UPOV
International Union for the Protection of New Varieties of Plants

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Technical Working Party for Fruit Crops

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TWF/53/12

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PRESENTATION ON THE USE OF MOLECULAR TECHNIQUES IN DUS EXAMINATION

Document prepared by an expert from China

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The annex to this document contains a copy of a presentation "Application of molecular techniques in DUS testing and PBR enforcement of fruit sector in China", to be made by an expert from China, at the fifty-third session of the TWF.

[Annex follows]

Application of molecular techniques in DUS testing and PBR enforcement of fruit sector in China

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Outlines

- **Overview**
- Application in DUS testing
- Application in PBR enforcement
- Prospect

DUS examination of fruit sector in China

- Breeder's test and official on-site inspection
- Official centralized testing

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Molecular techniques standards

8 agricultural / forestry industry standards: Identification of varieties—SSR marker method for apple, citrus, grape, peach, kiwifruit, sweet cherry, Chinese jujube and apricot.

National standard "Identification of Plant Variety – MNP marker method" (Multiple Nucleotide Polymorphism) covering 16 crops including longan, litchi and kiwifruit

Crops	Marker
Apple	SSR
Citrus	SSR
Grape	SSR
Peach	SSR
Kiwifruit	SSR, MNP
Sweet cherry	SSR
Chinese jujube	SSR
Apricot	SSR
Longan fruit	MNP
Litchi	MNP

Others in developing

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Management of variety collections

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GUIDANCE ON THE USE OF BIOCHEMICAL AND MOLECULAR MARKERS IN THE EXAMINATION OF DISTINCTNESS, UNIFORMITY AND STABILITY (DUS)

- Characteristic-specific molecular markers (*not yet*)
- Combining phenotypic and molecular distances in the **management of variety collections**

Official on-site inspection: collection of plant materials and construction of DNA fingerprint database

Official centralized testing: construction of DNA fingerprint database to assist in trial conducting (selection of similar variety)

Crops	Marker	Varieties
Apple	SSR	140
Citrus	SSR	491
Grape	SSR	35
Peach	SSR	229
Kiwifruit	SSR	38

DNA database constructed by the DUS headquarters (Up to Feb. 2022)

Example of grape

- A SSR fingerprint database covering 520+ grape varieties
- Rapid and efficient DNA comparation
- Useful in similar variety selection


NY

中华人民共和国农业行业标准

NY/T 3640—2020

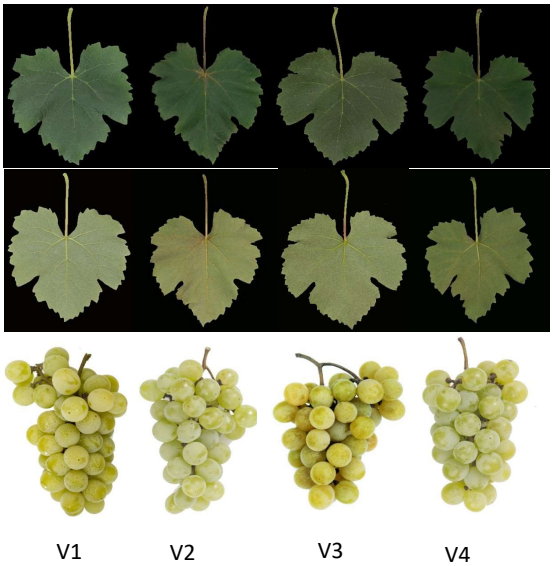
葡萄品种鉴定 SSR分子标记法

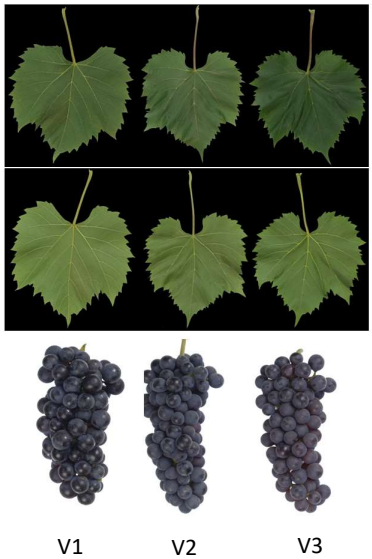
Identification of grape cultivars using SSR markers method

2020-07-27 发布 2020-11-01 实施

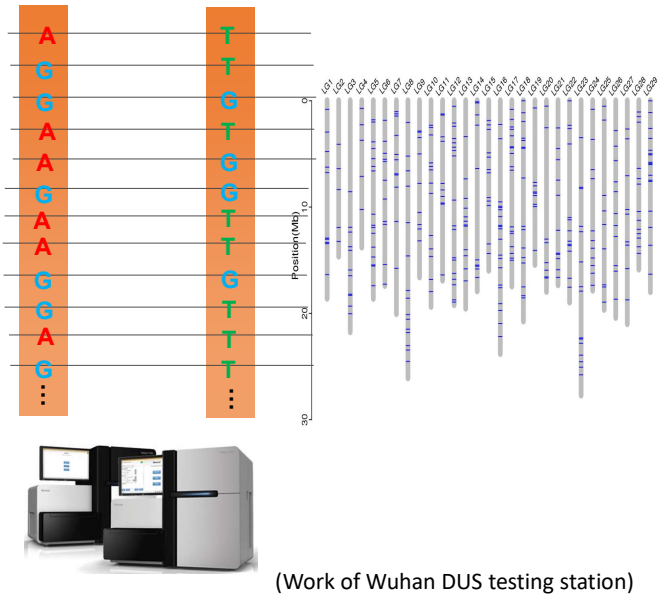
中华人民共和国农业农村部 发布

(Work of Zhengzhou DUS testing station)





A set of MNP containing 347 SNPs are available for screening similar varieties in DUS testing.



(Work of Wuhan DUS testing station)

DUS

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- **Application in PBR enforcement**
- Prospect

Legal effect of molecular techniques

Seed Law Article 46

The administrative departments of agriculture and forestry could **detect the seed varieties** produced and traded **using rapid detecting method** prescribed by the state, and the detection result can serve **as evidence for administrative punishment**. In case that the people being detected dissent with the result, s/he could apply for redetection, which could not use the same detection method.

Judicial Interpretation of the Superem People's Court

Provisions on the concrete application of legal issues regarding to disputes of infringement on PBR II (2021)

- Futher interprete the situation of application of molecular technique
- Clarify that If the conclusion of field observation and detection is different from that of molecular marker detection such as gene fingerprint, the people's court shall take the conclusion of field observation and detection as the standard

Application of molecular techniques

The molecular techniques can be used in the enforcement, both judicial and administrative, of PBR, as:

- **A rapid and efficient method of variety identification**

Cases of Judicial enforcement

Pear variety 'Sucui 1'
Date of title granted: May 1, 2017
Case 1 and 2

- The PBR holder provided the test report using **MNP** （in case 1） / **SSR** (in case 2) method with conclusion that the sued infringing variety is **extreme similar** variety or the **same** variety with Sucui 1 .
- The defendant did not provide counter evidence.
- The court accepted the molecular test report.
- The court's decision: stop the infringement, destroy the infringing seedlings, and **compensate for the losses**.

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Cases of administrative enforcement

Citrus variety 'Zhonggansuo 5'
Date of title granted: March 1, 2017
Case 3

The PBR holder provided the test report using method with conclusion that the sued infringing variety is **extreme similar** variety or the **same** variety with Zhonggansuo 5.

- The defendant did not provide counter evidence.
- The administrative body (Chongqing city, SW China) accepted the molecular test report.
- The administrative body made decision: Stop the infringement, destroy the infringing seedlings, **impose fines**.

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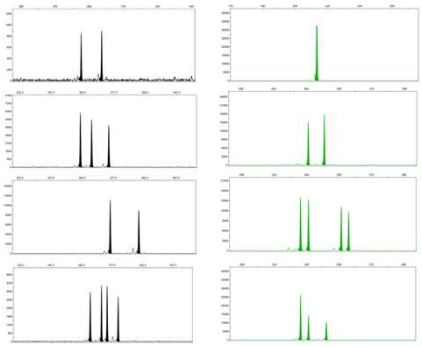
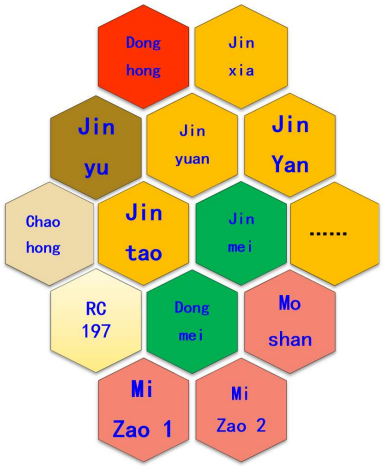
Cases of variety ID

Variety specific SSR marker: 16 patented markers for 16 kiwifruit varieties
Each marker can be used to identify a certain variety





DUS

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Prospect

More varieties: to further improve the DNA fingerprint databases
More crops: to further develop the molecular techniques for new genera and species
More method: SSR, MNP, SNP
More use: characteristic-specific molecular markers
More cooperation: international level

To facilitate the DUS testing and strengthen the PBR enforcement of fruit sector

Crops	Marker
Apple	SSR
Citrus	SSR
Grape	SSR
Peach	SSR
Kiwifruit	SSR, MNP
Sweet cherry	SSR
Chinese jujube	SSR
Apricot	SSR
Longan fruit	MNP
Litchi	MNP

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DUS

Thanks for your attention!

[End of Annex and of document]