

Application of Molecular Data on Ornamental Peach Systematics

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Flower Color





Flower Type

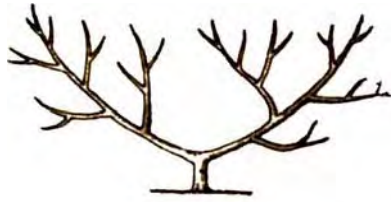




Upright Type

Growth Habit

Fastigiate Type



Dwarf Type



Weeping Type





Leaf Color



Problem

- **Genetic relationship and difference between cultivars**
- **Genetic diversity of cultivars**
- **Discrimination and protection of new cultivars**
- **New cultivars' breeding**

Objective

Using AFLP and ISSR to distinguish the different taxa and their genetic relationships, and elucidate the hierarchy of relationship among ornamental peach cultivars.

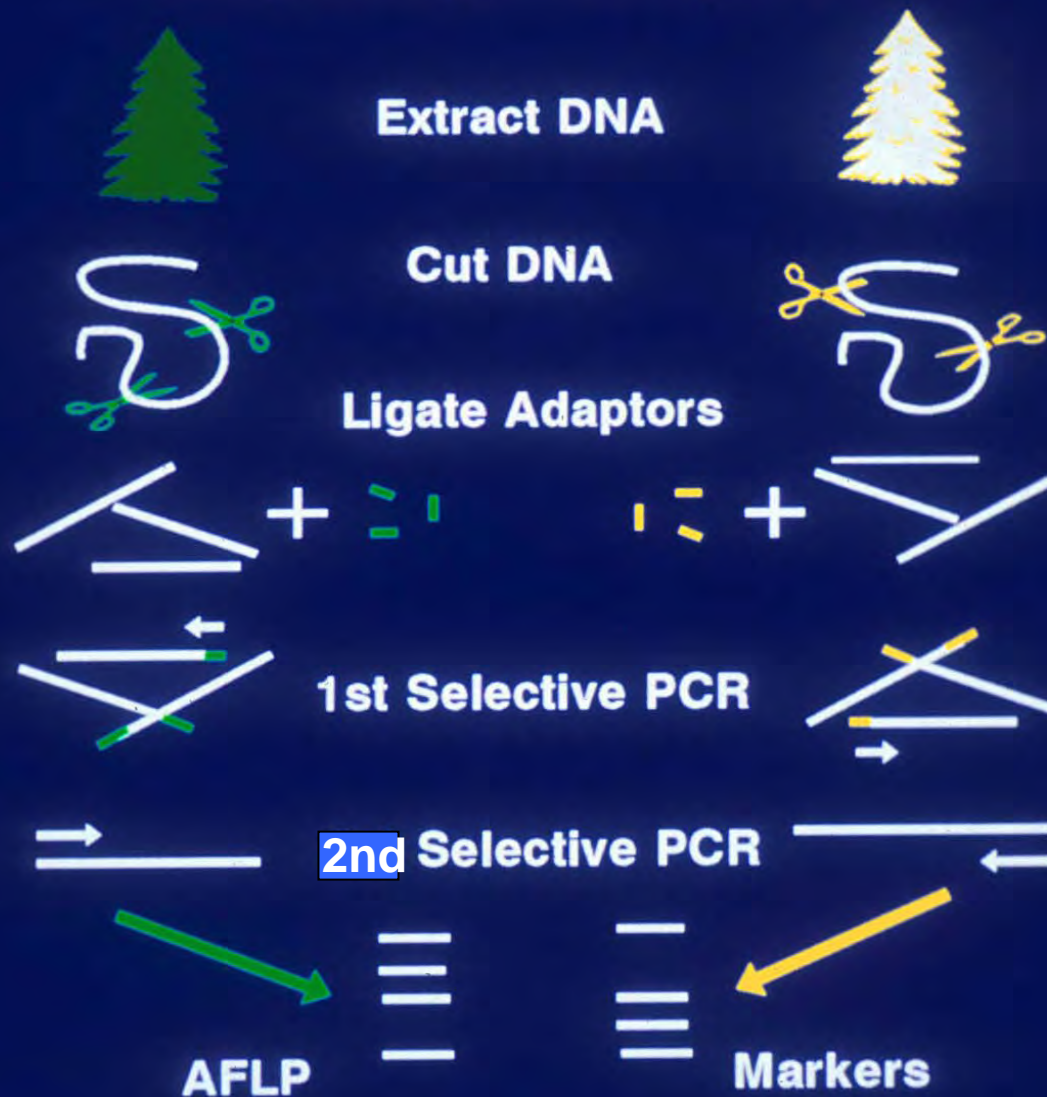
Advantages of Molecular Markers

- **Abundant Information**
- **Inheritance**
- **No change in any tissue**
- **No change in any environment**

AFLP

- **No prior knowledge about the target genome is required**
- **Small amount of DNA needed**
- **Large information generated from one reaction**
- **High Polymorphism**

Amplified Fragment Length Polymorphism (AFLP)



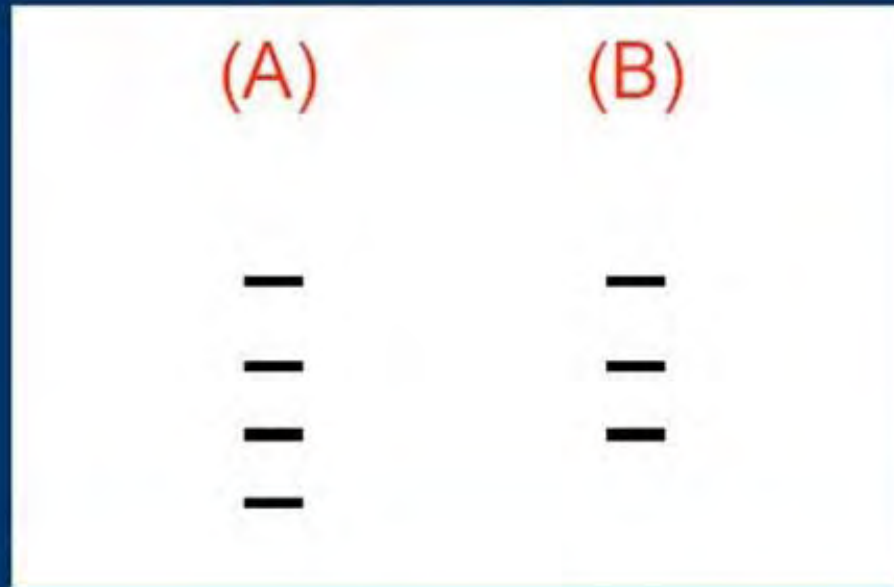
ISSR

- **Does not require prior sequence information and**
- **Generates a high number of polymorphisms**
- **More reproducible**

(A)



(B)



Inter Simple Sequence Repeat (ISSR)

Samples

| No. | Taxa Name | No. | Taxa Name |
|-----|---|-----|---|
| 1 | <i>Prunus persica</i> 'Corinthian Pink' | 9 | <i>P. persica</i> 'Bi Tao' |
| 2 | <i>P. persica</i> 'Houki Momo' | 10 | <i>P. persica</i> 'Kyou Maiko' |
| 3 | <i>P. persica</i> 'Lv E Chui Zhi' | 11 | <i>P. persica</i> 'Bai Bi Tao' |
| 4 | <i>P. persica</i> 'Clarisse' | 12 | <i>P. persica</i> 'Zi Ye Tao' |
| 5 | <i>P. persica</i> 'Xia Yu Shou Xing' | 13 | <i>P. persica</i> 'Unriu Momo' |
| 6 | <i>P. persica</i> 'Red Dwarf' | 14 | 'Bai Hua Shan Bi Tao' |
| 7 | <i>P. persica</i> 'Bonfire Patio' | 15 | 'Fen Hua Shan Bi Tao' |
| 8 | <i>P. persica</i> 'Beijing Zi' | 16 | <i>Prunus davidiana</i> var. <i>rubra</i> |

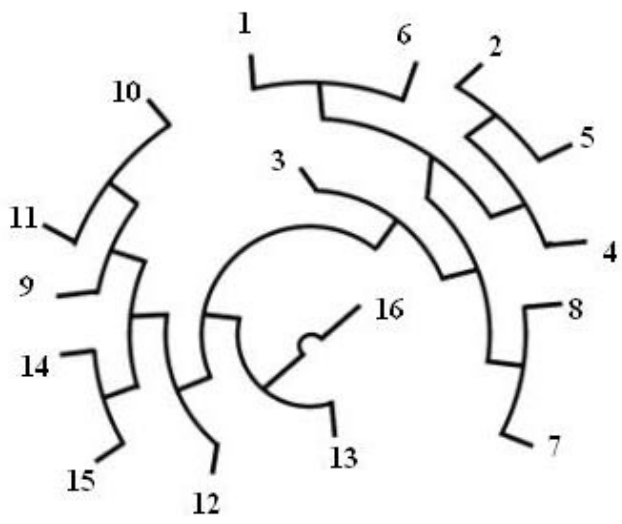
Result

AFLP

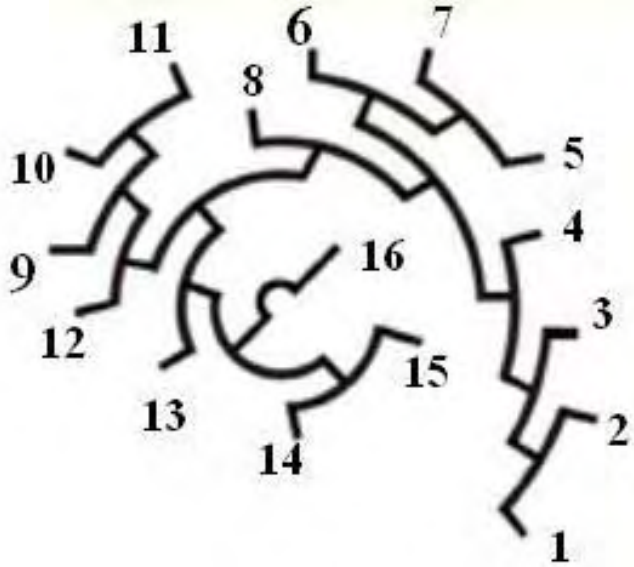
- **275 useful markers between 75 to 500 base pairs were generated from 6 EcoRI/MseI AFLP primer combinations (MseI-CAT/EcoRI-ACC, ACT, AGG and MseI-CTC/EcoRI-ACC, ACT, AGG)**
- **Among them, 89% of bands were polymorphic markers. Total markers for each taxon ranged from 104 to 140 and the average number of markers for each taxon was 123.**

ISSR

- **132 useful markers between 300 to 1400 base pairs, which were generated from 10 ISSR primers (UBC818, UBC825, UBC834, UBC855, UBC817, UBC868, UBC845, UBC899, UBC860, and UBC836) .**
- **Among them, 62% of bands were polymorphic markers. The average number of markers for each taxon was 80.**

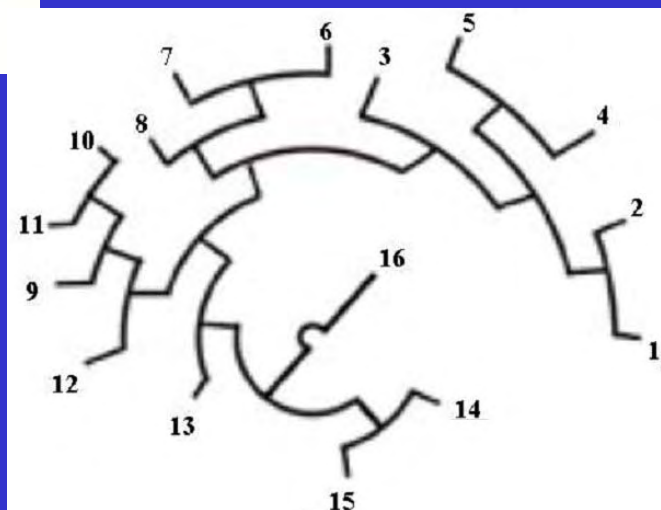


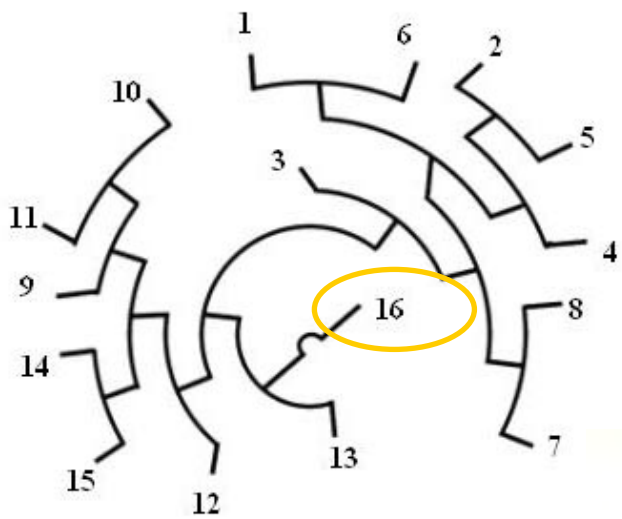
AFLP



AFLP+ISSR

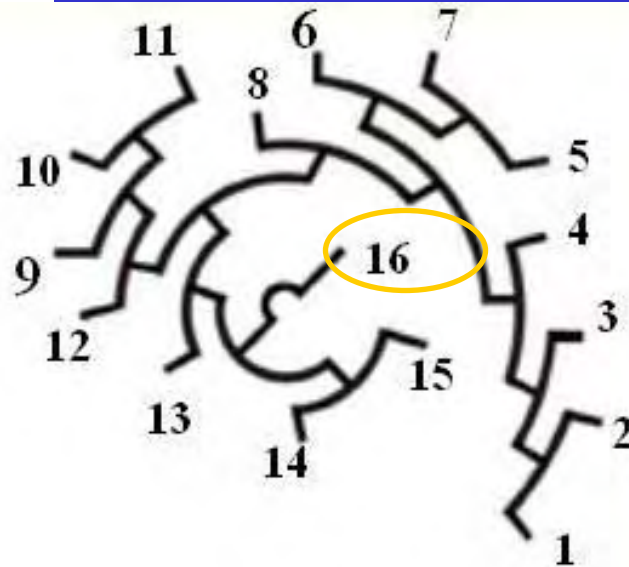
ISSR





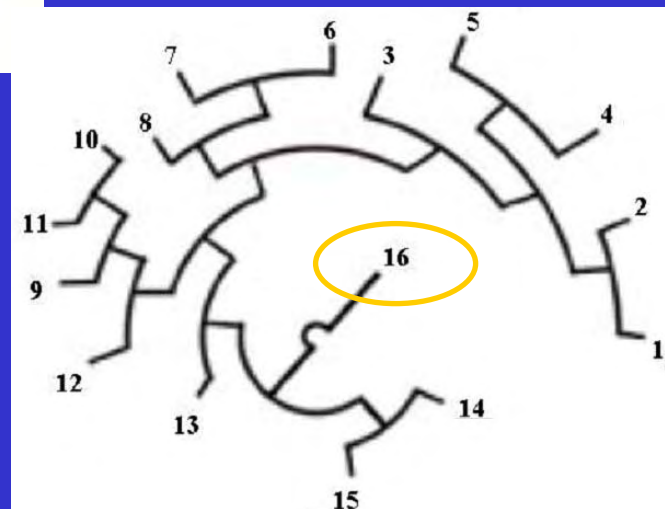
AFLP

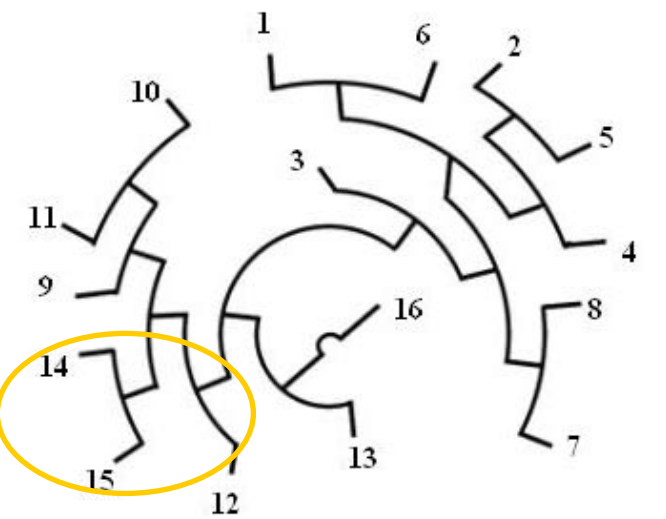
16. *Prunus davidiana* var. *rubra*



AFLP+ISSR

ISSR

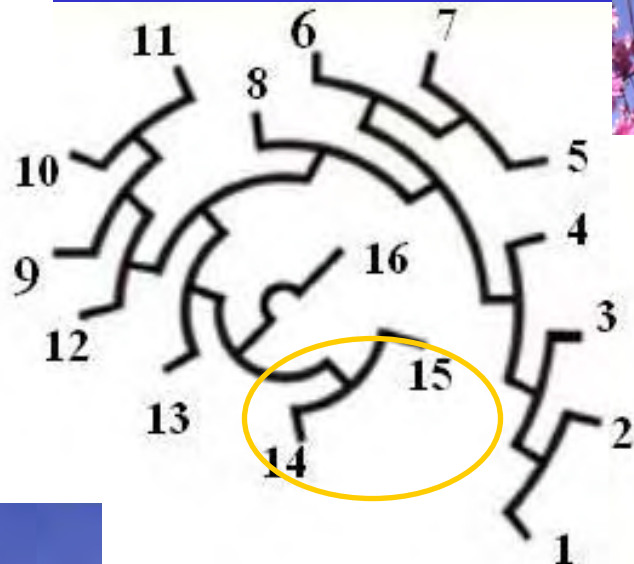




AFLP



15. 'Fen Hua Shan Bi Tao'

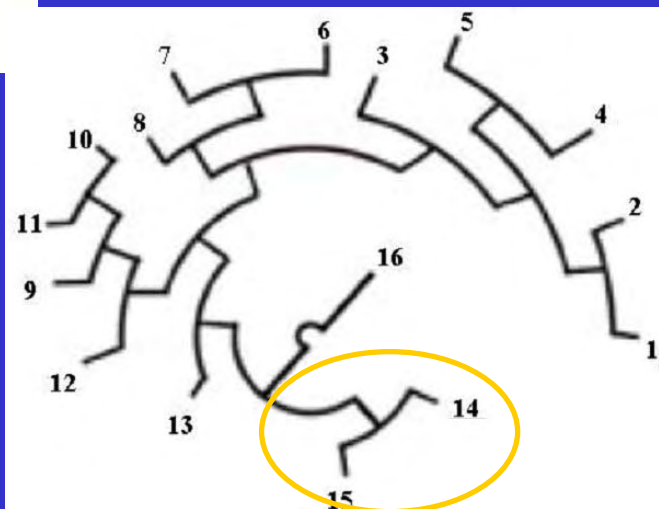


AFLP+ISSR

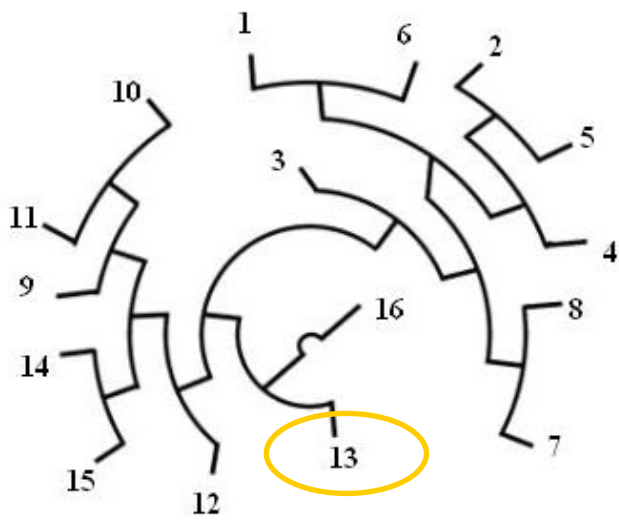
14. 'Bai Hua Shan Bi Tao'



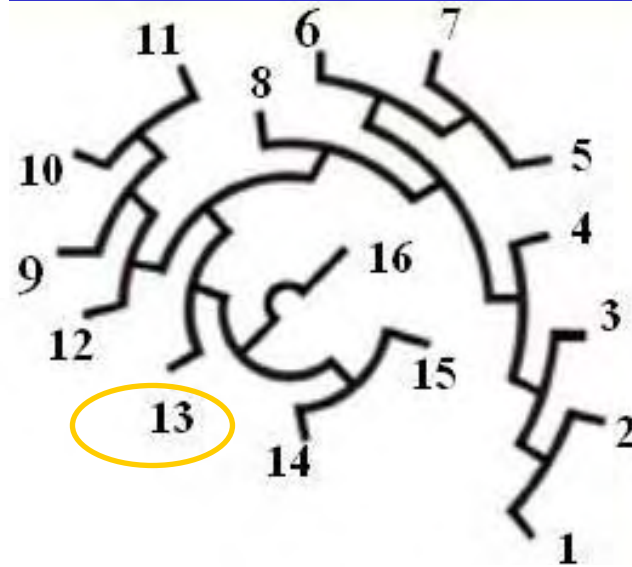
ISSR



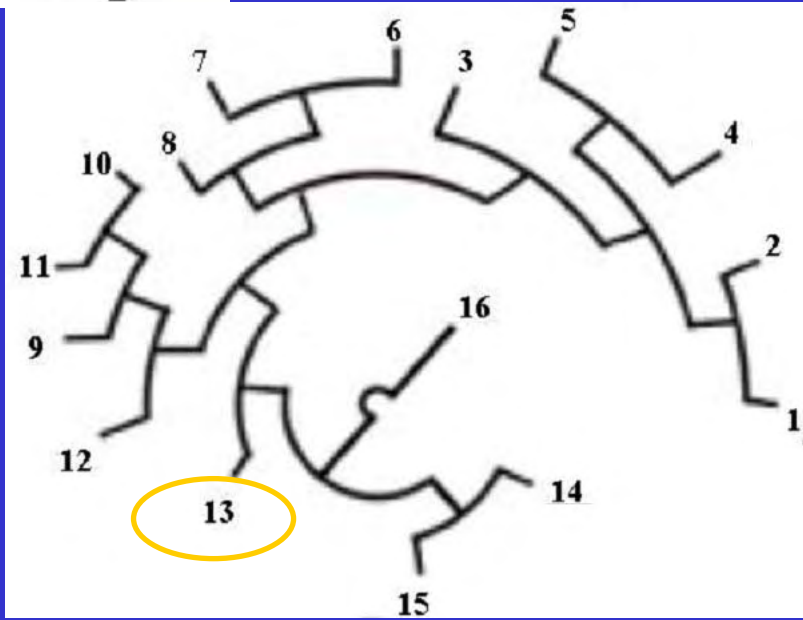
AFLP



ISSR

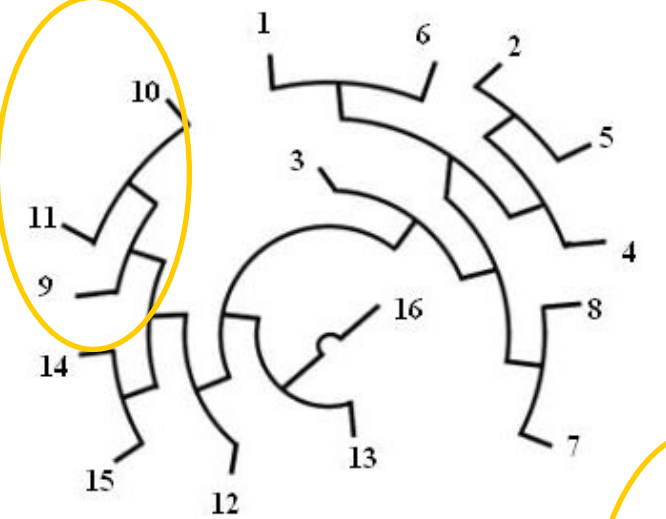


AFLP+ISSR



13. 'Unriu Momo'



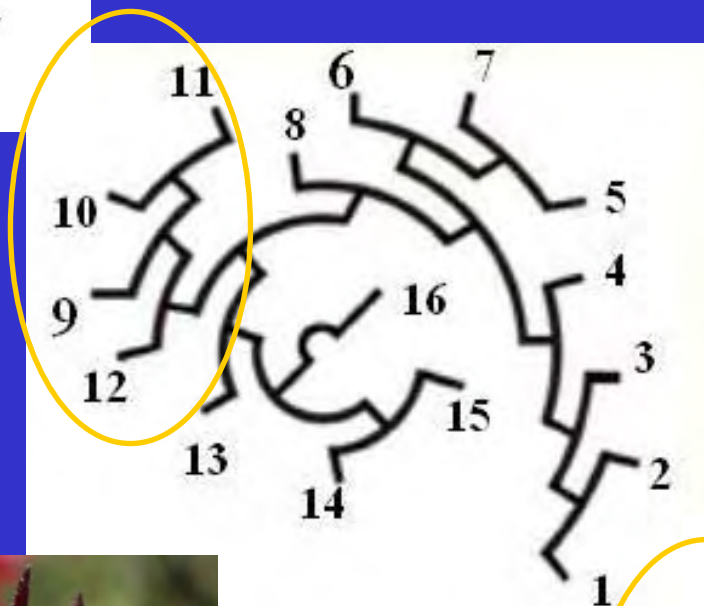


11. 'Bai Bi Tao'

AFLP



9. 'Bi Tao'



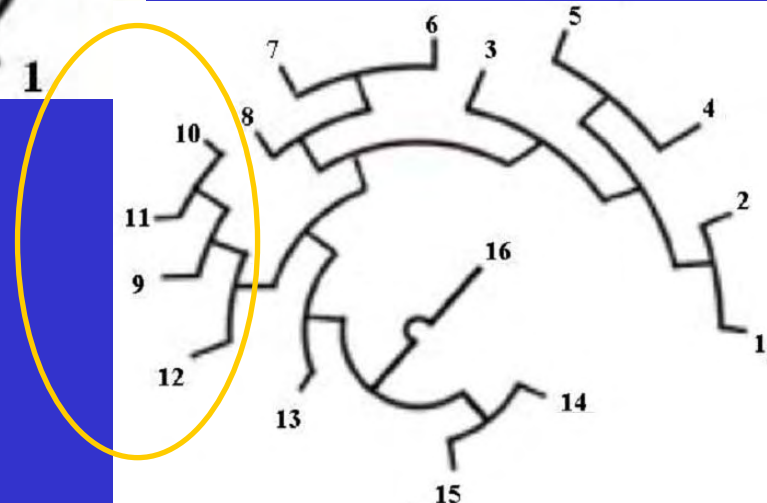
10. 'Kyou Maiko'

AFLP+ISSR

ISSR



12. 'Zi Ye'



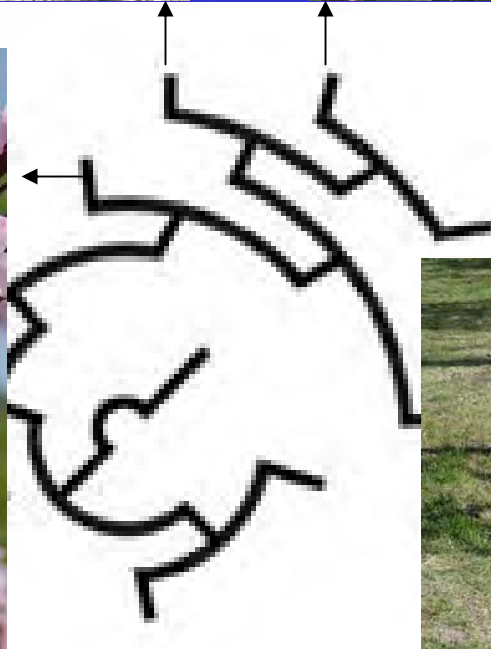
6. 'Red Dwarf'



7. 'Bonfire Patio'



8. 'Beijing Zi'



5. 'Xia Yu Shou Xing'



4. 'Clarisse'



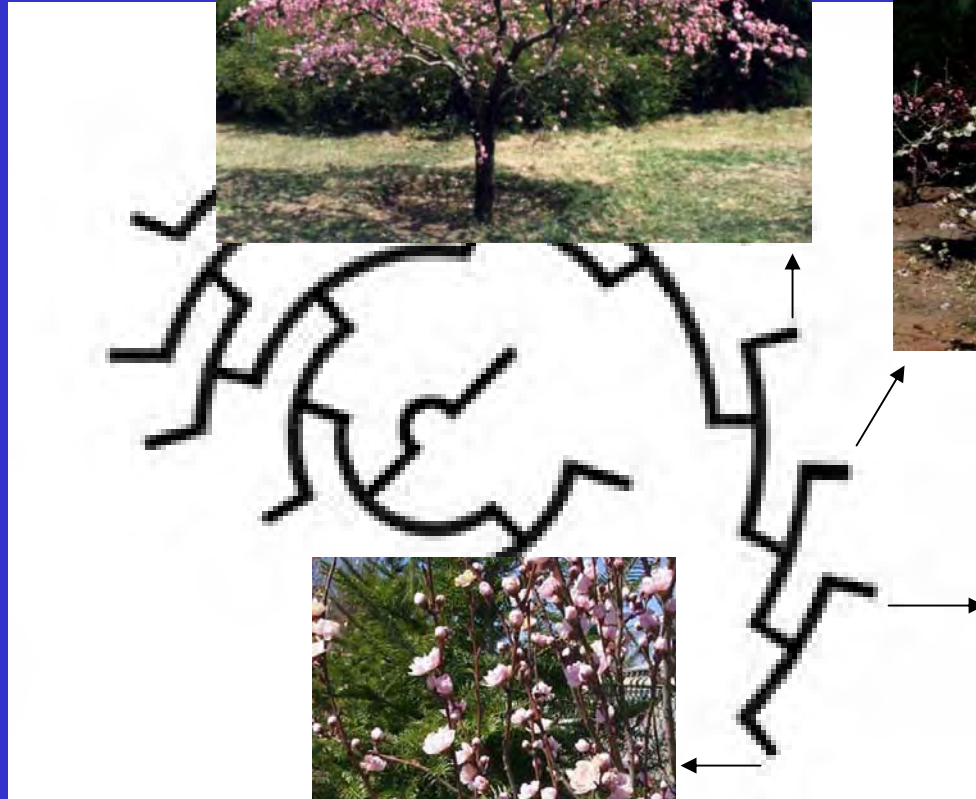
3. 'Lv E Chui Zhi'



2. 'Houki Momo'



1. 'Corinthian Pink'



Conclusion

- **Sufficient genetic relationships could be detected using AFLP and ISSR markers.**
- **Both methods provided the genetic relationships of the tested ornamental peach taxa and the groups were consistent.**

Conclusion

- **Results suggested that both AFLP and ISSR analysis have great potential to identify and estimate phylogeny among ornamental peach cultivars.**
- **Molecular techniques may elucidate the hierarchy of relationship among ornamental peach cultivars.**