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
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# Keystone Species And Biodiversity Loss In Agricultural Ecological Networks

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## Species Extinction



data

methods



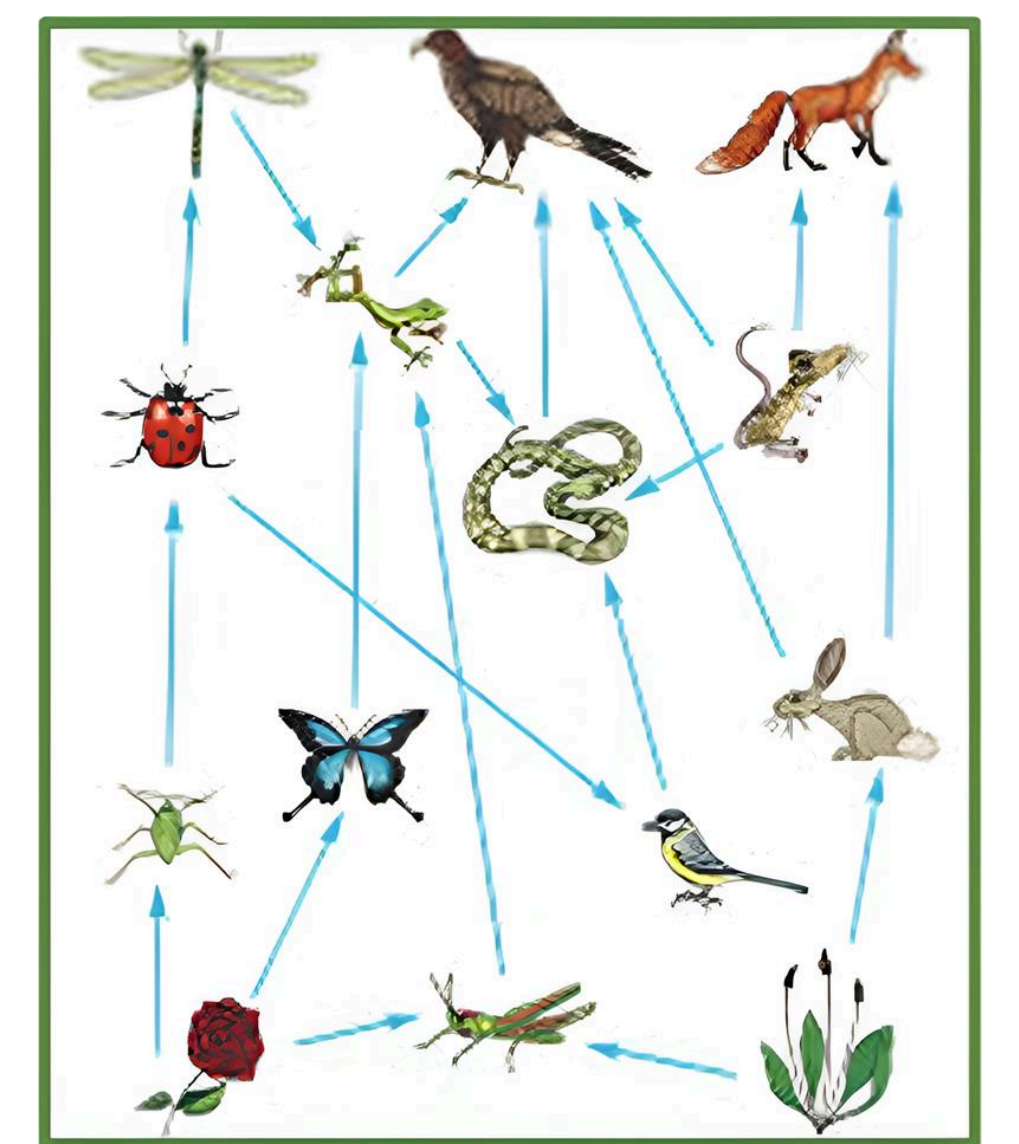
knowledge

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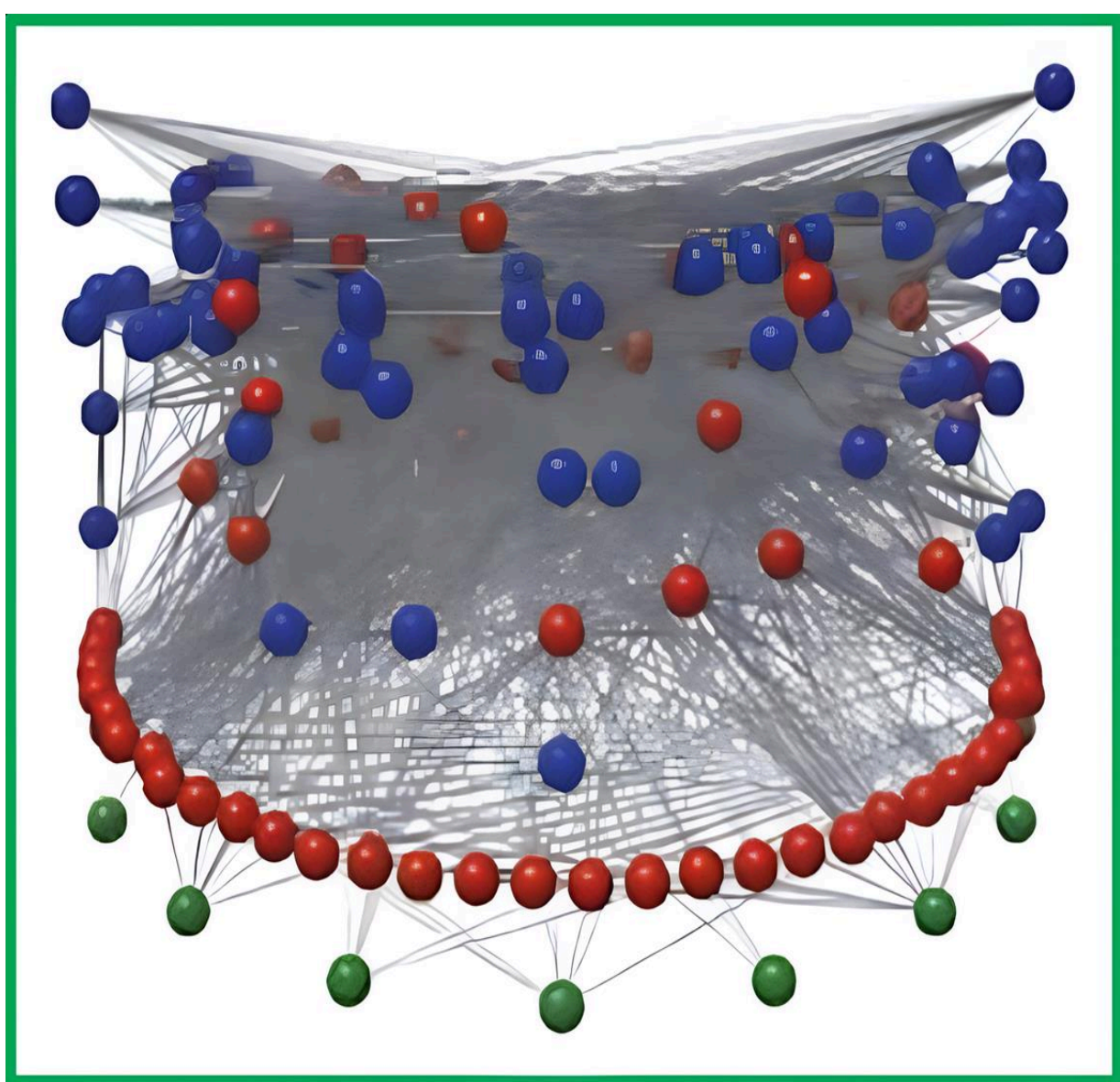
## Preserve Biodiversity



## Food web



## Complex Networks

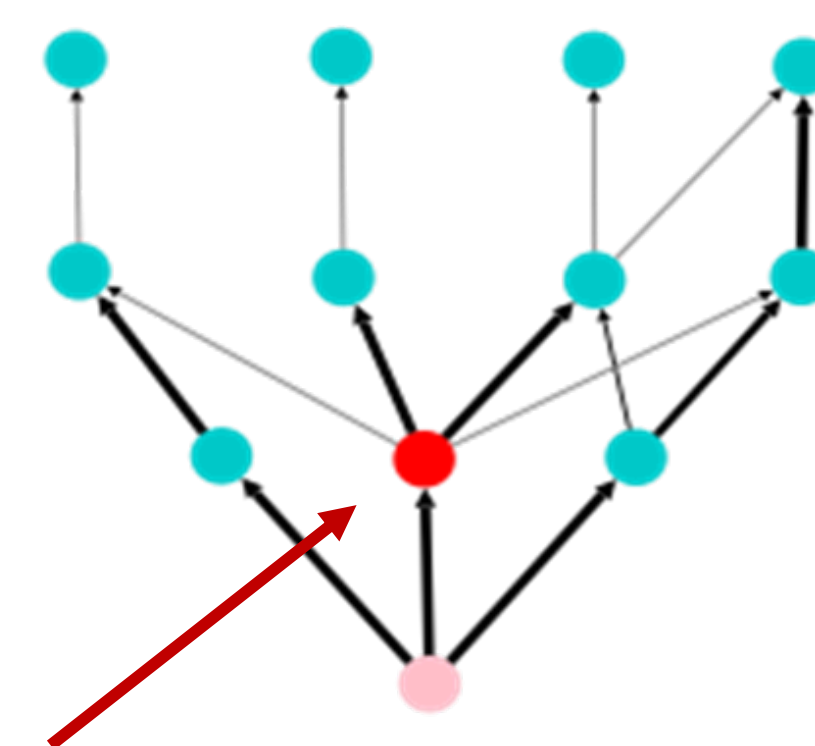


## Domino extinction

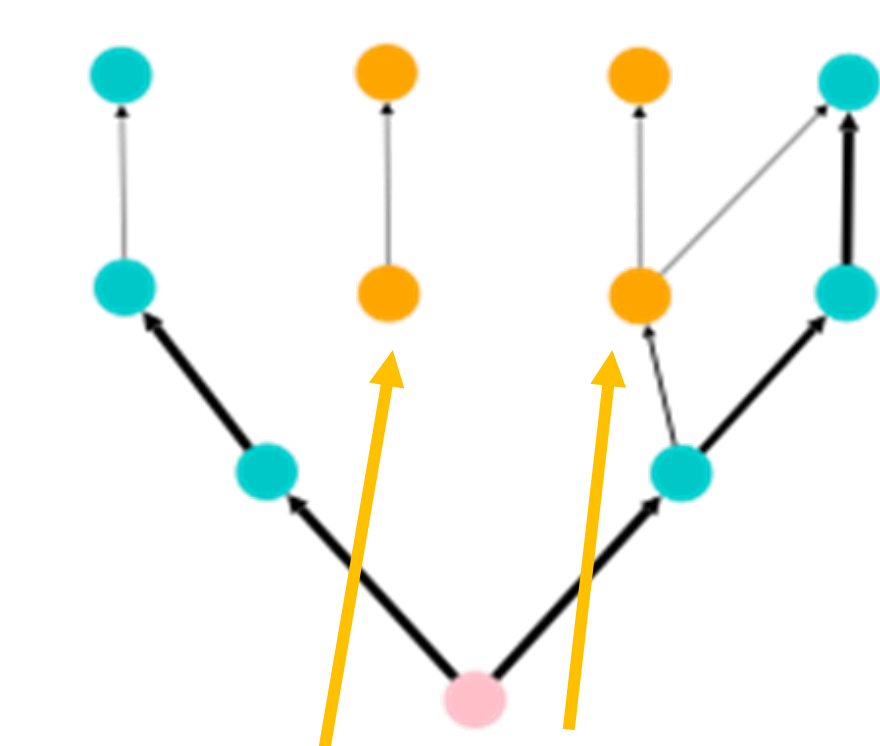


## How many species lose energy intake and go extinct?

'energetic criteria'



Primary extinction



Secondary extinction

## Energy threshold $th$

Initial Energy

100%

$th = 0 \rightarrow$  [bar]

0%

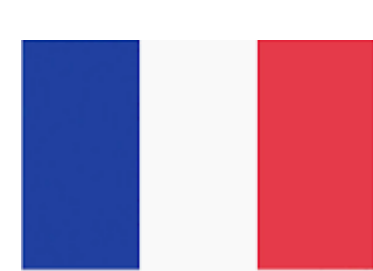
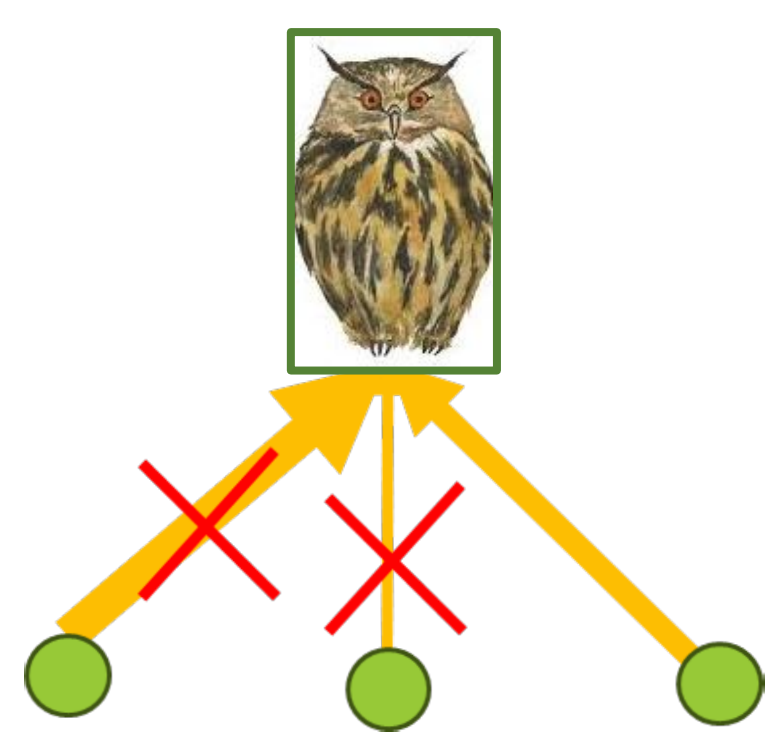
Secondary extinction

0.2  $\rightarrow$  [bar]

20%

0.5  $\rightarrow$  [bar]

50%



504 Agri food webs

INRAE

Algorithms



Databases

Beet

Corn

Oil seed



## Beet $\rightarrow$ Highest secondary extinction

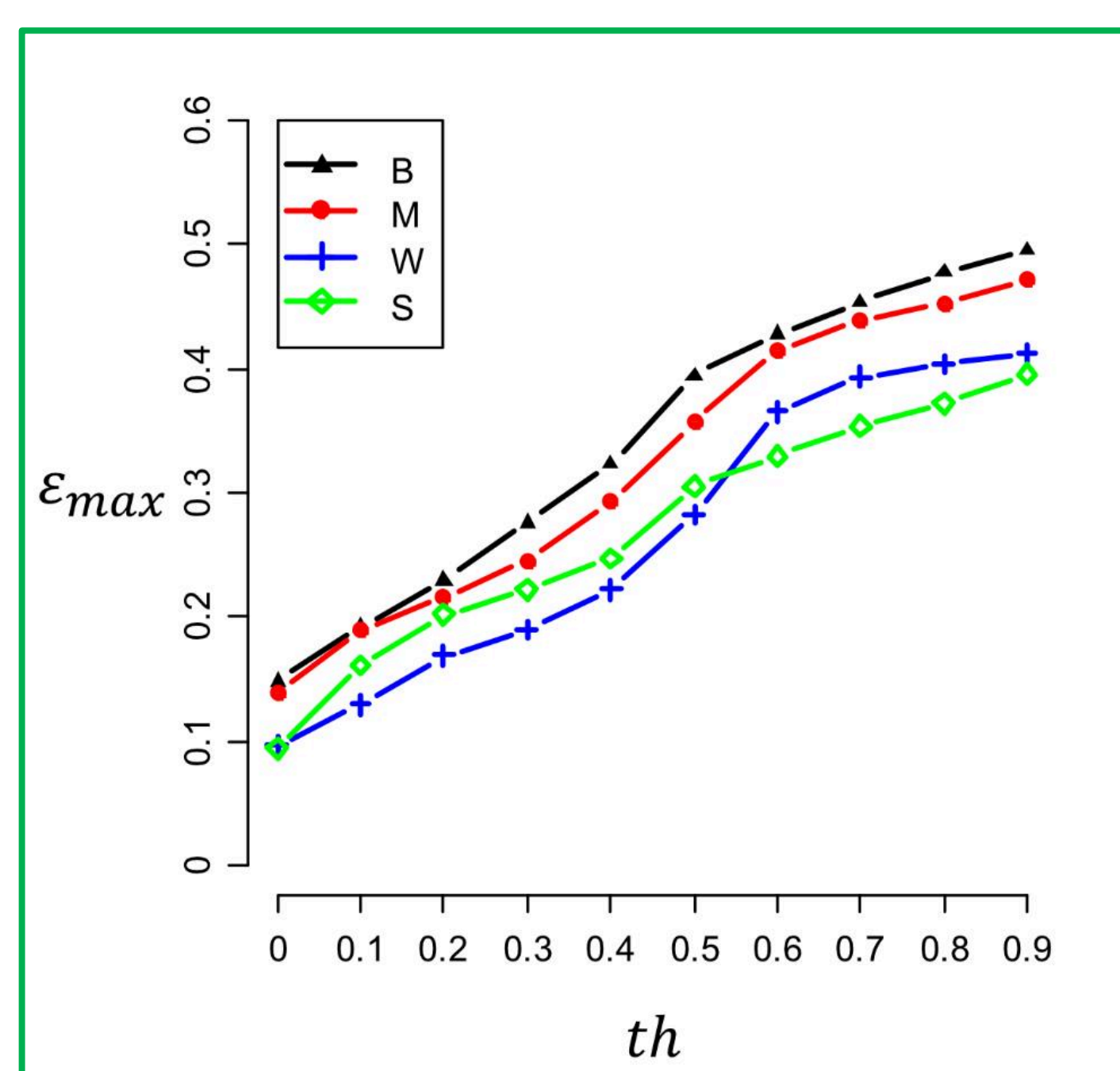


Figure 1: Maximum normalized secondary extinction ( $\epsilon_{max}$ ) as a function of the extinction threshold ( $th$ ) for each crop.

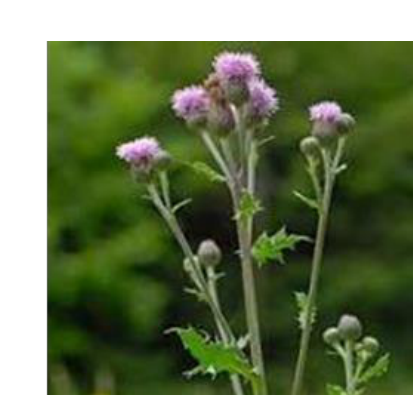
## Finding Fundamental species

Species	th=0	0.1	0.2	0.3	0.4
Chenopodium album	0	0	0	7	7
Persicaria lapathifolia	0	0	0	0	0
Cirsium arvense	4	4	4	4	4
Amara apricaria	0	0	0	0	0
Amara aulica	0	0	0	0	0
Anchomenus dorsalis	0	0	0	0	0
Calathus fuscipes	0	0	0	0	0
Harpalus affinis	0	0	0	0	0
Harpalus rufipes	0	0	0	0	0
Pterostichus cupreus	0	0	0	0	0
Pterostichus madidus	0	0	0	0	0
Pterostichus melanarius	0	0	0	0	0
Stomis pumicatus	0	0	0	0	0
Trechus quadristriatus	0	0	0	0	0

Table 1: Number of secondary extinctions caused by single species removal as a function of the extinction threshold ( $th$ ).



Chenopodium album



Cirsium arvense

