La diversification : une stratégie de réduction du risque?

Ou comment ne pas mettre tous ses légumes dans le même panier…

Raphaël Paut - UR Écodéveloppement

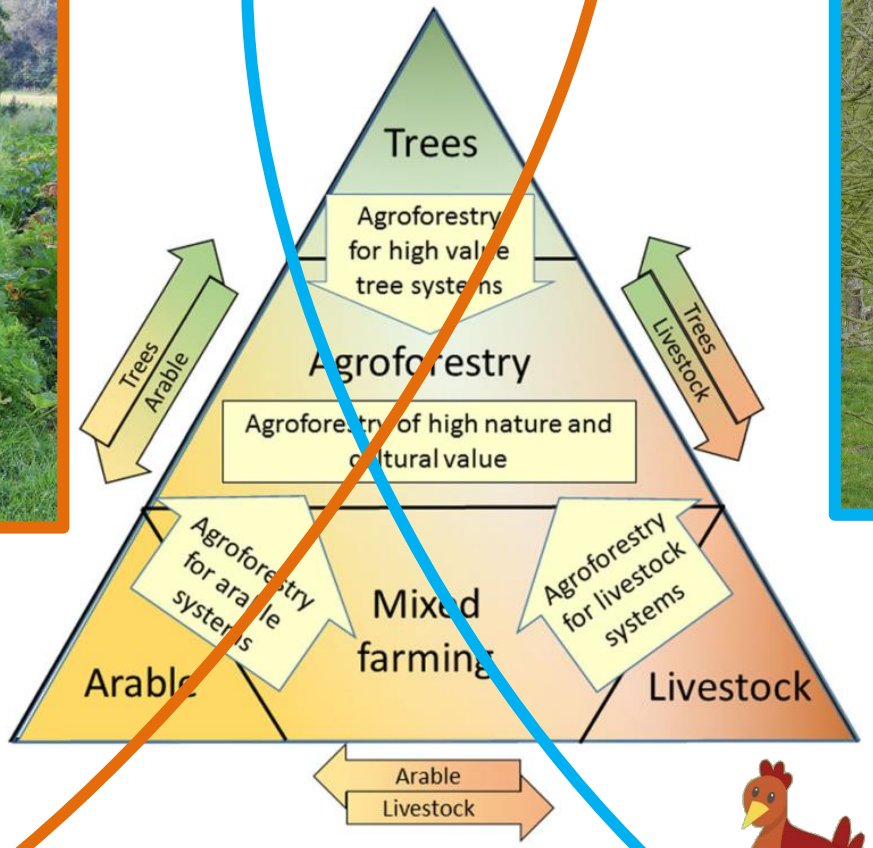
La diversification : comme levier, contexte ou objet d'étude

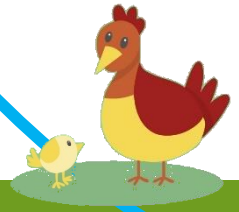
EcoOrchard

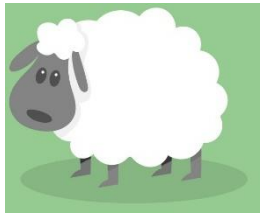
La Diversification Comme Objet d'Etude

Verger-Maraîcher

Verger-Pâturé





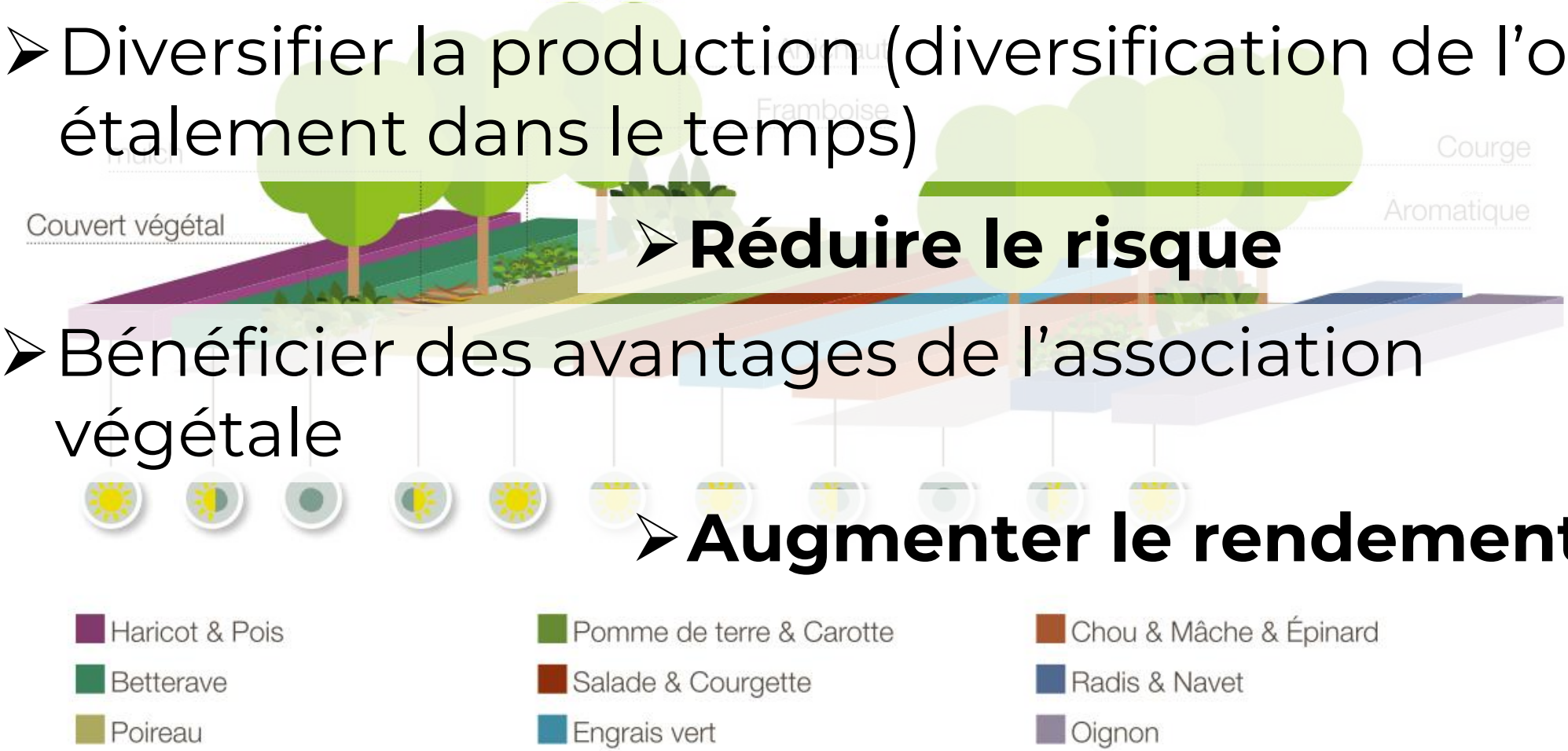


Burgess, P.J., Rosati, A., 2018. Advances in European agroforestry: results from the AGFORWARD project. Agrofor. Syst. doi:10.1007/s10457-018-0261-3

Vergers-maraichers : un « mystère » scientifique ?

Exemple d'aménagement d'un Verger-Maraicher

- Diversifier la production (diversification de l'offre, étalement dans le temps)
- Bénéficier des avantages de l'association végétale

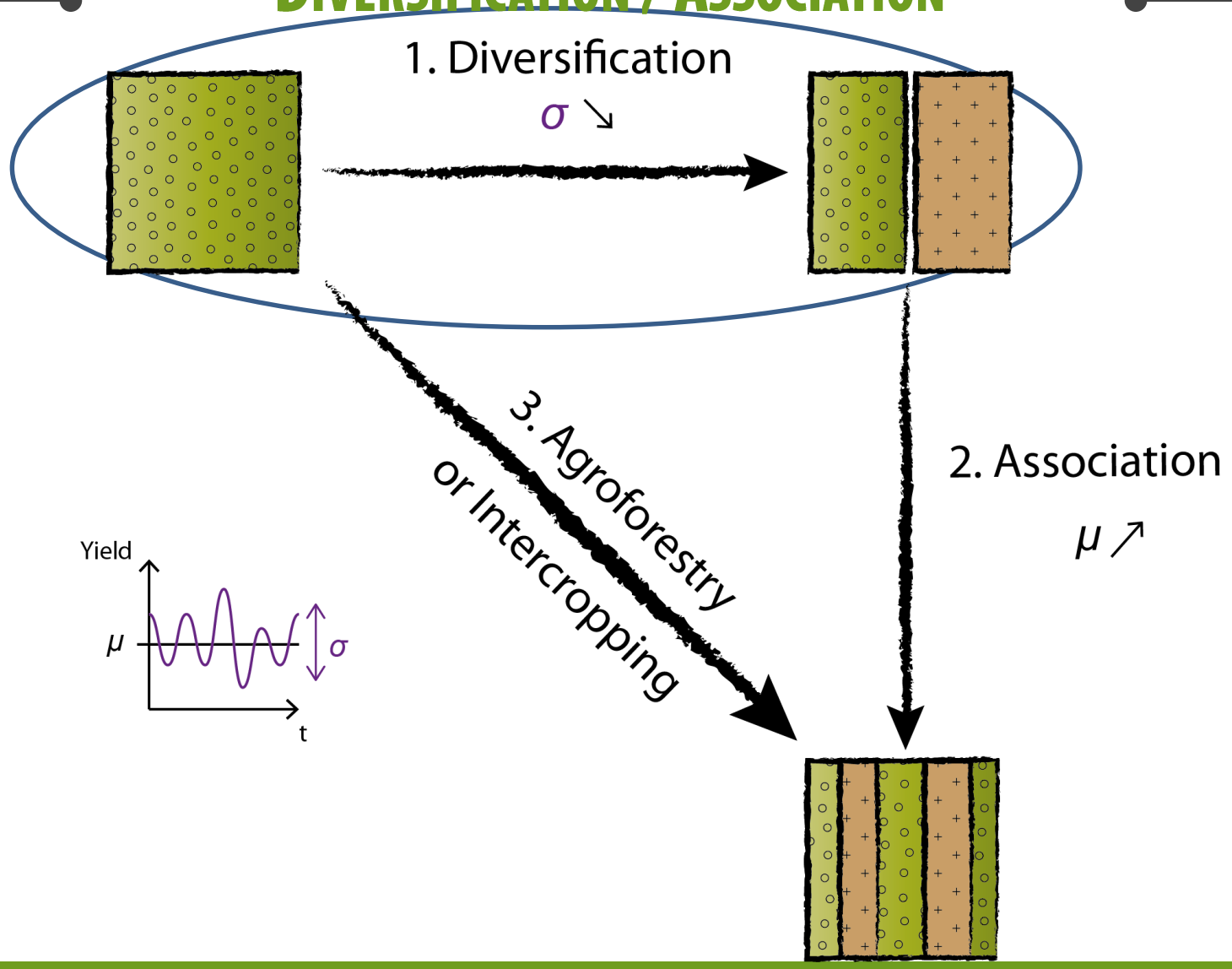


- **Réduire le risque**
- **Augmenter le rendement**

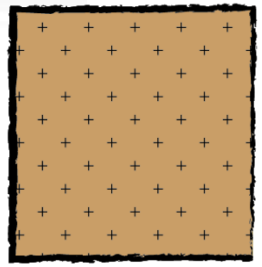
Haricot & Pois
Pomme de terre & Carotte
Chou & Mâche & Épinard
Betterave
Salade & Courgette
Radis & Navet
Poireau
Engrais vert
Oignon

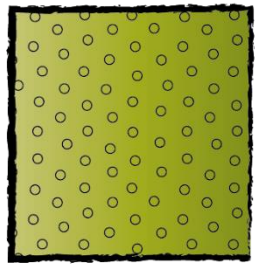
Warlop et al. 2017

Diversification / Association

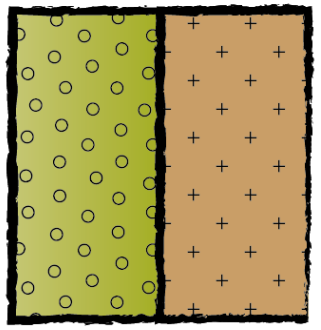


Théorie du portefeuille (illustration)





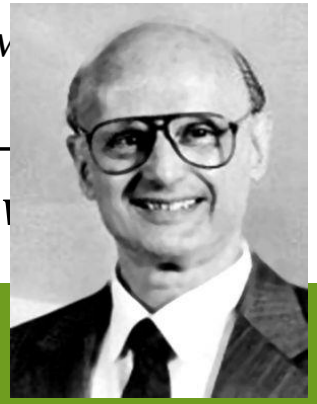
Diversification effect ?



2-crops Portfolio

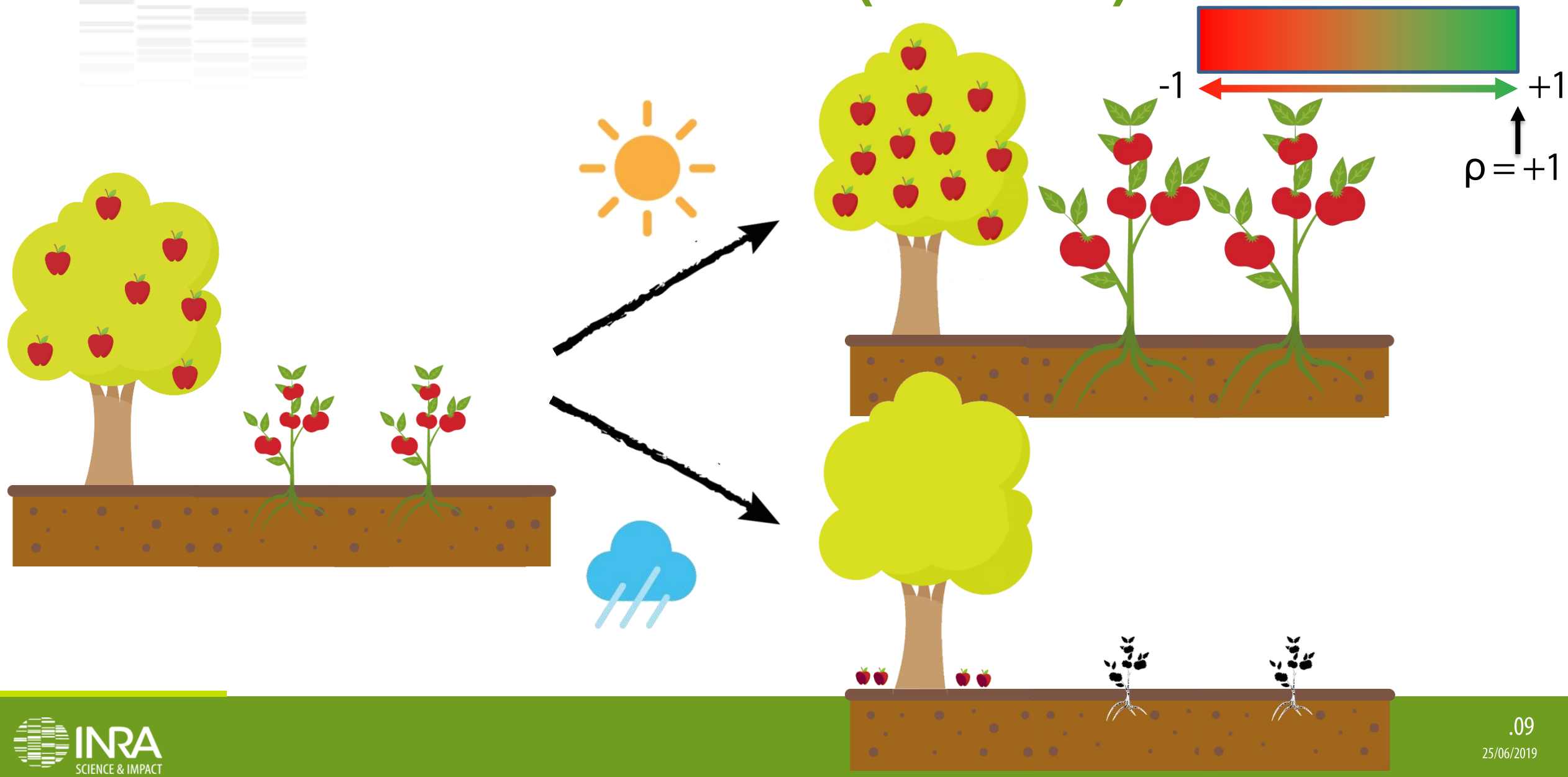
$$E(R_{Portfolio}) = w_1E(R_1) + w_2E(R_2) + w$$
$$+ w_nE(R_n)$$

$$\sigma_P = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w}$$

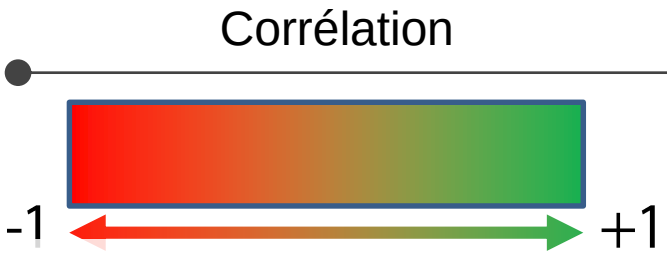


Portfolio Theory

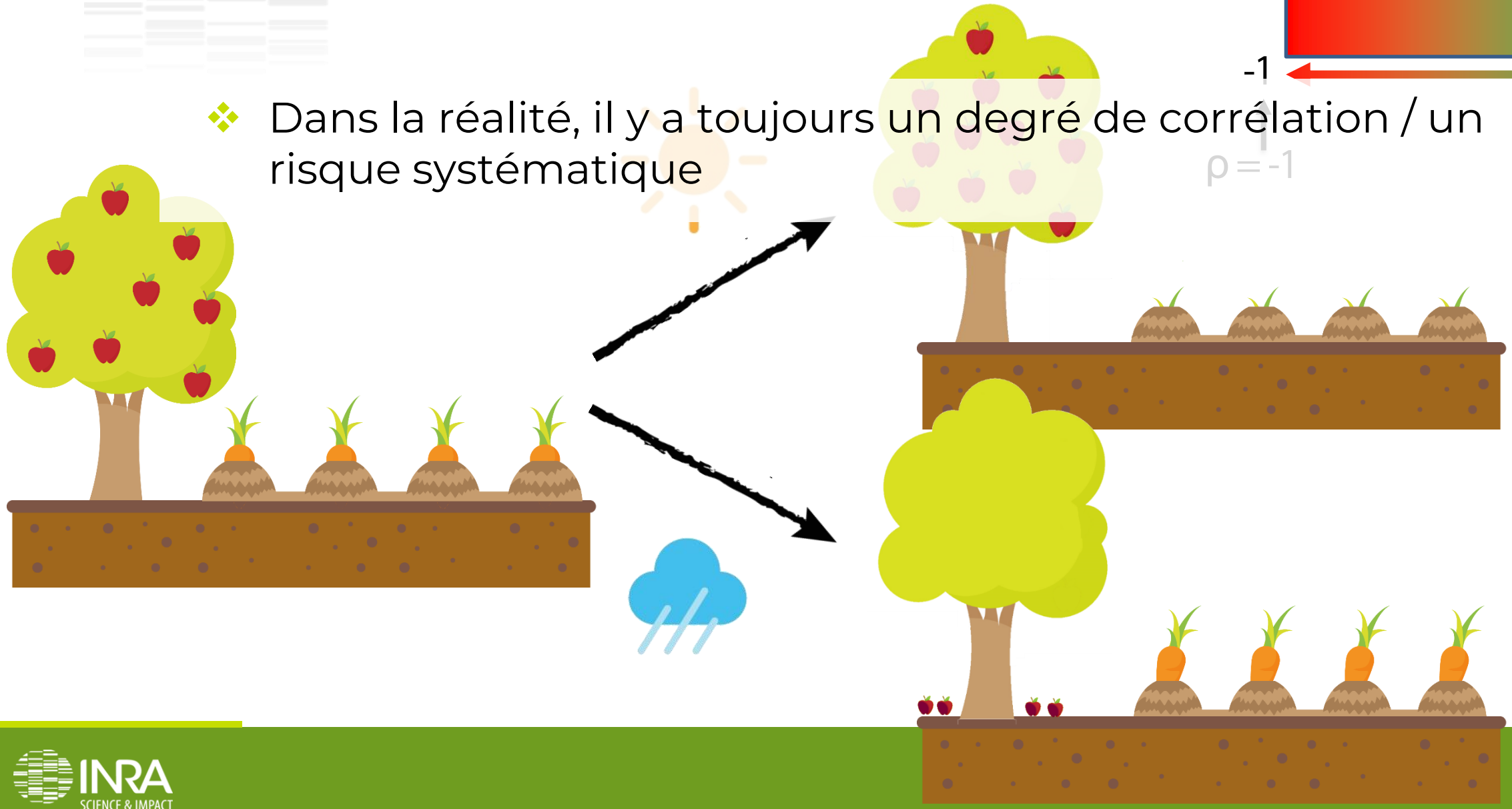
Théorie du portefeuille (illustration)

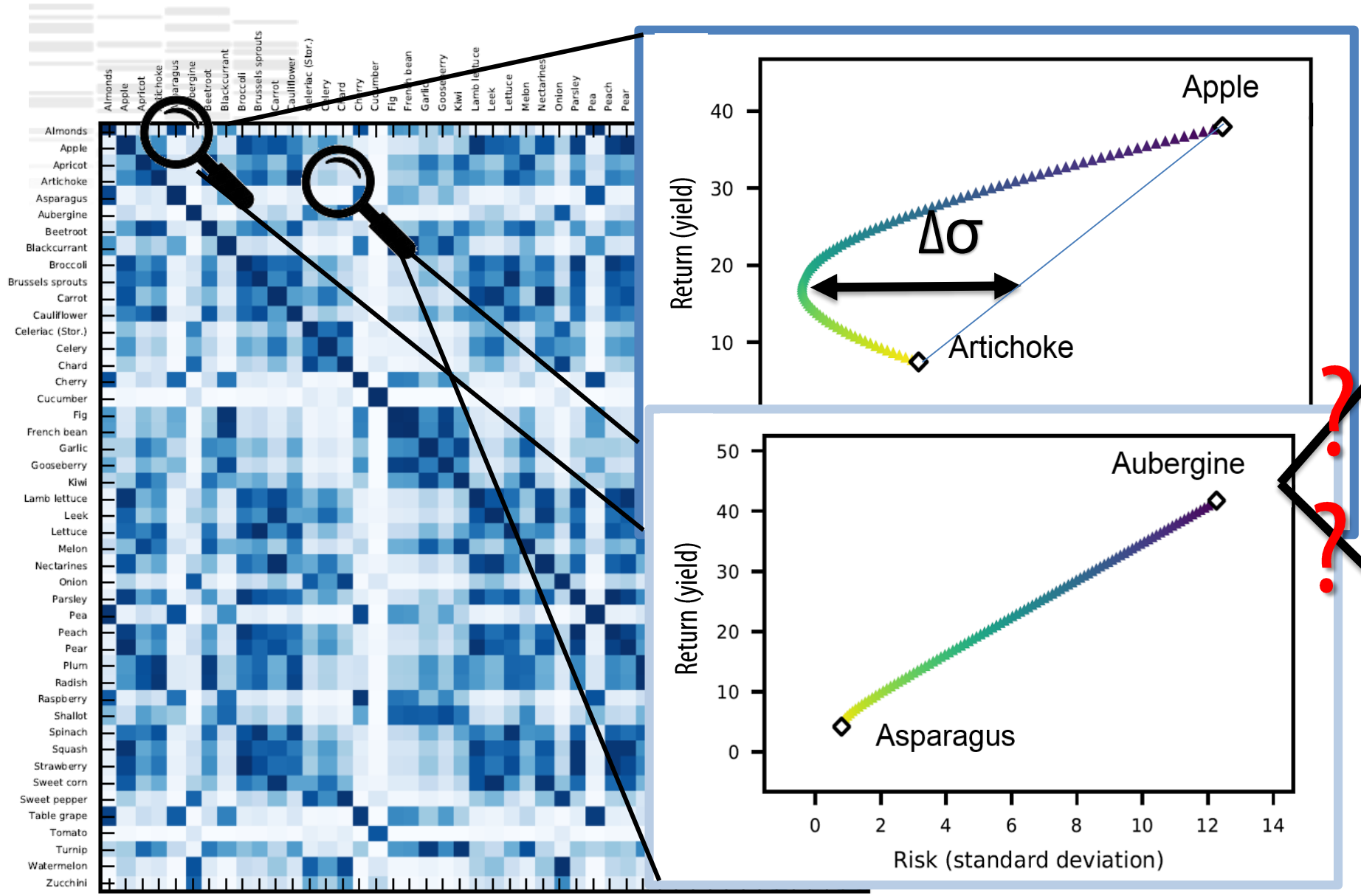


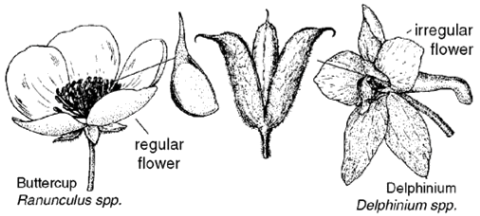
Théorie du portefeuille (illustration)

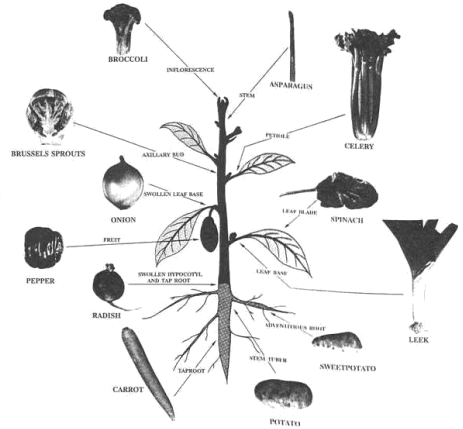


- Dans la réalité, il y a toujours un degré de corrélation / un risque systématique

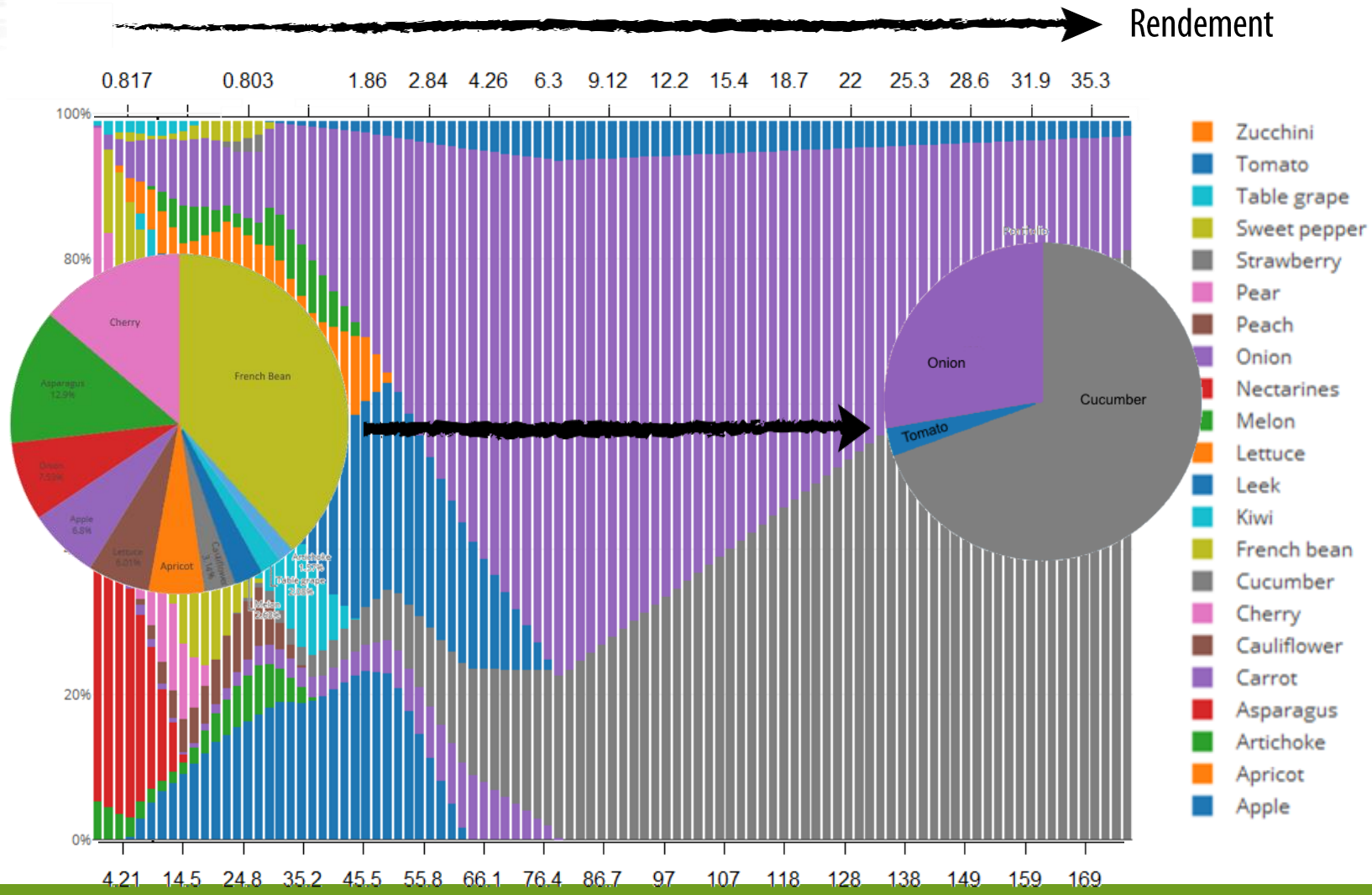



Almonds
Apple
Apricot
Artichoke
Asparagus
Aubergine
Beetroot
Blackcurrant
Broccoli
Brussels sprouts
Carrot
Cauliflower
Celeriac (Stor.)
Celery
Chard
Cherry
Cucumber
Fig
French bean
Garlic
Gooseberry
Kiwi
Lamb lettuce
Leek
Lettuce
Melon
Nectarines
Onion
Parsley
Pea
Peach
Pear
Plum
Radish
Raspberry
Shallot
Spinach
Squash
Strawberry
Sweet corn
Sweet pepper
Table grape
Tomato
Turnip
Watermelon
Zucchini
Apple
Artichoke
Δσ
Return (yield)
Risk (standard deviation)
Aubergine
Asparagus
?
?

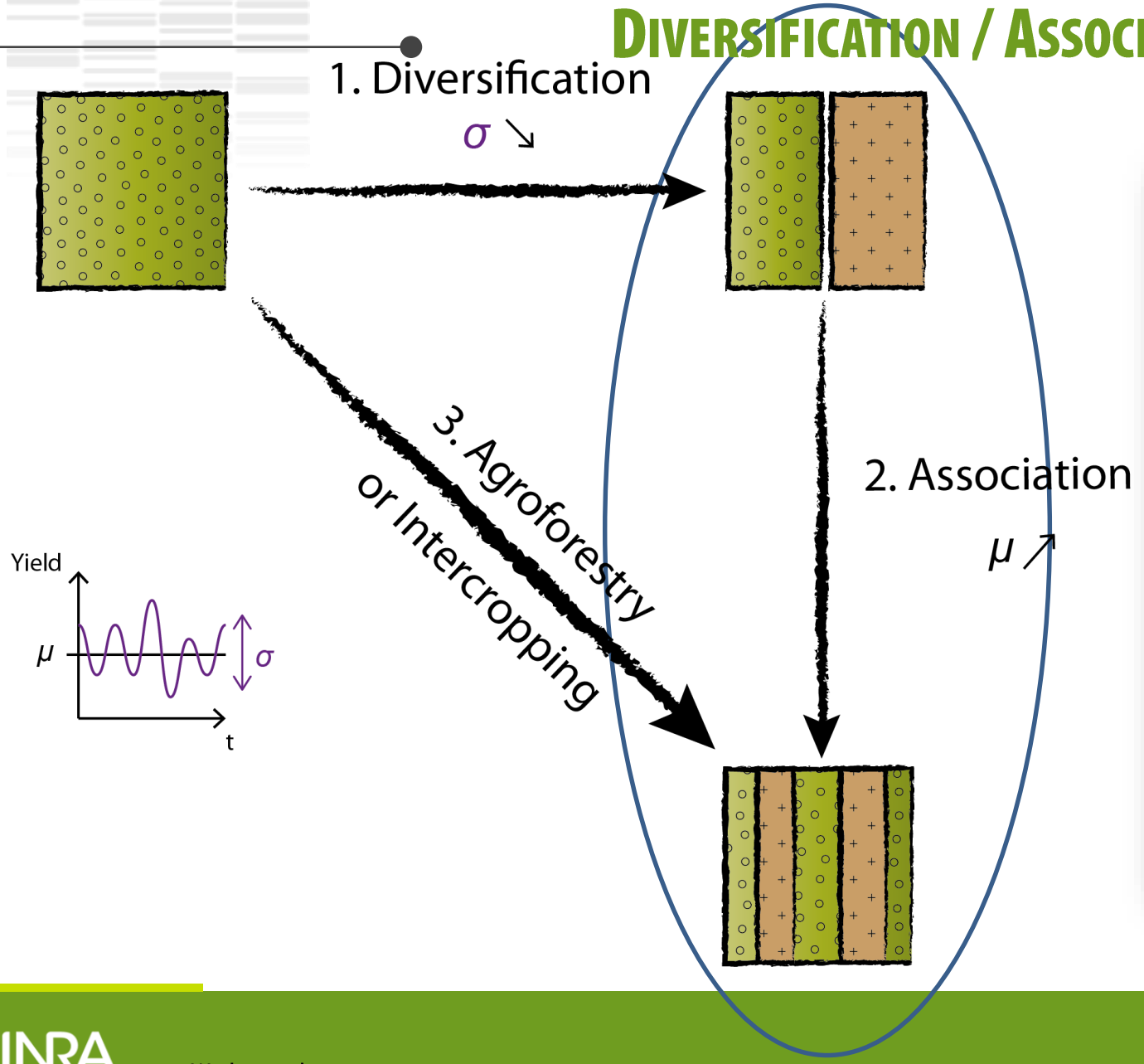

irregular flower
regular flower
Buttercup
Ranunculus spp.
Delphinium
Delphinium spp.


BROCCOLI
ASPARAGUS
CELERY
BRUSSELS SPROUTS
ONION
SPINACH
PEPPER
RADISH
LEEK
SWEETPOTATO
CARROT
POTATO

MEILLEURS COMPROMIS

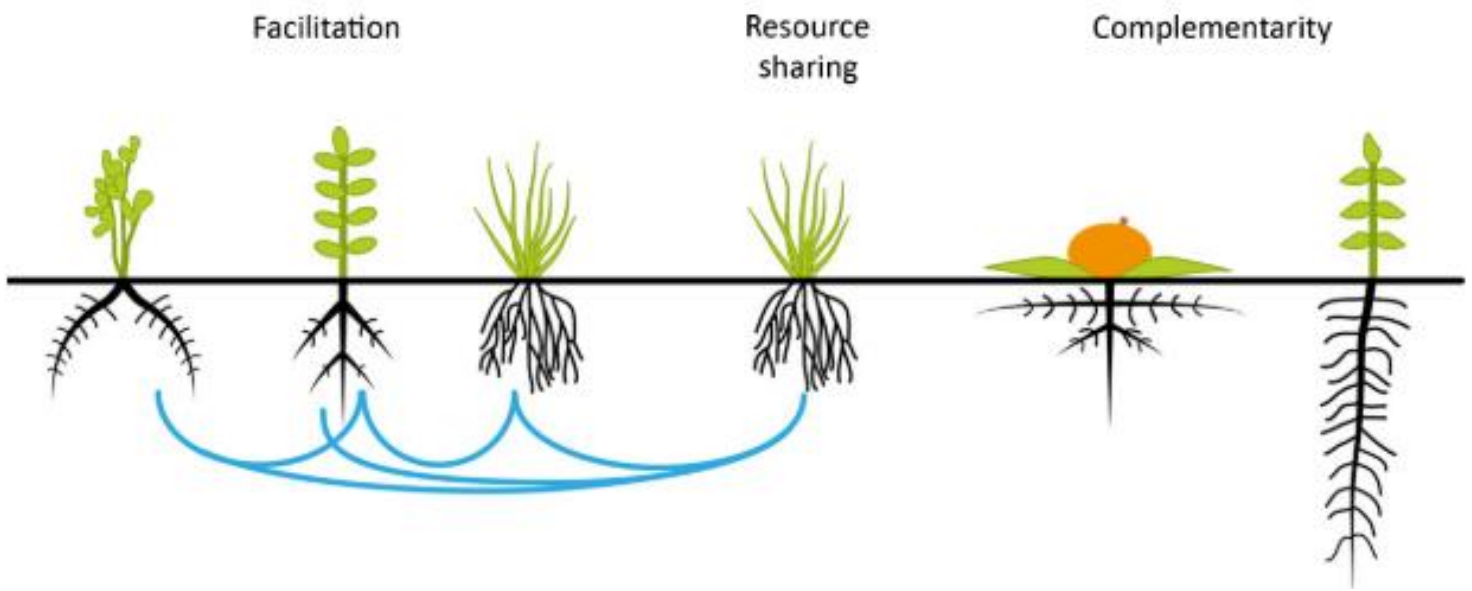


Diversification / Association



Warlop et al. 2017

Cultures associées



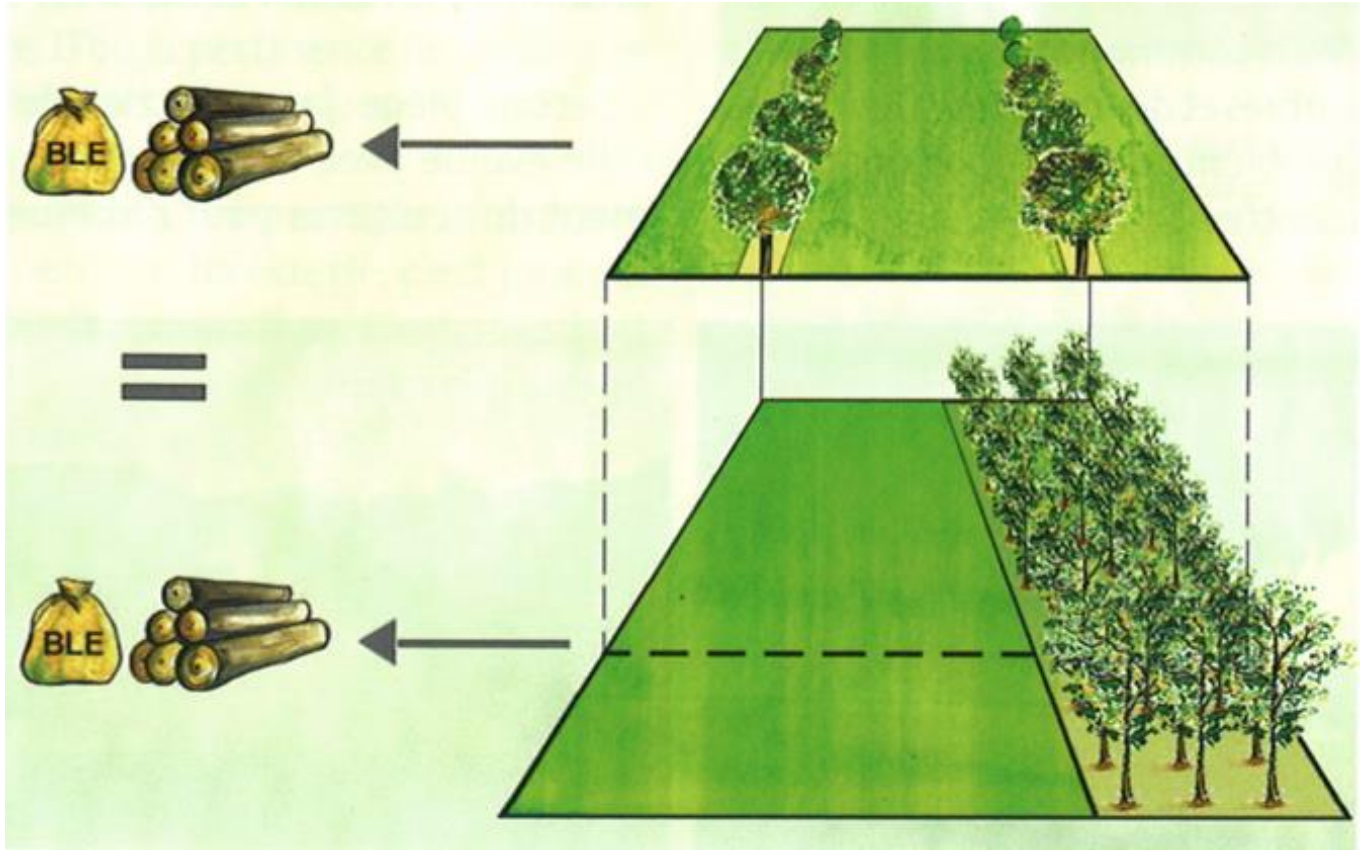
1. **Compétition** pour l'utilisation de même ressources
2. **Complémentarités** de niches
3. **Facilitation:** accéder à des ressources inaccessibles

Bertness et Callaway, 1994

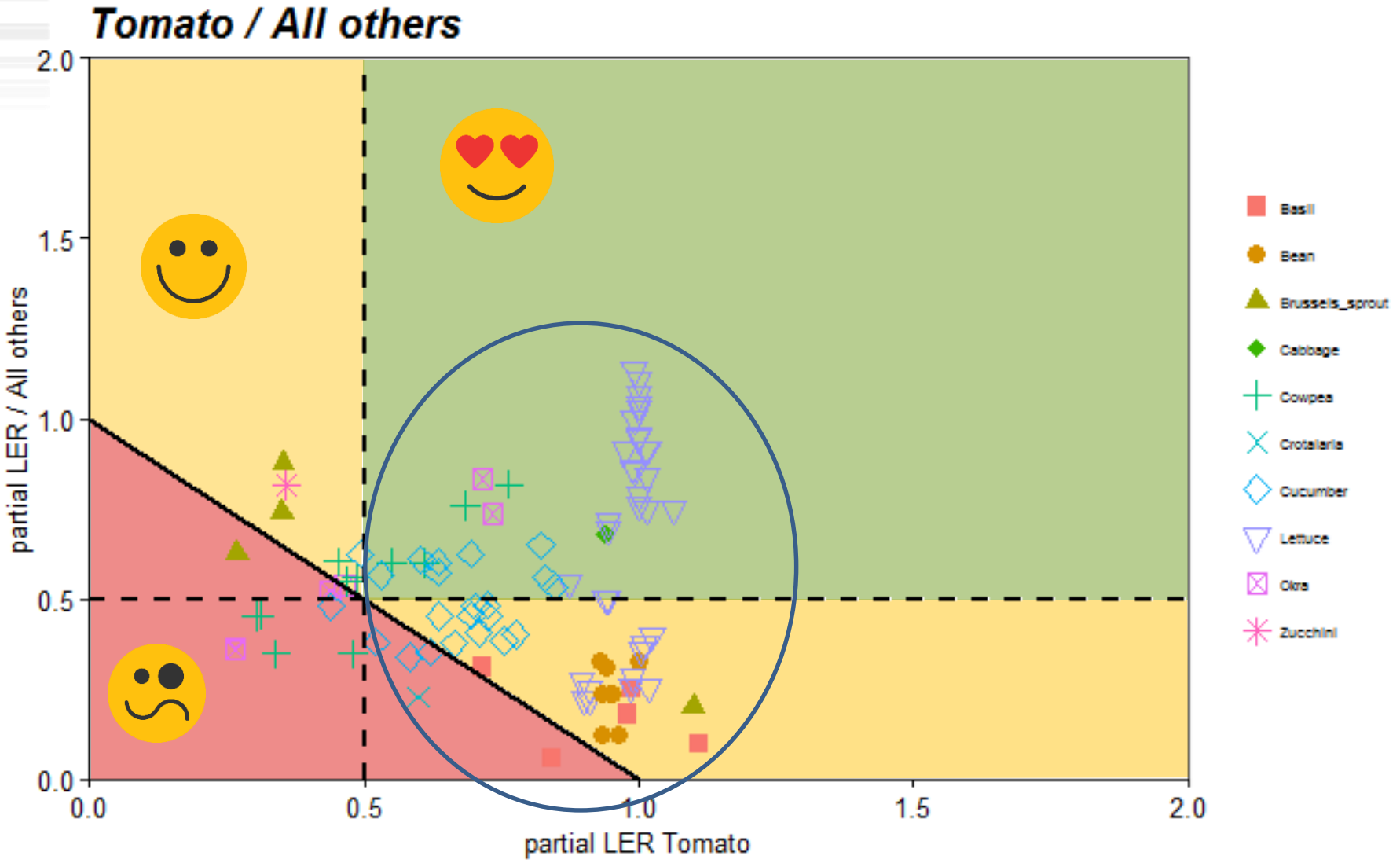
Implications pour la conception et l'expérimentation

L'évaluation

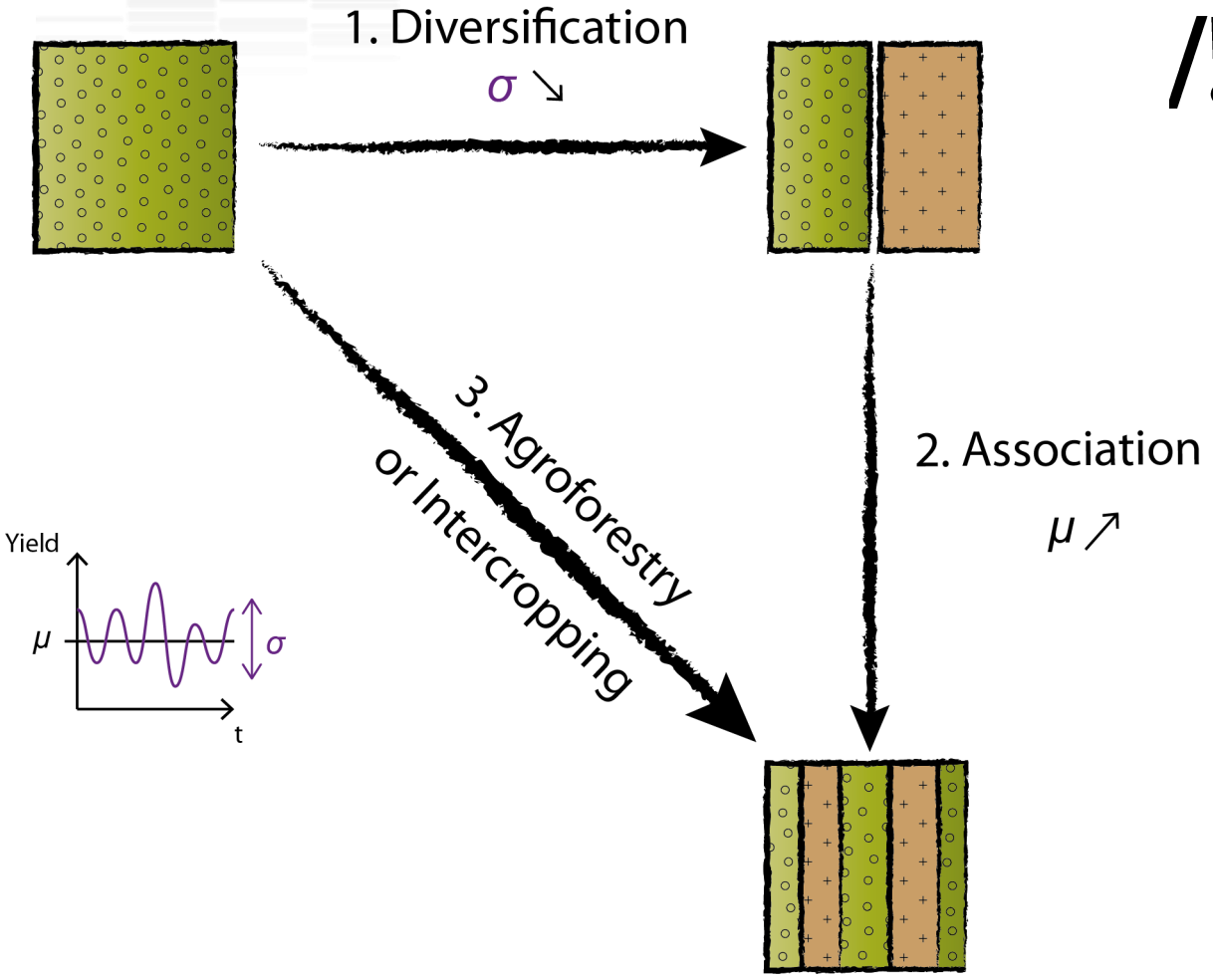
$$LER = \frac{Y_A}{S_A} + \frac{Y_B}{S_B}$$



Dupraz and Liagre 2008


Tomato / All others
partial LER / All others
partial LER Tomato
0.0
0.5
1.0
1.5
2.0
Basil
Bean
Brussels_sprout
Cabbage
Cowpea
Crotalaria
Cucumber
Lettuce
Okra
Zucchini

Perspectives...



/!\ Diversité Vs. Complexité

Merci

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