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Creation of added value in direct selling microfarms: a quantitative exploration through modelling

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State-of-the-art

Within the agroecological social movement claiming for agricultural systems contributing to ecosystems health and social welfare, microfarms are arousing growing interest in industrialised countries. The term “microfarms” denotes small-sized organic commercial farms sharing some important characteristics: cultivated acreage smaller than official recommendations for market gardening; marketing through short supply chains; wide diversity of plants cultivated; and low level of motorization and investment [1]. Compared to classic forms of organic market gardening, microfarms aim to create more added value per unit surface area through ecological intensification and a higher level of human care. The impact of these intensification strategies on incomes and workload has been illustrated in a few emblematic, sometimes controversial, examples [2,3] but the ability of microfarms to be financially viable needs to be further examined in a wider range of contexts.

Methods

Based on quantitative data collected on a sample of 10 microfarms in northern France, we developed a modelling tool to explore the creation of added value per unit surface area and per hour workload. This tool combined two models. The first model was a mixed model which estimated the workload and yield per m² according to vegetable type and growing practices. The variability between farms was integrated as a random effect. The second model was a linear program which generated crop planning to match the criteria of a CSA (Community Supported Agriculture) box scheme selling from 30 to 50 vegetables: sufficient quantity and satisfying diversity of different types of vegetables each week throughout the year. We used this tool on 3 contrasted technical scenarios which were designed based on a previous qualitative analysis of semi-directive interviews carried out on 20 microfarms in northern France:

- Manual microagriculture (**Mi**): no motorisation, superficial tillage, high cropping density, intercropping, as many crops as possible were grown each year on one plot (from 2 to 6 cropping cycles) limiting the possibility of growing green manures.
- Biointensive market gardening (**Bi**): small motorisation for superficial tillage, high cropping density, no intercropping, as many crops as possible were grown each year on one plot but green manures were integrated in the rotation (from 1 to 4 cropping cycles in average on a plot).
- Classic small-scale diversified organic market gardening (**Cl**): motorisation for most cropping activities (except hand harvest), low cropping density, no intercropping, it was not aimed to optimise land use and only 1 or 2 cropping cycles took place in average on a plot each year.

Scenarios Mi and Bi implemented ecological practices for managing soil fertility and sanitary disorders whereas scenario Cl relied mainly on commercial inputs. For each scenario, 1000 simulations were ran. For each simulation, we estimated the sales generated by an annual workload of 2000 hours from which 80% was spent working on field and 20% dedicated to commercial and administrative tasks. We considered the hypothesis of a farm managed by only

one single farmer with no subsidy and used variable and fixed costs according to each scenario based on the 10 microfarms from our sample and market gardening references [4].

Main results

For a yearly workload of 2000 hours, the average utilised agricultural area (including footpaths) of Mi (1889 m² sd: 685) was smaller than Bi's (4010 m² sd: 1422), which was smaller than C's (7899 m² sd: 2662). These figures reflected the logic of scenario Mi to focus human care on a smaller acreage with time consuming ecological practices whereas Ci aimed to decrease human workload per unit area through motorisation and commercial inputs. Scenario Bi stood in between as a trade-off between both approaches. The mean added value created per unit area was linked to the level of labour invested per m² as shown in **Figure 1**: Mi (5.2 € per m² sd: 1.8); Bi (3.6 € per m² sd: 1.3); C (0.8 € per m² sd: 0.5). However, in terms of added value per h labour, Bi (7.5 € per h sd: 3.9) outperformed Mi (5.4 € per h sd: 2.8) which outperformed Ci (3.6 € per h sd: 2.7). Each scenario showed a high level of variability in the result as illustrated by the boxplots and which will be discussed.

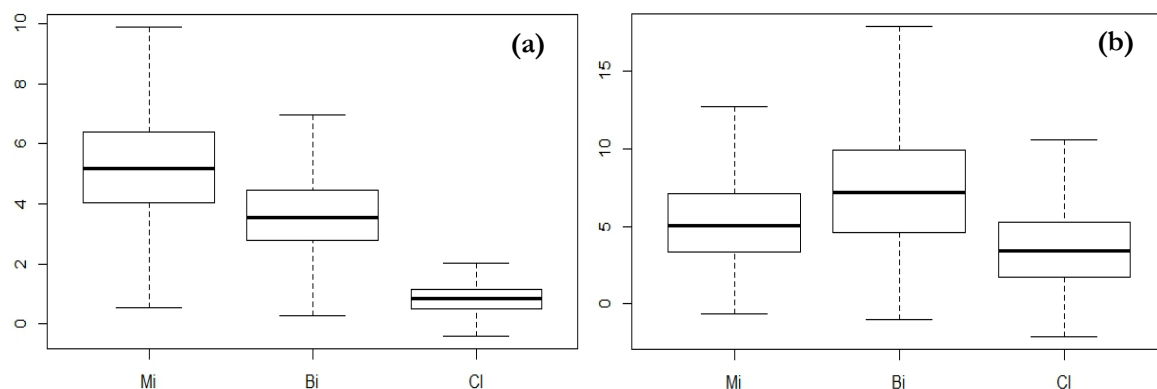


Figure 1. Added value (€) per m² (a) and per hour of labour (b)

Conclusions

This quantitative exploration showed that microfarming practices based on ecological intensification and higher level of human care per unit surface area tended to create more added value per m² and per h labour than classic organic market gardening. In this aspect, the political and philosophical claims of microfarms that “small is beautiful” looks to be grounded in empirical reality. However, added value is just one piece of the accountancy puzzle and other financial considerations such as level of investment and taxes have to be factored in. Other marketing strategies also have to be investigated as microfarms often combine CSA box schemes with more profitable channels. For each scenario, the high variability in the results resulted from the variability of farmer's efficiency (random farm effect) and from crop planning. This illustrates the central importance of farmer's skills (and their transfer) both in cropping practices and planning which is a major issue in the viability of agroecological farms.

References

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