



CHINA

# DUS testing of Cauliflower ///

# 花椰菜的DUS测试

Esther van der Meer/Wim Sangster | Roelofarendsveen |  
21-11-2023



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Reporting /// 报告

Quality control /// 质量控制

Calibration book /// 校准手册



## Introduction /// 简介

Difficult crop: /// 测试难度较大:

- Many climatic types /// 气候类型较多
- Many different seasonal growing types /// 有许多不同季节的栽培类型
- Many plant types /// 品种类型较多
- Large range in earliness /// 熟性范围较大
- Sensitivity for bad soil structure /// 对不良土壤结构较敏感
- Parent lines with many aspects /// 亲本需要考量的方面较多
- Flowering characteristics (colour + MS) /// 开花性状 (颜色 + 个体测量)



## UPOV Technical guideline (TG) /// UPOV技术指南 (TG)

- DUS testing based on UPOV TG TG/45/7 Rev. /// DUS测试依据UPOV技术指南TG/45/7 Rev。
- Last update 2016 /// 最近更新于2016年
- Revised TWV 2023 (add. of flower colour marker), to be accepted Oct 2023 by TC and published /// 蔬菜技术工作组于2023年作了修订（添加花颜色标记），将于2023年10月被技术委员会接受并发布
- In EU we use Technical protocol of CPVO (TP), based on TG UPOV /// 欧盟使用基于UPOV技术指南的CPVO技术规程（TP）





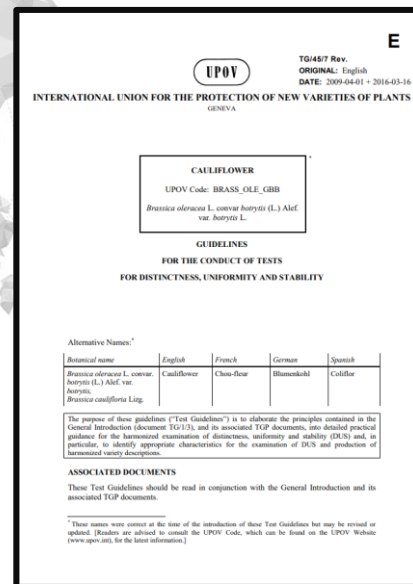
# Technical Examination /// 技术审查

## CPVO technical Protocol /// CPVO技术规程

CPVO Technical Protocol  
/// CPVO技术规程



UPOV Technical Guideline  
/// UPOV技术指南



## Number of applications at Naktuinbouw /// 荷兰园艺检验局的申请数量

Varying, but quite stable last 10 years: ///

近10年来有变化，但相当稳定：

For listing and/or PBR ///

品种登记和/或育种者权利申请

Mostly NL + CPVO /// 大多为荷兰 + CPVO

2014: 20

2015: 15

2016: 27

2017: 22

2018: 30

2019: 31

2020: 28

2021: 15

2022: 19

2023: 21





## Varieties of common knowledge /// 已知品种

Varieties of  
common  
Knowledge ///  
已知品种

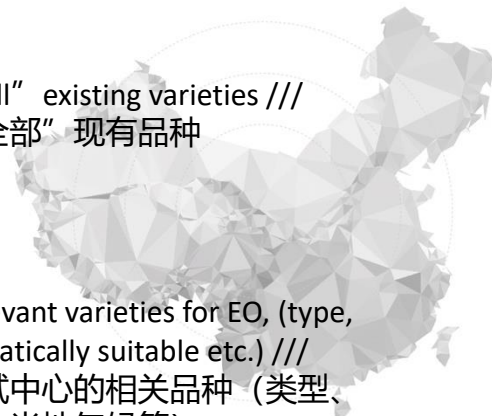
Variety  
Collection  
/// 品种集

Comparison  
varieties ///  
对比品种

"All" existing varieties ///  
"全部" 现有品种

Relevant varieties for EO, (type,  
climatically suitable etc.) ///  
测试中心的相关品种 (类型、  
适合当地气候等)

Similar varieties (per  
application) ///  
近似品种 (每次申请)



## Variety collections /// 品种集

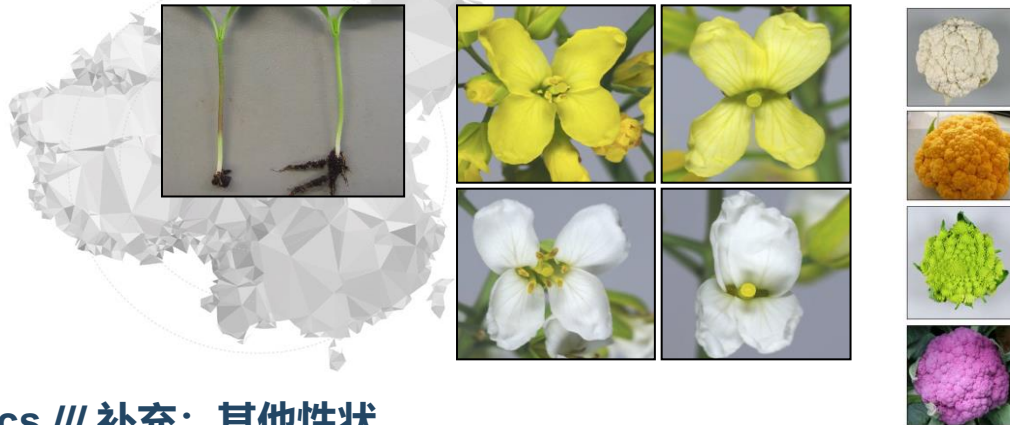
- Database with variety descriptions /// 包含品种描述的数据库
- Living collection: seeds /// 活体材料库：种子
- Photo database (for cauliflower not very important) /// 照片数据库（对花椰菜而言不是很重要）



## Selecting similar varieties /// 选择近似品种

### Basis: Grouping characteristics /// 基本依据：分组性状

- Anthocyanin coloration of hypocotyl /// 下胚轴花青甙显色
- Curd color /// 花球颜色
- Flower color /// 花颜色
- Earliness /// 熟性
- Male sterility /// 雄性不育
- Plant type /// 品种类型



### Additional: other characteristics /// 补充：其他性状



## Selecting similar varieties /// 选择近似品种

Plant type/cultivation types: /// 品种类型/栽培类型:

- Mechelse /// 梅歇尔斯
- Alpha /// 阿尔法
- Oze/Dok /// 欧泽/多克
- Italian Giant /// 意大利巨人
- Tropical /// 热带
- Walcheren Winter (overwintering) /// 瓦尔切伦冬季 (越冬)
- Roscoff (overwintering) /// 罗斯科夫 (越冬)
- Tardivo di Fano (winter) /// 塔迪沃·迪·法诺 (冬季)



(complication: many crosses between types) /// (复杂性: 类型之间有许多杂交)



## Organisation of trials /// 组织试种

4 different DUS trials (in NL needed for different seasonal types): ///

4场不同的DUS试种（在荷兰需要；对应不同季节的类型）：

- Summer trial (spring sown): spring and summer types /// 夏季试种（春播）：春季和夏季类型
- Autumn trial (summer sown): autumn and winter types /// 秋季试种（夏播）：秋季和冬季类型
- Overwintering trial (summer sown): overwintering types (need cold, vernalization!) /// 越冬试种（夏播）：越冬类型（需要低温，春化！）
- Tropical trial (summer sown in greenhouse): tropical types (need warm nights!) /// 热带试种（温室中夏播）：热带类型（夜间需要保暖！）

Flowering trial (for sterility and flower color): /// 开花试种（测试不育性和花的颜色）：

- Official marker only for sterility in TG/TP /// 技术指南/技术规程中的官方标记仅涉及不育性
  - UPOV TWV 2023 accepted marker for flower colour in new draft TG /// UPOV蔬菜技术工作组2023年接受了新技术指南草案中的花颜色标记
- > still flowering trial needed until flower colour marker in CPVO TP (we test now double with marker and flowering trial until new TP) /// 仍然需要开花试种，直到花颜色标记写入CPVO 技术规程（目前标记和开花试种仍在重复开展，直至新技术规程发布）





## Organisation of trials // 组织试种

In which trial to place the application? // 申请品种应当放在哪一场试种?

- Important for submission date of material (sowing time) // 对于材料提交日期很重要 (播种时间)
- Optimal development // 优化生育
- Avoid doubling // 避免重复



Based on questions on TQ: // 基于技术问卷中的问题:

- Earliness + // 熟性 +

07 . 02.02 . Preferred growing season \*

- spring
- summer
- autumn
- winter
- overwintering
- tropical

首选栽培季节

- 春季
- 夏季
- 秋季
- 冬季
- 越冬
- 热带

07 . 02.03.01 . Preferred trial for DUS examination \* 首选DUS测试试种

- summer trial (outdoor, sowing week 7, around 13-2)
- autumn trial (outdoor, sowing week 19, around 06-6)
- overwintering trial (outdoor, sowing week 28, around 10-7)
- tropical trial (greenhouse, sowing week 25, around 19-6)

- 夏季试种 (户外, 第7周播种, 2-13左右)
- 秋季试种 (户外, 第19周播种, 6-06左右)
- 越冬试种 (户外, 第28周播种, 7-10左右)
- 热带试种 (温室, 第25周播种, 6-19左右)





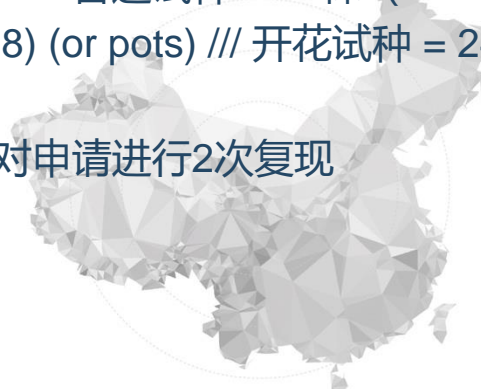
## Organisation of trials // 组织试种

Number of plants per plot // 每个地块的植株数量

- Normal trial = 40 plants (5 x 8) // - 普通试种 = 40株 (5 × 8)

- Flowering trial = 24 plants (3 x 8) (or pots) // 开花试种 = 24株 (3 × 8) (或盆)

Applications in 2 replications // 对申请进行2次复现



## DUS test /// DUS测试

Distinctness /// 特异性



Uniformity /// 一致性

Stability /// 稳定性

Quality of the trial: important for reliability! /// 试种的质量：对于可靠性很重要！

Optimal expression of characteristics /// 性状的最优表达

- Very sensitive for bad soil structure /// 对不良土壤结构非常敏感
- Field effects -> enough boarder rows! /// 田间效应 -> 足够的边行！
- Pests + diseases -> overwintering trial in Zeeland (separate, no overlapping!) /// 病虫害 -> 越冬试种在泽兰省进行（单独开展，无重叠！）
- Eating by birds-> cover /// 鸟类啄食 -> 覆盖



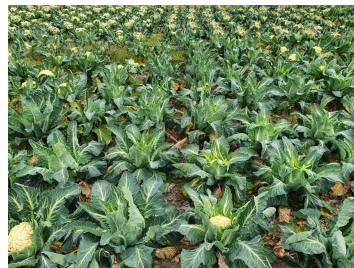
## DUS test /// DUS测试

- Applications /// 申请

- Example varieties (calibration of expression characteristics) ///  
标准品种 (用于校准表达性状)

- Similar varieties /// 近似品种

- (+ post and maintenance control samples) /// (+ 后期和维护控制样本)





## Making observations /// 进行观测

At different stages: /// 不同生育阶段:

- Seedling stage (sowing tray) /// 幼苗期 (育苗盘)
- Plant: height + Leaf: attitude -> expression changes at maturity /// 植株: 高度 + 叶片: 姿态 -> 成熟时表达会改变
- Full foliage and leaf development stage (a) /// 叶丛完全发育成熟和叶片发育期 (a)
- Harvest maturity of curd (b) /// 花球成熟采收期 (b)
- Overmaturity (char 24. Curd: anthocyanin coloration after harvest maturity) /// 过度成熟 (性状24. 花球: 达到采收成熟度后的花青素显色)
- Big differences in earliness -> observe once every week during several months /// 熟性区别很大 -> 持续数月每周观测一次
- Flowering characteristics -> separate flowering trial and/or markers /// 开花性状 -> 单独的花试种和/或标记

### 2. 2. VG/MG Plant: height (at time of harvest) VG/MG 植株: 高度 (采收期)

#### 8.1 Explanations covering several characteristics 覆盖多个性状的解释

Characteristics containing the following key in the third column of the Table of Characteristics should be examined as indicated below: 性状表中第三列包含以下符号的性状应当用下述相应方式进行观测:

- Foliage and leaf:** Observations on the foliage and the leaf which should be made at the time of full development of the foliage, before curd formation. All observations on the leaf should be made on the largest leaf.
- Curd:** Observations on the curd which should be made when the curd is fully developed (at harvest maturity).



- 叶丛和叶片: 叶丛和叶片的观测应当在叶丛完全发育成熟、花球形成前进行。叶片的观测应当选取最大的叶片进行。
- 花球: 花球的观测应当在花球完全发育成熟时 (成熟采收期) 进行

## Distinctness /// 特异性

Approach for assessing Distinctness in cauliflower: /// 花椰菜特异性评估方法:

- 'side-by-side' visual comparison in the growing trial /// 在试种期间  
“并排” 目测比较
- Varieties must be grown closely together /// 相关品种必须紧密相邻
- -> essential to use grouping characteristics for order of samples /// ->  
需要用分组性状来确定样本顺序



## Distinctness /// 特异性

- Compare only varieties in same types /// 只比较同类型的品种
- Different trials for different types (harmonisation needed but difficult!) /// 不同类型分别试种（需要协调，很困难！）
- Some characteristics very dependent on environmental interaction /// 部分性状高度依赖与环境的相互作用  
e.g. earliness: /// 例如熟性:
  - Location: /// 地点: NL = 4, FR = 6 (describe in own trial) /// 荷兰 = 4, 法国 = 6（分别在各自的试种中描述）
  - Season: /// 季节: Summer = 4, Autumn = 6 (depending on genetic background, is rare (e.g. Erfurter)) /// 夏季 = 4, 秋季 = 6（取决于遗传背景，较罕见（如爱尔福特））
  - -> no examples varieties for earliness in UPOV TG /// -> UPOV 技术指南中未列出熟性的标准品种





## Uniformity /// 一致性

### Background information important /// 背景信息很重要

Propagation method: /// 繁殖方法:

- Seed /// 种子
- Vegetatively propagated /// 营养繁殖
- Summer and autumn cauliflower = self pollinating /// 夏季和秋季型花椰菜 = 自花授粉
- Overwintering cauliflower = cross pollinating /// 越冬型花椰菜 = 异花授粉

Varietal type: /// 品种类型:

- OP /// 开放授粉
- F1 (CMS or not?) /// F1 (是否为细胞质雄性不育)
- Parent line (rare) /// 亲本品系 (罕见)

## Uniformity /// 一致性

### CMS varieties: /// 细胞质雄性不育品种:

- No inbreds possible /// 无法近交
- Sometimes higher percentage of aberrants /// 有时异常株的比例较高

### Parent lines: /// 亲本品系:

- Rare /// 罕见
- Sometimes similar to varieties, mostly very different (inbreeding depression!) /// 有时同相关品种近似, 但多数区别很大 (近交衰退)
- Important to know background (for which F1 hybrid used to produce -> confidential question on TQ) /// 了解背景很重要 (用于产生哪些F1杂交种 -> 技术问卷上的保密问题)
- Sometimes vegetatively -> plants instead of seeds /// 有时营养繁殖 -> 植株而非种子
- No seedling observations possible /// 无法观测幼苗
- Synchronisation of growing with seed propagated necessary /// 必须与繁殖的种子同步栽培



## Uniformity /// 一致性

### Off-types /// 异型株

- For the assessment of uniformity of single cross hybrids and inbred lines, a population standard of **1%** and an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, 2 off-types are allowed. /// 评估单交杂种和近交系时，应当采用**1%**的群体标准和至少95%的接受概率。如样本量为60株，则允许出现2个异型株。

### Aberrant plants /// 异常株

- In addition, a population standard of **2%** and an acceptance probability of at least 95% should be applied for aberrant plants. In the case of a sample size of 60 plants, 3 aberrant plants are allowed. /// 此外，对于异常株应采用**2%**的群体标准和至少95%的接受概率。如样本量为60株，则允许出现3个异常株。

- The definition of aberrant plants is explained in TG Chapter 8.3. /// 异常株的定义参见技术规程8.3节。

### Inbred plants /// 近交株

- In addition, for single cross hybrids, a population standard of **3%** and an acceptance probability of at least 95% should be applied for inbred plants obviously resulting from the selfing of a parent line. In the case of a sample size of 60 plants, 4 inbred plants are allowed. /// 此外，评估单交杂种时，对于明显是由单一亲本自交产生的近交株应当采用**3%**的群体标准和至少95%的接受概率。如样本量为60株，则允许出现4个近交株。

**Not always easy to make distinction between categories! /// 不同的类别有时并不容易区分!**

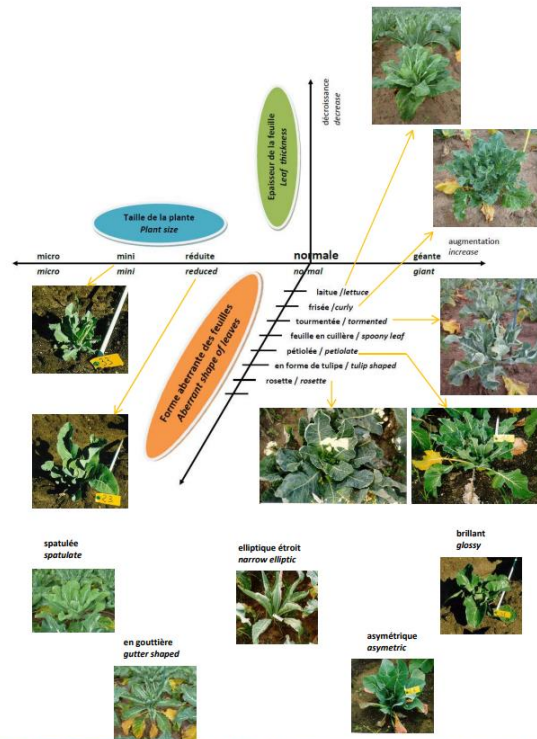


## Uniformity /// 一致性

Aberrant plants defined by (and/or): /// 异常株判定依据 (和/或) :

- Deformation (curly leaves, tormented leaves, “salad” shape leaves...) /// 畸形 (起皱、扭曲、“色拉”状叶片...)
- reduction of the vigour /// 生长势减弱
- thickening of the leaf blades /// 叶片增厚

Explanation in 8.3 of TG /// 具体说明参见技术规程8.3节



## Uniformity /// 一致性

### Examples of aberrants 异常株示例









## Quality control /// 质量控制

- two or three examiners do the observations and make variety descriptions /// 由两到三名审查员进行观测和品种描述
- It is very important that the observations are **harmonized** /// 观测结果的**统一**非常重要
- **Calibration** of characteristics each trial /// 每次试种**校准**性状
- **Calibration** every few years /// 每隔数年**校准**
  - Describe same sample in all characteristics (all examiners) /// 描述相同样本的所有性状 (所有审查员)
  - Discuss differences /// 讨论差别
  - Possible actions /// 可采取的行动



## Quality control /// 质量控制

- **Use of boarder rows with every year same variety /// 每年边行使用同样的品种**
  - Check of quality of trial (earliness, plant height, colour etc) /// 试种质量检查 (熟性、植株高度、颜色等)
  - Calibration for earliness /// 熟性校准

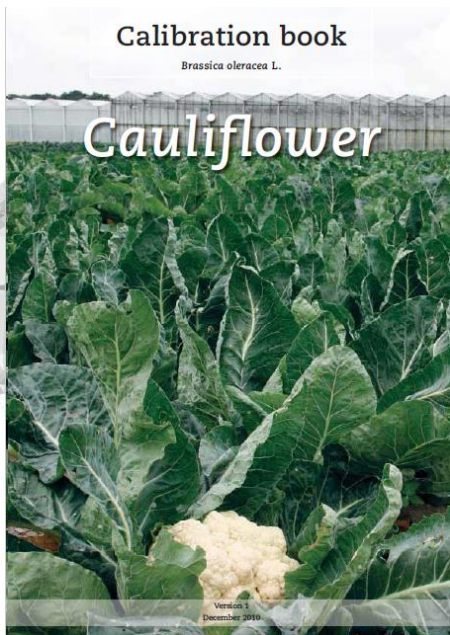
## Calibration book /// 校准手册

Explanation of all characteristics ///  
所有性状的说明

Method of observation /// 观测方法

Stage of observation /// 观测阶段

Many pictures /// 大量图片



[Naktuinbouw calibration book cauliflower ///  
荷兰园艺检验局花椰菜校准手册](#)



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