

[Title]

Tomato grafting creates economic opportunities for farmers in Vietnam

[Summary]

- Tomato farmers in Southeast Asia can lose 100% of their crops due to diseases and wet soils
- AVRDC – The World Vegetable Center researched grafting as a possible solution to these constraints through a series of projects funded by DFID and other donors in the early 1990s
- DFID also supported the establishment of an International Bacterial Wilt Symposium in 1992
- In 2002, tomato grafting was disseminated in Vietnam
- In 2012, AVRDC conducted an impact evaluation of the technology in Vietnam, 10 years after the technique was introduced
- Results of the evaluation show tomato grafting helps farmers overcome production constraints, increase yield and generate more income

[Introduction]

Waterlogged soils and bacterial wilt caused by *Ralstonia solanacearum* have long been a problem for tomato producers in Vietnam's hot, wet climate, sometimes leading to 100% yield loss. Tomato grafting—combining a bacterial wilt-resistant, flood-tolerant rootstock with a high-yielding tomato scion—provides farmers with a means to overcome these constraints. AVRDC – The World Vegetable Center began tomato grafting experiments in 1992, and in the mid-1990s incorporated grafting lessons into training courses held at its headquarters in Taiwan. The technique was introduced in northern and southern Vietnam after several scientists from the Fruit and Vegetable Research Institute (FAVRI) and the Potato, Vegetable and Flower Research Center (PVFC) attended an AVRDC training course in 2002. Both partners evaluated the technique in their respective institutes and disseminated it to farmers through television programs, brochures, guides and demonstrations.

Adoption was rapid in Lam Dong province in the south, where the number of farmers using grafted tomato began to steadily increase after 2002. Uptake was slower in the Red River Delta in the north, where disease problems are not as acute; farmers began using grafted tomato there in 2009.

AVRDC conducted a survey in 2012 with 225 tomato farmers in Lam Dong and 75 tomato farmers in the Red River Delta to evaluate the impact of grafting on their incomes and activities.

[Research Findings]

The survey results showed that 100% of the tomato farmers in Lam Dong and 48% of the tomato farmers in the Red River Delta adopted the use of grafted seedlings. In Lam Dong the farmers used tomato variety Vimina (Hawaii 7996) as a rootstock for its resistance to bacterial wilt, while in the Red River Delta, eggplant variety EG203 was used as it tolerates waterlogging, the major constraint there.

The average yield (81.4 t/ha) and farm gate price (US\$0.41/kg) of grafted tomato were significantly greater—by 31% in Lam Dong and 39% in the Red River Delta—compared with non-grafted tomato.

[Outcomes and Impacts]

In places where bacterial wilt, Fusarium wilt and root-knot nematodes are a problem, tomato grafting offers significant monetary benefits to farmers.

Grafted tomatoes had a benefit-cost ratio of 2.23 compared to 1.76 for non-grafted tomatoes. For every US\$1 invested, farmers who adopted grafting could expect US\$1.23 in income (revenues minus costs).

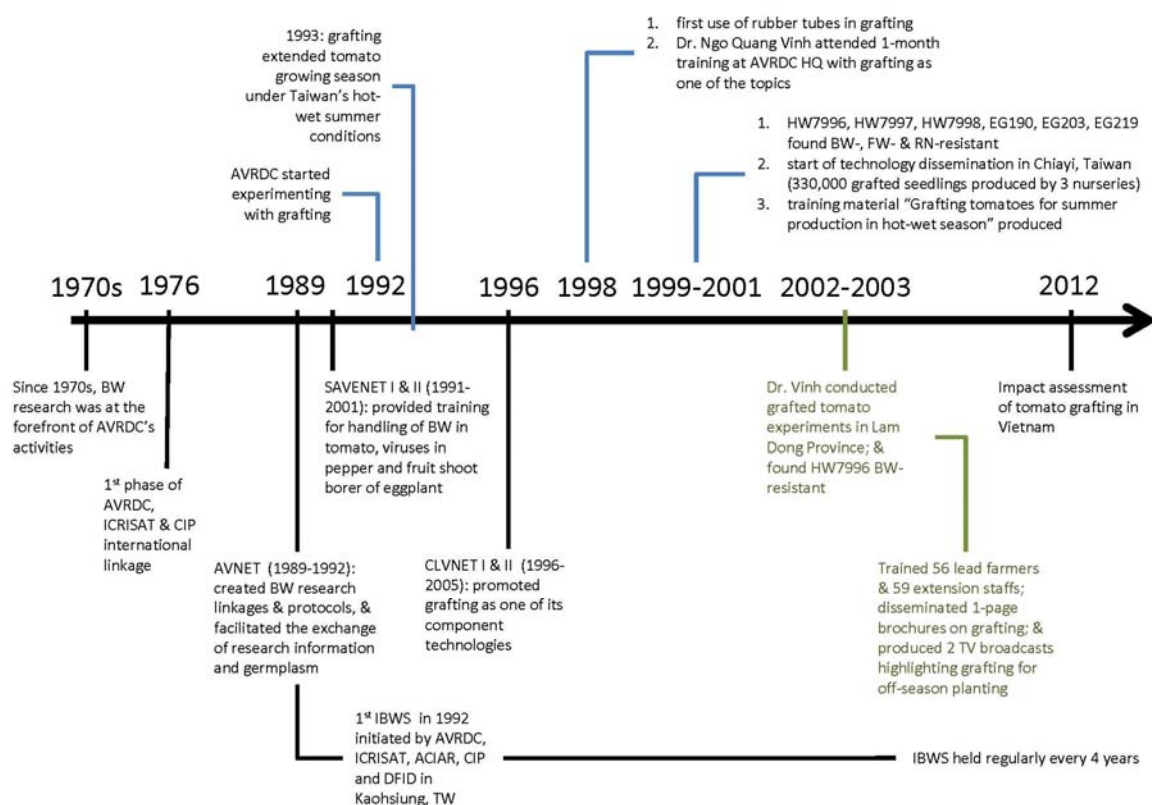
[Impact summary]

The evaluation found that the use of grafted seedlings significantly increases average tomato yield by about 30%—which means the rootstocks were effective in reducing waterlogging and soil-borne disease problems.

Grafted tomato fruits commanded a higher price (US\$0.41/kg) than non-grafted tomatoes (US\$0.25/kg) in the market.

In Lam Dong province, estimated total profit for farmers planting grafted tomato was US\$41.7 million higher than if the same area had been planted with non-grafted tomato.

[Diagrams]



Sources: ADB (2005); Attanayaka et al. (1997); AVRDC (1994), (1995), (2000a), (2000b), (2001), (2002), (2008); Black et al. (1998); Black et al. (2003); Hayward et al. (2005); Midmore et al. (1997); Opena & Tschanz (1987); Vinh & Ngo (2006); Wang et al. (1998); Ya-Juia et al. (2001)

Figure 1. Timeline of AVRDC's research on bacterial wilt and tomato grafting, 1970-2012

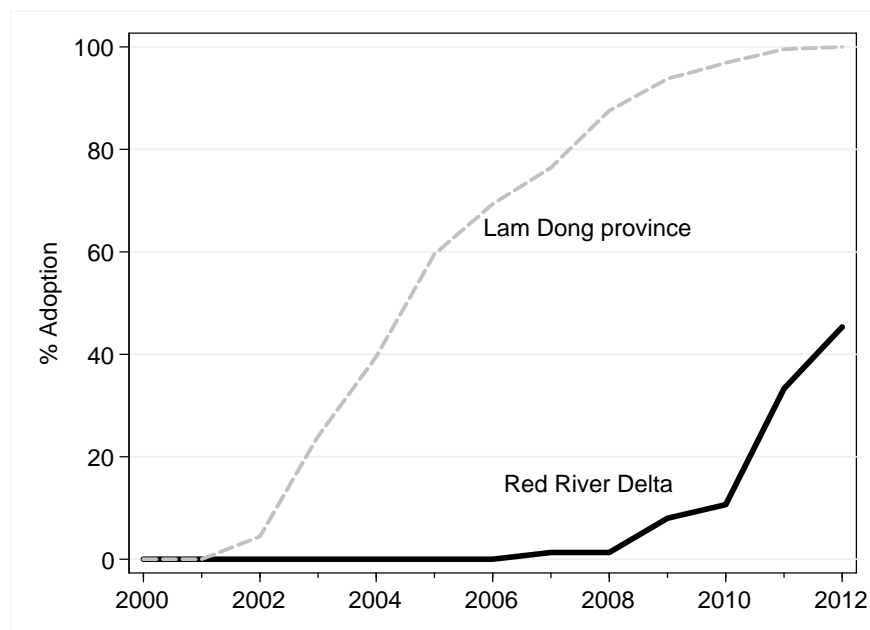


Figure 2. Adoption of tomato grafting in Lam Dong province and the Red River Delta

[Wider Environment]

Grafted tomatoes are now planted on more than 6000 hectares in Lam Dong province. In the Red River Delta, FAVRI has established nurseries to ensure farmers have access to grafted seedlings.

There have now been five International Bacterial Wilt Symposia; the most recent was held in 2011.

The benefits of tomato grafting can be achieved only if soil-borne diseases or flooding constrains tomato production, as grafted seedlings are more costly than non-grafted seedlings.

[Next Steps]

AVRDC is disseminating tomato grafting practices in Indonesia, Bangladesh, Thailand and other countries with locations suitable for the successful application of the method. Further research will focus on rootstocks resistant to bacterial wilt, Fusarium wilt and root-knot nematode; alternative rootstocks; growth, yield, and fruit quality of grafted tomato; and the role of private sector nurseries in the production and marketing of grafted seedlings.

[References]

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Dr. Ngo Quang Vinh from the Institute of Agricultural Science in southern Vietnam at a grafted tomato field in Lam Dong province. Dr. Vinh was instrumental in disseminating AVRDC's grafting technology in the country. *Photo by Christian Genova.*