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THE NOTION OF INDEPENDENT GROWING CYCLES

独立生长周期的概念

Ms. Clarisse LECLAIR | GEVES, Angers, FR | 28/11/2023
Clarisse Leclair女士 | 法国昂热, GEVES | 2023年11月28日



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 - 2- IMPLEMENTATIONS AND CONCRETE EXAMPLES /// 实施方法和具体案例
 - 3- FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

GROWING CYCLE /// 生长周期

In the case of sexually reproduced plants, the growing cycle is normally from seed to seed. /// 有性繁殖植物的生长周期通常是从种子到种子。

In the case of vegetatively propagated species, the Test Guidelines can clarify the growing cycle. For example for Fruit species without a clearly defined dormant period: The growing cycle consists of the period from the start of active vegetative growth or flowering, continuing throughout active vegetative growth or flowering and fruit development, and ends with the harvesting of the fruit. /// 无性繁植物种，测试指南可以指明生长周期。例如，对于没有明确休眠期的水果物种：生长周期从活跃营养生长或花期开始，贯穿活跃营养生长或花期及水果发育期，至果实收获结束。



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

INDEPENDENCE /// 独立性

Generally speaking, independence refers to the absence of cause and effect, influence, constraint or coordination between different things or events. /// 一般而言，独立性指不同事物或事件之间，不存在因果、影响、制约或协调关系。

In probability : /// 在概率上：

Two events are independent if the occurrence of one provides no information about the occurrence of the other. /// 如果发生某一事件不产生有关发生另一事件的信息，则两个事件是相互独立的。



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

INDEPENDENT GROWING CYCLES /// 独立生长周期

UPOV gives guidance on the notion of independent growing cycles; /// UPOV对独立生长周期提供了指导;

it can be found in TGP/8 - TRIAL DESIGN AND TECHNIQUES USED IN THE EXAMINATION OF DISTINCTNESS, UNIFORMITY AND STABILITY /// 参见TGP/8—试验设计和DUS审查技术

1.2.2 Independent growing cycles /// 1.2.2 独立生长周期

1.2.2.1 As indicated in section 1.2.1.1, one means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles. /// 如第1.2.1.1节所述，判断试验观测发现的性状差异是否具有充分一致性，方法之一是在至少两个独立生长周期内对该性状进行审查。

1.2.2.2 In general, **the assessment of independence is based on the experience of experts.** /// 1.2.2.2 一般而言，**对独立性的评估以专家经验为基础。**



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

1.2.2.3 When a characteristic is observed in a growing trial in two independent growing cycles, it is generally observed in **two separate plantings or sowings**. /// 1.2.2.3 对两个独立生长周期进行试种性状观测，一般是通过**两次种植或播种**。

However, in some perennial crops, such as **fruit trees**, the growing cycles take the form of one trial observed in two successive years. /// 不过，对多年生作物（例如果树），采取一次试种、**连续两年**观测的方式。



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

“The minimum duration of test should normally be two independent growing cycles.” /// “测试最短周期一般应当是两个独立生长周期。”

This suggests that each characteristic mentioned in the TP or TG should be observed in each growing cycle to check distinctness and uniformity and to produce a reliable variety description. /// 这表明，应在每个生长周期中观测TP（测试规程）或TG（测试指南）中提及的性状，进行特异性、一致性判定，形成可靠的品种描述。

Document TG/1/3 stipulates “2.3 Design of the DUS Tests. The design of the growing trial or other tests, with regard to aspects such as the number of growing cycles, layout of the trial, number of plants to be examined and method of observation, is largely determined by the nature of the variety to be examined. Guidance on design is a key function of the Test Guidelines. Guidance on the development of Test Guidelines, including the design of the trials and tests, is provided in document TGP/7, Development of Test Guidelines”. /// 文件TG/1/3: “2.3 DUS测试设计。试种或其他试验在生长周期、田间布局、待测植株数量和观测方法等方面的设计，很大程度上取决于待测品种的特点。指导测试设计是测试指南的重要目的之一。关于如何制定测试指南，包括试验和测试设计等方面的内容，参见TGP/7。”



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

Document TGP/7 (referred to by **TGP/8**, 1.2.1.1. & 1.2.1.2.) stipulates “4.1.2 Consistent Differences. The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles”. /// TGP/7 (**TGP/8** 1.2.1.1. 和1.2.1.2节分别引用) 指出: “4.12 一致性差异。品种间差异可能非常明显, 无需两个及以上生长周期进行判断。此外, 在某些情形下, 环境影响较小, 无需通过两个及以上生长周期, 保证品种间差异的一致性。判断试验观测发现的性状差异是否具有充分一致性, 方法之一是在至少两个独立生长周期内对该性状进行审查。”



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

TGP/8 1.2.2.7 The rationale for using independent growing cycles is that if the observed difference in a characteristic results from a genotypic difference between varieties, then that difference should be observed if the varieties are compared again in a similar environment but in an independent growing cycle. /// TGP/8 1.2.2.7: 使用独立生长周期法的基本思路是，如果观测发现的性状差异是由品种间基因型差异引起的，那么在相似环境、独立生长周期中再次比较，应当能够观测发现该差异。

So, in TGP/8 the notion of independent growing cycles is solely linked to Distinctness /// 因此，在 TGP/8中，独立生长周期仅与特异性相关

Also important for high quality stable descriptions /// 加强高质量稳定描述

And for less “error risk” in Uniformity assessment /// 减少一致性评价中的“误差风险”



DEFINITIONS AND RATIONALE /// 概念定义和基本思路

The risk of making a Type II error can be reduced by increasing the precision, e.g. by increasing the number of replicates, by increasing the sample size (...) (TGP/10) /// 通过增加精确度（例如，增加重复次数、增大样本量等），可以降低产生II型错误的风险。（TGP/10）

The population standard and acceptance probability, together with an appropriate sample size, are selected on the basis of experience, in particular with reference to other UPOV Test Guidelines for comparable types of variety. /// 群体标准、接受概率以及样本量的计算，一般根据经验，并且参考其他可比品种的UPOV测试指南。

Consistency in Uniformity observations : /// 一致性观测中的前后一致:

How to assess uniformity by off-types on the basis of more than one growing cycle? TPG/10 gives guidance on three approaches /// **如何在两个及以上生长周期内，通过异型株进行一致性评价？** TPG/10就三种方法提供了指引

Approach 1: Third growing cycle in the case of inconsistent results /// 方法1：结果前后不一致的，实施第三个生长周期

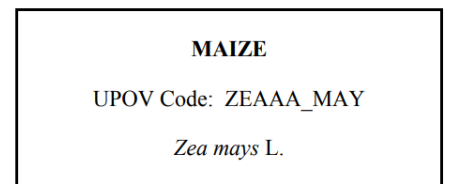
Approach 2: Combining the results of two growing cycles in the case of inconsistent results; /// 方法2：结果前后不一致的，合并两个生长周期的结果；

Approach 3: Combining the results of two growing cycles /// 方法3：直接合并两个生长周期的结果



IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例

Chapter 3.1 of the Test Guidelines refers to the number of independent growing cycles for the DUS test. /// 测试指南第3.1章规定了DUS测试的独立生长周期数。



GUIDELINES

FOR THE CONDUCT OF TESTS

3.1 *Number of Growing Cycles*

The minimum duration of tests should normally be two independent growing cycles.

IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例

Chapter 3.1 of the Test Guidelines refers to the number of independent growing cycles for the DUS test.
/// 测试指南第3.1章规定了DUS测试的独立生长周期数。

TGP/8 1.2.1.2 [...] When making the recommendation (on the number of growing cycles), the experts drafting the UPOV Test Guidelines take into account factors such as /// TGP/8 1.2.1.2:在提出（关于生长周期数的）建议时，起草UPOV测试指南的专家组考虑了以下因素：

- the number of varieties to be compared in the growing trial, /// 需要通过试种进行比较的品种数量
- the influence of the environment on the expression of the characteristics, /// 环境对性状表达的影响
- and the degree of variation within varieties, taking into account the features of propagation of the variety e.g. whether it is a vegetatively propagated, self-pollinated, cross-pollinated or a hybrid variety.
/// 以及品种内变异度（鉴于品种繁殖类型：无性繁殖、自花授粉、异花授粉、杂交品种等）



IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例

Roughly the present UPOV practice: /// 当前，UPOV的做法大体如下：

- **Seed propagated agricultural and vegetable crops: two independent growing cycles** /// **种子繁殖的农业作物和蔬菜：两个独立生长周期**
- **Fruit crops: two independent growing cycles** /// **水果：两个独立生长周期**
- **Vegetatively propagated ornamentals: one growing cycle** /// **无性繁殖观赏植物：一个生长周期**



MAIZE *
UPOV Code: ZEAAA_MAY
Zea mays L.

GUIDELINES
FOR THE CONDUCT OF TESTS
FOR DISTINCTNESS, UNIFORMITY AND STABILITY

IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例



Example : Maize DUS testing in France

案例：玉米DUS测试，法国

3.1 Number of Growing Cycles

The minimum duration of tests should normally be two independent growing cycles.

First Growing cycle

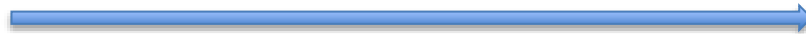
第一个生长周期

year n /// 第n年

Sowing 播种 : 15/04/n

End of observations

观测结束 : 15/11/n



Second Growing cycle

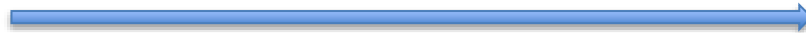
第二个生长周期

year n+1 /// 第n+1年

Sowing 播种 : 15/04/n+1

End of observations

观测结束 : 15/11/n+1



Two growing cycles conducted in same location(s) in successive years in the form of two different sowings. One official DUS seed sample submitted in beginning of year n. /// 两个生长周期，同一地点，连续两年两次播种。DUS测试用种子样品于第n年初提交。



CAROTTE
Code UPOV : DAUCU_CAR
Daucus carota L.

IMPLEMENTATION AND CONCRETE EXAMPLES
实施方法和具体案例

3.1 *Duration of Tests*

The minimum duration of tests should normally be two independent growing cycles.



Example : Carrot DUS testing in France

案例：胡萝卜DUS测试，法国



First Growing cycle , beginning year n / Second Growing cycle, end year n /// 第一个生长周期，开始于第n年 / 第二个生长周期，结束于第n年

Two growing cycles conducted in same location(s) in same year in successive periods in the form of two different sowings. One official DUS seed sample submitted in beginning of year n. /// 两个生长周期，同一地点，同一年连续两次播种。DUS测试用种子样品于第n年初提交。

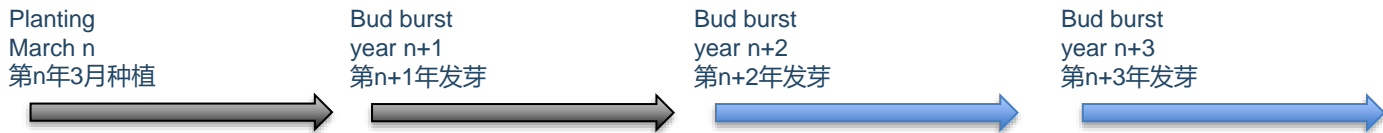
The minimum duration of tests should normally be two independent growing cycles. The growing cycle is considered to be the duration of a single growing season, beginning with bud burst (flowering and/or vegetative), flowering and fruit harvest and concluding when the following dormant period ends with the swelling of new season buds.

IMPLEMENTATION AND CONCRETE EXAMPLES

实施方法和具体案例

Example : Apple DUS testing in France

示例：苹果DUS测试，法国



Establishment period usually in years n and n+1 (the trees do not produce satisfactory crop of fruit during this period), then two growing cycles for DUS observations usually in years n+2 and n+3 when the trees produce satisfactory crops of fruit. // 一般而言，定植期为第n年和第n+1年（此时果树尚未达到投产标准），在第n+2年和第n+3年的两个生长周期内进行DUS观测（此时果树达到投产标准）

Two growing cycles conducted in same location(s) on the same trees, in two successive years. One official DUS sample of trees submitted in beginning of year n. // 两个生长周期，同一地点，连续两年。DUS测试用树苗样品于第n年初提交。

3.3 Conditions for Conducting the Examination

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination. In particular, it is essential that the trees produce a satisfactory crop of fruit in each of the two growing cycles.

IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例

TGP/8

1.2.2.6 Where two growing cycles are conducted in the same year and at the same time, a suitable distance or a suitable difference in growing conditions between two locations may satisfy the requirement for independence. /// 1.2.2.6 同一年份、同一时间开展两个生长周期种植的，两个种植地点之间应当具有满足独立性要求的适当距离或生长条件差异。



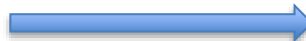
IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例



Example : Lettuce DUS testing in France, outdoor testing

例如：莴苣DUS测试，法国，室外测试

Sowing /// 播种
March year n /// 第n年3月



Location 1 (Brion station) /// 地点1 (布里永测试站)

Sowing /// 播种
March year n /// 第n年3月



Location 2 (Cavaillon station) /// 地点2 (卡瓦永测试站)

Two analogous growing cycles conducted in two different locations at the same time. /// 两个相似生长周期，同时在两个不同地点进行。

One official DUS seed sample submitted to Brion beginning of year n. /// DUS测试用种子样品于第n年初提交布里永站。

IMPLEMENTATION AND CONCRETE EXAMPLES /// 实施方法和具体案例

Even if the TG states « the minimum duration of tests should normally be two independant growing cycles », it is common practice to observe some characteristics only once : /// 测试指南指出，“测试最短周期一般应当是两个独立生长周期”。不过，部分性状通常仅作一次观测：

- Case of some characteristics observed directly on submitted seed sample /// 使用种子样品对性状直接观测：
example : lettuce seed : colour /// 例如，莴苣种子：颜色



1. (*)	PQ	VG				
	Seed: color	Semence : couleur	Samen: Farbe	Semilla: color		
	white	blanche	weiß	blanco	Verpia	1
	yellow	jaune	gelb	amarillo	Durango	2
	brown	marron	braun	marrón	Oaklin	3
	black	noire	schwarz	negro	Kagraner Sommer 2	4

- Case of « ploidy » characteristic /// “倍性”育种产生的性状
- Case of some QL characteristics /// 部分质量性状

Acceptable as long as it does not lower the quality and the reliability of the DUS test and the description. /// 在不影响DUS测试/描述质量和可靠性的前提下可以接受。



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Analogous growing periods is to be understood as parallel-like growing cycles for the candidate variety, taking place at the same/overlapping period of time at two separate locations. /// 应对可比生长周期作如下理解：测试品种发生在两个不同地点、相同/重叠时间段的平行生长周期。

UPOV provides guidance on independent growing cycles in document TGP/8/3 section 1.2.2. This explains the possibility for conducting two growing cycles in the same year and at the same time as long as there is a suitable distance or difference in growing conditions between the two locations. /// 依据UPOV在TGP/8/3第1.2.2节中对独立生长周期的指引，可以解释如何在同一年份、同一时间进行两个生长周期的种植（前提是两个地点之间具有适当距离或生长条件差异）。



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Usually one “lead” station and one “secondary” station, depending on species. /// 取决于具体物种，一般设置一个测试“主”站、一个测试“副”站。

Need rules and coordination, for example in France : /// 需要制定规则、相互协调。例如，在法国：

The “lead” station is the one responsible overall for the DUS examinations of the species in question. This includes: maintenance of the variety collection, planning of the DUS trial setup, address to which plant material of the candidate varieties is to be submitted, carrying out one of the growing cycles, analysis of results from both DUS growing cycle locations, drawing up of technical report and variety description. /// 主站全面负责有关物种的DUS审查，包括品种集维护、DUS试验布局规划、接收待测品种植物材料、执行种植生长周期（主站）、分析DUS生长周期结果（主站和副站）、起草技术报告和品种描述。

The “secondary” station is the one carrying out one of two the growing cycles according to the trial layout specified by the lead station; the results from this growing cycle are then analyzed by the lead station to establish whether a technical report can be drawn up. /// 副站根据主站制定的试验布局规划执行种植生长周期。主站将对该生长周期的结果进行分析；符合条件的，用于起草技术报告。



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Analogous testing used in France
Used for some vegetable species
在法国，可比独立生长周期法用于部分蔬菜品种的测试

Between our 2 main stations for vegetable testing : Brion station
And Cavaillon station
国内主要蔬菜品种测试站有两个：
布里永测试站和卡瓦永测试站



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Brion: /// 布里永:

Influence of Oceanic climate /// 海洋气候影响

On average, 110 days of rainfall. /// 年降水日数平均为110天

700 mm/year /// 700毫米/年

Average annual T° 11°C /// 年平均气温11°C

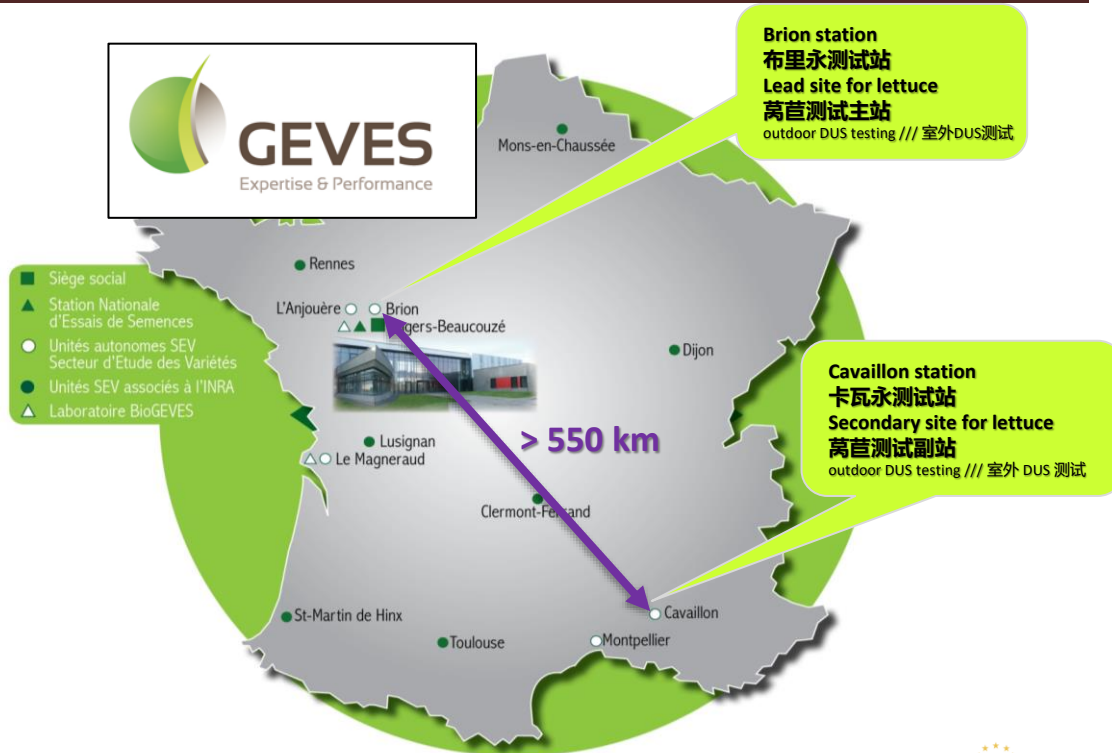
Cavaillon: /// 卡瓦永:

Influence of Mediterranean climate /// 地中海气候影响

On average, 80 days of rainfall. /// 年降水日数平均为80天

700 mm/year /// 700毫米/年

Average annual T° 15°C /// 年平均气温15°C



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Lead site 主站	Secondary site 副站	Coordination of DUS Activities DUS工作安排
X		Receives applications /// 接收申请
X		Receives plant material /// 接收植物材料
X		Is responsible for the preparation of the trial lists and for sending the plant material to the secondary site /// 编制试验清单，将部分植物材料移送副站
X		Manages the living reference collection /// 管理活体参考品种集



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

Lead site 主站	Secondary site 副站	Coordination of DUS Activities DUS工作安排
X	X	Grows the DUS cycle / DUS observations /// DUS生长周期 / DUS 观测
X	X	Uniformity assessment /// 一致性评价
X	X	Distinctness assessment /// 特异性评价 If one site shows that the variety is clearly distinct, the other site is not necessarily necessary /// 测试站之一明确发现品种特异性即可
X		Analyses results of both sites, draws DUS conclusion and the final description /// 分析两个测试站的测试结果，进行DUS判定，描述植物品种



FOCUS ON ANALOGOUS INDEPENDENT CYCLES IN FRANCE /// 聚焦：可比独立生长周期在法国的应用

To sum up Analogous testing : /// 可比独立生长周期法：

15 years experience in France, only used for some vegetable species however

在法国有15年的应用经验，但仅限部分蔬菜品种

A way to finalize the DUS test as quickly as possible, with same quality

是以同等质量尽快完成DUS测试的一个方法

Need for available facilities/climatic conditions, and staff (DUS examiner in each site)

需要符合条件的设施/气候环境和工作人员（每个测试站均要配备DUS审查员）

Requires good communication and coordination between sites : rules to be established in advance

测试站之间要做好沟通和协调：提前制定规则

Requires Technical Questionnaires to be filled carefully to enable correct grouping before testing

要仔细填好技术问卷，以便在测试前正确完成分组



RECAP /// 总结

DUS usually assessed during 2 independent growing cycles, for “seed” species. /// 对于“种子”植物，DUS一般通过2个独立生长周期进行判定。

The rationale is to get consistency in DUS observations; it is mainly linked to Distinctness, but also important for reliable stable description, and for Uniformity. /// 基本思路是要在DUS观测中保持前后一致。这主要对特异性评价产生影响，但对可靠、稳定的品种描述以及一致性评价也很重要。

DUS assessed in only one growing cycle for several vegetatively reproduced ornamental species. /// 对部分无性繁殖观赏植物，仅通过一个生长周期进行DUS判定。

In case of doubt : additional growing cycles may be necessary. /// 如有疑问，可以增加生长周期数。

Independent growing cycles can be successive growing cycles in same location, or concomitant cycles in two different locations. /// 独立生长周期可以是同一地点的连续生长周期，也可以是两个不同地点的并存生长周期。

Independence is based on expertise. /// 独立性建立在专业知识的基础上。



THANK YOU
感谢聆听

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