Evaluation of the Value for Cultivation, Use, and Sustainability (VCUS) of new varieties for inclusion in the French Catalogue

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MINISTÈRE DE L'AGRICULTURE
C.T.P.S.
COMITÉ TECHNIQUE PERMANENT DE LA SÉLECTION DES PLANTES CULTIVÉES

Soft winter wheat

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 VCUS 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, on the basis of summaries presented by GEVES

VCUS 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. In order 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.

In order 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.

soft wheat varieties adapted to Organic Agriculture are subject to a specific regulation.

➔ The experimental set-up for VCUS studies:

Variety trial networks

Three experimental networks have been set up for soft wheat:

Late network, trials in the northern regions of France, for late varieties, year 1 (17 trials), year 2 (19 trials)

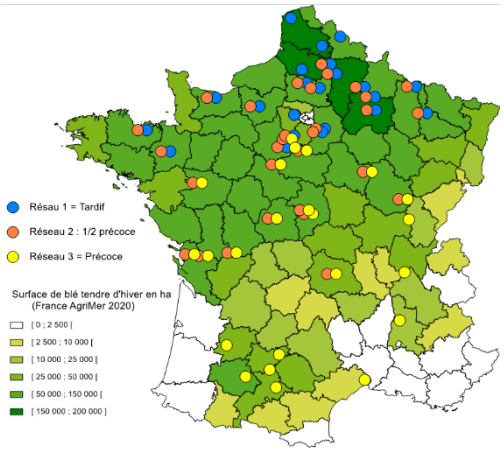
Early ½ network, trials in the North and Centre regions, and Pays de la Loire, year 1 (19 trials), year 2 (22 trials)

Early network, trials located in the 2/3 south of France, for early varieties, year 1 (17 trials), year 2 (20 trials)

The experimental sites aim to be representative of the growing areas.

In most of the trials, the varieties were evaluated **under conventional** (fungicide-treated) and **non-fungicide-treated conditions.** In both types of management, the use of regulators is strictly controlled.

To study the nitrogen efficiency of varieties, varieties are tested **at 2 levels of nitrogen fertilisation:** a nitrogen dose X units and a dose X-80 in part of the network (4 to 5 trials in A1, 5 in A2).



These trials make it possible to evaluate the yield as well as a certain number of characteristics (earliness, lodging, diseases, etc.) and to provide samples **for assessing the technological value** (5 locations/varieties are retained for bread-making, 16 for protein content).

Specific tests

Physiological characteristics:

- **Alternativity:** 5 trials over 2 years.
- Resistance **to cold**: under mobile greenhouse in the Jura region, 1 trial/year.
- Resistance **to lodging**: 2 trials/year.
- Resistance **to sprouting** in the laboratory on ears harvested in the field, 1 trial/year: year 2 and post registration.
- **Aptitude for early sowing:** 4 trials: 2 in year 2, and 2 in post-enrolment.

Pest Resistance Characteristics (*field trials with artificial contamination):*

- **Yellow rust** resistance: 4 trials/year for early, 3 trials/year for ½ P and late.
- Resistance to **brown rust:** 3 trials/year.
- Resistance to **eye spot:** 2 trials in the 1st year of study (2nd year of study if behaviour needs to be confirmed).
- **Fusarium** resistance (*Fusarium graminearum and other spp.*): 7 trials over 2 years: 1 in the first year + 6 in the second year.

+Characteristics assessed at the breeder's request

- **Mosaic** resistance (SBCMV and WSSMV): establishment in contaminated plots, 3 trials/year over 2 years.
- Resistance **to orange wheat blossom midge:** greenhouse implantation, 1 trial in year 1 (CRA-W Gembloux)
- **Wheat for improvement:** 5 trials with nitrogen fertilisation adapted to this type of production, specific techno test.

Trials are carried out by partners of the VCUS network: breeders (UFS), ARVALIS, INRAE, GEVES and cooperatives.

➔ Characteristics assessed:

Yield	Technological value	Physiological and other characteristics	Resistance to pests
Yield in fungicide treated and **untreated trials.**	- Protein content - Specific Weight - Alveogram (W, P/L, etc…) - Hardness - Gluten content - French bread value - (Or Biscuit test)	- Grain Protein Deviation (deviation from the negative regression between yield and protein content) - Alternativity - Earliness of heading - Height - Resistance to lodging - Resistance to cold	- Yellow Rust - Brown Rust - Foot rot - Powdery mildew - Septoria *(Z.tritici et P.nodorum)* - Fusarium (F.graminearum &and other spp.) - Overall disease tolerance (T-NT gap) - Mosaics (SBCMV et WSSMV) - Orange midge
Yield is expressed as % of control varieties.	From testing results, **the technological class of the variety is defined**	Ratings in the network (natural infection) and in the specific trials (artificial infection with strains selected in collaboration with INRAE) are translated into resistance ratings independent of year and location (1 = highly susceptible; 9 = resistant).	

➔ Judging of varieties:

Examination for advancement to the second year: varieties must meet the required yield threshold taking into account their provisional technological class. There is no examination for class A and A' wheat.

VCUS admission: *(from August 2022 deposits)*
The VCUS acceptance decision is taken by considering the important characteristics of the variety for the sectors. It is a multi-criteria decision taken on the basis of comparison of the variety's yield rating (calculated from the results of the 2 years of study) with a threshold defined by the variety's technological class weighted by potential bonus/malus.

Yield Rating = Average yield from **Treated** and **Untreated Fungicide trials** (% control) **≥** **Technological threshold - Sum of bonus/malus**

Allocation of bonuses/maluses: example of late and ½ early deposit in networks

	1 malus	1 bonus
Yellow Rust	Note ≤ 4	-
Brown Rust	Note ≤ 3	
Foot rot	Note =1	Note ≥ 5
Powdery mildew	Note ≤ 4	
Septoria *tritici*	Note ≤ 4.5	Note ≥ 7
Fusarium	Note ≤ 3	Note ≥ 6
T-NT gap	Gap > 120%	Gap <80%
Mosaics	-	R
Orange midge	-	R

	2 malus	1 malus	1 bonus	2 bonus
Cold	Note =1	2 < Note ≤ 4	Note ≥ 7.5	
lodging	Note ≤4	4 < Note ≤ 5	Note ≥ 7	
Specific Weight	<75	<76	>80	
Protein		GPD -	GPD +	GPD + +

No cold penalty for varieties registered in the early and alternatives network (quotation ≥7)

Technological threshold=
Required yield threshold corresponding to the technological class of the variety.

A' Improving wheat with original technological characteristics	
A : Improving wheat	80
BPS : Premium bread wheat	102
BP : Bread wheat	104
BB : Biscuit wheat	102
BAU: Wheat for use other than French bread-making	107

However, a variety that does not meet this threshold but has a characteristic or combination of characteristics that is not (or is only marginally) taken into account in the current regulations may be proposed for registration, and it is also possible for the breeder to request the registration of a variety for an innovative characteristic or use, within the framework of a special experiment.

VCUS 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.

For more information:

The references acquired during the registration years of listed varieties are published on the GEVES website. This information is taken up by ARVALIS, which combines it with the post-registration data.
For registration rules, the only reference document is the **technical examination regulations** approved by ministerial order of the Ministry of Agriculture. Application documents and the technical examination regulations can be downloaded from the GEVES website.

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