



Transition paths to sustainable  
legume-based systems in Europe

## Impact of varying inorganic nitrogen supply on growth and yield of common bean grown hydroponically

Hydroponic cultivation of grain legumes such as common beans aims to achieve a more sustainable and less costly production by reducing inorganic nitrogen (N) input and without compromising yield. This is possible in practice based on the unique capability of legumes to form symbiotic relationships with bacteria commonly called 'rhizobia'. Rhizobia reside within root nodules where they fix inert atmospheric di-nitrogen gas into forms that can be used by the plants. Hence, while in nature legumes plants can meet their entire N requirements from N fixation, we found that in hydroponic cultivation systems, provision of inorganic N helped the productivity. During growth inorganic N should be supplied at levels of up to 60% of requirement. However, from the flowering stage onwards, when nitrogen fixation begins to diminish, inorganic N-supply can be limited to approximately 25-30 % of the full requirement.

This research has shown that such a reduction resulted in fewer larger nodules, that yield was not compromised (compared to plants supplied with 100% inorganic N (*i.e.* without rhizobia inoculation)). Thus, applying up to 60% of the grain legumes full requirements in inorganic N until the flowering stage, and 25-30% thereafter can be an effective strategy for the efficient hydroponic cultivation of common beans, and could reduce inorganic N fertiliser requirement.

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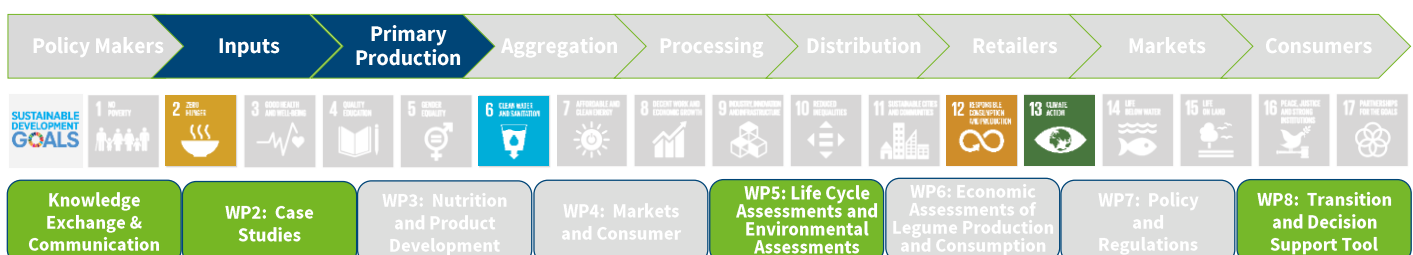
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Practice Abstract #1



**Figure 1.** Common beans in Hydroponically cultivation with different N-supply-strategies.  
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**About TRUE**

The EU funded project "TTransition paths to sUustainable legume based systems in Europe" (TRUE) is a balanced practice-research partnership of 24 institutions, which aims to identify the best routes, or "transition paths" to **increase sustainable legume cultivation and consumption across Europe** and includes the entire legume feed and food value chains.

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