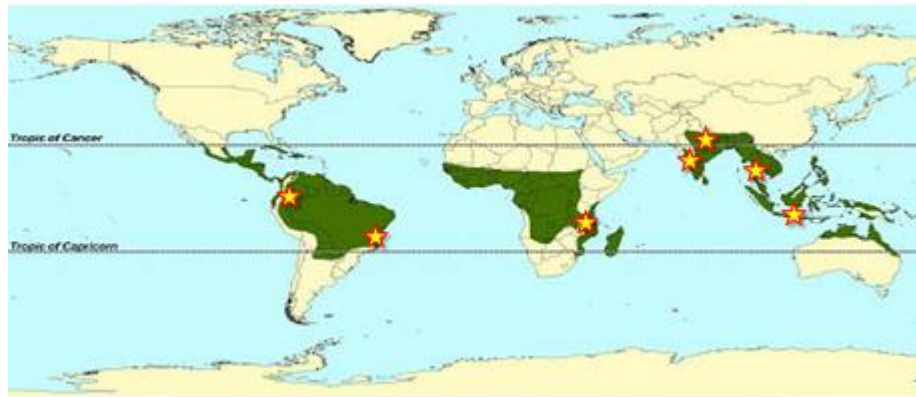


# Grape growing and winemaking



Tropical viticulture



# Tropical viticulture

## E. Fungus control



# Downy mildiou/*Plasmopara viticola*

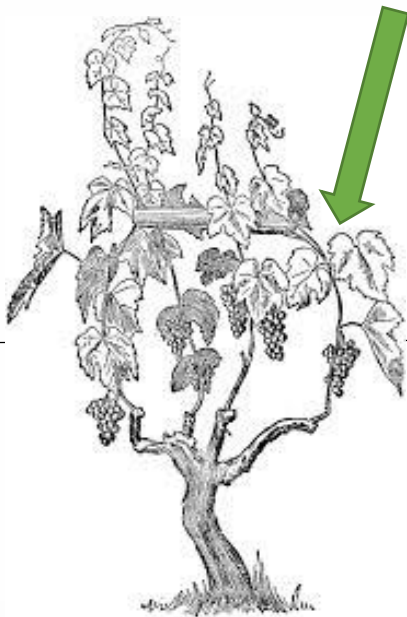
The only real fungus problem

|                                |                   |            |              |             |
|--------------------------------|-------------------|------------|--------------|-------------|
| <i>Plasmopara<br/>viticola</i> | valse<br>meeldauw | Le mildiou | Downy miliou | Peronospora |
|--------------------------------|-------------------|------------|--------------|-------------|



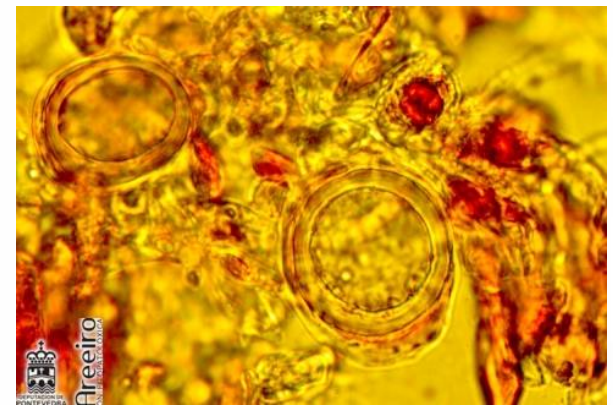
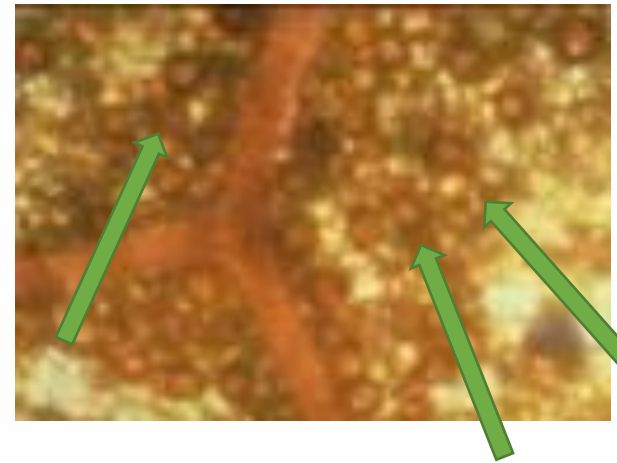
# Oospores

They are formed in late summer (when temperature drops).



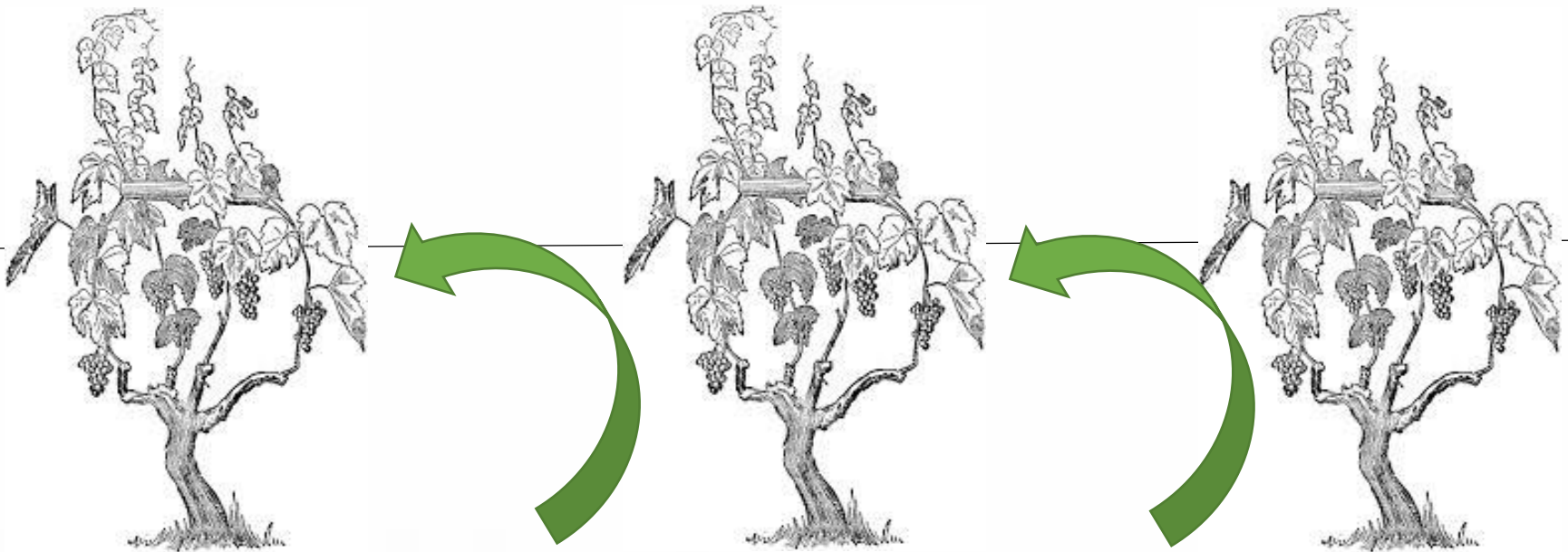


# Oospores



# Oospores

They overwinter and mature in/on the soil, in the following years they germinate and start infections (not only one primary infection, but several)



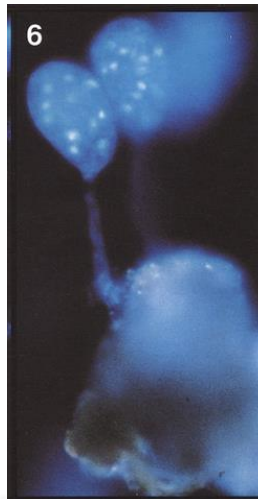
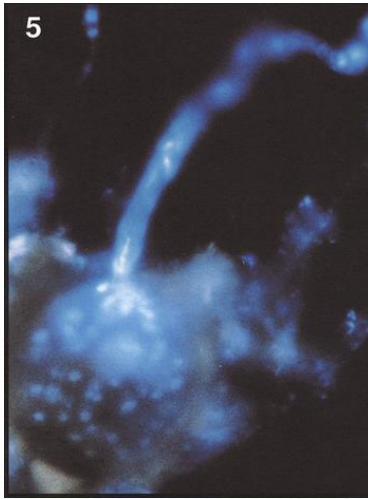
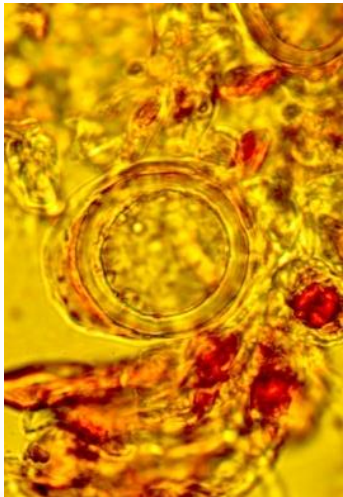


# Germination of oospores

They germinate when the sum of hours at the right conditions reaches a threshold

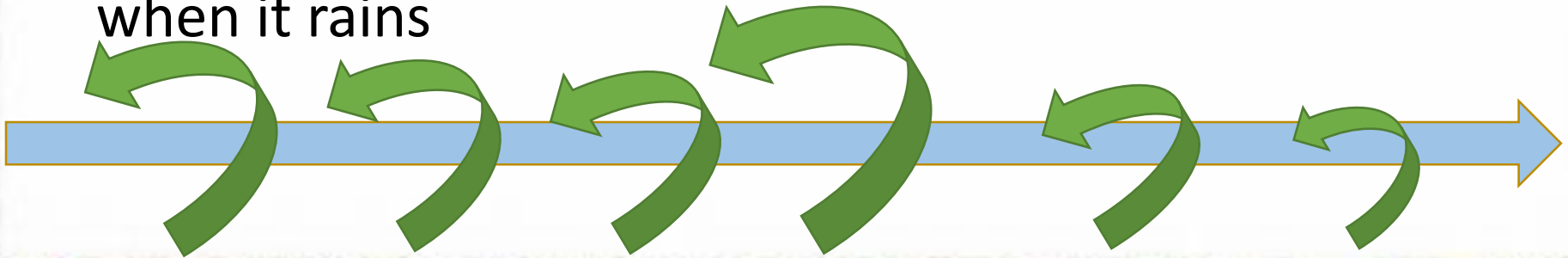
They produce a sporangium

which reach the leaves (sporangium or zoospores?)

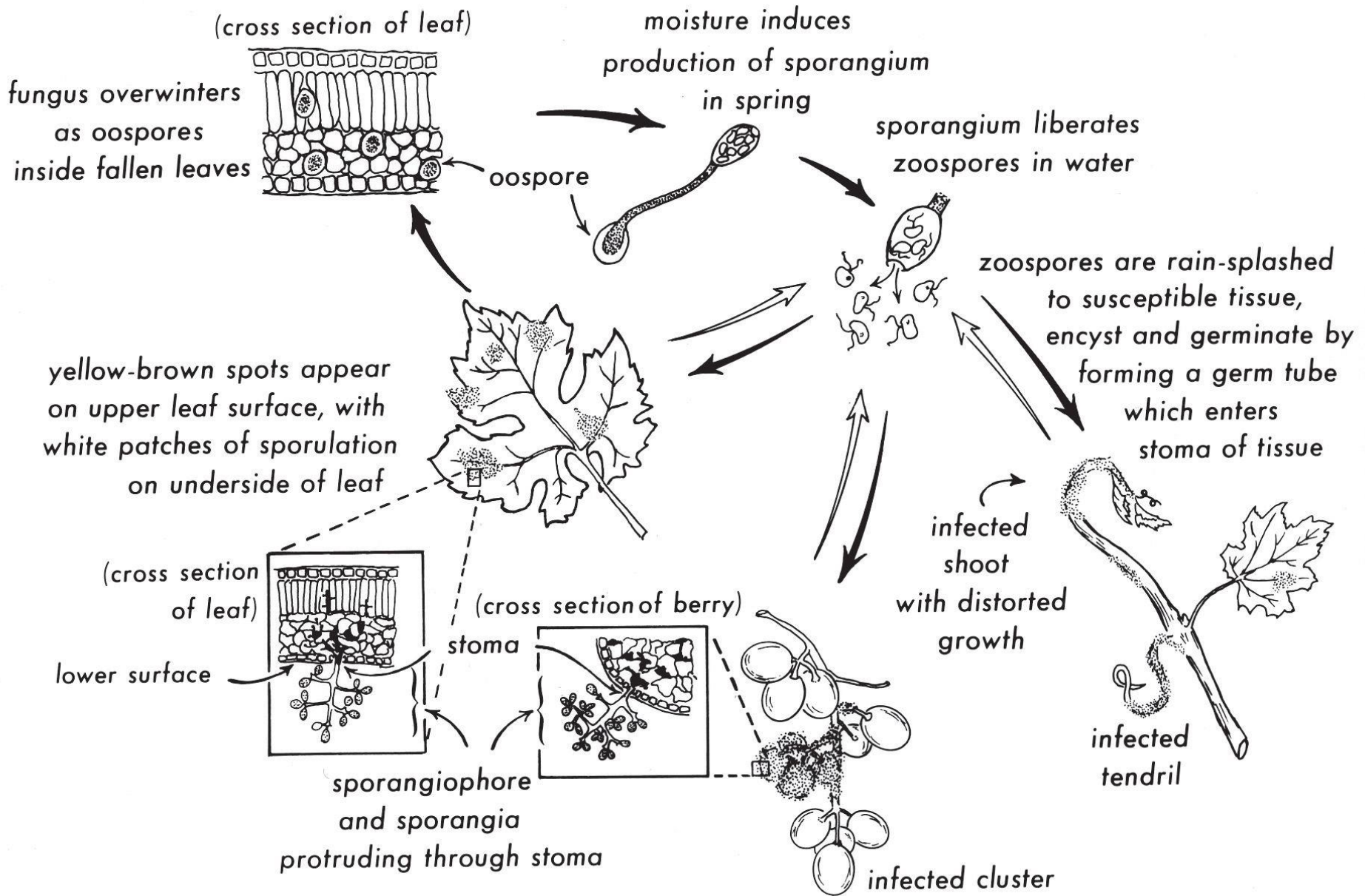


# Primary infections: when?

- Oospores do not germinate too early: under optimal conditions normally from three leafs unfolded
- Sporangia must reach the leaves (must be susceptible)
- Primary infections can continuously occur throughout the season from three leafs on when it rains

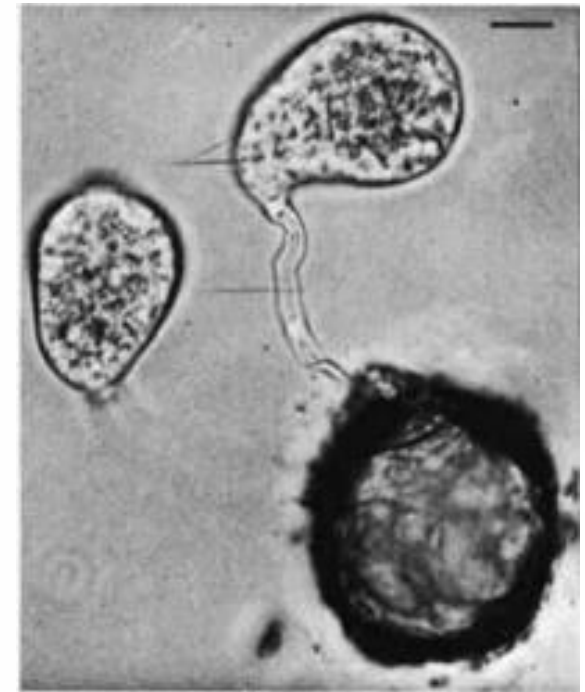




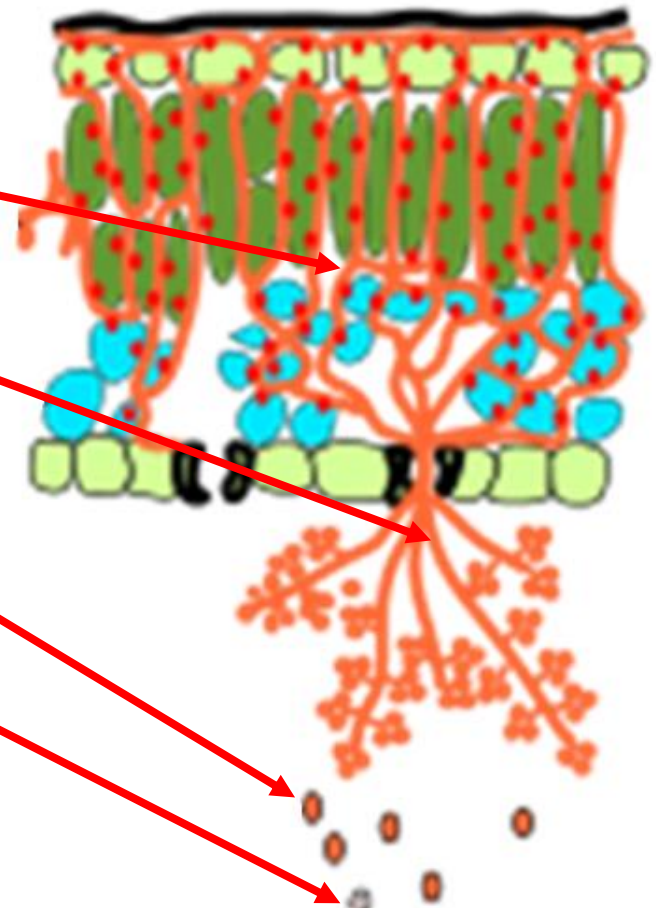


# Primary infections: how?

- First observations (Baldacci): 3-10 rule
- Other studies (DMCAST):  $> 2,5 \text{ mm}$  e  $> 11^\circ\text{C}$
- The rain splashes have a role (Rossi): not only the volume and the rain intensity, but the dimension of drops and the kinetic energy, too
- Most probably the air movements, aerosol, have a role, too
- Macro-sporangia can move for several meters (Pertot)
- **Disease forecasting models simplify the reality and use thresholds to intervene**

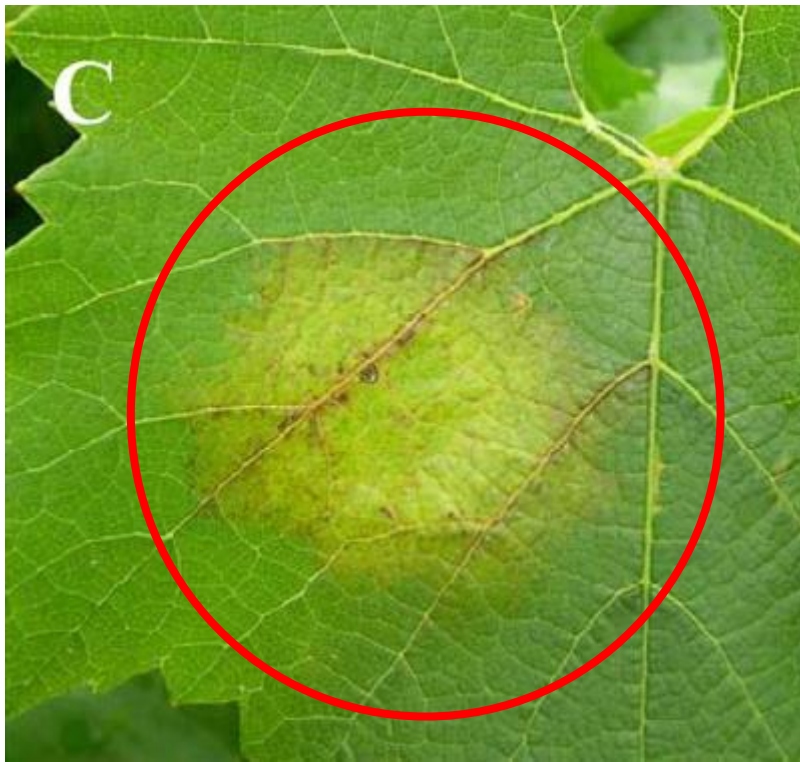


- ❖ Mycelium
- ❖ Sporangium
- ❖ Sporencyste
- ❖ Zoosporen





Oilspots = primary infection



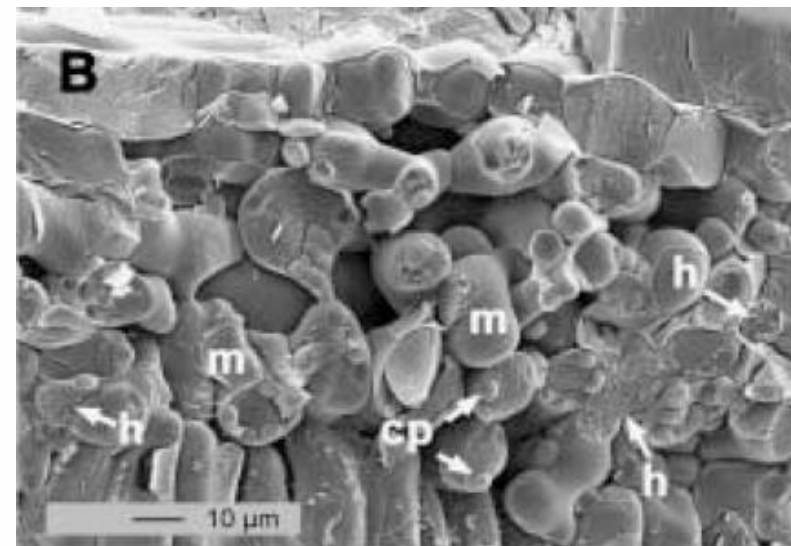
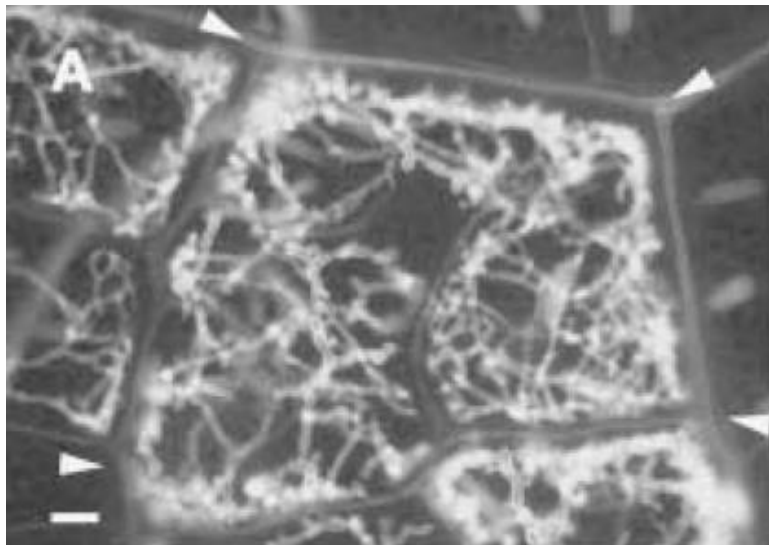




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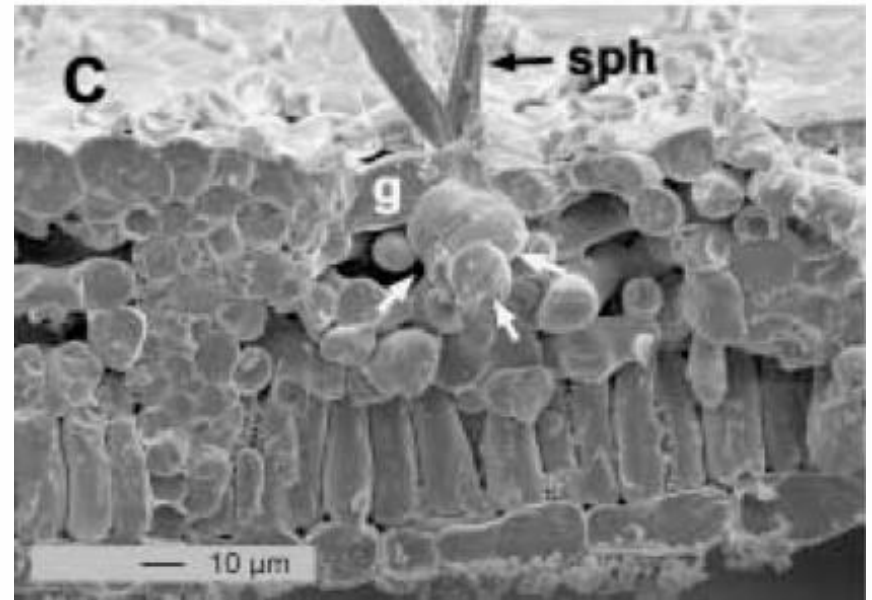
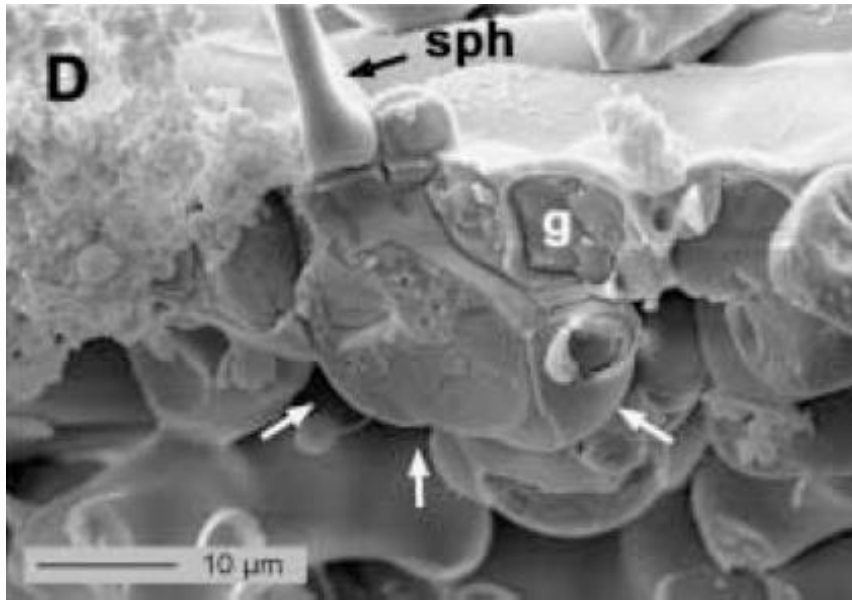


# Incubation and sporulation



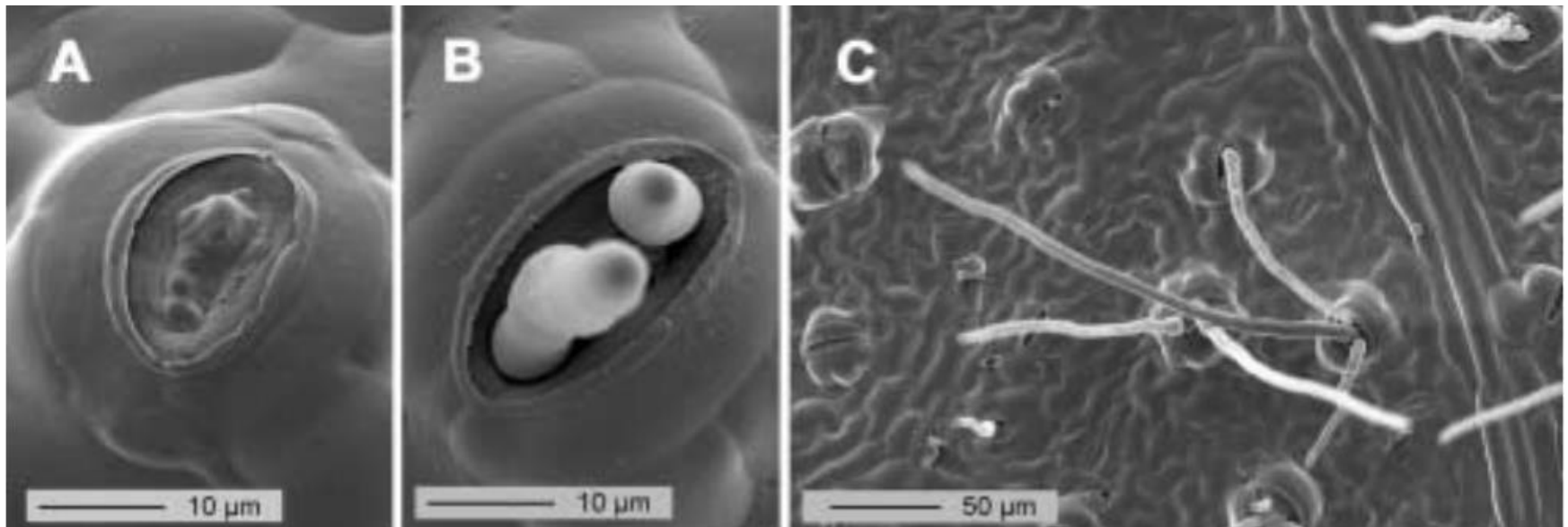


# Incubation and sporulation



# Incubation and sporulation

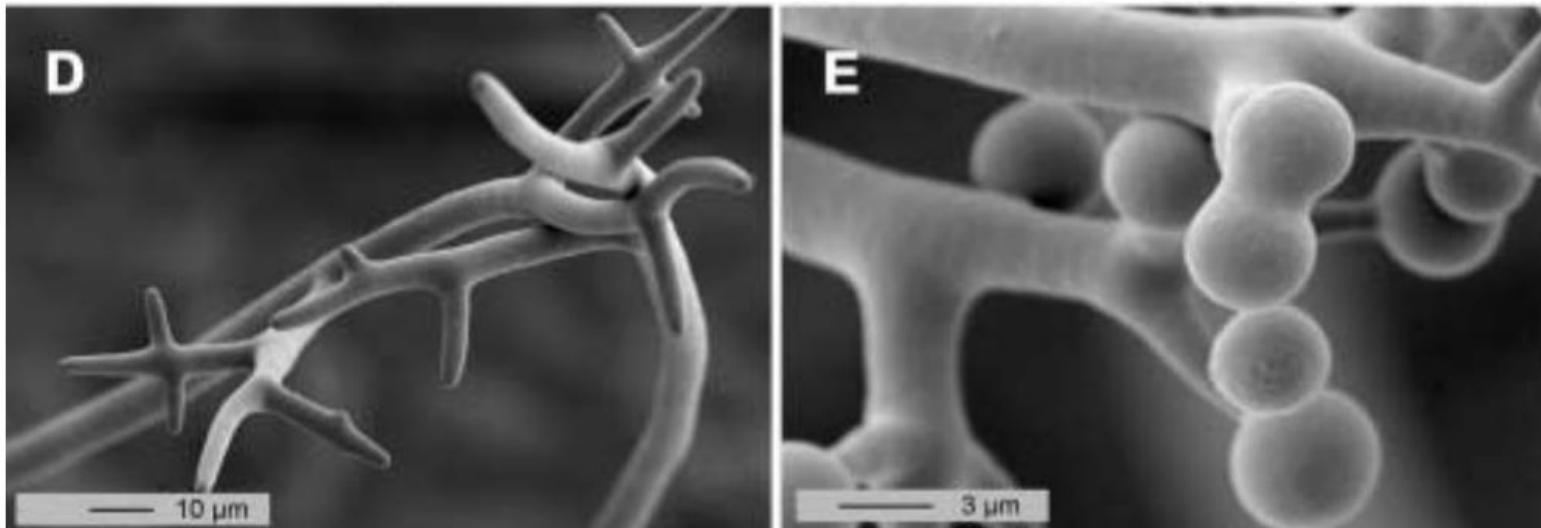
- Hours of darkness (absence of light), leaf wetness, temperature



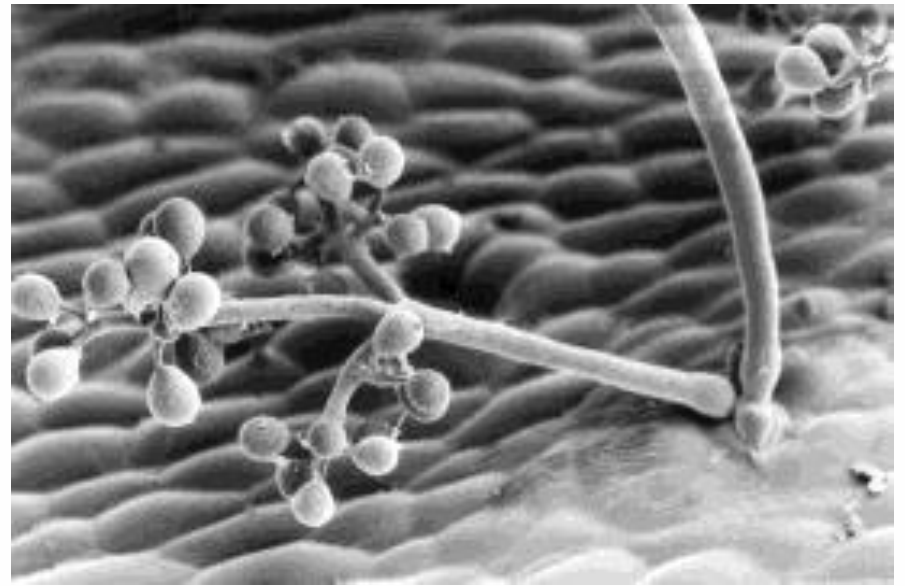
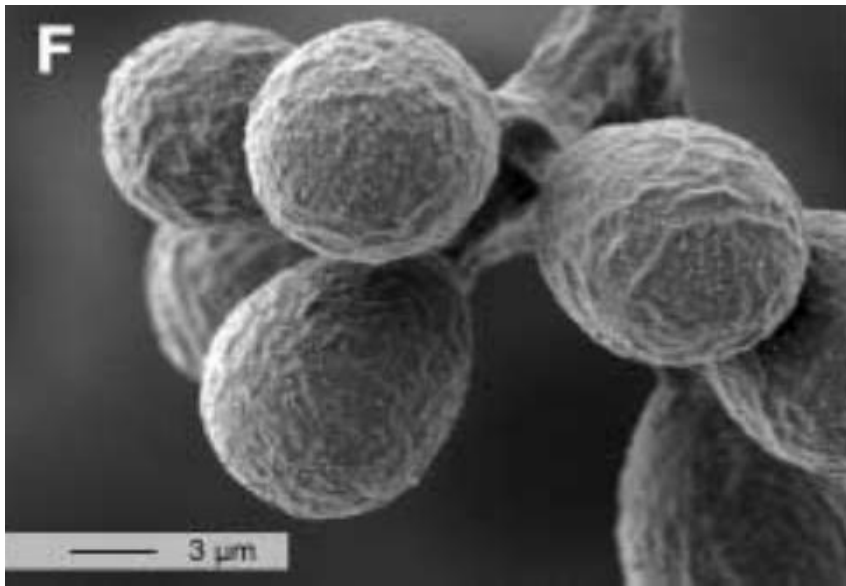


# Incubation and sporulation

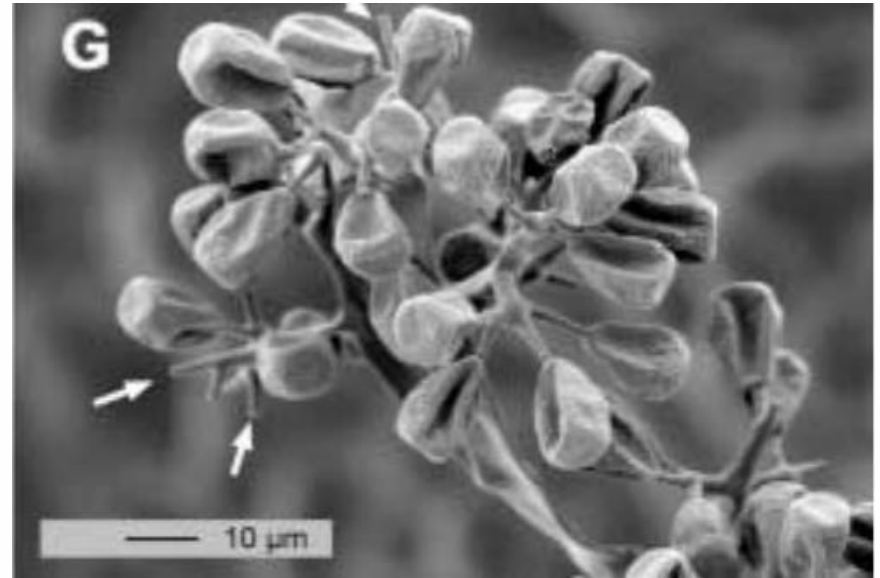
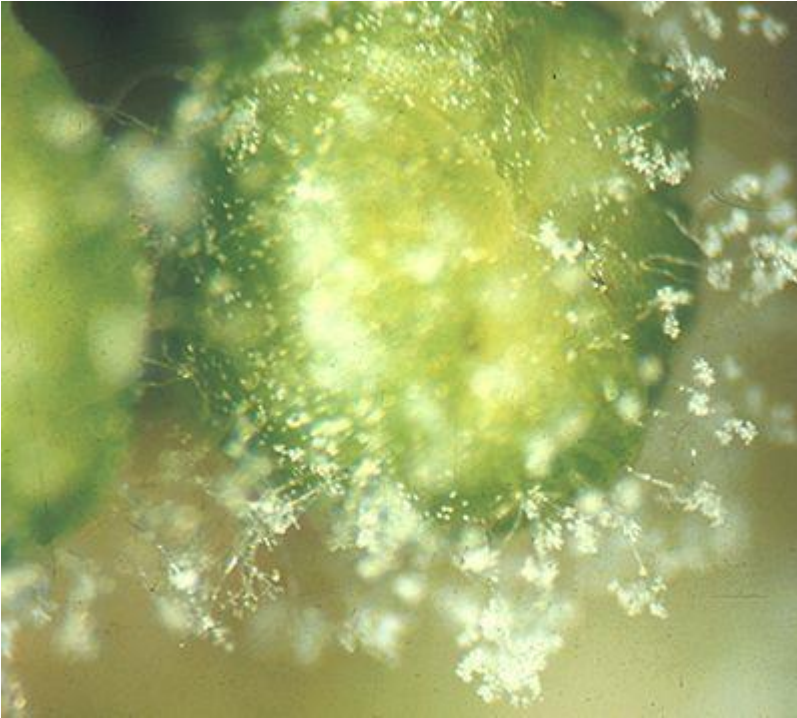
- Sporangia formation



# Incubation and sporulation



# Incubation and sporulation



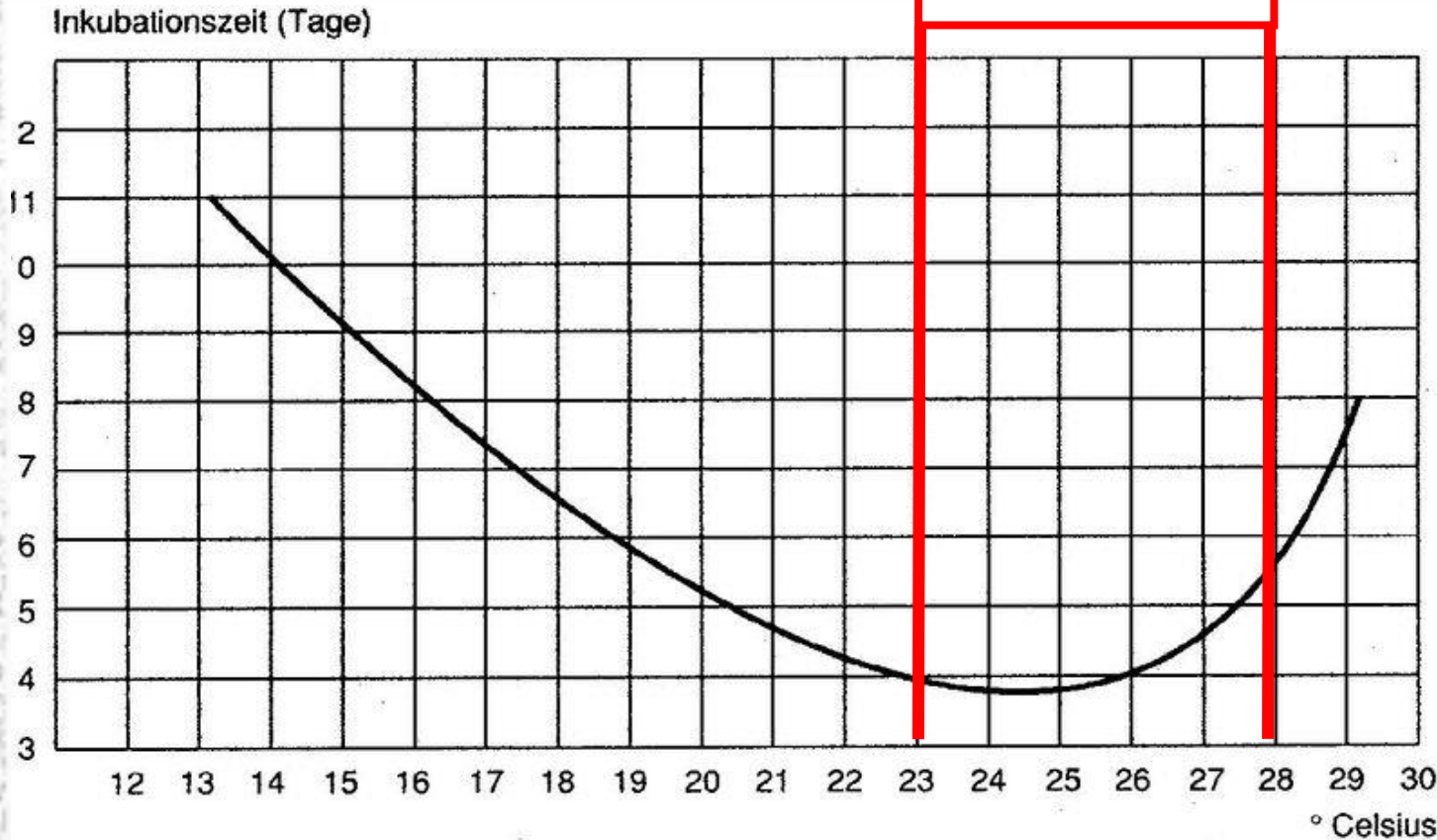
Sporangia release the zoospores in presence of water and suitable temperature

Sporangia die at low relative humidity, UV and high temperature





# Incubationperiod

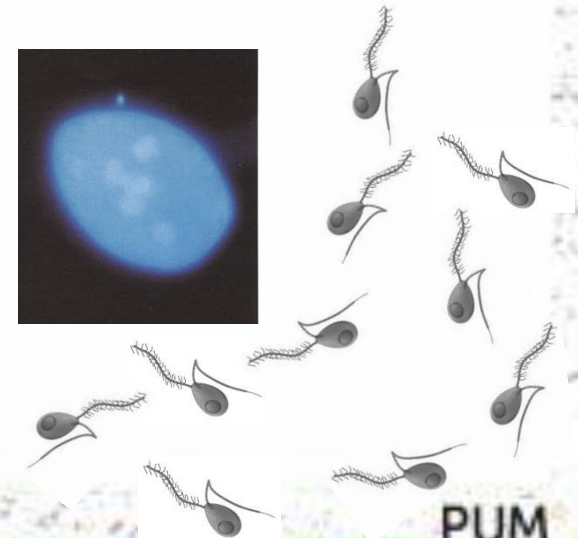
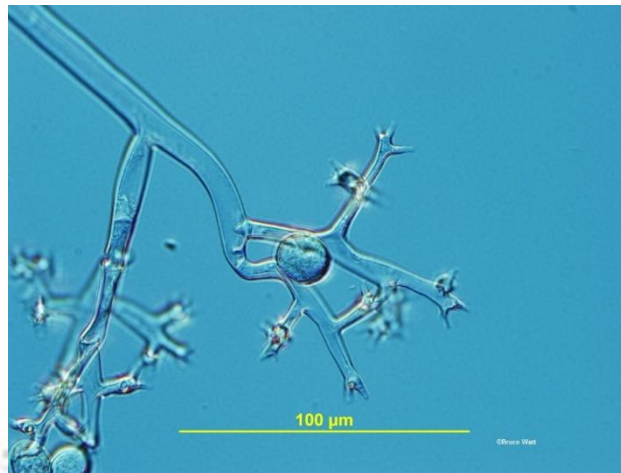


| $T_{\text{gem}}$ | rijpingsfactoren |
|------------------|------------------|
| 13 °C            | 9                |
| 14 °C            | 10               |
| 15 °C            | 12               |
| 16 °C            | 13               |
| 17 °C            | 14               |
| 18 °C            | 16               |
| 19 °C            | 18               |
| 20 °C            | 20               |
| 21 °C            | 21               |
| 22 °C            | 24               |
| 23 °C            | 25               |
| 24 °C            | 25               |
| 25 °C            | 25               |
| 26 °C            | 25               |
| 27 °C            | 21               |
| 28 °C            | 18               |
| 29 °C            | 13               |



# 'Oil spots'

- Lesions continue to sporulate for 2-3 months, even if progressively less
- If the conditions are favorable for the disease the sporulation capability is lost earlier, because of the necrosis of tissues



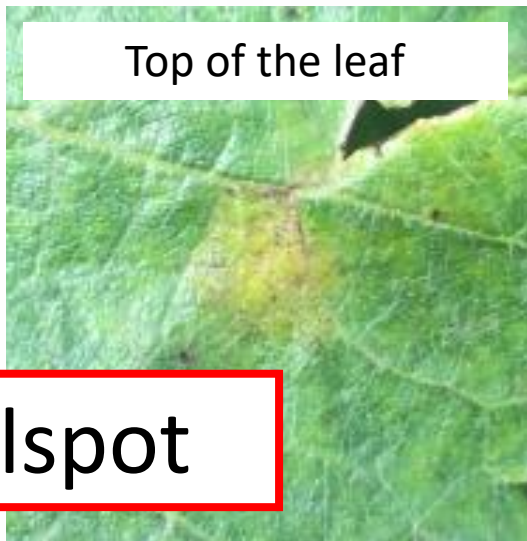
# Primary and following infections



**A primary infection will multiply by over ten times after four days.**

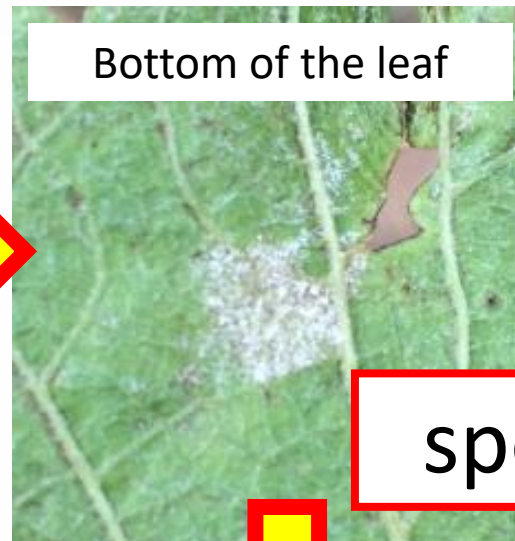


Top of the leaf

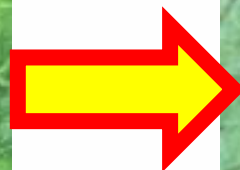


oilspot

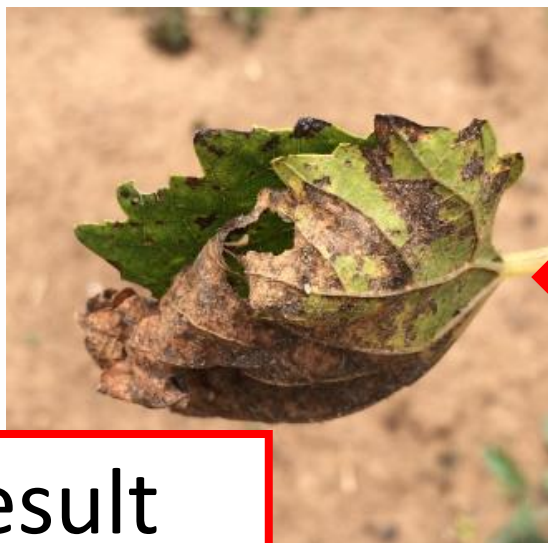
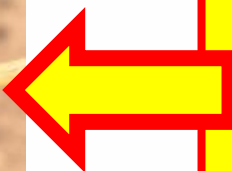
Bottom of the leaf



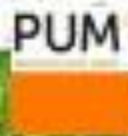
spoores



Secondary  
infection

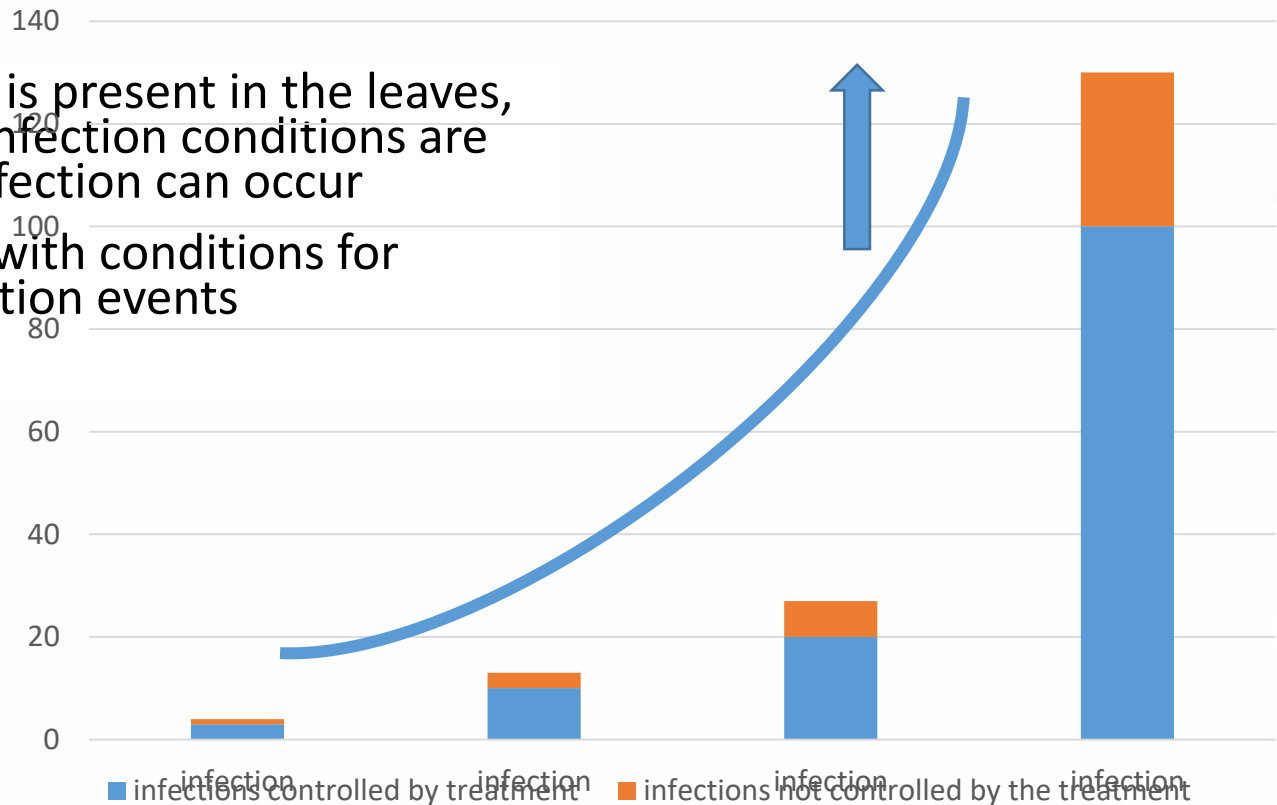


result



# Secondary infections

- When the inoculum is present in the leaves, each time that the infection conditions are fulfilled, then the infection can occur
- Example: if 20 days with conditions for infections = 20 infection events





# Infections and protection concepts

primary

secondary



B

C

D-E

J

K

L

M

05

09

11

61

67-69

71

75

77

81

83-85

Preventive, protection of leaves,  
minimizing inoculum

e.g. COPPER

Preventive, protection of new  
leaves after summer pruning

Cytotropic, Systemic, protection of bunches



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# Fungicides



# Fungicides

We have different kind of fungicides:

A. Preventive

Prevents spores to grow in to the leaf

B. Curative

Penetrates the leaf and kills the infection

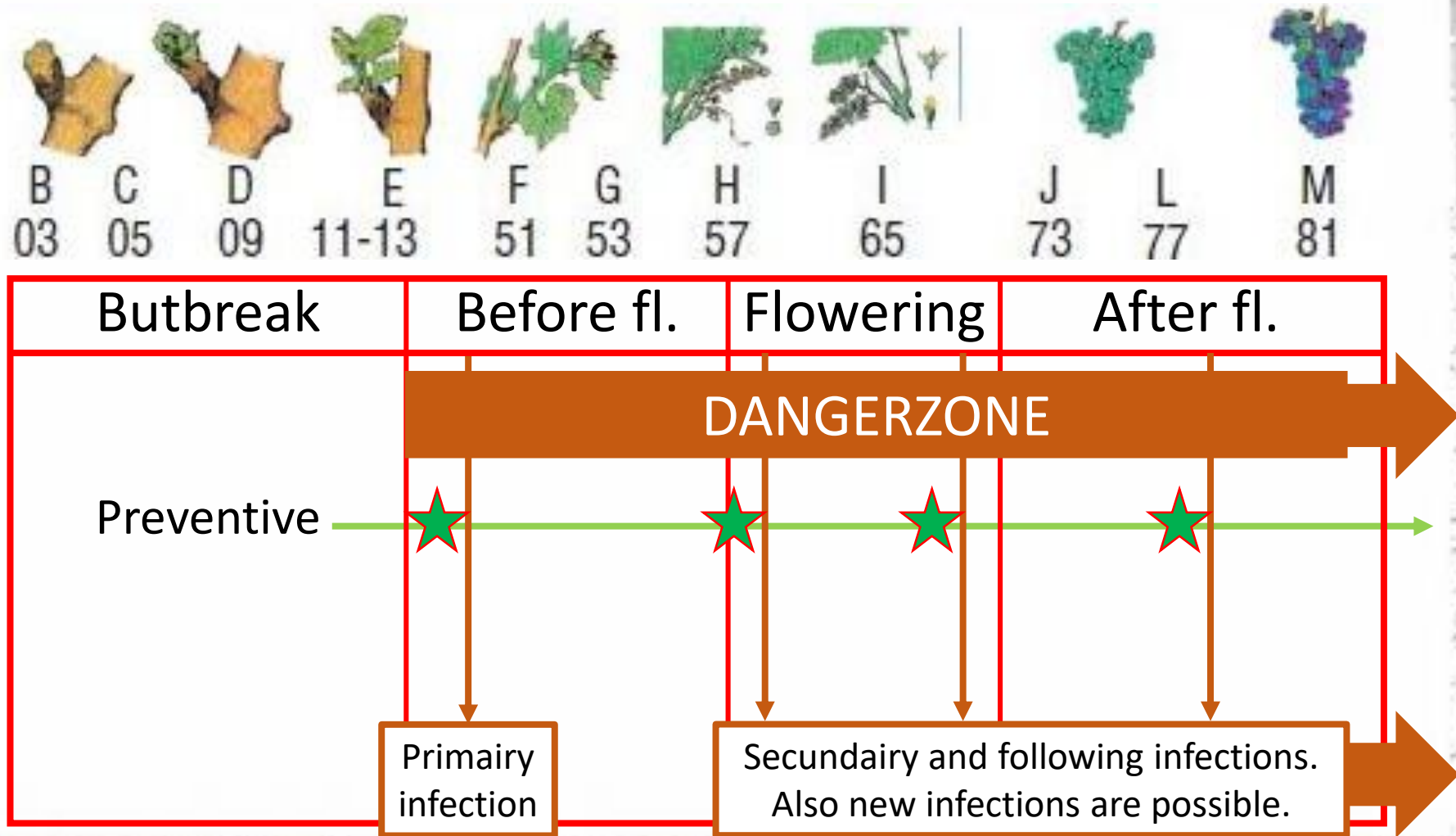
C. Systemic

Penetrates the plant system an spreads within the floëm-flows to new leafs

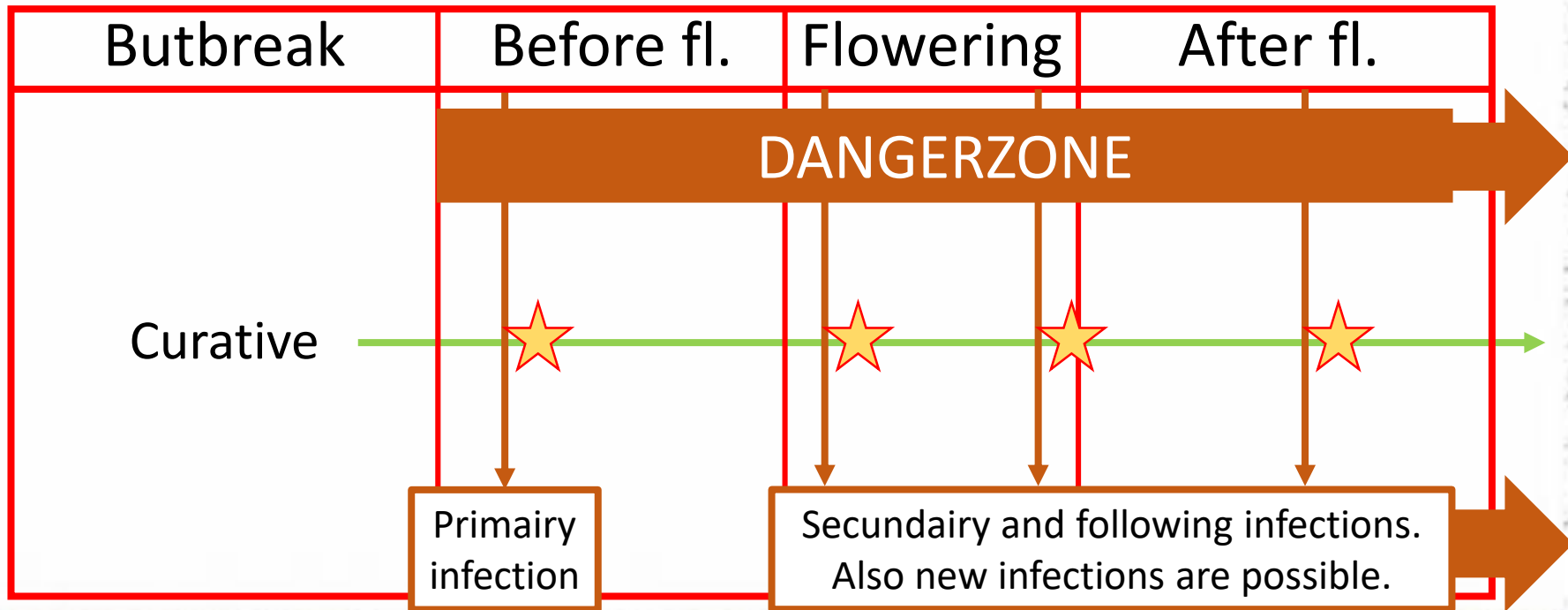
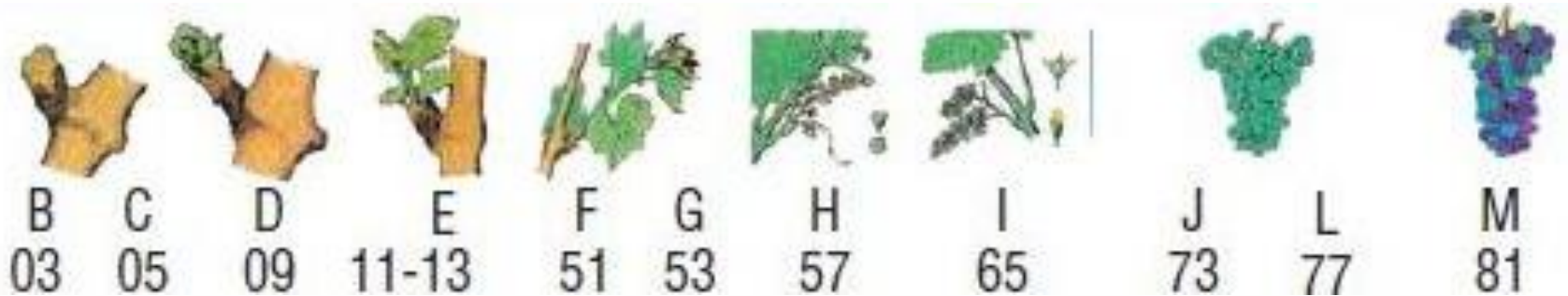




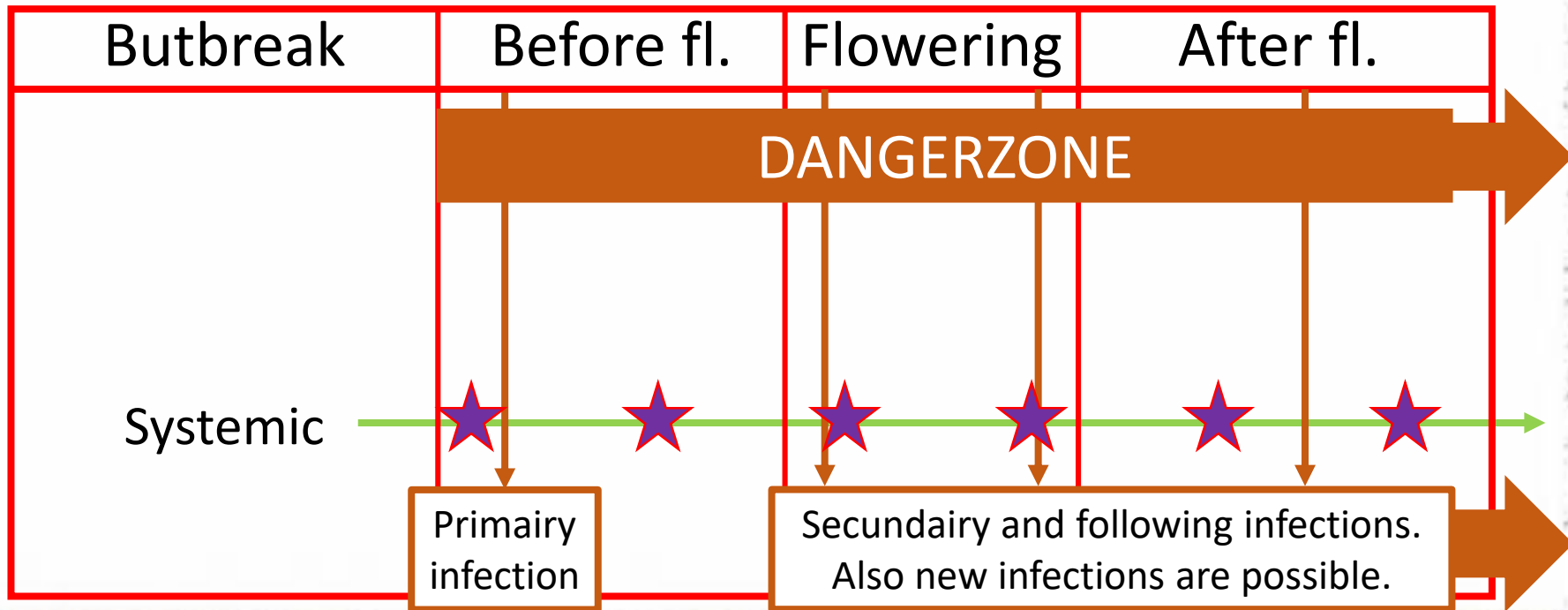
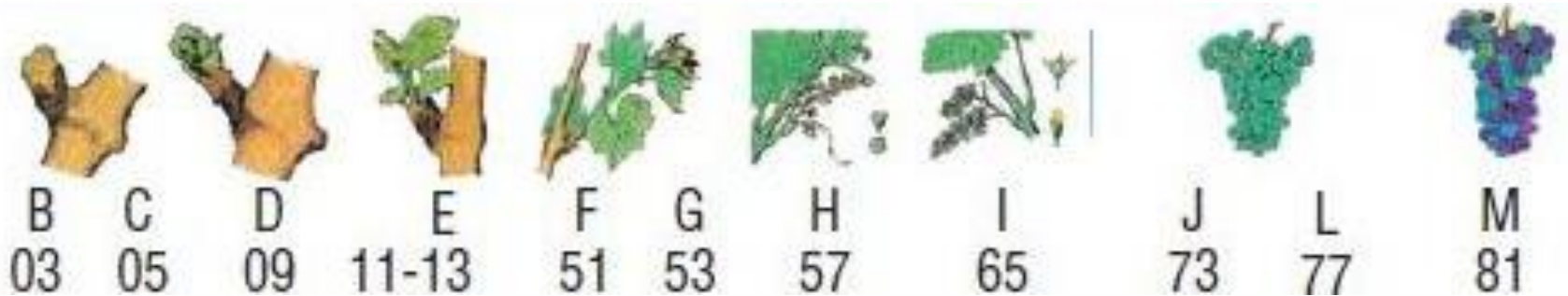
# Preventive



# Curative

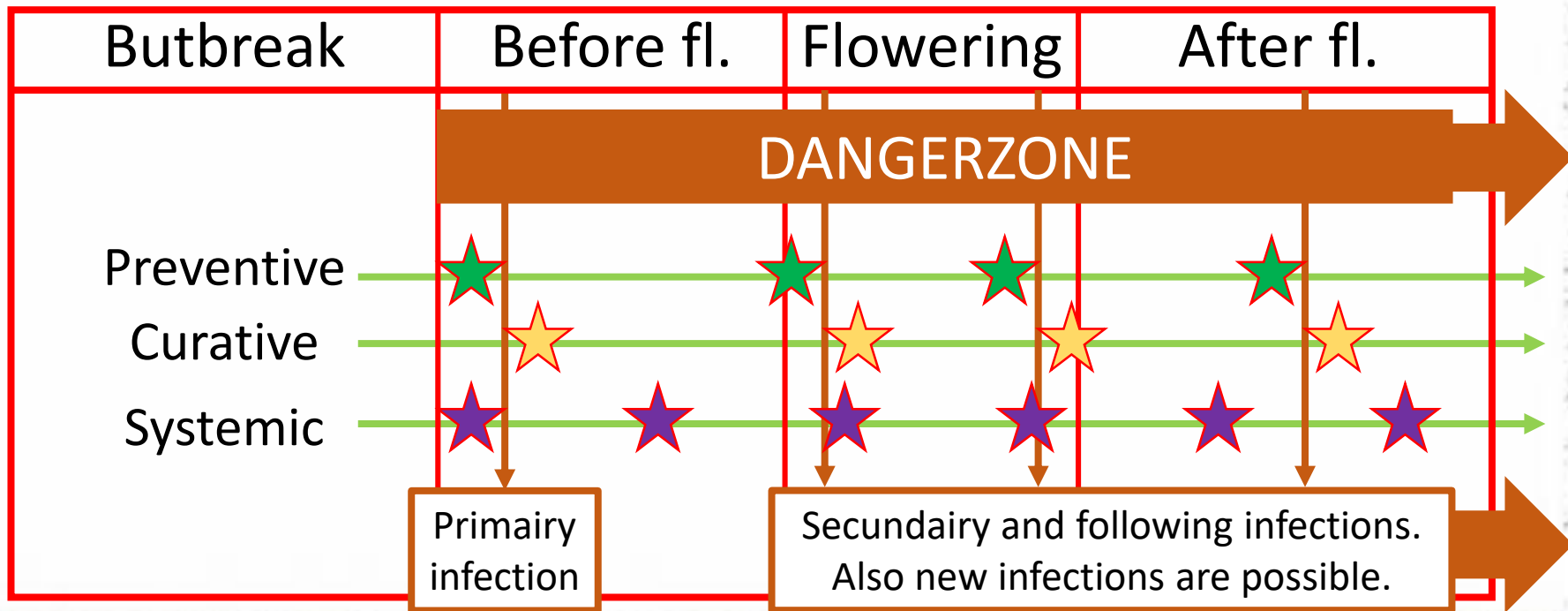
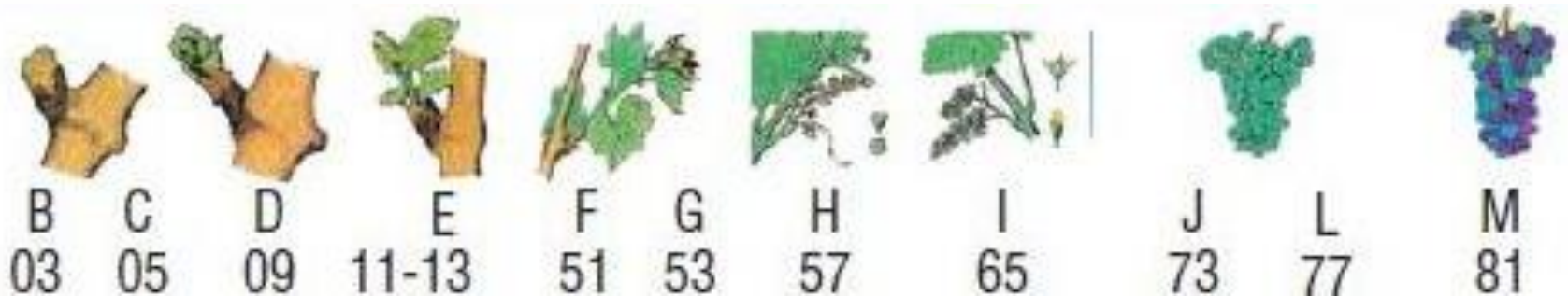


# Systemic





# Preventive, curative or systemic



# Fungicide molecules

| Molecule                 | Type                    | Interval | Q max | Days |
|--------------------------|-------------------------|----------|-------|------|
| Dimethomorf              | Preventive              | 10-14    | 2     | 35   |
| Dithianon                | Preventive              |          | 1     | 48   |
| Fenamydone + Fosethyl-al | Preventive (+ systemic) | 10-14    | 3     | 35   |
| Mancozeb                 | Preventive & Curative   | 14       | 4     | 56   |
| Cymoxanil + Mancozeb     | Systemic Curative       | 14       | 4     | 28   |
| Metalaxyl + Mancozeb     | Systemic Curative       | 10-14    | 3     | 56   |
| Copper hydroxide         | Preventive              | 10-14    | 6     | 50   |
| Copper oxichloride       | Preventive              | 10-14    | 6     | 50   |







# Sulphur



Preventive

Every 10 days

Leaf coverage important

Not during flowering

# Cosavet garden (80% zwavel)

**Teelt: druivelaars (open lucht) (Vitis vinifera)**

**Veiligheidstermijn** /

**Toepassingsstadium** april - september

**Opmerking**

De behandelingen hebben een nevenwerking tegen de druiveviltmijt (Phytoptus vitis).  
Maximum 2 toepassingen/12 maanden.

| Ter bestrijding van         | Dosis  | Toepassingsstadium<br>vijand | Opmerking<br>vijand |
|-----------------------------|--|------------------------------|---------------------|
| echte<br>meeldauw/witziekte | voor de bloei: 60 g/10 l, tot afdruppen, 1 toepassing na de<br>bloei: 30 g/10 l, tot afdruppen, 1 toepassing |                              |                     |

Om het gistingsproces niet ongunstig te beïnvloeden dient bij druiven die bestemd zijn voor de wijnbereiding de laatste bespuiting uiterlijk 6 weken voor de oogst plaats te vinden.



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# Thiovet Jet (80% zwavel)

**Teelt: druivelaars (open lucht) (Vitis vinifera)**

**Veiligheidstermijn**

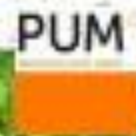
**Toepassingsstadium**

**Opmerking** preventieve behandeling

| Ter bestrijding van | Dosis            | Toepassingsstadium vijand | Opmerking vijand |
|---------------------|------------------|---------------------------|------------------|
| echte meeldauw      | 6 - 8 kg/ha haag | Voor de bloei (BBCH 61)   |                  |
| echte meeldauw      | 3 - 5 kg/ha haag | Na de bloei (BBCH 69)     |                  |

**Risicobeperkende maatregelen** Minimale bufferzone van 3 m met klassieke techniek

Om het gistingsproces niet ongunstig te beïnvloeden dient bij druiven die bestemd zijn voor de wijnbereiding de laatste bespuiting uiterlijk 6 weken voor de oogst plaats te vinden.





# Fungicide molecules

| Molecule                 | Type                    | Interval | Q max | Days |
|--------------------------|-------------------------|----------|-------|------|
| Dimethomorf              | Preventive              | 10-14    | 2     | 35   |
| Dithianon                | Preventive              |          | 1     | 48   |
| Fenamydone + Fosethyl-al | Preventive (+ systemic) | 10-14    | 3     | 35   |
| Mancozeb                 | Preventive & Curative   | 14       | 4     | 56   |
| Cymoxanil + Mancozeb     | Systemic Curative       | 14       | 4     | 28   |
| Metalaxyl + Mancozeb     | Systemic Curative       | 10-14    | 3     | 56   |
| Copper hydroxide         | Preventive              | 10-14    | 6     | 50   |
| Copper oxichloride       | Preventive              | 10-14    | 6     | 50   |





# Low ecological impact

| Ziekten        | Werkzame stof            | Handelsproduct  | Driftreductie                        | Opmerkingen  | Dosis /ha haag      | Dosis /are haag    | Max. aantal toep. | Wacht- termijn | MRL mg/kg  |
|----------------|--------------------------|---|--------------------------------------|--|---------------------|--------------------|-------------------|----------------|------------|
| Valse meeldauw | dimethomorf              | Paraat  |                                      | Preventief toepassen met een interval van 10-14 dagen.   | 330 g               | 3,3 g              | 2                 | 35 d           | 3          |
|                | dithianon                | Delan 70 WG   |                                      | Preventief toepassen.  | 400 g               | 4 g                | 1                 | 48 d           | 3          |
|                | fenamidone + fosethyl-Al | Fenomenal   | bufferzone 20m                       | Preventief toepassen.  | 1,2 kg              | 12 g               | 3                 | 35             | 0,5<br>100 |
|                | mancozeb + metalaxyl-M   | Ridomil Gold<br>Mistress 72   | bufferzone 20m,<br>50% driftreductie | Preventief toepassen met een interval van 10-14 dagen.   | 750 g               | 7,5 g              | 3                 | 56 d           | 5<br>1     |
|                | cymoxanil + mancozeb     |   | bufferzone 20m                       | Toepassingen met een interval van 14 dagen of volgens de waarschuwingen.   | 1 kg                | 10 g               | 4                 | 28 d           | 0,2<br>5   |
|                | mancozeb + zoxamide      | Unikat pro  | bufferzone 10m                       |  | 1 kg                | 10 g               | 2                 | 56 d           | 5<br>5     |
|                | koperhydroxide           | Belchim hydro   | /                                    | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.<br><br><b>Belchim hydro: opgebruik tot 30/11/2015</b> | 800 g / 100 l       | 80 g / 10 l        | /                 | 42 d           | 50         |
|                |                          | Hydro WG  | bufferzone 20m                       |  | 1 kg / 100 l water  | 100 g / 10 l water | 4                 |                |            |
|                |                          | Ko-plus 40  |                                      |  |                     |                    |                   |                |            |
|                |                          | Koperhydroxide WG   |                                      |  |                     |                    |                   |                |            |
|                |                          | Hydro super 25 WG   | bufferzone 20m,<br>90% driftreductie |  | 1,6 kg / 100 l      | 160 g / 10 l       | 2                 |                |            |
|                | koperoxychloride         | Cuperit   | bufferzone 20m                       | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.   | 800 g / 100 l water | 80 g / 10 l water  | 4                 | 42 d           | 50         |
|                |                          | Cuprex 50%  | bufferzone 20m,                      |  |                     |                    |                   |                |            |
|                |                          | Cuprex 50% WG   | 75% driftreductie                    |  |                     |                    |                   |                |            |
|                |                          | Curvata   | /                                    |  |                     |                    |                   |                |            |
|                | maneb                    | Trimangol 80  | bufferzone 20m                       | Toepassen voor en tijdens de bloei.  | 2 kg                | 20 g               | 5                 | /              | 5          |
|                |                          | Trimangol WG  |                                      |  | 2,1 kg              | 21 g               |                   |                |            |
|                | mancozeb                 | Agro-Mancozeb 80 WP,<br>Dequiman MZ WP,<br>Indofil M45,<br>Manfil 80 WP,<br>Penncozeb, Prozeb,<br>Spoutnik, Tridex WP,<br>Vondozeb WP | bufferzone 10m                       | Toepassen met een interval van 14 dagen.   | 1,1 kg              | 11 g               | 4                 | 56 d           | 5          |

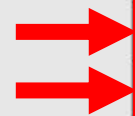


# Copper (Organic viticulture)

| Ziekten   | Werkzame stof            | Handelsproduct  | Driftreductie                        | Opmerkingen  | Dosis /ha haag      | Dosis /are haag    | Max. aantal toep. | Wacht-termijn | MRL mg/kg  |
|---|--------------------------|---|--------------------------------------|--|---------------------|--------------------|-------------------|---------------|------------|
|  <br>Valse meeldauw | dimethomorf              | Paraat  |                                      | Preventief toepassen met een interval van 10-14 dagen.   | 330 g               | 3,3 g              | 2                 | 35 d          | 3          |
|   | dithianon                | Delan 70 WG   |                                      | Preventief toepassen.  | 400 g               | 4 g                | 1                 | 48 d          | 3          |
|   | fenamidone + fosethyl-Al | Fenomenal   | bufferzone 20m                       | Preventief toepassen.  | 1,2 kg              | 12 g               | 3                 | 35            | 0,5<br>100 |
|   | mancozeb + metalaxyl-M   | Ridomil Gold<br>Mistress 72   | bufferzone 20m,<br>50% driftreductie | Preventief toepassen met een interval van 10-14 dagen.   | 750 g               | 7,5 g              | 3                 | 56 d          | 5<br>1     |
|   | cymoxanil + mancozeb     |   | bufferzone 20m                       | Toepassingen met een interval van 14 dagen of volgens de waarschuwingen.   | 1 kg                | 10 g               | 4                 | 28 d          | 0,2<br>5   |
|   | mancozeb + zoxamide      | Unikat pro  | bufferzone 10m                       |  | 1 kg                | 10 g               | 2                 | 56 d          | 5<br>5     |
|   | koperhydroxide           | Belchim hydro   | /                                    | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.<br><br><b>Belchim hydro: opgebruik tot 30/11/2015</b> | 800 g / 100 l       | 80 g / 10 l        | /                 | 42 d          | 50         |
|   |                          | Hydro WG  | bufferzone 20m                       |  | 1 kg / 100 l water  | 100 g / 10 l water | 4                 |               |            |
|   |                          | Ko-plus 40  |                                      |  |                     |                    |                   |               |            |
|   |                          | Koperhydroxide WG   |                                      |  |                     |                    |                   |               |            |
|   |                          | Hydro super 25 WG   | bufferzone 20m,<br>90% driftreductie |  | 1,6 kg / 100 l      | 160 g / 10 l       | 2                 |               |            |
|   | koperoxychloride         | Cuperit   | bufferzone 20m                       | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.   | 800 g / 100 l water | 80 g / 10 l water  | 4                 | 42 d          | 50         |
|   |                          | Cuprex 50%  | bufferzone 20m,                      |  |                     |                    |                   |               |            |
|   |                          | Cuprex 50% WG   | 75% driftreductie                    |  |                     |                    |                   |               |            |
|   |                          | Curvata   | /                                    |  |                     |                    |                   |               |            |
|   | maneb                    | Trimangol 80  | bufferzone 20m                       | Toepassen voor en tijdens de bloei.  | 2 kg                | 20 g               | 5                 | /             | 5          |
|   |                          | Trimangol WG  |                                      |  | 2,1 kg              | 21 g               |                   |               |            |
|   | mancozeb                 | Agro-Mancozeb 80 WP,<br>Dequiman MZ WP,<br>Indofil M45,<br>Manfil 80 WP,<br>Penncozeb, Prozeb,<br>Spoutnik, Tridex WP,<br>Vondozeb WP | bufferzone 10m                       | Toepassen met een interval van 14 dagen.   | 1,1 kg              | 11 g               | 4                 | 56 d          | 5          |



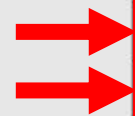
# Modern chemical fungicides



| Ziekten        | Werkzame stof            | Handelsproduct  | Driftreductie                        | Opmerkingen  | Dosis /ha haag      | Dosis /are haag    | Max. aantal toep. | Wacht- termijn | MRL mg/kg  |
|----------------|--------------------------|---|--------------------------------------|--|---------------------|--------------------|-------------------|----------------|------------|
| Valse meeldauw | dimethomorf              | Paraat  |                                      | Preventief toepassen met een interval van 10-14 dagen.   | 330 g               | 3,3 g              | 2                 | 35 d           | 3          |
|                | dithianon                | Delan 70 WG   |                                      | Preventief toepassen.  | 400 g               | 4 g                | 1                 | 48 d           | 3          |
|                | fenamidone + fosethyl-Al | Fenomenal   | bufferzone 20m                       | Preventief toepassen.  | 1,2 kg              | 12 g               | 3                 | 35             | 0,5<br>100 |
|                | mancozeb + metalaxyl-M   | Ridomil Gold<br>Mistress 72   | bufferzone 20m,<br>50% driftreductie | Preventief toepassen met een interval van 10-14 dagen.   | 750 g               | 7,5 g              | 3                 | 56 d           | 5<br>1     |
|                | cymoxanil + mancozeb     |   | bufferzone 20m                       | Toepassingen met een interval van 14 dagen of volgens de waarschuwingen.   | 1 kg                | 10 g               | 4                 | 28 d           | 0,2<br>5   |
|                | mancozeb + zoxamide      | Unikat pro  | bufferzone 10m                       |  | 1 kg                | 10 g               | 2                 | 56 d           | 5<br>5     |
|                | koperhydroxide           | Belchim hydro   | /                                    | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.<br><br><b>Belchim hydro: opgebruik tot 30/11/2015</b> | 800 g / 100 l       | 80 g / 10 l        | /                 | 42 d           | 50         |
|                |                          | Hydro WG  | bufferzone 20m                       |  | 1 kg / 100 l water  | 100 g / 10 l water | 4                 |                |            |
|                |                          | Ko-plus 40  |                                      |  |                     |                    |                   |                |            |
|                |                          | Koperhydroxide WG   |                                      |  |                     |                    |                   |                |            |
|                |                          | Hydro super 25 WG   | bufferzone 20m,<br>90% driftreductie |  | 1,6 kg / 100 l      | 160 g / 10 l       | 2                 |                |            |
|                | koperoxychloride         | Cuperit   | bufferzone 20m                       | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.   | 800 g / 100 l water | 80 g / 10 l water  | 4                 | 42 d           | 50         |
|                |                          | Cuprex 50%  | bufferzone 20m,                      |  |                     |                    |                   |                |            |
|                |                          | Cuprex 50% WG   | 75% driftreductie                    |  |                     |                    |                   |                |            |
|                |                          | Curvata   | /                                    |  |                     |                    |                   |                |            |
|                | maneb                    | Trimangol 80  | bufferzone 20m                       | Toepassen voor en tijdens de bloei.  | 2 kg                | 20 g               | 5                 | /              | 5          |
|                |                          | Trimangol WG  |                                      |  | 2,1 kg              | 21 g               |                   |                |            |
|                | mancozeb                 | Agro-Mancozeb 80 WP,<br>Dequiman MZ WP,<br>Indofil M45,<br>Manfil 80 WP,<br>Penncozeb, Prozeb,<br>Spoutnik, Tridex WP,<br>Vondozeb WP | bufferzone 10m                       | Toepassen met een interval van 14 dagen.   | 1,1 kg              | 11 g               | 4                 | 56 d           | 5          |



# Available in Uganda



?

| Ziekten        | Werkzame stof            | Handelsproduct  | Driftreductie                        | Opmerkingen   | Dosis /ha haag      | Dosis /are haag    | Max. aantal toep. | Wacht-termijn | MRL mg/kg  |
|----------------|--------------------------|---|--------------------------------------|---|---------------------|--------------------|-------------------|---------------|------------|
| Valse meeldauw | dimethomorf              | Paraat  |                                      | Preventief toepassen met een interval van 10-14 dagen.  | 330 g               | 3,3 g              | 2                 | 35 d          | 3          |
|                | dithianon                | Delan 70 WG   |                                      | Preventief toepassen.   | 400 g               | 4 g                | 1                 | 48 d          | 3          |
|                | fenamidone + fosethyl-Al | Fenomenal   | bufferzone 20m                       | Preventief toepassen.   | 1,2 kg              | 12 g               | 3                 | 35            | 0,5<br>100 |
|                | mancozeb + metalaxyl-M   | Ridomil Gold<br>Mistress 72   | bufferzone 20m,<br>50% driftreductie | Preventief toepassen met een interval van 10-14 dagen.  | 750 g               | 7,5 g              | 3                 | 56 d          | 5<br>1     |
|                | cymoxanil + mancozeb     |   | bufferzone 20m                       | Toepassingen met een interval van 14 dagen of volgens de waarschuwingen.  | 1 kg                | 10 g               | 4                 | 28 d          | 0,2<br>5   |
|                | mancozeb + zoxamide      | Unikat pro  | bufferzone 10m                       |   | 1 kg                | 10 g               | 2                 | 56 d          | 5<br>5     |
|                | koperhydroxide           | ?   | /                                    | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.<br><br>Belchim hydro: opgebruik tot 30/11/2015 | 800 g / 100 l       | 80 g / 10 l        | /                 | 42 d          | 50         |
|                |                          |   | bufferzone 20m                       |   | 1 kg / 100 l water  | 100 g / 10 l water | 4                 |               |            |
|                |                          |   | bufferzone 20m,<br>90% driftreductie |   | 1,6 kg / 100 l      | 160 g / 10 l       | 2                 |               |            |
|                | koperoxychloride         | ?   | bufferzone 20m                       | Toepassen van mei tot september met een spuitinterval van 10-15 dagen.  | 800 g / 100 l water | 80 g / 10 l water  | 4                 | 42 d          | 50         |
|                |                          |   | bufferzone 20m,<br>75% driftreductie |   |                     |                    |                   |               |            |
|                |                          |   | /                                    |   |                     |                    |                   |               |            |
|                | maneb                    | Trimangol 80  | bufferzone 20m                       | Toepassen voor en tijdens de bloei.   | 2 kg                | 20 g               | 5                 | /             | 5          |
|                |                          | Trimangol WG  |                                      |   | 2,1 kg              | 21 g               |                   |               |            |
|                | mancozeb                 | Agro-Mancozeb 80 WP,<br>Dequiman MZ WP,<br>Indofil M45,<br>Manfil 80 WP,<br>Penncozeb, Prozeb,<br>Spoutnik, Tridex WP,<br>Vondozeb WP | bufferzone 10m                       | Toepassen met een interval van 14 dagen.  | 1,1 kg              | 11 g               | 4                 | 56 d          | 5          |

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# Mistress 72



Cymoxanil (Systemic)  
+ Mancozeb (Curative)

14 days effective

4 times max

28 days before  
harvest



# Ridomil Gold



Metalaxyl 4%  
(Systemic) +  
Mancozeb 64%  
(Curative)

10-14 days effective

3 times max

56 days before  
harvest



# Mancozeb and Metalaxyl-M



Systemic and contact  
Best implemented before  
and after flowering



# potassium-phosphonate

A 'fertilizer' with potassium-phosphonate elicits disease resistance against powdery and downy mildew in grapevine (en preparation pour soumission dans Journal of agricultural and food chemistry)

**Once before flowering and once immediately after flowering.**

Commercial names: Ekofluid\*, Frutogard\*, Extraforte\* and Veriphos\*\*

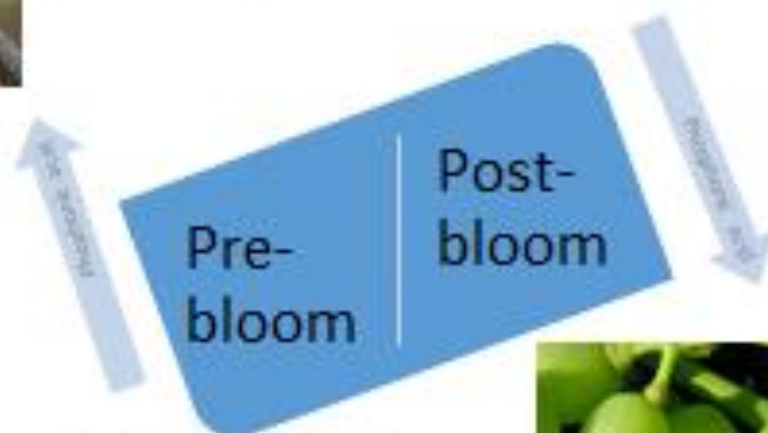




# Phosphonates (K, Na)



Time of application  
Some effect of green  
pruning on residues



Registered products and not 'fertilizers'  
based on phosphonates (risk of phytotox,  
inconsistent effect, residues)



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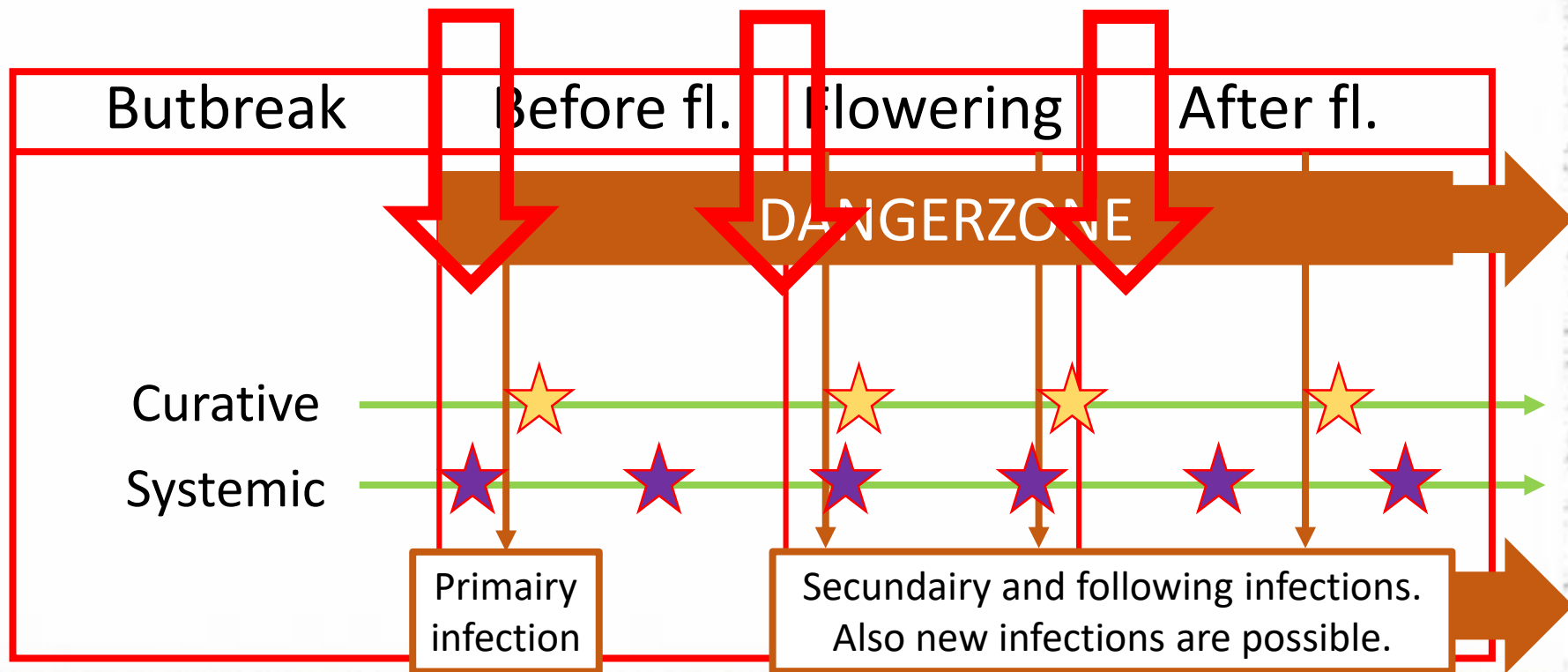


# Program for Uganda



# Preventive, curative or systemic

Third leaf  
unfolded      Before  
flowering      After  
flowering

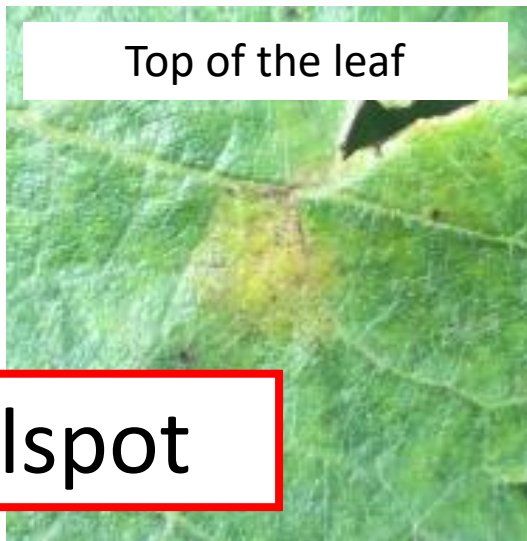


# Fungicide molecules

| Molecule             | Type                  | Interval | Q max | Days |
|----------------------|-----------------------|----------|-------|------|
| Mancozeb             | Preventive & Curative | 14       | 4     | 56   |
| Cymoxanil + Mancozeb | Systemic Curative     | 14       | 4     | 28   |
| Metalaxyl + Mancozeb | Systemic Curative     | 10-14    | 3     | 56   |

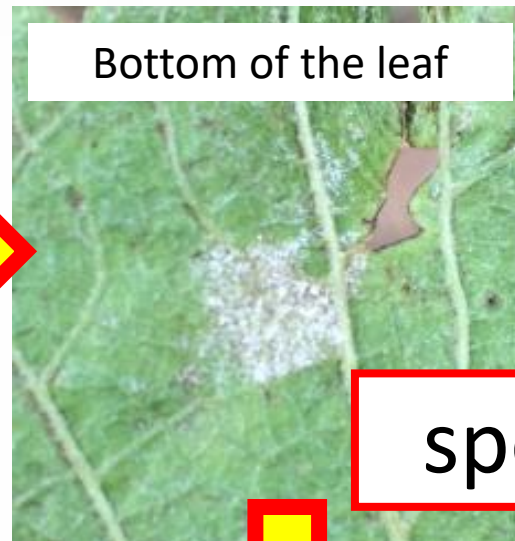


Top of the leaf

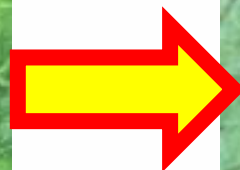


oilspot

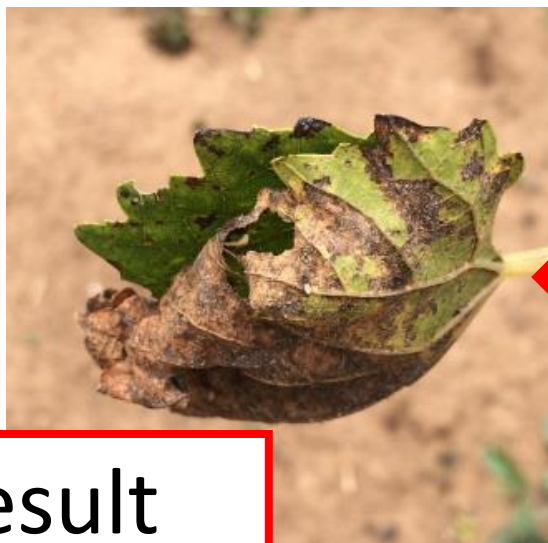
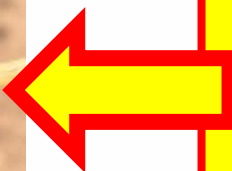
Bottom of the leaf



spores



Secondary  
infection



result





# Preventive spraying



- 1 Three leaves unfolded
- 2 Before flowering
- 3 After flowering

Before flowering



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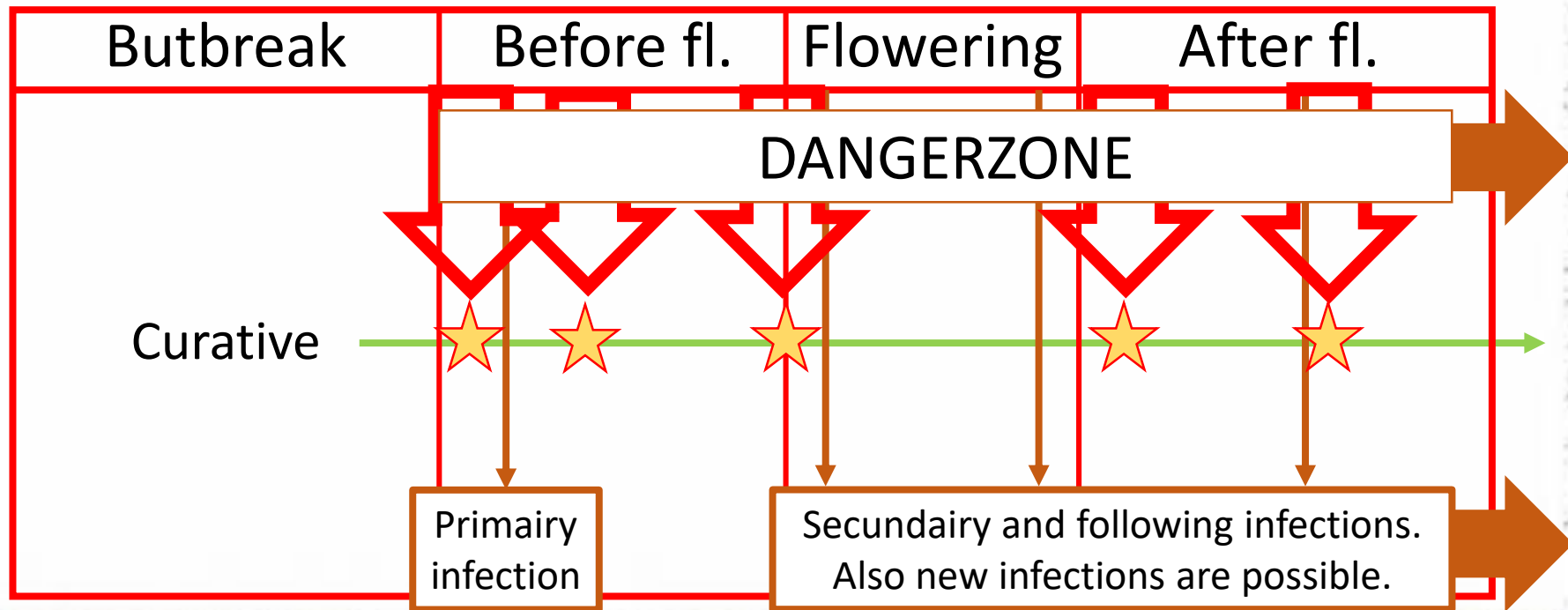
Otherwise this will be the result





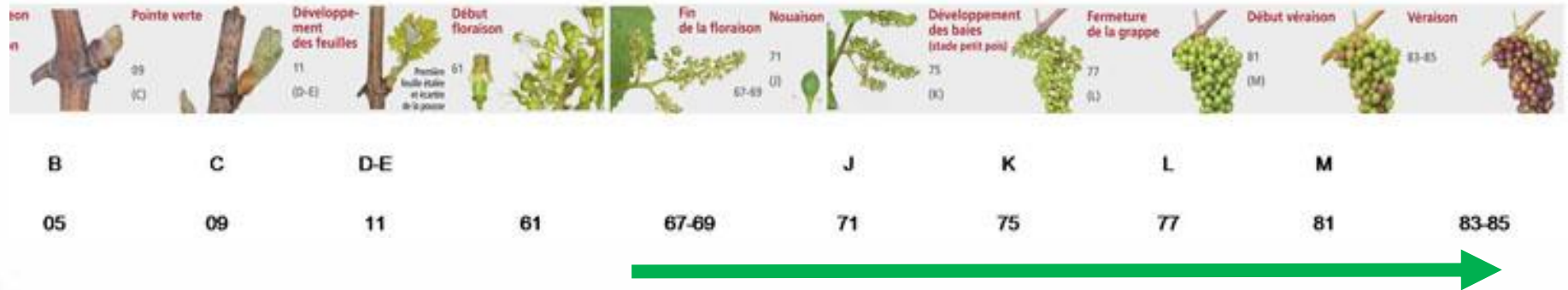
# Curative

Immediately after primary infection  
(**within 3 days after infection !!!!**)





# Curative spraying



**After primary infection spray  
within 3 days**

# Safety first

**This is the most important part of the lesson**

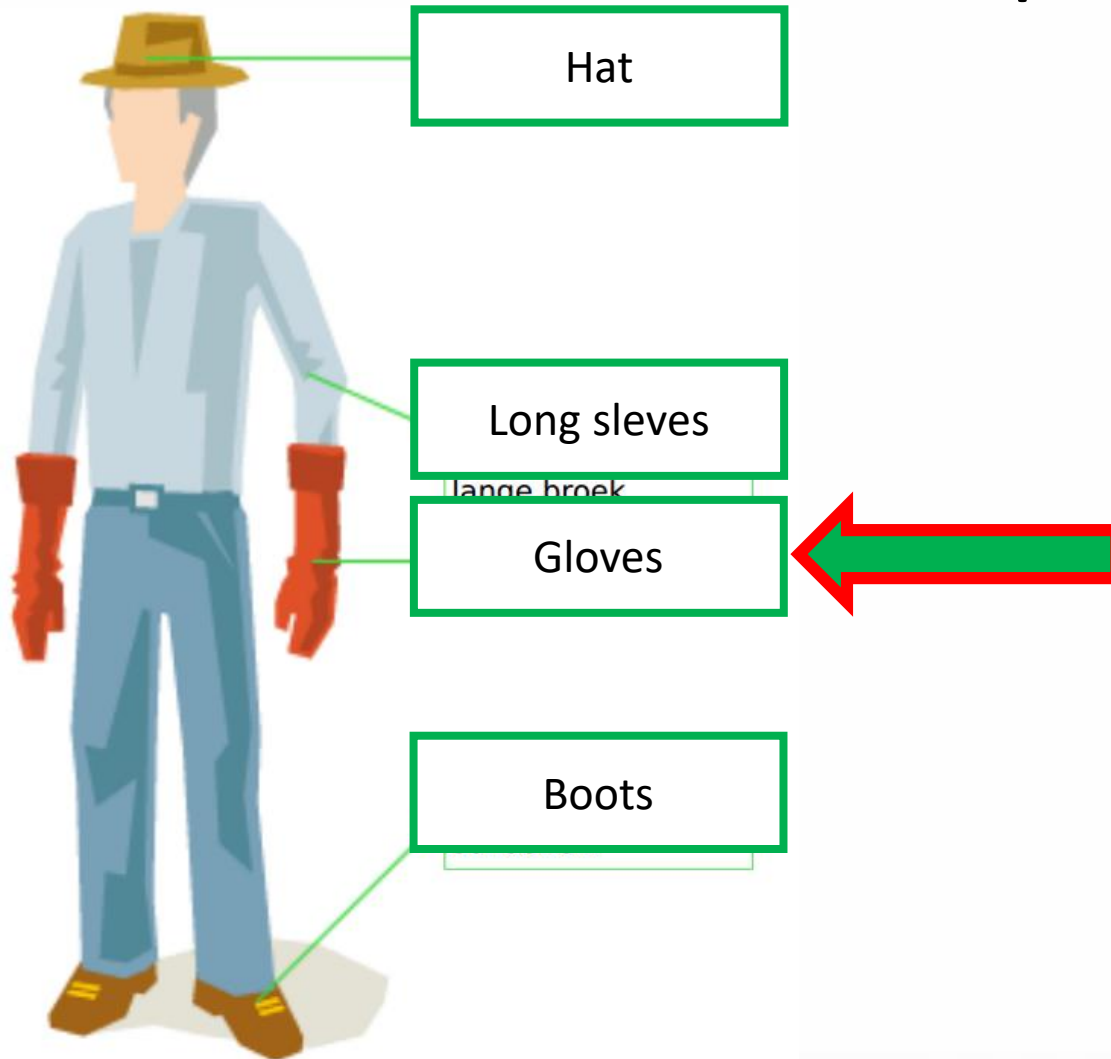


# Chemicals are hazardous

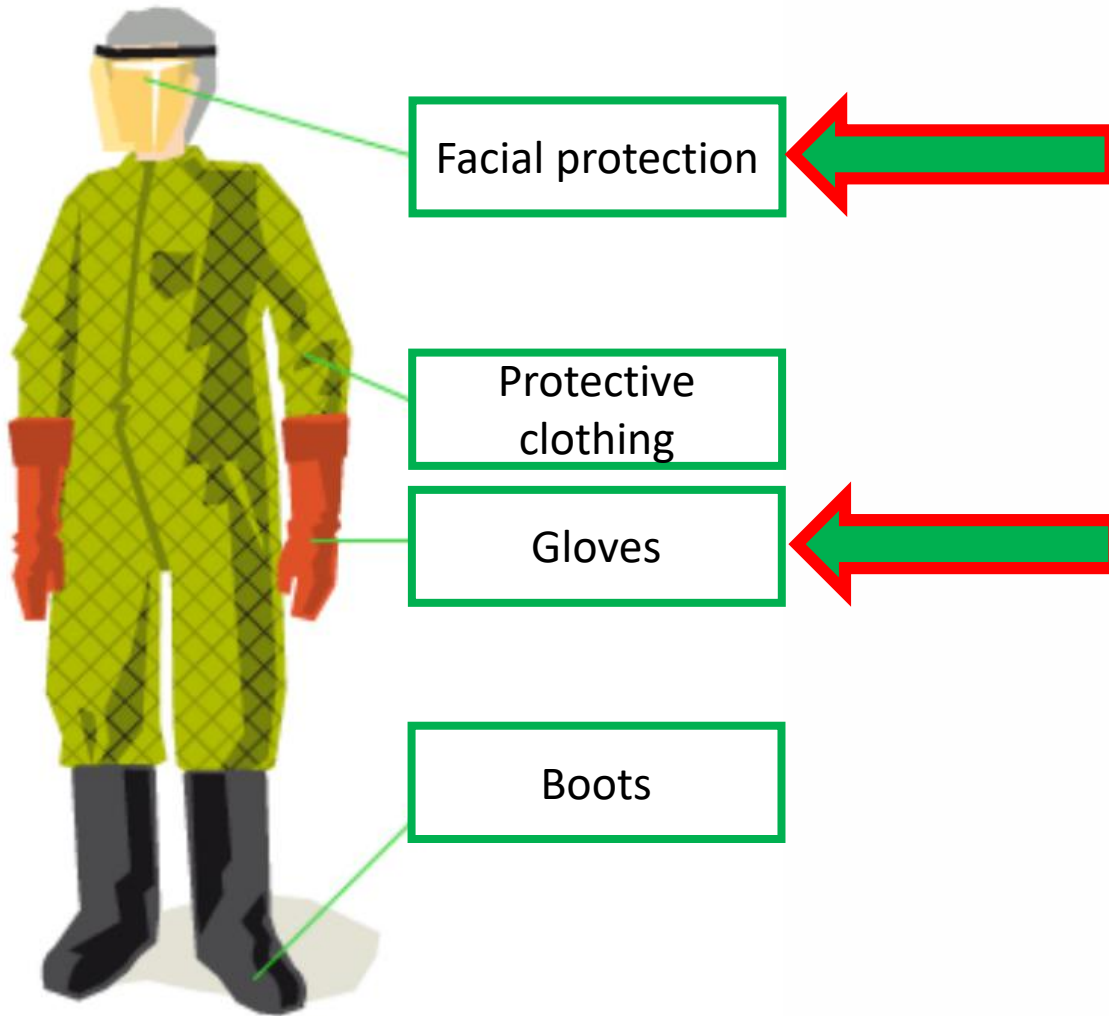




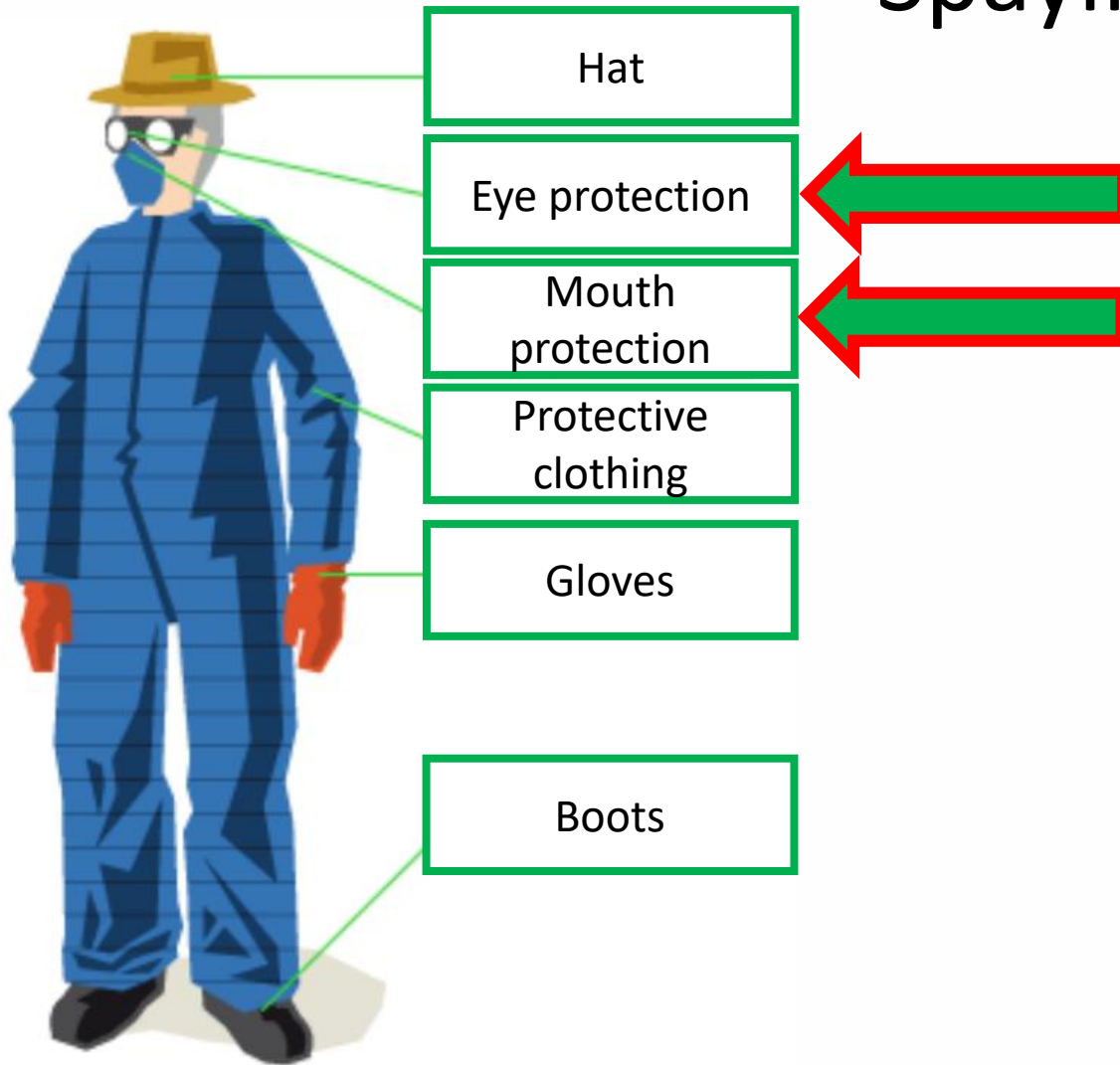
# Preparing copper



# Preparing chemicals



# Spaying



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Thank you for your  
attention



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