

# 'Land sparing vs. land sharing' and 'food vs. fuel' – Energy crops as a joining link for the dichotomies

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## Objectives

The debates on *land sparing vs. land sharing* often miss out a land-use type of increasing importance: energy crops. The need of feeding and fuelling a growing human population raises the concern of whether land spared through higher food crop yields per unit area would indeed be available for nature conservation or whether it would be utilized for energy crop production instead. Here is where the two dichotomies of *land sparing vs. land sharing* and *food vs fuel* meet and interact.

Energy crops interfere with *sparing* and *sharing* on a range of spatial scales. They could be segregated from food crops at coarse scales by determining whole regions or farms for energy crop production, e.g. based on the productivity of the land. In contrast, at fine scales, strips or patches of energy crops could be positioned in the landscape for improving biodiversity and ecosystem services within the food crops (combined food and energy systems). Additionally, as a land sharing option, energy crops could become part of the food crop rotation cycle.

Here I present scenarios of *sparing* or *sharing* food and energy production on either productive or marginal land and discuss their potential impacts on biodiversity and ecosystem services.

## Conclusions

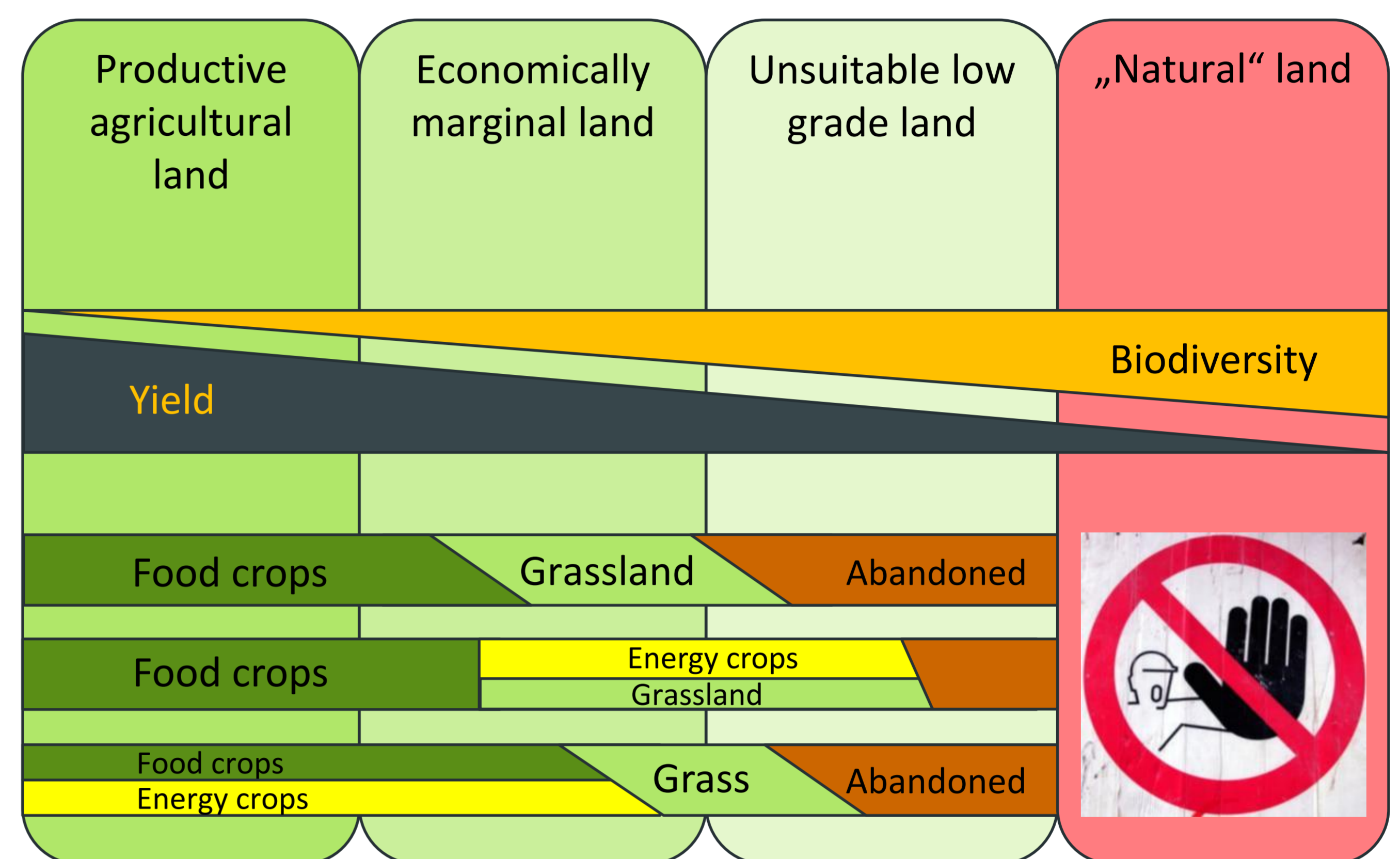
To support sustainable intensification within combined food and energy systems, the integrating approaches require efficient land-use and landscape planning. For this, a better knowledge about the most efficient combinations of energy crops (1<sup>st</sup> generation or 2<sup>nd</sup> generation; annual or perennial) and food crops is needed.

## Conceptual framework and scenarios

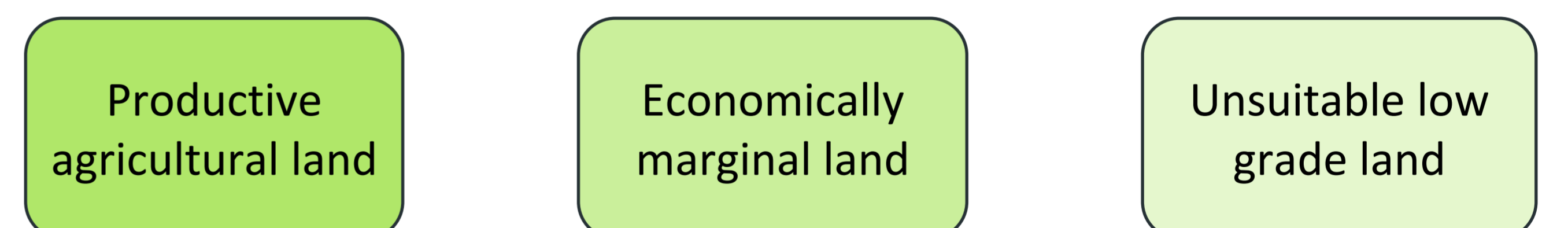
Land of varying economic/environmental suitability for food production

Yield-biodiversity relationship

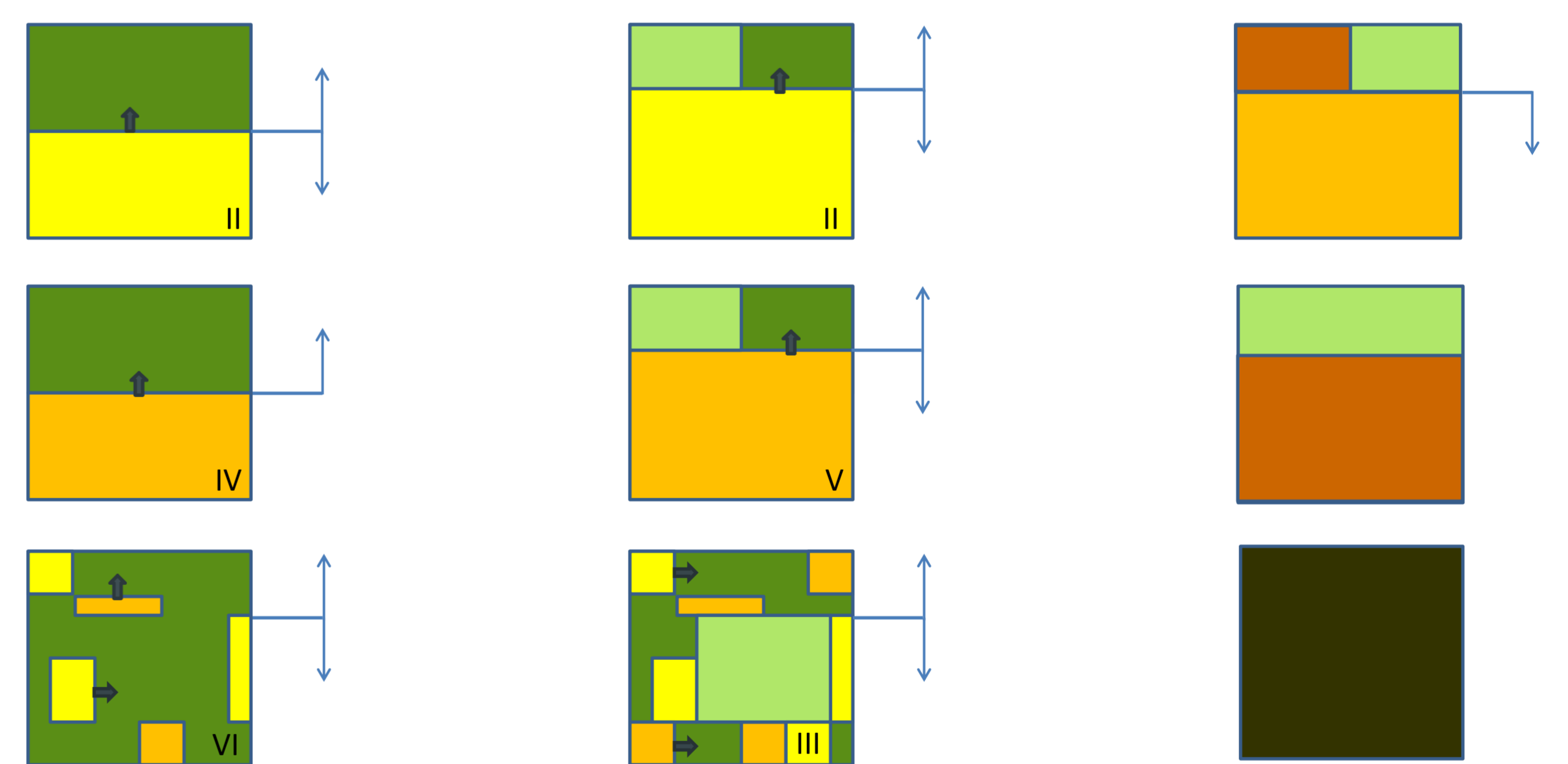
Pre-bioenergy land use  
Segregation of food and energy crops  
Integration of food and energy crops



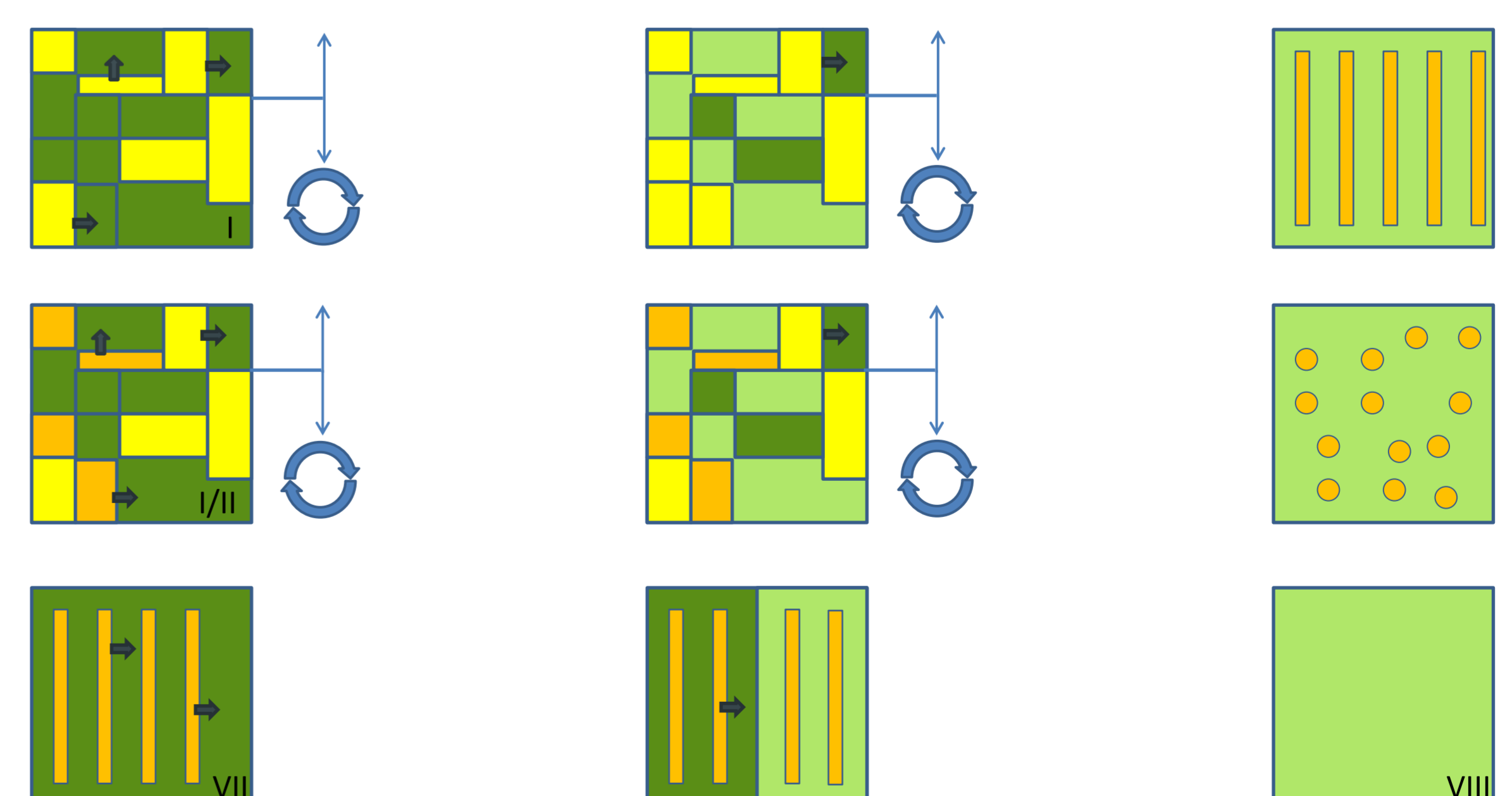
Scenarios at the farm scale









Segregating food and energy crops



Integrating food and energy crops



- Crop types**
-  Food/fodder
  -  1<sup>st</sup> gen. energy crop
  -  Dedicated energy crop
  -  Permanent grassland
  -  Forest
  -  Biomass from landscape conservation actions
- ↑ Food can be used for energy and vice versa  
 ↑ Food can be used for energy  
 ↓ Energy can be used for fodder  
 ↻ Food and energy crops in rotation  
 → Promotion of regulating services in food crops??

