time**: the study procedures and rules of admission evolve regularly and progressively according to the needs of users and consumers as well as methodological advances.

However, a variety that does not meet this threshold but has a characteristic or combination of characteristics that is not (or is only marginally) considered in the current regulations may be proposed for registration. In addition, varieties with innovative characteristics may be submitted for registration through special experiment applications.

## → For more information:

The references acquired during testing years of registered varieties are published on **GEVES website**. This information is taken over by the ITB, which completes it with post-registration data.

For the registration rules, the only reference document is the **technical examination regulations** approved by ministerial order of the Ministry of Agriculture.

The registration documents can be downloaded from the GEVES website.

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