Melhoramento de citros para resistência a doenças fúngicas

Doutorando: Leonardo Brandão

Disciplina: Citricultura (LPV 5711)

Docente: Prof. Dr. Francisco Mourão

Piracicaba, 2023

Roteiro

1. Introdução
2. Dificuldades do melhoramento genético de plantas cítricas
3. Métodos de melhoramento de espécies cítricas
4. Melhoramento para a mancha marrom de alternaria
5. Melhoramento para a podridão floral dos citros
6. Melhoramento para a pinta preta
7. Melhoramento para a verrugose
8. Conclusões

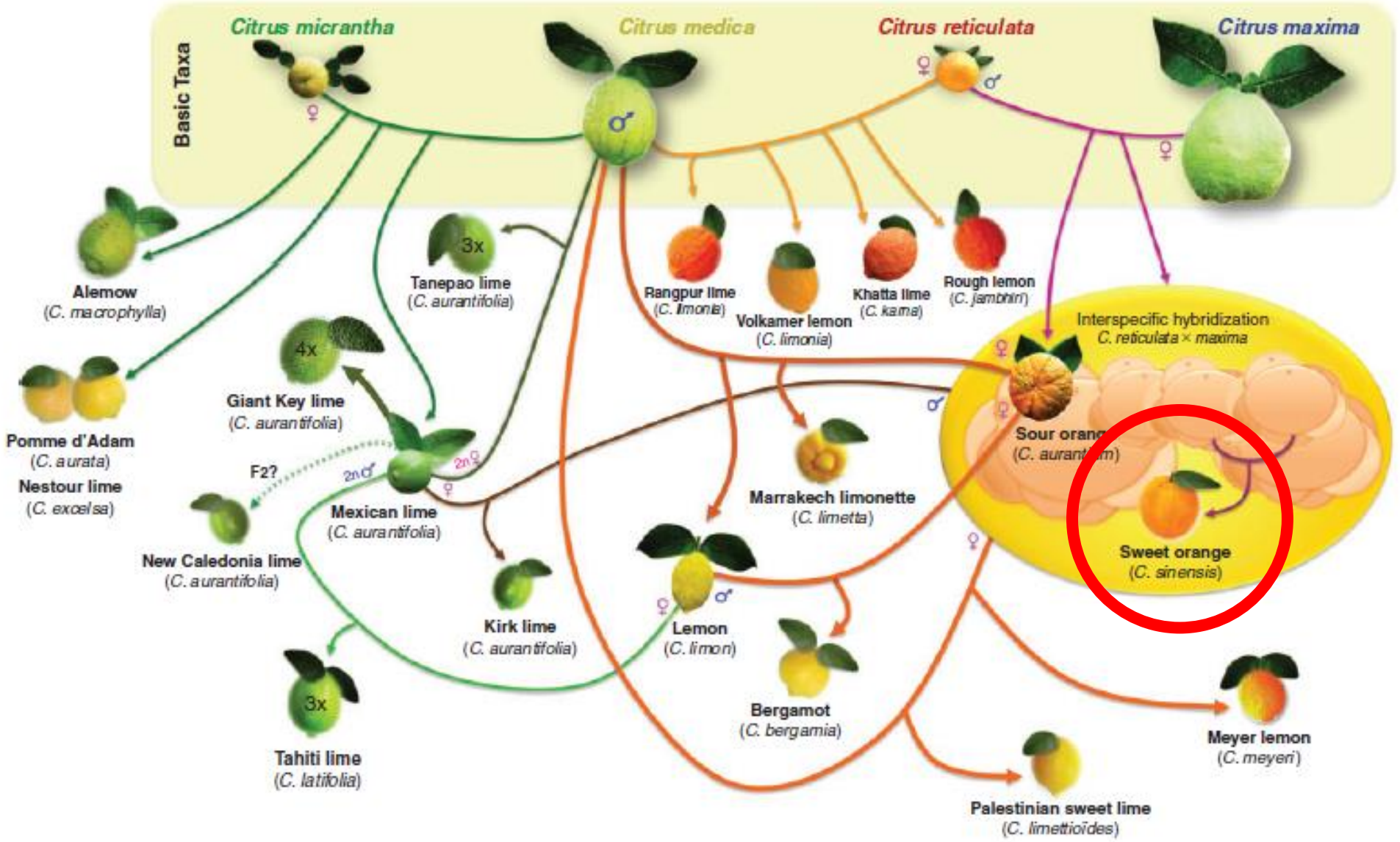
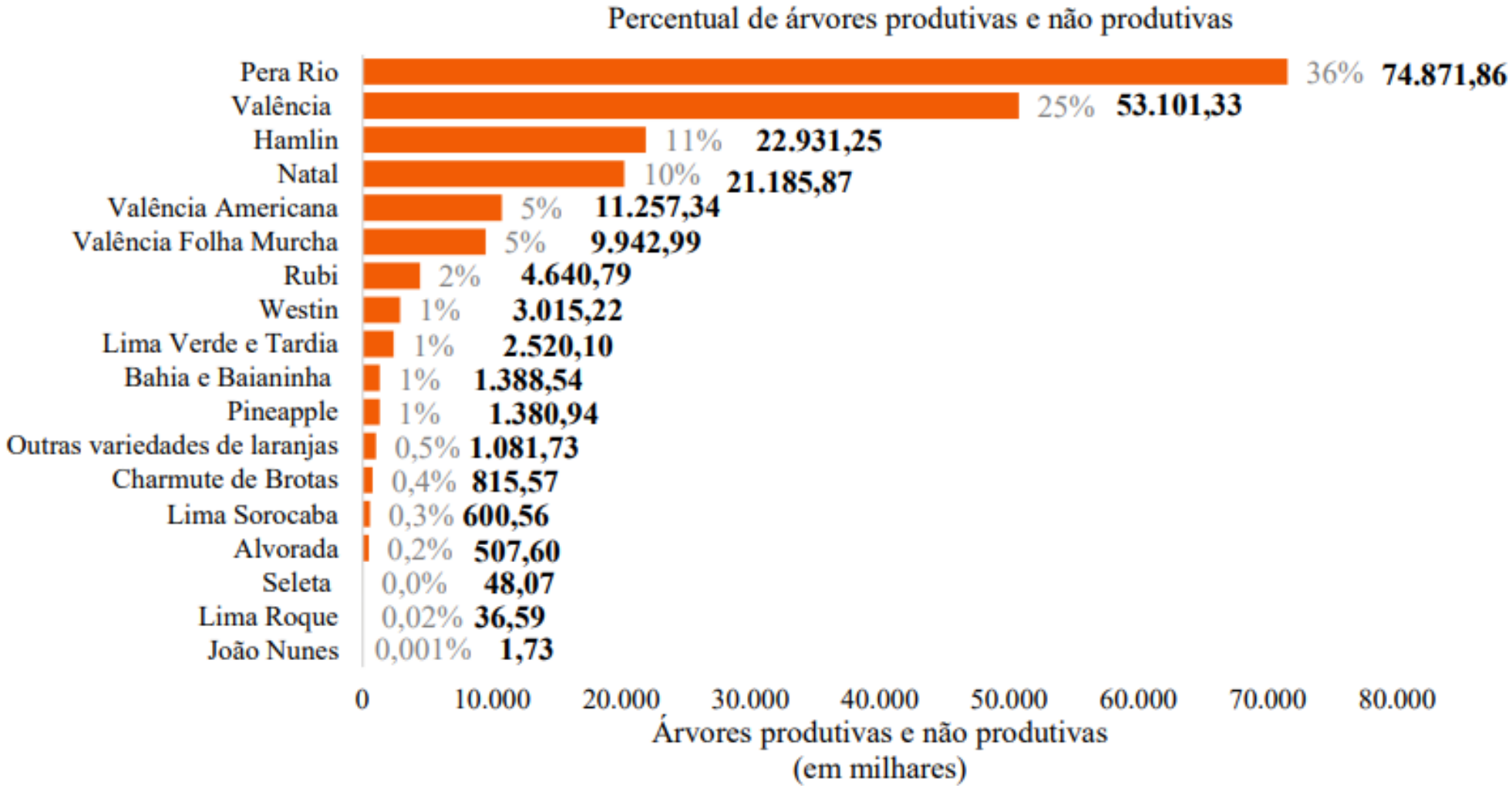


FIG. 8. Origin of the main lime and lemon varietal sub-groups.



Fundecitrus (2023)

Gomose

Tristeza

MSC

HLB

Pinta preta

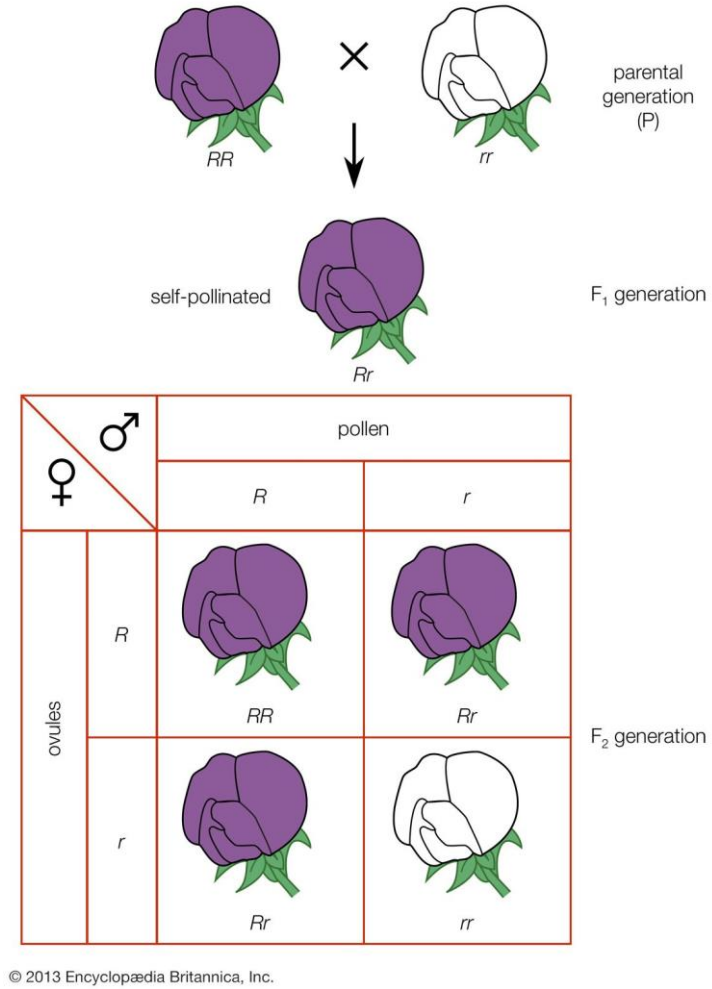
Verrugose

PFC

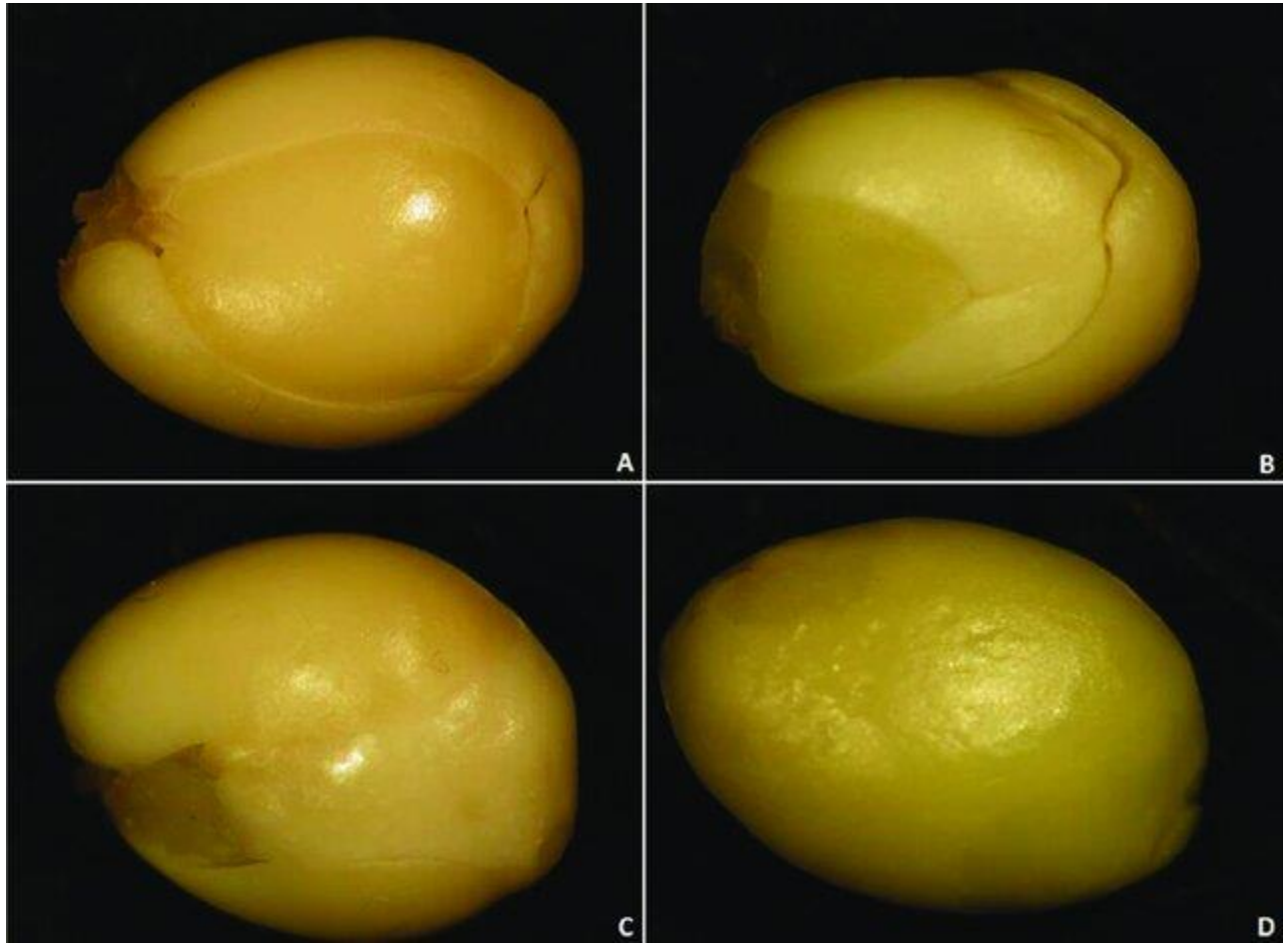
Mancha marrom de alternaria

- Objetivos

Alta heterozigosidade

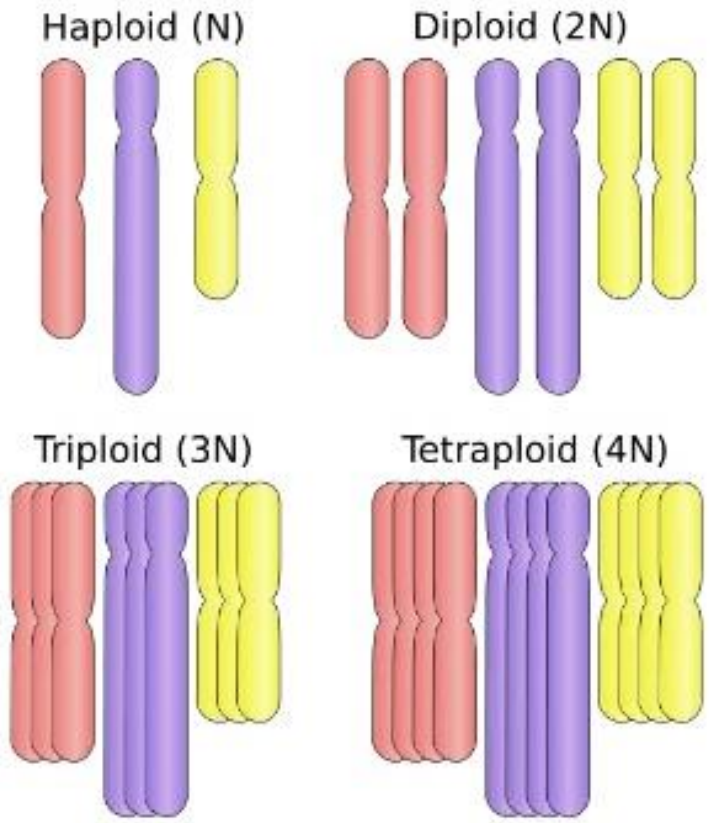


Apoximia e poliembrionia



Simsek et al. (2018)

Poliploidia



http://en.wikipedia.org/wiki/Polyploidy

NORWEGIAN SEQUENCING CENTRE

Incompatibilidade/esterilidade

1. Autoincompatibilidade
2. Esterilidade gamética absoluta
3. Esterilidade gamética feminina
4. Esterilidade zigótica

Período juvenil

Hibridação sexual controlada/híbridos naturais

Tangelo ‘Page’

Tangerina ‘Nova’

Mutações induzidas ou espontâneas

Laranja ‘Bahia’

Laranja ‘Pera’

Pomelo ‘Star Ruby’

Hibridação somática

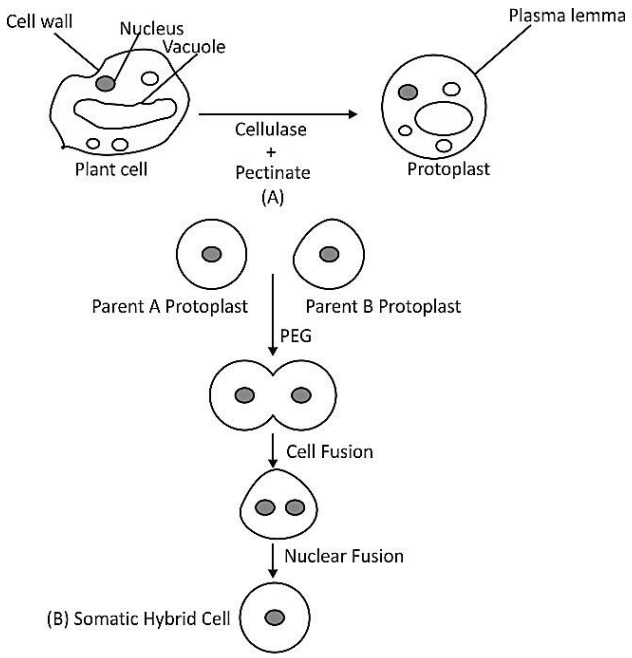


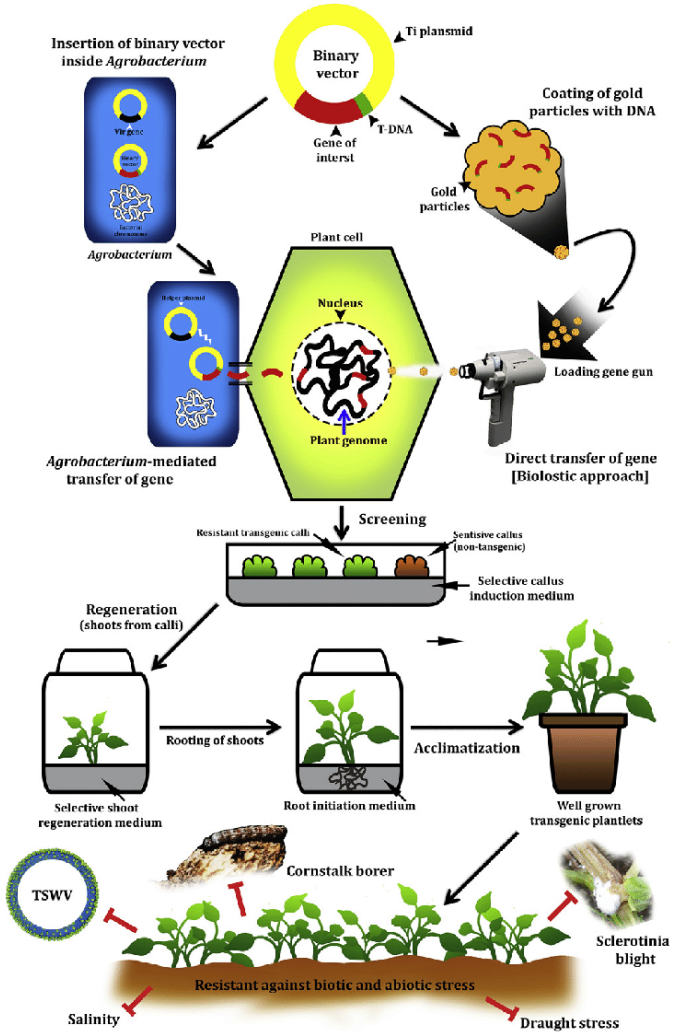
Fig. : Protoplast culture and somatic Hybridization

Mapeamento genético/seleção assistida por marcadores moleculares

Cromossomo

Marcador 1 Marcador 2 Marcador 3 Gene de interesse

Engenharia/Transformação genética



Scientia Agricola

Resistance and susceptibility of mandarins and their hybrids to *Alternaria alternata*

Camilla de Andrade Pacheco, Ivan Bortolato Martelli, Denis Augusto Polydoro, Evandro Henrique Schinor, Rose Mary Pio, Kátia Cristina Kupper, Fernando Alves de Azevedo*

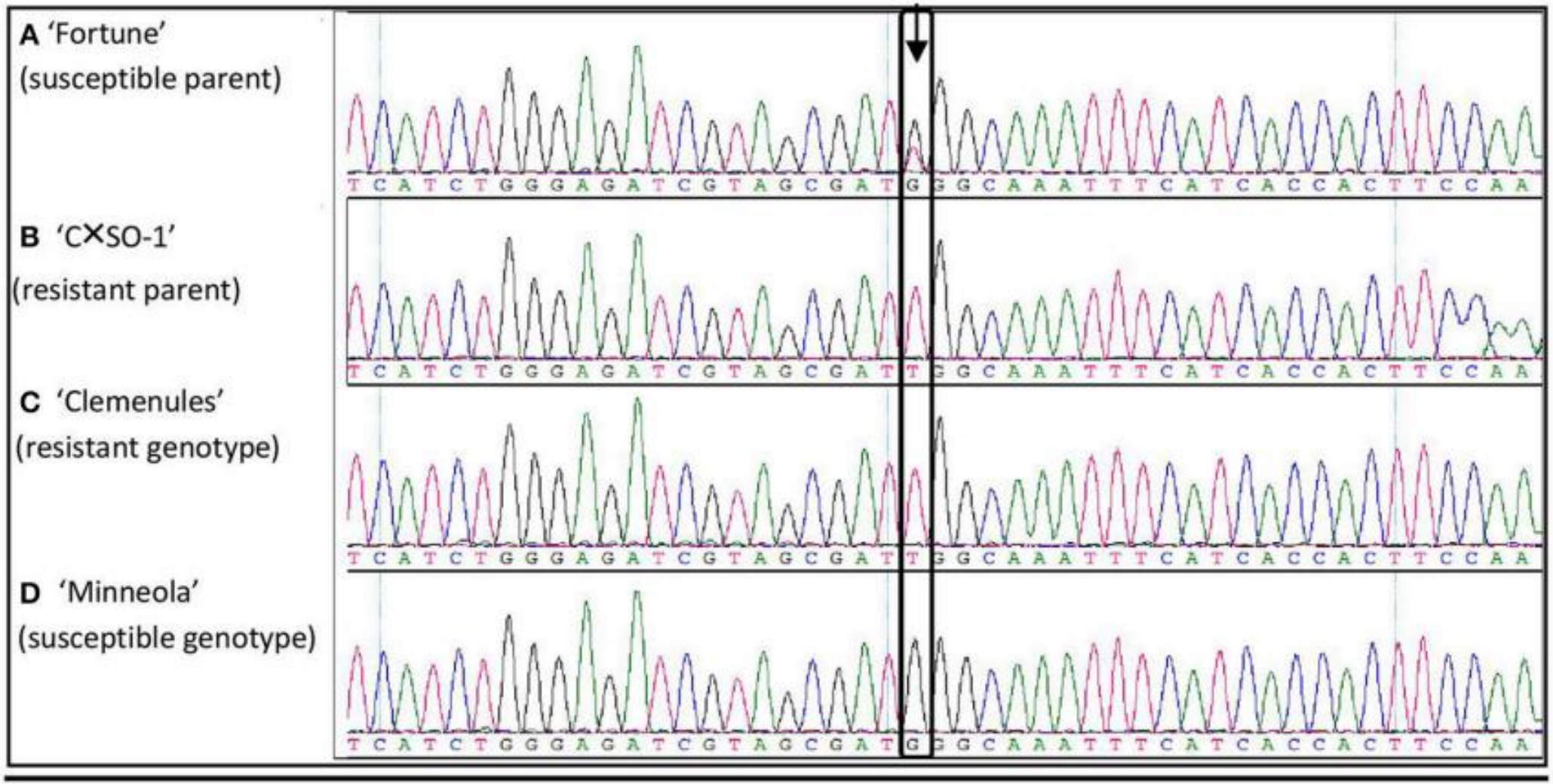


FIGURE 2 | Sequence alignment of four genotypes revealing the SNP08. (A) "Fortune"; **(B)** "CxS0-1"; **(C)** "Clemenules"; **(D)** "Minneola."

Cuenca et al. (2016)

Resistência

Varietal Susceptibility and number of blooms*		
Highly susceptible - lemons, limes, Navel, Natal, and Pera sweet oranges		
	Multiple	10
	Single	8
Moderately susceptible - Valencia orange, most tangelos		
	Multiple	10
	Single	5
Susceptible - early and mid-season oranges		
	Multiple	7
	Single	3
Tolerant - grapefruit		
	Multiple	3
	Single	1

* In the case of single blooms, points are added according to the number of declining trees in the grove: None, 0; few scattered, 1; more than 10%, 2.

Peres et al. (2002)

Resistência à Mancha Preta dos Citros Avaliada por Curvas de Progresso da Doença*

Marcel B. Spósito[1], Renato B. Bassanezi[1] & Lilian Amorim**[2]**

[1]Departamento Científico, Fundecitrus, Cx. Postal 391, CEP 14801-970, Araraquara, SP, e-mail: marcel@fundecitrus.com.br;
[2]Departamento de Entomologia, Fitopatologia e Zoologia Agrícola, ESALQ-USP, Cx. Postal 9, CEP 13418-900, Piracicaba, SP, e-mail: liamorim@esalq.usp.br

(Aceito para publicação em 17/06/2004)

HortScience 54(10):1673–1681. 2019. https://doi.org/10.21273/HORTSCI14200-19

Identification of Resistance to Citrus Black Spot Using a Novel In-field Inoculation Assay

Andrew K. Miles
Centre for Horticultural Science, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Ecosciences Precinct, 41 Boggo Road, Dutton Park, Brisbane, Queensland 4102, Australia

Malcolm W. Smith
Department of Agriculture & Fisheries, Bundaberg Research Station, 49 Ashfield Road, Bundaberg, Queensland 4670, Australia

Nga T. Tran and Timothy A. Shuey
Centre for Horticultural Science, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Ecosciences Precinct, 41 Boggo Road, Dutton Park, Brisbane, Queensland 4102, Australia

Megan M. Dewdney
Citrus Research and Education Centre, University of Florida, 700 Experiment Station Road, Lake Alfred, FL 33850-2243

André Drenth
Centre for Horticultural Science, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, Ecosciences Precinct, 41 Boggo Road, Dutton Park, Brisbane, Queensland 4102, Australia

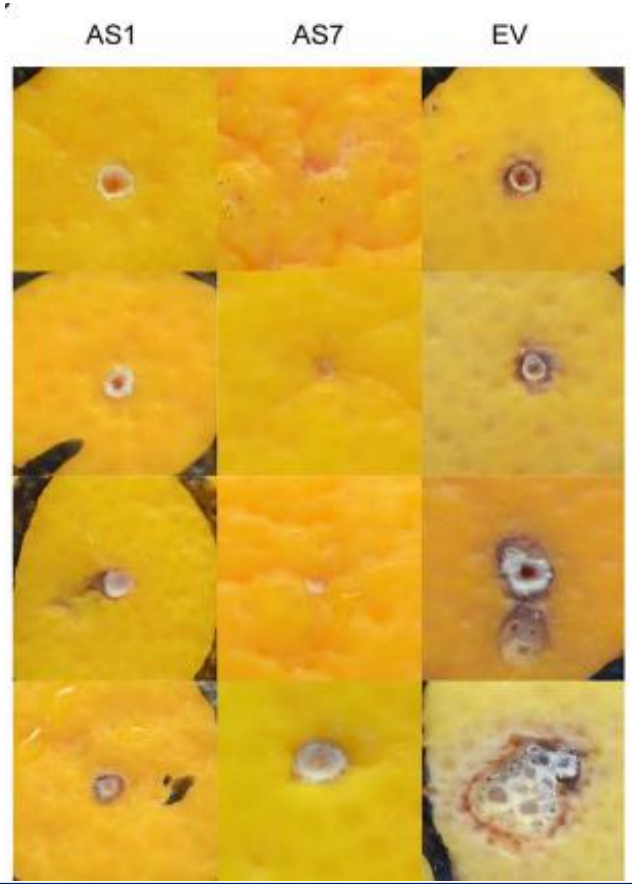
Additional index words. breeding, fruit, infection, *Guignardia*, pathology, *Phyllosticta citricarpa*

Molecular Plant Pathology

MOLECULAR PLANT PATHOLOGY (2018) 19(9), 2077–2093 DOI: 10.1111/mpp.12681

Engineering D-limonene synthase down-regulation in orange fruit induces resistance against the fungus *Phyllosticta citricarpa* through enhanced accumulation of monoterpene alcohols and activation of defence

ANA RODRÍGUEZ[1,2], VANESSA KAVA[3], LORENA LATORRE-GARCÍA[2], GERALDO J. DA SILVA JR.[1], ROSANA G. PEREIRA[1], CHIRLEI GLIENKE[3], LISANDRA S. FERREIRA-MABA[3], ANTONIO VICENT[4], TAKEHIKO SHIMADA[5] AND LEANDRO PEÑA[1,2,*]



Melhoramento para a pinta preta

Eur J Plant Pathol (2012) 133:391–404
DOI 10.1007/s10658-011-9912-1

Transgenic citrus expressing the antimicrobial gene *Attacin E* (*attE*) reduces the susceptibility of 'Duncan' grapefruit to the citrus scab caused by *Elsinoë fawcettii*

S. N. Mondal · M. Dutt · J. W. Grosser · M. M. Dewdney

Fig. 4 *Elsinoë fawcettii* pustules on A. the non-transformed control and B. the least susceptible transgenic line A-23 of 'Duncan' grapefruit 45 days post-inoculation under greenhouse conditions

Conclusões

- A restrição ao uso de fungicidas está aumentando ao longo do tempo

Obrigado!