

UPOV 果树 DUS 测试指南综述及 对我国果树指南研制的建议

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摘 要: 综述了 UPOV 颁布的 61 个果树 DUS 测试指南, 对 UPOV 果树 DUS 测试指南的范围、颁布时间、主要内容、提交材料要求和测试性状等进行了解读和分析, 并对我国研制 UPOV 果树 DUS 测试指南、我国果树 DUS 测试指南的修订工作进行了探讨和展望, 以期为我国研制相关技术标准提供参考。

关键词: 果树; UPOV; DUS; 测试指南; 品种保护

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Review of UPOV guidelines for the conduct of tests for dus of fruit trees and suggests of developing Chinese Guidelines of Fruit Trees

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Abstract: By December 31, 2018, there were 326 UPOV DUS guidelines in total, among which 61 guidelines were for fruit trees. UPOV fruit tree guidelines involved more than 40 genera. In this paper, 61 UPOV guidelines for the conduct of tests for DUS of fruit trees were reviewed, and the contents included the subject, release time, main contents, material requirement and test characteristics were summarized and analyzed. The first fruit tree guideline was issued in the 1970s and it was for Hazelnut. In the 1980s, UPOV issued two fruit tree guidelines. In the 1990s it issued seven. But from the year of 2000, the number of fruit tree guidelines issued by UPOV increased sharply. There were 29 fruit tree guidelines issued between 2000 and 2009, and the guidelines for pear, apple, grape, et al. were issued in this stage. From 2010 to now, there were already 22 fruit tree guidelines issued. The format and content of UPOV fruit tree guidelines were basically the same. They mainly included 10 parts, which were subject of the test guidelines, material required, method of examination, assessment of distinctness, uniformity and stability, grouping of varieties and organization of the growing trial, introduction to the table of characteristics, table of characteristics, explanations on the table of characteristics, literature and technical questionnaire. The materials required by UPOV fruit tree guidelines mainly were plants, shoots, stem segments, seeds, fruits. Plants were the materials which can be planted directly, including grafted plants, plants on their own roots, rooted cuttings, in vitro plants and potted plants. Shoots were used to propagate plants, including budsticks, dormant shoots, cuttings. Stems were also used to propagate plants, including stem segments, corms and rhizomes. Seeds and fruits were also used to propagate plants. Melon, watermelon, husk tomato, strawberry and prunus rootstocks propagated by seeds needed to submit seeds as the materials. Only coconut needed to submit fruits as the materials. Some guidelines

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only required one type of these materials, and some require more than two types of these materials, and the corresponding quantity of different types of the materials were also specified. Some guidelines also required different forms and quantities of submissions based on the origin of the cultivar, the reproductive mode of the cultivar, and so on. For example, the guidelines of apple, pear, loquat and mume had different requirements of the number of submissions on the varieties from cross or from mutation. The guidelines of strawberry and Prunus rootstocks had different requirements of the type and number of submissions on the varieties propagated vegetatively or by seeds. Characteristics were the basis of DUS test and examination of plant varieties. Characteristics in UPOV fruit tree guidelines could be divided into standard characteristics, asterisked characteristics, grouping characteristics and technical questionnaire characteristics according to its function. The standard characteristics were those accepted by UPOV in DUS examination and from which UPOV members could select traits suitable for their particular environment. The basic traits of UPOV fruit tree guidelines mainly included characteristics of plants, shoots, buds, leaves, flowers, fruits, seeds, phenological phase, resistance, storage and compatibility. But to rootstock varieties, characteristics of flowers and fruits were not important characteristics, so guidelines for pear rootstocks, prunus rootstocks and avocado rootstocks just had the characteristics of plants, shoots, buds, leaves. The asterisked characteristics were the characteristics that must be adopted in the description of varieties. They were important and necessary characteristics for DUS test. Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness, and to organize the growing trial so that similar varieties are grouped together. There were one to twelve grouping characteristics in the UPOV fruit tree guidelines, and most of the fruit tree guidelines had three to six grouping characteristics, including characteristics of fruits, phenological phase, plants, shoots, flower and seeds. Technical questionnaire characteristics were characteristics listed in the part of technical questionnaire, they could help to know the basic situation of the variety and to select similar variety through these information provided by breeder. There were two to sixteen technical questionnaire characteristics in the UPOV fruit tree guidelines, and most of the fruit tree guidelines had three to seven technical questionnaire characteristics, including characteristics of fruits, phenological phase, plants, and shoots. DUS test is very important to variety plant protection and variety registration, and test guidelines are the base of DUS test. Many Chinese DUS test guidelines were made on the base of UPOV test guidelines. Through reviewing and analyzing the contents of UPOV fruit tree guidelines, prospect of developing UPOV guidelines and Chinese guidelines of fruit trees were proposed and discussed. The purpose is to provide reference for the development of relevant technical standards in China.

Key words: Fruit trees; UPOV; DUS; Guidelines; Variety protection

国际植物新品种保护联盟(UPOV)是依据国际植物新品种保护公约建立的政府间组织,其职责是协调和促进成员国之间在行政和技术领域的合作,特别是在制定基本的法律和技术准则、交流信息、促进国际合作等方面发挥着重大作用。我国于1999年4月23日正式加入UPOV,并成为第39个成员国^[1]。测试指南是植物新品种特异性(distinctness)、

一致性(uniformity)和稳定性(stability)(简称DUS)鉴定的技术标准,审批机关授予植物育种家权利的科学依据。UPOV发布的DUS测试指南,对于指导和统一各成员国植物新品种的鉴定方法和品种描述具有重要作用^[2]。

我国果树资源丰富、栽培历史悠久,是果品生产大国,果品生产已成为我国农业的支柱产业之

一^[3]。随着果树育种工作的开展,近年来果树新品种不断涌现,果树品种权保护也成为果树产业的一个重要环节。《中华人民共和国种子法》规定审定品种应当符合特异性、一致性、稳定性要求,登记品种和新品种保护都必须进行DUS测试;《非主要农作物品种登记办法》也明确指出,对新培育的品种,申请者应当按照品种登记指南的要求提交特异性、一致性、稳定性测试报告。DUS测试指南是开展DUS测试的技术依据^[4],目前,我国大部分DUS测试指南是在参考UPOV指南的基础上制定的,本文对UPOV果树DUS测试指南进行综述和解读,旨在为我国研制相关技术标准提供参考,同时对我国开展果树DUS测试指南的制修订工作具有重要的参考作用和指导意义。

1 UPOV 果树 DUS 测试指南的范围

UPOV颁布的植物DUS测试指南涉及观赏植物、蔬菜、果树、大田粮食植物、牧草和其他植物种类,截至2018年12月31日,UPOV共颁布了326个指南^[5]。其中,果树DUS测试指南有61个,涉及40多个属。参照相关文献资料^[6],UPOV果树DUS测试指南涉及到以下的属(种):仁果类的苹果属^[7-9]、梨属^[10-12]、山楂属^[13]、榲桲属^[14],核果类的桃属^[15-16]、杏属^[17-18]、李属^[19-21]、樱桃属^[22-23];浆果类的葡萄属^[24]、猕猴桃属^[25]、树莓属^[26-27]、草莓属^[28]、醋栗属^[29-30]、越橘属^[31-34]、无花果属^[35]、柿属^[36]、石榴属^[37];坚果类的栗属^[38]、榛属^[39]、核桃属^[40]、山核桃属^[41];柑果类的柑橘属^[42-45]、金柑属^[46]、枳属^[47];亚热带和热带果树类的枇杷属^[48]、荔枝属^[49]、油橄榄^[50]、杧果属^[51]、鳄梨属^[52-53]、番石榴属^[54]、番荔枝属^[55]、番木瓜属^[56]、香蕉^[57]、凤梨属^[58]、椰子属^[59]、西番莲属^[60];以及沙棘属^[61]、火棘属^[62]、量天尺属^[63]、仙人掌属^[64]、酸浆属^[65]以及西甜瓜类^[66-67]。

UPOV果树DUS测试指南大部分适用于果实生产的果树品种,也有少部分针对砧木品种,如梨属砧木指南^[12]、苹果属砧木指南^[8]、李属砧木指南^[21]和鳄梨属砧木指南^[53];除此之外,苹果属还有一个针对观赏苹果品种^[9]制定的指南(表1)。

2 UPOV 果树 DUS 测试指南颁布时间

UPOV在20世纪70年代只颁布了1个果树

DUS测试指南——榛属DUS测试指南^[39],这也是UPOV颁布最早的一个果树DUS测试指南。20世纪80年代颁布了2个果树DUS测试指南,90年代颁布了7个果树DUS测试指南。随着对知识产权的重视以及指南研制技术的提高,从2000年开始,果树DUS测试指南的颁布数量急剧增加,2000—2009年期间颁布的果树DUS测试指南多达29个,梨、苹果、柑橘、葡萄等主要果树的DUS测试指南都是在这个期间颁布的。从2010年至今,颁布的果树DUS测试指南也已达22个(图1)。

3 UPOV 果树 DUS 测试指南的主要内容

UPOV果树DUS测试指南的格式和内容基本一致,主要包括适应范围,材料要求,测试方法,特异性、一致性和稳定性评价,品种分组和试验组织,性状表介绍,性状表,性状表解释,参考文献,技术问卷等10个部分。

适应范围主要对指南适应的属、种做出规定。材料要求是对提交的待测品种繁殖材料的形式和数量做出规定。测试方法对测试周期、测试地点、测试条件、试验设计、测试数量、附加测试等环节做出具体要求。特异性、一致性和稳定性评价部分主要对三性结果判定的依据和方法做出说明。品种分组和试验组织部分主要对分组性状及其作用进行说明。性状表介绍部分是对性状表的内容进行详细说明、举例和注释。性状表详细列出了测试性状、表达状态、代码、标准品种,以及性状的表达类型等。性状表解释主要包括对多个性状的解释和对单个性状的解释,对多个性状的解释是对某些性状的测试时期、测试部位进行解释说明;对单个性状的解释是通过语言描述、照片、图片或者数据对某个性状的测试方法、表达状态等进行解释说明。技术问卷是测试指南的最后一部分,主要由育种人来填写相关信息,主要包括品种的基本信息、申请人信息、申请品种需指出的性状,近似品种及与申请品种有差异性状,有助品种审查的附加信息,授权释放等内容。

4 UPOV 果树 DUS 测试指南提交材料要求

UPOV果树DUS测试指南要求提交的测试材料主要有植株、枝条、茎、种子、果实等形式,其中,植

表 1 UPOV 果树 DUS 测试指南
Table 1 UPOV guidelines for the conduct of tests for DUS of fruit trees

序号 属(种) No. Genus(species)	植物学名 Botanical name	指南编号 Guideline No.	颁布时间 Release time	基本性状 Standard character- istics	带星号 性状 Asterisked character- istics	分组 性状 Grouping character- istics	技术 问卷 性状 Technical questionnaire characteristics
1 Japanese Pear	砂梨 <i>Pyrus pyrifolia</i> (Burm.f.) Nakai var. <i>culta</i> (Mak.) Nakai	TG/149/2	1994-11-04	76	42	3	3
2 Pear	西洋梨 <i>Pyrus communis</i> L.	TG/15/3	2000-04-05	65	34	5	5
3 Pyrus Rootstocks	梨砧木 <i>Pyrus</i> L.	TG/169/3+ Corr.	2000-03-29+ 2000-08-16	39	15	3	3
4 Apple	苹果 <i>Malus domestica</i> Borkh.	TG/14/9	2005-04-06	57	38	8	9
5 Ornamental Apple	观赏苹果 <i>Malus</i> Mill.	TG/192/1	2003-04-09	38	26	5	5
6 Apple Rootstock	苹果砧木 <i>Malus</i> Mill.	TG/163/4	2015-03-25	52	25	5	8
7 Mandarins	宽皮柑橘 <i>Citrus</i> L.-Group 1*	TG/201/1 Rev.	2003 - 04-09 + 2015-03-25	110	22	5	7
8 Oranges	橙 <i>Citrus</i> L.-Group 2*	TG/202/1 Rev.	2003 - 04-09 + 2015-03-25	95	15	5	7
9 Lemons and Limes	柠檬和 来檬 <i>Citrus</i> L.-Group 3*	TG/203/1 Rev.	2003-04-09 + 2015-03-25	79	17	5	10
10 Grapefruit and Pummelo	葡萄柚 和柚 <i>Citrus</i> L.-Group 4*	TG/204/1 Rev.	2003 - 04-09 + 2015-03-25	94	16	5	6
11 Kumquat	金柑 <i>Fortunella</i> Swingle	TG/290/1	2013-03-20	29	28	4	4
12 Trifoliate Orange	枳 <i>Citrus</i> L.-Group 5*	TG/83/4 Rev.	2003-04-09 + 2015-03-25	111	13	5	5
13 Peach	桃 <i>Prunus persica</i> (L.) Batsch; <i>Persica vulgaris</i> Mill.; <i>Prunus</i> L. subg. <i>persica</i>	TG/53/7 Rev.	2010-03-24 + 2014-04-09	70	37	11	11
14 Japanese Plum	李 <i>Prunus salicina</i> Lindl.	TG/84/4 Corr. 2 Rev.	2011-10-20+ 2013-01-25+ 2017-04-05+ 2018-09-20	61	37	6	6
15 European Plum	欧洲李 <i>Prunus domestica</i> L.	TG/41/5	2002-04-17	62	21	5	7
16 Prunus Rootstocks	李砧木 <i>Prunus</i> L.	TG/187/2	2014-04-09	36	14	5	5
17 Sweet cherry	甜樱桃 <i>Prunus avium</i> L.; <i>Cerasus</i> <i>avium</i> (L.) Moench	TG/35/7	2006-04-05	41	17	6	6
18 Sour Cherry, Duke Cherry	欧洲 酸樱桃 <i>Prunus cerasus</i> L.; <i>Cerasus</i> <i>vulgaris</i> Mill.; <i>Prunus</i> × <i>gondouinii</i> (Poit. & Turpin) Rehder; <i>P. avium</i> × <i>P. cerasus</i>	TG/230/1 Corr.	2006-04-05+ 2007-03-28	47	19	6	6
19 Apricot	杏 <i>Prunus armeniaca</i> L.; <i>Armeniaca vulgaris</i> Lam.	TG/70/4 Rev.	2007-03-28	57	15	6	6
20 Almond	扁桃 <i>Prunus dulcis</i> (Mill.);D.A. Webb; <i>Prunus amygdalus</i> (L.)	TG/56/4 Corr.	2011-10-20+ 2017-10-17	44	37	5	5
21 Pecan nut	美国山核桃 <i>Carya illinoensis</i> (Wangenh.) K. Koch	TG/308/1	2015-03-25	36	15	7	7
22 Walnut	核桃 <i>Juglans regia</i> L.	TG/125/6	1999-03-24	35	19	3	4
23 Chestnut	板栗 <i>Castanea sativa</i> Mill.	TG/124/3	1989-10-06	39	21	6	6
24 Hazelnut	榛 <i>Corylus avellana</i> L.; <i>Corylus maxima</i> Mill.	TG/71/3	1979-03-28	54	32	-	10
25 Persimmon	柿 <i>Diospyros kaki</i> L.	TG/92/4	2004-03-31	50	20	6	5
26 Hawthorn	山楂 <i>Crataegus</i> L.	TG/239/1	2008-04-09	50	11	6	7
27 Grapevine	葡萄 <i>Vitis</i> L.	TG/50/9	2008-04-09	44	28	11	11

表 1(续) Table 1(continued)

序号 No.	属(种) Genus(species)	植物学名 Botanical name	指南编号 Guideline No.	颁布时间 Release time	基本性状 Standard character- istics	带星号 性状 Asterisked character- istics	分组 性状 Grouping character- istics	技术 问卷 性状 Technical questionnaire characteristics	
28	Strawberry	草莓 <i>Fragaria</i> L.	TG/22/10 Rev.	2012-03-28	48	18	6	6	
29	Black Currant	黑穗醋栗 <i>Ribes nigrum</i> L.; <i>Ribes dikuscha</i> Fisch. ex Turcz.; <i>Ribes ussuriense</i> Jancz.	TG/40/7	2008-04-09	30	15	4	6	
30	Gooseberry	醋栗 <i>Ribes uva-crispa</i> L.	TG/51/7	2011-10-20	36	30	4	5	
31	Red Currant, White Currant	红醋栗, 白醋栗 <i>Ribes rubrum</i> L.; <i>Ribes sylvestre</i> (Lam.) Mert. et W. Koch; <i>Ribes vulgare</i> Lam.; <i>Ribes sativum</i> (Rchb.) Syme	TG/52/6	2011-10-20	30	29	4	4	
32	Jostaberry	茶藨子 (<i>Ribes</i> × <i>nidigrolaria</i>)	<i>Ribes</i> × <i>nidigrolaria</i> R. & A. Bauer	TG/138/3	1991-10-18	14	14	1	3
33	Blackberry	黑莓 <i>Rubus</i> subgenus <i>Rubus</i>	TG/73/7 Corr.	2006-04-05+ 2017-10-17	44	11	6	7	
34	Lingonberry	越橘 <i>Vaccinium vitis-idaea</i> L.	TG/139/3	1991-10-18	10	9	2	2	
35	Blueberry	蓝莓 <i>Vaccinium angustifolium</i> Aiton; <i>Vaccinium corymbosum</i> L.; <i>Vaccinium formosum</i> Andrews; <i>Vaccinium myrtilloides</i> Michx.; <i>Vaccinium myrtilloides</i> L.; <i>Vaccinium virgatum</i> Aiton; <i>Vaccinium simulatum</i> Small	TG/137/4	2007-03-28	36	21	7	7	
36	Raspberry	覆盆子 <i>Rubus idaeus</i> L.	TG/43/7	2003-04-09	47	27	5	10	
37	Actinidia	猕猴桃 <i>Actinidia</i> Lindl.	TG/98/7	2012-03-28	76	44	7	8	
38	Fig	无花果 <i>Ficus carica</i> L.	TG/265/1	2010-03-24	78	56	6	6	
39	Pomegranate	石榴 <i>Punica granatum</i> L.	TG/284/1	2013-03-20	40	17	6	6	
40	Husk Tomato	酸浆 <i>Physalis ixocarpa</i> Brot.; <i>Physalis philadelphica</i> Lam.	TG/236/1	2007-03-28	49	13	10	10	
41	Common Sea Buckthorn	沙棘 <i>Hippophae rhamnoides</i> L.	TG/240/1	2008-04-09	22	11	4	6	
42	Mume (Japanese Apricot)	梅 <i>Prunus mume</i> Sieb. et Zucc.	TG/160/3	1998-04-01	43	27	4	4	
43	Quince	榲桲 <i>Cydonia</i> Mill. sensu stricto	TG/100/4	2003-04-09	38	21	3	3	
44	Guava	番石榴 <i>Psidium guajava</i> L.	TG/110/3	1987-10-07	57	23	5	5	
45	Mango	芒果 <i>Mangifera indica</i> L.	TG/112/4 Corr.	2006-04-05+ 2017-04-05	57	20	4	7	
46	Banana	香蕉 <i>Musa acuminata</i> Colla; <i>Musa × paradisiaca</i> L.; <i>M. acuminata</i> Colla × <i>M. balbisiana</i> Colla	TG/123/4	2010-03-24	52	26	10	10	
47	Pyracantha, Firethorn	火棘 <i>Pyracantha</i> M.J. Roem.	TG/147/2	1994-11-04	32	16	4	6	
48	Loquat	枇杷 <i>Eriobotrya japonica</i> (Thunb.) Lindl.	TG/159/3	1998-04-01	49	35	3	3	
49	Litchi	荔枝 <i>Litchi chinensis</i> Sonn.	TG/302/1	2014-04-09	51	21	4	4	
50	Coconut	椰子 <i>Cocos nucifera</i> L.	TG/314/1	2016-03-16	30	12	5	6	
51	Cherimoya	番荔枝 <i>Annona cherimola</i> Mill.	TG/208/1	2003-04-09	49	5	3	3	
52	Granadilla, Passion fruit	鸡蛋果 <i>Passiflora edulis</i> Sims	TG/256/1	2009-04-01	32	7	3	3	
53	Papaya	番木瓜 <i>Carica papaya</i> L.	TG/264/1	2010-03-24	42	13	4	4	

表1(续) Table 1(continued)

序号 No.	属(种) Genus(species)	植物学名 Botanical name	指南编号 Guideline No.	颁布时间 Release time	基本性状 Standard characteristics	带星号性状 Asterisked characteristics	分组性状 Grouping characteristics	技术问卷性状 Technical questionnaire characteristics
54	Dragon Fruit	火龙果 <i>Hylocereus undatus</i> (Haw.) Britton & Rose	TG/271/1	2011-10-20	39	12	6	5
55	Pineapple	凤梨 <i>Ananas comosus</i> (L.) Merr.	TG/295/1	2013-03-20	48	22	7	7
56	Olive	油橄榄 <i>Olea europaea</i> L.	TG/99/4	2011-10-20	41	24	10	9
57	Avocado	鳄梨 <i>Persea americana</i> Mill.	TG/97/4	2006-04-05	68	13	4	7
58	Avocado Rootstocks	鳄梨砧木 <i>Persea americana</i> Mill.; <i>Persea schiedeana</i> Nees	TG/318/1 Corr.	2016-03-16+ 2017-04-05	36	15	6	6
59	Cactus Pear and Xoonostles	仙人掌果 <i>Opuntia</i>	TG/217/2	2006-04-05	61	20	5	5
60	Watermelon	西瓜 <i>Citrullus lanatus</i> (Thunb.) Matsum. et Nakai; <i>Citrullus vulgaris</i> Schrad.	TG/142/5	2013-03-20	39	13	9	9
61	Melon	甜瓜 <i>Cucumis melo</i> L.	TG/104/5 Rev.	2006-04-05+ 2014-04-09	76	25	12	16

注:*. 详见指南 TG201、TG202、TG203、TG204、TG83。

Note: *. Refer to guidelines of TG201, TG202, TG203, TG204, TG83.

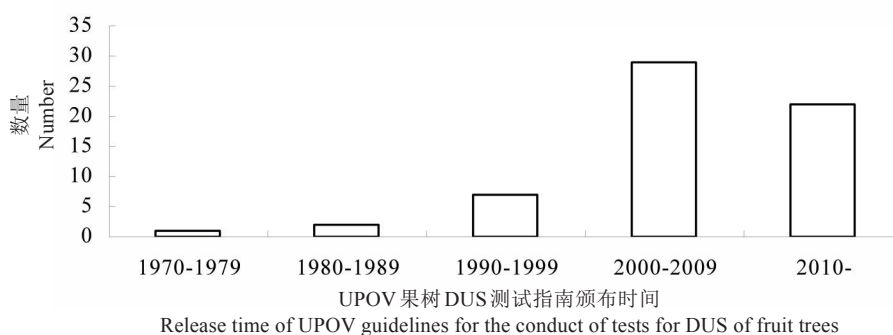


图1 UPOV 果树 DUS 测试指南的颁布时间及数量

Fig. 1 Release time and number of UPOV guidelines for the conduct of tests for DUS of fruit trees

株是可以直接种植的测试材料,包括嫁接苗、自根苗、扦插苗、组培苗、盆栽植株等形式。枝条是用于繁殖测试植株的繁殖材料,包括可用于嫁接或扦插的生长季芽枝、休眠枝、扦插枝等。茎也是用于繁殖测试植株的繁殖材料,包括茎段、球茎、根茎等。种子和果实同样是用来繁殖测试植株,甜瓜^[66]、西瓜^[67]、酸浆^[65]、通过种子繁殖的草莓^[28]、通过种子繁殖的李砧木^[21]都需要提交种子作为繁殖材料,提交果实作为繁殖材料的只有椰子^[59]。繁殖材料的形式是由测试材料的繁殖特点决定的。

UPOV 果树 DUS 测试指南提交材料的形式较多,有的指南仅要求以 1 种形式提供材料,如欧洲李^[19]、覆盆子^[26]、醋栗^[30]、桃^[15]、榛子^[39]、黑莓^[27]、柿^[36]、鳄梨^[52]、甜瓜^[66]、杧果^[51]、蓝莓^[33]、茶藨子^[32]、越橘^[34]、西

瓜^[67]、火棘^[62]、砂梨^[11]、梨砧木^[12]、观赏苹果^[9]、番荔枝^[55]、酸浆^[65]、沙棘^[61]、番木瓜^[56]、无花果^[35]、石榴^[37]、椰子^[59]、鳄梨砧木^[53];其他指南则可以 2 种形式或多种形式提供,并且规定了不同形式测试材料的相应数量。

有些指南还针对品种的来源、品种的繁殖方式等对提交材料的形式和数量做出不同要求,如苹果^[7]、西洋梨^[10]、枇杷^[48]、梅^[18]的指南对通过杂交育成的品种和通过突变育成的品种提交材料的数量要求不同;草莓^[28]、李砧木^[21]的指南对通过无性繁殖的品种和通过种子繁殖的品种提交材料的形式和数量要求均不同。因此,在开展这些树种的 DUS 测试提交材料时,要根据品种的来源、繁殖特性等特点,提交符合指南要求的繁殖材料和数量。

5 UPOV 果树特异性、一致性和稳定性测试的特点

特异性、一致性和稳定性是判定一个待测品种是否真正成为品种的基本依据,是品种必备的3个基本属性^[1]。

5.1 特异性

UPOV 果树测试指南特异性判定要参阅总则特异性判定的原则,并对一致的差异和明显的差异进行了说明。

5.1.1 一致的差异 当观测到的品种之间的差异非常明显时,则没有必要种植一个以上生长周期。此外,在某些情况下,环境的影响并不意味着需要一个以上的生长周期来保证品种间观察到的差异是足够一致的。为确保在种植试验中所观测到的性状差异是足够一致的,可以对性状进行至少两个独立的生长周期的测试。

5.1.2 明显的差异 决定两个品种间的差异是否明显取决于很多因素,特别应考虑所测性状的表达类型,即该性状是质量性状、数量性状还是假质量性状。因此,在做出关于特异性的判定前,测试指南的使用者应熟悉总则中的建议,这一点很重要。

5.2 一致性

1994年及以前制定颁布的UPOV果树测试指南没有对一致性进行说明,2016年颁布的椰子^[59]指南中要求一致性要根据总则进行判定,并且没有做详细说明。其他的测试指南都对一致性的判定方法和要求做出了说明,在参阅总则一致性判定的原则的基础上,大多数果树测试指南在评价一致性时应采用1%的群体标准和至少95%的接受概率,允许异形株出现的株数根据规定的测试群体的数量而定。而西瓜^[67]测试指南一致性评价则要求采用2%的群体标准和至少95%的接受概率。其他测试指南则根据品种来源^[10,18,48]、种植方式^[8]、繁殖方式^[21,65]的不同,采用不同的群体标准和接受概率。

5.3 稳定性

UPOV 果树测试指南在实际操作中,通常不像测试特异性和一致性那样对稳定性进行测试,当一个品种表现一致时,可认为其是稳定的。适当情况下或者有疑问时,稳定性可以采用通过种植测试品种的后代种子或者测试一批新材料,看其性状表现是否与之前提交的材料表现相同的方法进行测试。

6 UPOV 果树 DUS 测试指南测试性状

性状是指可遗传表达的能明确识别、区分和描述的植物的特征或特性,是植物品种DUS测试审查的基础,UPOV 果树DUS测试指南中的性状按其功能主要分为基本性状、带星号(*)性状、分组性状、技术问卷性状等^[1]。

6.1 基本性状

基本性状是DUS审查中UPOV接受的性状以及UPOV成员能够从中选择适合于其特定环境的性状^[2]。统计发现,枳的指南^[47]中基本性状多达111个,是UPOV所有果树DUS测试指南中最多的,其次是柑橘属的几个指南^[42-45],基本性状的数量为79~110个。基本性状最少的是越橘的指南^[34],仅列出10个基本性状。性状越多对品种描述越详细,但同时也增加了测试的工作量,因此,制定指南时应充分考虑测试材料的特点和用途,选择必要的性状,从而提高测试的效率。

UPOV 果树DUS测试指南的基本性状主要包括植株(树)性状、枝条性状、芽性状、叶性状、花性状、果实性状、种子性状、物候期、抗性、贮藏性及亲和性等,涉及不同物候期、不同器官的诸多性状。但对于砧木品种来说,花和果实不是重要性状,因此,梨砧木^[12]、李砧木^[21]和鳄梨砧木^[53]的指南中基本性状仅涉及到植株(树)性状、枝条性状、芽性状、叶性状,不涉及花、果实、种子等其他性状。

6.2 带星号性状

带星号性状是各成员测试时,品种描述必须采纳的性状,对于统一品种描述十分重要^[2],是开展DUS测试的重要性状和必要性状。无花果指南^[55]中的带星号性状为56个,是UPOV所有果树DUS测试指南中最多的,而番荔枝指南^[55]是最少的,仅有5个带星号性状。茶藨子指南^[32]的基本性状仅有14个,而且这14个性状均为带星号性状,其带星号性状的比例最高,其次是白醋栗^[31]、金柑^[46]、越橘^[34]的指南,带星号性状占有所有性状的90%以上。番荔枝^[55]指南中带星号性状数量最少,所占比例也是最少的(10%),枳^[47]、柑橘属^[42-45]、鳄梨^[52]、鸡蛋果^[60]、山楂^[13]等指南中带星号性状的比例也较低,均不足25%,尤其是枳^[47]和柑橘属^[42-45]的指南中基本性状是最多的(79~110个),但带星号性状的数量仅13~22个。

6.3 分组性状

分组性状可作为选择近似品种的依据,在特异性测试中将那些不相关的已知品种排除在种植试验之外,同时可用于种植试验的分组,以便将近似品种种在一起^[68]。除榛子^[39]的指南没有列出分组性状外,其他指南在“品种分组和试验组织”部分都列出了分组性状,数量为1~12个,其中茶藨子指南^[32]的分组性状只有1个,甜瓜指南^[66]的分组性状多达12个,多数指南的分组性状为3~6个,以果实性状、物候期、植株(树)性状、枝条性状等为主要内容,有的指南还包括花性状、种子性状等。

6.4 技术问卷性状

技术问卷性状是在 DUS 测试指南技术问卷中列出的性状,旨在通过育种人提供的性状信息了解品种基本情况、初步筛选近似品种^[1]。技术问卷性状需要育种人填写,因此列入技术问卷的性状应便于育种者观测和记录^[4]。UPOV 果树 DUS 测试指南的技术问卷性状的数量为2~16个,其中越橘指南^[34]技术问卷性状的数量是最少的,仅有2个,甜瓜指南^[66]是最多的(16个),多数指南的技术问卷性状的数量为3~7个,也是以果实性状、物候期、植株(树)性状、枝条性状等为主要内容。

不同测试指南测试性状的数量有很大差异,测试性状数量的设置与测试材料现有品种资源的数量及其发掘、研究现状有很大关系,比如柑果类、梨、苹果等资源丰富的树种的测试性状数量较多,而像越橘、茶藨子等小宗果树研究起步较晚、研究不够深入,其测试性状数量较少。

7 建 议

UPOV 测试指南的研制由技术委员会负责,一个 UPOV 测试指南从起草到完成需要经过提出任务、讨论、修改、采纳和发布等几个环节,往往需要经过技术工作组会议多轮讨论和修改,一般需要2~3年,甚至7~8年时间^[2]。因此,UPOV 测试指南的制定有非常严格的程序,并且由专门的技术委员会负责,指南的内容科学合理,而且指南基本采用统一的格式,非常规范。UPOV 作为一个世界性的组织,各个成员国都积极参与其测试指南的研制工作,所以 UPOV 指南涵盖的属、种较多。我国于1999年加入 UPOV,然后开始测试指南的研制工作,由于起步较晚,我国果树 DUS 测试指南的研制程序与 UPOV 相

比还有一定差距,指南涉及的属、种也相对较少。但近年来,随着新品种保护工作的开展,我国 DUS 测试指南的研制也取得了较大成就,指南数量激增,指南研制的程序、水平也逐步完善。我国有着丰富的种质资源,随着资源挖掘、研究的逐步深入,果树测试指南的研制有着巨大潜力。

7.1 利用我国果树资源优势,积极参与 UPOV 指南的研制

中国是农业和栽培植物起源最早和最大的中心之一,植物种类繁多,栽培植物起源于中国的有170种以上,其中果树包括砂梨、秋子梨、桃、杏、梅、李等温带落叶果树,橙、柿、枇杷、枳、杨梅、荔枝、龙眼等亚热带果树50余种^[6]。随着新品种保护和 DUS 测试工作的加强,我国已制定了近40个果树 DUS 测试指南,并以国家标准和行业标准的形式发布实施,推动了我国植物新品种保护工作的开展。但到目前为止,我国尚未研制果树的 UPOV 测试指南,因此,应该加强学习 UPOV 测试指南的研制程序和方法,充分利用我国果树资源,加快我国特有果树资源如枣、桑等果树 UPOV 测试指南的研制工作,以扩大我国在 UPOV 的影响力,为世界植物新品种保护作出贡献。

7.2 针对我国果树资源的特点和用途,加快完善我国果树 DUS 测试指南标准体系

我国于1999年4月23日加入 UPOV 之后,开始实施植物新品种保护制度,并研制相应的 DUS 测试指南^[1],到目前为止,我国共发布了梨、苹果、桃、柑橘、葡萄、龙眼、荔枝、草莓、葡萄等近40个果树 DUS 测试指南,指南研制技术不断成熟。但和 UPOV 果树测试指南相比较,我国果树 DUS 测试指南的适用范围过于宽泛,目前,我国颁布的指南针对每个属仅有1个指南,但同属不同种的品种在一些性状上存在较大差异,以梨属为例,其不同种的特征特性存在差异,比如秋子梨果实较小、白梨和砂梨果实为脆肉型、西洋梨和秋子梨果实为软肉型、西洋梨叶片较小等,在 DUS 测试过程中如果采用同一个指南作为测试标准会对性状表达状态的判断产生偏差,可能会影响判定结果的准确性。UPOV 针对果实生产的梨属 DUS 测试指南有西洋梨和砂梨有2个,柑橘属 DUS 测试指南有宽皮柑橘、橙、柠檬和来檬、葡萄柚和柚4个,因此,应该根据我国果树资源的特点,继续加强 DUS 测试指南的制定,为高效准确地开展

DUS 测试提供技术标准。

除此之外,根据果树的用途,有用于果实生产的品种,有砧木品种,还有观赏品种,UPOV 果树 DUS 测试指南包括了 4 个砧木的指南和 1 个观赏品种的指南,而我国目前尚未发布此类果树 DUS 测试指南,这也是我国果树 DUS 测试指南研制的空白,下一步应该加强该类指南的研制工作,使果树 DUS 测试指南的适用范围更加精准。同时,应利用我国丰富的果树资源优势,加快我国特有果树 DUS 测试指南的研制工作,以逐渐完善我国植物新品种保护体系。

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