PEPPER 2018

BRAZILIAN ORNAMENTAL PEPPER BREEDING PROGRAM

Elizanilda Ramalho do Rêgo
Universidade Federal da Paraíba
Paraíba State-Brazil

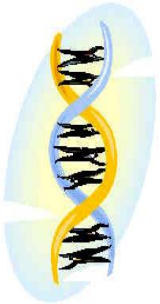
Summary

- Research timeline
- Brazilian Ornamental pepper uses and production
- Ornamental pepper breeding program
- Extension projects: production and processing (familiar small farmers)

Research timeline

- 1997 – Universidade Federal de Viçosa (UFV) – Minas Gerais - Brazil

2001 – Universidade Federal de Roraima (UFRR) – Roraima Brazil



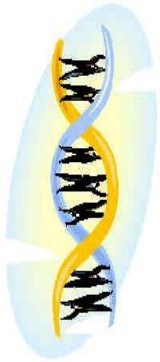
2006 - Universidade Federal da Paraíba (UFRR)

- *2007: Holambra producers with transport problems: breeding program consortium : Universities (UFV), MDA and producers*

Ornamental uses

Brazilian Production

- Brazil (north and northeast) by households and small farmers
- *For fresh market 280,000ton/year*
- The cultivated area equals 75.000ha with a 10 to 30 ton per ha yield.
- The most productive states are MG, GO, SP, CE and RS.



- The ornamental plants Market in Brazil moves R$7.2 billions in sales, using 15.000ha of cultivated area.
- (IBRAFLOR, 2017)

Veiling, located in Holambra-SP, is the biggest distributor of ornamental plants in Brazil.

Ornamental Pepper sales by Veiling - Holambra

Year	Vases sold	Unitary price	Total amount in sales	Loss
2009	1,008.315	R$ 1,41	R$1,425.205,34	5%
2010	1,111.730	R$ 1,61	R$1,784.604,40	5%
2011	1,366.396	R$ 1,84	R$2,519.505,84	2%
2012	1,643.444	R$ 1,68	R$2,768.522,82	3%
30/11/13	1,573.617	R$ 1,73	R$2,725.845,31	2%

How are they transported?

How are they transported?

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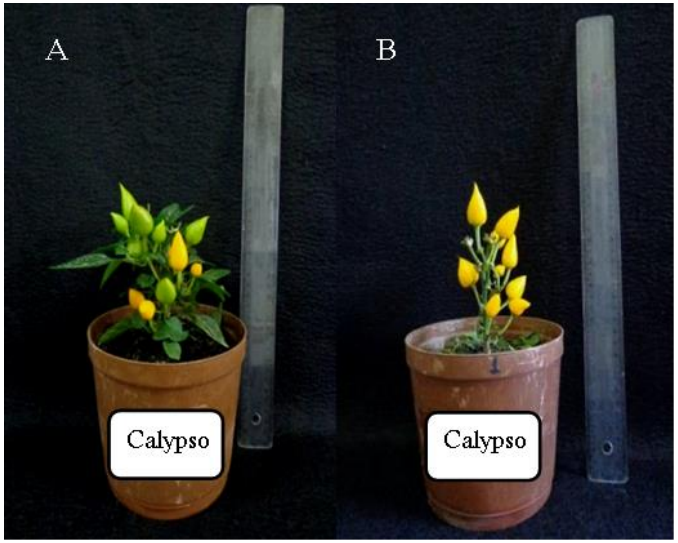
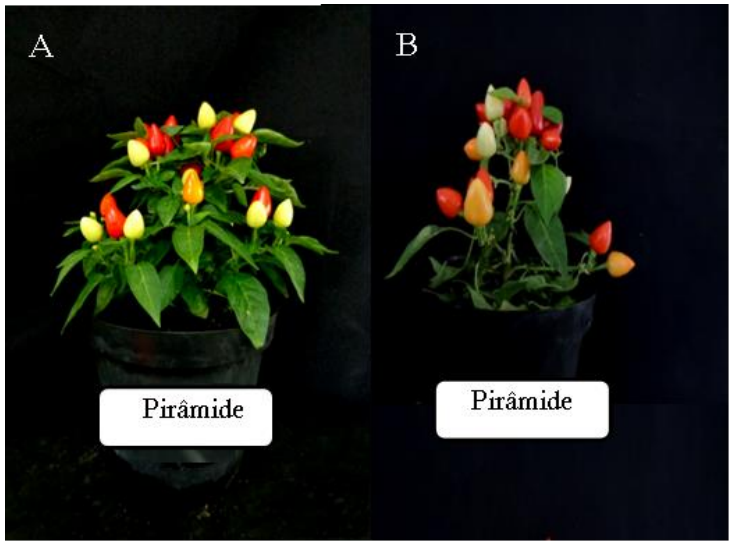
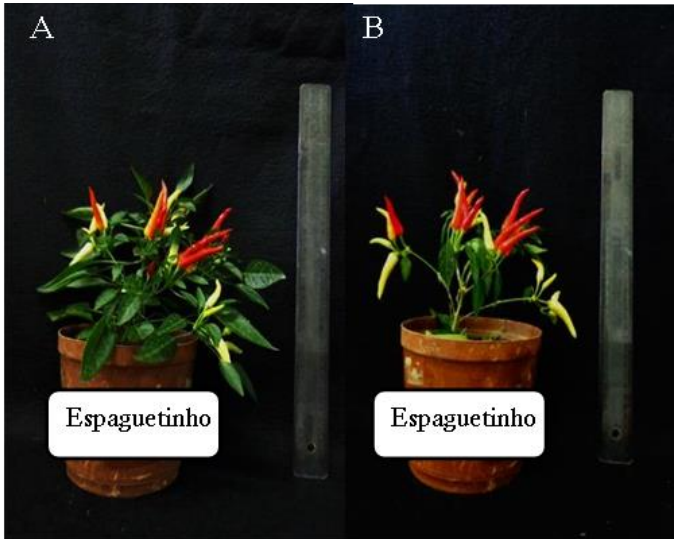
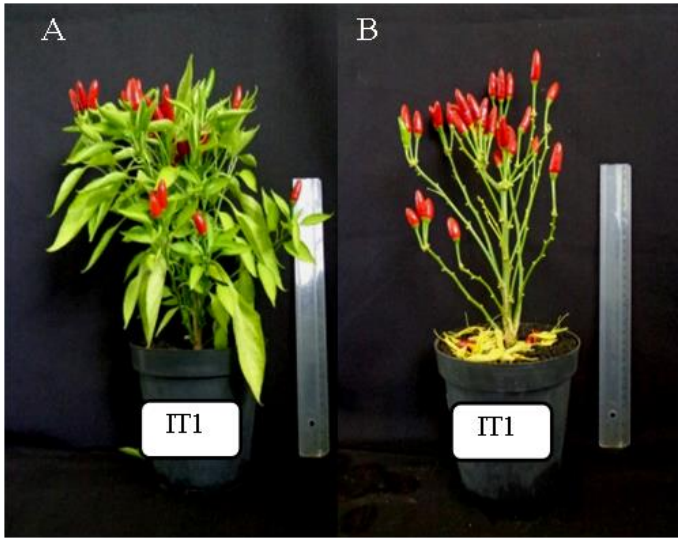
How do the pepper plants arrive at the supermarket?

How do the pepper plants arrive at the supermarket?

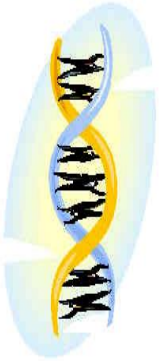








Which specie are better suited to be potted?



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different landraces of *C.frutescens* species

Como obter plantas de porte anão?

Growth and quality of potted ornamental peppers treated with paclobutrazol

Christiane de Fátima Martins França[1], Wellington Souto Ribeiro[2], Mirelle Nayana Sousa Santos[3], Kharen Priscilla de Oliveira Salomão Petrucci[4], Elizanilda Ramalho do Rêgo[5] and Fernando Luiz Finger[4]

Pesq. agropec. bras., Brasília, v.53, n.3, p.316-322, Mar. 2018
DOI: 10.1590/S0100-204X2018000300006

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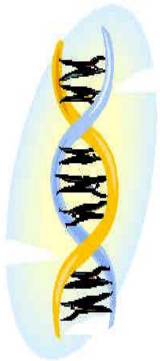
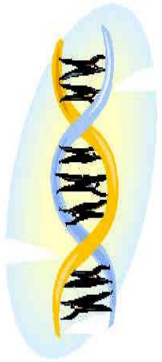
Objectives

- The aim of our consortium is to search for ethylene resistance and for new varieties to use as potted ornamental and transfer our results to small farmers of Brazilian Northeast region.

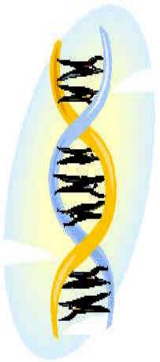


Objectives



- The goals of the ornamental pepper breeding program in Brazil are: 1) to evaluate, and to select breeding lines, and 2) to release new cultivars for small farmers.

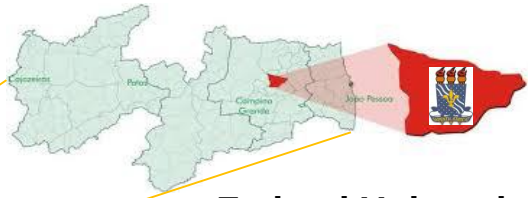
Material and methods



- The breeding program is divided in five basic steps:
- 1) Germplasm bank conservation and evaluation;
- 2) Mass selection;
- 3) Hybridization and evaluation of segregating populations and
- 4) Search for ethylene resistance in ornamental pepper.
- 5) Transfering the technology to small and family farmers

Material and Methods

Experimental Locations

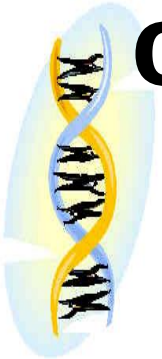


Federal University of Paraíba

Federal University of Viçosa

Results

1) Germplasm bank conservation and evaluation



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Results

Genet Resour Crop Evol (2011) 58:909–918
DOI 10.1007/s10722-010-9628-7

RESEARCH ARTICLE

Phenotypic diversity, correlation and importance of variables for fruit quality and yield traits in Brazilian peppers (*Capsicum baccatum*)

Elizanilda Ramalho do Rêgo · Mailson Monteiro do Rêgo · Cosme Damião Cruz · Fernando Luiz Finger · Vicente Wagner Dias Casali

Analysis of Divergence and Correlation of Quantitative Traits in Ornamental Pepper (*Capsicum* spp.)

M.M. Rêgo, M.J.L.C. Sapucay, E.R. Rêgo and E.R. Araújo

Proc. XXV[th] Int. Eucarpia Symp. – Section Ornamentals "Crossing Borders"
Eds.: J. Van Huylenbroeck and E. Dhooghe
Acta Hort. 1087, ISHS 2015

GMR 2018

Genetic diversity among accessions of *Capsicum annuum* L. through morphoagronomic characters

Angela Maria dos Santos Pessoa, Elizanilda Ramalho do Rêgo, Michelle Gonçalves de Carvalho, Cristine Agrin
Pereira dos Santos, Mailson Monteiro do Rêgo

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Results

In vitro conservation

Genet Mol Res. 2017 Sep 21;16(3). doi: 10.4238/gmr16038869.

Genetic effects of in vitro germination and plantlet development in chilli pepper.

Barroso PA[1], Rêgo MM[2], Rêgo ER[3], Ferreira KTC[3].

Effects of genotype and environment on in vitro seed germination and plantlet development of *Capsicum* spp.

Authors: G.P.S.S. Vasconcelos, E.R. do Rêgo, M.S. Cruz, M.M. do Rêgo, E.U. Alves, R.A. Bruno
Keywords: abiotic stress, chilli peppers, water deficit, genetic variability
DOI: 10.17660/ActaHortic.2018.1204.32

Results

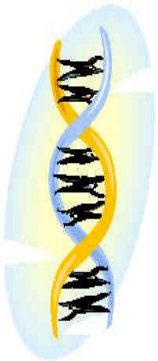
Naturals and induced mutants

Ethyl Methanesulfonate in the Generation of Genetic Variability in *Capsicum*

K.S. Nascimento, M.M. Rêgo, A.M.M. Nascimento and E.R. Rêgo

Proc. XXVth Int. Eucarpia Symp. – Section Ornamentals
"Crossing Borders"
Eds.: J. Van Huylenbroeck and E. Dhooghe
Acta Hort. 1087, ISHS 2015

Results



2) Mass selection

Results

Plants (A) fruits and flowers (B) of new cultivar Elizas' rainbow (UFPB 1).

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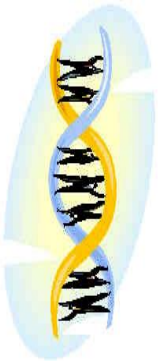
Results

Elizas' Rainbow (purple fruits). Commercial cultivar Calypso (yellow fruits).

Results



3) Hybridization and evaluation of segregating populations

Results

Euphytica
DOI 10.1007/s10681-009-9947-y

A diallel study of yield components and fruit quality in chilli pepper (*Capsicum baccatum*)

Elizanilda Ramalho do Rêgo · Mailson Monteiro do Rêgo · Fernando Luiz Finger · Cosme Damião Cruz · Vicente Wagner Dias Casali

Combining ability for yield and fruit quality in the pepper *Capsicum annuum*

N.F.F. do Nascimento[1], E.R. do Rêgo[2], M.F. Nascimento[1], C.H. Bruckner[1], F.L. Finger[1] and M.M. do Rêgo[2]

Genetics and Molecular Research 13 (2): 3237-3249 (2014)

Epistasis and inheritance of plant habit and fruit quality traits in ornamental pepper (*Capsicum annuum* L.)

R.M.C. Santos[1], E.R. do Rêgo[2], A. Borém[3], M.F. Nascimento[1], N.F.F. Nascimento[1], F.L. Finger[3] and M.M. Rêgo[2]

Genetics and Molecular Research 13 (4): 8876-8887 (2014)

Heritability and Genetic Parameters for Size-Related Traits in Ornamental Pepper (*Capsicum annuum* L.)

F.L.G. Fortunato, E.R. Rêgo, M.M. Rêgo, C.A. Pereira dos Santos and M. Gonçalves de Carvalho

Proc. XXV[th] Int. Eucarpia Symp. – Section Ornamentals "Crossing Borders"
Eds.: J. Van Huylenbroeck and E. Dhooghe
Acta Hort. 1087, ISHS 2015

Breeding by hybridization

✓ Three-way hybrids

HS1 x L1

HS2 x L3

L2 x HS2

HS2 x L4

Breeding by hybridization

- ✓ **Double hybrids**

HS1 x HS2

Breeding by hybridization

✓ **One –way Hybrids** .

L1 x L2

L3 x L2

L3 x L4

L2 x L4

Flower Color Variability in Double and Three-Way Hybrids of Ornamental Peppers

N.F.F. Nascimento, M.F. Nascimento, R.M.C. Santos, C.H. Bruckner and F.L. Finger

E.R. Rêgo and M.M. Rêgo

Proc. VIIth IS on New Floricultural Crops
Eds.: G. Facciuto and M.I. Sánchez
Acta Hort. 1000, ISHS 2013

Ornamental Pepper Breeding: Could a Chili be a Flower Ornamental Plant?

R.M.C. Santos, N.F.F. Nascimento, A. Borém, F.L. Finger, G.C. Carvalho, M.F. Nascimento and R.C. Lemos

E.R. Rêgo and M.M. Rêgo

Proc. VIIth IS on New Floricultural Crops
Eds.: G. Facciuto and M.I. Sánchez
Acta Hort. 1000, ISHS 2013

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Genetic Diversity and Importance of Morpho-Agronomic Traits in a Segregating F_2 Population of Ornamental Pepper

A.M. dos S. Pessoa, E.R. Rêgo, P.A. Barroso and M.M. Rêgo

Proc. XXV[th] Int. Eucarpia Symp. – Section Ornamentals
"Crossing Borders"
Eds.: J. Van Huylenbroeck and E. Dhooghe
Acta Hort. 1087, ISHS 2015

Revista Agropecuária Técnica
ISSN 0100-7467 (impresso); ISSN 2525-8990 (online)

CRISPIM, JG; RÊGO, ER; RÊGO, MM; NASCIMENTO, NFF; BARROSO, PA. 2017. Stigma receptivity and anther dehiscence in ornamental pepper. *Horticultura Brasileira* 35: 609-612. DOI - http://dx.doi.org/10.1590/S0102-053620170421

Stigma receptivity and anther dehiscence in ornamental pepper

Joelson Germano Crispim[1]; Elizanilda R Rêgo[2]; Mailson M Rêgo[2]; Naysa Flávia F Nascimento[2]; Priscila A Barroso[3]

Inheritance of flower traits in ornamental pepper[1]

Angela Maria dos Santos Pessoa[2]; Elizanilda Ramalho do Rêgo[3]; Cristine Agrine Pereira dos Santos[4]; Michelle Gonçalves de Carvalho[5]; Júlio Carlos Polimeni de Mesquita[6]; Mailson Monteiro do Rêgo[7]

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Heritability and Variability of Morphological Traits in a Segregating Generation of Ornamental Pepper

N.F.F. Nascimento[1], E.R. Rêgo[2,a], M.F. Nascimento[1], F.L. Finger[3], C.H. Bruckner[3], J.J. Silva Neto[2] and M.M. Rêgo[2]

Proc. 24th Int. Eucarpia Symp. Section Ornamentals
"Ornamental Breeding Worldwide"
Ed.: T. Orlikowska
Acta Hort. 953, ISHS 2012

Phenotypic Variability and Importance of Characters in a F_2 Segregating Generation of Ornamental Chili (*Capsicum annuum*)

E.R. Rêgo and M.M. Rêgo

F.L. Finger, N.F.F. Nascimento,
M.F. Nascimento and R.M. Cortez dos Santos

Proc. VIIth IS on New Floricultural Crops
Eds.: G. Facciuto and M.I. Sánchez
Acta Hort. 1000, ISHS 2013

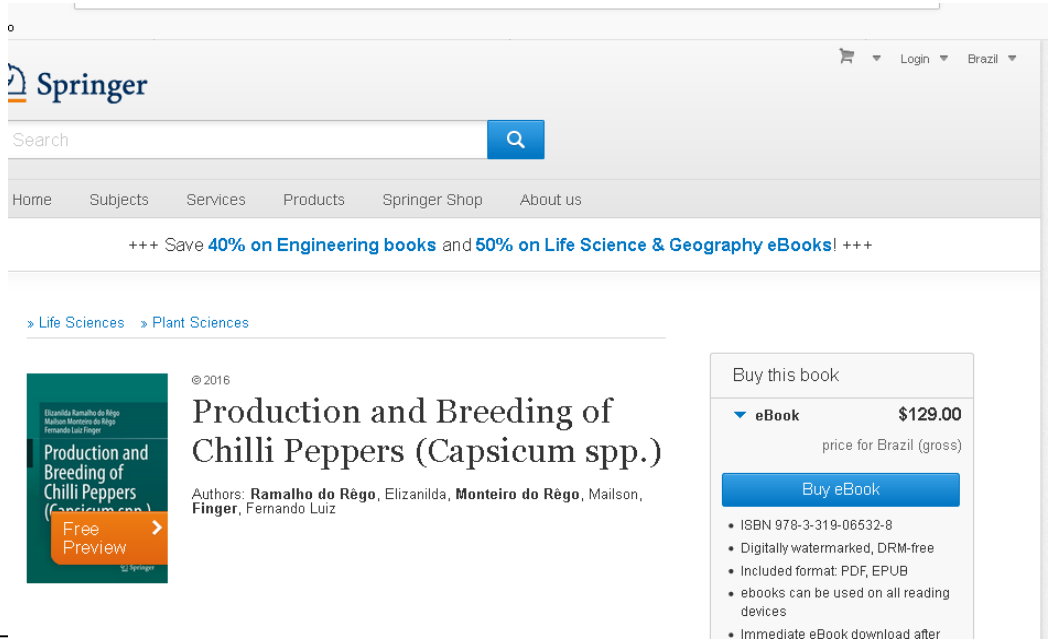
Correlation network analysis between phenotypic and genotypic traits of chili pepper

Anderson Rodrigo da Silva(1), Elizanilda Ramalho do Rêgo(2), Angela Maria dos Santos Pessoa(2) and Maílson Monteiro do Rêgo(2)

Pesq. agropec. bras., Brasília, v.51, n.4, p.372-377, abr. 2016
DOI: 10.1590/S0100-204X2016000400010

New cultivar: Ouro negro

4) Search for ethylene resistance in ornamental pepper



Material and methods

Five generations (parents, F1, F2, BC1 and BC2) were treated for 6 hours with 10 µL L^{-1} ethylene for 48 hours.

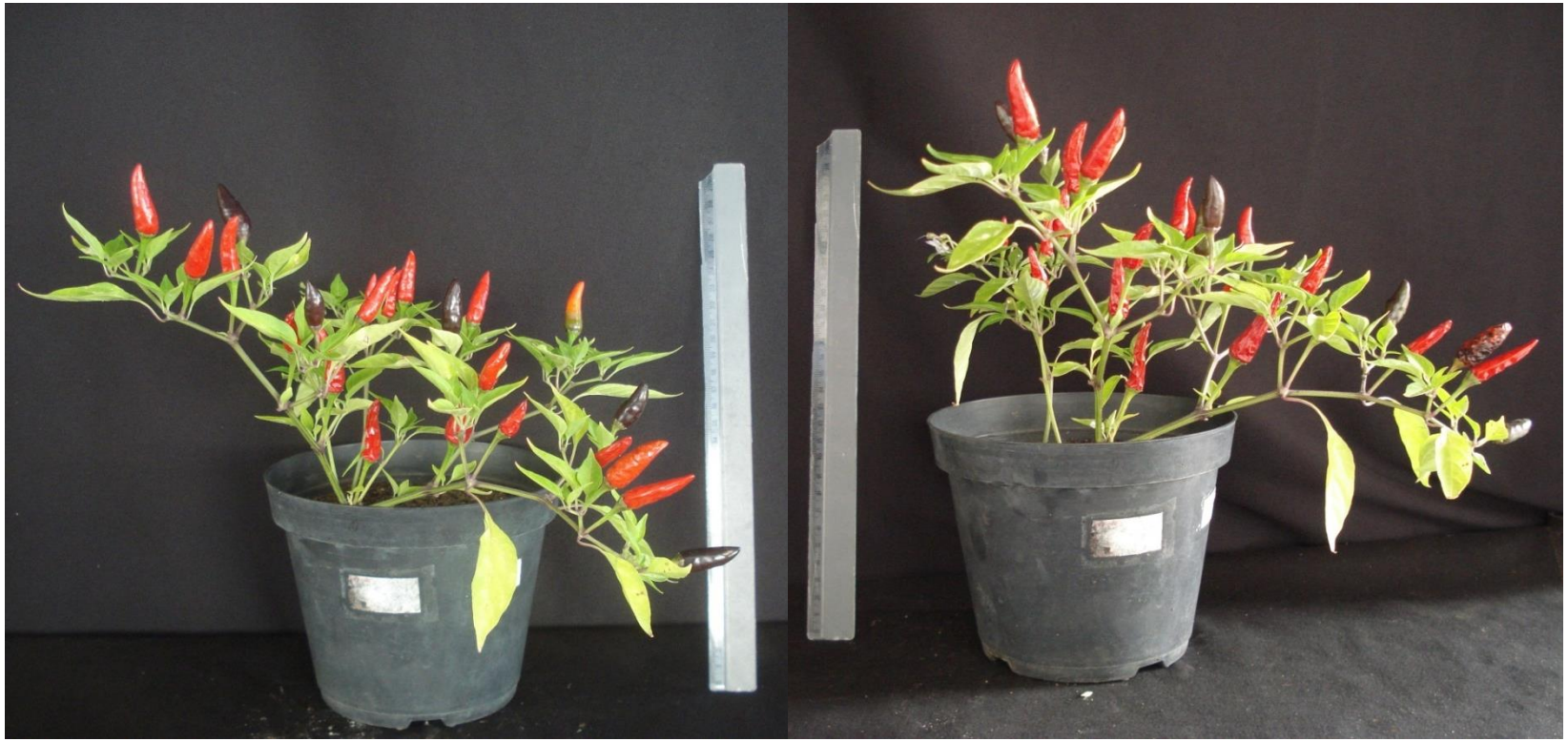
Heritability for leaf and fruit abscission, allelic and genic effects and correlation with morphoagronomic traits were determined.

Parents

P1 - susceptible

P2 - Resistant

Hybrid



Before

After

BC1

Before **After**

BC2

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Results

Broad sense heritability (H^2_b), narrow sense heritability (H^2_n), allelic interaction and genic interaction for leaf and fruit abscission in ornamental peppers

Trait	H^2_b	H^2_n	Allelic interaction	Genic Interactions
Leaf abscission	98.57	0.01	Overdominance	**
Fruit abscission	99.62	95.00	Additive	ns

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Results

Correlation among leaf abscission and morphoagronomic traits

Trait	Leaf abscission	H^2_b	H^2_n
Anther length	0.95*	0.36	0.13
Major fruit diameter	0.98*	0.84	0.75
Pedicel length	0.95*	0.80	0.62
Pericarp thickness	0.95*	0.86	0.66
Dry matter content	0.96*	0.71	0.71

Correlation between morphoagronomic traits and resistance to ethylene action in ornamental peppers

Mayana F Nascimento[1]; Elizanilda R Rêgo[2]; Naysa FF Nascimento[1]; Rusthon MC Santos[1]; Claudio H Bruckner[1]; Fernando L Finger[1]; Mailson M Rêgo[2]

Hortic. bras., v. 33, n. 2, abr. - jun. 2015

Ethylene Resistance in a F_2 Population of Ornamental Chili Pepper (*Capsicum annuum*)

R.M.C. Santos, M.F. Nascimento, N.F.F. Nascimento, A. Borém, F.L. Finger and D.S. Costa
Universidade Federal de Viçosa, MG
Brazil

E.R. Rêgo and M.M. Rêgo
Centro de Ciências Agrárias
Universidade Federal da Paraíba
Brazil

Proc. VIIth IS on New Floricultural Crops
Eds.: G. Facciuto and M.I. Sánchez
Acta Hort. 1000, ISHS 2013

Results

Cut stem bouquet

Results

Cut stem bouquet

Results

Cut stem bouquet

Rural extension meetings: pepper production and processing

Open field production: ADESMAF

CNPq

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II wokshop of ornamental plants

Rural settlings Senhor do Bonfim and Santa Terezinha

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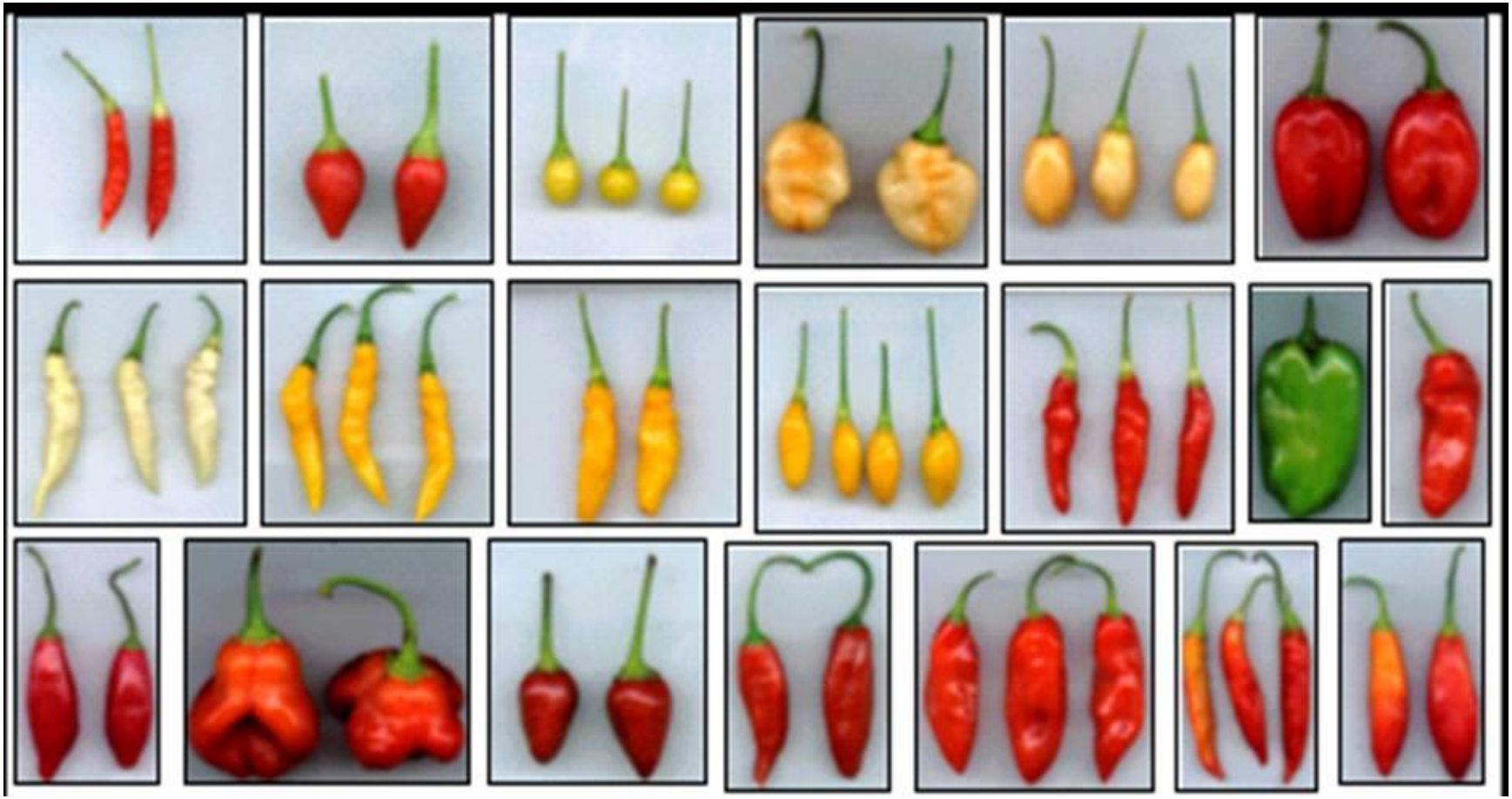
Seedling production

Fruit diversity



Fruit diversity

Fruit diversity

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Processing classes

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IV workshop of ornamental plants




School visits to the greenhouses at ufpb




Conclusions

- The great variability among the evaluated materials can be used in Brazilian Breeding Program.

- The knowledge of inheritance of the evaluated traits is necessary to choose an adequate breeding strategy.

- The breeding program gave an unique opportunity for better training of undergraduate, graduate and post-graduate students (new breeders) in Genetics and Plant Breeding

- The consortium has been improving the life quality of small farmers

PRODUÇÃO, GENÉTICA E MELHORAMENTO DE PIMENTAS (CAPSICUM SPP.)

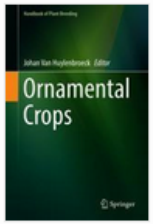
Elizanilda Ramalho do Rêgo, Fernando Luiz Finger e Mailson Monteiro do Rêgo

Páginas	223
ISBN	9788564778009
Formato	14x22
Assunto	Agropecuária, Genética e Melhoramentos
Ano	2011
Editora	CNPQ
Código	31224
Preço	25,00

R$ 25,00

Production and Breeding of Chilli Peppers (Capsicum spp.)

Authors: **Ramalho do Rêgo**, Elizanilda, **Monteiro do Rêgo**, Mailson, **Finger**, Fernando Luiz



Ornamental Crops pp 529-565 | Cite as

Ornamental Pepper

Authors Authors and affiliations

Elizanilda Ramalho do Rêgo ✉, Mailson Monteiro do Rêgo

Chapter
First Online: 26 July 2018

Part of the Handbook of Plant Breeding book series (HBPB, volume 11)

Abstract

The sale of ornamental pepper is an important source of income to agricultural populations. Their use for decoration and for consumption adds value to this product, increasing the financial return to the producer. Peppers' fruits are considered to be a good source of various

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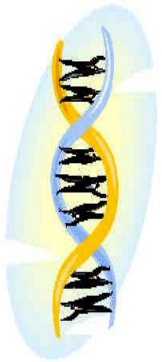
Team

- **UFPB:**
- **Elizanilda Ramalho do Rêgo - pesquisadora**
- **Mailson Monteiro do Rêgo - pesquisador**
- **Angela Maria dos Santos Pessoa – Pós - Doutoranda Agronomia**
- **João Felipe – Graduate Student (Agronomy)**



- **Nardiele Freitas – Graduate Student (Agronomy)**
- **Priscila Duarte – Graduate Student (Agronomy)**
- **Vaneilson de Araújo – Graduate Student (Agronomy)**
- **Manoel Junior – – Magister Science Student (Agronomy)**
- **Kaline Nascimento - PhD Student (Agronomy)**
- **Michelle Gonçalves de Carvalho - PhD Student (Agronomy)**

- **Geovana Silva- PhD Student (Agronomy)**
- **KadsonFrutuoso - PhD Student (Agronomy)**
- **Marcelo Cruz - PhD Student (Agronomy)**

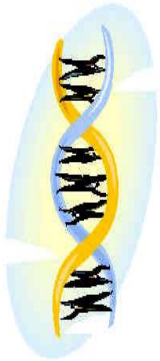
Team

Federal University of Viçosa

Fernando Luiz Finger – Researcher

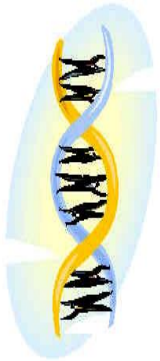
Christiane Martins – PhD Student (Agronomy)

Mayana Ferreira Nascimento – PhD Student (Genetics and Plant Breeding)



Contact info

- **UFPB:**
- **elizanilda@cca.ufpb.br**



- **mailson@cca.ufpb.br**
- **UFV**

- **ffinger@ufv.br**

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Thanks for your attention!!!!!

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Introduction

Important plant characteristics of ornamental peppers

✓ Be able to grow in small pots (less than 1 L of volume)

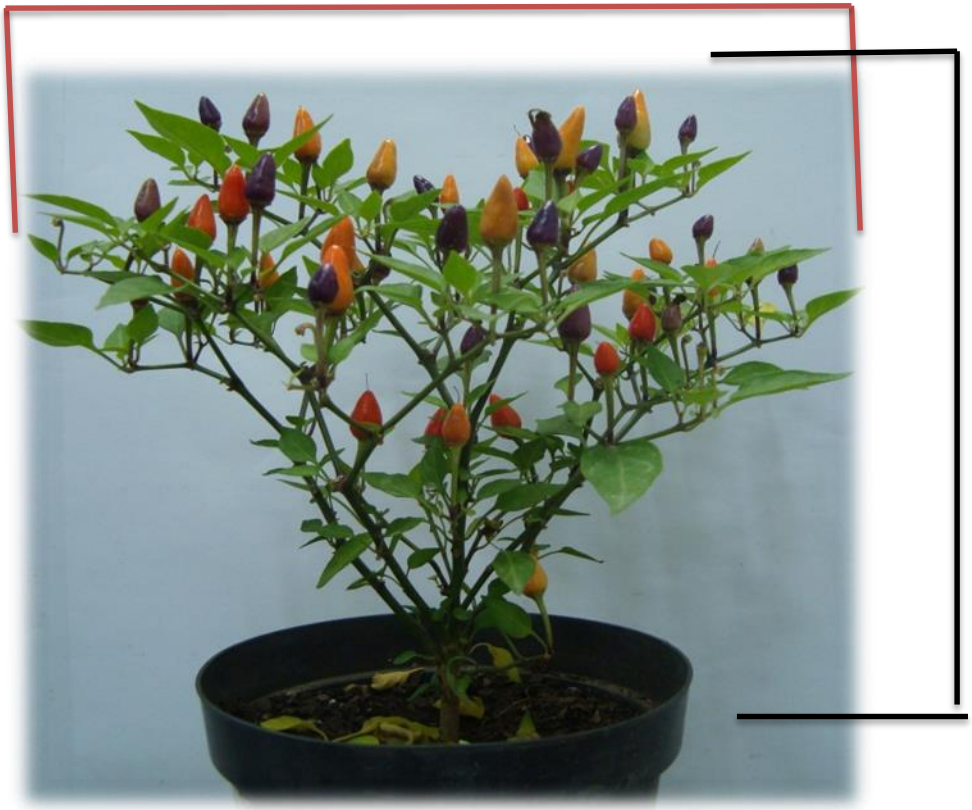
✓ Short internodes

✓ Circular and dense canopy

✓ Colorful and erect fruits

Elevated post-production shelf life – resistent to senescence inducing fators

Introduction



Potted Ornamental Plant Ideotype