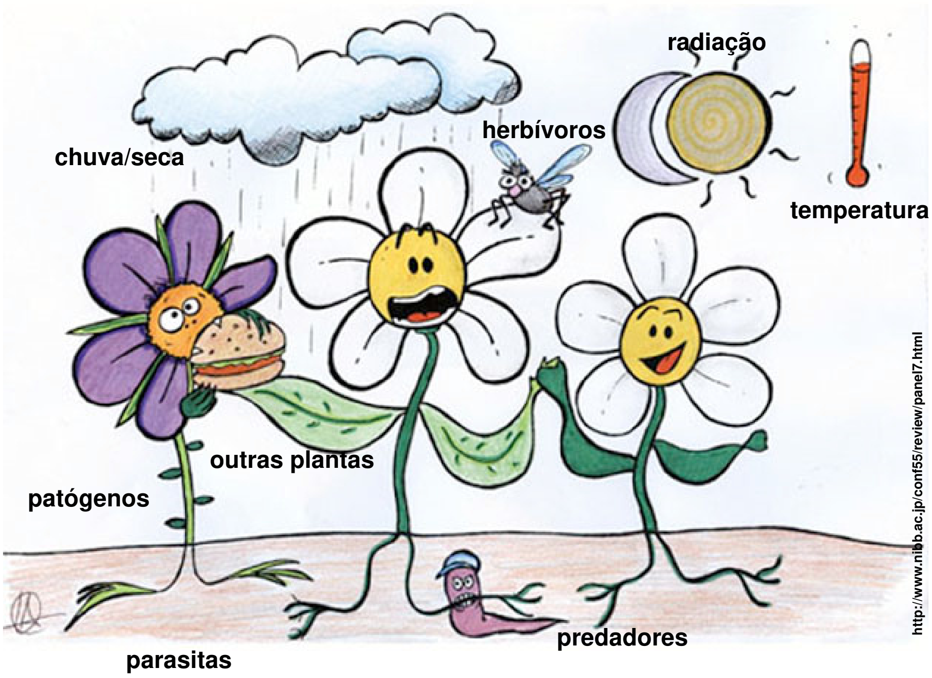
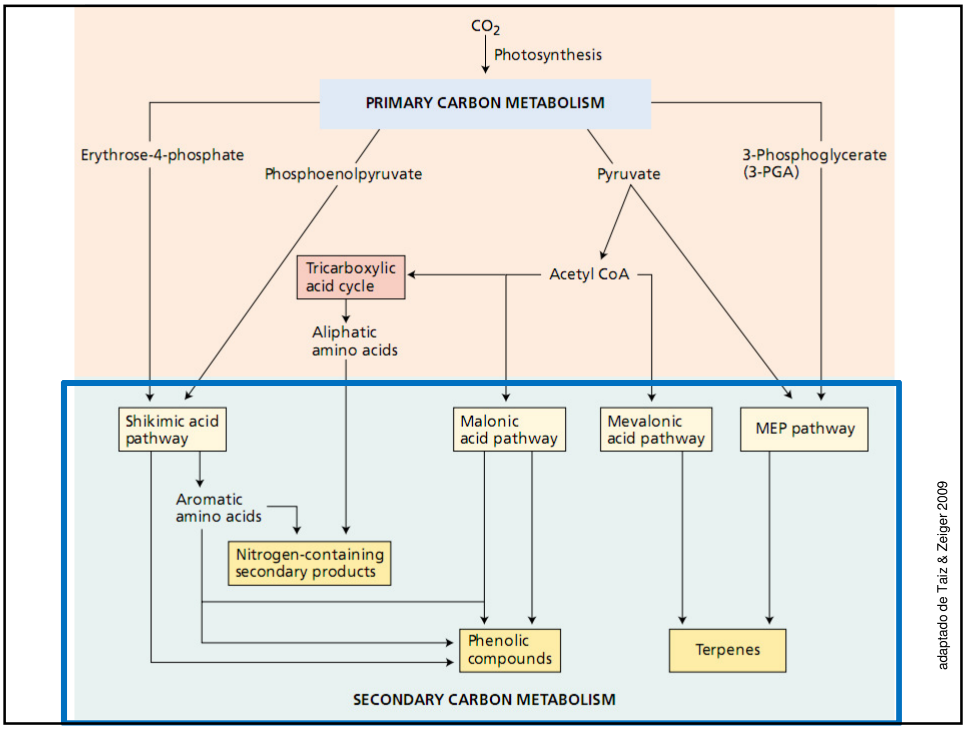
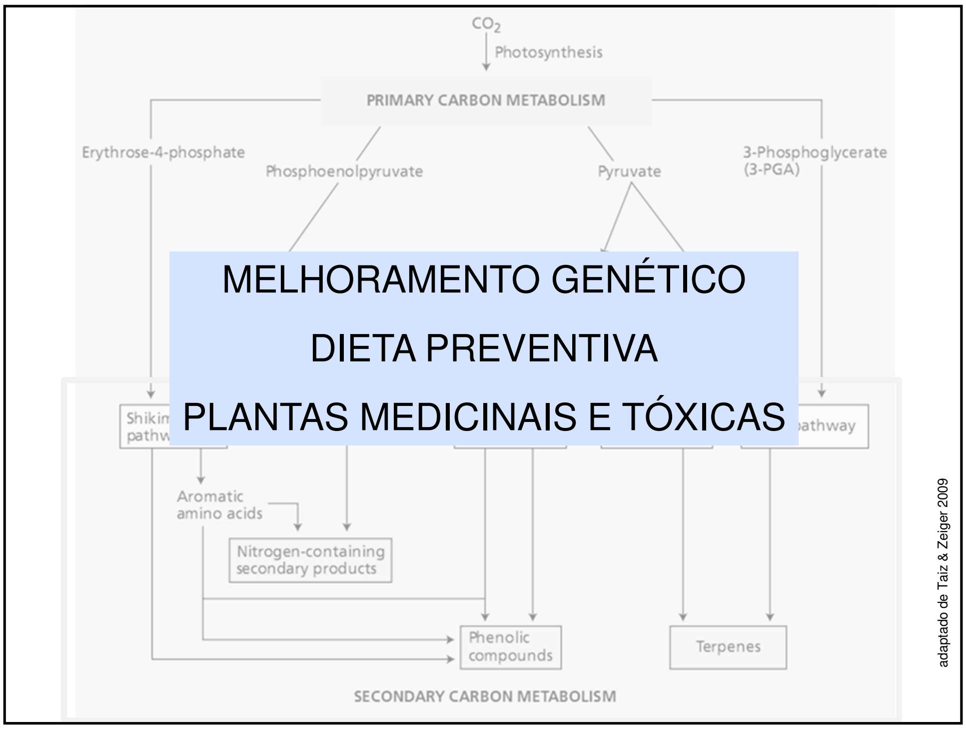
Interações planta-ambiente/herbívoros: aspectos econômicos e ecológicos

Déborah
dyacsan@ib.usp.br




CO2
Photosynthesis
PRIMARY CARBON METABOLISM
Erythrose-4-phosphate
Phosphoenolpyruvate
Pyruvate
3-Phosphoglycerate (3-PGA)
Tricarboxylic acid cycle
Acetyl CoA
Aliphatic amino acids
Shikimic acid pathway
Malonic acid pathway
Mevalonic acid pathway
MEP pathway
Aromatic amino acids
Nitrogen-containing secondary products
Phenolic compounds
Terpenes
SECONDARY CARBON METABOLISM
adaptado de Taiz & Zeiger 2009


MELHORAMENTO GENÉTICO
DIETA PREVENTIVA
PLANTAS MEDICINAIS E TÓXICAS
CO2
Photosynthesis
PRIMARY CARBON METABOLISM
Erythrose-4-phosphate
Phosphoenolpyruvate
Pyruvate
3-Phosphoglycerate (3-PGA)
Aromatic amino acids
Nitrogen-containing secondary products
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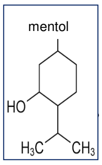
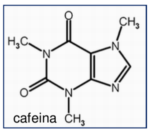
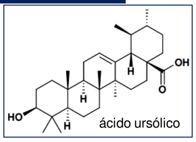
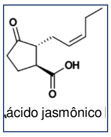
Terpenes
SECONDARY CARBON METABOLISM
adaptado de Taiz & Zeiger 2009

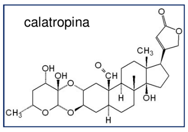




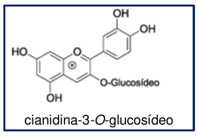
METABÓLITOS SECUNDÁRIOS



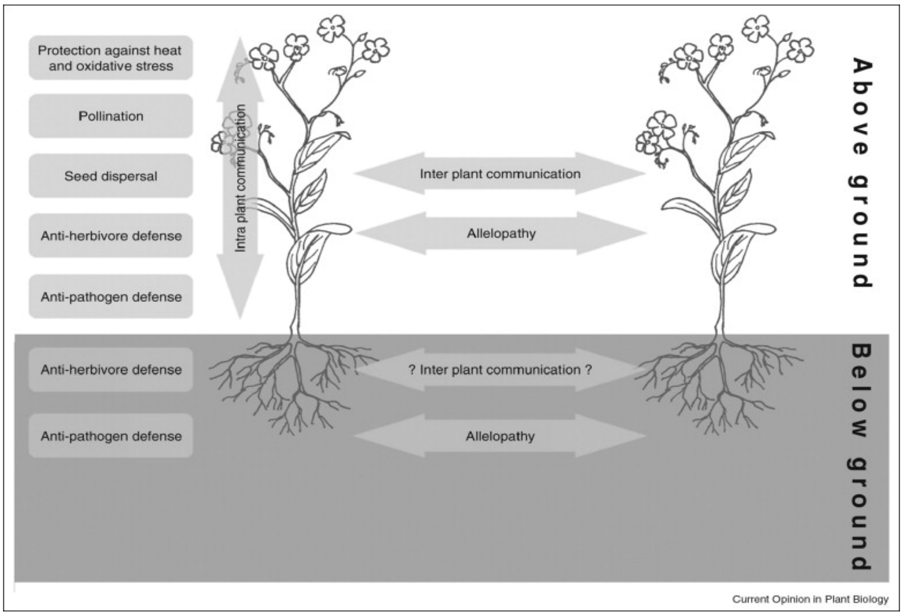




- Promovem proteção contra herbívoros (insetos) como dissuasores alimentares, redutores de crescimento, toxinas, etc
- Interferência bioquímica com outras plantas - alelopatia
- Proporciona proteção contra patógenos (fungos) - fitoalexinas
- Podem servir como sinalisadores para nodulação em leguminosas e para polinizadores
- ….



Metabólitos secundários são substâncias que NÃO participam dos processos de formação de protoplasto e geração de energia; são MEDIADORES em processos de interação das plantas com o ambiente; NÃO são UNIVERSAIS; apresentam ampla diversidade estrutural.



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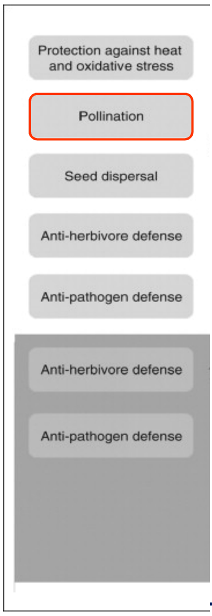


INTERAÇÕES COM FATORES BIÓTICOS

Sybille B Unsicker , Grit Kunert , Jonathan Gershenzon. 2009. Protective perfumes: the role of vegetative volatiles in plant defense against herbivores. **Current Opinion in Plant Biology** 12(4): 479 – 485.

POLINIZAÇÃO

✓relação benéfica aos dois envolvidos: animal – néctar e pólen; planta – transferência do pólen;

✓a reprodução sexuada nas plantas envolve a polinização;

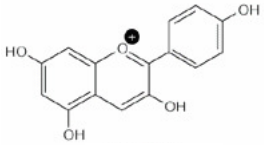
✓a polinização, em especial a cruzada, amplia e garante a variabilidade genética dos vegetais;

✓a relação entre o agente polinizador e a planta pode ser generalista ou especialista;

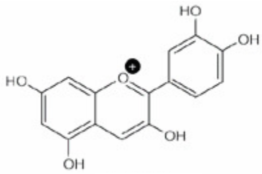
✓os agentes polinizadores mais abundantes em angiospermas são os insetos.

Como os metabólitos secundários estão envolvidos no processo de polinização?

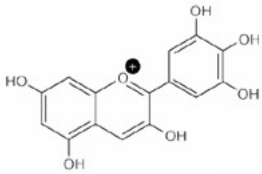
COR



pelargonidina



cianidina



delfinidina

Pelargonium (Geranium)

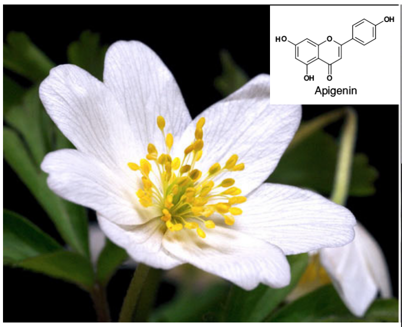
Rosa (Rose)

Delphinium (Larkspur)

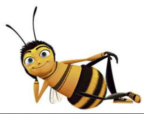
BIB 143 – Recursos Econômicos Vegetais 2023

COR

visão humana



visão abelha



http://www.dailymail.co.uk/sciencetech/article-473897/A-bees-eye-view-How-insects-flowers-differently-us.html

Como os metabólitos secundários estão envolvidos no processo de polinização?

ODOR

Available online at www.sciencedirect.com
ScienceDirect
South African Journal of Botany 76 (2010) 796–807
SOUTH AFRICAN JOURNAL OF BOTANY
www.elsevier.com/locate/sajb

Convergent evolution of carrion and faecal scent mimicry in fly-pollinated angiosperm flowers and a stinkhorn fungus

S.D. Johnson *, A. Jürgens

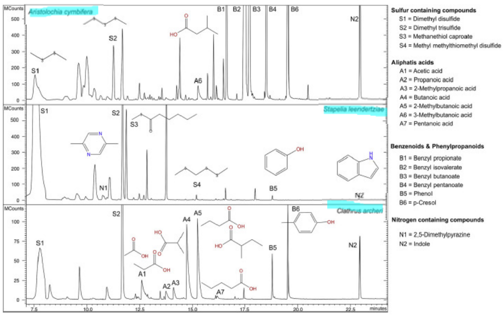
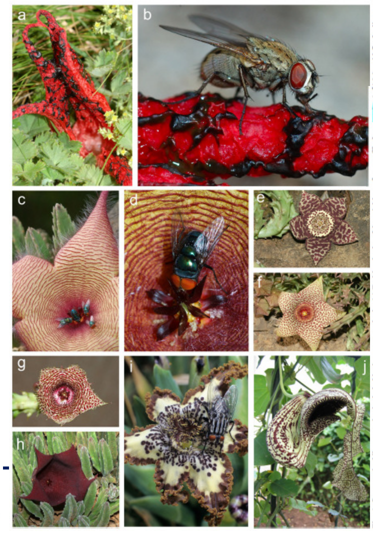


Fig. 2. Chromatograms of the volatile compounds emitted by *Aristolochia cymbifera*, *Stapelia leendertziae*, and *Clathrus archeri*. Chemical structures shown for compounds with pungent odours.



Ecological Economics 71 (2011) 80–88
Contents lists available at SciVerse ScienceDirect
Ecological Economics
journal homepage: www.elsevier.com/locate/ecolecon

Analysis

Valuing pollination services to agriculture

Rachael Winfree [a,*,1], Brian J. Gross [b,1], Claire Kremen [c]
[a] Department of Entomology, 93 Lipman Dr., Rutgers University, New Brunswick, NJ 08901, USA
[b] Food and Resource Economics, University of British Columbia, Vancouver, Canada, BC V6T1Z4
[c] Department of Environmental Science, Policy and Management, University of California, Berkeley, Berkeley, CA 94720, USA

A polinização por animais em culturas é um importante **serviço ecossistêmico**!

✓ Cerca de 35% da produção global de alimento depende de agente polinizador

✓Abelhas (Hymenoptera: Apiformes) - *Apis mellifera* ☠

✓17.000 espécies de abelhas nativas: café, melão, tomate, canola, girassol

Abelhas **prestando** serviços

Falta polinizador? Alugue uma colmeia. O negócio é indispensável para a produção de alguns alimentos, como maçãs e melões

O valor econômico da **polinização**

O trabalho das abelhas e de outros polinizadores melhora a qualidade e aumenta a produção agrícola

As sete culturas

De 2010 a 2015, o Projeto Polinizadores do Brasil estudou sete culturas para analisar o aumento da qualidade e da produtividade relacionadas à polinização

Fonte: Projeto Polinizadores do Brasil

Algodão	Caju	Canola	Castanha	Maçã	Melão	Tomate
Aumento de **12% a 16%** no peso da fibra e de **17%** de sementes por fruto	Cultivos **a no máximo 1 quilômetro** de mata têm produtividade superior aos de áreas distantes	A abelha africanizada (*Apis mellifera*) pode aumentar **em 17% a 30%** a produtividade de grãos	Grandes abelhas nativas são as principais polinizadoras. **Sem polinização a árvore não frutifica**	O uso de abelhas sem ferrão em conjunto com as africanizadas resultou em **produção 44% maior de frutos e 67% de sementes**	Aumento **de até 15% na produtividade e 50% na qualidade** do fruto	A frutificação sobe até **12%**, os tomates pesam até **41% a mais** e geram **11%** mais sementes

- Protection against heat and oxidative stress
- Pollination
- Seed dispersal
- Anti-herbivore defense
- Anti-pathogen defense
- Anti-herbivore defense
- Anti-pathogen defense

Braz. J. Plant Physiol., 14(2):71-81, 2002

MINIREVIEW

Plant-insect interactions: an evolutionary arms race between two distinct defense mechanisms

Marcia O. Mello and Marcio C. Silva-Filho*

Teoria da Coevolução

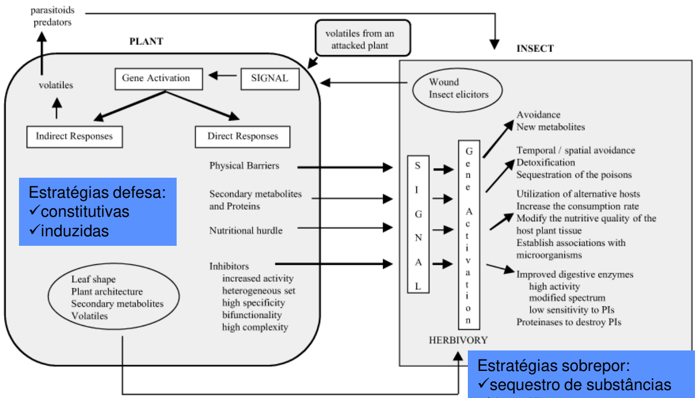


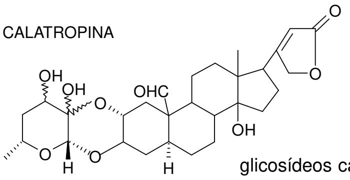
Figure 1. Interactions between plants and insects.

Estratégias defesa:
✓constitutivas
✓induzidas

Estratégias sobrepor:
✓sequestro de substâncias
✓detoxificação
✓assoc com microrganismos

monarca x *Asclepias* x pássaro

CALATROPINA



glicosídeos cardioativos

http://borboletasbr.blogspot.com.br/2016/02/lagartas-de-monarca-em-asclepias.html

- Protection against heat and oxidative stress
- Pollination
- Seed dispersal
- Anti-herbivore defense
- Anti-pathogen defense
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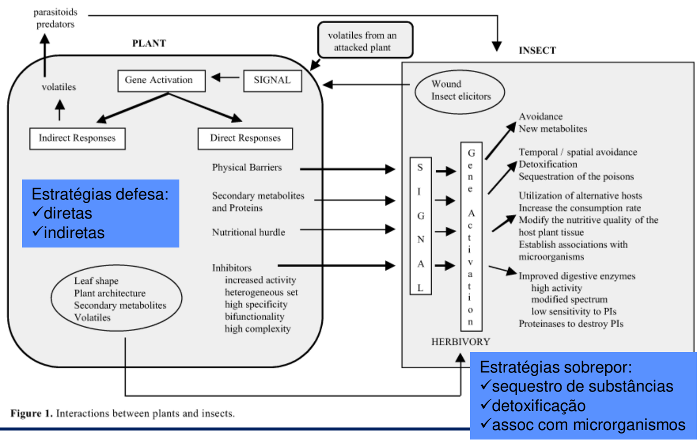


Figure 1. Interactions between plants and insects.

- Protection against heat and oxidative stress
- Pollination
- Seed dispersal
- Anti-herbivore defense
- Anti-pathogen defense
- Anti-herbivore defense
- Anti-pathogen defense

INTERAÇÕES COM FATORES BIÓTICOS

Available online at www.sciencedirect.com

ScienceDirect

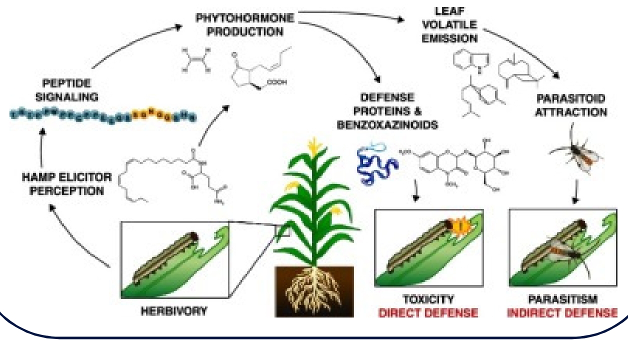
Current Opinion in Insect Science

ELSEVIER

Plant elicitor peptides in induced defense against insects

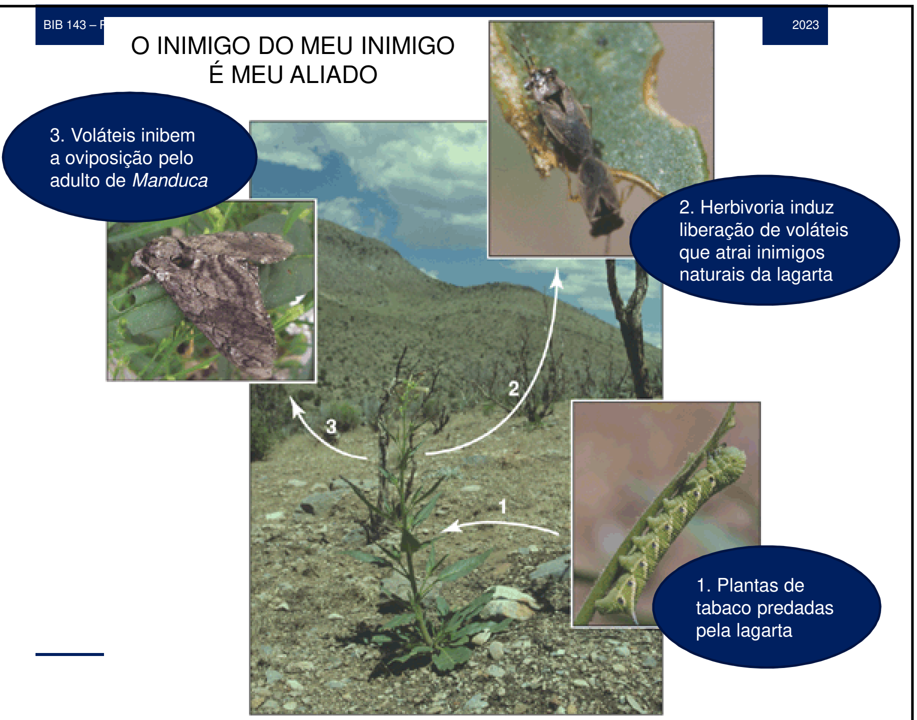
Alisa Huffaker

Current Opinion in Insect Science 2015, 9:44–50



Sybille B Unsicker, Grit Kunert, Jonathan Gershenzon. 2009. Protective perfumes: the role of vegetative volatiles in plant defense against herbivores. **Current Opinion in Plant Biology** 12(4): 479 – 485.

O INIMIGO DO MEU INIMIGO É MEU ALIADO



Sabelis et al. 2001. The enemy of my enemy is my ally. **Science** 291: 2104-5

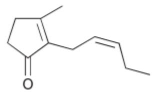
PLANT DEFENCES

Pesticide Outlook – June 2003

CIS-JASMONE SWITCHES ON PLANT DEFENCE AGAINST INSECTS

Toby Bruce, John Pickett and Lesley Smart from Rothamsted Research at Harpenden in the UK describe a volatile plant activator which could have an important part to play in plant defence mechanisms

cis-Jasmone

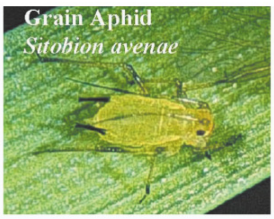


Substâncias voláteis induzidas em plantas injuriadas:

1. Repelente de insetos fitófagos.
2. Defesa indireta – atração de predador ou parasita do fitófago.
3. Sinais entre plantas – indução de mecanismos de defesa em plantas vizinhas antes do ataque dos herbívoros.

BIB 143 – Recursos Econômicos Vegetais 2023

Trigo (*Triticum aestivum*) x afídeo (*Sitobion avenae*) x parasitoide (*Aphidius ervi*)



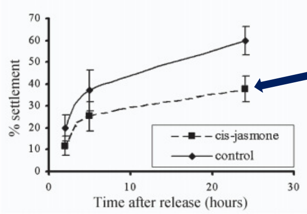


Figure 1 **Settlement of *S. avenae* in simulator bioassay**

Plantas tratadas com sinalizador são **menos** atrativas ao herbívoro e **mais** ao seu parasita

Figure 2 **Time spent foraging by *Aphidius ervi* on *cis*-jasmone and control wheat seedlings.**

Figure 3 **Field application of *cis*-jasmone**

Menor captura de afídeos em armadilhas de campo com plantas tratadas

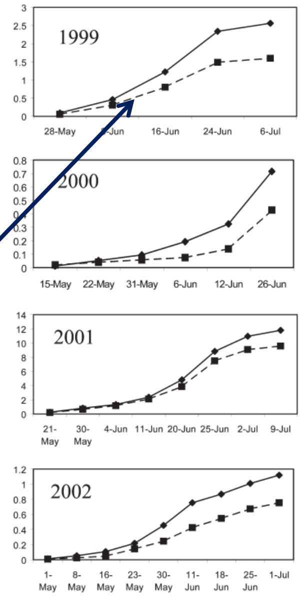


Figure 4 **Cumulative Cereal Aphid Counts in Field Plot Trials with *cis*-jasmone treatment 1999–2002 (control: ——: *cis*-jasmone: - - -)**

frontiers in Plant Science

ORIGINAL RESEARCH
published: 01 October 2021
doi: 10.3389/fpls.2021.711696

Effects of *cis*-Jasmone Treatment of Brassicas on Interactions With *Myzus persicae* Aphids and Their Parasitoid *Diaeretiella rapae*

*Jamin Ali[1], Anca D. Covaci[1], Joe M. Roberts[2], Islam S. Sobhy[1,3], William D. J. Kirk[1] and Toby J. A. Bruce[1]**

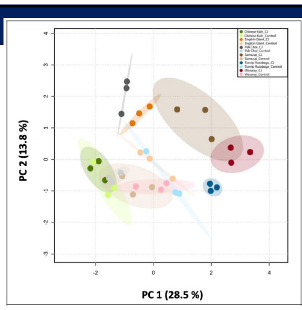
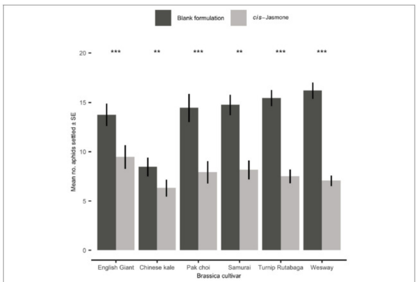
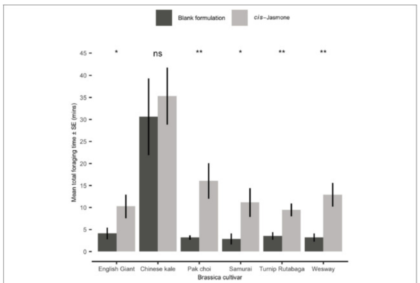


FIGURE 9 | Principal Component Analysis (PCA) of the volatile compounds emitted by six brassica cultivars (i.e., Chinese kale, English Giant, pak choi, Samurai, Wesway, and Turnip Rutabaga) (n = 3). Score plot visualizes the ordination of collected samples according to the first two PCs based on the quantitative values of emitted VOCs from different brassica cultivars with and without CJ-treatment, with the percentage of explained variation in parentheses. The ellipses show 95% confidence regions.

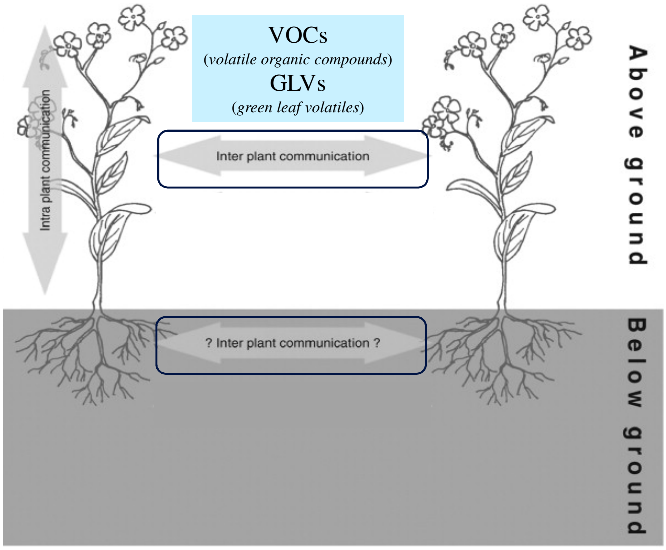




Diminuição o número de afídeos nas plantas tratadas

Aumento no tempo de forrageio do parasitoide nas plantas tratadas

INTERAÇÕES COM FATORES BIÓTICOS



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INTERAÇÕES COM FATORES BIÓTICOS

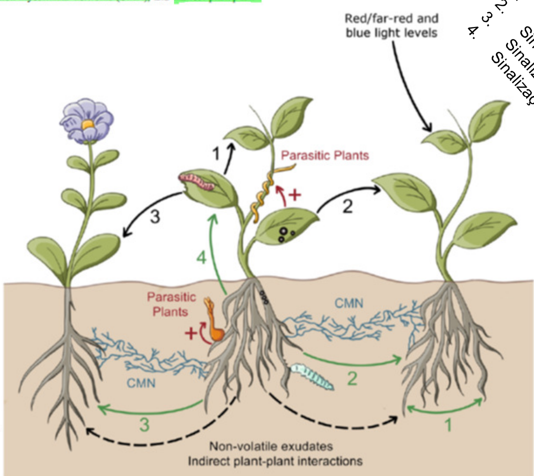
Root-emitted volatile organic compounds: can they mediate belowground plant-plant interactions?

Benjamin M. Delory · Pierre Delaplace · Marie-Laure Fauconnier · Patrick du Jardin

Plant Soil
DOI 10.1007/s11104-016-2823-3

Fig. 2 Overview of the known and potential mechanisms mediating *plant-plant interactions above and below the soil surface.* Aboveground, both the variations in red/far-red and blue light levels in the plant's canopy and the volatile compounds emitted by plants in the atmosphere enable plants to detect the presence of neighbours. Laboratory and field experiments have also shown that VOCs are involved in within-plant and between-plant signalling aboveground. Belowground, plant-plant interactions mediated by non-volatile exudates, the transport of compounds through common mycorrhizal networks (CMN), and indirect plant-plant interactions (alteration of soil chemistry, microbial populations and nutrient availability) have also been reported in the literature. The green arrows refer to plant-plant interactions mediated by root VOCs. 1, within-plant signalling (shoot-shoot or root-root); 2, intraspecific between-plant signalling (shoot-shoot or root-root); 3, interspecific between-plant signalling (shoot-shoot or root-root); 4, within-plant root-shoot signalling; +, attraction of parasitic plants; solid and labelled arrows, VOC emission (Drawing: Ir Carolina Levicek)

1. Sinalização na mesma planta
2. Sinalização intraespecífica
3. Sinalização interespecífica
4. Sinalização na mesma planta eixo caule-raiz



Environmental and Experimental Botany 147 (2018) 261–270

Contents lists available at ScienceDirect

Environmental and Experimental Botany

journal homepage: www.elsevier.com/locate/envexpbot

Induction of priming by salt stress in neighboring plants

Stefania Caparrotta, Sara Boni, Cosimo Taiti, Emily Palm, Stefano Mancuso, Camilla Pandolfi*

Department of Plant, Soil and Environmental Science, University of Florence, Viale delle Idee 30, 50019 Sesto F.no, Florence, Italy

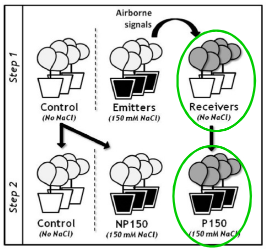
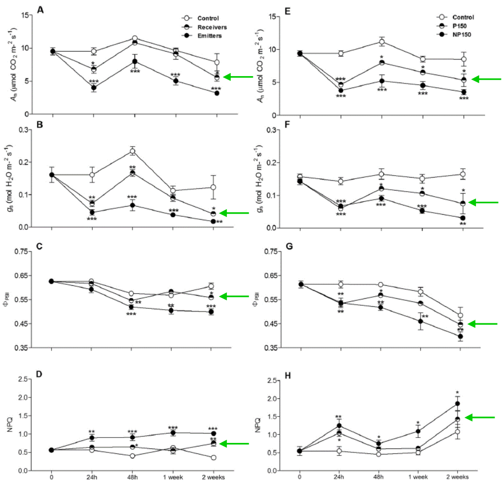


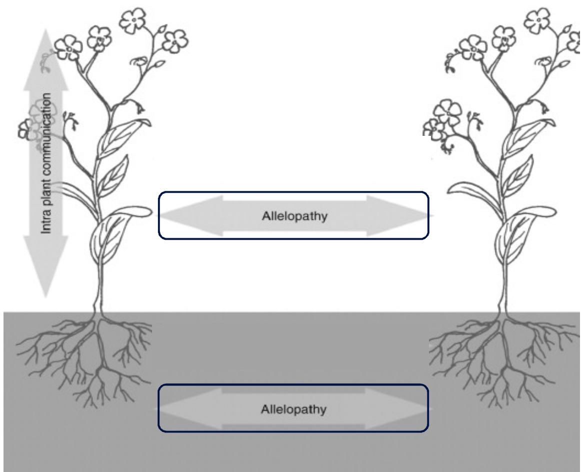
Fig. 1. Experimental design used for plant-plant communication experiment. *Step1:* Unstressed neighbouring plants (Receivers) were exposed for two weeks to airborne signals emitted by plants treated with 150 mM NaCl (Emitters). Unexposed plants grown in similar conditions were used as Control. *Step2:* After two weeks of priming mediated by airborne cues, Receivers (primed) were treated with NaCl solution (P150). Plants that were not previously exposed to volatile cues emitted by Emitters were used as non-primed plants and treated with the salt solution (NP150). Unprimed plants grown in similar conditions were used as Control.

Plantas vizinhas não estressadas apresentam alteração em padrões fisiológicos

Plantas vizinhas quando estressadas respondem de forma mais amena que



INTERAÇÕES COM FATORES BIÓTICOS



Alelopatia – fenômeno biológico em que um organismo produz aleloquímicos que influenciam, positiva ou negativamente, o crescimento, a sobrevivência, o desenvolvimento e a reprodução de outro organismo

Sybille B Unsicker , Grit Kunert , Jonathan Gershenzon. 2009. Protective perfumes: the role of vegetative volatiles in plant defense against herbivores. **Current Opinion in Plant Biology** 12(4): 479 – 485.

fitotoxicidade

COMPOSIÇÃO QUÍMICA E ATIVIDADE ALELOPÁTICA DO ÓLEO ESSENCIAL DE EUCALIPTO

CHEMICAL COMPOSITION AND ALLELOPATHIC ACTIVITY OF THE EUCALYPTUS ESSENTIAL OIL

Marcelo Antonio TOMAZ[1]; Adilson Vidal COSTA[2]; Wagner Nunes RODRIGUES[3]; Patrícia Fontes PINHEIRO[2]; Luciana Alves PARREIRA[4]; Daniel RINALDO[2]; Vagner Tebaldi de QUEIROZ[2]

1. Professor, Doutor, Departamento de Produção Vegetal, Centro de Ciências Agrárias - CCA, Universidade Federal do Espírito Santo - UFES, Alegre, Espírito Santo, tomaz@cca.ufes.br; 2. Professor, Doutor, Departamento de Química e Física, CCA - UFES, Alegre, Espírito Santo; 3. Mestre, Doutorando em Produção Vegetal, CCA - UFES, Alegre, Espírito Santo; 4. Professora, Mestre, Departamento de Química e Física, CCA - UFES, Alegre, Espírito Santo.

Biosci. J., Uberlandia, v. 30, supplement 2, p. 475-483, Oct./14

Componente	%
α-pineno	0,80
β-pineno	0,18
p-cimeno	0,44
1,8-cineol	1,75
γ-terpineno	0,27
linalol	0,35
iso-isopulegol	10,20
citronelal	**64,92**
neo-isopulegol	0,58
β-citronelol	8,25
Acetato de α-terpenila	6,74
Acetato de citronelila	3,21

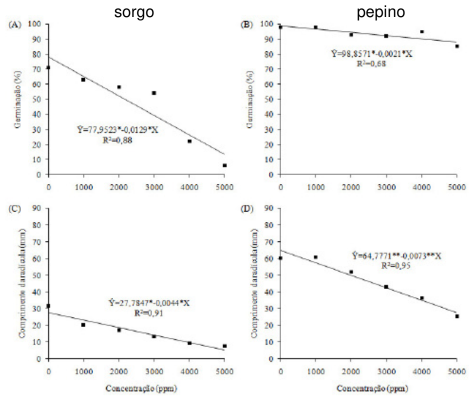


Figura 1. Germinação de sorgo (A) e pepino (B), e comprimento da radícula de sorgo (C) e pepino (D), em função do aumento da concentração do óleo essencial de *E. citriodora*.

BIB 143 – Recursos Econômicos Vegetais 2023

bioestimulante

Algal Research 32 (2018) 142–149

Contents lists available at ScienceDirect

Algal Research

journal homepage: www.elsevier.com/locate/algal

Effects of extracts and isolated molecules of two species of *Gracilaria* (Gracilariales, Rhodophyta) on early growth of lettuce

Priscila Torres[a,*], Paula Novaes[a], Luciana Garcia Ferreira[b], Janaína Pires Santos[c], Ester Mazepa[b], Maria Eugênia R. Duarte[b], Miguel D. Noseda[b], Fungyi Chow[c], Deborah Y.A.C. dos Santos[a]

alga
↓
extratos de diferentes polaridades
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bioensaios
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extrato aquoso
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polissacarídeos (ficocoloides)

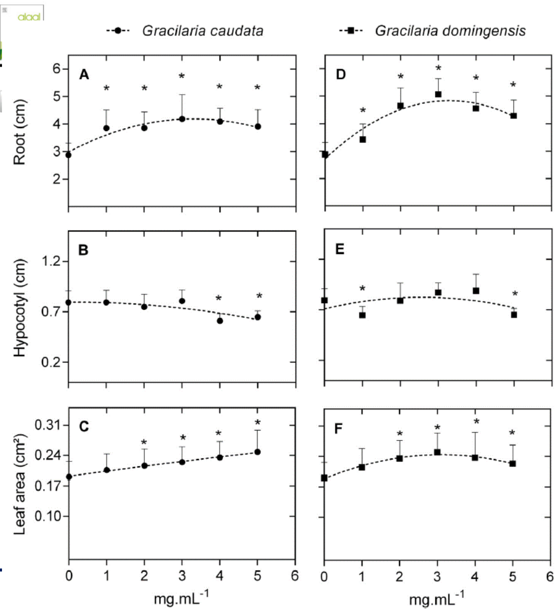

Fig. 2. Initial growth of *Lactuca sativa* under aqueous extracts of *Gracilaria caudata* and *Gracilaria domingensis*. A and D – root length, B and E – hypocotyl length, C and F – leaf area. Data correspond to means ± SD (n = 40). Asterisks (*) indicate significant difference from negative control (Kruskal-Wallis, Dunn; $p < 0.05$).

INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
ISSN Print: 1560–8530; ISSN Online: 1814–9596
13S–011/2013/15–6–1367–1378
http://www.fspublishers.org
Int. J. Agric. Biol., Vol. 15, No. 6, 2013

Review Article

Application of Allelopathy in Crop Production

Muhammad Farooq[1*], Ali Ahsan Bajwa[1], Sardar A. Cheema[1] and Zahid A. Cheema[1]
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*For correspondence: farooqcp@gmail.com

Table 1: Weed control through allelopathic crop water extracts

Allelopathic extract	Crop	Weeds controlled	Weed control: Reduction in weed density (%)	Weed control: Reduction in dry weight (%)	Yield increase over control (%)	Reference
Sorghum	Wheat	*Fumaria indica, Phalaris minor, Rumex dentates, Chenopodium album*	21.6-44.2	35.4-49.0	11.0-20.0	Cheema and Khaliq (2000)
	Cotton	*Trianthema portulacastrum, Cynodon dactylon, Cyperus rotundus*	47.0	29.0-40.1	17.7-59.0	Cheema *et al.* (2002)
	Mungbean	*Cyperus rotundus, Chenopodium album, Convolvulus arvensis*	17.5-31.6	23.7-59.6	4.0-17.7	Cheema *et al.* (2001)
	Rice	*Echinocloa colonum, Cyperus rotundus, Cyperus iria*	-	40.4	12.5	Wazir *et al.* (2011)
Sunflower	Wheat	*Avena fatua, Melilotus officinalis, Phalaris minor, Rumex obtusifolius*	10.6-33.6	2.2-16.5	1.6-10.7	Cheema *et al.* (2003), Naseem *et al.* (2010)
Sorghum + Sunflower Sorghum + Brassica Sorghum + Tobacco Sorghum + Sesame		*Avena fatua, Phalaris minor*	-	10.0-62.0	18.55-62.0	Jamil *et al.* (2009)

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frontiers in Plant Science
REVIEW
published: 17 November 2015
doi: 10.3389/fpls.2015.01020

Research Progress on the use of Plant Allelopathy in Agriculture and the Physiological and Ecological Mechanisms of Allelopathy

Fang Cheng and Zhihui Cheng*

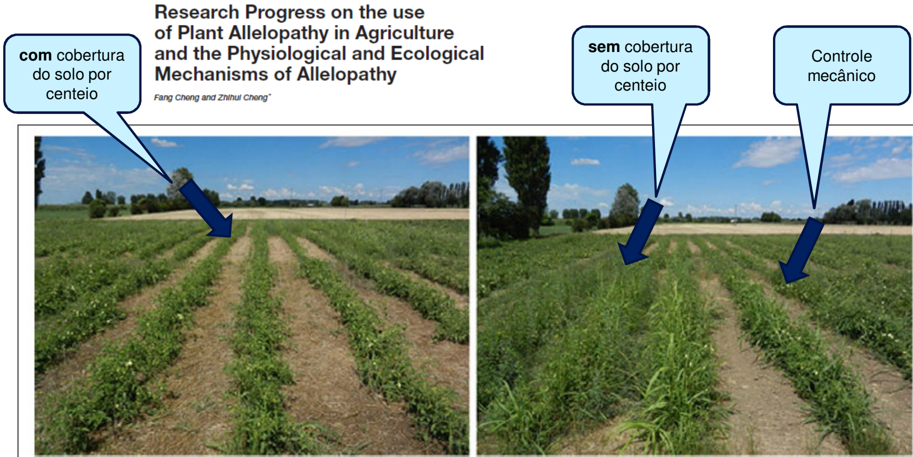
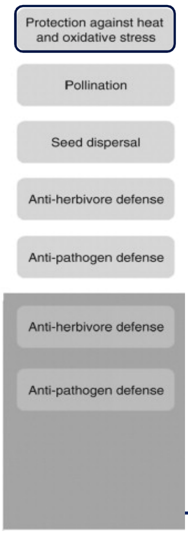


FIGURE 2 | Field trial on rye mulch preceding a tomato crop in a biological farm (Schulz et al., 2013). Left, test plot with rye mulch left on the soil surface, showing the good weed suppression ability. Right, control plot without rye mulch, split into two treatments: left side, untreated sub-plot in which tomato plants are almost completely overgrown by weeds; right side, sub-plot with mechanical control by cultivation, in which tomato plants grow as well as those in the test plot.

INTERAÇÕES COM FATORES ABIÓTICOS



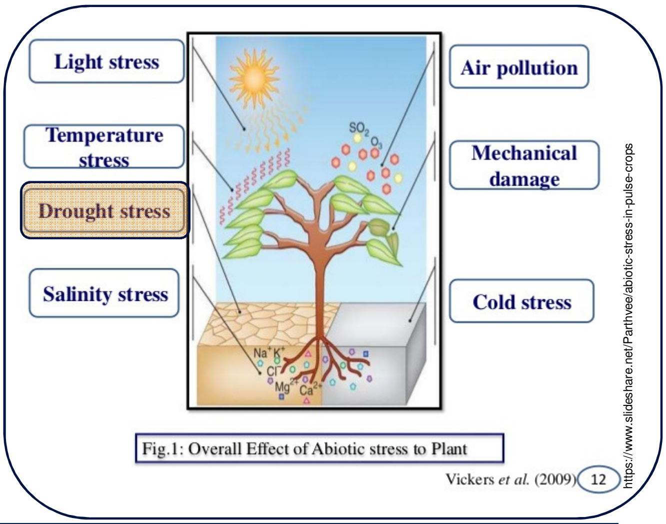


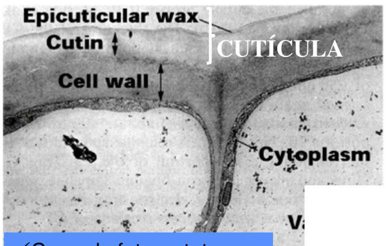
Fig.1: Overall Effect of Abiotic stress to Plant

Vickers *et al.* (2009) 12

https://www.slideshare.net/Parthvee/abiotic-stress-in-pulse-crops

Sybille B Unsicker , Grit Kunert , Jonathan Gershenzon. 2009. Protective perfumes: the role of vegetative volatiles in plant defense against herbivores. **Current Opinion in Plant Biology** 12(4): 479 – 485.

Ceras cuticulares



- ✓Camada fotoprotetora
- ✓ Minimizar a adesão de resíduos nas superfícies das plantas
- ✓Limitar perda de água não estomática
- ✓ Mediação da interação das plantas com ambiente e herbívoros/patógenos
- ✓ Manutenção do correto desenvolvimento de vários órgãos

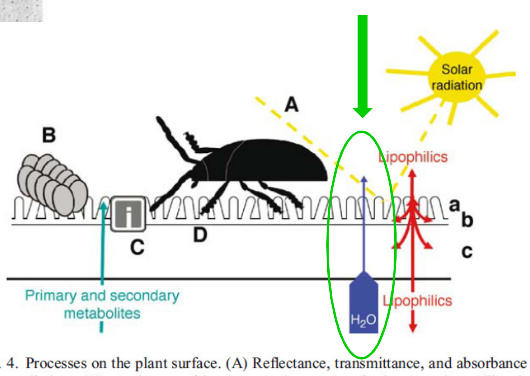


FIG. 4. Processes on the plant surface. (A) Reflectance, transmittance, and absorbance of solar radiation; (B) attachment of insect eggs (or spores of microorganisms, likewise); (C) physical and chemical cues used for host recognition by microorganisms and insects; (D) adhesion of insect legs and influences of surface characteristics on locomotion. Water and other metabolites diffuse in different degrees through the cuticular layer, formed by epicuticular wax crystals (a), the epicuticular wax film (b), and cutin and intracuticular waxes (c).

Müller, C. & Riederer, M. **J. Chemical Ecology** 31: 2621-51. (2005)

Increased Accumulation of Cuticular Wax and Expression of Lipid Transfer Protein in Response to Periodic Drying Events in Leaves of Tree Tobacco[1[W]]

Kimberly D. Cameron, Mark A. Teece, and Lawrence B. Smart*
Faculty of Environmental and Forest Biology (K.D.C., L.B.S.) and Faculty of Chemistry (M.A.T.), State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13210

Plant Physiology, January 2006, Vol. 140, pp. 176–183

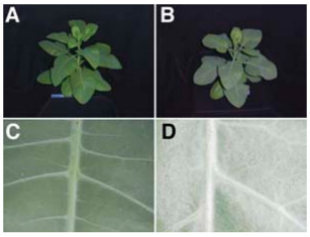


Figure 1. Tree tobacco plants exposed to periodic drying events. A, Well-watered plant. B, Plant exposed to three periodic drying events. C, Close-up of the adaxial surface of a fully expanded leaf from the plant in A. D, Close-up of the adaxial surface of a fully expanded leaf from the plant in B.

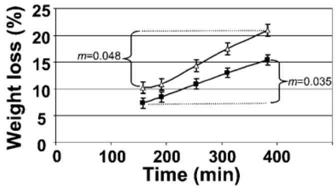


Figure 5. Rate of actual weight loss due to epidermal conductance from leaves excised from periodically dried (■) or well-watered (△) plants. Data represent one of three replicated experiments. Three leaves per plant from each of four well-watered and periodically dried plants were excised and immediately placed in a 30°C incubator. Leaves were weighed after excision at approximately 150 min, 180 min, and at hourly increments thereafter. The percent of water loss was determined relative to the original leaf weight. Error bars indicate the mean SD across all time points. m = slope of the line.

Aumento na quantidade de cera nas plantas submetidas a seca

Aumento na tolerância a seca relacionado ao aumento de cera total

Pak. J. Agri. Sci., Vol. 54(1), 35-44; 2017
ISSN (Print) 0552-9034, ISSN (Online) 2076-0906
DOI: 10.21162/PAKJAS/17.5317
http://www.pakjas.com.pk

COMPARISON OF DIFFERENT FRUIT COATINGS TO ENHANCE THE SHELFLIFE OF KINNOW MANDARIN

SakeenaTul-Ain Haider[1,*], Saeed Ahmad[1], Ahmad Sattar Khan[1] and Shahzad, M.A. Basra[2]
[1]Institute of Horticultural Sciences, University of Agriculture Faisalabad, Pakistan; [2]Department of Agronomy, University of Agriculture Faisalabad, Pakistan.
*Corresponding Author's e-mail: sandhu100hassan@yahoo.com

http://clausennursery.com/citrus-trees/tangerine-trees/item/kinnow-mandarin

Citrus notabilis Lour. X *Citrus deliciosa* Tenora

2014 – 2015:

Pakistão exportou > 350 ton (US$ 284 milhões)

Perdas pós-colheita – 23 – 38%

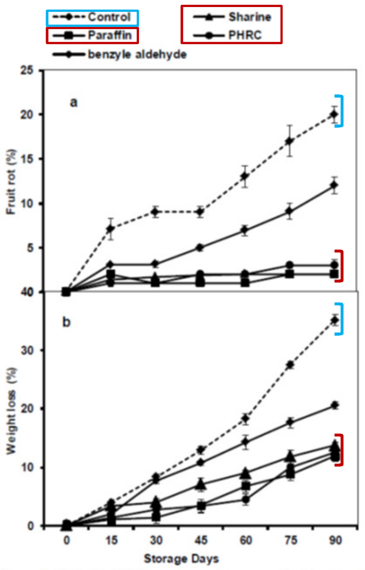
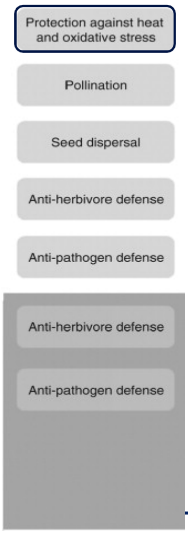
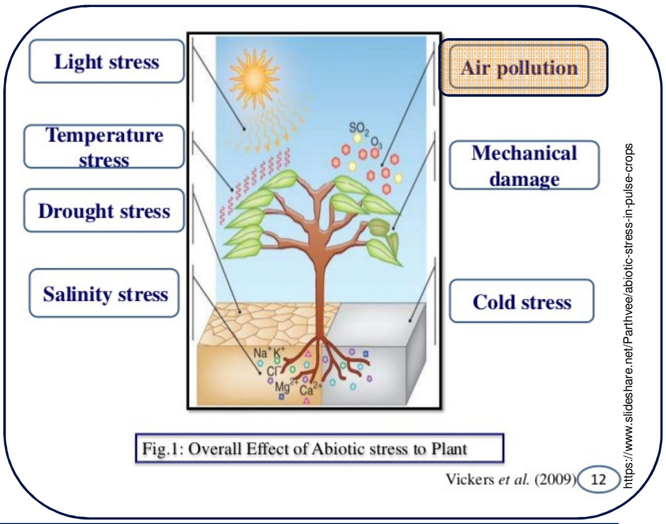


Figure 1. Effect of different wax types on fruit rot and weight loss (%) during storage.

INTERAÇÕES COM FATORES ABIÓTICOS





Sybille B Unsicker , Grit Kunert , Jonathan Gershenzon. 2009. Protective perfumes: the role of vegetative volatiles in plant defense against herbivores. **Current Opinion in Plant Biology** 12(4): 479 – 485.

Chemosphere 76 (2009) 1445–1450

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

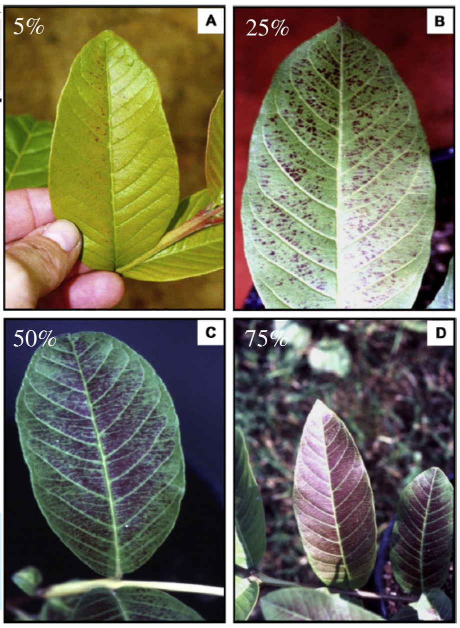
Anthocyanins and tannins in ozone-fumigated guava trees

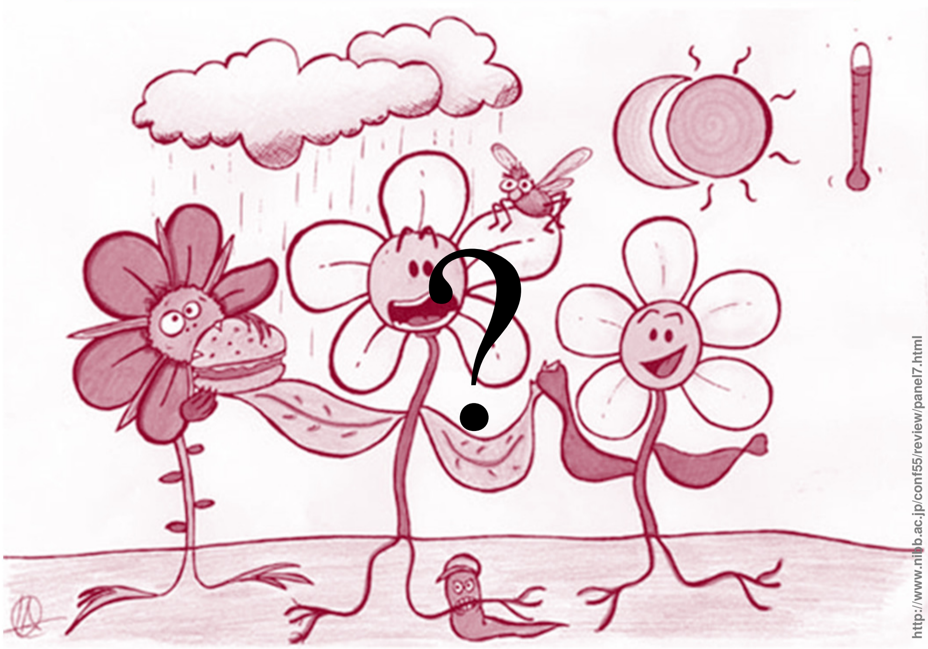
Fernanda Mendes de Rezende[a], Cláudia Maria Furlan[b,*]

Table 1
Mean percentages (±standard deviation) of anthocyanins and tannins on *Psidium guajava* 'Paluma' after 30 days of exposure to different fumigation treatments: CF – charcoal-filtered air; NF – ambient non-filtered air; NF + O_3 – ambient non-filtered air plus 40 ppb of O_3; n = 10; Values followed by # correspond to statistically different means when comparing to CF (p < 0.05).

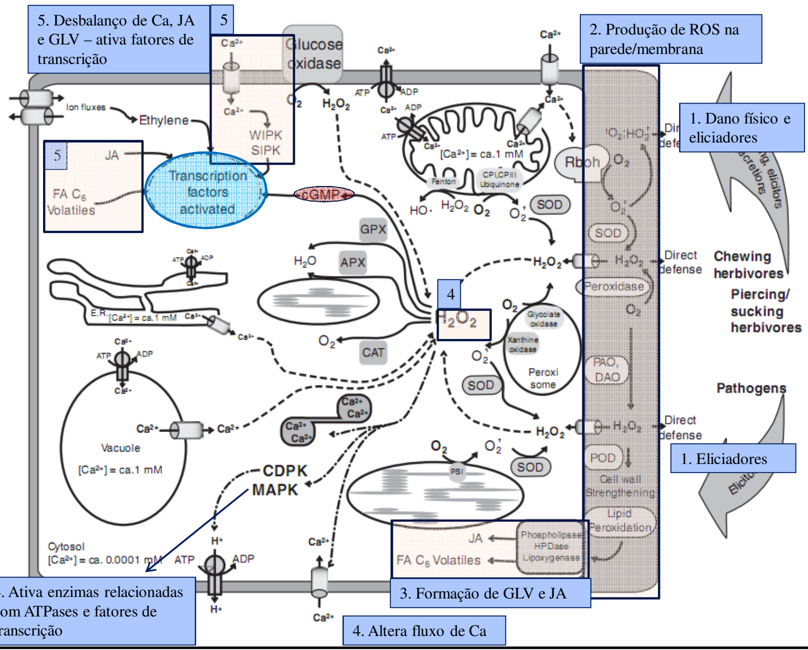
Treatment	Anthocyanins	Tannins	
		Total	Condensed
CF	0.970 ± 0.4	0.136 ± 0.016	0.035 ± 0.006
NF	1.295 ± 0.7	0.160 ± 0.017#	0.051 ± 0.009#
NF + O_3	1.607 ± 0.6#	0.162 ± 0.014#	0.046 ± 0.006#

Correlação entre porcentagem de injúrias foliares (manchas roxas) e teor de antocianinas.





Modelo de desencadeamento de resposta em planta frente ao ataque de herbívoros e patógenos



Environmental and Experimental Botany 114 (2015) 4–14

Contents lists available at ScienceDirect

Environmental and Experimental Botany

journal homepage: www.elsevier.com/locate/envexpbot

Signaling events in plants: Stress factors in combination change the picture

Christian M. Prasch*, Uwe Sonnewald

Biochemistry Division, Department of Biology, Friedrich-Alexander-University Erlangen-Nuernberg, 91058 Erlangen, Germany

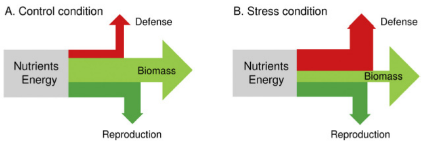


Fig. 1. Energy channeling is shifted from biomass production to defense programs. Under stress conditions nutrients and energy are redirected from biomass production towards defensive processes. Additionally reproduction is accelerated under adverse environmental conditions.

Como será a resposta de uma planta a uma combinação de fatores de estresse?

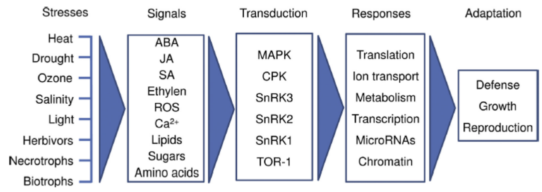


Fig. 2. Crucial events in the signal transduction pathway activated by several biotic and abiotic stress factors. The schematic diagram shows how different stress factors activate different signals, which themselves trigger signal transduction cascades. Different signaling events result in appropriate plant responses leading to adaption processes including defense, growth and reproduction. ABA (abscisic acid); ROS (reactive oxygen species); JA (jasmonic acid); SA (salicylic acid); Ca^{2+} (Calcium); MAPK (mitogen-activated protein kinase); CPK (Ca^{2+}-dependent protein kinases); SnRK (sucrose non-fermenting-1-related protein kinase); TOR-1 (target of rapamycin).

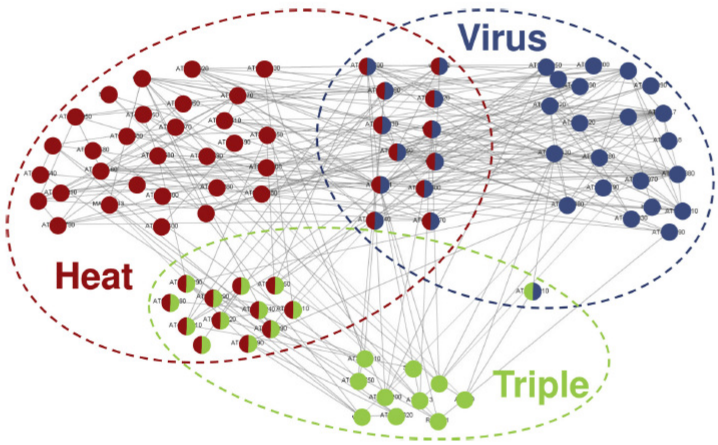


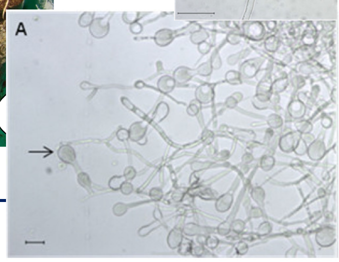
Fig. 3. Co-expression networks are changed under combination of stresses. A multifactorial test system, allowing simultaneous application of heat, drought, and virus stress revealed deactivation of defense responses under multifactorial stress, which in turn caused higher susceptibility to virus infection (Prasch and Sonnewald, 2013). As further transcriptome analysis showed clear changes in signaling genes, co-expression analysis of signaling genes under single and combined stress conditions have been conducted. The picture illustrates significantly regulated signaling genes within the heat, virus and triple stress network visualized by the ARANET Web tool (www.functionalnet.org/aranet/). These observations suggested that abiotic stress factors in combination with virus stress repress virus-specific networks. Gene identities are given in the supplemental Table S5 provided by Prasch and Sonnewald (2013).

Laboratório de Fitoquímica (IB-USP)

Laboratório de Fitoquímica (IB-USP)

Atta sexdens rubropilosa Forel

Leucoagaricus gongylophorus (Möller) Singer



Research Article

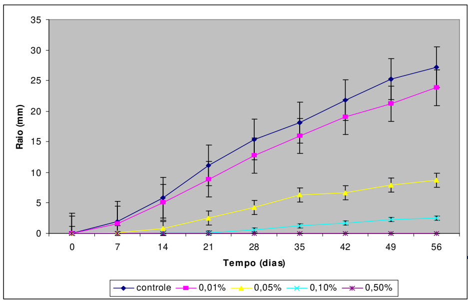
Pest Manag Sci 2012; 68: 935–940

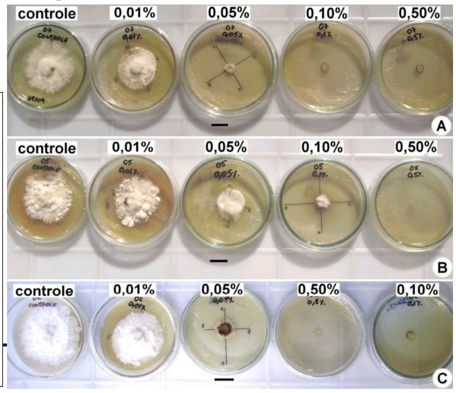
Received: 25 May 2011 Revised: 23 August 2011 Accepted article published: 16 December 2011 Published online in Wiley Online Library: 10 February 2012

(wileyonlinelibrary.com) DOI 10.1002/ps.3254

Influence of caffeine on the survival of leaf-cutting ants *Atta sexdens rubropilosa* and *in vitro* growth of their mutualistic fungus

Carlos H Miyashira,[a] Daniel G Tanigushi,[a] Adriana M Gugliotta[b] and Déborah YAC Santos[a]*





Ricinus communis and *Jatropha curcas* (Euphorbiaceae) Seed Oil Toxicity Against *Atta sexdens rubropilosa* (Hymenoptera: Formicidae)

E. C. ALONSO AND D.Y.A.C. SANTOS[1]
Institute of Bioscience, University of São Paulo, Rua do Matão, 277, São Paulo-São Paulo, Brazil, CEP 05508-090

J. Econ. Entomol. 106(2): 742–746 (2013); DOI: http://dx.doi.org/10.1603/EC12035

(A) mamona (B) pinhão-manso

injestão

tópico

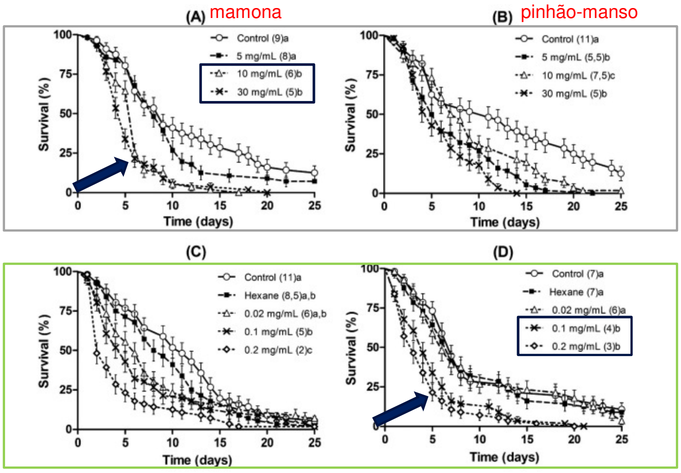


Fig. 2. Survival curves of workers of the leaf-cutting ant *Atta sexdens rubropilosa*. (A) Castor oil (*R. communis*) ingestion bioassay. (B) Physic nut oil (*J. curcas*) ingestion bioassay. (C) Castor oil contact bioassay. (D) Physic nut oil contact bioassay. Median survival time (S_{50}) is placed between brackets; different lowercase letters indicate significant differences between survival curves (data obtained using the log-rank test at α = 0.05 and degrees of freedom = 3). Bars indicate SEs.

NPC Natural Product Communications

2011
Vol. 6
No. 8
1189 - 1192

Influence of Viral Infection on Essential Oil Composition of *Ocimum basilicum* (Lamiaceae)

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[b]*Biological Institute, Research Center of Plant Sanity, Laboratory of Plant Virology, Av. Cons. Rodrigues Alves, 1252, São Paulo-SP, Brazil, 04014-002*

[c]*University of São Paulo, Institute of Bioscience, Department of Botany, R. do Matão, 277. São Paulo-SP, Brazil, 05508-090*

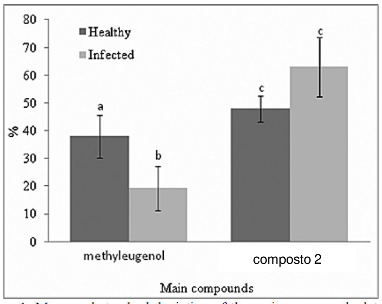

Figure 1: Mean and standard deviation of the main compounds detected in healthy and infected plants of *Ocimum basilicum* cv. Genovese. Different letters mean significant differences (p ≤ 0.05).

Braz. J. Bot (2016) 39(1):131–137
DOI 10.1007/s40415-015-0225-z
CrossMark

Biological activities of Annonaceae species extracts from Cerrado

Paula Novaes[1] · Priscila Bezerra Torres[1] · Déborah Yara Alves Cursino dos Santos[1]

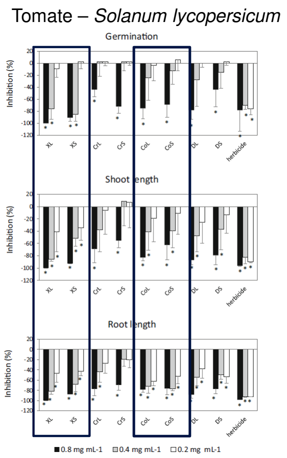

Fig. 3 Inhibition percentage of germination, shoot and root length of tomato at initial growth using leaf (*L*) and stem (*S*) extracts of *Xylopia aromatica* (*X*), *Annona crassiflora* (*Cr*), *Annona coriacea* (*Co*), and *Duguetia furfuracea* (*D*) and herbicide glyphosate in relation to negative control. *Asterisks* indicate significant difference from negative control ($P < 0.05$)

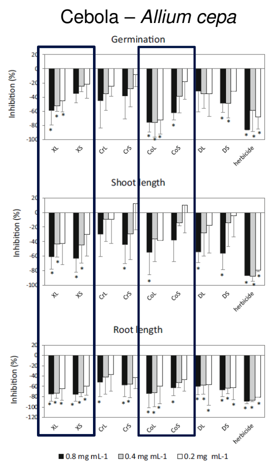

Fig. 4 Inhibition percentage of germination, shoot and root length of onion at initial growth using leaf (*L*) and stem (*S*) extracts of *Xylopia aromatica* (*X*), *Annona crassiflora* (Cr), *Annona coriacea* (Co), and *Duguetia furfuracea* (*D*) and herbicide glyphosate in relation to negative control. *Asterisks* indicate significant difference from negative control ($P < 0.05$)

Capim-braquiária, Braquiária
Urochloa decumbens

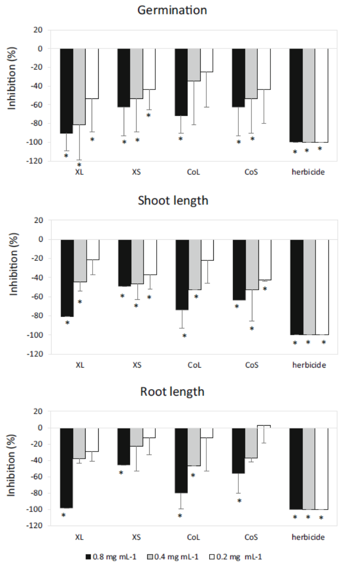

Fig. 5 Inhibition percentage of germination, shoot and root length of *Urochloa decumbens* at initial growth using leaf (*L*) and stem (*S*) extracts of *Xylopia aromatica* (*X*), *Annona coriacea* (*Co*) and herbicide glyphosate a in relation to negative control. *Asterisks* indicate significant difference from negative control ($P < 0.05$)

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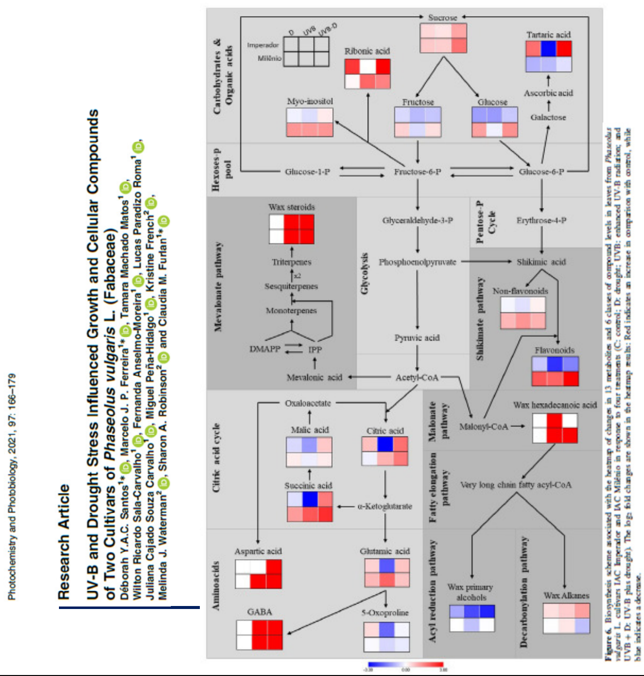

IAC Imperador
IAC Milênio

- respostas mais intensas ao UV-B e UV-B+D quando comparado ao D
- IAC imperador respostas mais fortes que IAC milênio
- razão raiz/caule maior nos dois cultivares