

Plant

(natural environment)



Simultaneous infection (= co-infection)
(by different viruses or strains of the same virus)

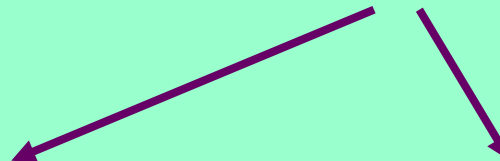


No interaction
(= Neutralism)

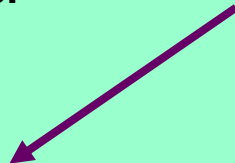


Viruses do not
influence each other

Interaction



Antagonism



Prevent or reduce virus
accumulation
(= cross-protection)

Synergism



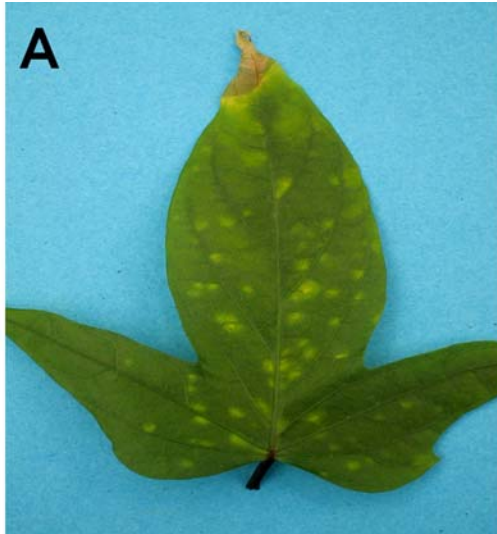
- Facilitate virus replication
(increase on virus
accumulation)
- Facilitate movement
(translocation) of virus on
plant tissues

} Increase on
severity of
symptoms
More effect on
yield

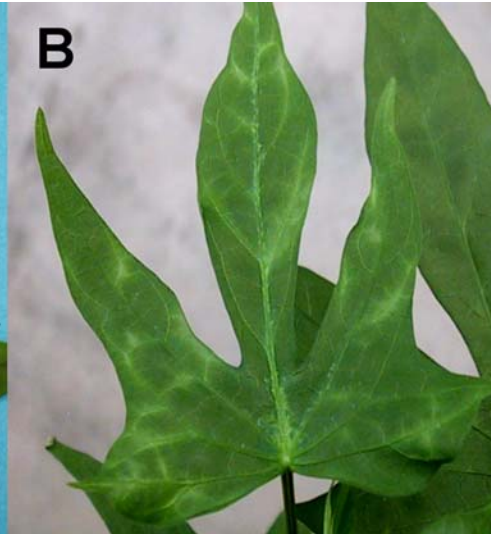


Symptoms on single infection

C-6
Paramonguino



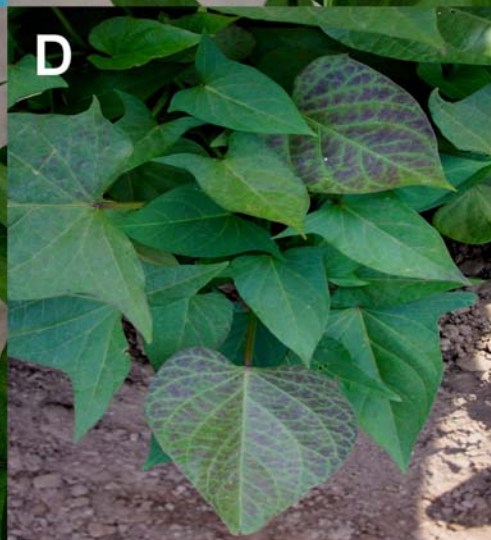
SPMMV
Jonathan



SPFMV + CMV
Jonathan



SPCSV
Costanero





SPCSV +
Crinivirus

Potyviruses (SPFMV, SPLV, SPMSV)

Ipomovirus (SPMMV)

Carlaviruses (SPCFV, C-6)

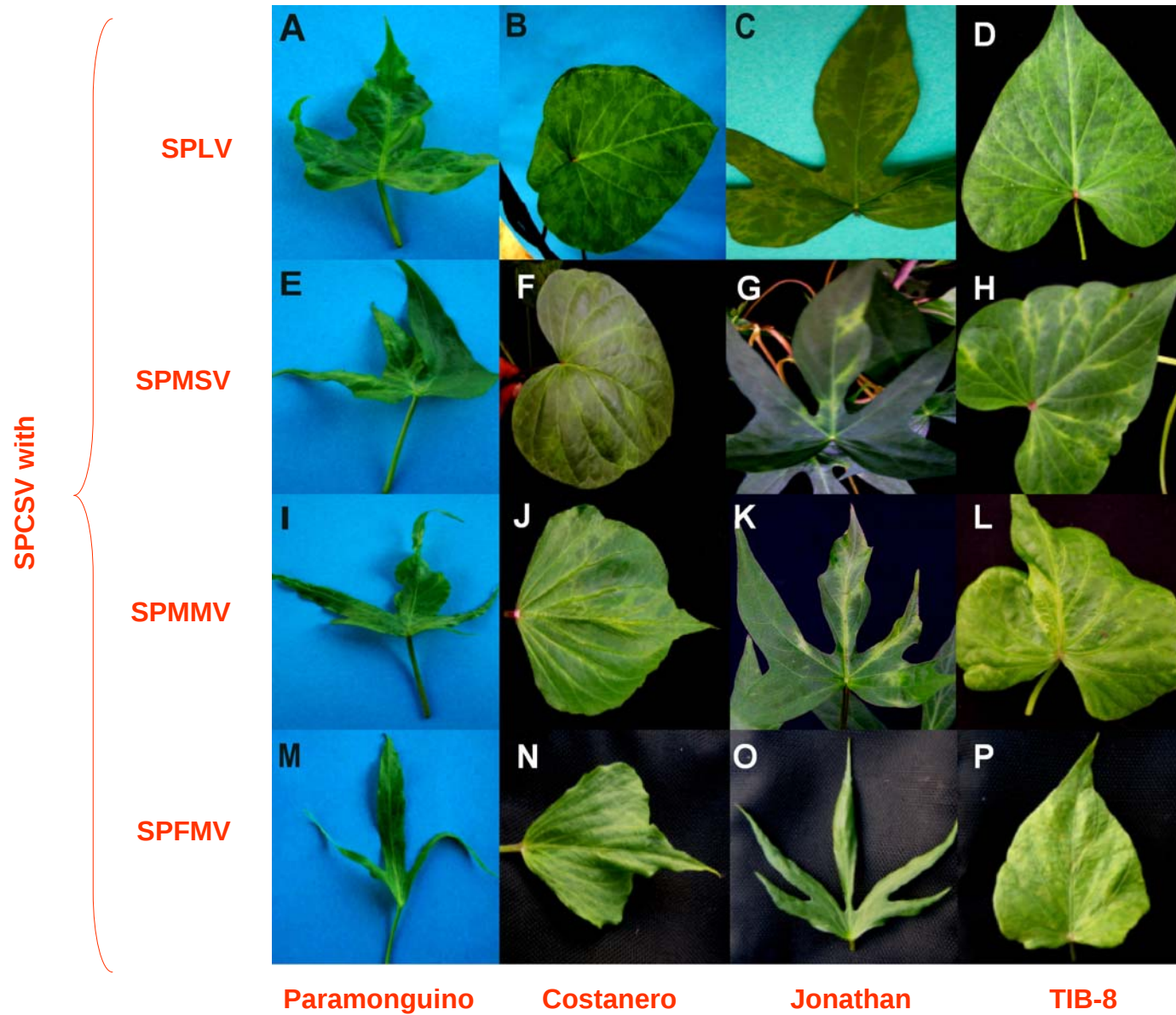
Cucumovirus (CMV)

Begomovirus (SPLCV)

Cavemovirus (C-9, SPCaLV)

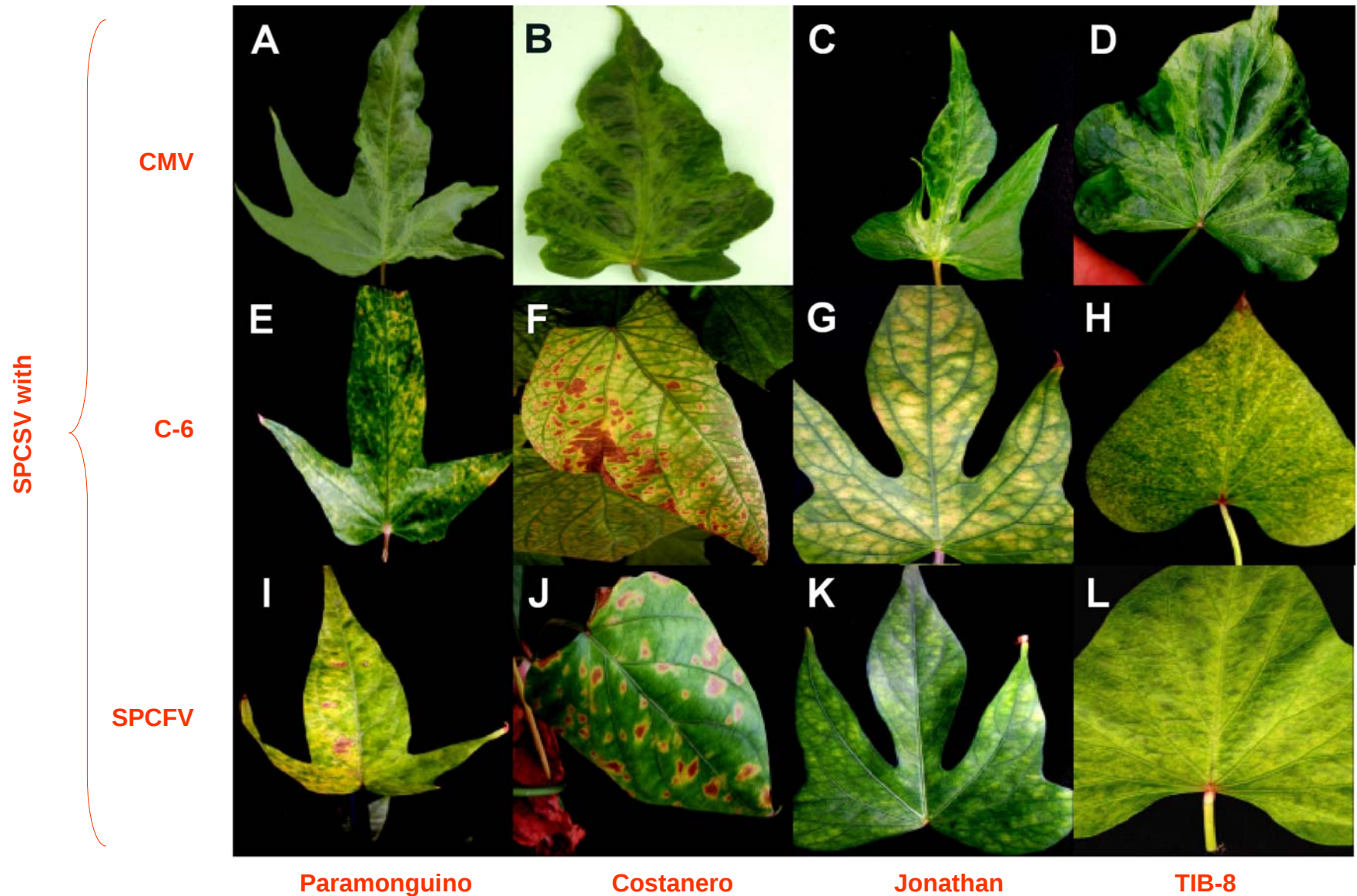


Foliar symptoms on SPplants induced by synergistic co-infection of SPCSV (genus *Crinivirus*) with viruses in the family *Potyviridae*





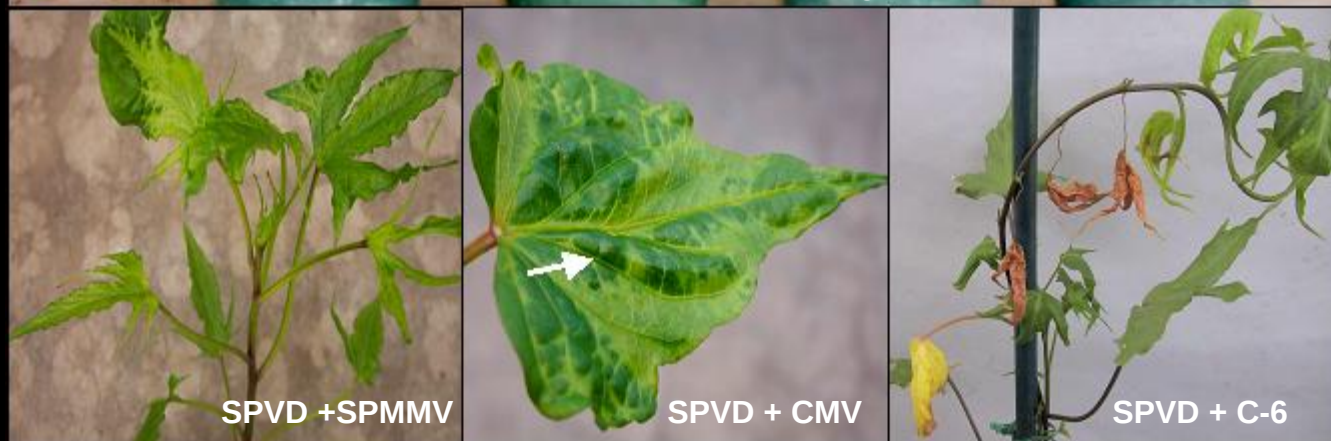
Foliar symptoms in SP plants induced by synergistic co-infection of SPCSV (genus *Crinivirus*) with viruses in genus *Cucumovirus* and *Carlavirus* (putative members)



Double and triple virus infection on SP plants

The presence of a third virus increase severity of SPVD symptoms

Costanero



The synergism with viruses C-6 and SPCFV cause leaf defoliation

Morada-INTA

Costanero

Jonathan



Facilitating virus movement

