

Décryptage du signal cytokinine dans la formation haustoriale chez *Phelipanche ramosa*

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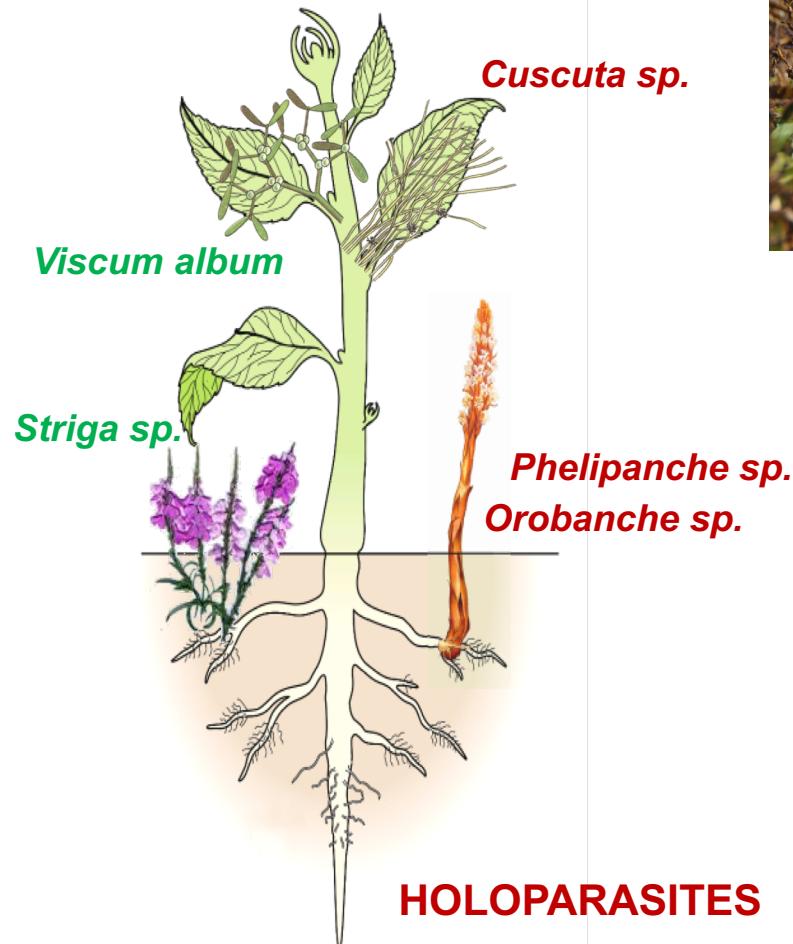


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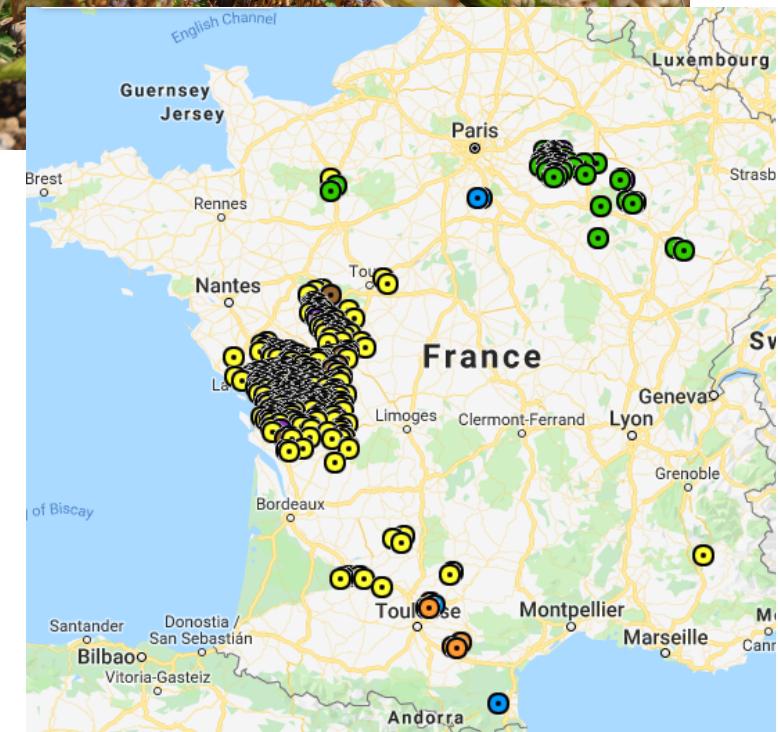
Plantes parasites

Epiphytes

HEMIPARASITES



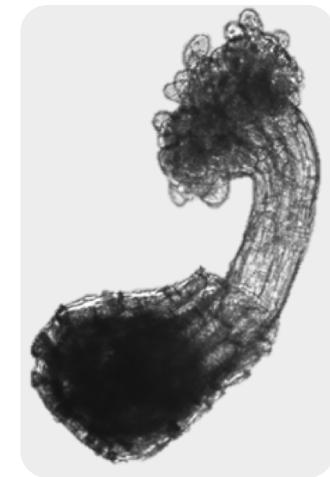
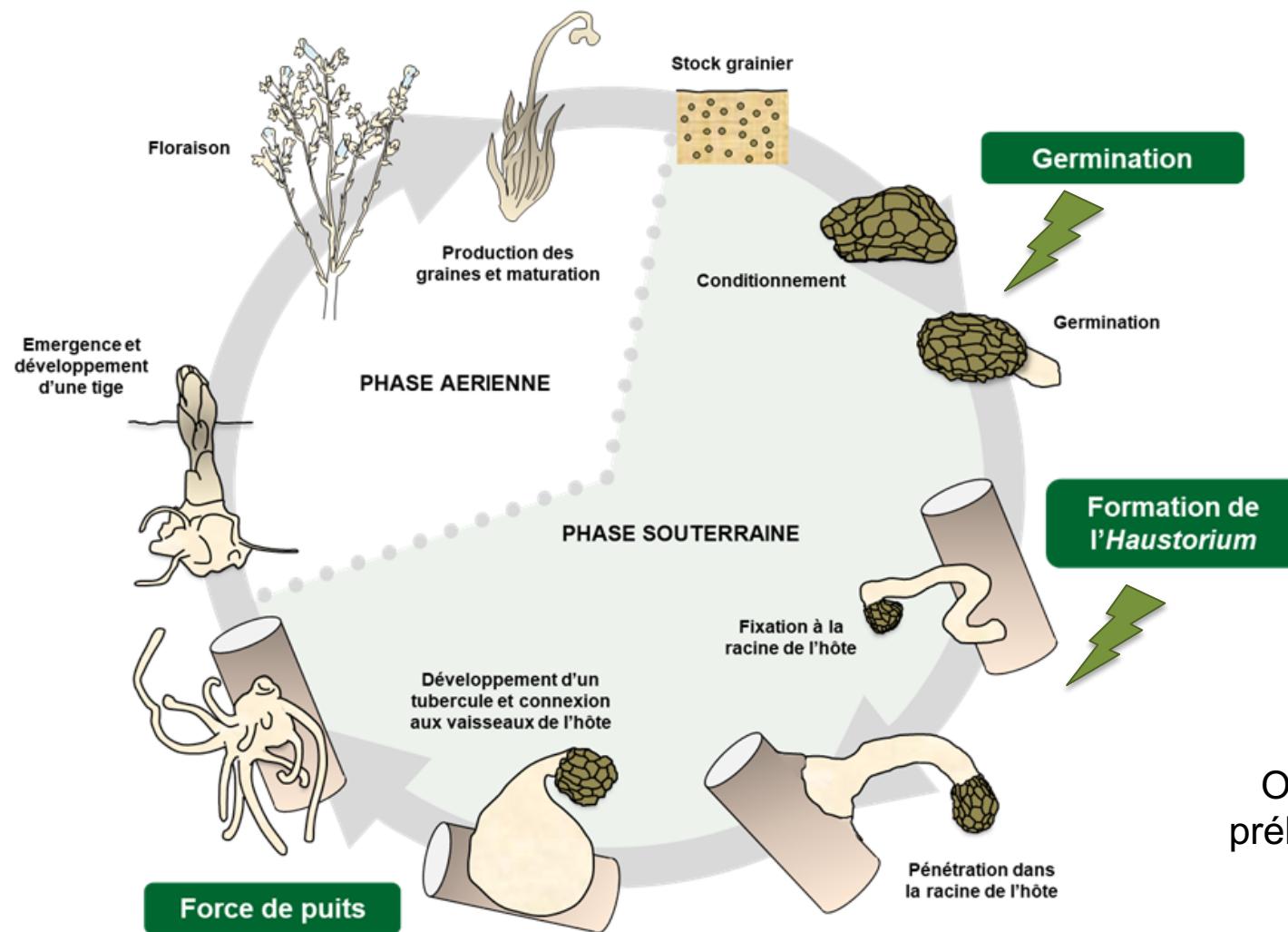
Epiphizies



Pas de moyen de lutte efficace actuellement



Cycle de vie de *P. ramosa*



Organe de fixation et de prélèvement des nutriments

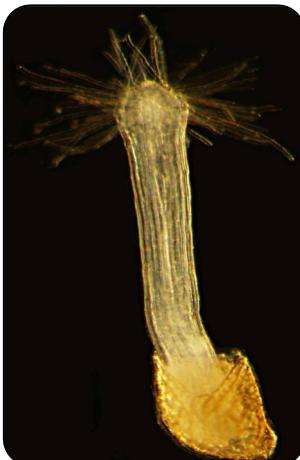


L'haustorium



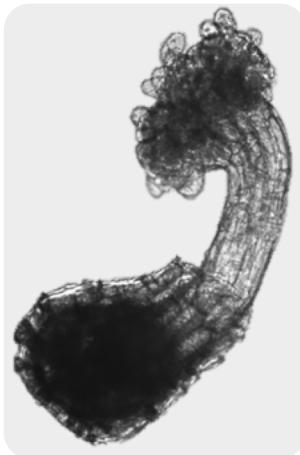
Organe de fixation et de prélèvement des nutriments

Hémiparasites



S. hermonthica

Holoparasites



P. ramosa

Early Haustorial Structure (EHS)

- Arrêt de l'élongation de la radicule
- Gonflement de l'apex
- Différenciation des cellules épidermiques
 - Hémiparasites : poils haustoriaux
 - Holoparasites : papilles



L'haustorium



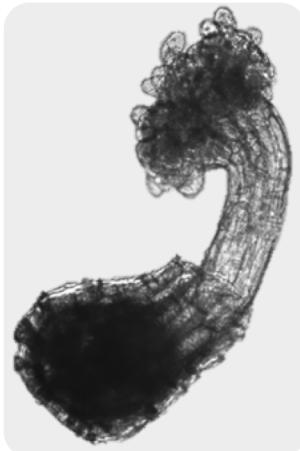
Organe de fixation et de prélèvement des nutriments

Hémiparasites

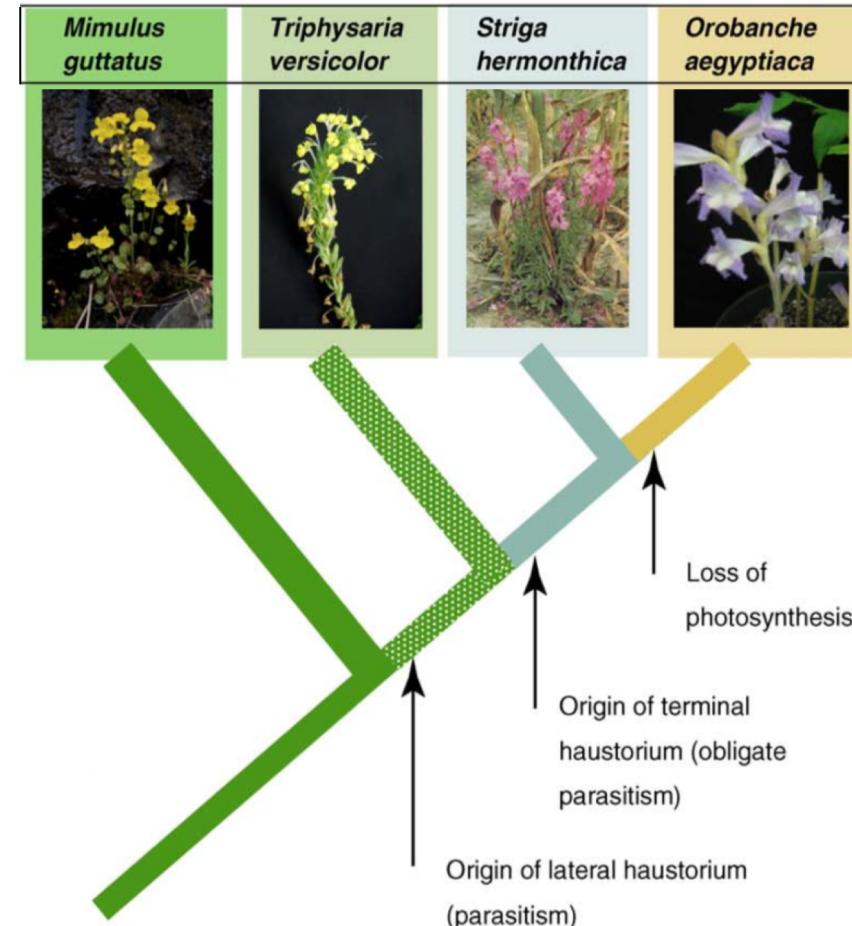


S. hermonthica

Holoparasites



P. ramosa



Westwood et al., 2010

L'haustorium



Organe de fixation et de prélèvement des nutriments

Hémiparasites



S. hermonthica

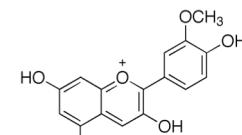
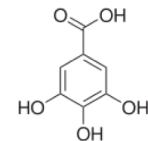
Holoparasites



P. ramosa

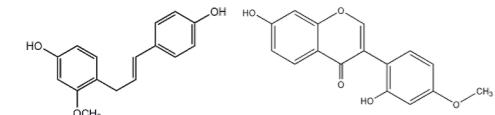
Haustorium Inducing Factors (HIF)

Composés phénoliques



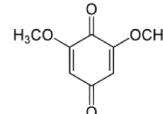
Peonidin

Flavonoïdes



Xenognosin A et B

Quinones



DMBQ

(2,6 dimethoxy-1,4-benzoquinone)



L'haustorium



Organe de fixation et de prélèvement des nutriments

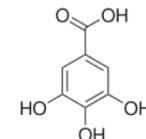
S. hermonthica



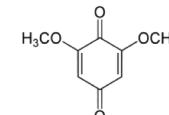
P. ramosa

Haustorium Inducing Factors (HIF)

Composés phénoliques



Quinones



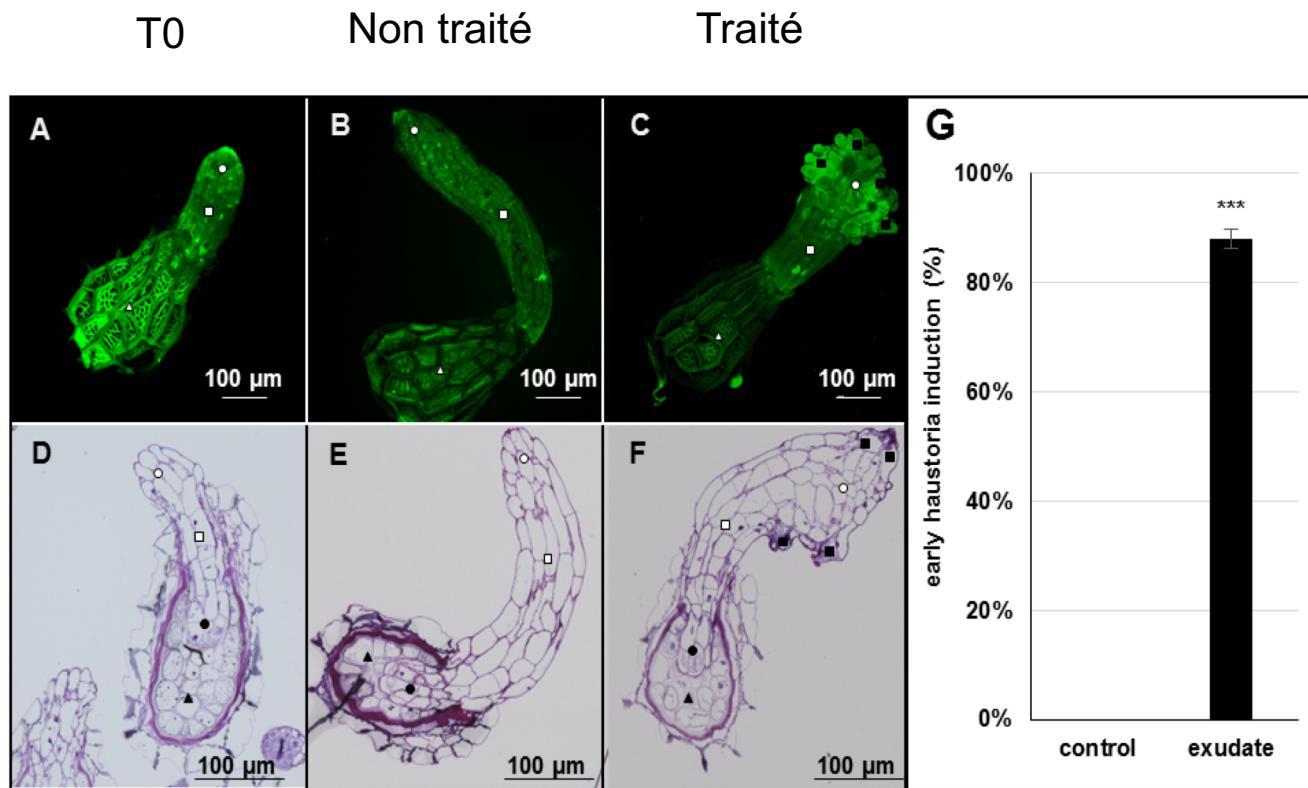
DMBQ

(2,6 dimethoxy-1,4-benzoquinone)

Pas d'induction de l'haustorium



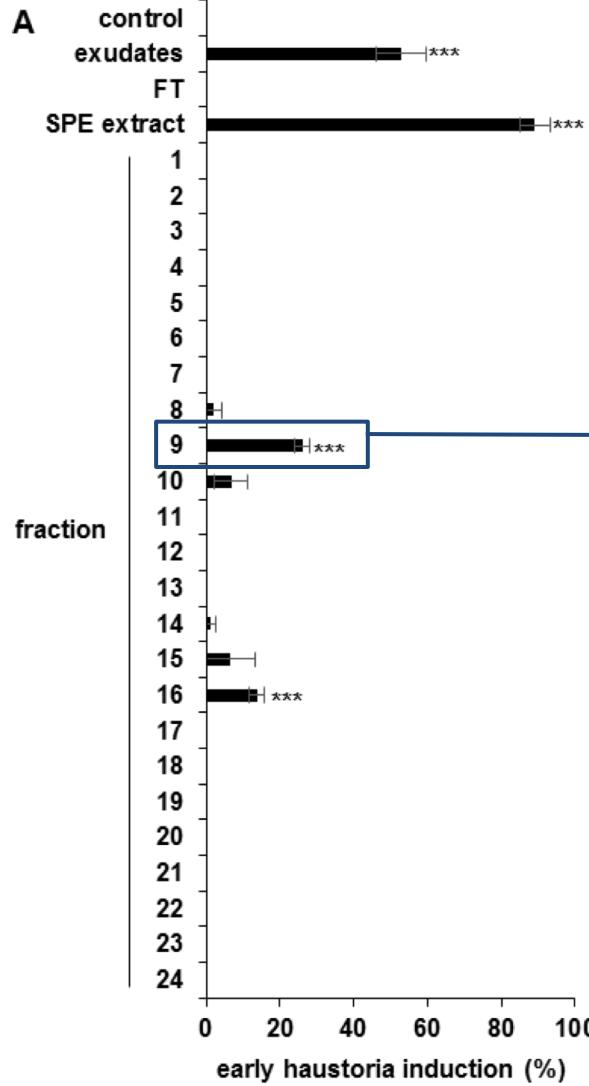
Induction de l'haustorium chez *P. ramosa*



Les exsudats racinaires de Colza induisent la formation de l'haustorium



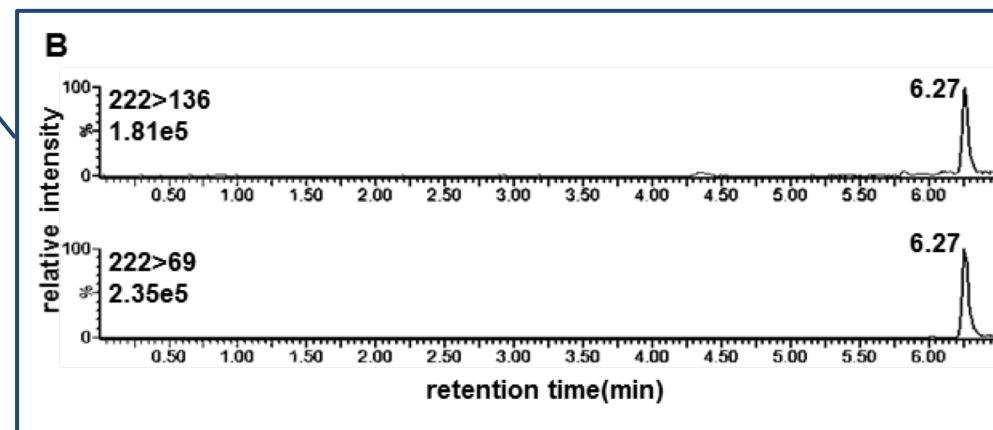
Induction de l'haustorium chez *P. ramosa*



Extraction SPE → Fractionnement HPLC inverse

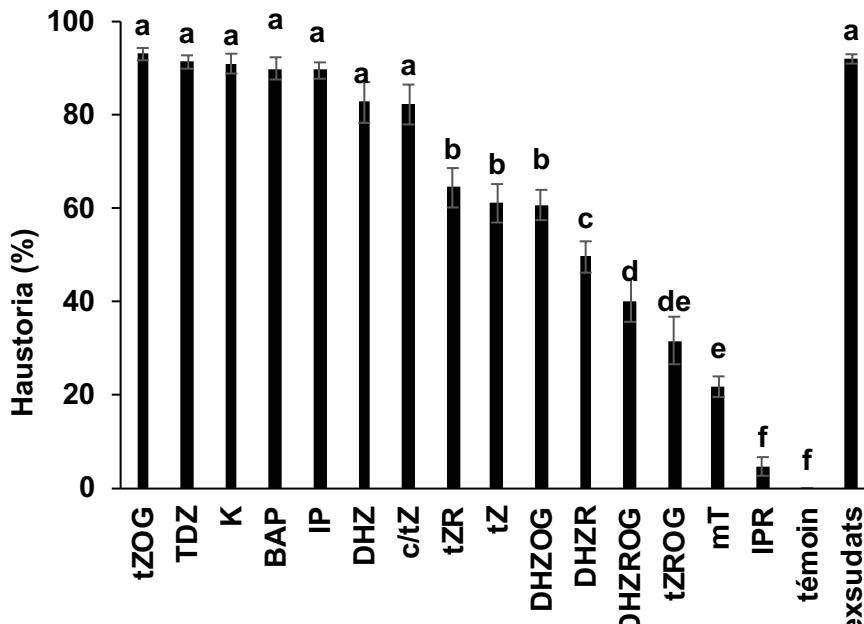
Deux fractions induisent la formation de l'haustorium

→ UPLC-ESI (+)– MS/MS

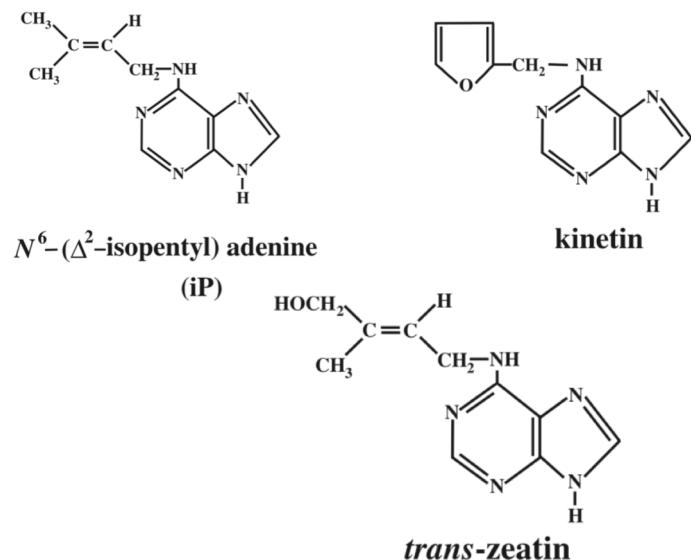


Molécules ayant les caractéristiques des cytokinines

Induction de l'haustorium chez *P. ramosa*



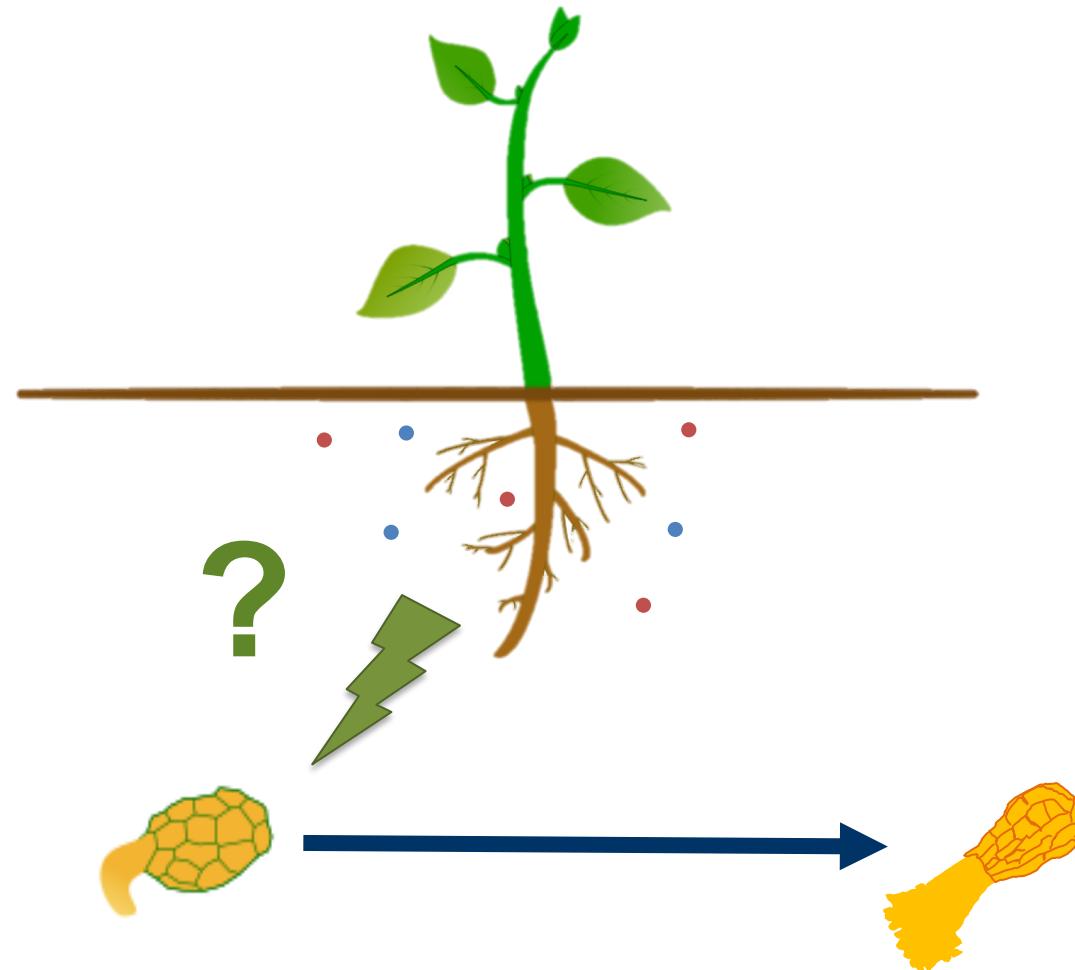
Les cytokinines induisent la formation de l'haustorium chez *P. ramosa*



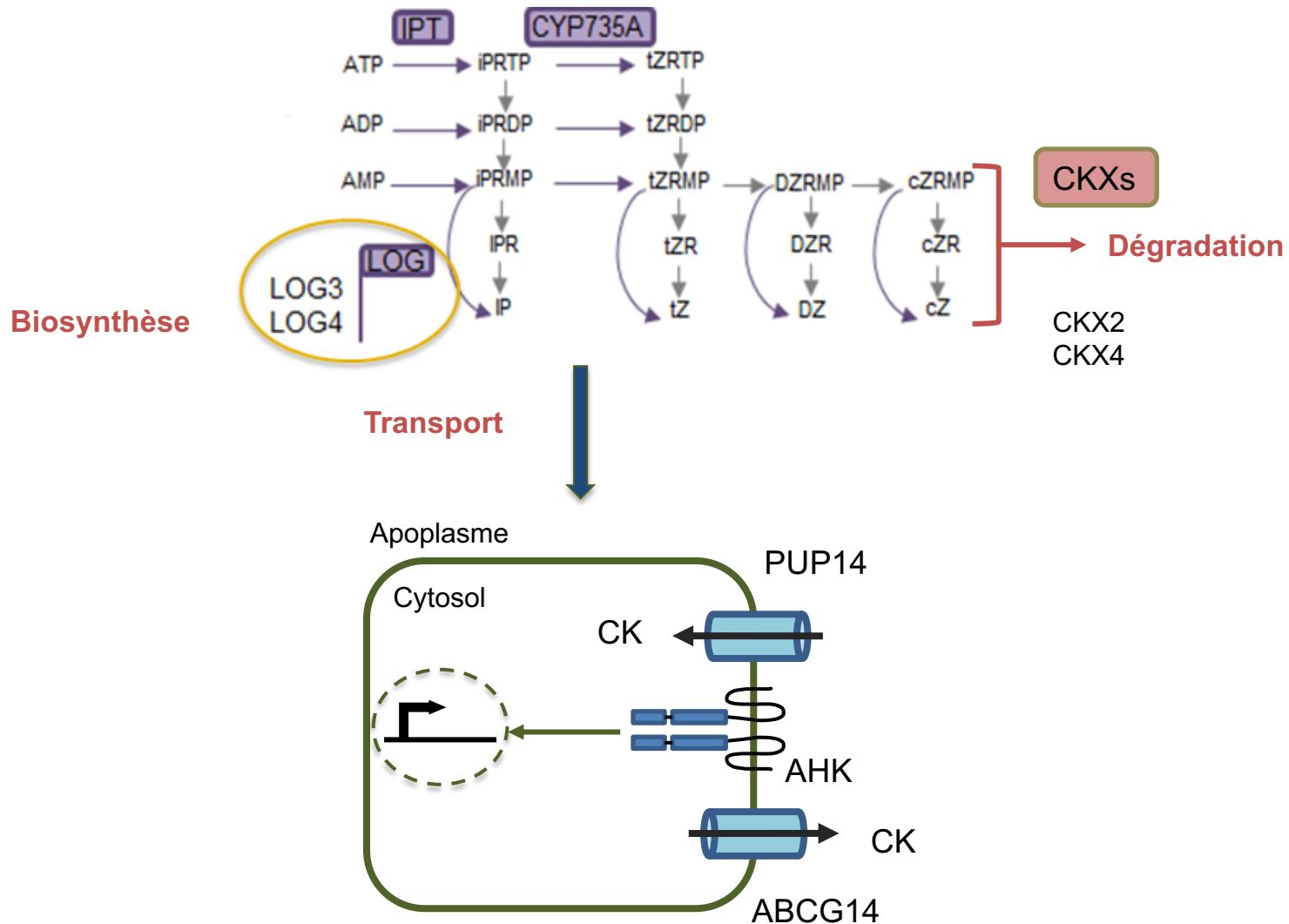
Phytohormones impliquées dans la division et différenciation cellulaire, développement racinaire, ...

Molécules très conservées dans le monde du vivant (plantes, bactéries, champignons, microalgues)

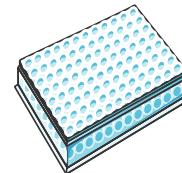
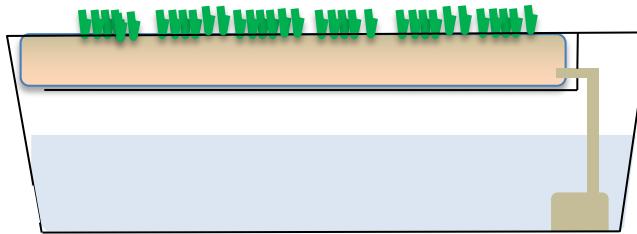
D'où proviennent les cytokinines présentes dans la rhizosphère de la plante hôte ?



Caractérisation de mutants et plants transgéniques d'*Arabidopsis thaliana*



Production des exsudats racinaires



Test d'activité haustoriale

Culture hydroponique
d'*Arabidopsis thaliana*

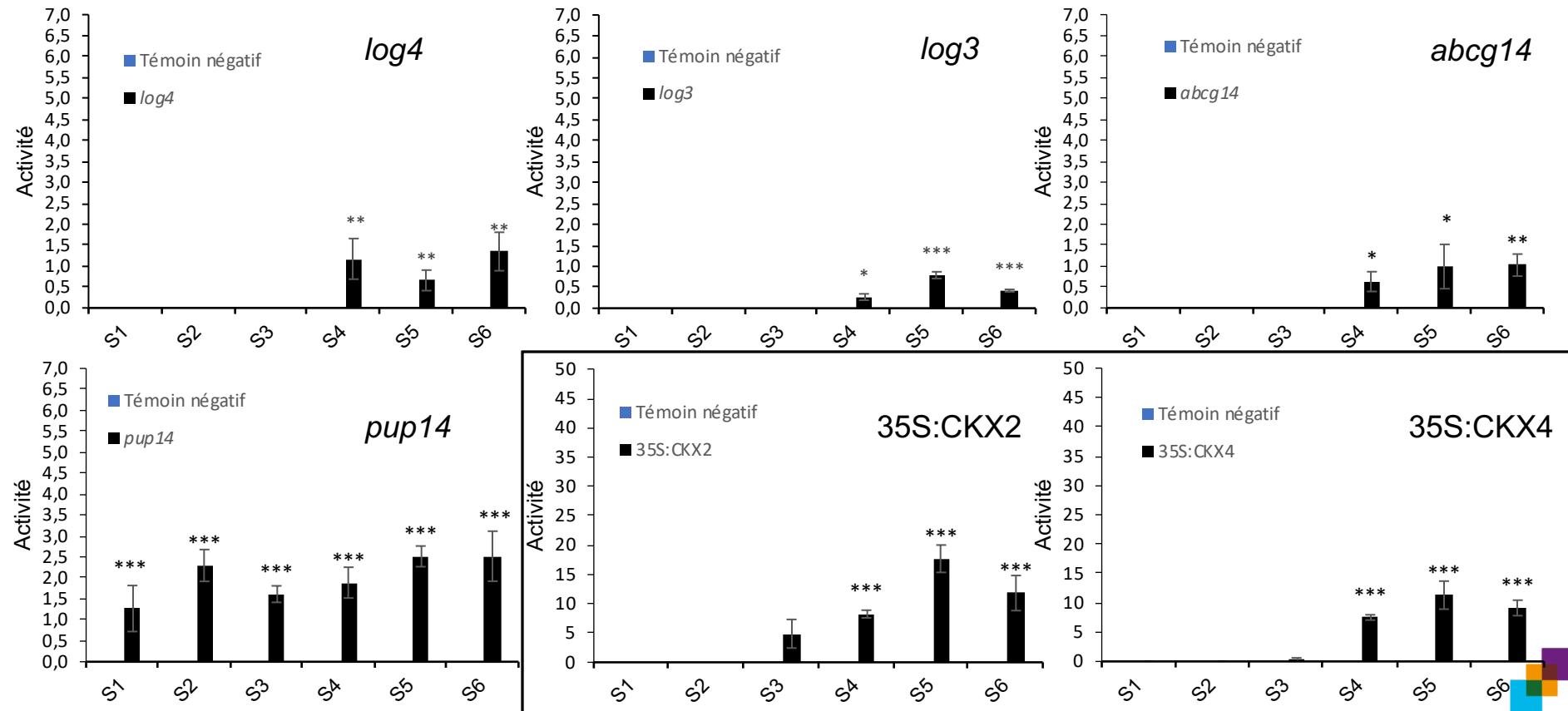


Collecte hebdomadaire
des exsudats

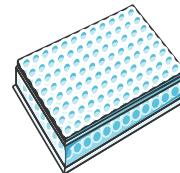
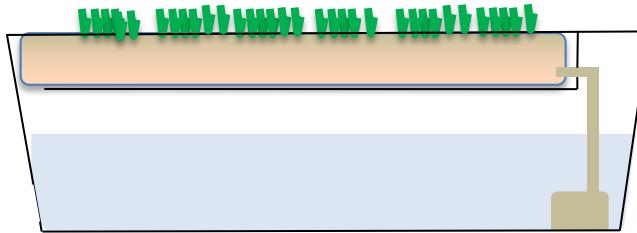


Activité des exsudats bruts

Activité (Haustoriums / g MS / L)



Production des exsudats racinaires



Test d'activité haustoriale

Culture hydroponique
d'*Arabidopsis thaliana*

Collecte hebdomadaire
des exsudats

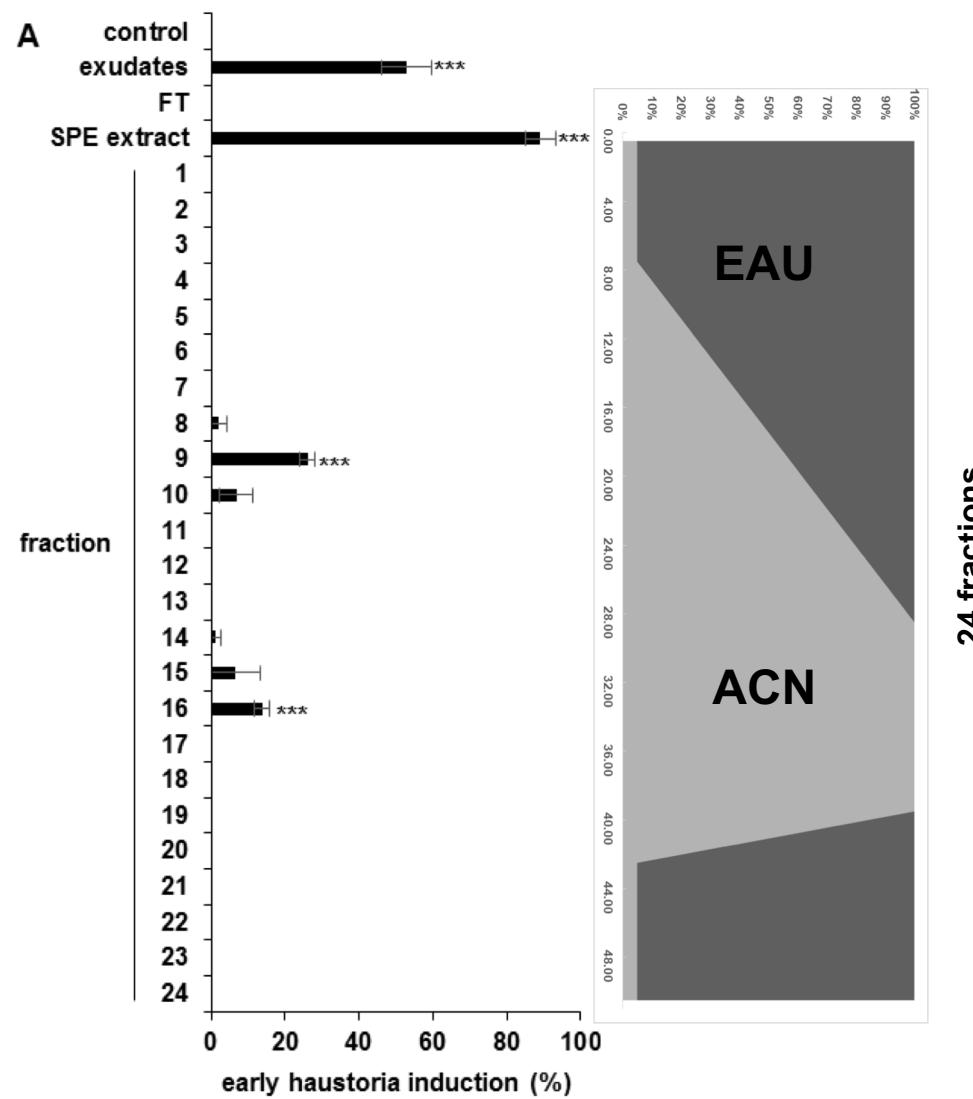
Extraction SPE

Fractionnement HPLC
inverse

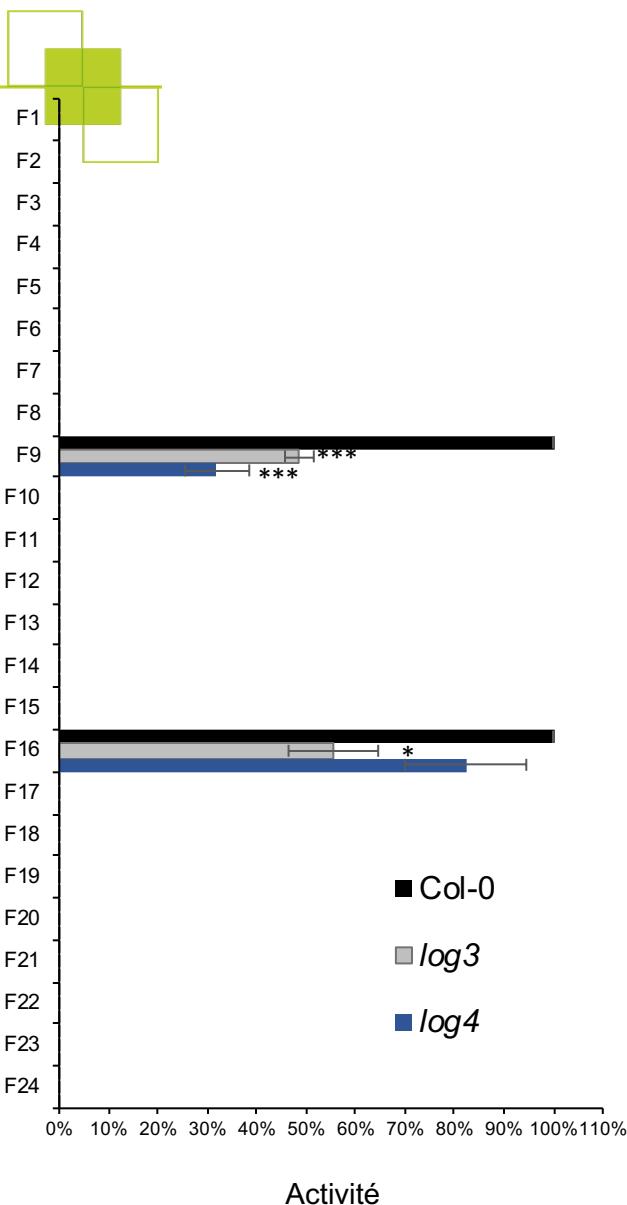


Activité des fractions

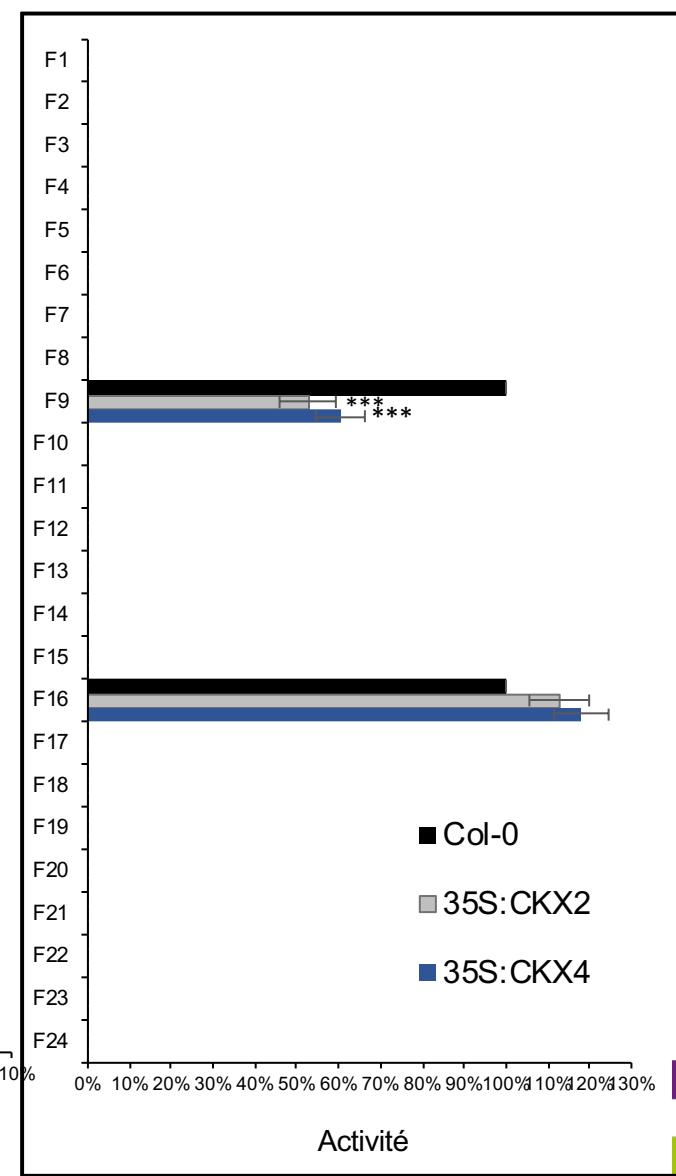
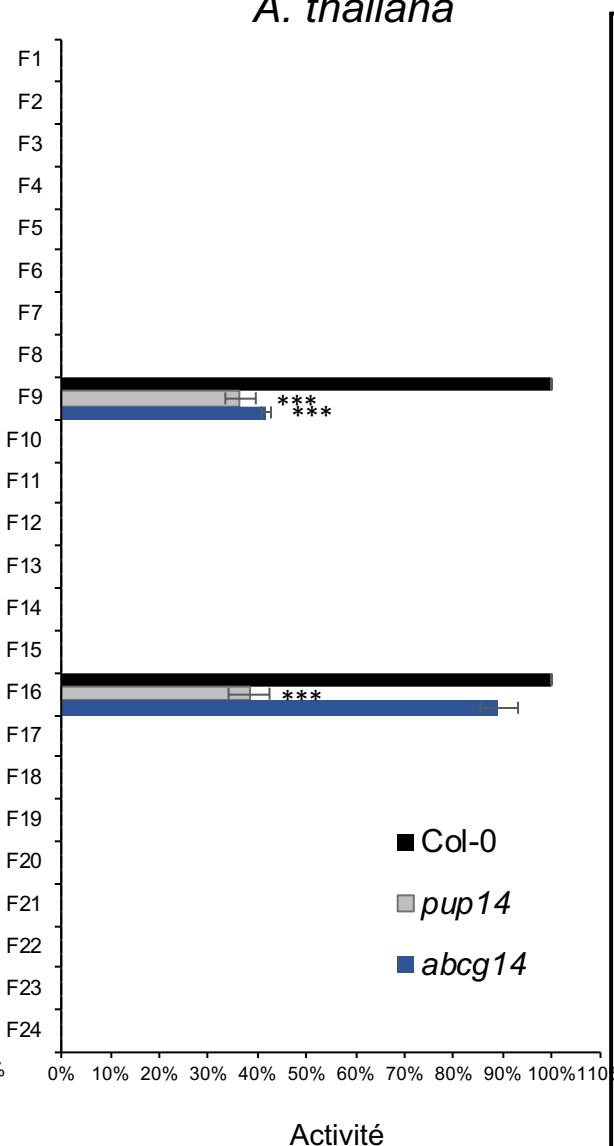
B. napus



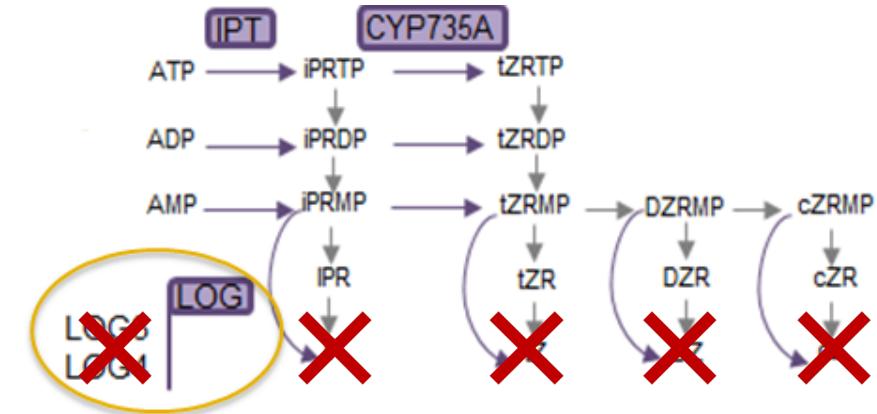
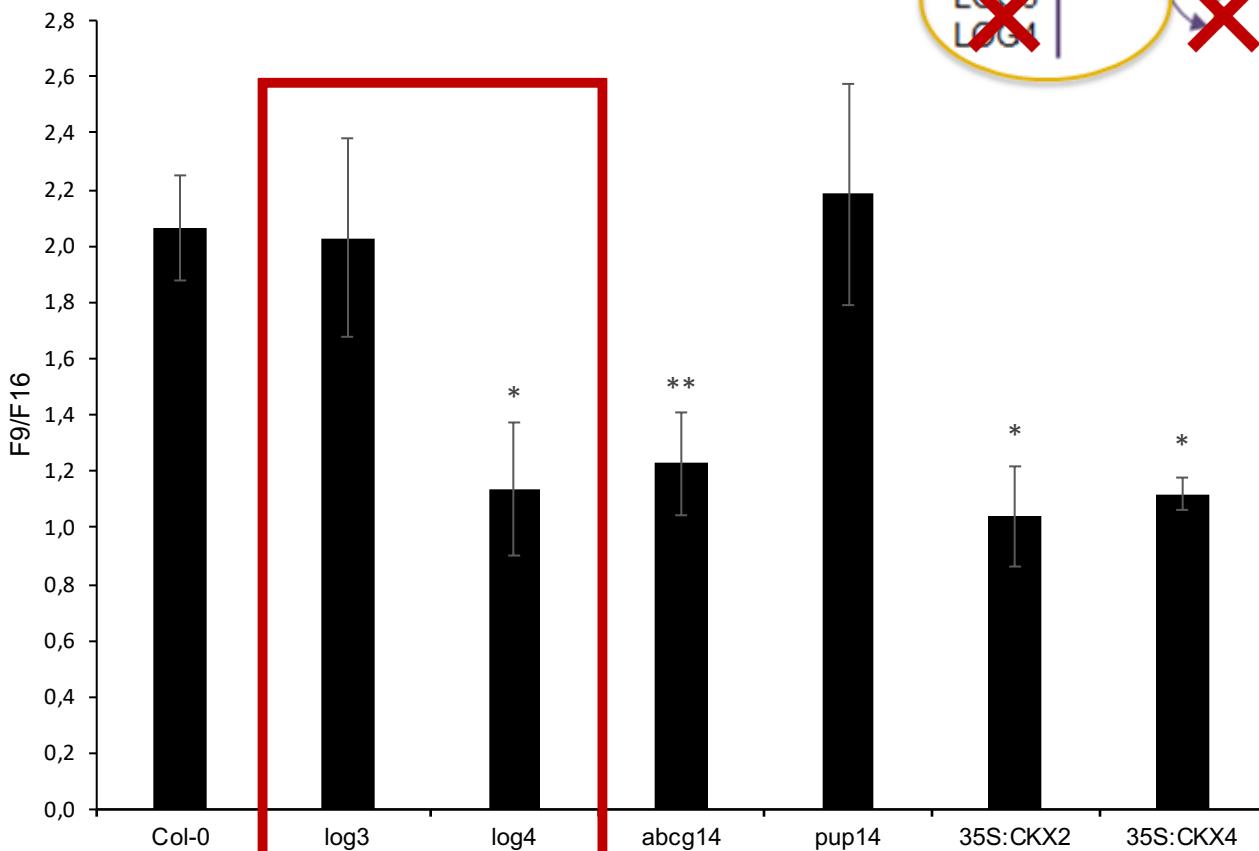
Activité des fractions



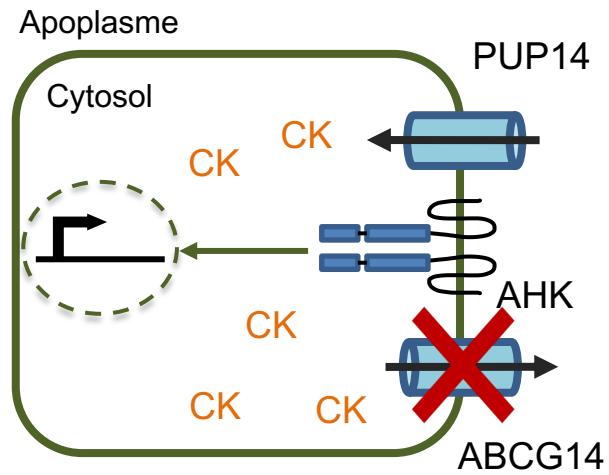
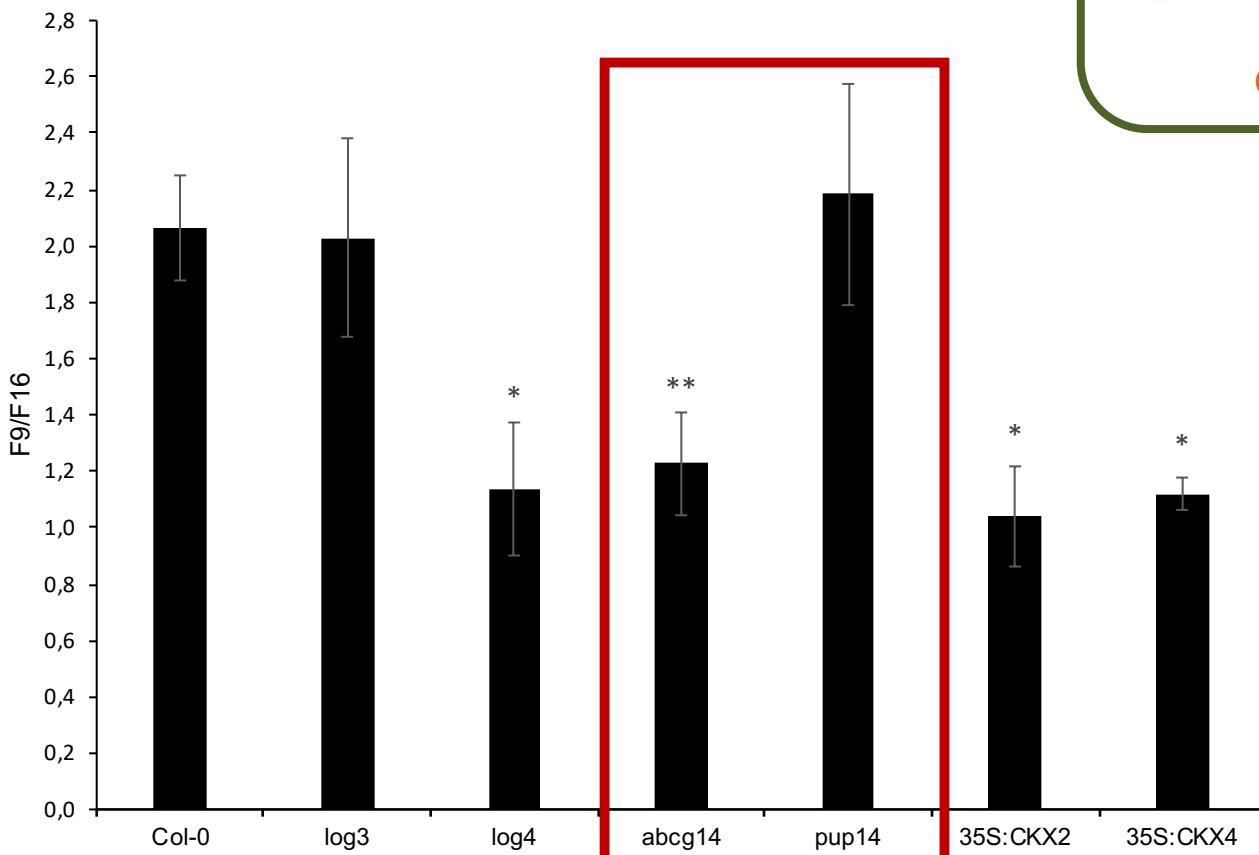
A. thaliana



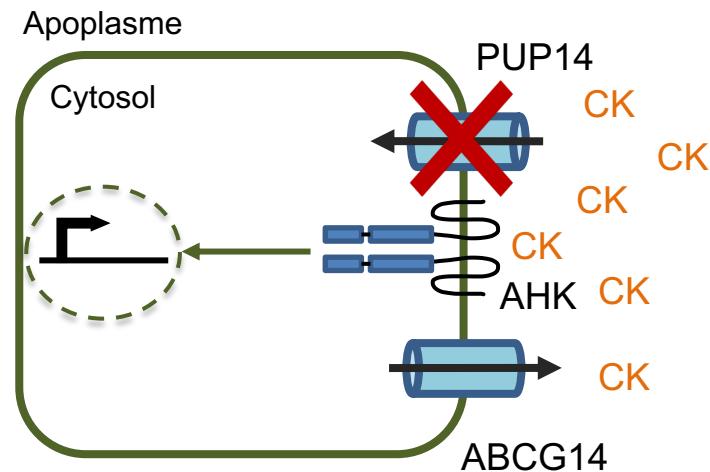
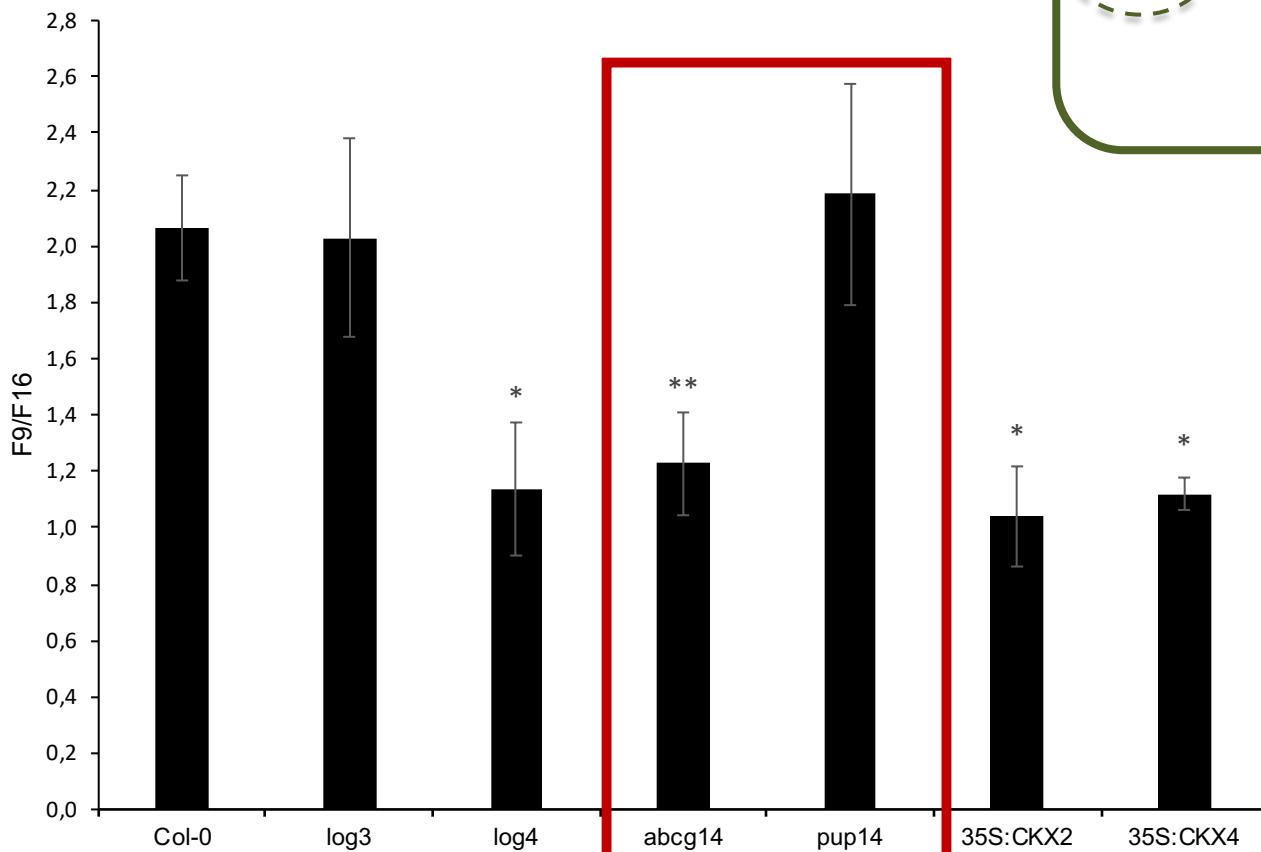
Activité inductrice de l'haustorium



Activité inductrice de l'haustorium

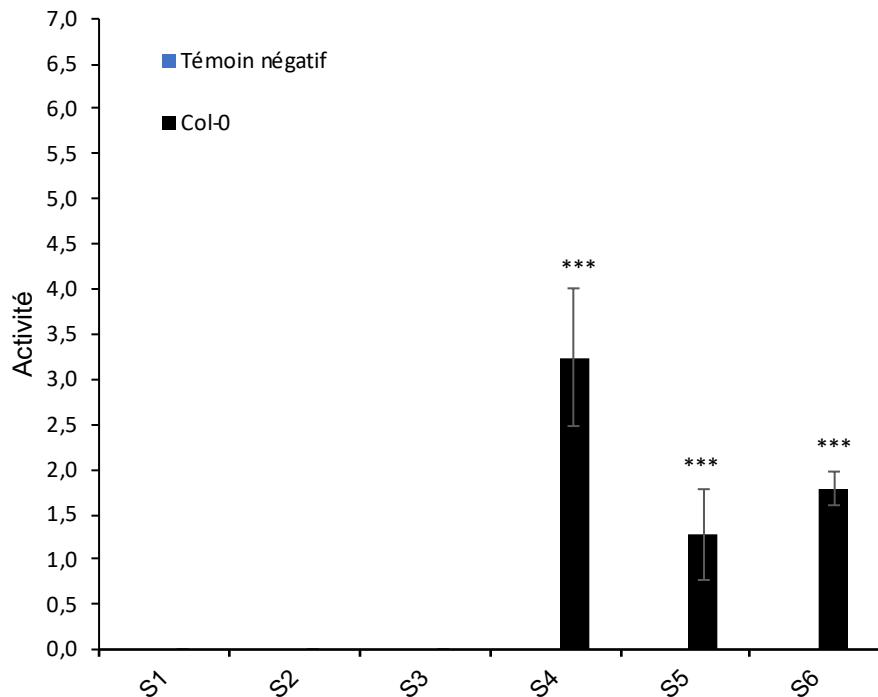


Activité inductrice de l'haustorium

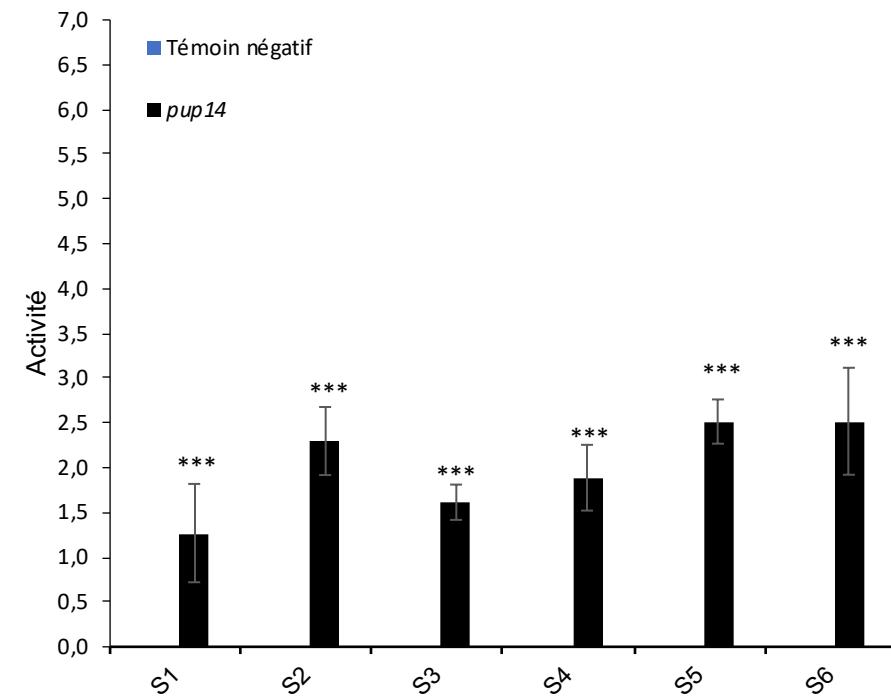


Activité des exsudats racinaires bruts

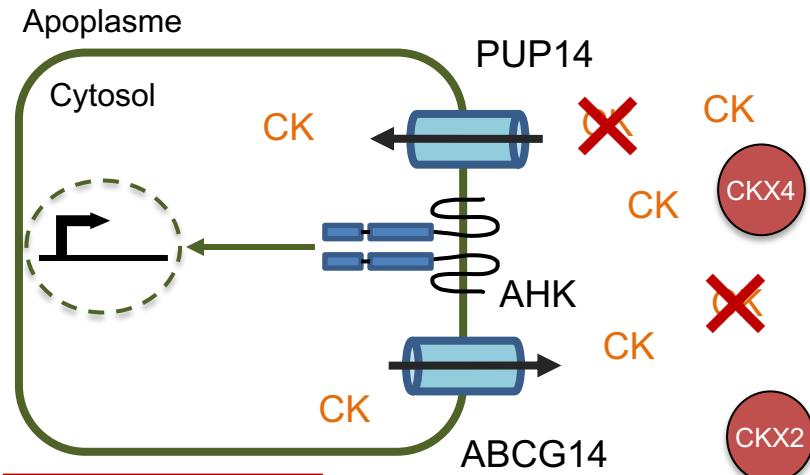
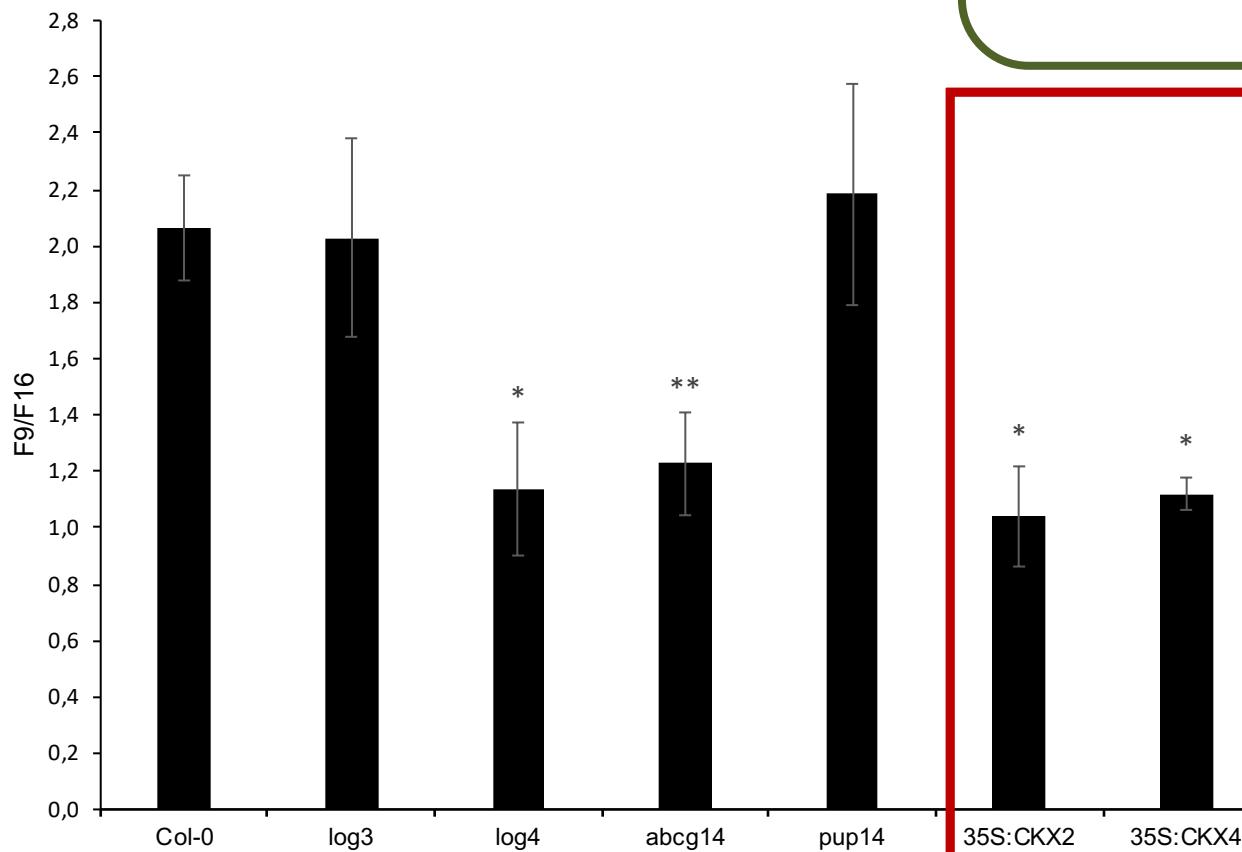
Col-0

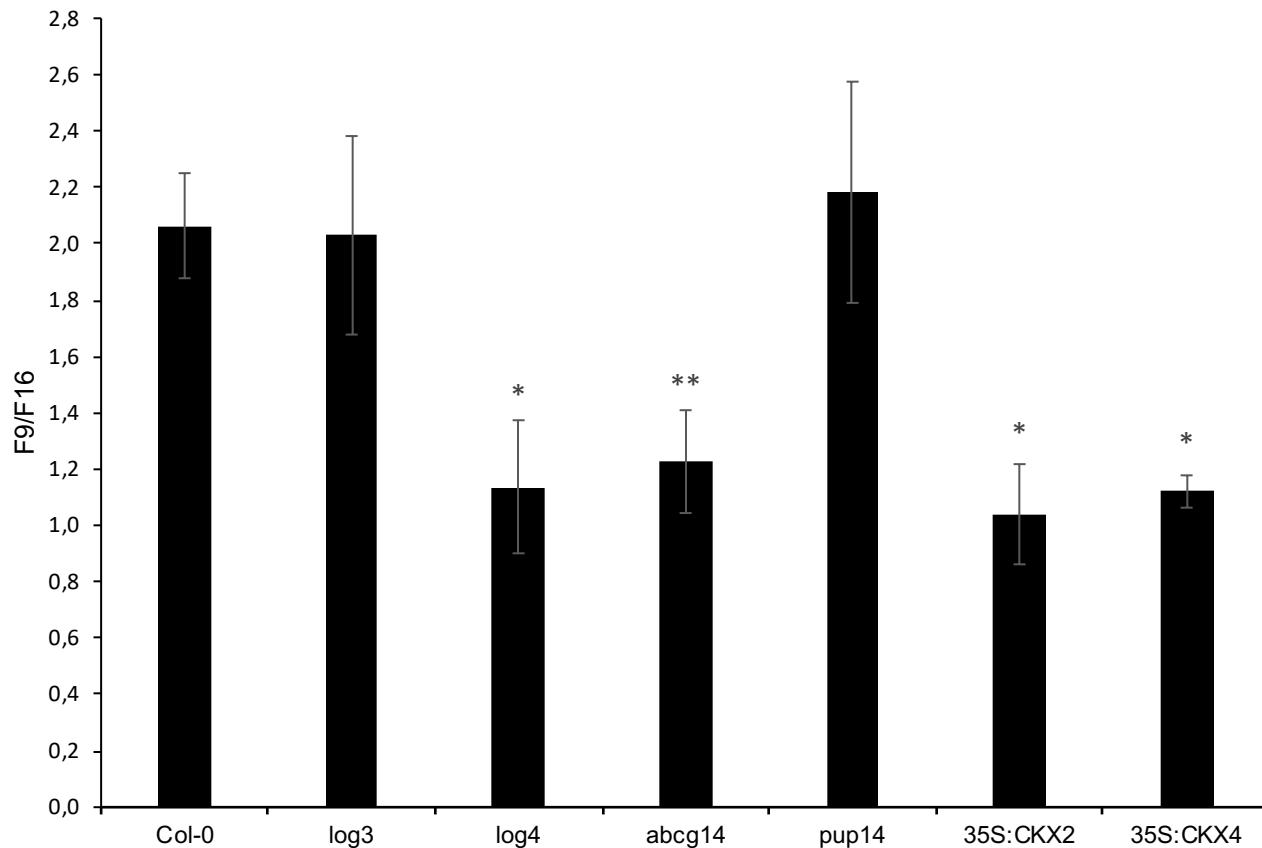


pup14



Activité inductrice de l'haustorium

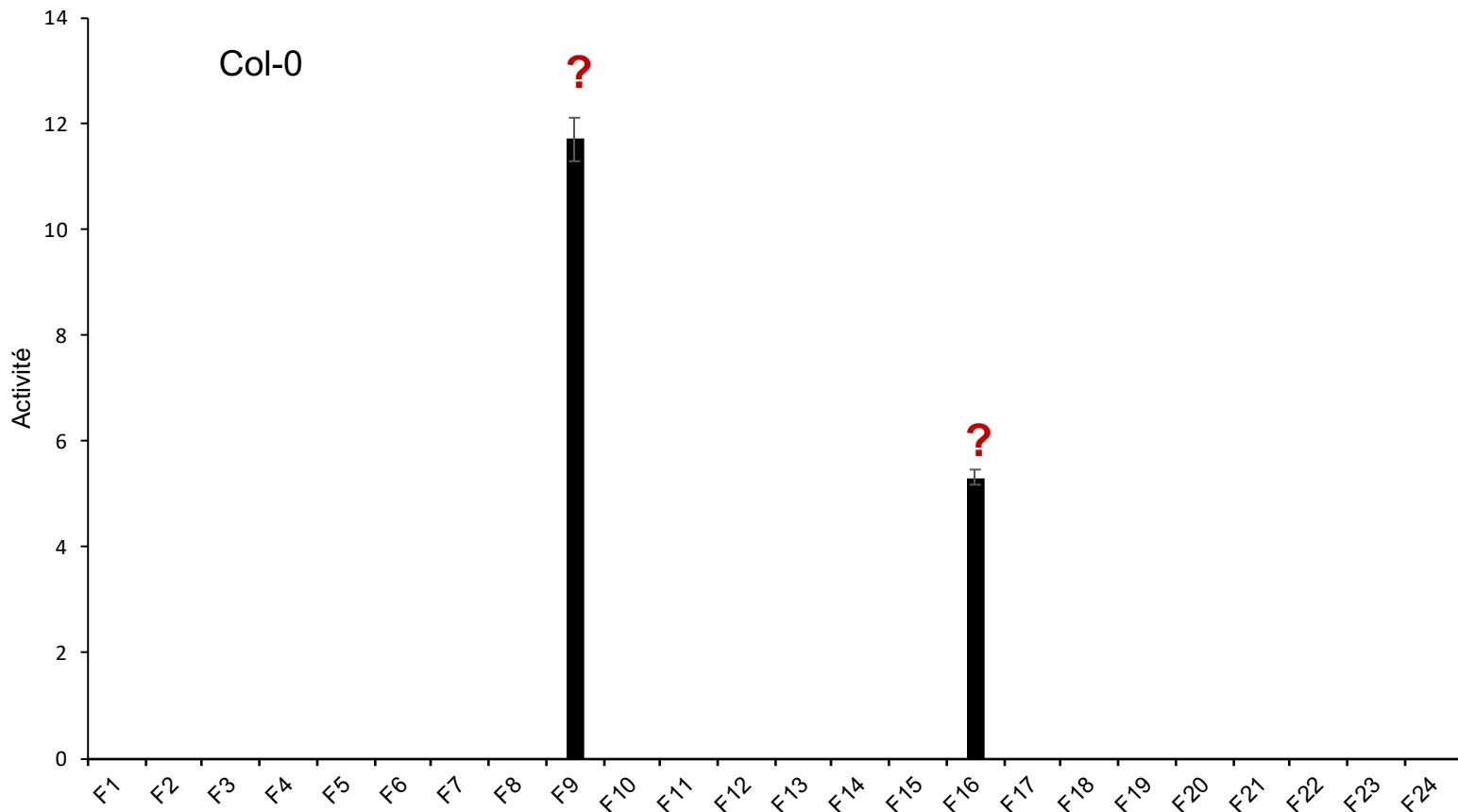




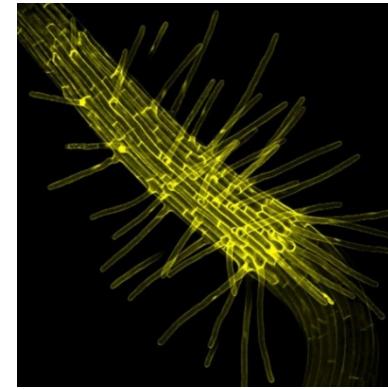
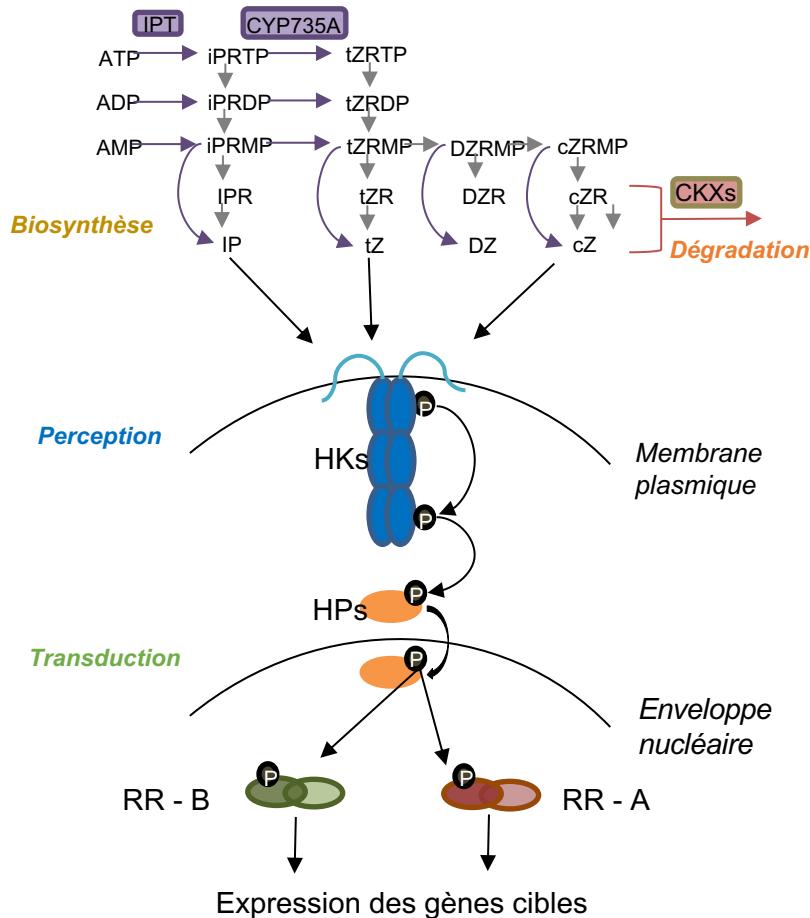
L'altération de la voie des cytokinines induit une modification de l'activité inductrice de l'haustorium des exsudats racinaires



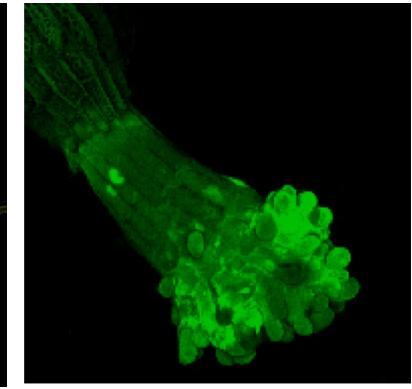
Réponse transcriptomique des fractions actives (9 et 16)



Réponse transcriptomique des fractions actives (9 et 16)



Dr. J. Lucas



V. Goyet

PrRR5 : marqueur de la voie de CK

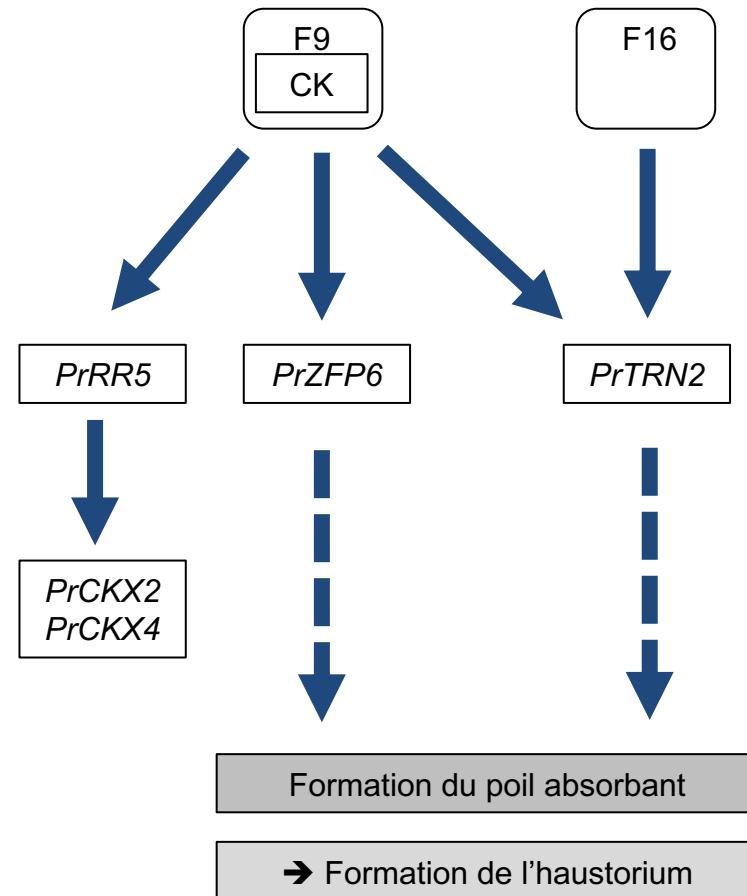
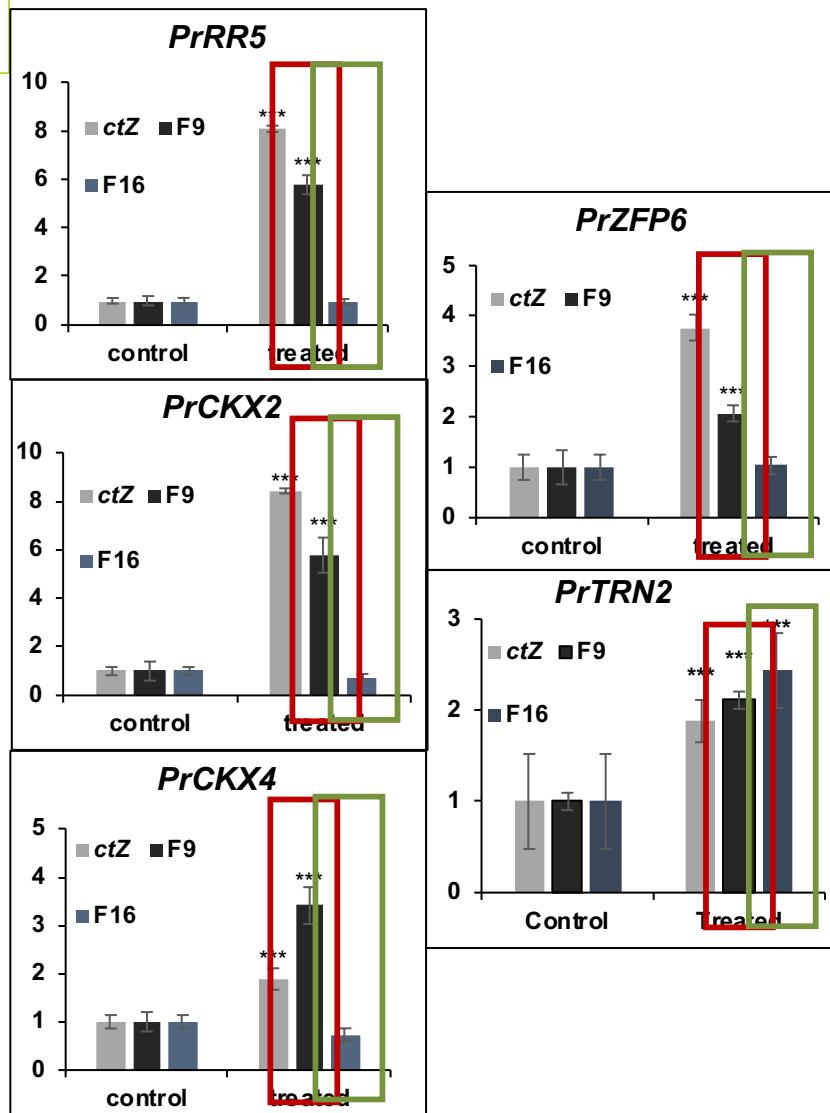
PrCKX2 et *PrCKX4* : dégradation des CK

PrZFP6 : formation des poils absorbant en réponse aux CK

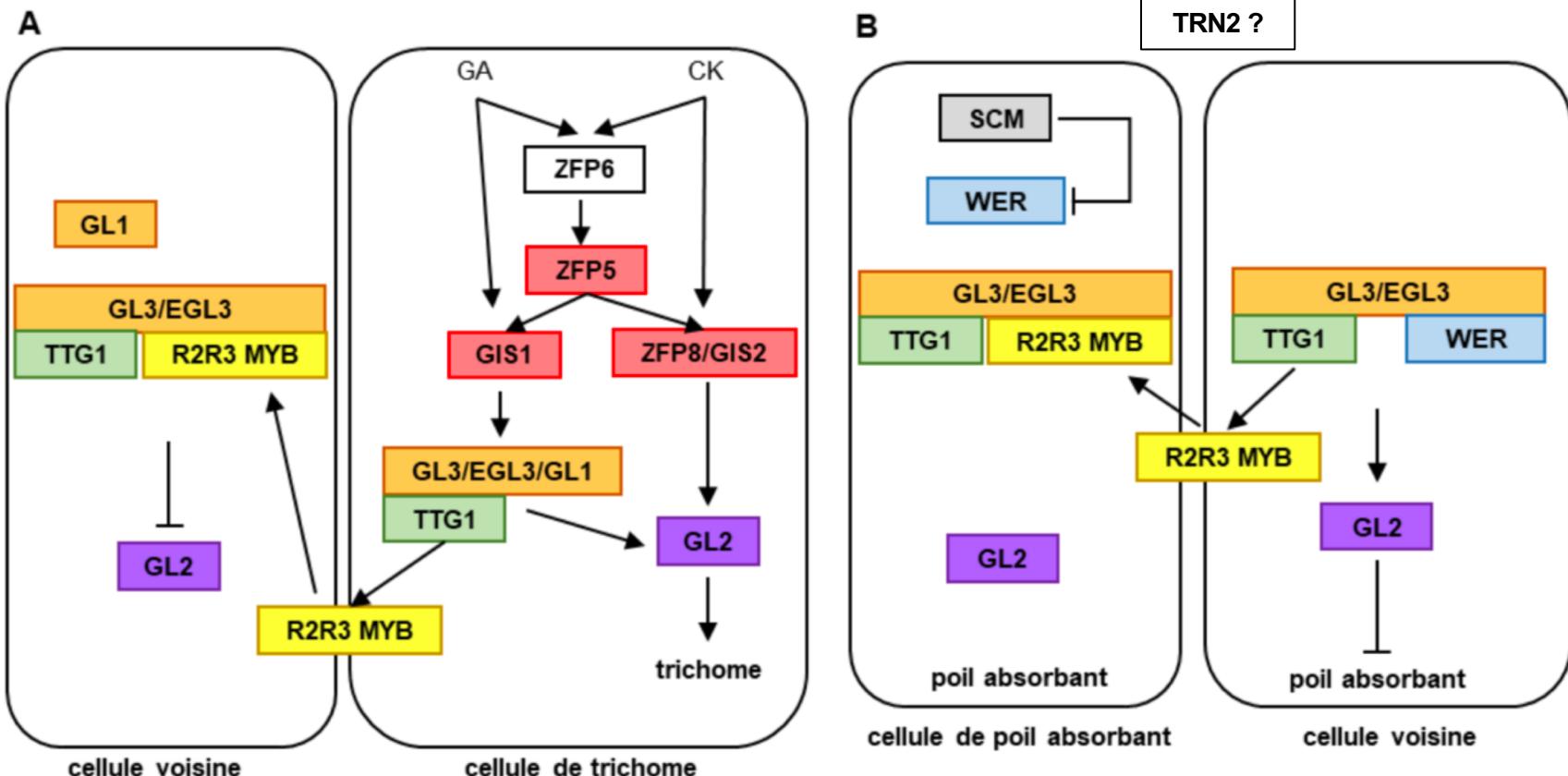
PrTRN2 : formation des poils absorbant



Réponse transcriptomique des fractions actives (9 et 16)



Réponse transcriptomique des fractions actives (9 et 16)





Les cytokinines induisant la formation de l'haustorium sont exsudées par la plante hôte

Perspectives

Contribution de la fraction 16 à l'agressivité de la plante parasite

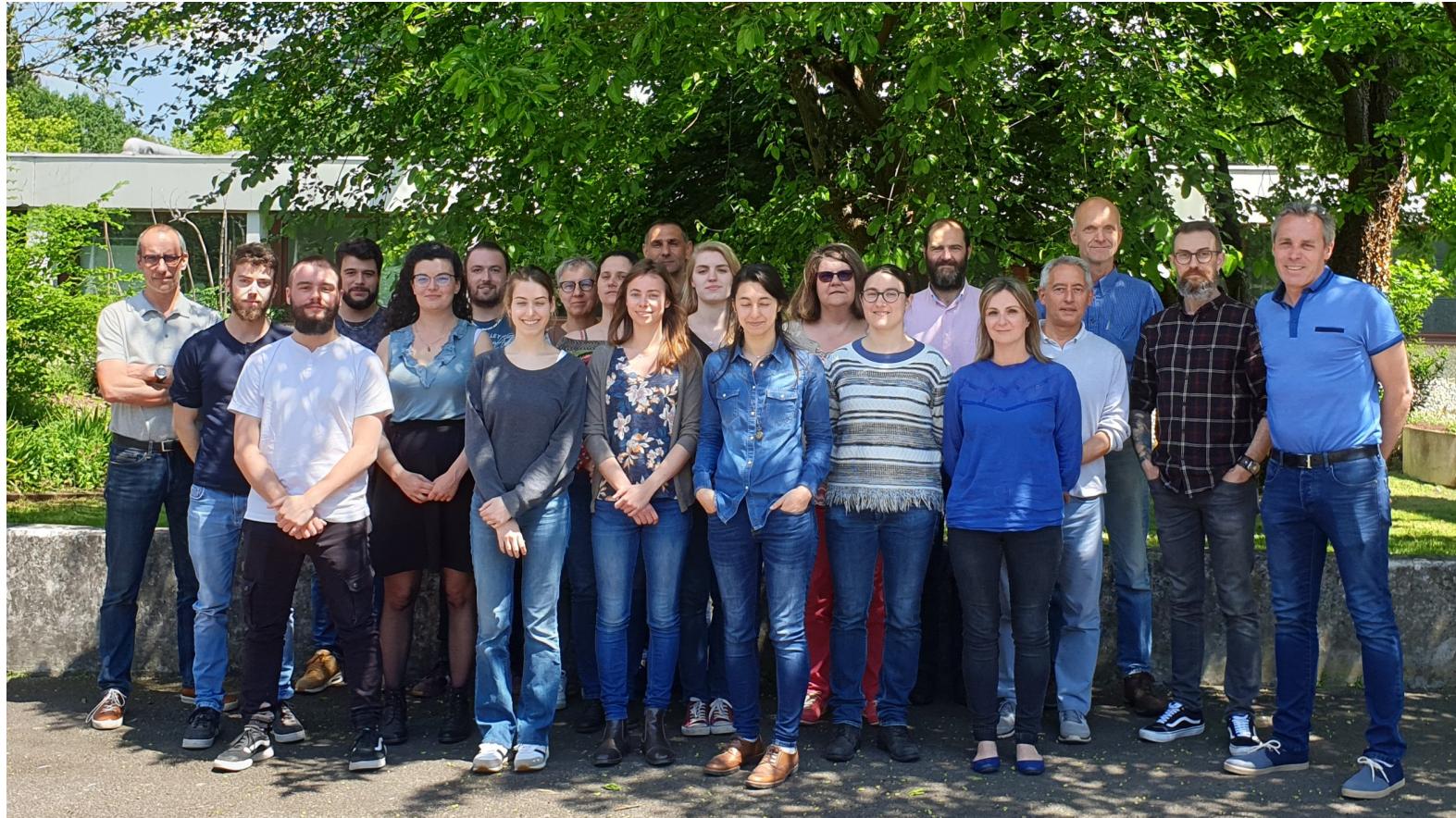
- Tests d'agressivité avec traitement par la fraction 16
- Identification des composés inducteurs de l'haustorium
 - Exploration de la voie de signalisation induite

Comparaison entre les plantes holoparasites et hémiparasites





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Merci de votre attention

