

Update on Diseases of Coastal Vegetables

**Steven Koike
UC Cooperative Extension
Monterey County**

CA / AZ : Proliferation of new spinach DM races

R2

R3

R4

R5 R6

R7

R9

R10

R11

R12

R13

R14



Spinach downy mildew races

1990

'08

'09

' 10

‘12

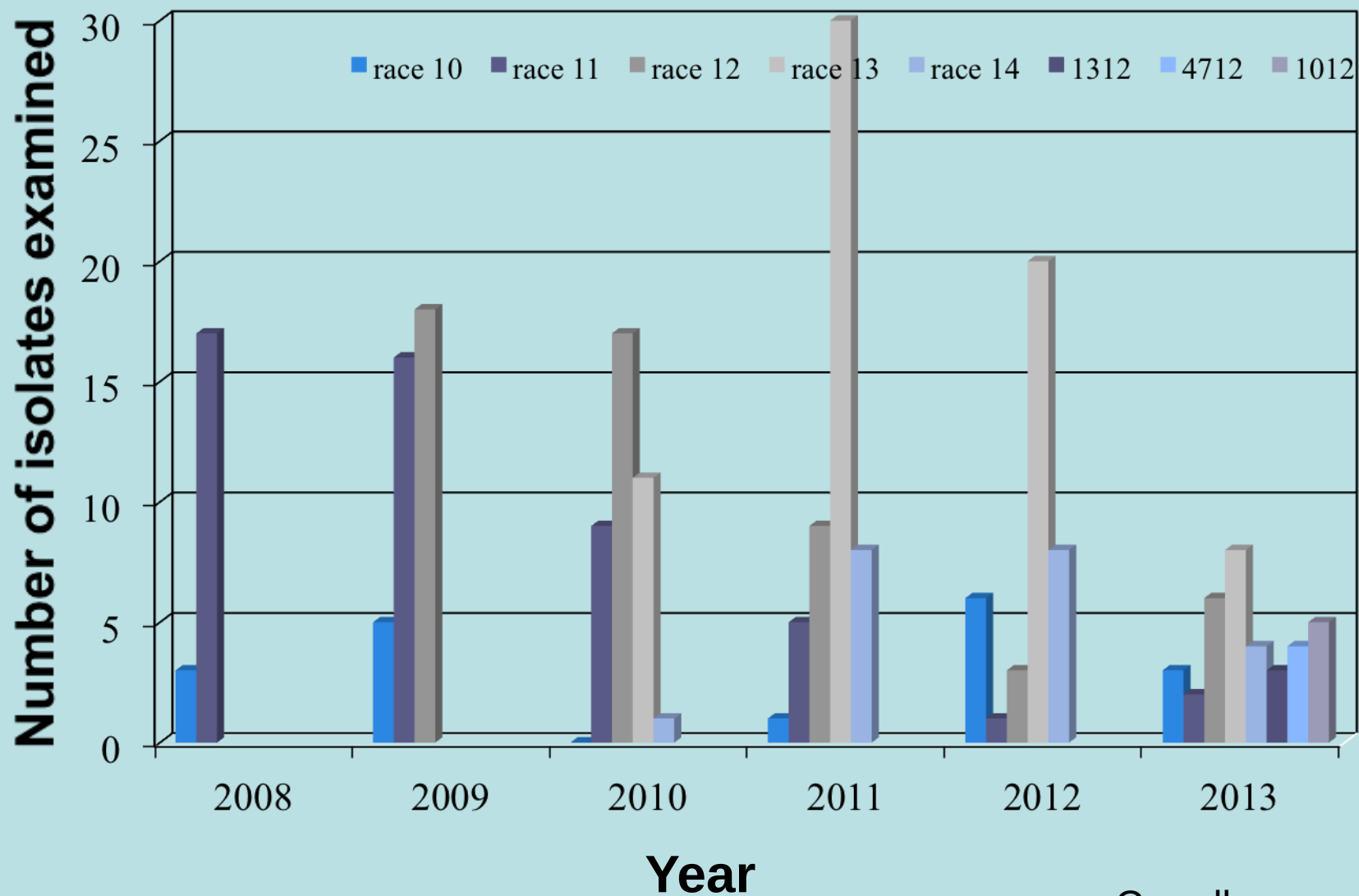


Disease reactions of spinach differentials for race identification of downy mildew (Correll)

[illegible]

2013-2014 Summary

- **Races 10, 11, 12, 13, 14, and UA4712 (R 15)**
 - All present and detected
 - Greater diversity than seen in previous years
 - More mixtures (multiple races in field)
- **Main deviating isolates**
 - UA4712 (R 15), UA2213, UA1312, UA1012

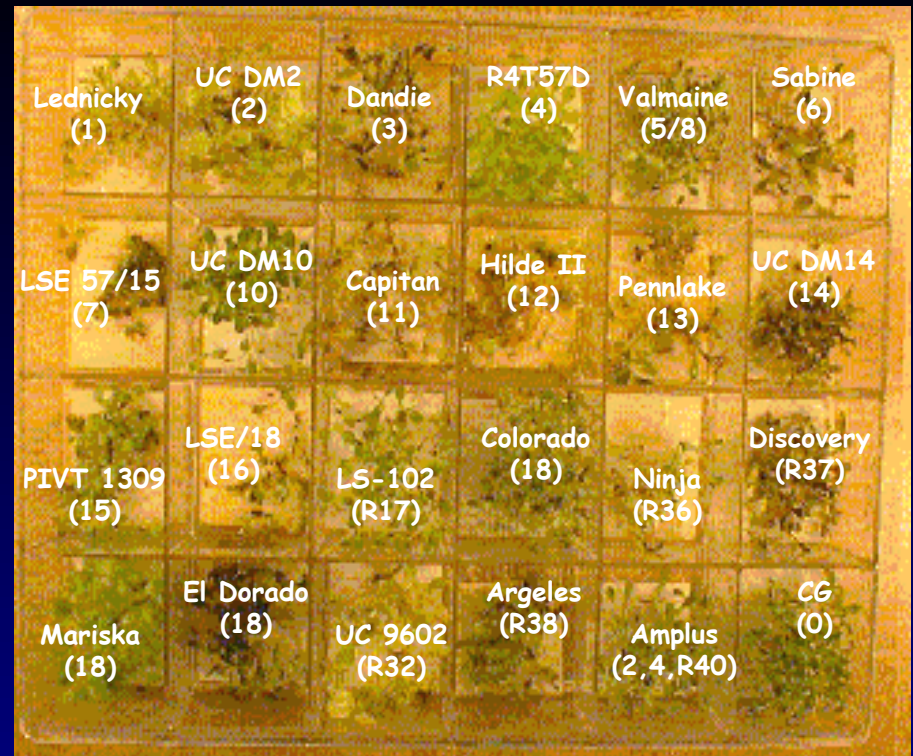


Correll



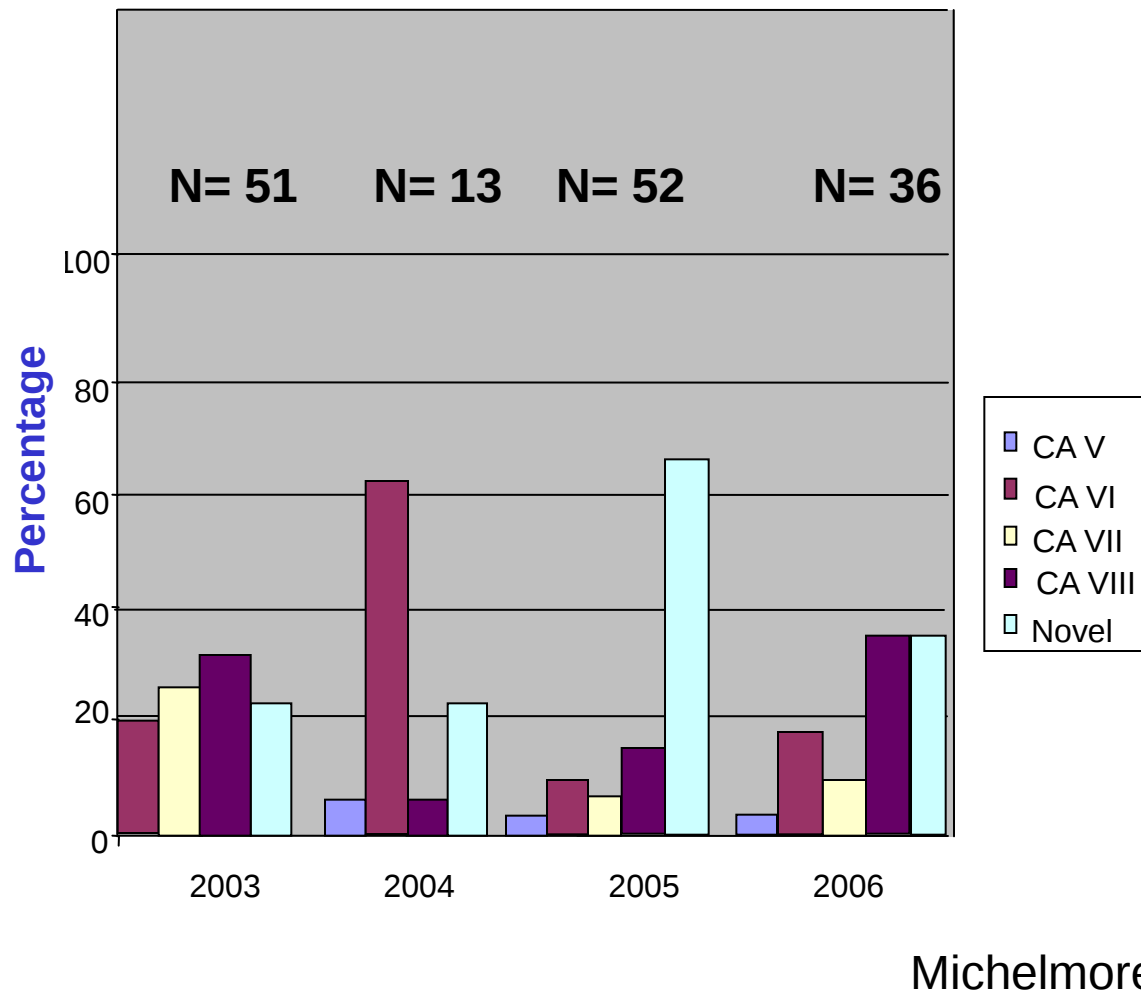
Resistant →

**Lettuce differential
cultivars for determining
downy mildew pathotypes**



**Susceptible
reaction**

Frequency of DM Pathotypes: 2003-2006



2014
New race:
CA IX?

Downy mildew management options

- Resistant spinach cultivars
- Cultural practices (?)
 - Crop rotation
 - Reduce “green bridges”
- Chemicals and other applied materials
 - Seed treatments
 - Fungicides: conventional or organic
 - Biological agents (?)



TSWV



TSWV



TSWV





ApVY



Copyright © 2007 The Regents of the University of California. All rights reserved.



Copyright © 2007 The Regents of the University of California. All rights reserved.



Copyright © 2007 The Regents of the University of California. All rights reserved.



**Fusarium wilt of
cilantro**

Impact of Soilborne Strawberry Diseases on Vegetable Crops:

Macrophomina

Fusarium

Verticillium

Vegetable grower question:

**If a strawberry field had one of these
problems, can I safely follow with a
vegetable crop?**

Verticillium wilt



Coastal CA Verticillium Diseases

<u>V. source</u>	<u>lettuce</u>	<u>strawb</u>	<u>pepper</u>	<u>cauliflower</u>
lettuce	++++	+++	+	0
strawberry	+++	++++	+	+
pepper	+	+	++++	+
cauliflower	0	+	+	++++

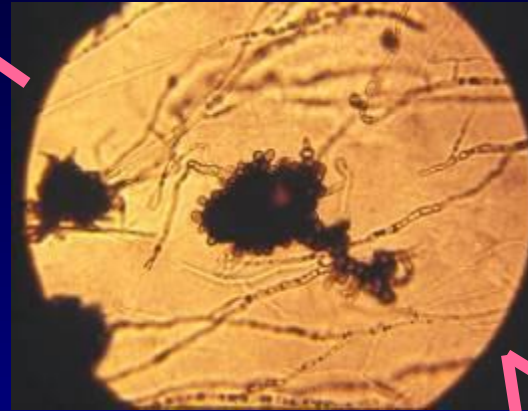
+++ / ++++ = severe disease

+ = minimal symptoms

0 = no disease

Note: This is not a host range table.

Verticillium wilt







Fusarium wilt

**Fusarium oxysporum
f. sp. fragariae**









Charcoal rot

2005

2005

2013

2013

Macrophomina: July 26



Macrophomina root inoculation

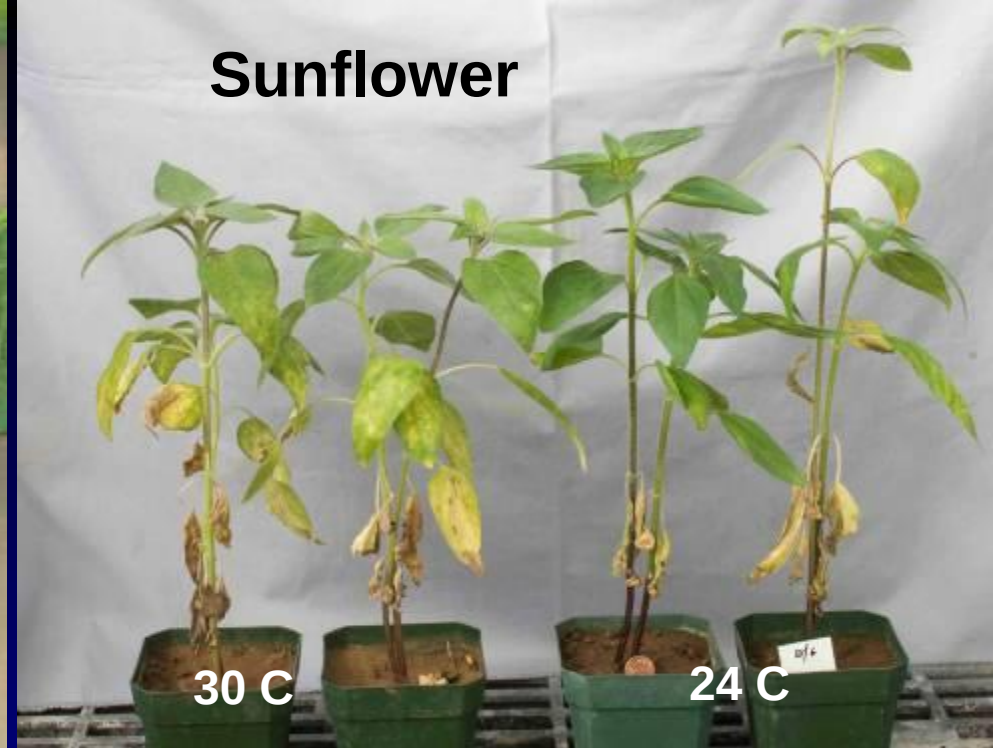
<u>Plant</u>	<u>Root necrosis</u>	<u>Foliar symptoms</u>	<i>M. phaseolina</i> <u>re-isolated</u>
Bean	no	no	(no)*
Corn	no	no	no
Cotton	no	no	no
Soybean	no	no	no
Sunflower	no	no	(no)*
Watermelon	no	no	no
Strawberry	yes	yes	yes
Straw. (ctrl)	no	no	no

* No necrosis; 1 positive re-isolation/50 root pieces.

Soybean



Sunflower





**Crown inoculation with
infested toothpicks**

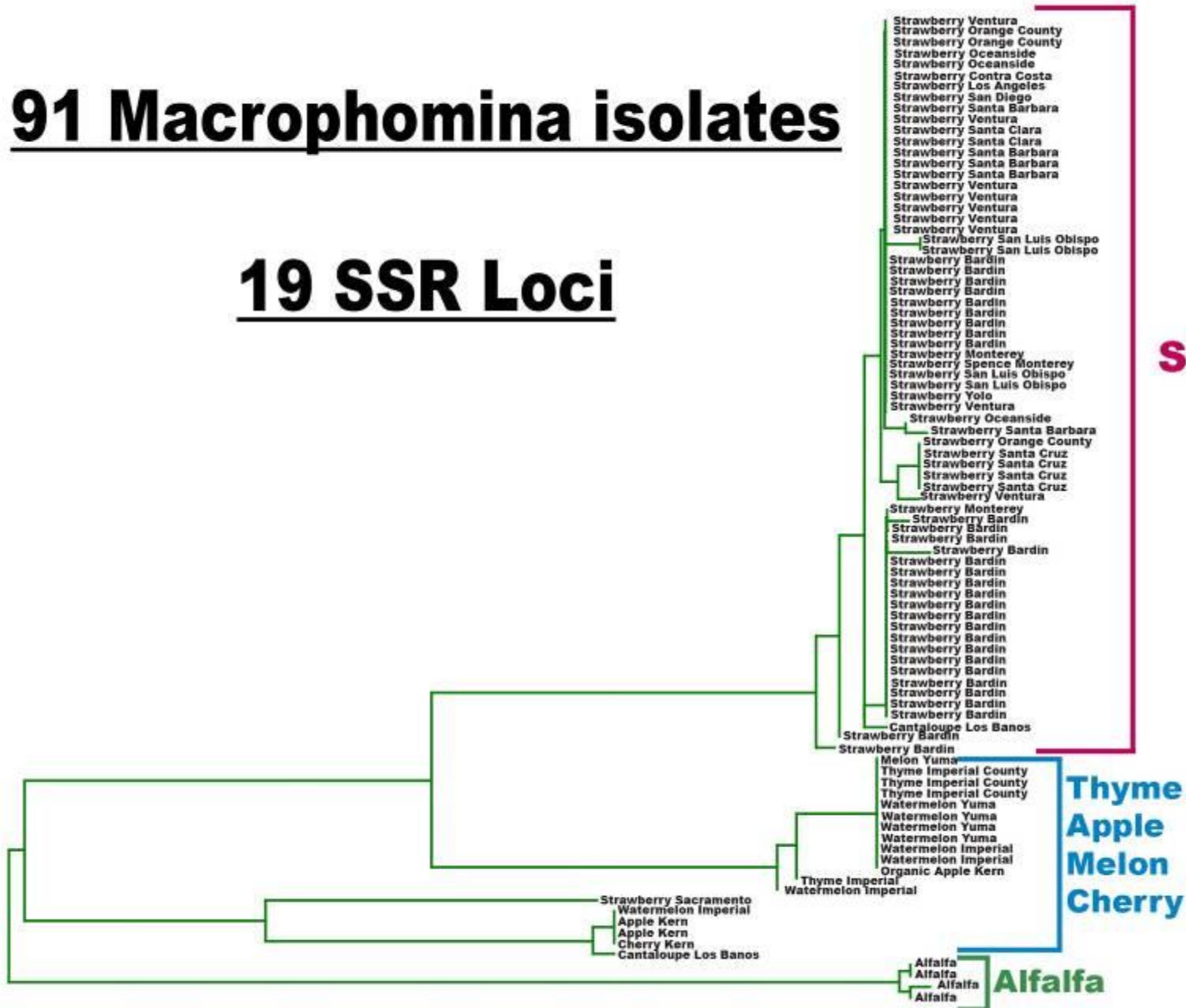


Macrophomina crown inoculation

<u>Host</u>	<u>Crown necrosis</u>	<u>Collapse symptoms</u>	<i>M. phaseolina</i> <u>re-isolated</u>
Bean	no	no	no
Corn	no	no	no
Cotton	no	no	no
(Pea)	...	...	...
Pepper	no	no	no
Potato	no	no	no
Sunflower	no	no	no
Tomato	no	no	no
Strawberry	yes	yes	yes
Straw. (ctrl)	no	no	no

91 Macrophomina isolates

19 SSR Loci



Circumstantial evidence from the field:

Reported hosts grown in strawberry regions

- Asparagus
- Bean
- Beet
- Carrot
- Corn
- Garlic
- Lettuce
- Onion
- Pea
- Pepper
- Strawberry
- Sunflower
- Tomatillo
- Tomato

Circumstantial evidence from the field:

Regional crops infected with *Macrophomina**

- Asparagus
- Bean
- Beet
- Carrot
- Corn
- Garlic
- Lettuce
- Onion
- Pea
- Pepper
- **Strawberry**
- Sunflower
- Tomatillo
- Tomato

* UC Cooperative Extension Diagnostic Lab, Salinas CA

Conclusions: Can vegetable crops follow diseased strawberry plantings?

- **Strawberry *Verticillium***: depends
 - If strawberry then lettuce: could be trouble
 - If strawberry then cauliflower: no problem
- **Strawberry *Fusarium***: no problem
 - Strawberry *Fusarium* only infects strawb.
- **Strawberry *Macrophomina***: probably ok
 - Strawberry *Mac.* seems to prefer strawb.

平

