Benefits of legume crops, manure and compost on corn yields and N supply

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Introduction

- Legume crops, manure and compost add N-rich residues and improve soil properties that can boost the yield of subsequent crops in organic farming.
- However, these effects depend on soil and climatic conditions which determine the mineralization rate and N availability to crops.
- They also are influenced by soil tillage regimes.

Materials and Methods

- The objective of this long term study is to identify the most appropriate preceding legume crops for subsequent corn and wheat yield and N nutrition, and for soil physical and biological properties improvement.
- To determine the effects of different tillage regimes on N use efficiency of legume crops, manure and composts.
- The study is situated at Biological Research Station at Saint Bruno, Québec (IRDA).

1) Legume systems (8 treatments):
- Barley as control
-Dry pea
-Alfalfa
-Crimson clover
-White clover (Ladino)
-Red clover
- Red clover & white clover
-Hairy vetch
2) Organic fertilizer applications: dairy manure and compost at 40 Mg/ha on wet basis.
3) Tillage regimes: by plowing or by harrowing with Offset discs.

- Corn in the second year

Results and discussion

➢ This study demonstrated that it is possible to achieve corn grain yields ranging from 5 to 8 t/ha in organic farming by combining legume crops with organic amendment (manure or compost) (Figures 1 and 2).

➢ Only three legume crops produced higher increases of corn grain (2.5 to 4.9 t/ha, compared to the control (barley).

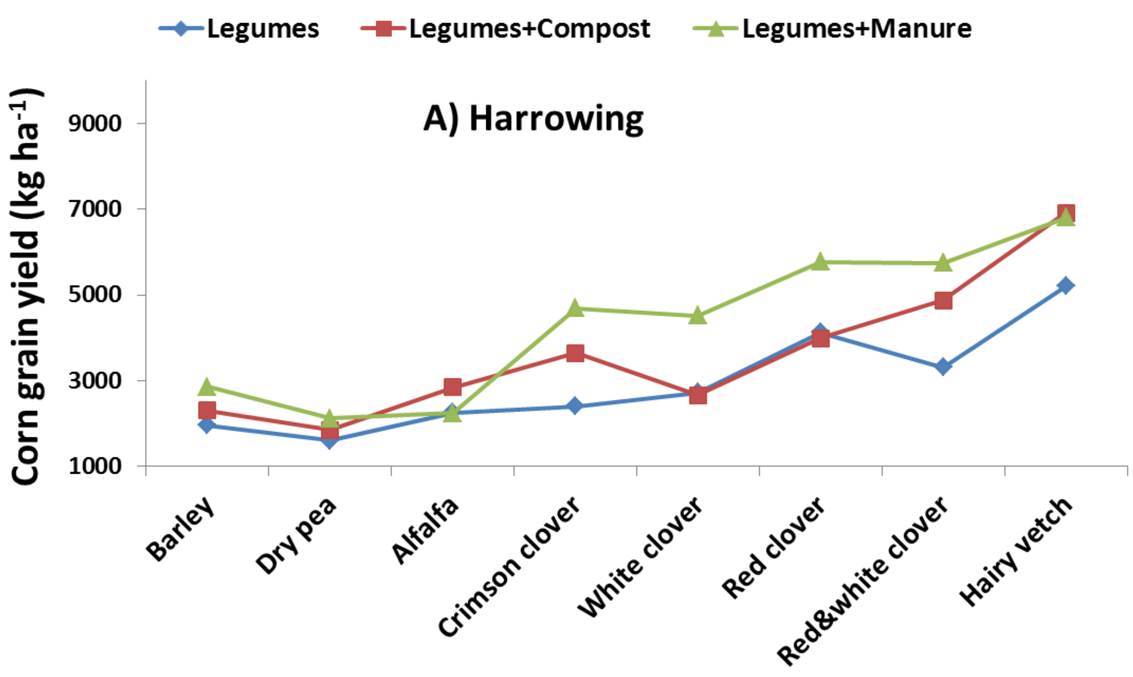
➢ Effects on corn yields and N nutrition were highest for red clover > red and white clover > hairy vetch. Corn N recoveries for these legume crops varied from 33 to 54%, and were from 16 to 24% for compost, and from 25 to 31% for manure.

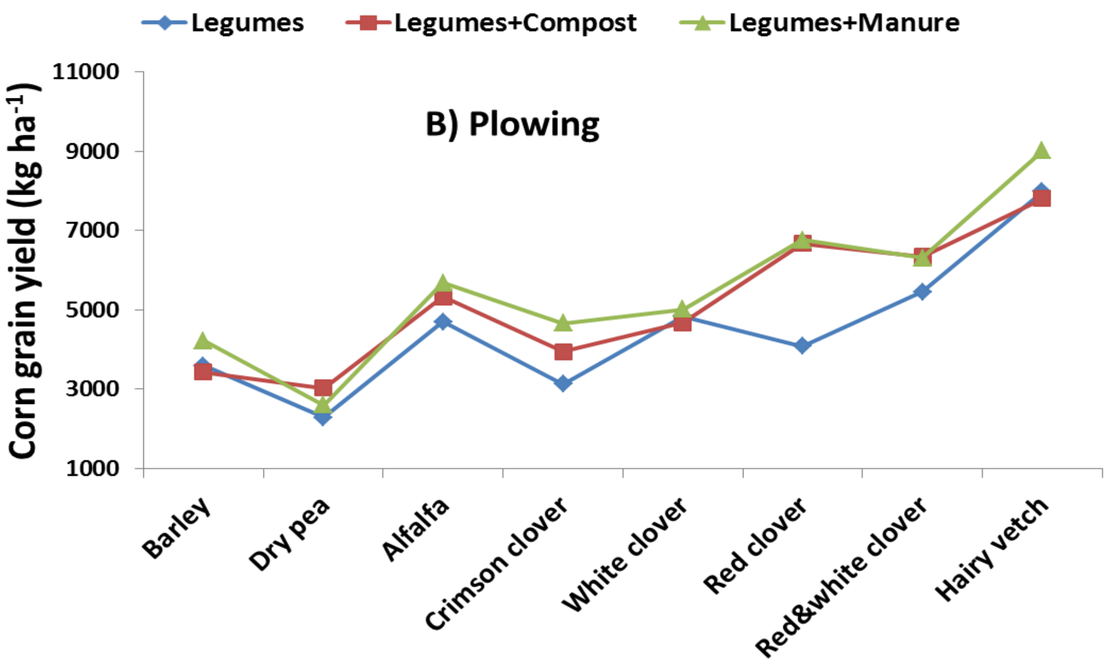
➢ Manure addition enhanced more corn yield and N nutrition than compost (Figures 1 and 2).

Results and discussion (continued)

➢ Corn yield and N nutrition were higher in tilled soils using moldboard than with harrowing (Figures 1 and 2).

➢ The effect on yield and N nutrition may not solely attributed to N input, but also to the soil properties improvement following legumes and organic fertilizers incorporation (data not presented)





Conclusions

➢ Legume crops can provide a direct N contribution to crops.

➢ Nitrogen input of legume crops are not sufficient to cover crop N needs in organic farming and has to be completed with other organic fertilizers.

Acknowledgments: This ongoing research (2012-2017) on N sources efficiency and tillage regimes is supported by INNOV'ACTION funding program (MAPAQ) and the Research Institute for Agri-Environment (IRDA).