

Docynia indica superior genotypes selection and their evaluation in clone trials in Northwest Vietnam

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Introduction

Son tra (*Docynia indica* (Wal.) Decne) is a fruit tree indigenous to mountainous areas of South and Southeast Asia. In northern Vietnam, son tra fruit is harvested by farmers and sold to processors who produce wine, juice, tea, syrup and vinegar. The area of plantations is expanding, but, to date, only unimproved local seed sources have been planted. Breeding to improve fruit value could improve rural livelihoods. Since 2012, the World Agroforestry and its partners have been evaluating genetic variation in fruit production and quality traits.



Figure 3. Field trial in Toa Tinh commune, Tuan Giao district, Dien Bien province evaluating 36 clones of son tra in 2019, age 24 months

Materials and Methods

- Dominant trees were selected in natural forests and plantations based on fruit yield, morphology and taste. In 2012, scion materials from 11 selected trees near Tuan Giao, Dien Bien Province, were grafted onto seedling stocks. Grafts were planted in a field trial in 2013 to evaluate growth, fruit yield and fruit quality. Fruit of 11 selected clones and 8 unselected control trees was evaluated by a panel of 19 experienced local growers and fruit traders in 2017, as follows:
 - Mean fruit length and diameter for each of the 19 trees was determined from measurements on 30 randomly selected fruits
 - 2 kg of fresh fruits from each tree were set out in bowls, with sample identities concealed
 - Assessors ranked all 19 samples for sale price (in VND kg⁻¹), attractiveness, sweetness, sourness and acidity
 - Scoring was based on each individual assessor's long-term experience: 1 – very poor, 2 – below average, 3 – average, 4 – above average, 5 – outstanding. Each assessor tasted several individual fruits per sample



Figure 1. Farmers harvesting son tra fruit in field trial



Figure 2. Assessing son tra fruit quality in Toa Tinh commune, Tuan Giao district, Dien Bien province

- A further 36 selected clones were grafted onto unselected seedling stocks and field trials testing these clones and unselected seedling controls were planted in three provinces (Dien Bien, Son La and Yen Bai) in 2017
- Performance of treatments (growth, fruit yield and quality) are being recorded for assessment

Results

The 2013 trial established:

- Rapid growth and early fruit-bearing of grafted trees
- Average fruit yield at year 5 was 21.9 kg tree⁻¹, twice that of unimproved trees which typically yield 11 kg tree⁻¹ at year 7
- Individual genotypes differed significantly in their sale price, fresh fruit attractiveness and sweetness and sourness, but not in acidity
- There was a strong correlation between estimated price and fresh fruit attractiveness score
- Average prices of the 11 clones and 8 unimproved trees did not differ significantly
- There was no significant relationship between fruit size and estimated selling price

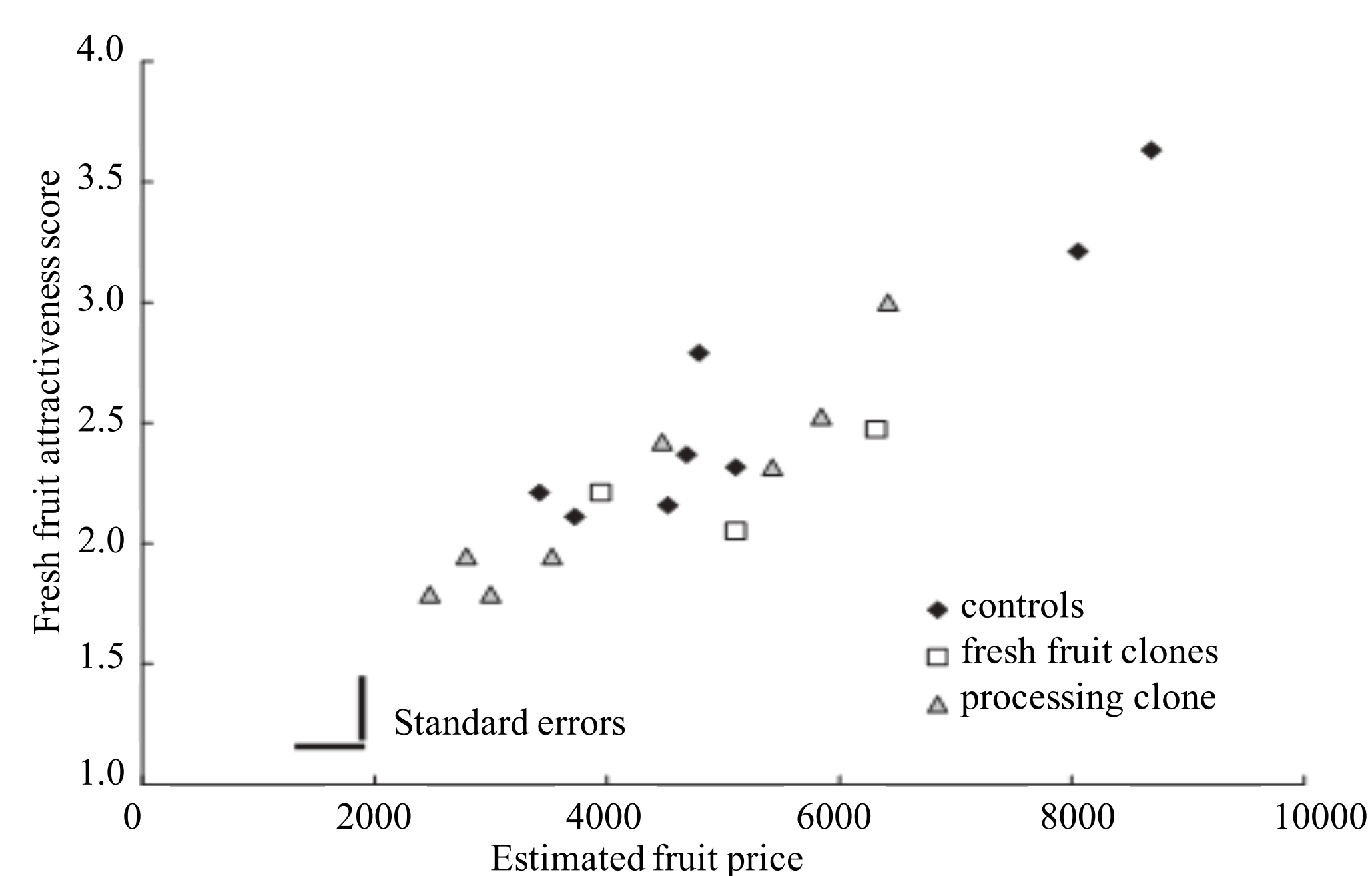


Figure 4. Price and fresh fruit attractiveness scores for 11 clones and 8 unselected control trees, judged by 19 assessors. Horizontal and vertical lines show standard errors of difference of treatment means for fruit price and attractiveness score

In the 2017 trial of 36 clones at Toa Tinh, 22 months after planting:

- Difference in vegetative growth among the clones was not significant
- Grafting resulted in earlier fruit-bearing. 27% (58 out of 216) grafted trees were bearing fruit, while none of the 24 seedling controls bore any fruit, a significant ($P < 0.05$) difference
- Differences among clones in fruit-bearing were not yet significant

Future work

Further selection of *D. indica* plus trees should be led by farmer experts and should focus on maximizing fruit quality and sale price

Ongoing research to select and rank the best clones on their value for different fruit market sectors and pest and disease resistance is recommended to support profitable expansion of *D. indica* growing

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Reference

Ha V.T et al. 2018. Domestication of *Docynia indica* in Vietnam. Forests, Trees and Livelihoods, DOI: 10.1080/14728028.2018.1511480