A deepen knowledge of Colletotrichum lupini, a major threat for Lupin cultures

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A deepen knowledge of *Colletotrichum lupini*, a major threat for Lupin cultures

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BACKGROUND

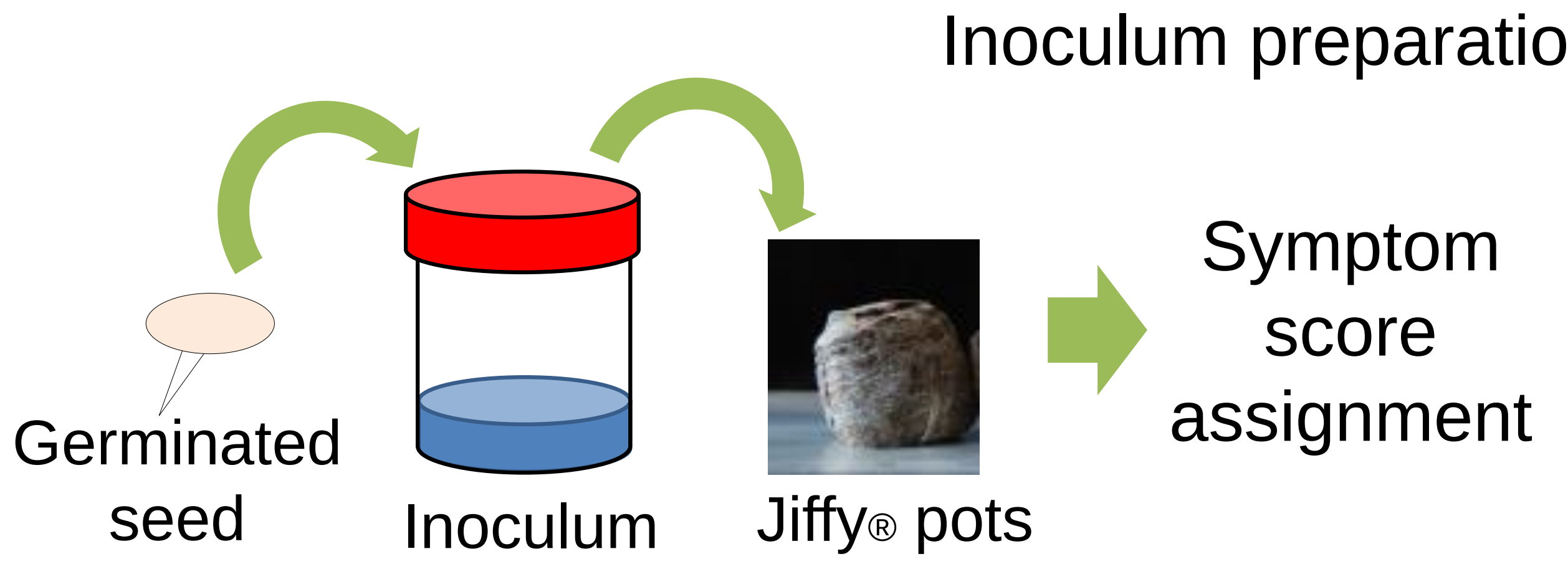
- The *Colletotrichum acutatum* species complex (CAsc) includes about 31 species that infect a wide diversity of crop plants worldwide.
- *Colletotrichum lupini* is a species within the CAsc, specific to his host. It is a major threat on Lupin (*Lupinus spp*). On the contrary, *C. fioriniae*, which is also in the CAsc and can infect a wide host range.
- In addition to its economic impact, *C. lupini* is a useful model to study host speciation process.
- The aim of the project is to gain an understanding in the molecular factors involved in pathogenicity and the genomic signature associated with host specificity in plant pathogenic fungi.

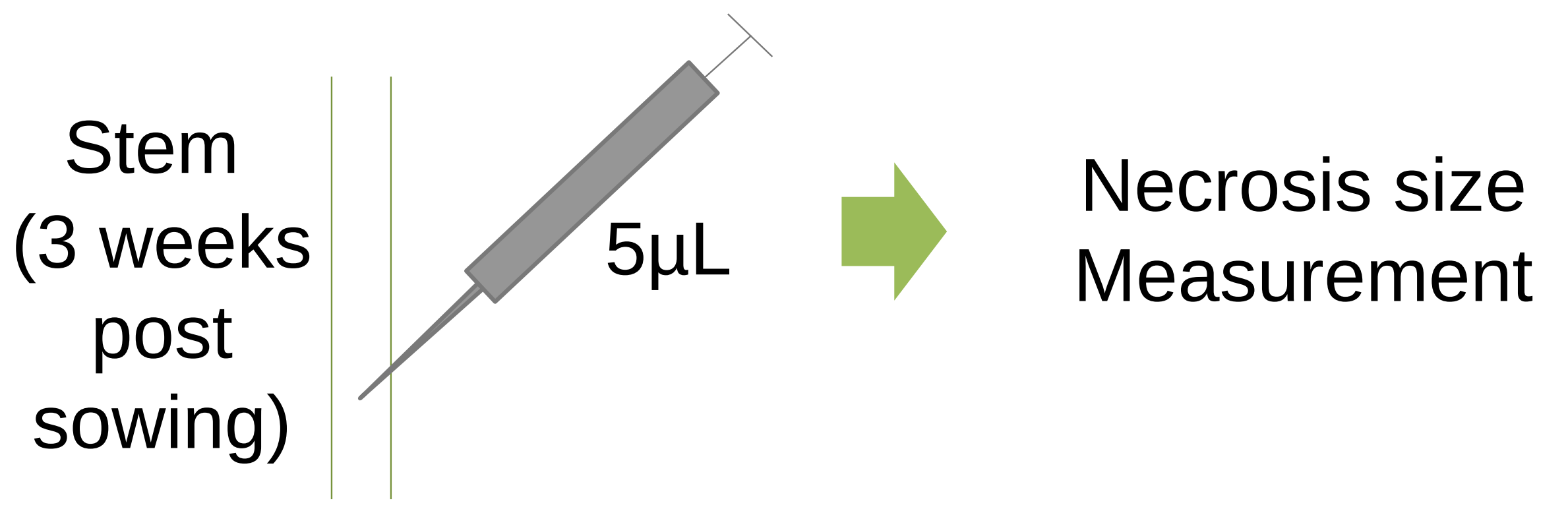
HOST SPECIFICITY

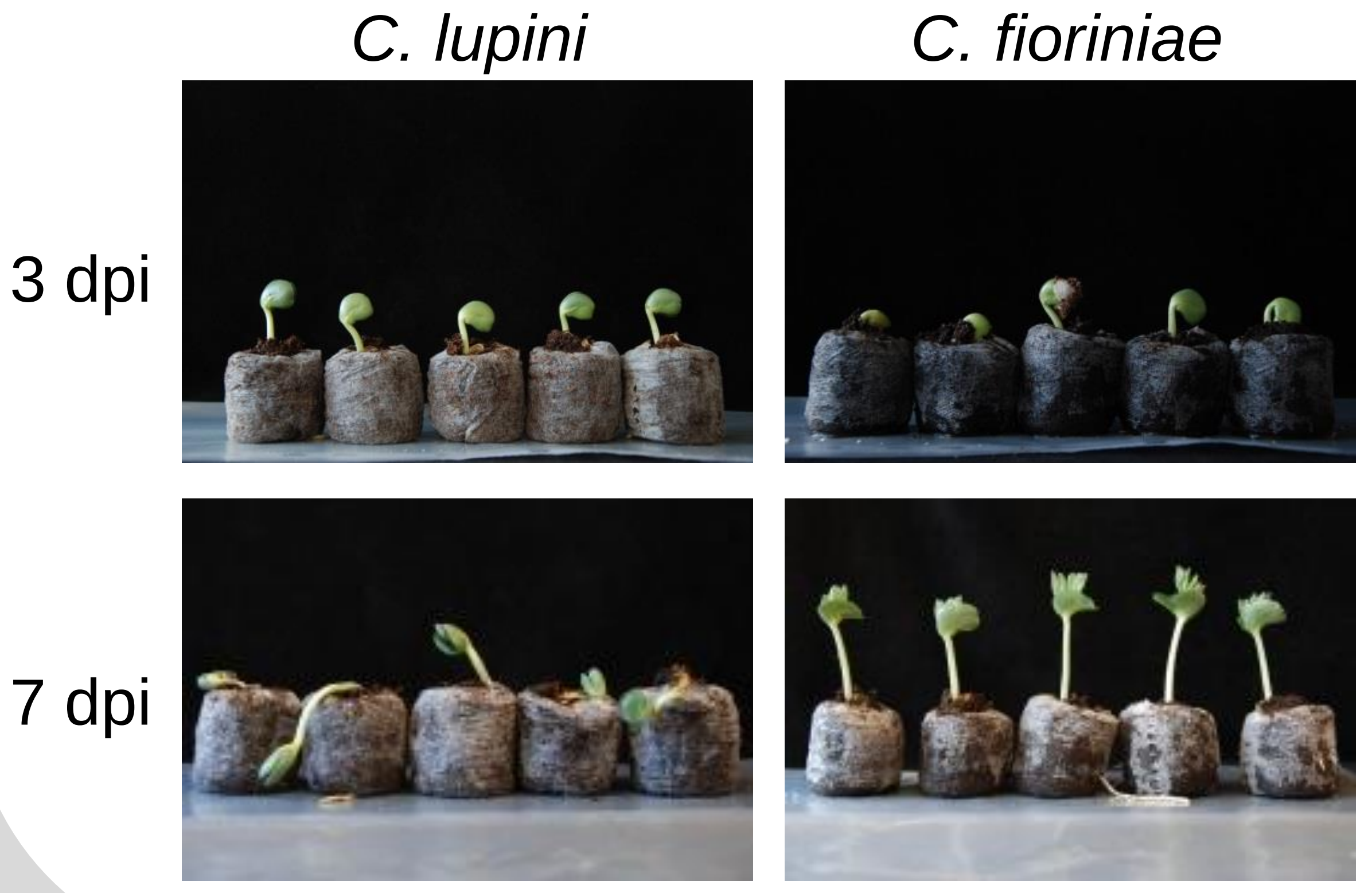
Germinated seeds inoculation by soaking (Unwounded)

Stem inoculation by injection (Wounded)

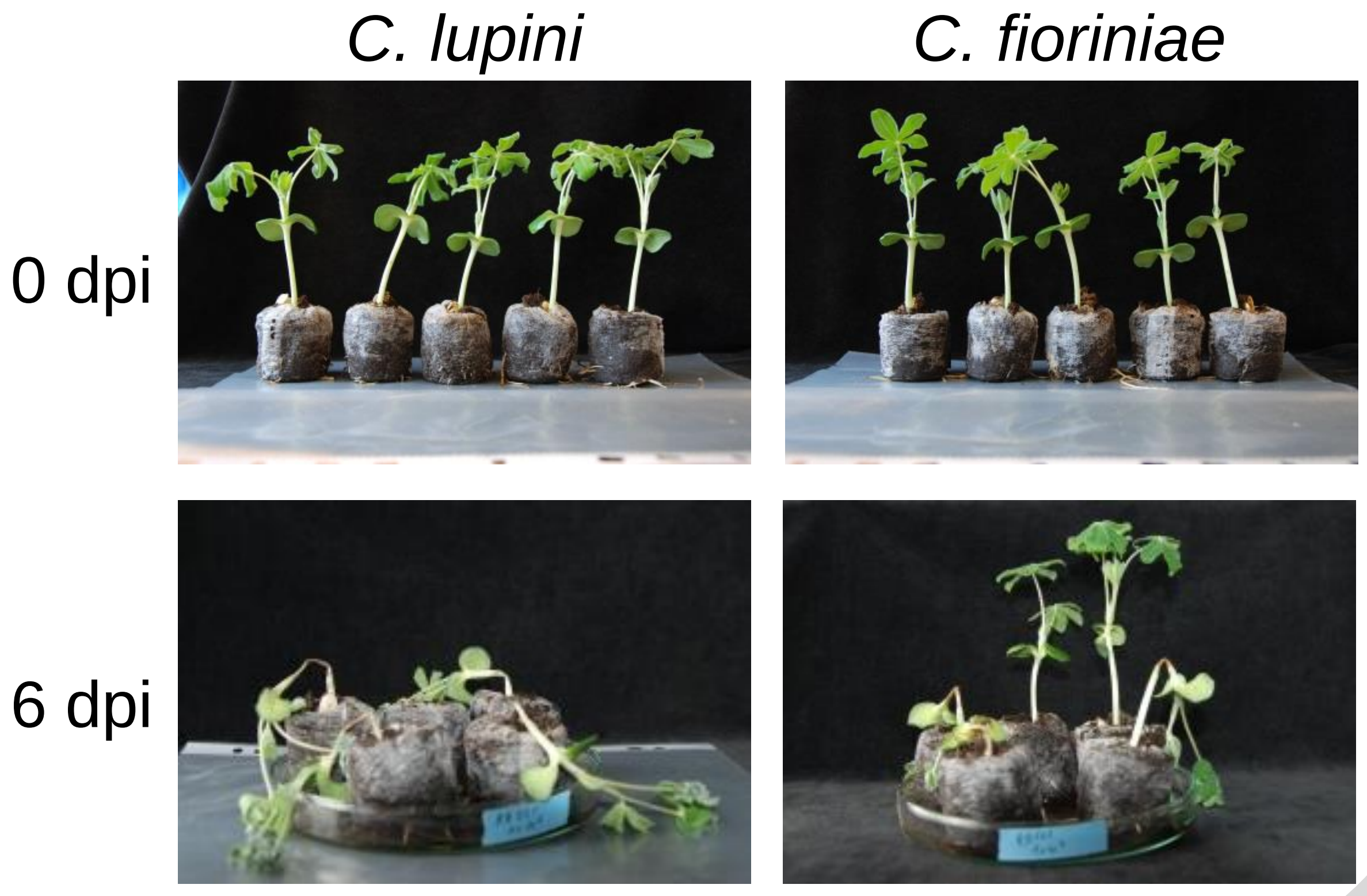
Inoculum preparation (1x10^7 spores/mL)



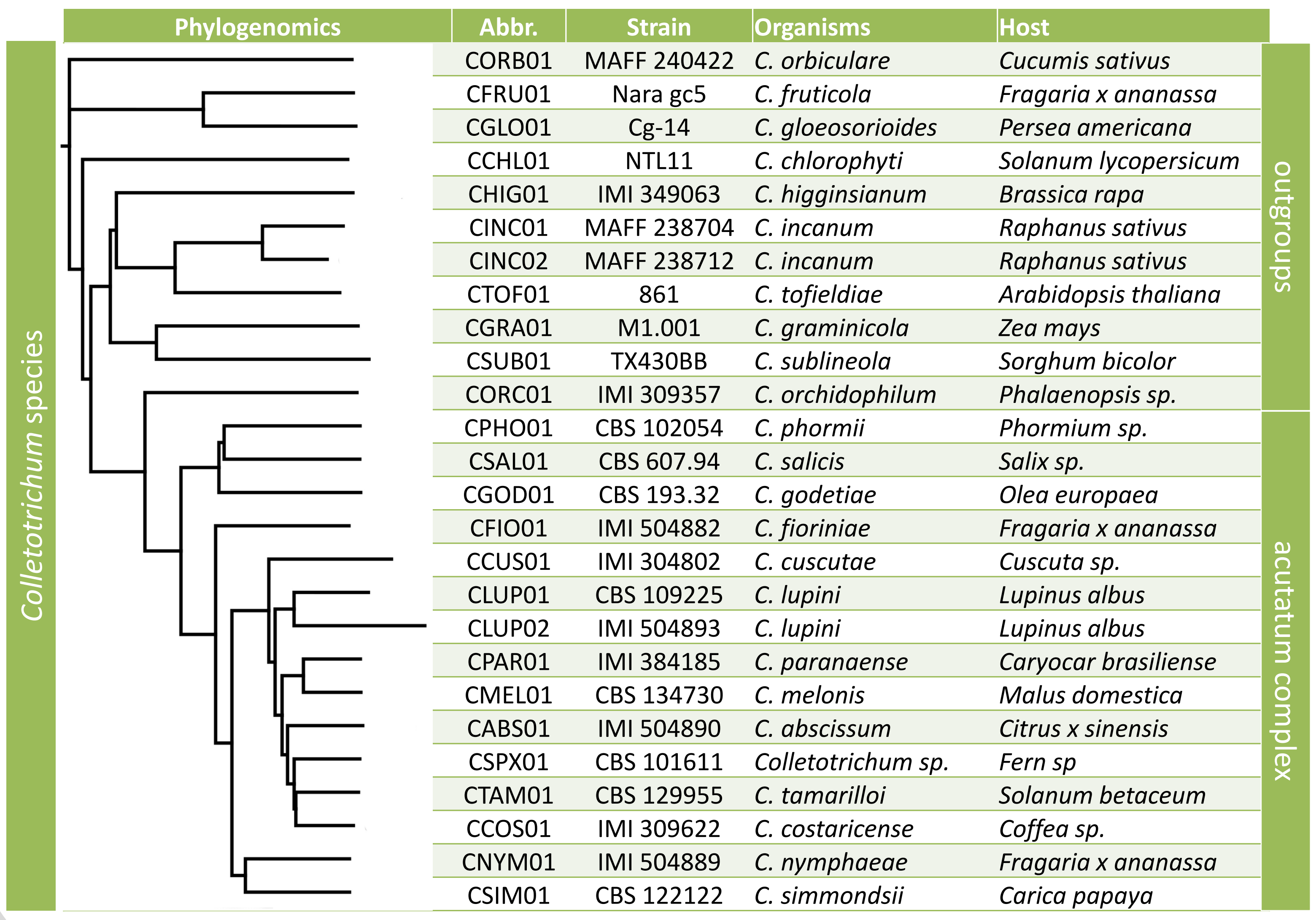




dpi: days post inoculation

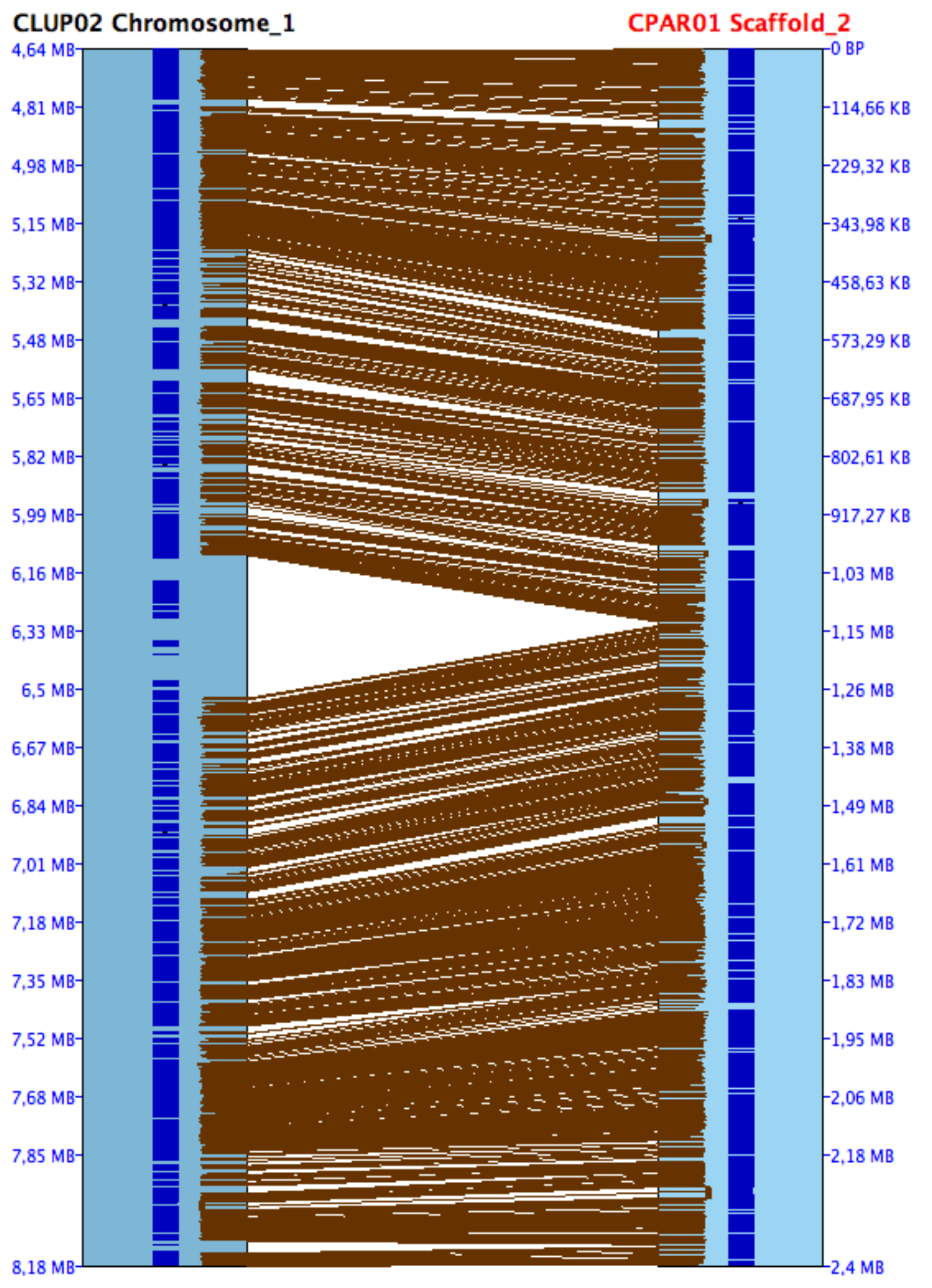


GENOME SEQUENCES



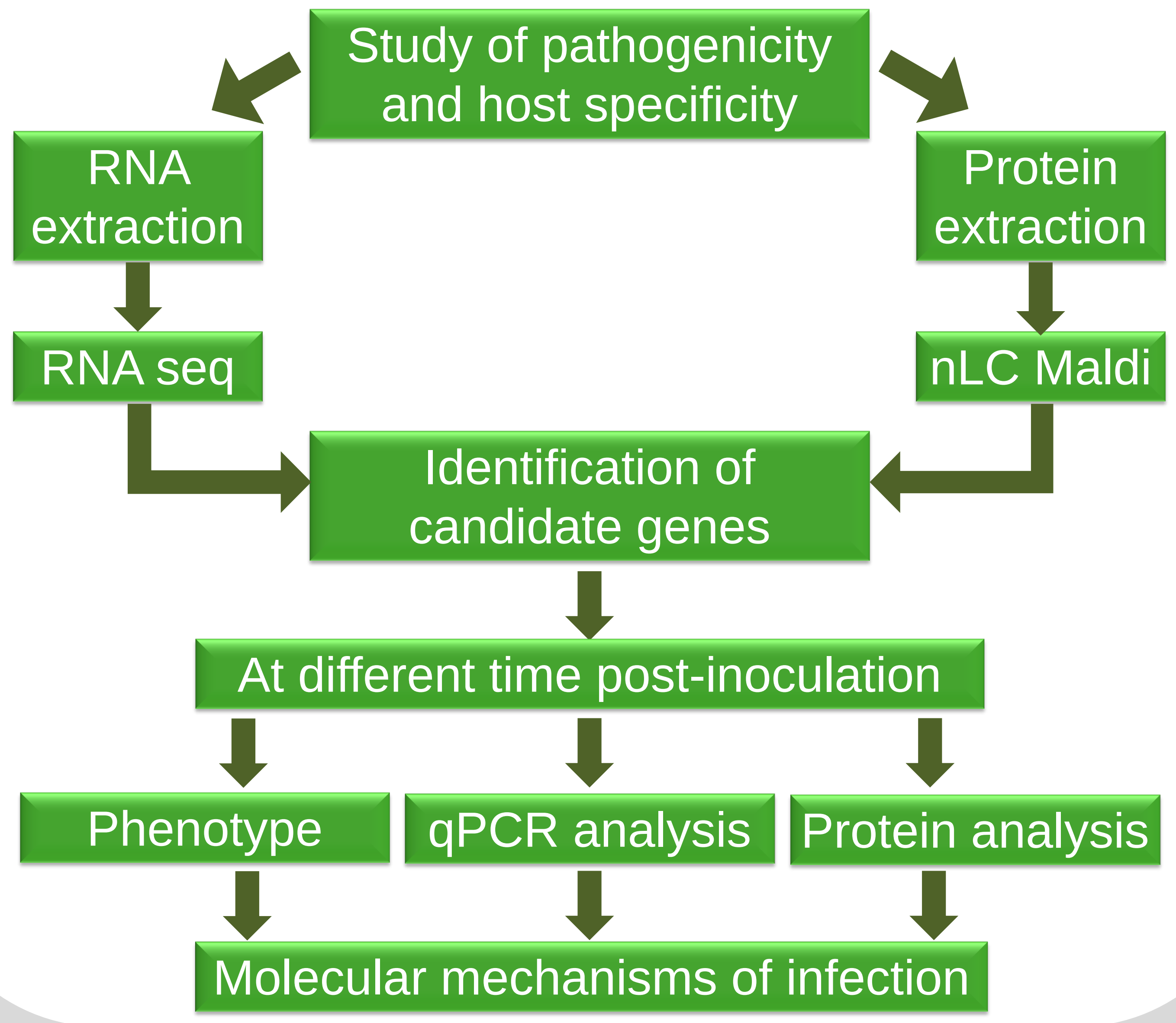
Abbr.	Strain	Organisms	Host
CORB01	MAFF 240422	*C. orbiculare*	*Cucumis sativus*
CFRU01	Nara gc5	*C. fruticola*	*Fragaria x ananassa*
CGLO01	Cg-14	*C. gloeosorioides*	*Persea americana*
CCHL01	NTL11	*C. chlorophyti*	*Solanum lycopersicum*
CHIG01	IMI 349063	*C. higginsianum*	*Brassica rapa*
CINC01	MAFF 238704	*C. incanum*	*Raphanus sativus*
CINC02	MAFF 238712	*C. incanum*	*Raphanus sativus*
CTOF01	861	*C. tofieldiae*	*Arabidopsis thaliana*
CGRA01	M1.001	*C. graminicola*	*Zea mays*
CSUB01	TX430BB	*C. sublineola*	*Sorghum bicolor*
CORC01	IMI 309357	*C. orchidophilum*	*Phalaenopsis sp.*
CPHO01	CBS 102054	*C. phormii*	*Phormium sp.*
CSAL01	CBS 607.94	*C. salicis*	*Salix sp.*
CGOD01	CBS 193.32	*C. godetiae*	*Olea europaea*
CFIO01	IMI 504882	*C. fioriniae*	*Fragaria x ananassa*
CCUS01	IMI 304802	*C. cuscutae*	*Cuscuta sp.*
CLUP01	CBS 109225	*C. lupini*	*Lupinus albus*
CLUP02	IMI 504893	*C. lupini*	*Lupinus albus*
CPAR01	IMI 384185	*C. paranaense*	*Caryocar brasiliense*
CMEL01	CBS 134730	*C. melonis*	*Malus domestica*
CABS01	IMI 504890	*C. abscissum*	*Citrus x sinensis*
CSPX01	CBS 101611	*Colletotrichum sp.*	*Fern sp*
CTAM01	CBS 129955	*C. tamarilloi*	*Solanum betaceum*
CCOS01	IMI 309622	*C. costaricense*	*Coffea sp.*
CNYM01	IMI 504889	*C. nymphaeae*	*Fragaria x ananassa*
CSIM01	CBS 122122	*C. simmondsii*	*Carica papaya*

SYNTENY AND SPECIES SPECIFIC REGIONS



- Comparing full genome alignments of the *C. lupini* genomes and other *Colletotrichum* spp. we were able to identify ***C. lupini* specific regions** (SSR)
- One single region (SSR1) of 0.4 Mb **does not show any similarity** with any other genomes analyzed and is present in all *C. lupini* genomes analyzed
- SSR1 harbors **28 putative genes** of which: 9 do not have any similarity with known proteins in public databases and 10 have been predicted to form a PKS/NRPS Hybrid Gene Cluster
- Those genes will be used to investigate their **role in *C. lupini* pathogenicity**

ONGOING ANALYSIS



Study of pathogenicity and host specificity

RNA extraction

Protein extraction

RNA seq

nLC Maldi

Identification of candidate genes

At different time post-inoculation

Phenotype

qPCR analysis

Protein analysis

Molecular mechanisms of infection

RESULTS AND CONCLUSION

Pathogenicity tests were developed, focusing on the inoculum concentration, inoculation methods and symptom scoring to study the interaction.

Preliminary tests of infection reveal that *C. lupini* produces symptoms in both infection methods (*i.e.* with and without wound). On the contrary, *C. fioriniae* did not produce symptoms on unwounded plants.

We could suppose that *C. lupini* host specificity relies on the early stage of infection during the entry of the fungi through plant epidermis.

The genome sequences enabled to identify specific regions of *C. lupini* that might be involved in the ability of this species to infect Lupin plants.

The coming methodological approach will contribute to identify pathogenicity factors and host specificity mechanisms.

DEEPEN KNOWLEDGE IN PLANT PATHOLOGY FOR INNOVATIVE AGRO-ECOLOGY
May 29 - June 2 2017
Dunkerque - Malo-les-bains - FRANCE
12th European Foundation for Plant Pathology (EFPP) & 10th French Society for Plant Pathology (SFP) CONFERENCE

CE PROJET EST COFINANCÉ PAR LE FONDS EUROPÉEN AGRICOLE POUR LE DÉVELOPPEMENT RURAL. L'EUROPE INVESTIT DANS LES ZONES RURALES

L'Europe s'engage en Bretagne / Avec le Fonds européen agricole pour le développement rural : l'Europe investit dans les zones rurales

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