



Le mélange d'essences peut-il aider les peuplements forestiers face aux sécheresses estivales? Cas du chêne sessile et du pin sylvestre du dispositif OPTMix en forêt d'Orléans

Nathalie Korboulewsky, Philippe Balandier, Jordan Bello, Sandrine Perret,
Thomas Perot, Camille Couteau, Olivier Chaintreuil

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Le mélange d'essences peut-il aider les peuplements forestiers face aux sécheresses estivales?

cas du chêne sessile et du pin sylvestre du dispositif OPTMix en forêt d'Orléans

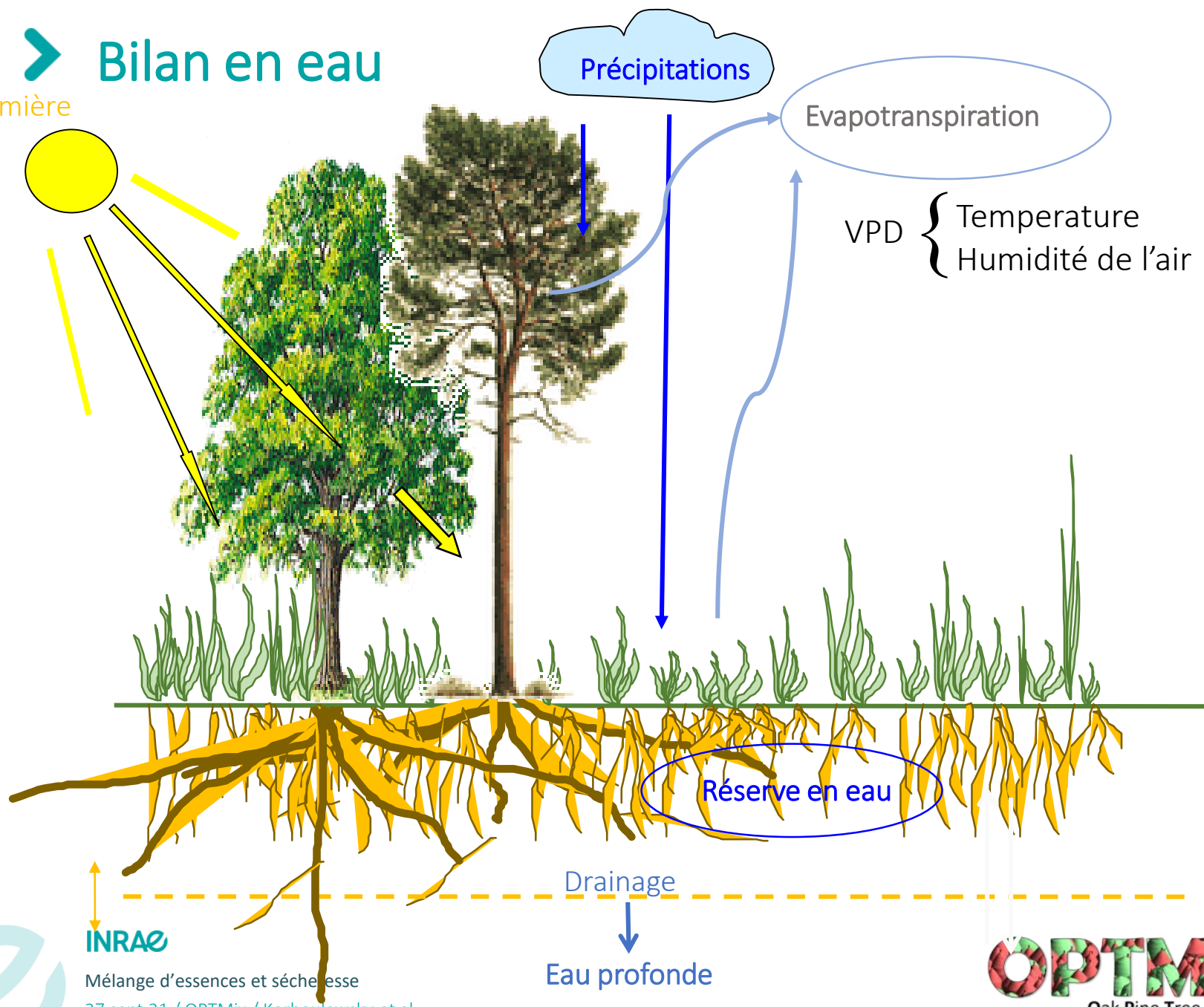
Nathalie Korboulewsky, Jordan Bello, Sandrine Perret, Thomas Pérot, Camille Couteau, Olivier Chaintreuil, Philippe Balandier

Financeurs:



Bilan en eau

Lumière



INRAE

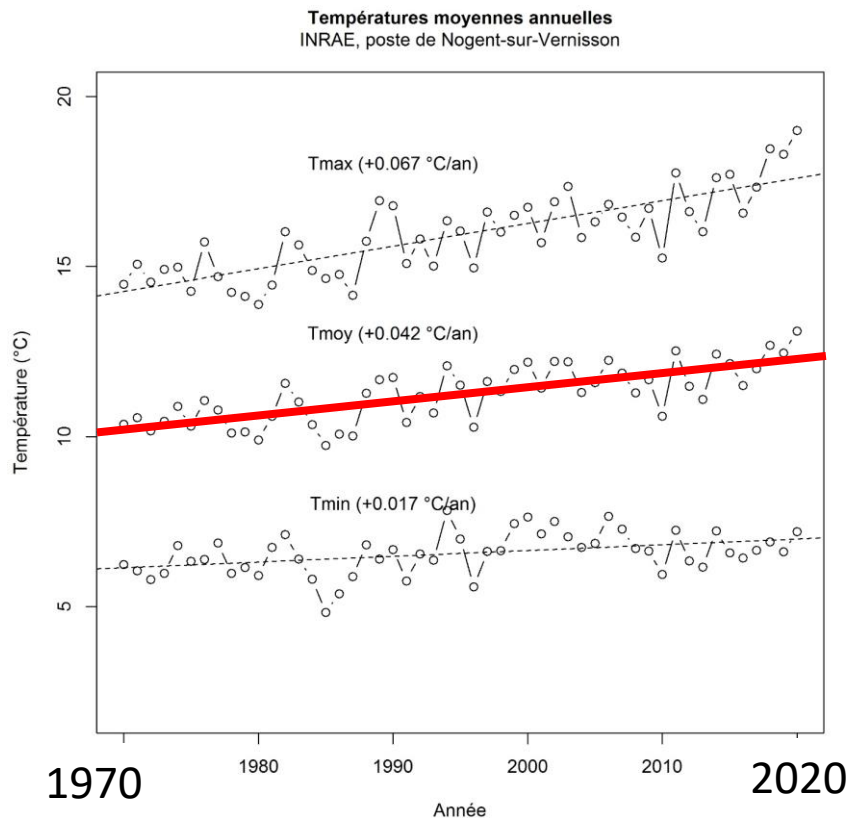
Mélange d'essences et sécheresse

27 sept 21 / OPTMix / Korhonen et al

OPTMix
Oak Pine Tree Mixture

<https://optmix.irstea.fr/>

➤ Mesures micrométéorologiques



T° max

T° moy : + 2,1° C sur 50 ans

T° min

Années 2018, 2019, 2020 dans les top 4
des années les plus chaudes

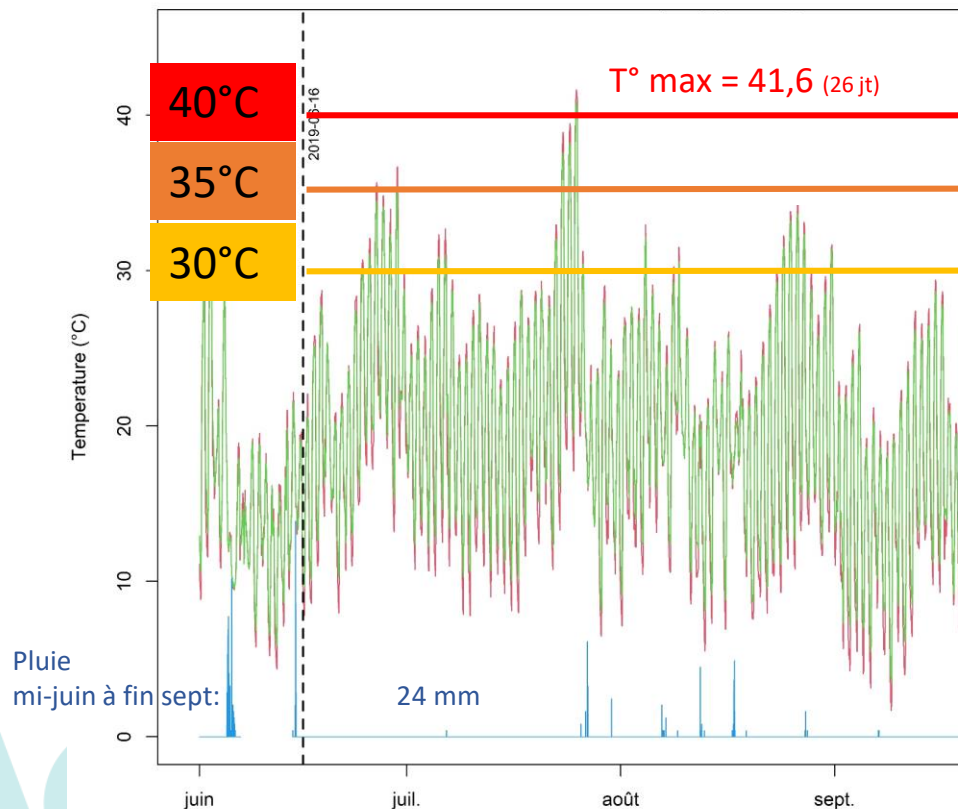
➤ Mesures micrométéorologiques

Vague de chaleur à Orléans:

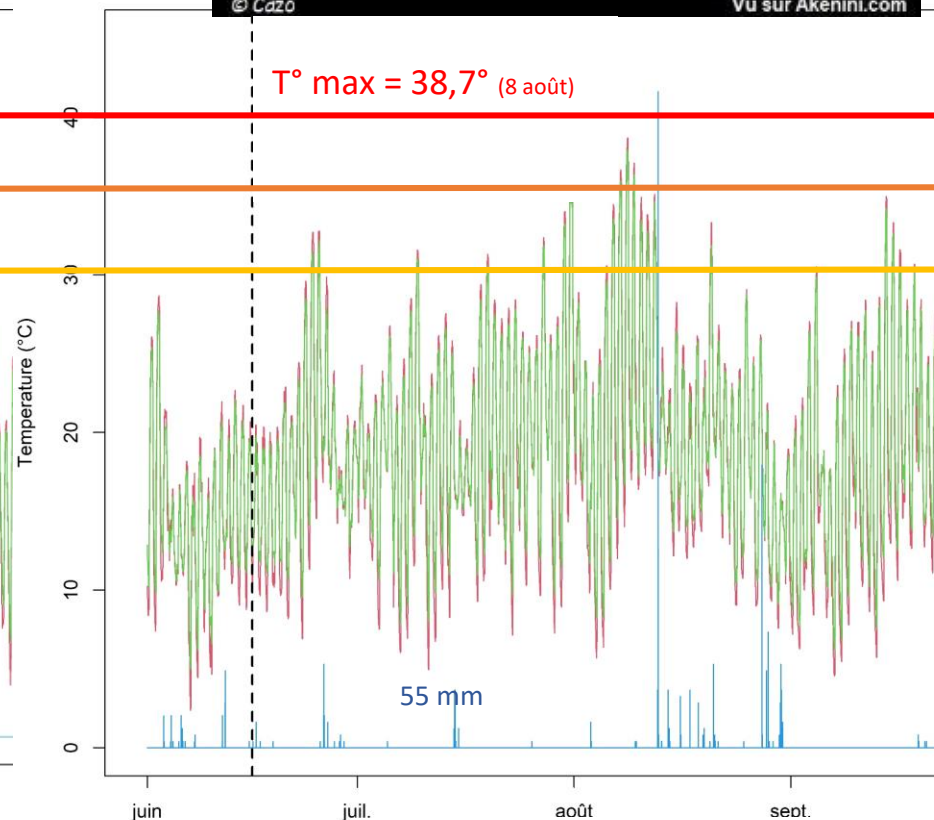
1976-2005 : 8 jours
prévu 2041-2070 : 28 jours



T° sous couvert forestier, et à découvert sous abri



2019



2020

Lumière





Chêne
Quercus petraea

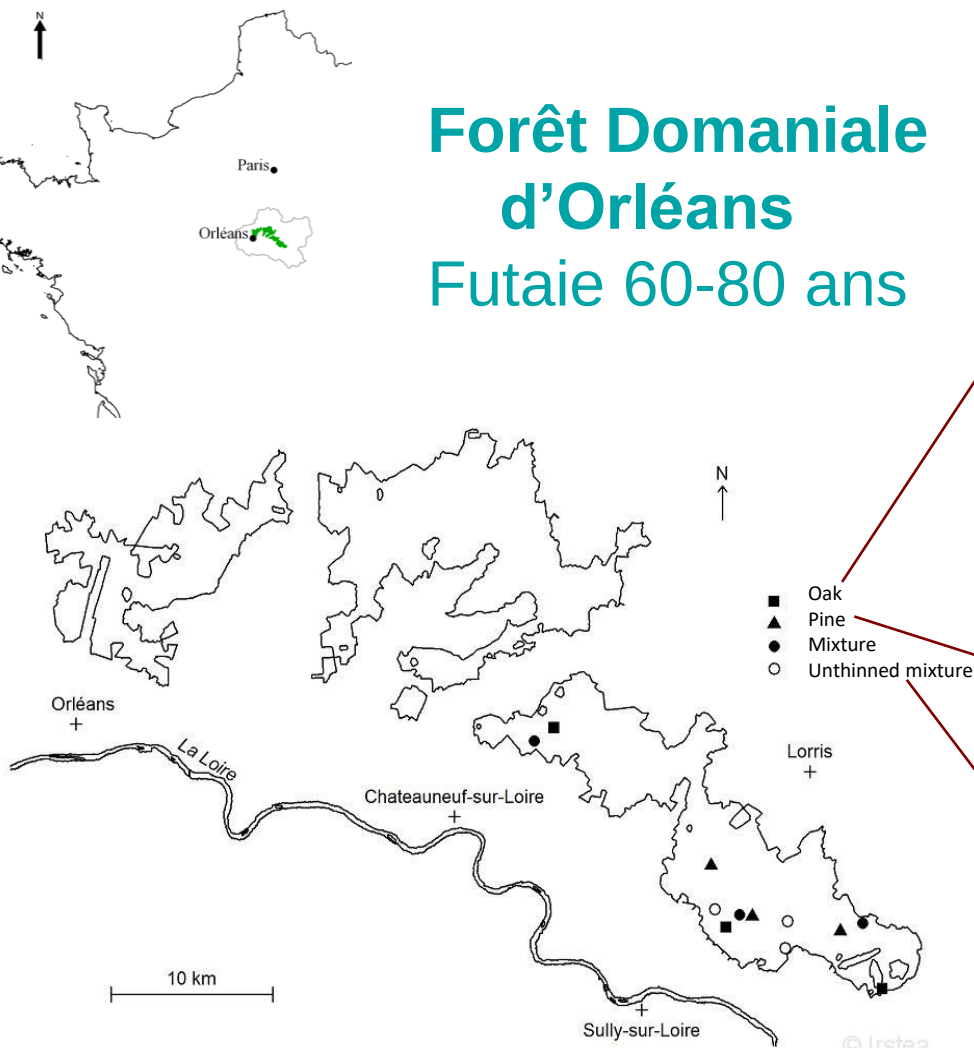


Pin
Pinus sylvestris



Mélange

Forêt Domaniale d'Orléans Futaie 60-80 ans





Pin pur



Mélange

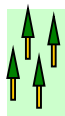


Chêne pur

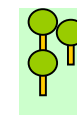
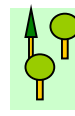
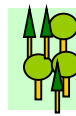
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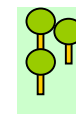
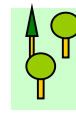
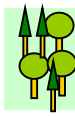
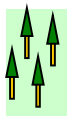
Medium
density



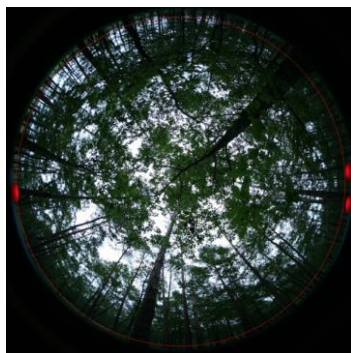
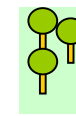
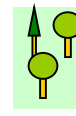
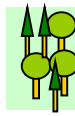
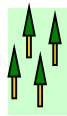
Low
density



Site 2



Site 3



Densité moyenne
430 arbres
32 m²/ha



Densité faible
200 arbres
16 m²/ha

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Pure pine



Mixed

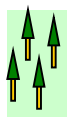


Pure oak

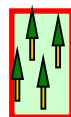
Site 1



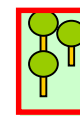
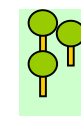
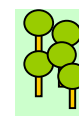
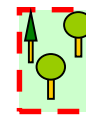
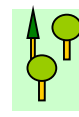
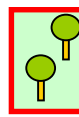
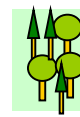
Medium density



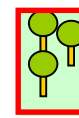
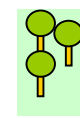
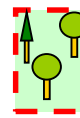
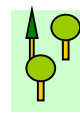
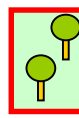
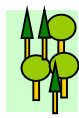
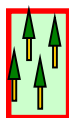
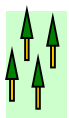
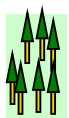
Low density



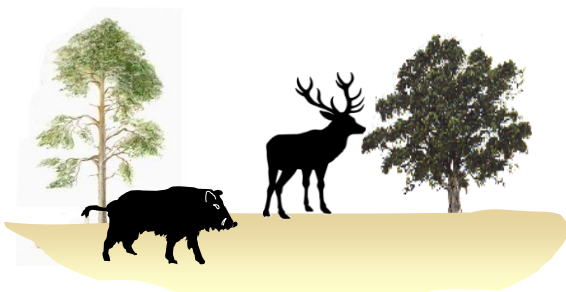
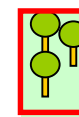
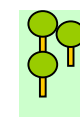
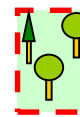
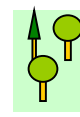
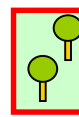
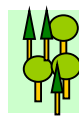
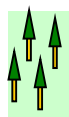
Low with enclosure



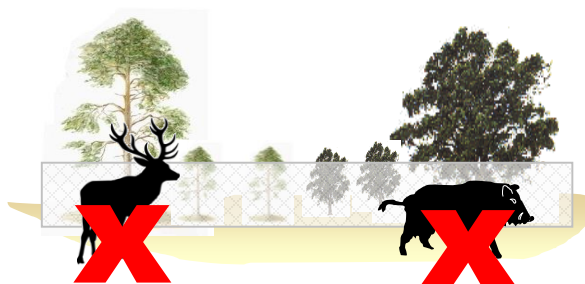
Site 2



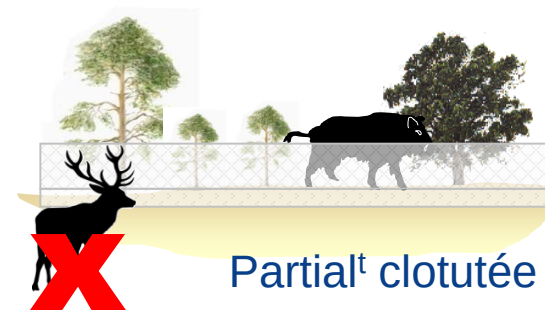
Site 3



Ouverte

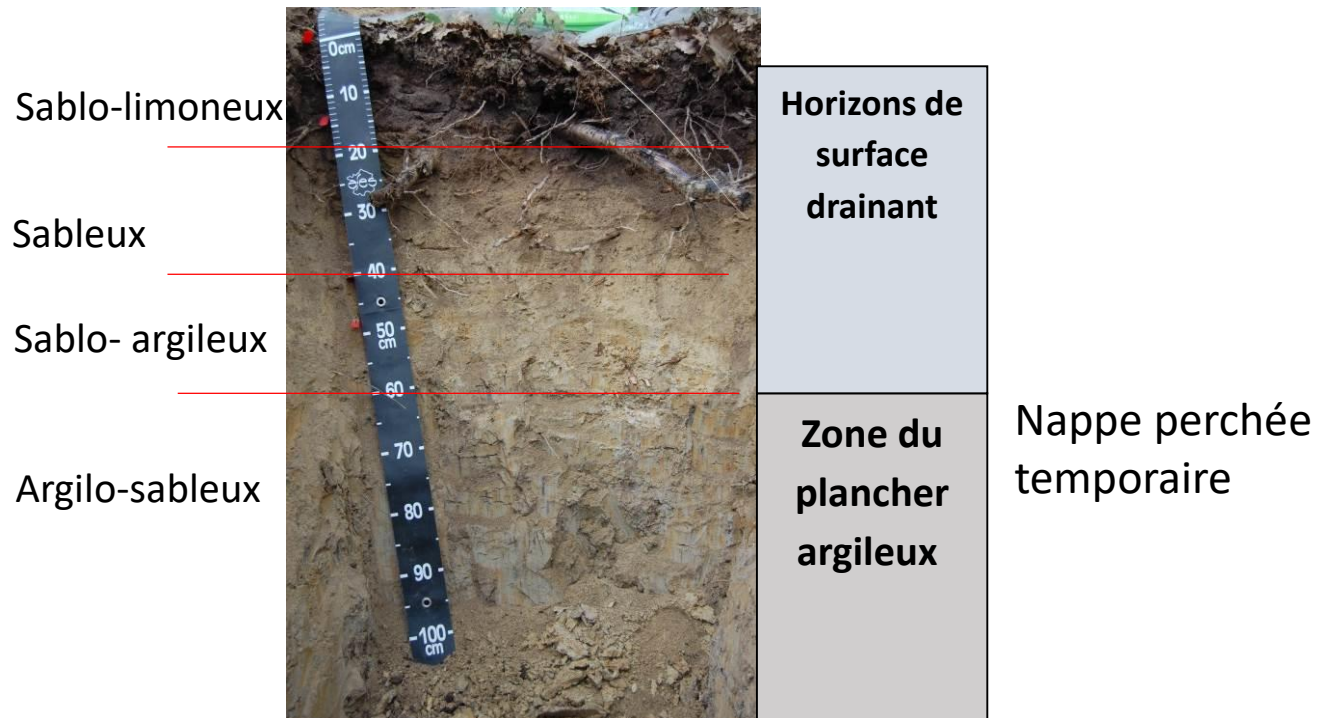


Clôturée



Partial^t clotutée

> Le sol



➤ Oak Pine Tree Mixture network (OPTMix)



INRAE

Mélange d'

27 sept 21 / OPTMix / Korobukewsky et al.

OPTMix
Oak Pine Tree Mixture

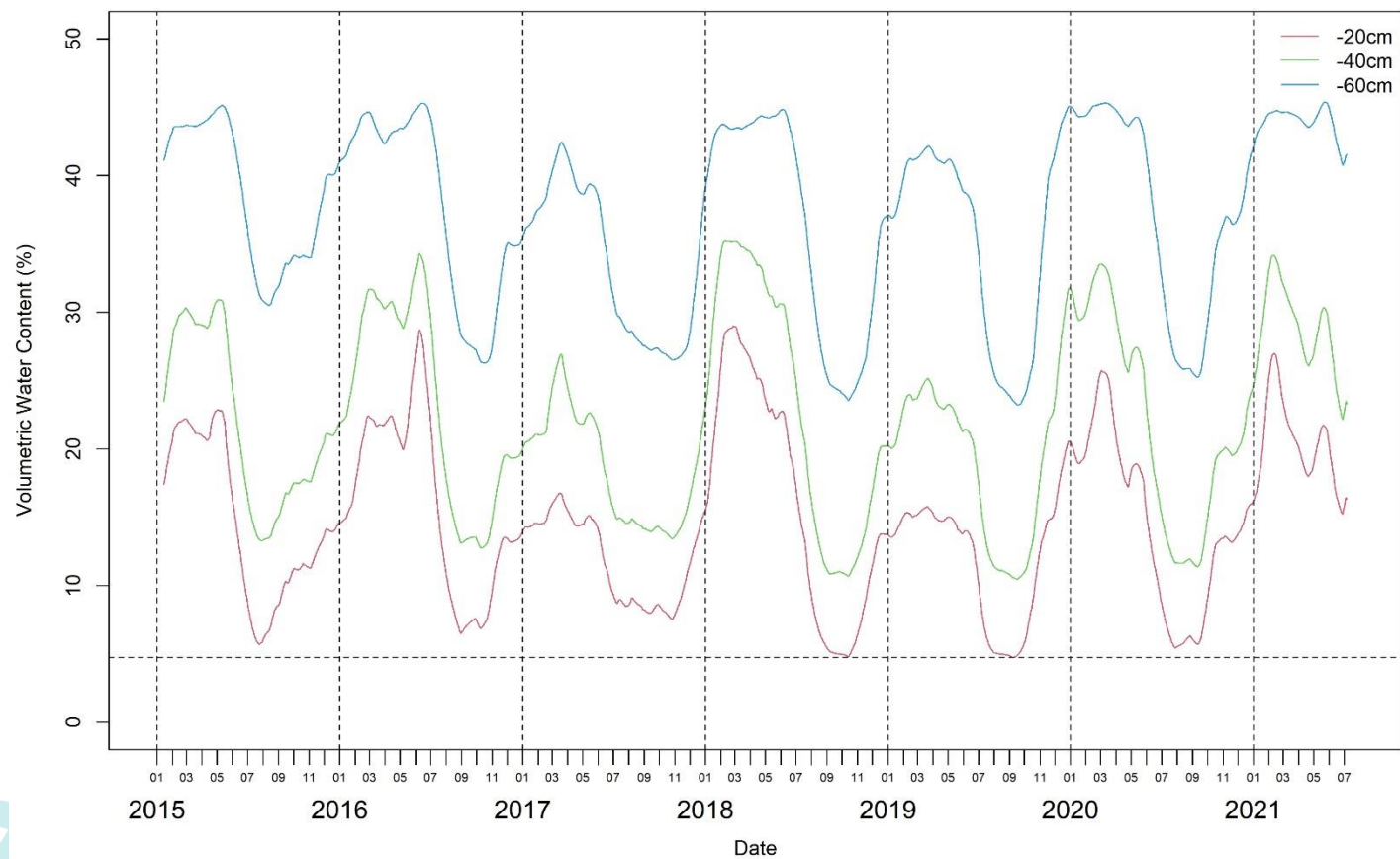
<http://www.cartograf.fr>

<https://optmix.irstea.fr/>

➤ Suivi de l'humidité des sols

OPTMix, toutes les placettes

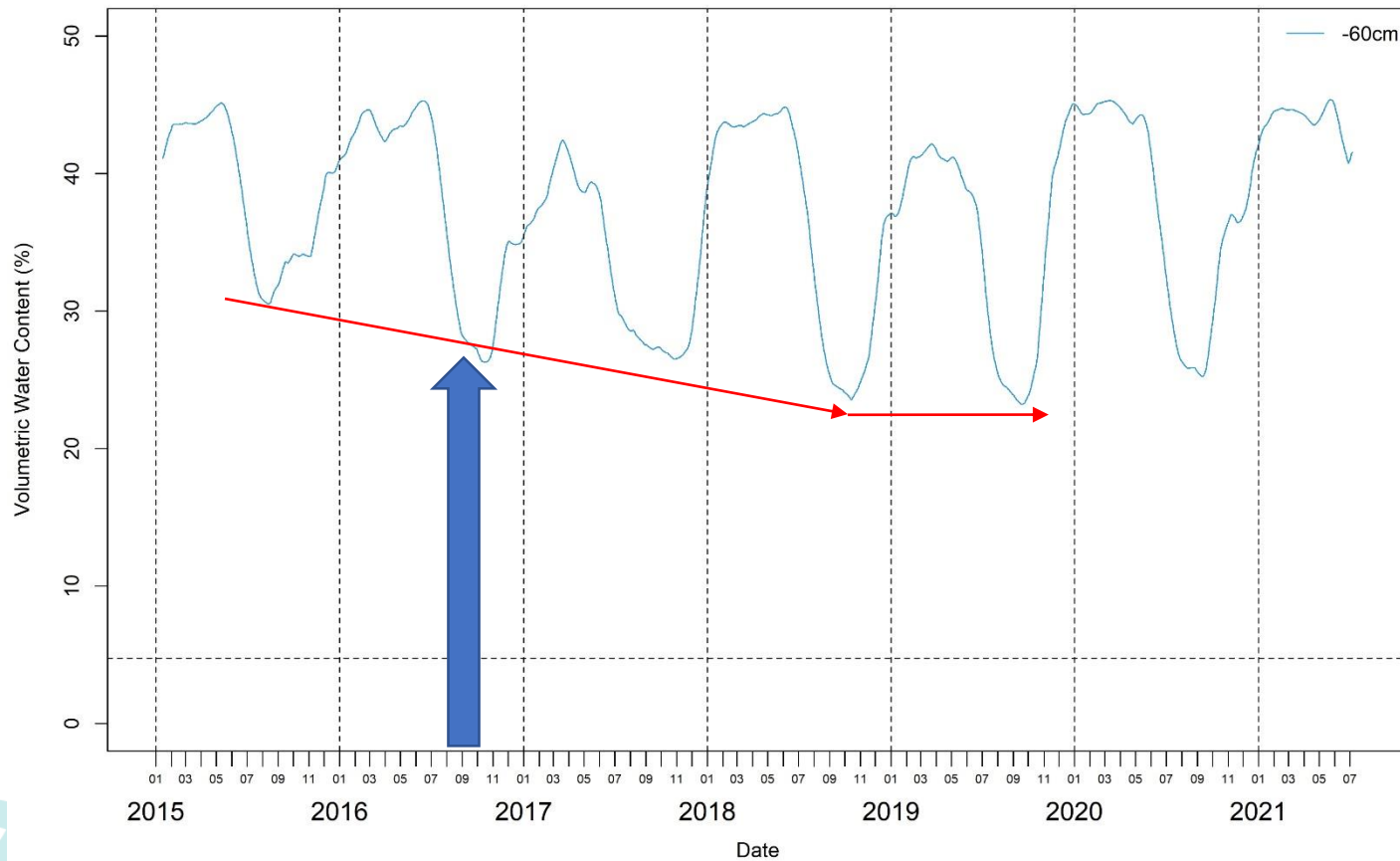
données lissées sur 30 jours



➤ Suivi de l'humidité des sols

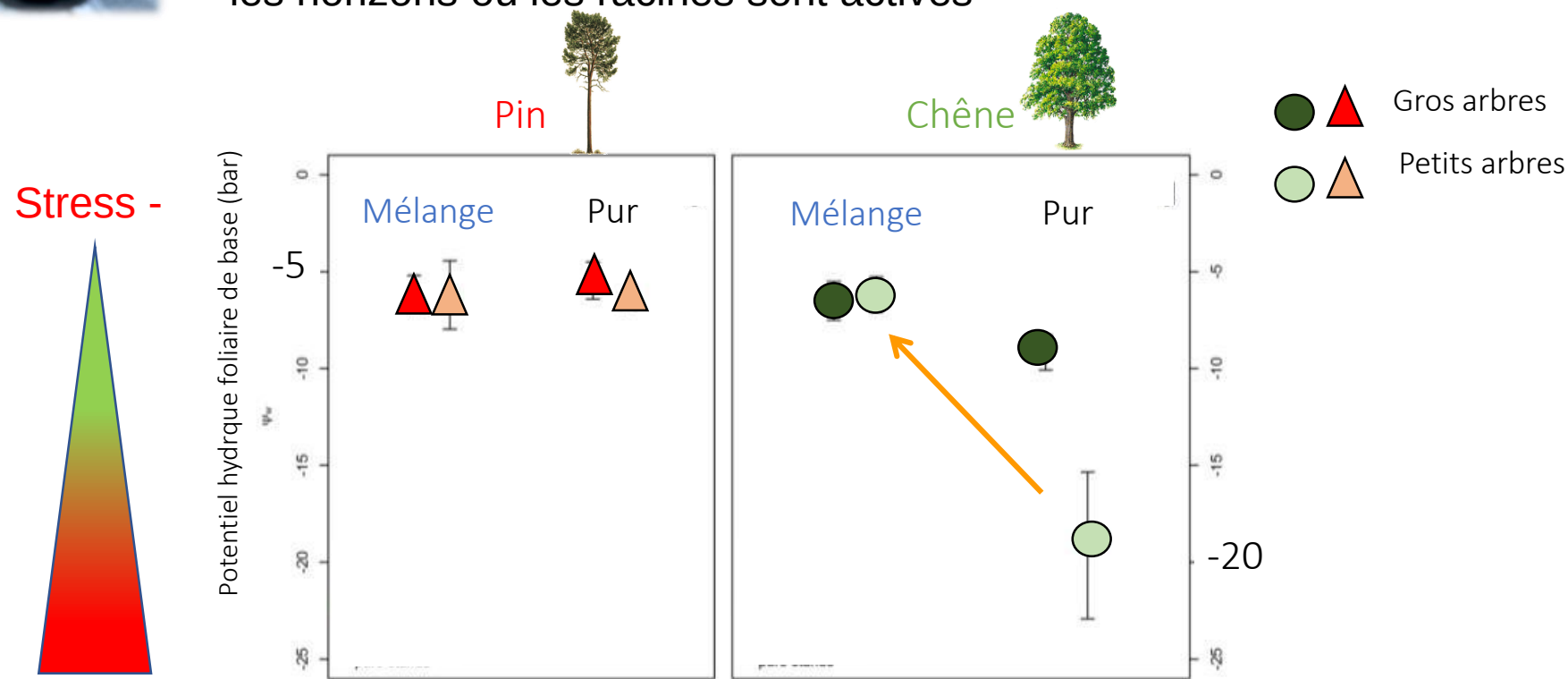
OPTMix, toutes les placettes

données lissées sur 30 jours



➤ Stress hydrique des arbres (fin été 2016)

Mesure du potentiel hydrique foliaire de base (fin été 2016) permet d'estimer le potentiel hydrique du sol dans les horizons où les racines sont actives

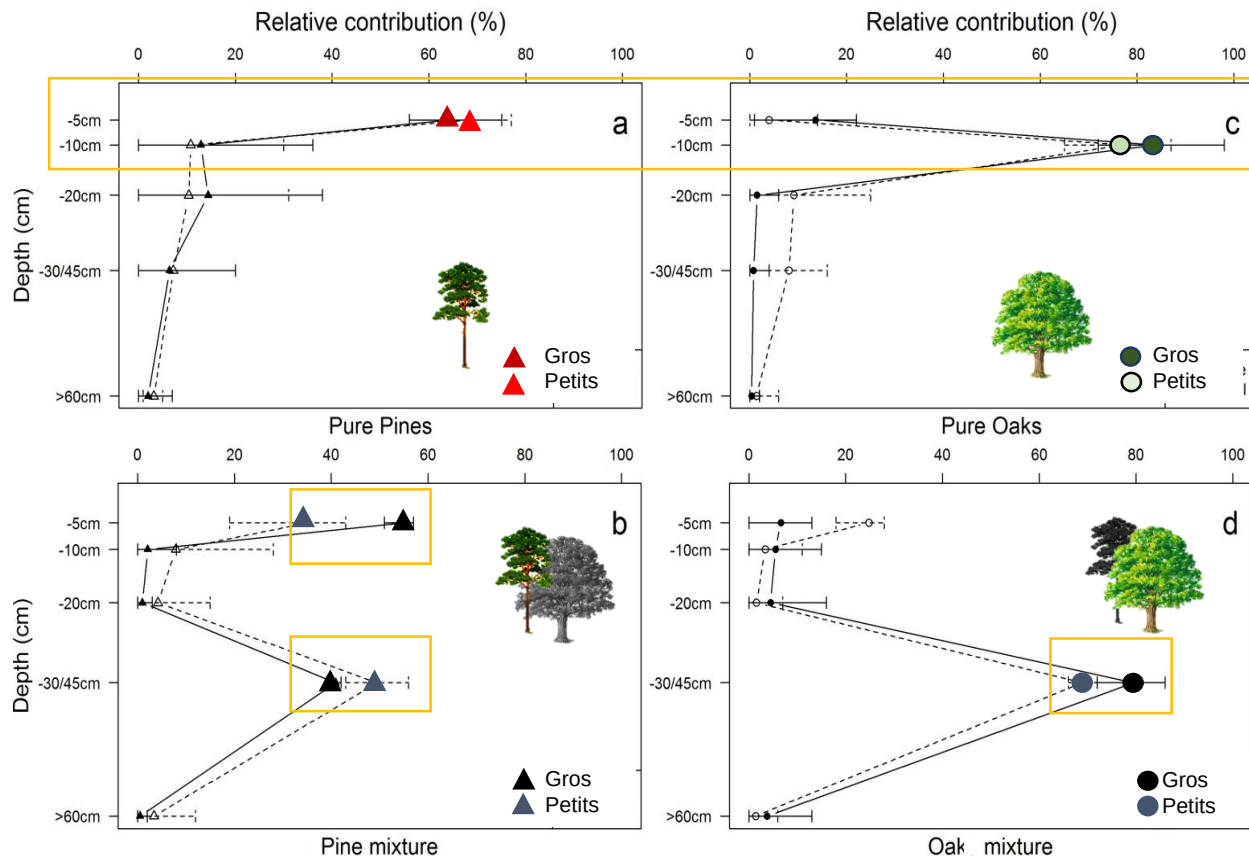


Le stress hydrique est plus faible en mélange pour les chênes pendant l'événement de sécheresse.

➤ Profondeur d'absorption de l'eau

Utilisation du logiciel IsoSource® pour estimer une contribution de chaque source d'eau possible dans le mix final retrouvé dans le xylème

Contributions des différentes sources possibles pour l'eau prélevée

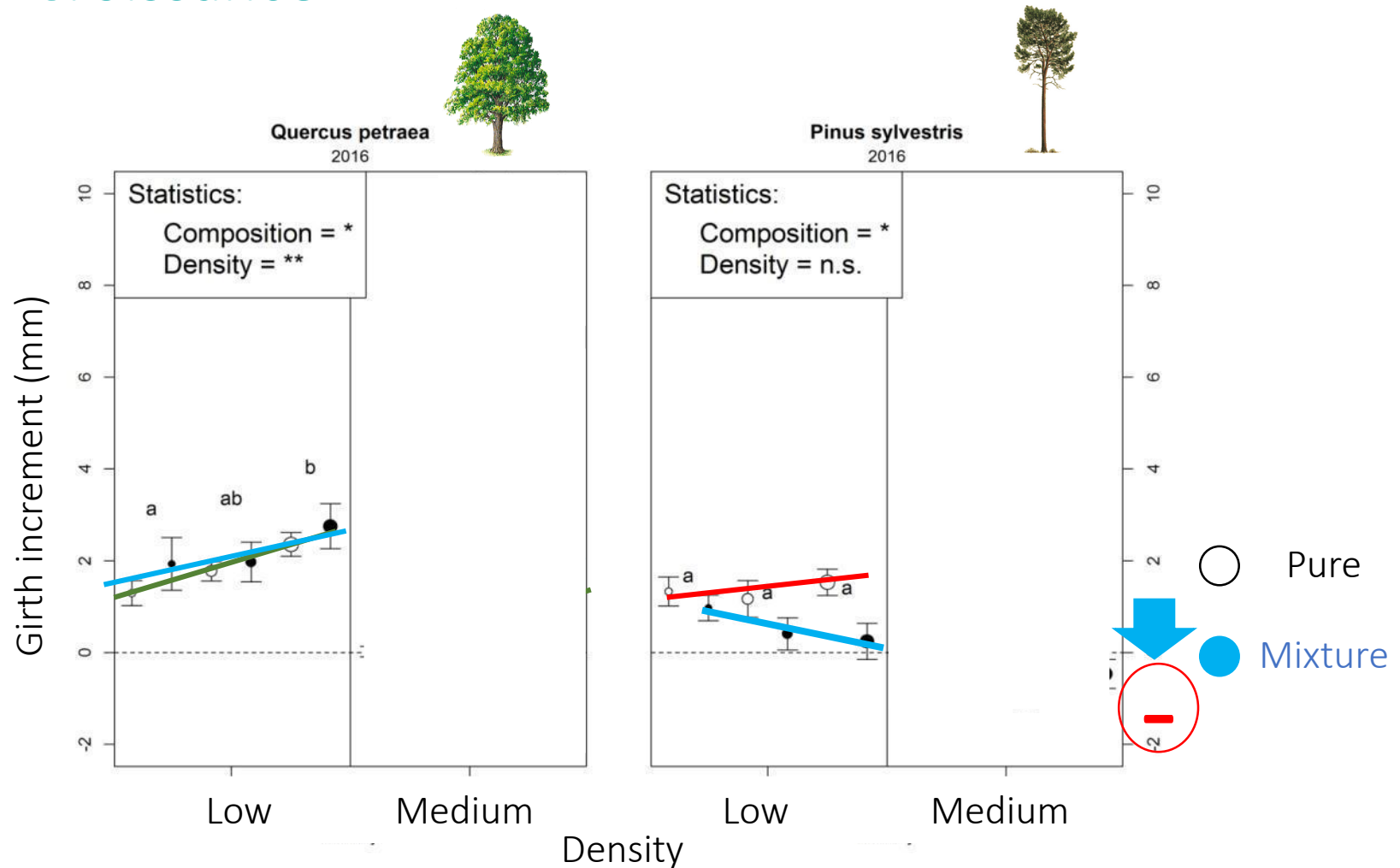


Prélèvement
superficiel dans les
monocultures

Déplacement en
profondeur en
mélange

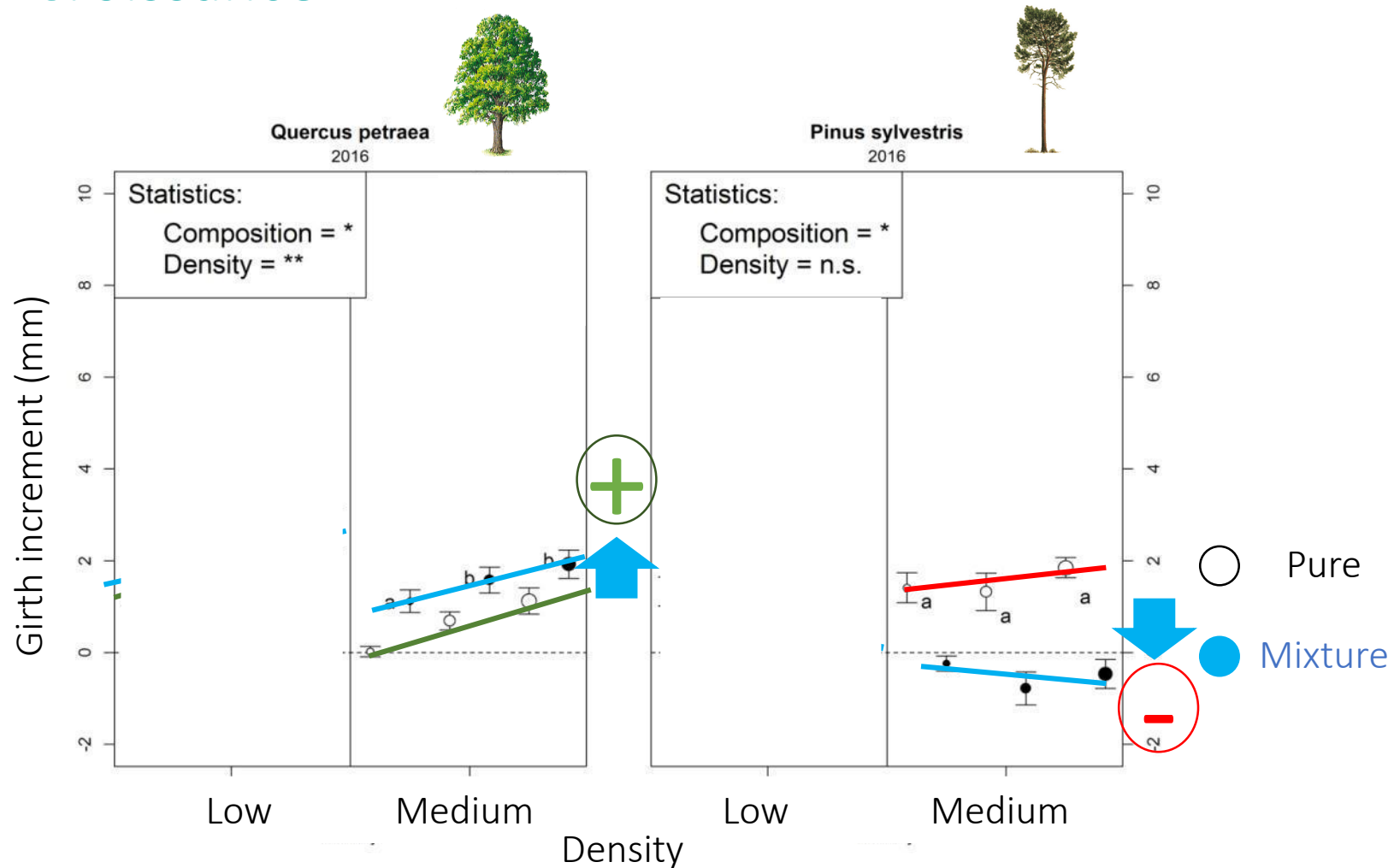
Complémentarité
partielle en période
de stress hydrique
estival

➤ Croissance



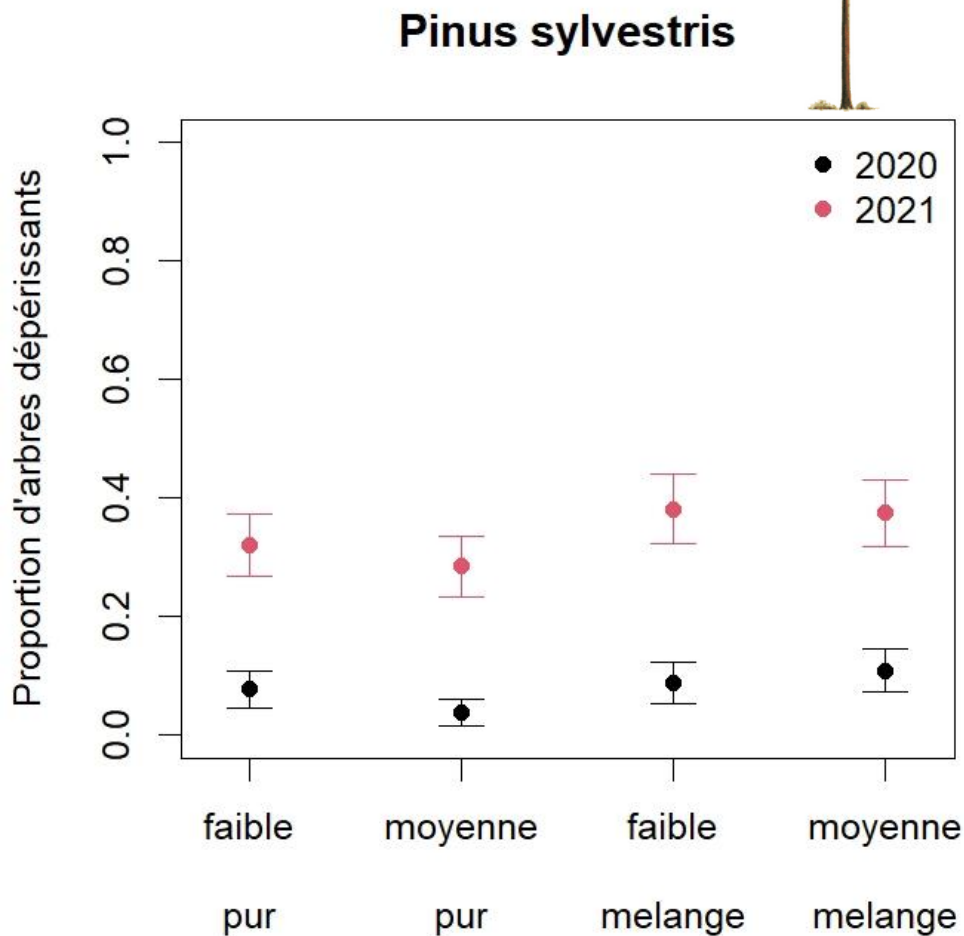
En faible densité : léger effet – du mélange sur les plus gros pins

➤ Croissance



En moyenne densité : Effet **positif** du mélange pour le chêne
Effet **négatif** du mélange pour le pin

➤ Dépérissement



34%

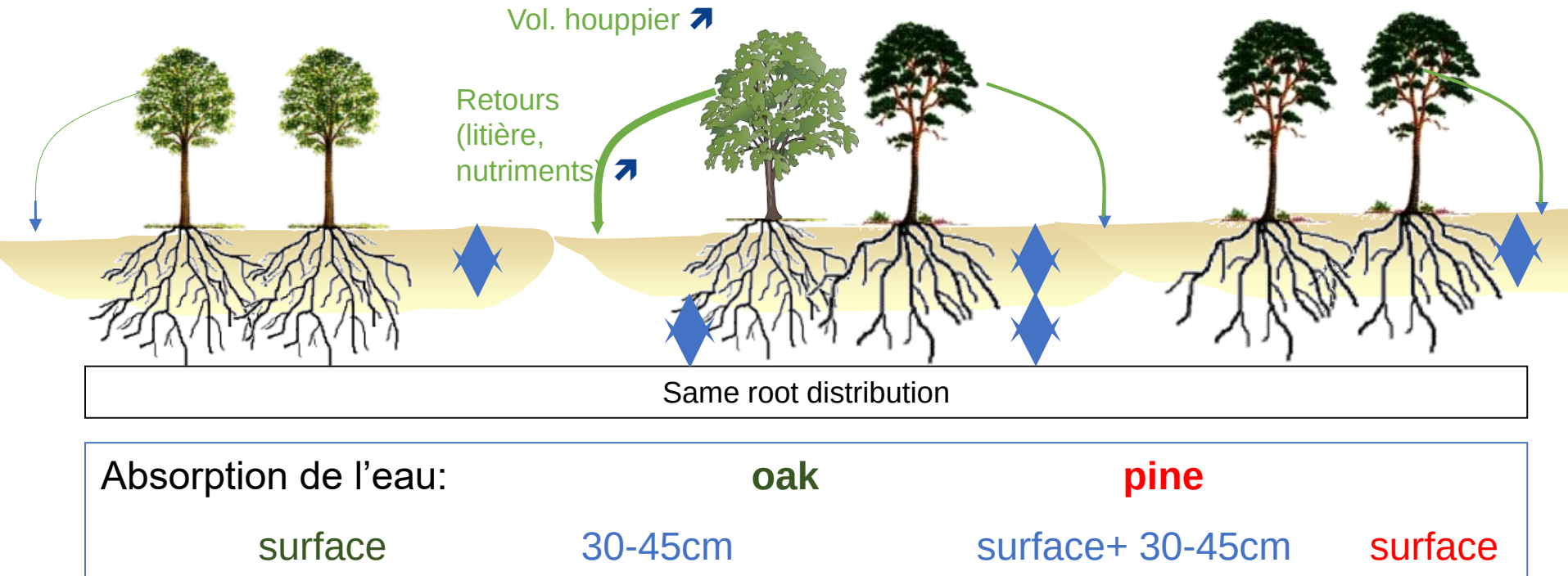
8%



Dépérissement ↗ de 26%
Effet mélange : ns

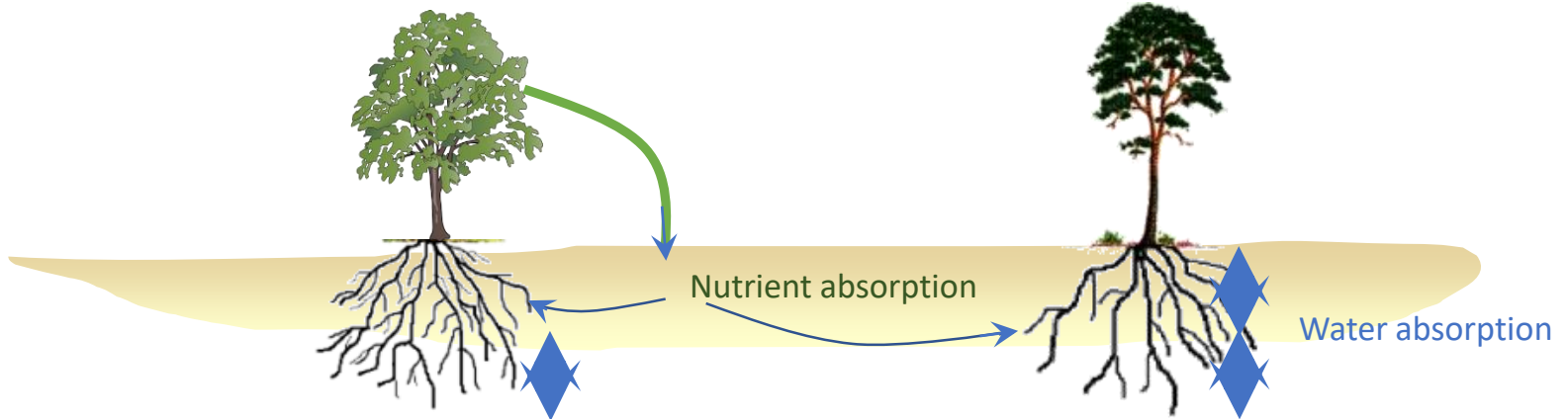
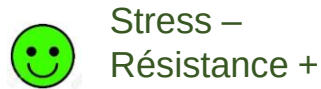
➤ CONCLUSION

Mélange = modification de certains traits fonctionnels



➤ CONCLUSION: Mélange vs peuplements purs

Le chêne en mélange:



- Chêne: stress hydrique moindre
- Surface photosynthétique > pur
- Meilleure résistance(+27%)
= accroissement > pur pendant la sécheresse

Le pin en mélange:



- Pin stop l'évapotranspiration
- Moindre résistance (-5%)
- Meilleur statut nutritionnel