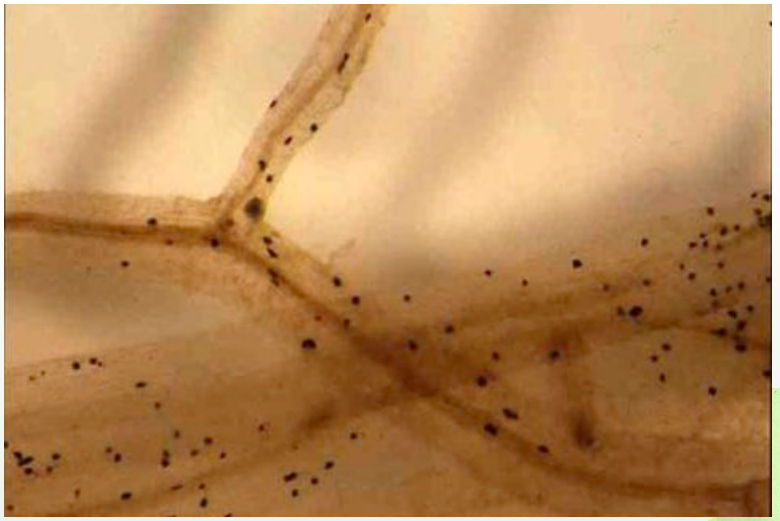
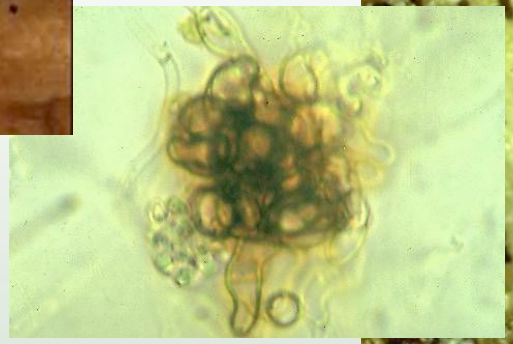
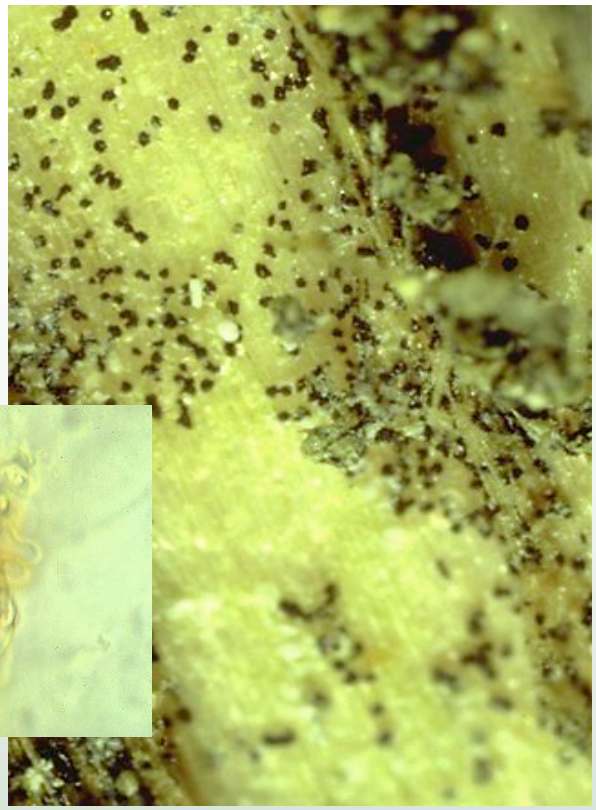
Verticillium dahliae races 1 and 2

- ‘V’ shaped chlorosis followed by necrosis
- light vascular discoloration
- wilting and premature senescence





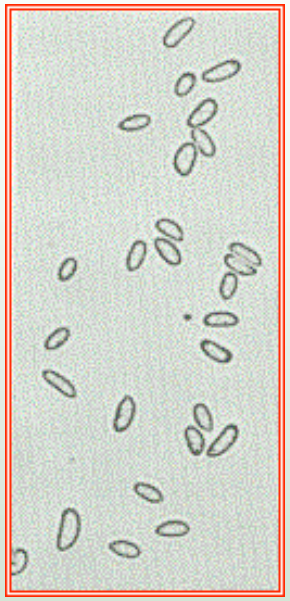


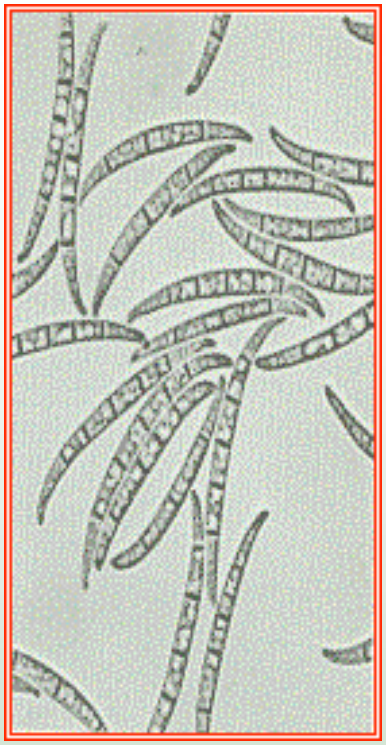
microscleroia
up to 2400/g soil

conidia

Fusarium oxysporum races 1, 2, and 3

- yellowing of branches and leaves
- dark vascular discoloration
- general wilting often leading to necrosis/death





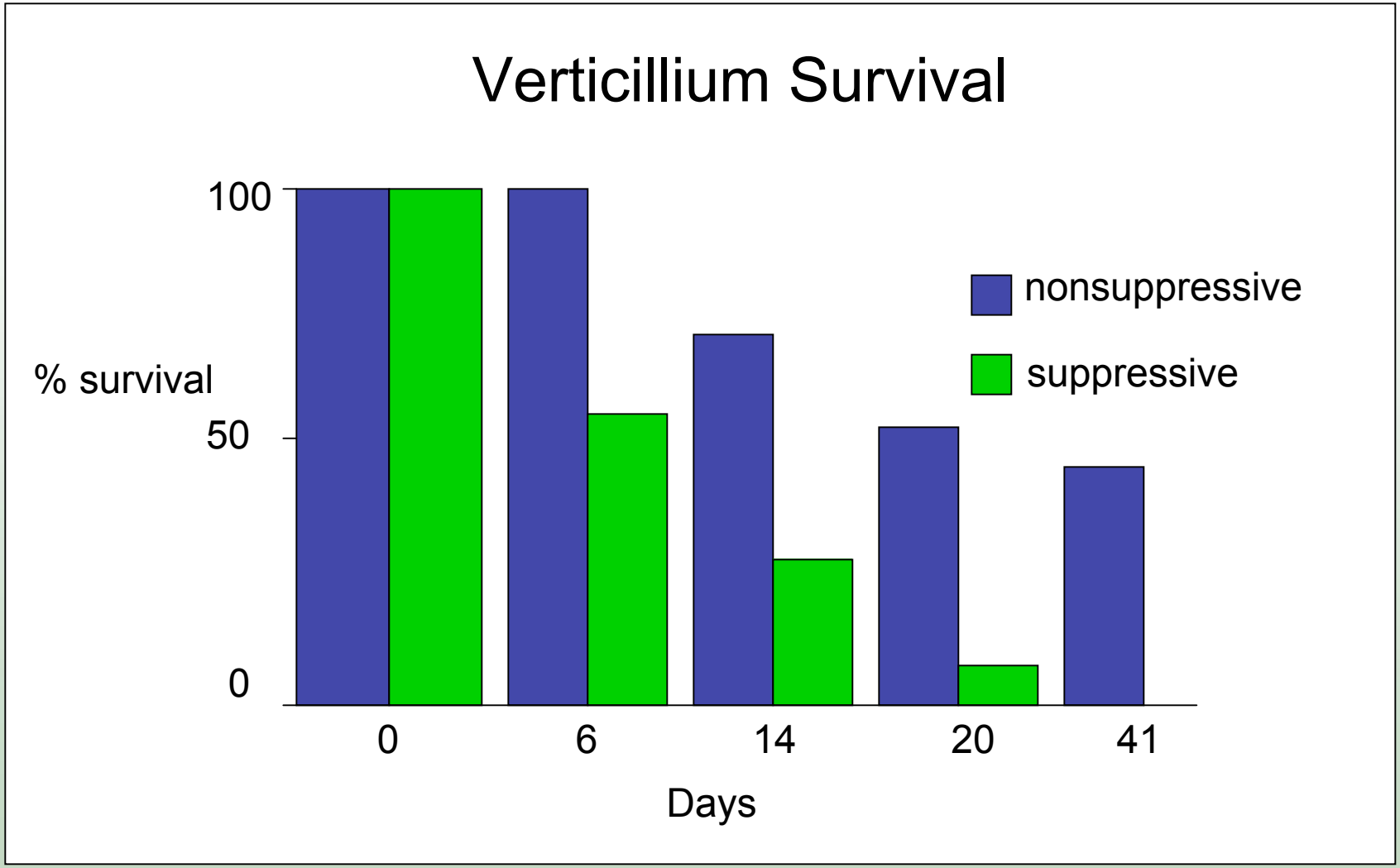
Microconidia, macroconidia, and chlamydospores

Dissemination

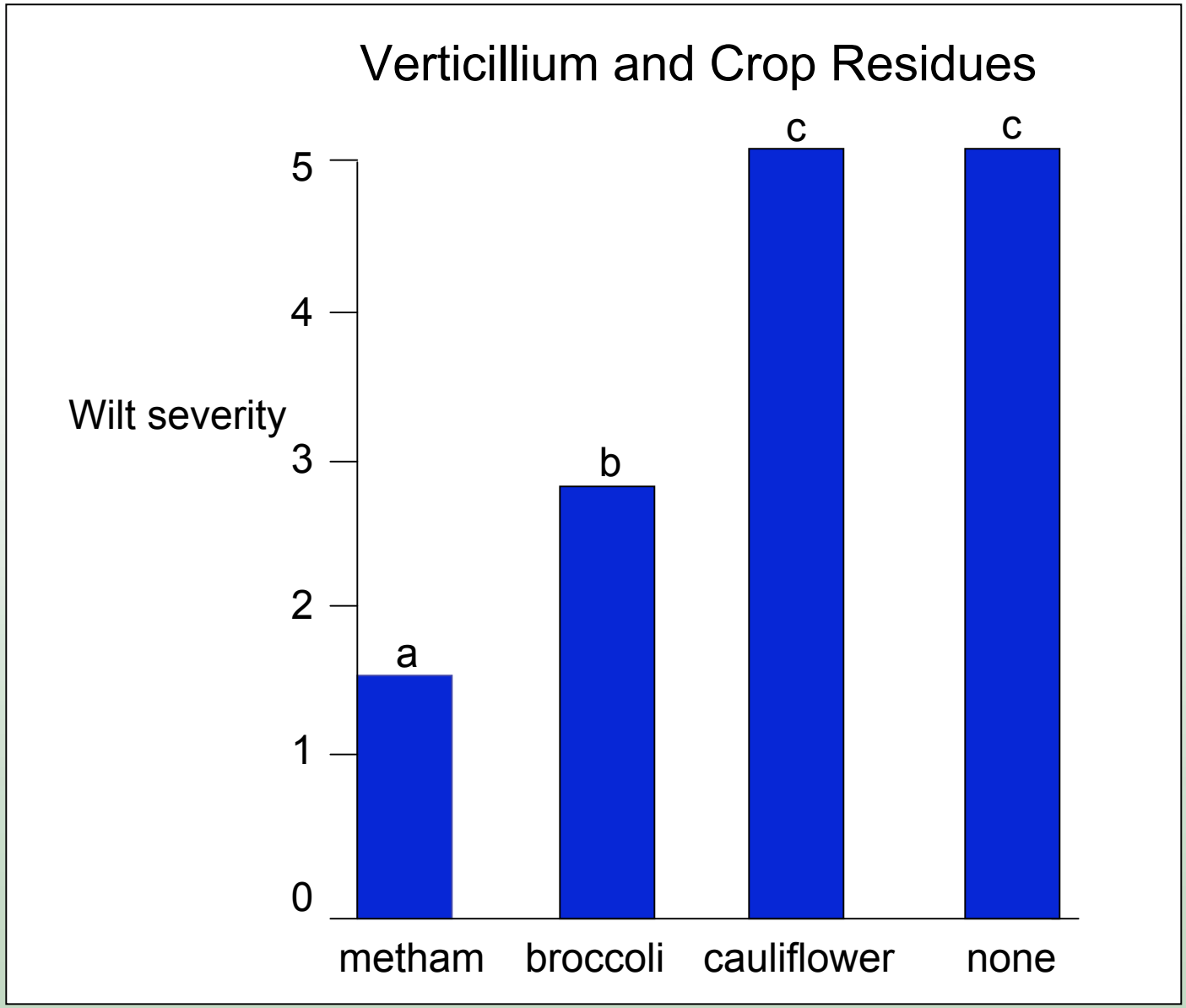
- seed (rare)
- soil
- implements
- water
- crop residue

Management

- Resistance
- Sanitation
- 5-7 year crop rotation

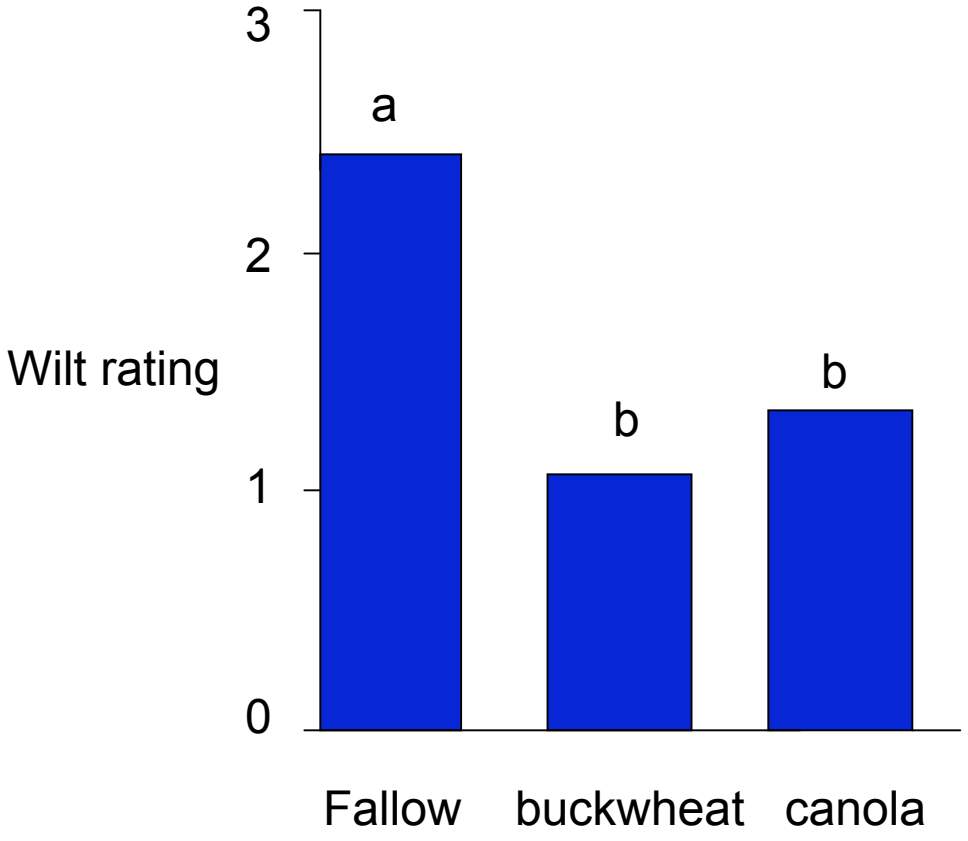


Jiarong et al. 2004. Phytopathologica 34:180-3

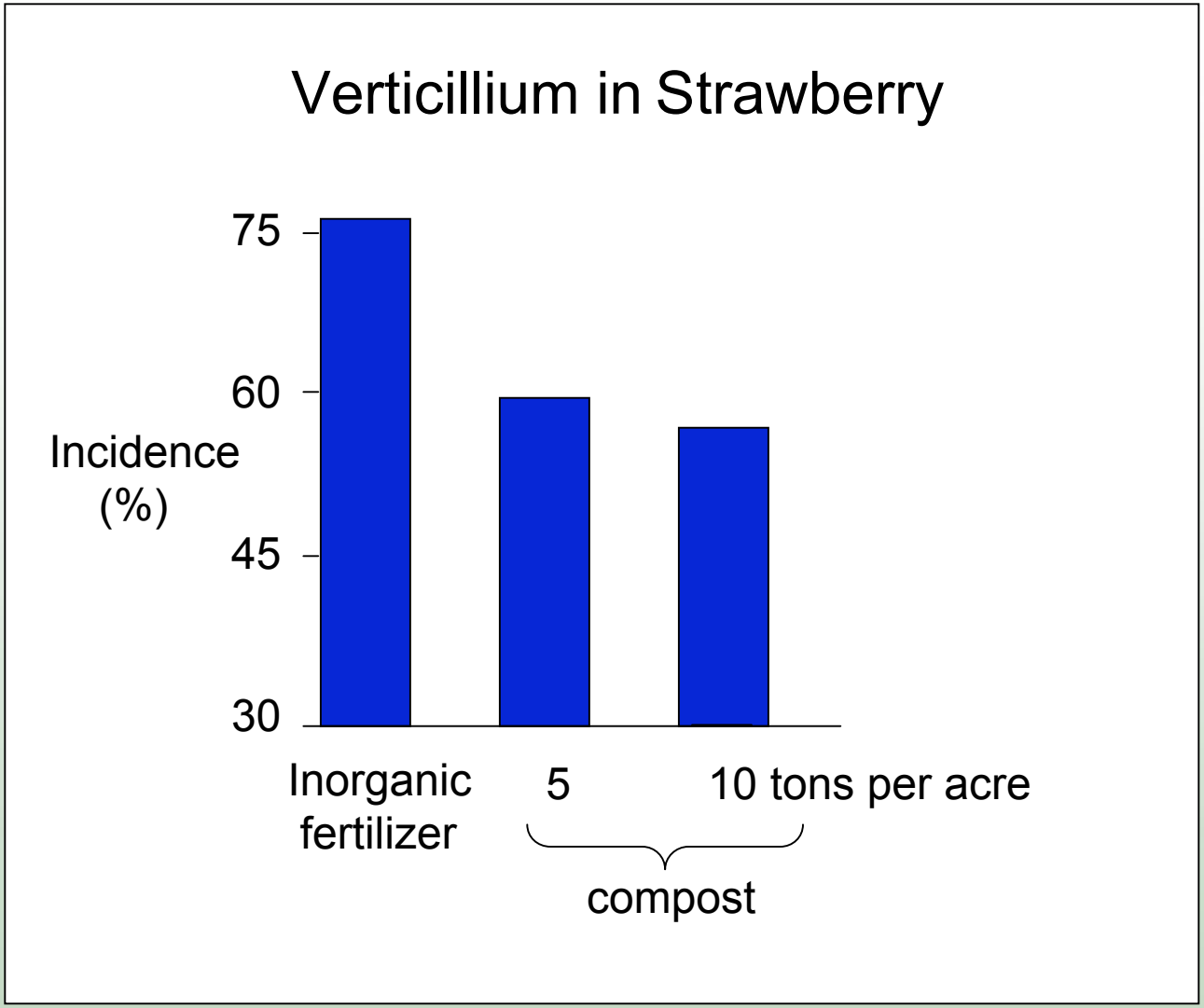


Subbarao et al Plant Disease 83:124-9

Verticillium wilt of potato



Becker field trial 2002



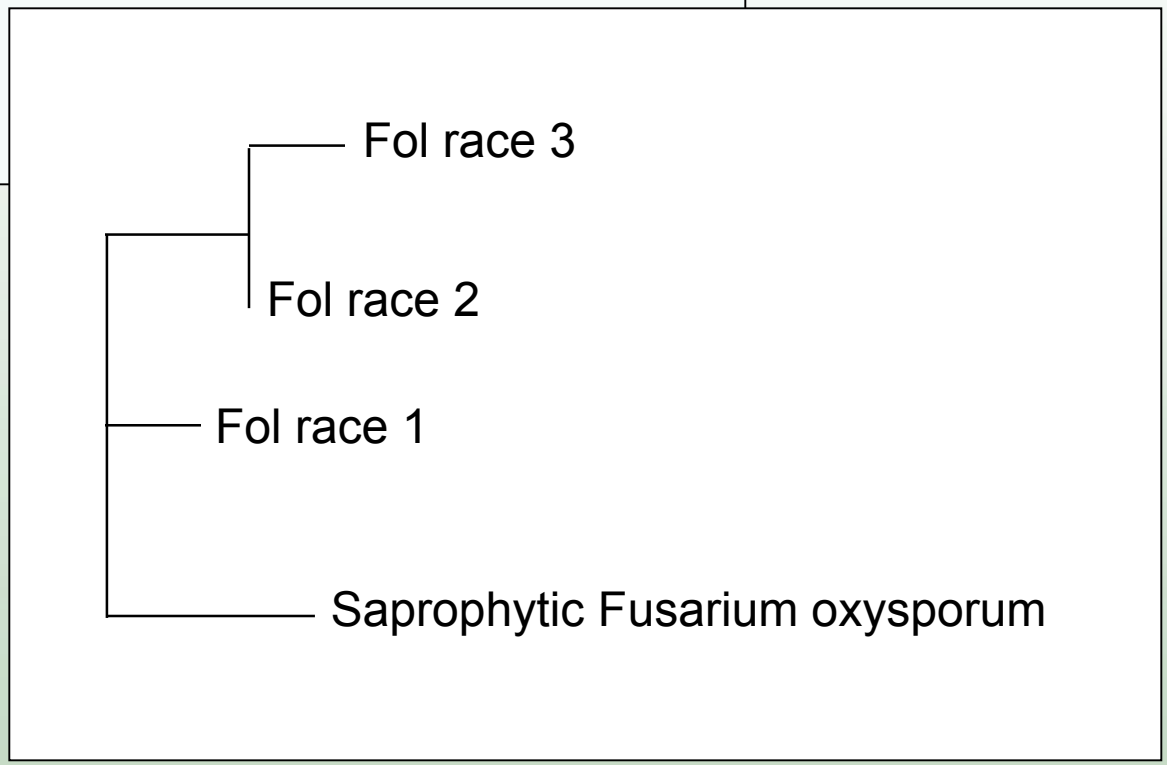
Chaoui et al, 2002 Proc. Brighton Crop Protection Conf.- Vol II, 8B-3, 711-716

Soil property	Manure	Compost	Cover Crops	Tillage	Verticillium
pH	>	>	<	no effect	no effect
Available nutrients	>	<	mixed effects	mixed effects	>
Total C	>	>	neutral	<	<
Water holding cap.	>	>	>	mixed effects	>
Aggregate stability	>	>	>	<	no effect?
Microbial activity	>	>	>	<	<

From one Sutter Basin field,

36 Fusarium oxysporum f. sp. lycopersici isolates

- 13 race 3
- 22 race 2
- 1 race 1



Cai, Miyao, et al. 2003 Phytopathology 93:1014-1022

Mustard produces ~ 4 gpa of Vapam
< 10% of metham application rate

Hartz et al. 2005. Hortscience 40:2016-19

	Fusarium-infected plants (%)
No cover crop	52
Caliente mustard	70

Miyao et al, 2007. CTRI

Fusarium wilt evaluation, Beeman Farms, Elkhorn, 2007

Variety		yield (t/A)	wilt potential high	wilt potential low	wilt incidence (%)
CXD 242	VFFF3NP	50 a	55 b	46	0
HMX 4798	VFFF3NP	48 ab	46 ab	51	0
AB 2	VFFP	48 ab	43 ab	54	55
Heinz 9663	VFFNP	41 b	36 a	46	54

Fusarium wilt

favored by:	suppressed by:
ammoniacal nitrogen	nitrate nitrogen
acid soils	alkaline soils
80-90 F	60-70 F
sandy soils	microbially rich soils

Verticillium wilt

favored by:	suppressed by:
nitrate nitrogen	ammoniacal nitrogen
alkaline soils	acid soils
65-80 F	80-90 F
	microbially rich soils