

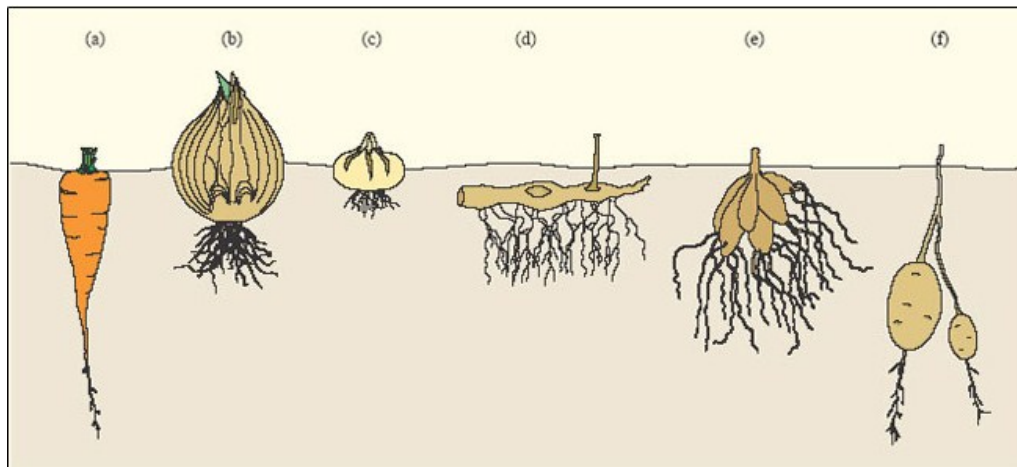
Postharvest Science of Underground Vegetables



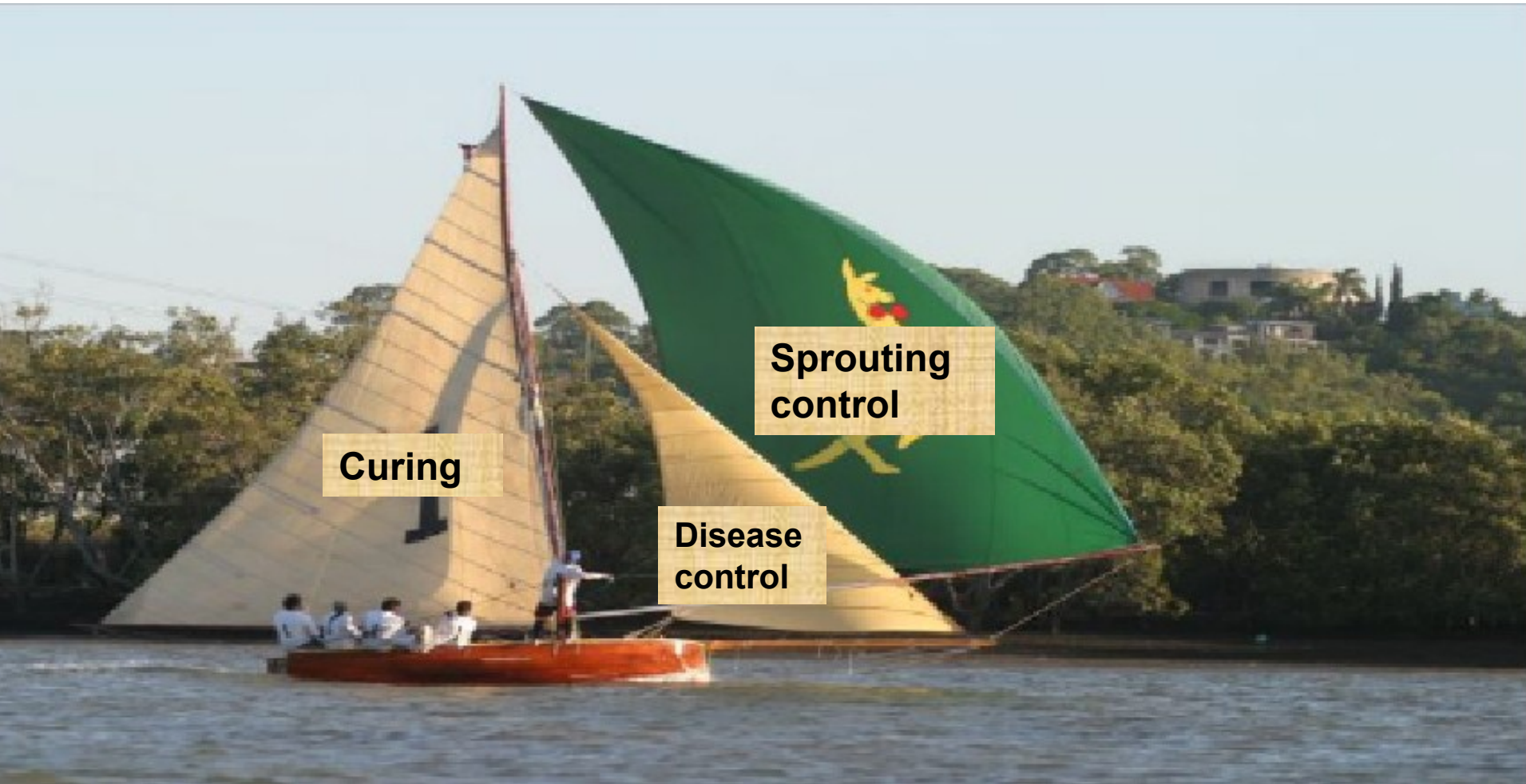
Dani Eshel, Department of Postharvest Science
The Volcani Center, Bet Dagan, Israel

What is so special in storage of underground vegetables?

- Mechanical harvest
- Curing
- Storage in large scale
- Storage with soil
- Used for propagation
- Sprouting and rooting in storage
- Storage disease



Good storage practice?



Curing

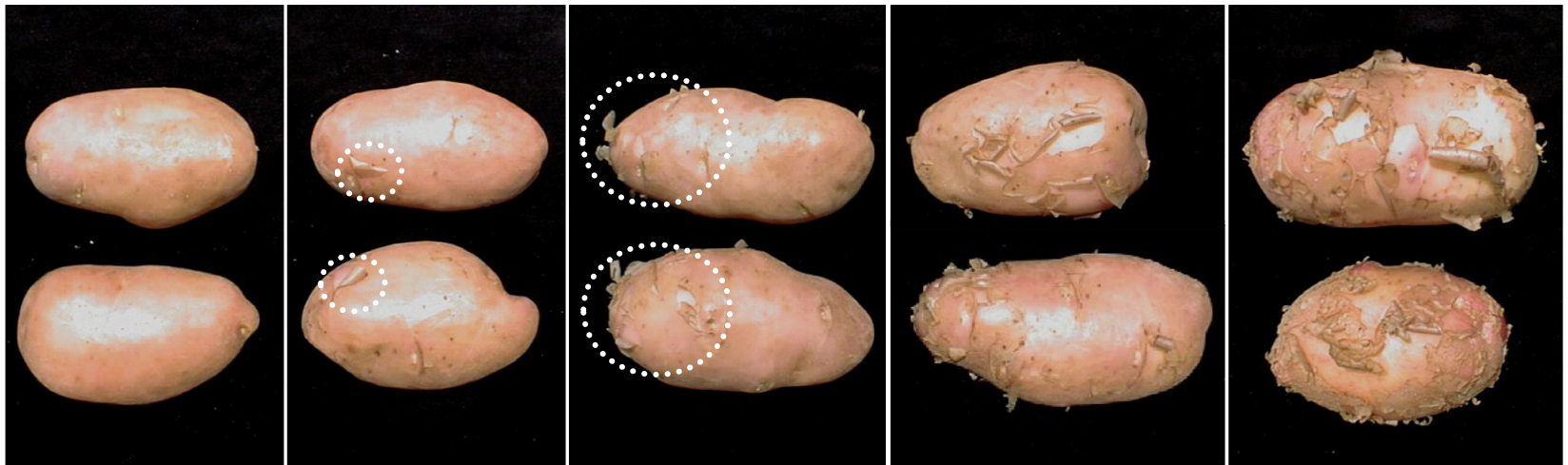
**Sprouting
control**

**Disease
control**

Minimizing the need for curing = Skin set



Harvest timing?



1

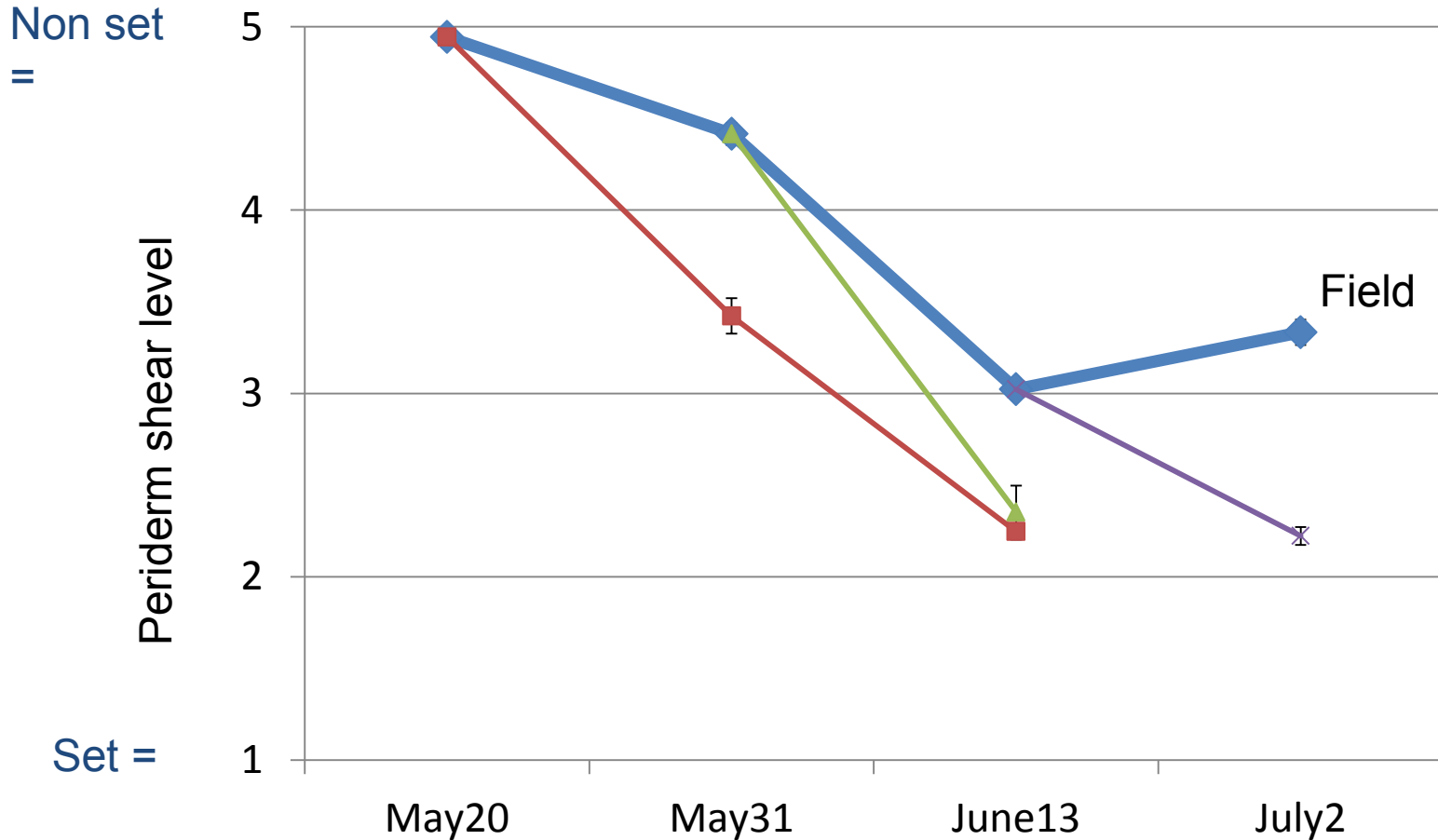
2

3

4

5

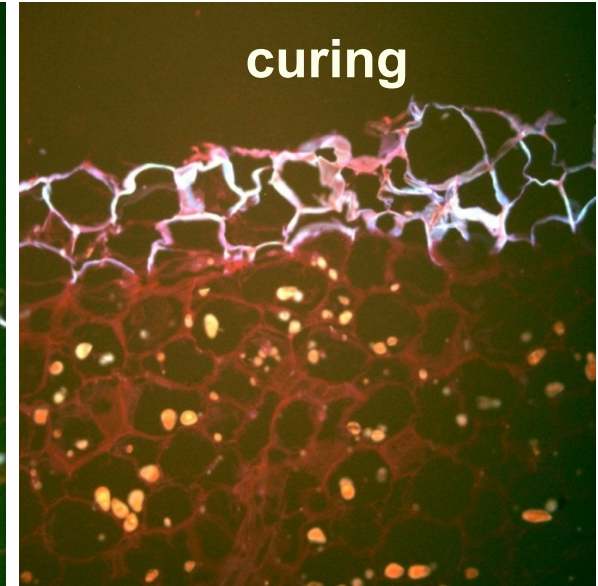
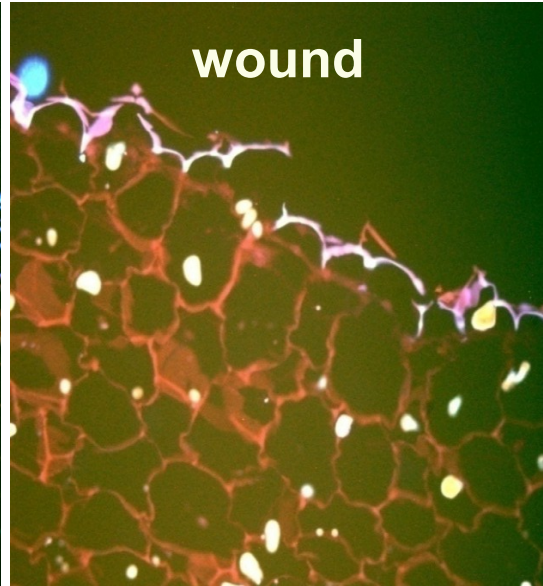
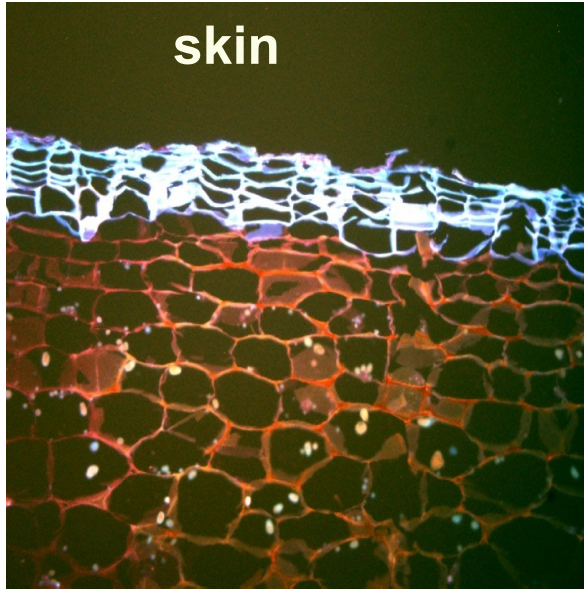
Can Skin set be induced in Storage?



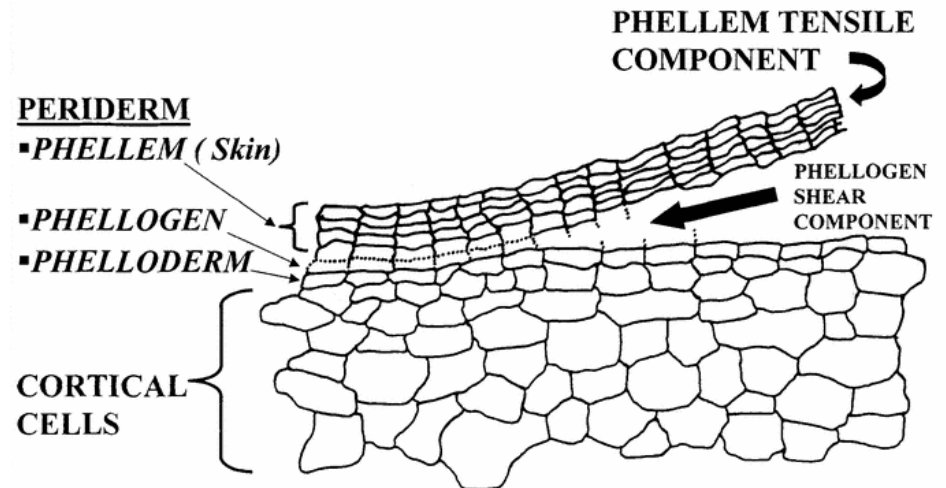
* Rosanna cultivar

** Foliage killing at May 14

Potato skin curing



- Reducing water loss
- Preventing pathogen penetration
- Reducing hypersensitive response



Potato curing and storage

- Storage timing in Israel:

I. June- December

II. January-April

- Curing:

First two days: reduce temp to

17-19C, than 1-1.5C a day, curing in 13C for 2 weeks

- Storage conditions

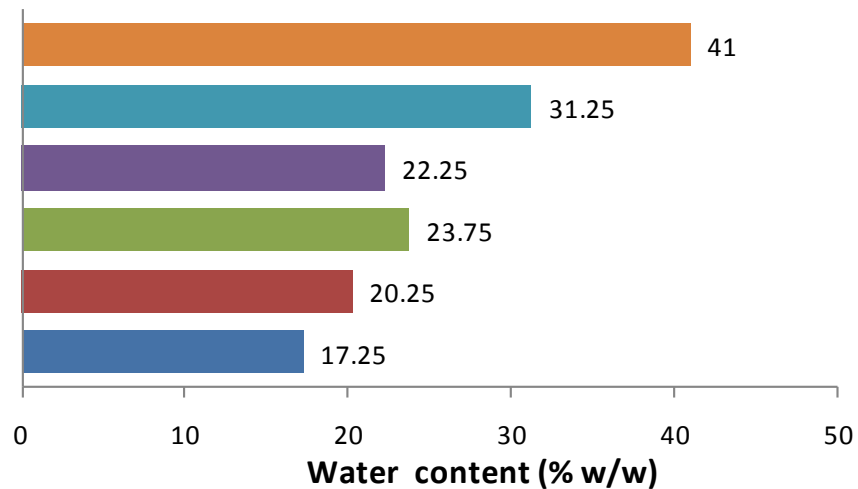
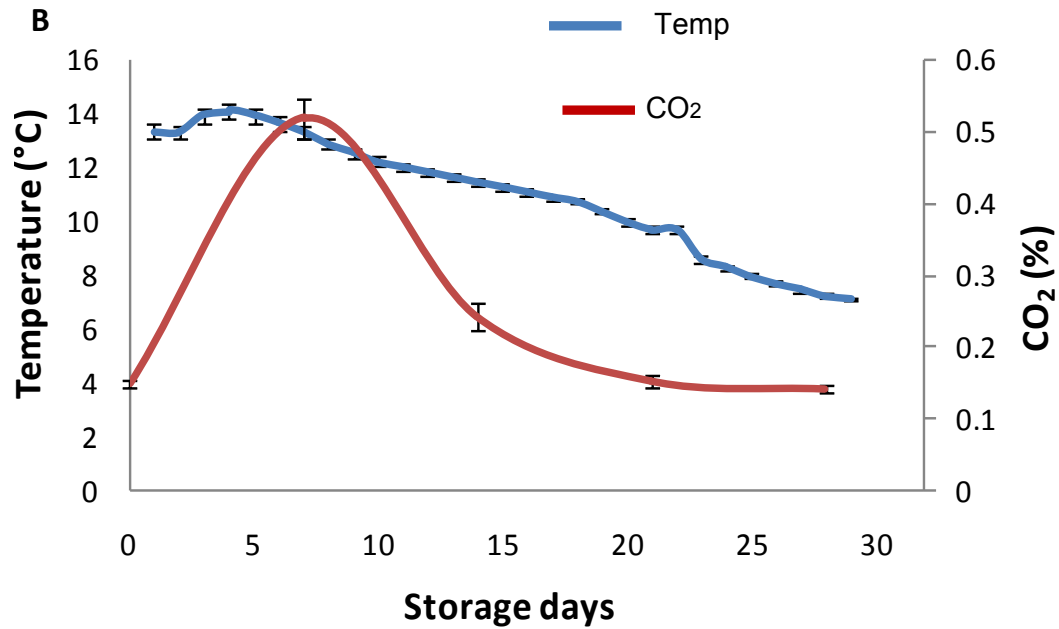
3-6C for table potato

8-12C for processed potatoes

92-98% RH

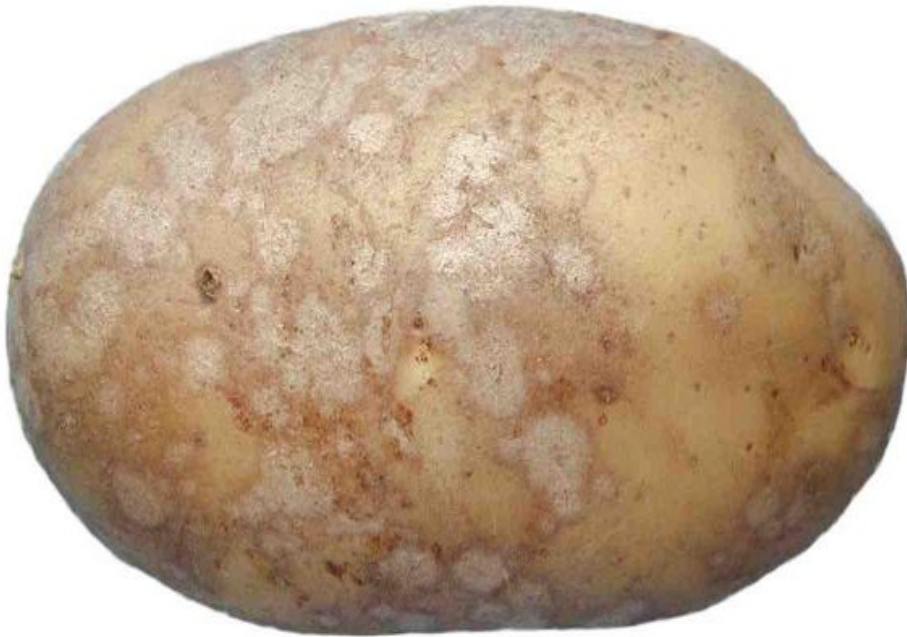


The Big-bag environment

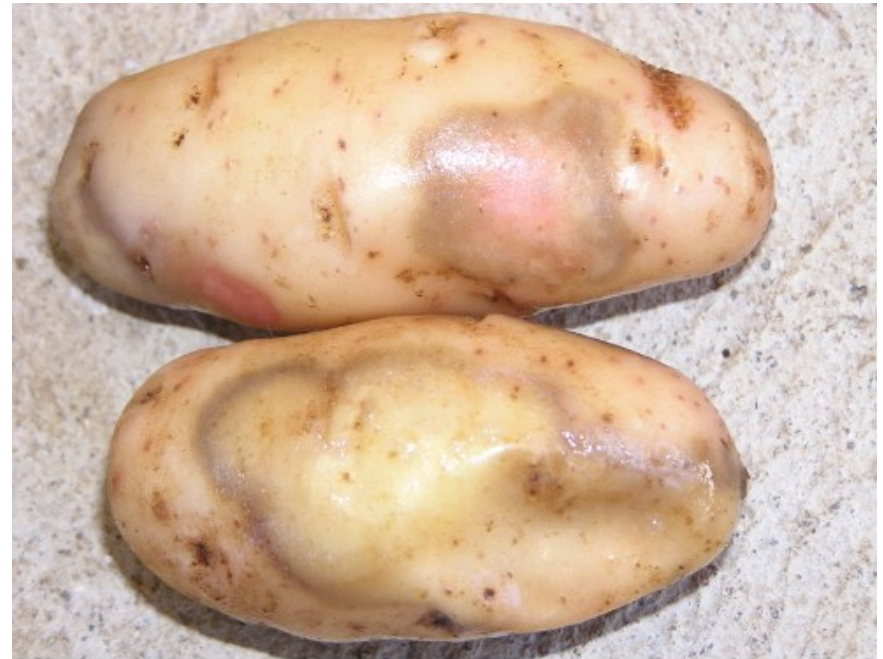


The main postharvest diseases in Israel

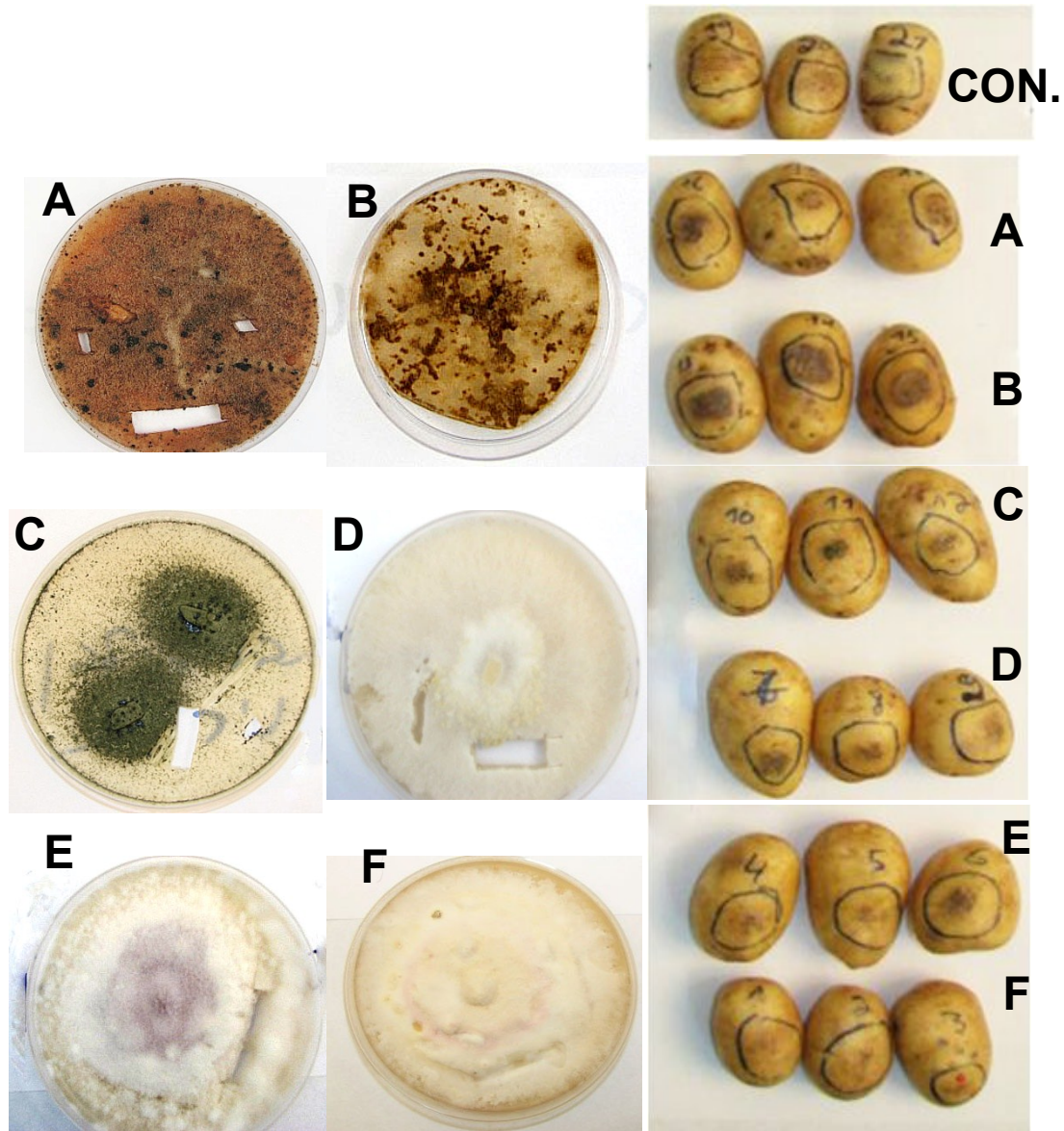
Silver scurf
(*Helminthosporium solani*)



Soft rot
(*Pectobacterium carotovorum*)



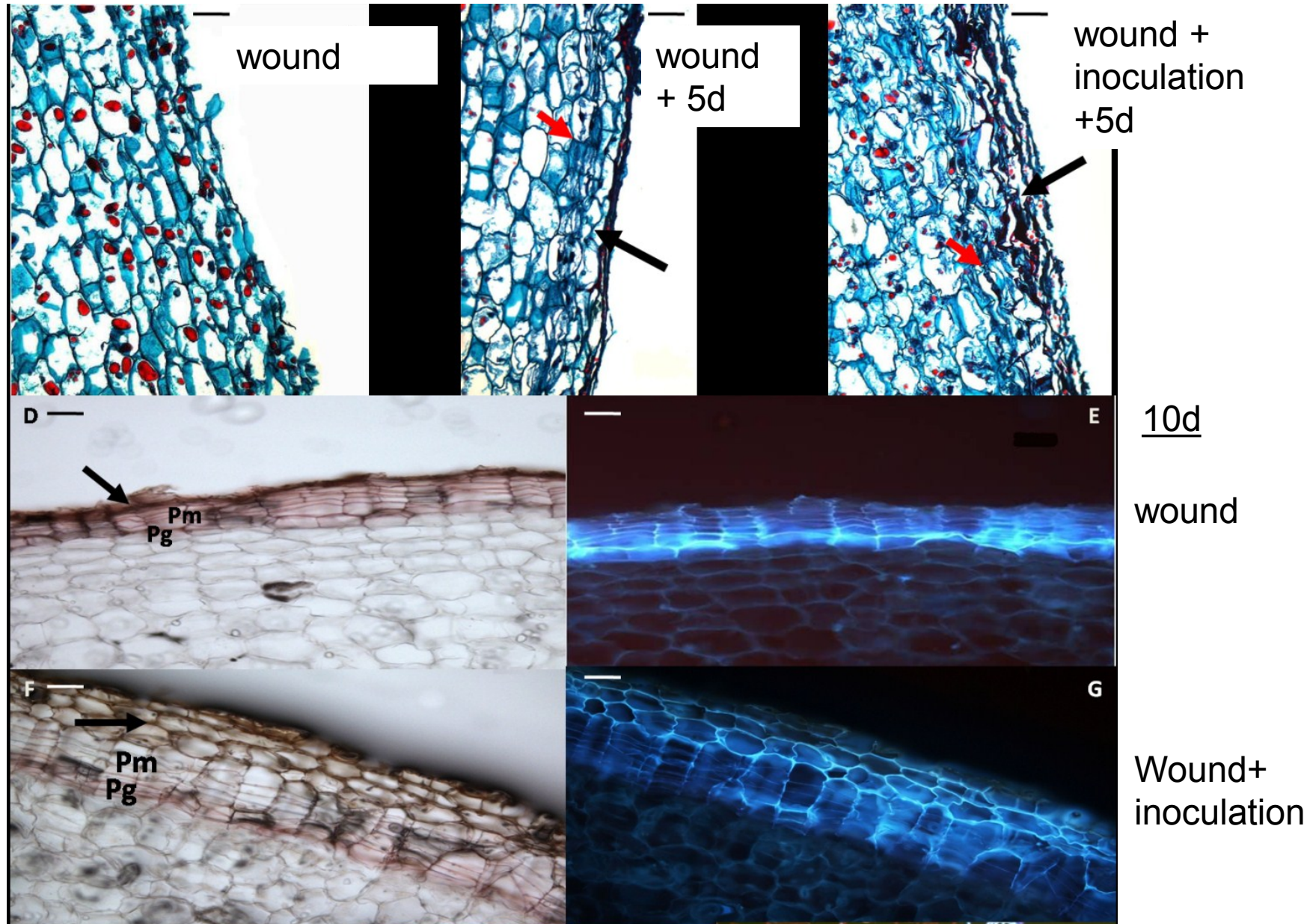
Most of the skin fungi can cause necrosis in wounds



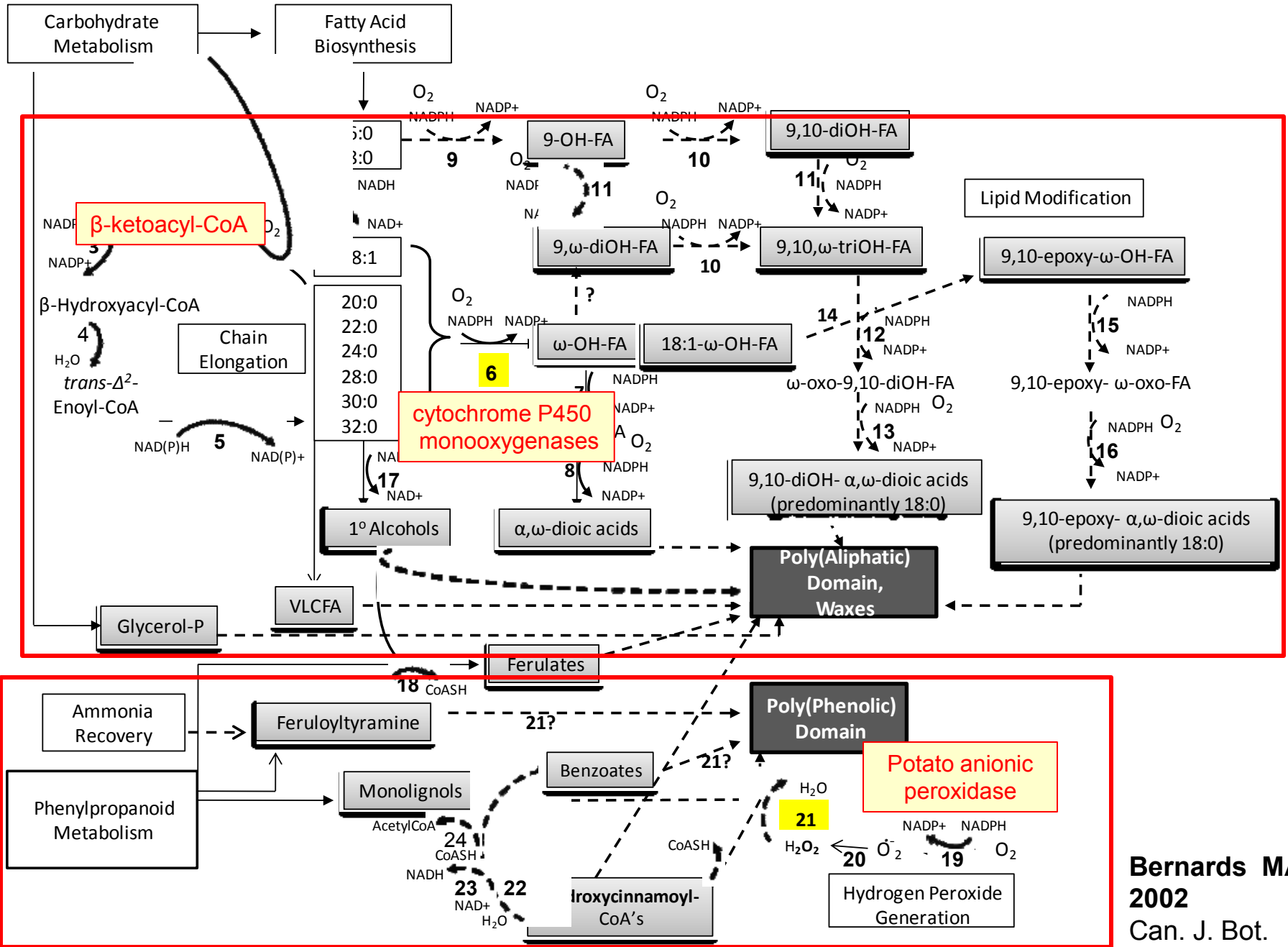
Over curing?



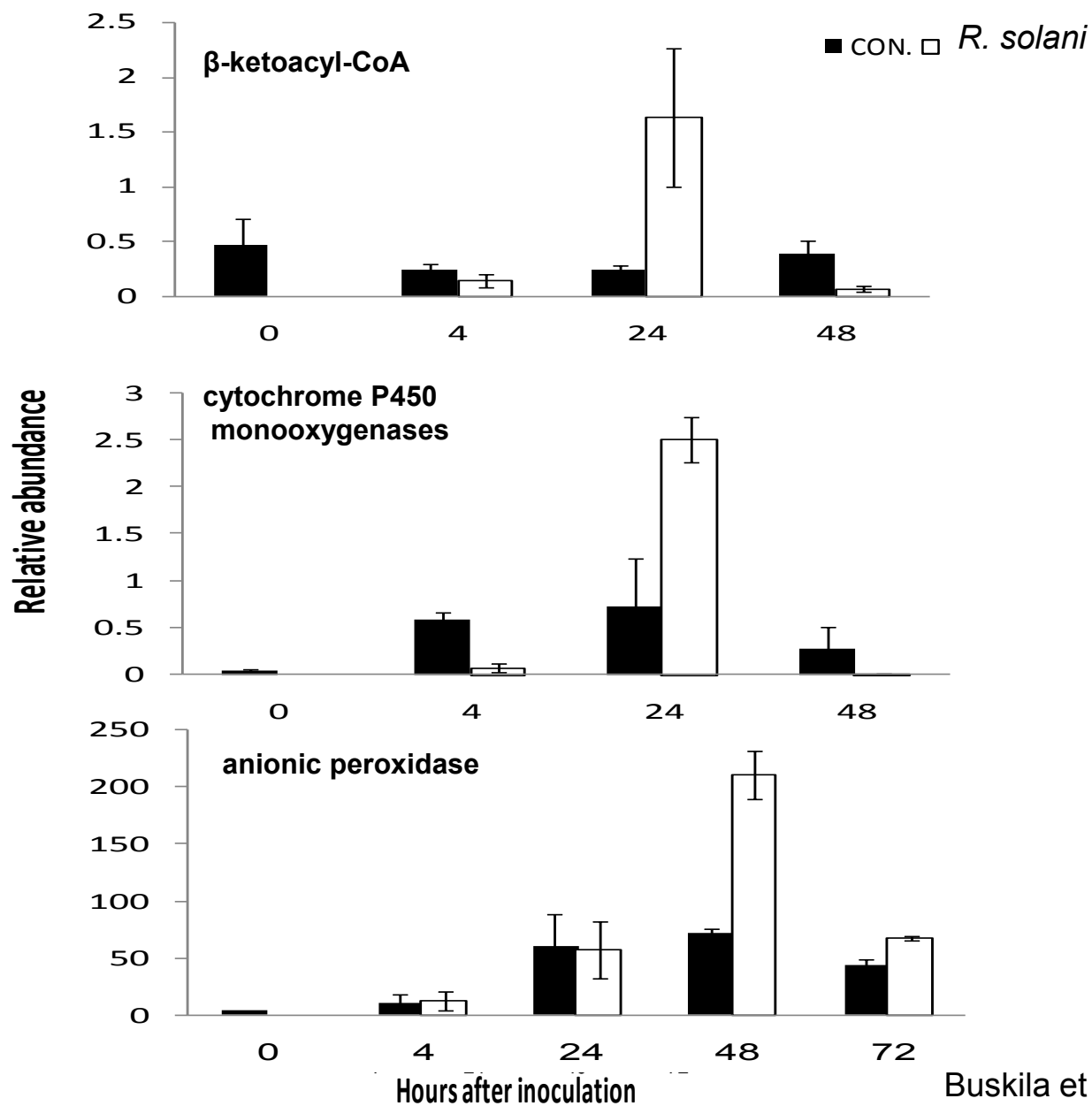
Can *R. solani* induce oversubercization of tuber skin?



Suberin biosynthesis



Up regulation of suberin genes induced by *R. solani* infection



Periderm response to *R. solani* infection

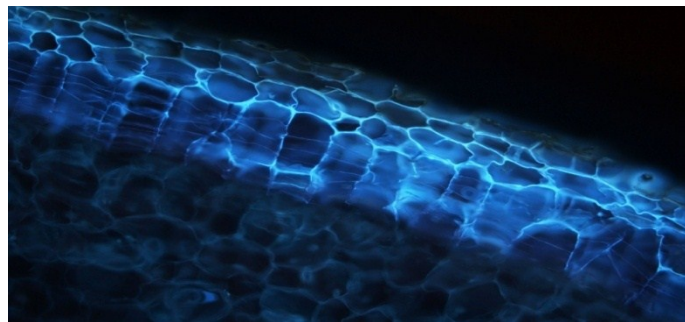
Postharvest Pathology and Mycotoxins

e-Xtra*

Postharvest Dark Skin Spots in Potato Tubers Are an Oversuberization Response to *Rhizoctonia solani* Infection

Yossi Buskila, Leah Tsrer (Lahkim), Michal Sharon, Paula Teper-Bamnlker, Orly Holczer-Erich, Shimon Warshavsky, Idit Ginzberg, Saul Burdman, and Dani Eshel

First, fourth, and ninth authors: Department of Postharvest Science, ARO, Volcani Center, Bet Dagan, Israel; second and fifth authors: Department of Plant Pathology and Weed Research, ARO, Gilat Research Center, Israel; third author: Department of Plant Science, The Faculty of Life Science, Tel-Aviv University, Israel; sixth author: Department of R&D, Hevel Maon Enterprises, Negev, Israel; seventh author: Department of Plant Science, ARO, Volcani Center, Bet Dagan, Israel; eighth author: Department of Plant Pathology and Microbiology, The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Rehovot, Israel. Accepted for publication 9 November 2010.



oversuberization

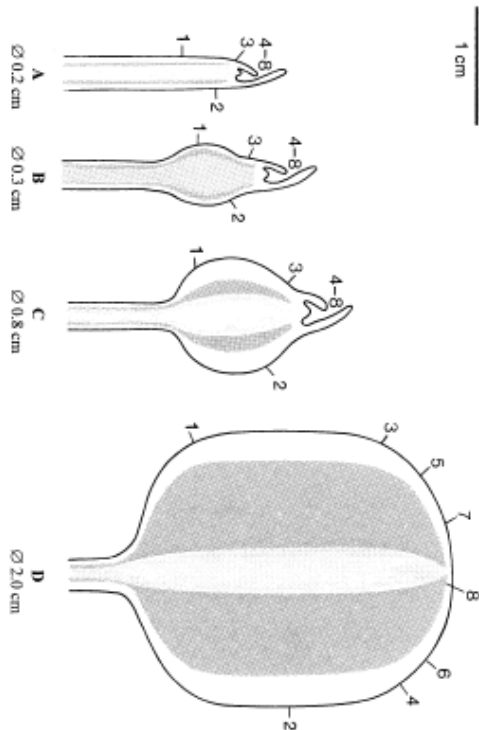
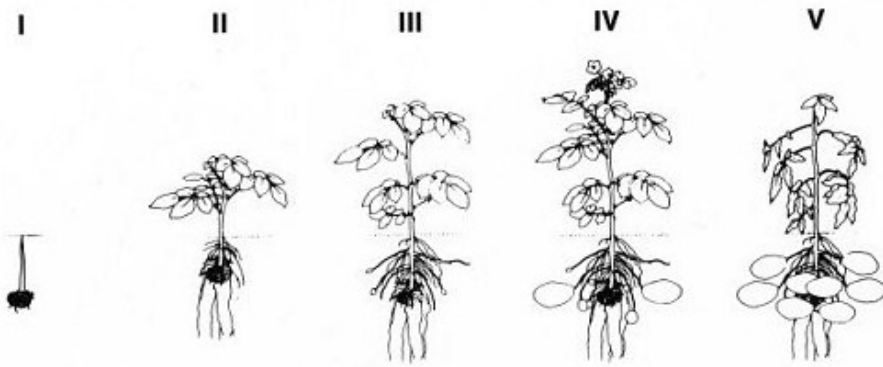


Curing

**Disease
control**

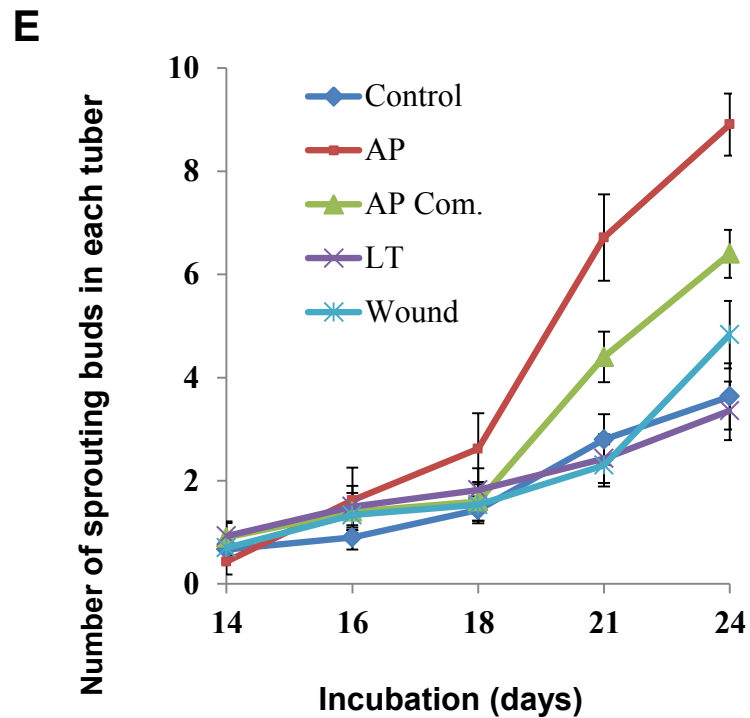
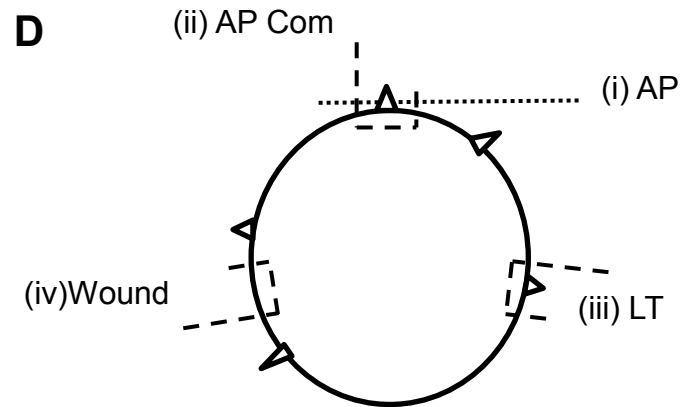
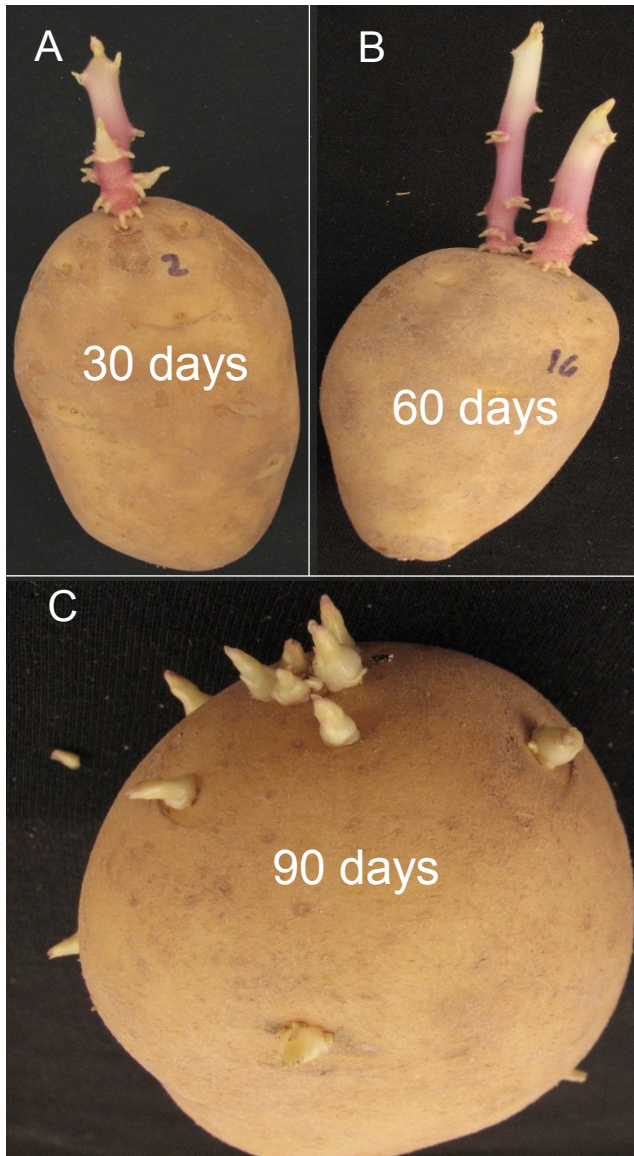
**Sprouting
control**

Potato tuber formation

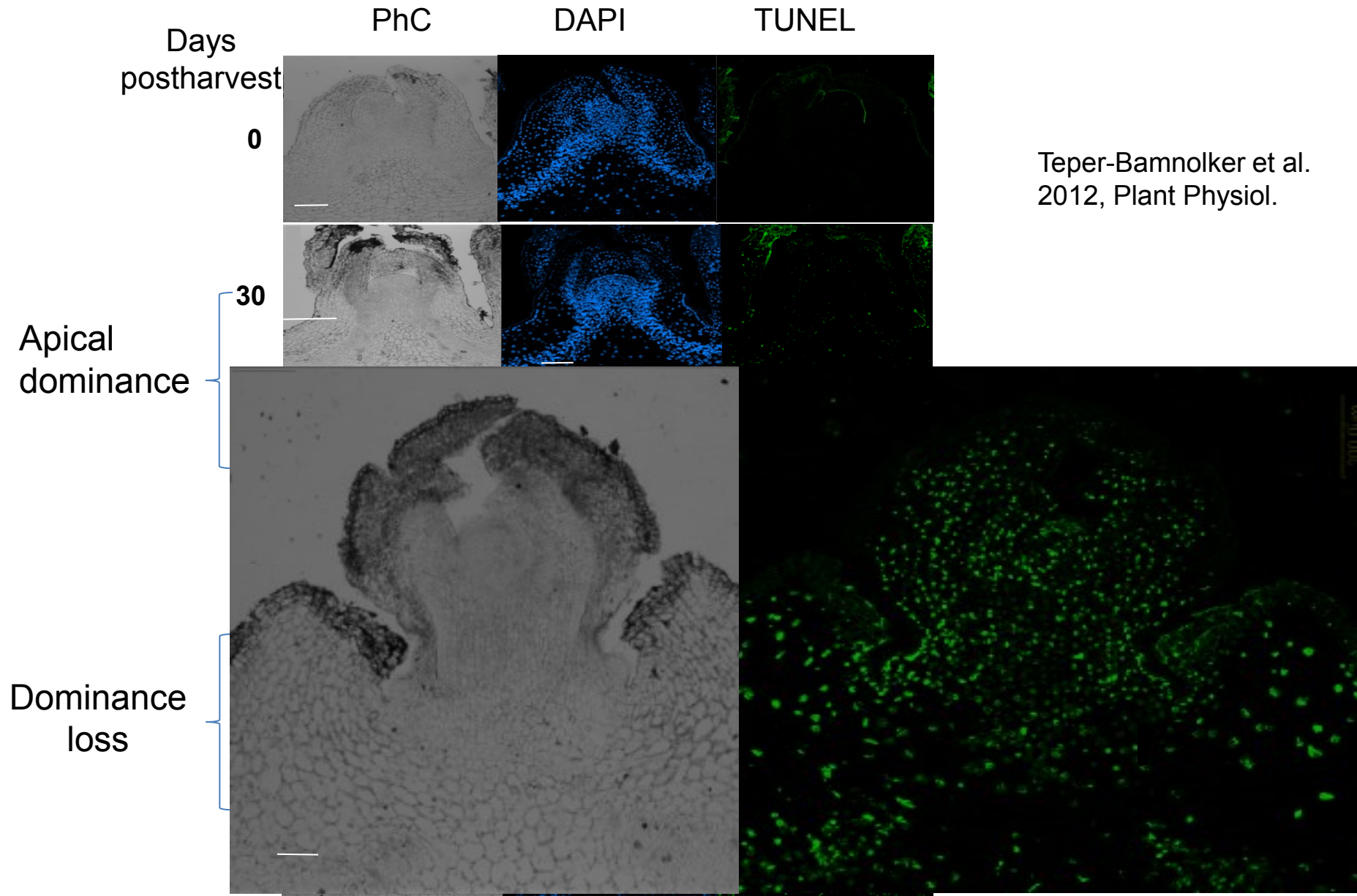


- Swollen stem
- Harvested in dormant physiological state
- When dormancy is released the tuber is sprouting

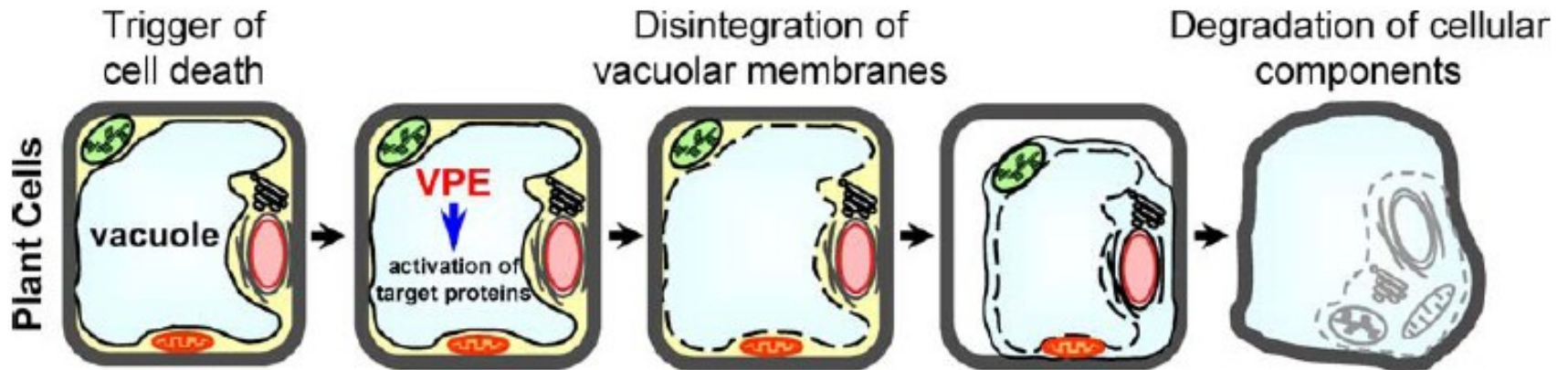
Dominance of the tuber apical meristem (TAM)



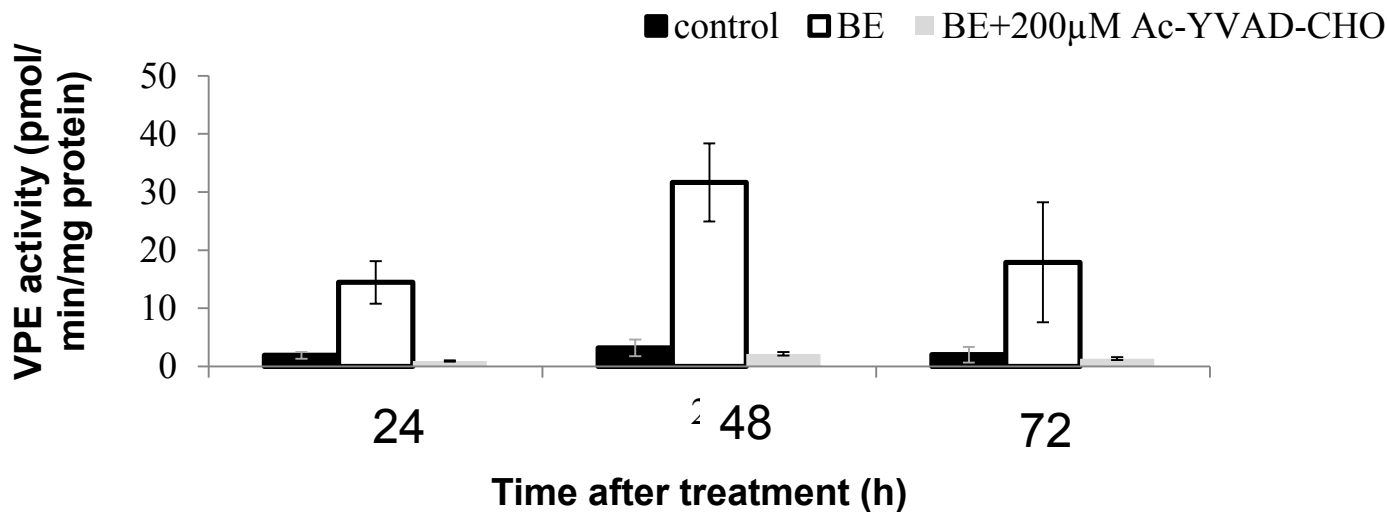
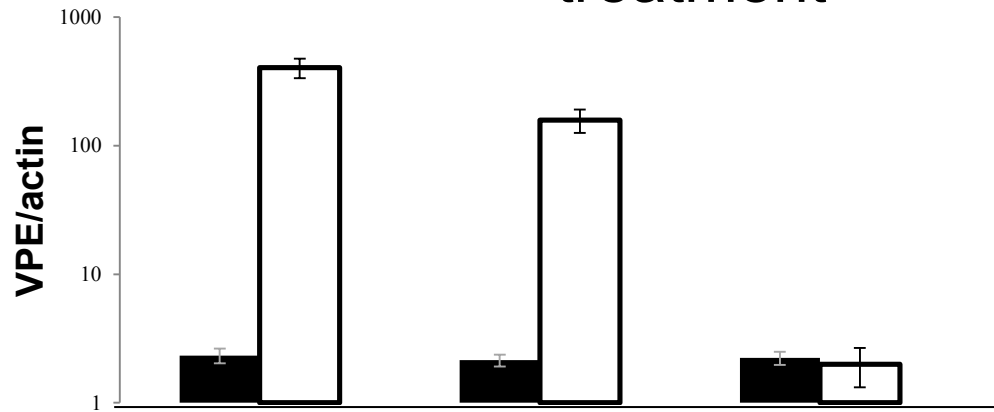
Cold temp induce PCD in the TAM in correlation to loss of AD



VPE targets to vacuole as a key molecule in vacuolar collapse



VPE expression and activity in TAM cells following BE treatment



Industrial storage methods

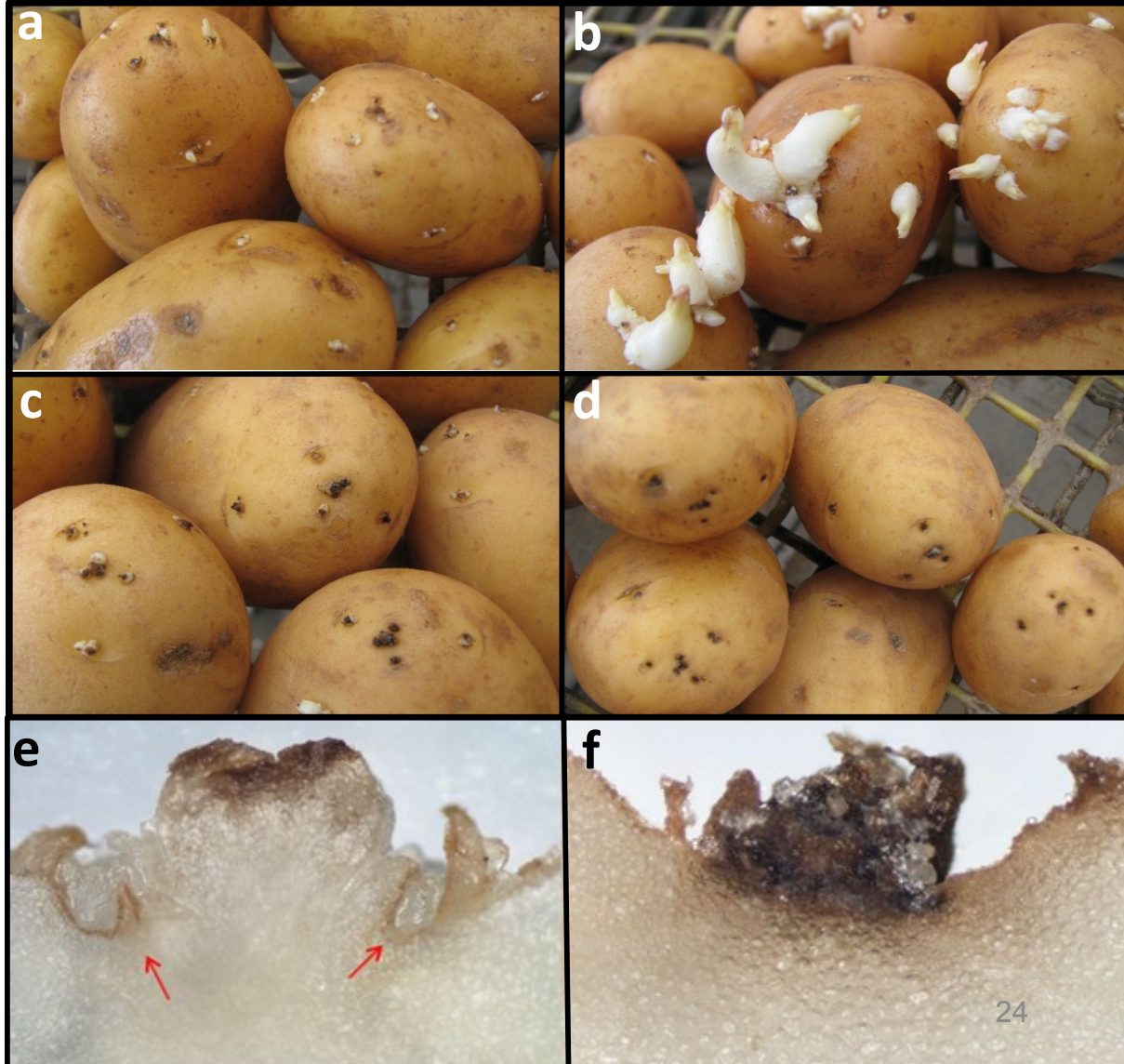
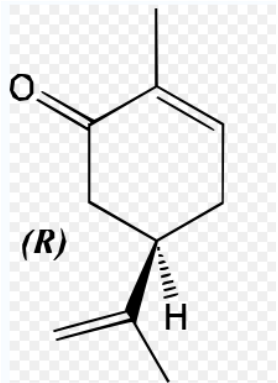
500-1800 ton
Plenum



Mint essential oil can induce or inhibit potato sprouting by differential alteration of apical meristem

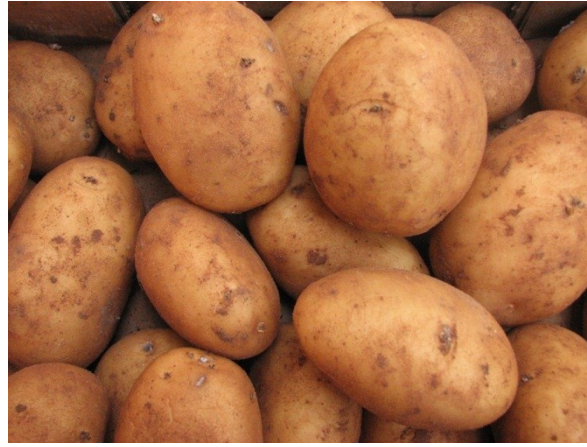
Paula Teper-Bamnlker • Nativ Dudai •
Ravit Fischer • Eduard Belausov • Hanita Zemach •
Oded Shoseyov • Dani Eshel

(Planta 2010)



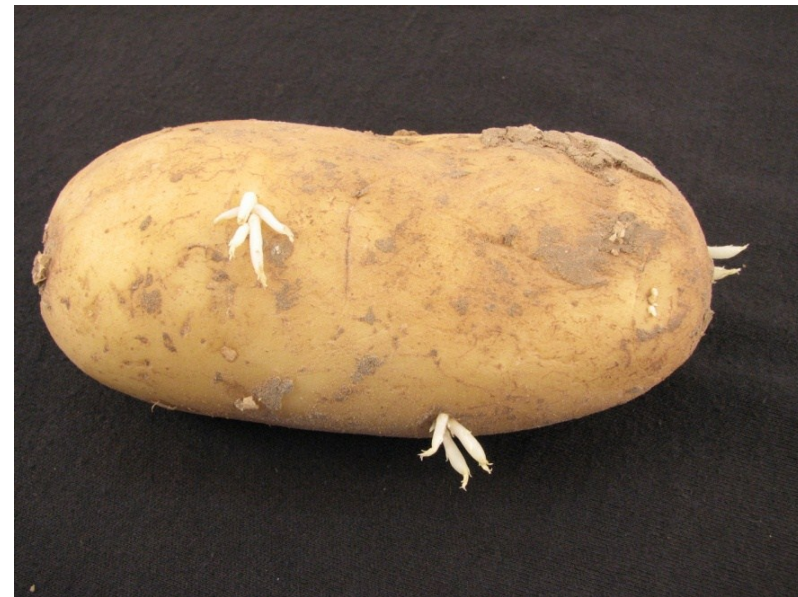
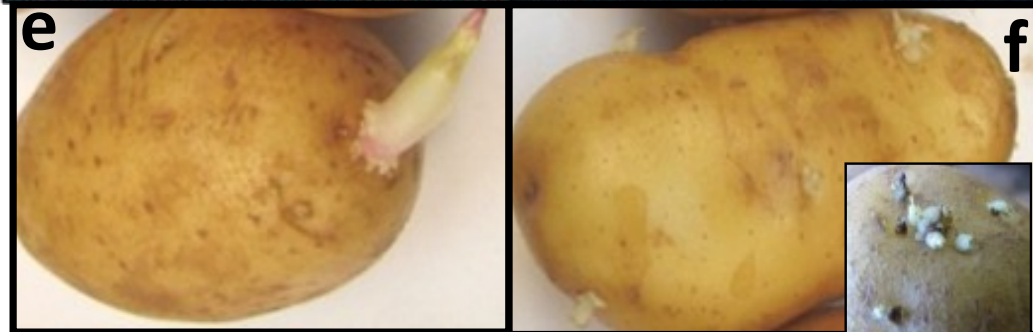
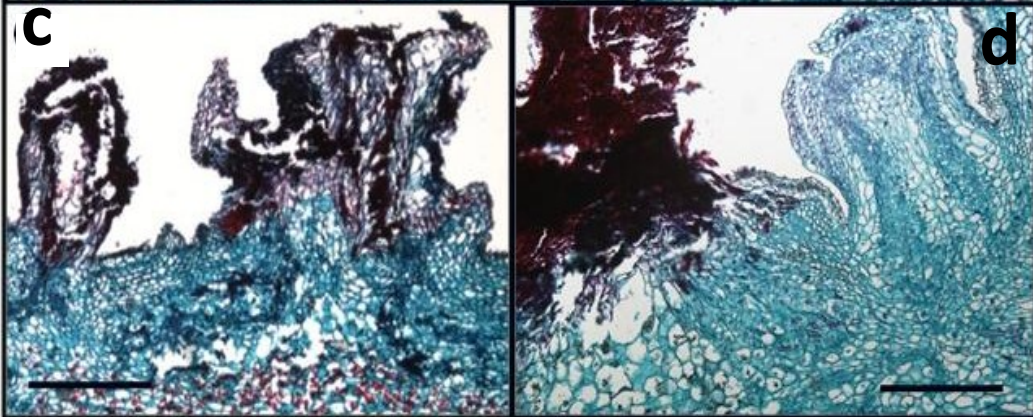
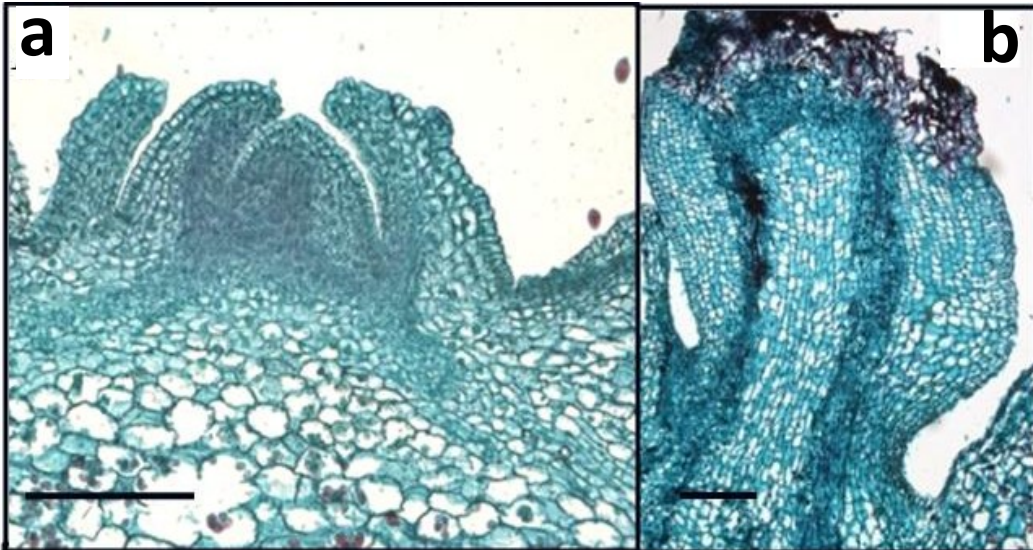
Natural sprout inhibitors

Tea tree oil



smartblock
POTATO SPROUT INHIBITOR





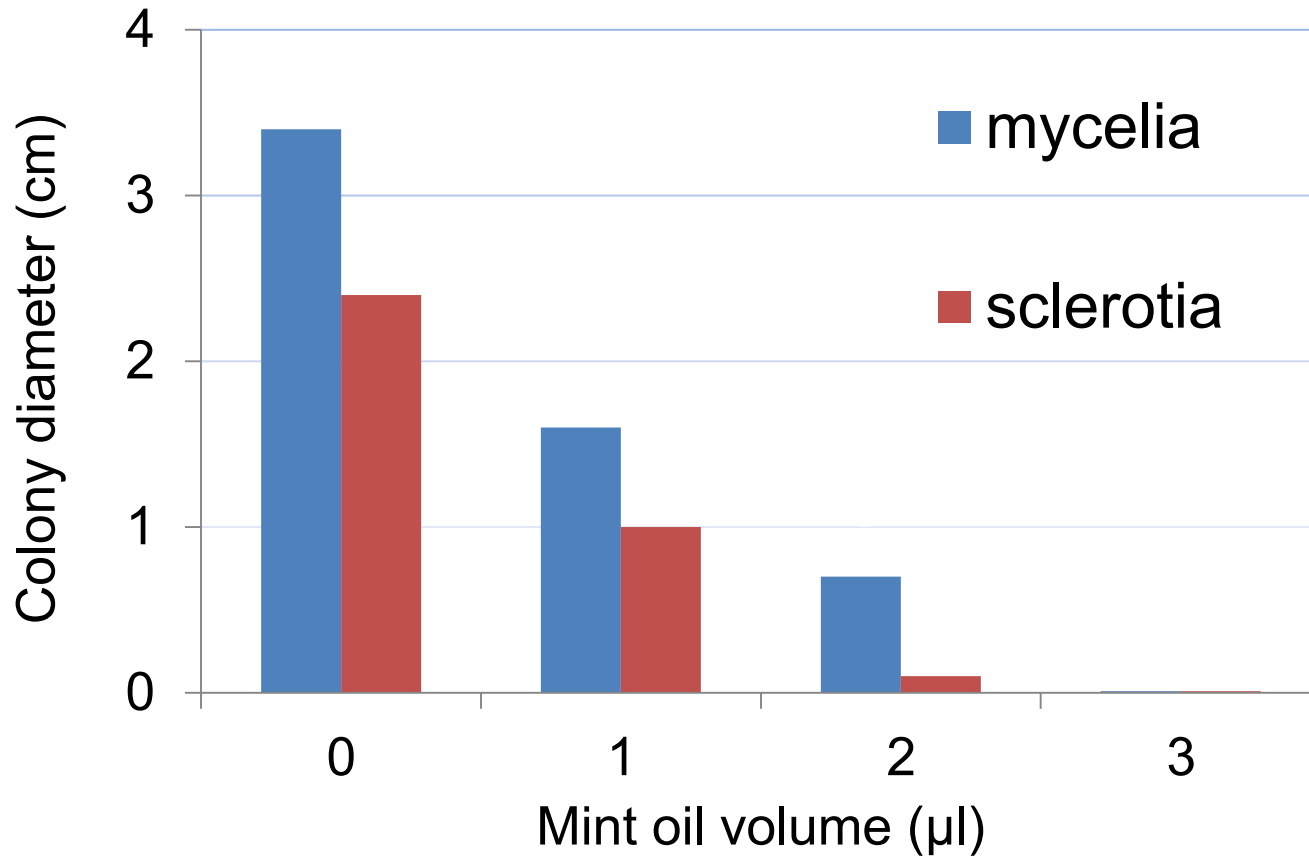


Curing

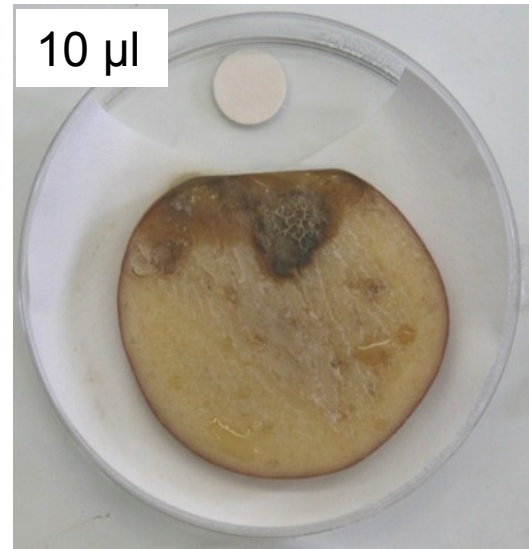
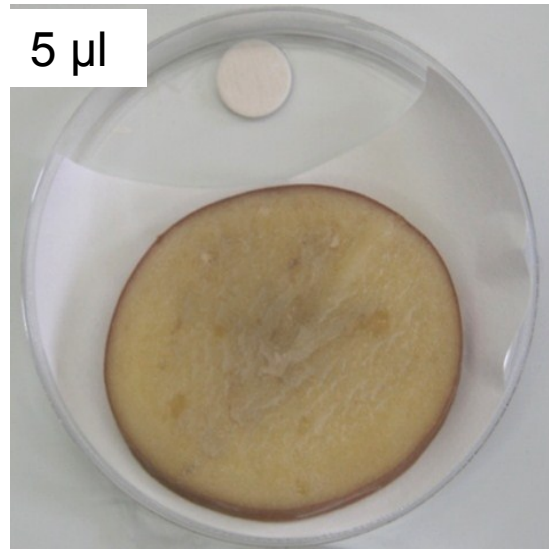
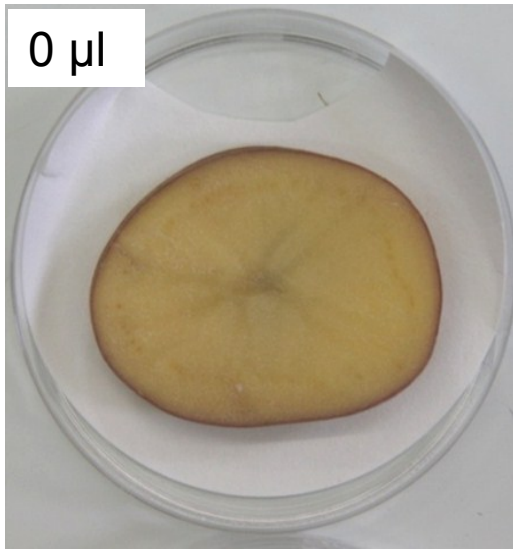
**Sprouting
control**

**Disease
control**

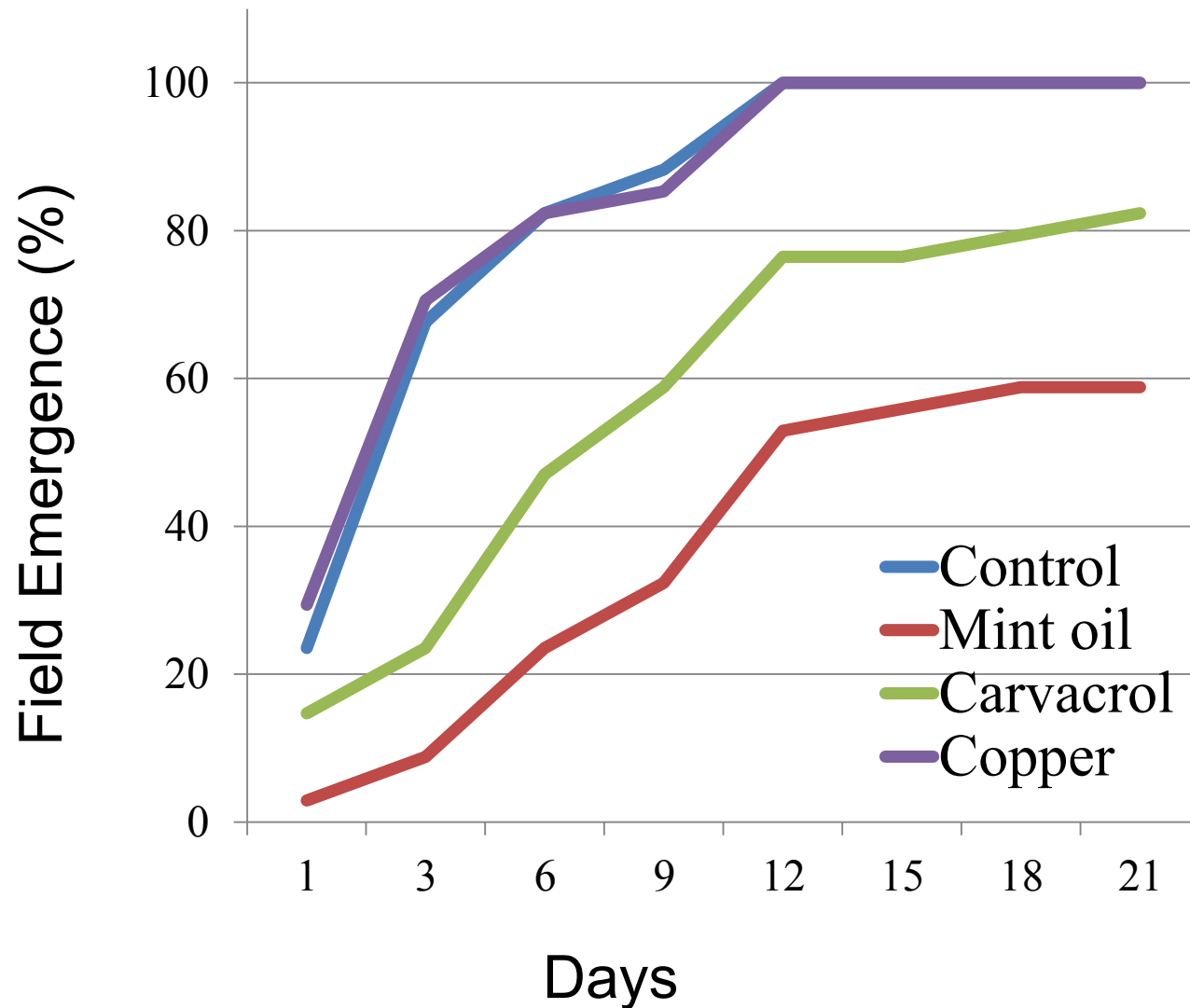
Inhibition of *R. solani* mycelial and sclerotial growth by mint essential oil vapor



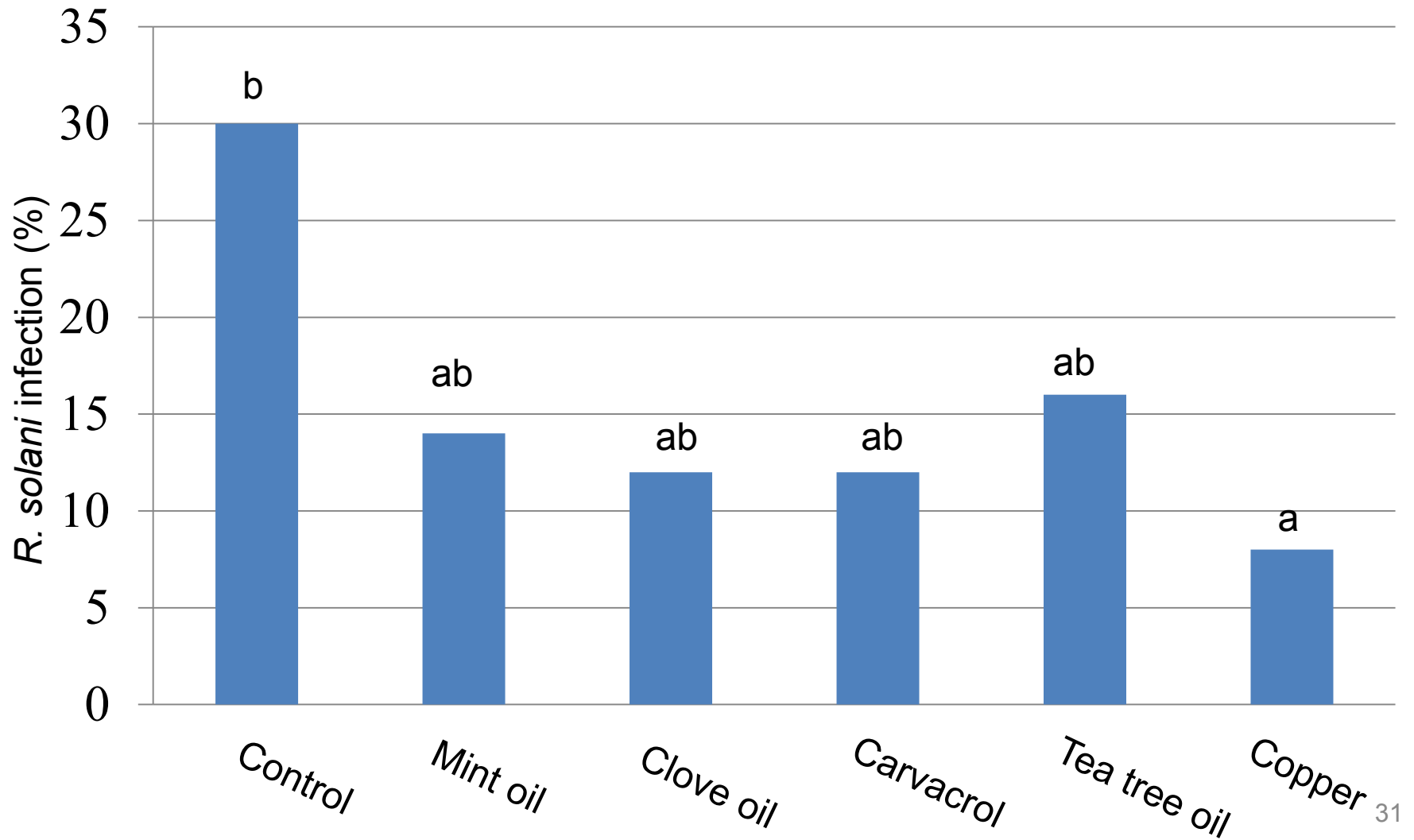
Essential oil damage



Effect of essential oil treatment of tuber-seeds on their field emergence

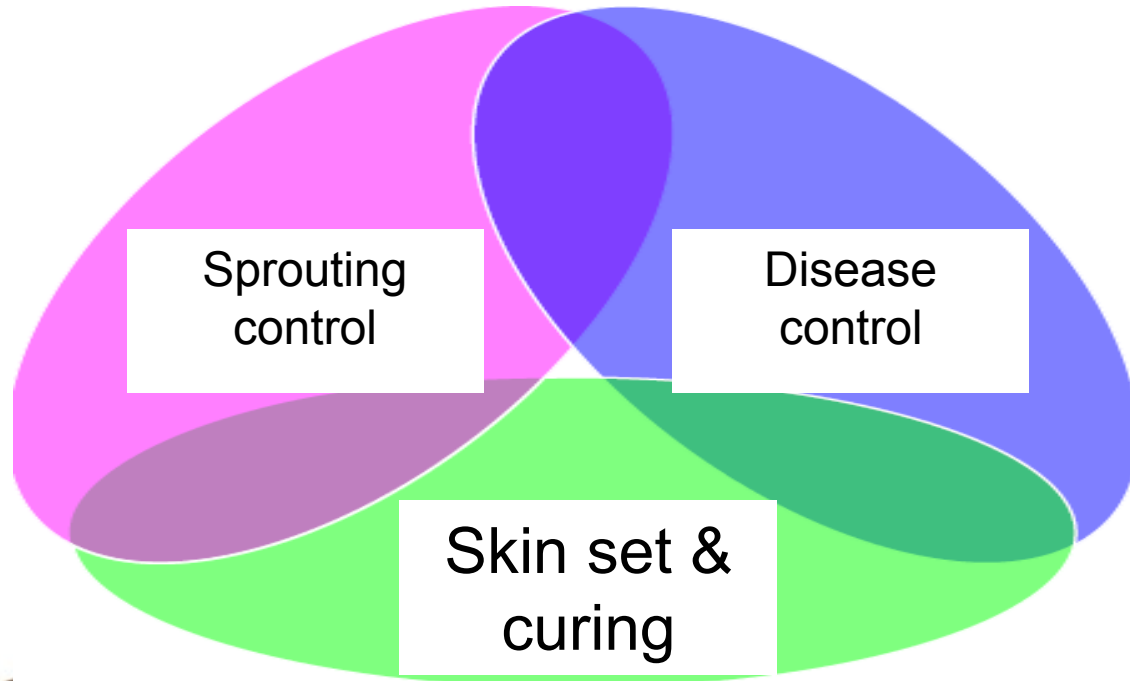


Control efficiency of essential oils





Conclusions



The Volcani Center, ARO, IL

Lea Tsrur
Idit Ginzberg
Amnon Lers

HUJI, Rehovot, IL

Saul Burdman
Naomi Ori

**Hevel Maon Enterprises,
Negev, Israel**

Uri Zig
Shimon Warshavsky



Absalon

© Courtesy of the artist & KW Institute for Contemporary Art

Thank you

