Pathways to phase-out contentious inputs from organic agriculture in Europe

Deliverable 6.2: Version 1.1

Feasibility of designed scenarios

Versions

Version: 1.0 (2. April 2019) First version


Version: 2

while version 1.1 (30. April 2019) focusses on the methodology of the feasibility assessment of design scenarios an updated version 2, including the 2019 field data will be submitted in month 24 (30. April 2020).

Funding

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No [774340 — Organic-PLUS]
Project Details:

Programme: H2020, SUSTAINABLE FOOD SECURITY – RESILIENT AND RESOURCE- EFFICIENT VALUE CHAINS

Call topic: SFS-08-2017, (RIA) Organic inputs – contentious inputs in organic farming

Project Title: Pathways to phase-out contentious inputs from organic agriculture in Europe

Project Acronym: Organic-PLUS

Proposal Number: 774340-2

Lead Partner: Coventry University

Time Frame: 01/05/2018 – 31/04/2022

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Deliverable Details

WP: 6 MODEL

Task(s): 6.2: Feasibility of designed scenarios

Deliverable Title: Feasibility of designed scenarios

Lead beneficiary: AU

Involved Partners: 11CU, 1UTH, 15UNIPD, 16UoH, 17AU, 8CUT, 9SEGES, 13IRTA, 18ETO, 2NORSOK, 19WSL, 20SLU, 21RHS, 10SA, 7FORI

Deadline for delivery: Month 12, 30/04/2019

Date of delivery: 30/04/2019
The authors of this report are very grateful for the kind assistance of many organic farmers and advisors, willing to share their knowledge and experiences. For valuable contributions we also thank:

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10. University of Hohenheim

11. Aarhus University, Department of Engineering, Operations Management group

12. Association of Ecological Agriculture

13. Swiss Federal Research Institute for Forest, Snow and Landscape

14. Swedish University of Agricultural Sciences

15. Royal Horticultural Society
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Annex A. Examples of information for feasibility study
1. Summary

Contentious inputs in organic agriculture and horticulture are undesirable inputs within the organic ethos, but permitted by the European Commission Regulation (EC) No 889/2008. The contentious inputs investigated by Organic-PLUS are the plant inputs, copper, sulphur and mineral oils; the soil inputs, conventional manure, plastic and peat, and the livestock inputs, conventional straw, antibiotic medicine and anthelminthic medicine. In order to select the most suitable alternatives, the consequences of substitution must be evaluated in terms of feasibility, sustainability and environmental impact. Specifically, it is important to consider whether the adoption of certain alternatives is feasible from not only a technological viewpoint but also from an operational, economic, and conceptual perspective. The overall objective of a feasibility study is to support different stakeholders and decision-makers (e.g. farmers, advisers, developers) in determining whether to implement a specific alternative production method as part of their business. A feasibility study comprises research, testing and experimentation, designed to determine if a strategy, design, product or process is possible and practical. This feasibility study design is partly based on the basic production data collected for the sustainability and LCA assessments, and partly on supplemental data concerning specific operations. Data collection will take place on selected case study farms, encompassing the contentious inputs Organic-PLUS focusses on. The feasibility study will examine advantages and disadvantages of both the current production methods and the proposed alternative methods.

2. Introduction

Contentious inputs in organic farming are undesired inputs, but permitted by the Commission Regulation (EC) No 889/2008, where in the annex I, II, V, VI, and IX it is specifically mentioned, which fertilisers and soil conditioners, pesticides - plant protection products, feed materials, feed additives and ingredients of agricultural origin which have not been produced organically can be used.

Contentious inputs in organic farming have been grouped according to the theme area in which they will be investigated by the Organic-PLUS consortium. The three themes are 1) Plant; 2) Livestock; and 3) Soil. Within these themes, specific issues have been identified which have been discussed extensively and are cause for concern, as they are not in line with the organic principles (IFOAM guidelines) and may be detrimental to the reputation and marketing of organic products. The market is the driving force behind the vigorous development of the volume of organic agriculture, in terms of area, farm numbers and amount of produce.

In order to select or frame possible alternatives, and to determine which alternatives are best, the consequences of transition to these alternatives needs to be evaluated. As part of the feasibility process and evaluation, each proposed alternative is studied in-depth and different pathways to implementation may be explored. An initial analysis may appear to be negative, but sometimes solutions to overcome obstacles may be identified through the process.
3. Methodology

3.1 Overall feasibility design

Generally, a feasibility analysis is the process of determining that a process, plan or design is possible and makes sense. The result of the feasibility study may be used to validate assumptions, constraints, decisions, approaches and business cases. Formally, a feasibility study is defined as an evaluation or analysis of the impact of a proposed method as compared to current methods or practises (e.g. Sørensen et al., 2005; Gael & Ellen, 2015). In this case, the feasibility of alternative scenarios involves assessing the functional and operational capabilities, and economic viability of specific operations, processes and methods based on information obtained about system performance before and after the implementation of alternative production methods substituting contentious inputs. The feasibility analysis will include sensitivity analyses, ranking and quantifying important influential factors as well as descriptive advantages and disadvantages of both the current situation and the proposed alternative situation.

A key objective of a feasibility study is to support decision-makers (here farmers) in determining whether or not to implement a specific alternative production method. The feasibility study is partly based on basic production data collected for the sustainability and LCA assessments, and partly on supplemental data concerning specifically operations data for usage scenarios. The feasibility study will include advantages and disadvantages of both the current production methods and the proposed new methods. For example, cost comparisons will involve estimating incremental costs as the difference between costs of current methods of operation and cost of implementing and operating new methods is likely to change in incremental steps.

A feasibility study comprises a number of specific components: 1) economic feasibility, 2) technical feasibility, 3) operational feasibility, and 4) schedule feasibility – see Figure 1. If necessary, additional components like conceptual feasibility (what do consumers think) and regulatory feasibility may be included.
The conclusions and results from the feasibility study will evaluate the different alternatives in terms of implementation weaknesses and strengths as the basis for the decision makers to review and critically study the assumptions and prerequisites. An important point is that the stakeholders (farmers and others) must make the final decision as to whether the proposed alternative is feasible or not – using the information from the feasibility study.

Additionally, it must be noted that a feasibility study is not a business plan, for which they are often mistaken. The feasibility study outlines whether the proposed change is viable or not, while the business plan outlines the steps or measures to implement the proposed change; in other words, translating it into reality.
<table>
<thead>
<tr>
<th>Senario</th>
<th>Country</th>
<th>Number of case farms</th>
<th>WP</th>
<th>Action Area</th>
<th>Plant</th>
<th>Livestock</th>
<th>Soil</th>
<th>Product</th>
<th>Input to be minimised</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Germany/DK</td>
<td>2</td>
<td>3</td>
<td>Horticultural appel</td>
<td>apple</td>
<td>S</td>
<td>resistant varieties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Turkey/Spain/ Greece</td>
<td>3</td>
<td>3</td>
<td>outdoor cultivation of olive/tomato/egg plant</td>
<td>olives/tomato/eggplant</td>
<td>S, Cu, mineral oil</td>
<td>resistant varieties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Germany/ France</td>
<td>2</td>
<td>3</td>
<td>Agriculture/potatoes</td>
<td>Potatoe</td>
<td>Cu</td>
<td>Seed tube dressings e.g. Phosphonate and chitosan, resistant varieties, foliar application of probiotic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>UK</td>
<td>1</td>
<td>3</td>
<td>Agriculture/potatoes</td>
<td>Potatoes</td>
<td>Cu</td>
<td>Growing practice e.g. removal of foliage at first sight of blight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spain/Germany</td>
<td>1</td>
<td>3</td>
<td>Nursery/greenhouse crops</td>
<td>tomatoes</td>
<td>Cu</td>
<td>potassium hydrogen carbonate, sulphur,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DK</td>
<td>1</td>
<td>3</td>
<td>Agriculture</td>
<td>Potatoes</td>
<td>Cu</td>
<td>pre sprouting, resistant varieties, defoliate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Germany</td>
<td>1</td>
<td>3</td>
<td>Agriculture and nursery</td>
<td>Orange</td>
<td>S</td>
<td>Less copper, less sulphur, other plant based fungicides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Italy/Turkey</td>
<td>2</td>
<td>3</td>
<td>Citrus</td>
<td>Cows, pigs, poultry,</td>
<td>meat/milk</td>
<td>Antibiotics</td>
<td>Plant based inflammatory, immune stimulants, anti-infectives, tannins</td>
<td></td>
<td></td>
</tr>
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<td>9</td>
<td>UK/Norway</td>
<td>2</td>
<td>4</td>
<td>Agriculture</td>
<td>Cheese production</td>
<td>Milk</td>
<td>Antibiotics</td>
<td>Plant based anti inflammatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Italy</td>
<td>1</td>
<td>4</td>
<td>Barn</td>
<td>Meat/milk</td>
<td>Conv. Straw</td>
<td>Agroforestry supply chain products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Germany</td>
<td>1</td>
<td>4</td>
<td>Pigs</td>
<td>Meat/milk</td>
<td>Conv. Straw</td>
<td>Agroforestry supply chain products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>DK</td>
<td>1</td>
<td>4</td>
<td>Pigs</td>
<td>Meat</td>
<td>Antibiotics</td>
<td>Herbs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Italy</td>
<td>3</td>
<td>4</td>
<td>Cows, pigs, poultry</td>
<td>Meat/milk</td>
<td>Antiparasitics</td>
<td>Herbs /tannin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Norway/Poland</td>
<td>2</td>
<td>4</td>
<td>Barn animals</td>
<td>Meat/milk</td>
<td>Conv. Straw</td>
<td>Park as bedding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Spain, France, UK</td>
<td>3</td>
<td>5</td>
<td>Agriculture</td>
<td>Feed</td>
<td>Agriculture and horticulture</td>
<td>Plant/Livestock products</td>
<td>manure/feed/medicine</td>
<td>Permaculture</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>DK</td>
<td>1</td>
<td>5</td>
<td>Free land</td>
<td>Tomato/strawberry</td>
<td>Soil cover</td>
<td>Tomatoes, strawberry</td>
<td>Plastic</td>
<td>Photodegradable plastic from corn starch, crop covers, woven ground cover (Mypex)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Germany/ DK/ Norway</td>
<td>3</td>
<td>5</td>
<td>Cereals</td>
<td>Fertilizer/ mulch/ marine waste</td>
<td>Grain</td>
<td>Conventional manure</td>
<td>Digestate/recycled household waste/other annex 1 possibilities/Fish waste etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>UK</td>
<td>1</td>
<td>5</td>
<td>Planting/cutlings</td>
<td>Vegetable transplants</td>
<td>Plants</td>
<td>Peat</td>
<td>Composted bark/wood, coir fibre, green waste compost, leaf mould, worm compost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Germany</td>
<td>1</td>
<td>5</td>
<td>Horticultural</td>
<td>Plant media</td>
<td>Plants</td>
<td>Peat</td>
<td>Composted bark + wood, coir fibre, green waste compost, leaf mould, garden compost, worm compost, processing trees/waste fibre material in a extruder (ATB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>UK</td>
<td>1</td>
<td>5</td>
<td>Agriculture free land, Cabbage, carrot</td>
<td>Protected cropping (horticulture) - fertilizer</td>
<td>Tomatoes or other polytunnel crops</td>
<td>Animal manure</td>
<td>New cropping systems with innovative use of legumes and organic biogas digestate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Germany/ Denmark/Poland</td>
<td>3</td>
<td>5</td>
<td>Agriculture and horticulture</td>
<td>Fertilizer</td>
<td>Arable crops</td>
<td>Manure</td>
<td>New cropping systems with legumes and clover, household waste, organic biogas waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>UK</td>
<td>1</td>
<td>5</td>
<td>Field vegetables - weed control mulch</td>
<td>Vegetable crops</td>
<td>Plastic</td>
<td>Non fossil fuel derived biodegradable mulch</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total**: 37
3.2 Economic feasibility

Economic feasibility means validating whether a process is possible within the cost benefit constraints. A key method of analysing incremental changes in a production system is to use the principles of partial budgeting. Partial budgeting involves analysing increase/reduction of costs or increase/reduction of returns together with a summary of the net effect. For example, the costs of prevention for a “no-copper” potato scenario include relating direct costs in terms of work hours and energy consumption to yields and quality.

3.3 Technical feasibility

Technical feasibility means validating that a given alternative input can be implemented using a given technology. For example, in the case of organic transplant production without peat, it has to be assessed if system redesign in terms of growing media based on composted plant material, modified direct sowing, more precise weeding, etc. is feasible and can be applied.

3.4 Operational feasibility

Operational feasibility means deploying and operating a new project or process. In operational feasibility, we consider whether the new system (compared to the current system) be can implemented using existing man power and resources or not. For example, potential costs and technical challenges associated with handling alternatives to plastic covering of the soil.

3.5 Schedule feasibility

Schedule feasibility means validating that a process is possible within the time constraints. This involves assessing if the implementation of a specific new process of procedure can be applied within a certain time limit. For example, in terms of being ready for the market. This could be of lower importance in this project, as theoretically no specific timeline exists for the introduction of the alternative inputs.

However, practically it is important to know for the organic sector when justifying the continued use of a specific contentious input, that there is a timeline for the phase-out. Within schedule feasibility the time for transition to the full implementation of the changed procedure/process can be considered and assessed and this can be used for policy advice. For example, for the contentious input copper this has been reduced to 4 kg/ha (6 kg/ha before) from 2019 with a 7-year limit, this in fact means in 2026 a new decision and scientific decision support is required.

3.6 Conceptual feasibility

Conceptual feasibility is a step that formally considers if the proposed alternative corresponds with the principles of organic farming and whether the proposed alternative method or process is acceptable to both farmers and their customers.

3.7 Regulatory feasibility

Regulatory feasibility formally considers if the proposed alternative corresponds with the rules and standards for the certification and labelling of organic food and any other regulation, including a check of any unintended consequences of regulation or conflicting regulations.
4. Scenarios and feasibility

4.1 Scenario examples

For each of the stipulated scenarios described in Table 1, specific case farms will be defined. These case farms will provide the quantitative data/information as well as qualitative information (e.g. experience with alternatives to contentious inputs) for the feasibility study. Examples of actions, data and information for specific scenarios and case farms are extracted from D6.1 in Annex A. Figure 2 gives a schematic overview of the procedure for estimating/assessing the feasibility of the scenarios/case farms.

![Feasibility Studies Diagram]

Figure 2. Procedure for feasibility assessments

While this version 1.1 (30. April 2019) focusses on the methodology of the feasibility assessment of design scenarios an updated D6.2 version 2, including the 2019 field data will be submitted in month 24 (30. April 2020).
## 5. Annex

### 5.1 Annex A. Scenarios and examples for the feasibility study

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Process</th>
<th>General</th>
<th>Actions</th>
<th>Information needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>Contentious input: Copper (Cu)</td>
<td>• 800 mm rainfall/y</td>
<td>• Pre-sprouting</td>
<td>• Cost</td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td>• Yield organic 20-25 t/ha</td>
<td>• Select size</td>
<td>• Yield level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price organic 300 euro/t</td>
<td>• Select resistant varieties</td>
<td>• Quality, size and taste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price conventional 160 euro/t</td>
<td>• Plant fewer plants</td>
<td>• Extra materials and resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fertilise optimally</td>
<td>• Extra mental work load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Complexity, specialist knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamb/meat</td>
<td>Contentious input: Antibiotics and</td>
<td>• 800 mm rainfall/y</td>
<td>• Increased indoor spacing/animal</td>
<td>• Costs</td>
</tr>
<tr>
<td>Norway</td>
<td>anthelmintics</td>
<td>• Production level of organic meat 30 – 40 kg/ewe/y</td>
<td>• Careful planning of grazing on cultivated land</td>
<td>• Meat yield level and quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Demand for cultivated land varying from 0,12 - 0,20 ha/ewe</td>
<td>• Changing the location of salt feeding station on permanent pasture</td>
<td>• Extra materials and resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Production level pr. ha will vary from 211 - 292 kg/ha</td>
<td></td>
<td>• Woody plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price organic lamb 4,1 euro/kg + 0,3 euro/kg premium price</td>
<td></td>
<td>• Extra mental work load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Complexity, specialist knowledge</td>
</tr>
<tr>
<td>Olive</td>
<td>Contentious input: Copper (Cu)</td>
<td>• 800 mm rainfall/y</td>
<td>• Specific actions taken to prevent Olive Leaf Scab</td>
<td>• Costs</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>• Yield level in organic olive 35-50 kg/tree</td>
<td>• Establish the orchard on windy, less humidity area</td>
<td>• Yield level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price for organic olive 1230-1960 euro/t</td>
<td>• Pruning the trees</td>
<td>• Fruit quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price for conventional olive 833 – 1330 euro/t</td>
<td>• Select resistant varieties</td>
<td>• Size and taste</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Combating the disease with the help of alternative or biological</td>
<td>• Extra materials and resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>substances</td>
<td>• Extra mental work load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fertilise optimally</td>
<td>• Complexity, specialist knowledge</td>
</tr>
<tr>
<td>Citrus/Mandarine</td>
<td>Contentious input: Copper (Cu)</td>
<td>• 800 mm rainfall/y</td>
<td>• No specific actions taken for citrus</td>
<td>• Costs</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>• Yield level in organic mandarin 100 kg/tree</td>
<td>• Establish the orchard on windy, less humidity area</td>
<td>• Yield level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price 1250 - 2000 euro/t</td>
<td>• Pruning the trees</td>
<td>• Fruit quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price for conventional mandarin 900 – 1400 euro/t</td>
<td>• Fertilise optimally as according to the lab test results</td>
<td>• Size and taste</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Extra materials and resources</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>• Extra mental work load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Complexity, specialist knowledge</td>
</tr>
<tr>
<td>Eggplant</td>
<td>Contentious input: Cu</td>
<td>• 800 mm rainfall/y</td>
<td>• Specific actions taken to prevent eggplant early blight (EEB)</td>
<td>• Costs</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>• Yield level in organic eggplant 4 t/ha</td>
<td>• Establish the orchard on windy, less humidity area</td>
<td>• Extra materials and resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price for organic eggplant 450 – 1200 euro/t</td>
<td>• Fertilize according to the test results</td>
<td>• Extra mental workload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price for conventional eggplant 300 – 830 euro/t</td>
<td>• Select resistant varieties</td>
<td>• Complexity, specialist knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Combating the disease with the help of alternative substances</td>
<td>• Collecting eggplants for testing</td>
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<td>• Fertilise optimally</td>
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<td>• Different alternative mulching techniques</td>
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| Cabbage/vegetable production | Germany | Contentious input: External animal derived fertilisers (conventional animal manure, horn, grit etc) | • Scenario with substitution of external animal derived fertilisers on an arable farm with field vegetable cultivation  
  - 700 mm rainfall/y  
  - N need (target): 160 – 220 kg/ha  
  - Yield level in organic cabbage production 35 – 50 t/ha  
  - Price for organic cabbage?  
  - Price for conventional potato 160 euro/t | • Specific actions taken to substitute conventional animal derived fertilisers  
  - Use of clover grass silage (internal fertiliser)  
  - Use biogas residues from household waste  
  - Combine both?  
  - Fertilize optimally  
  - Use software like N-Expert  
  - Maybe addition of K2SO4 | • Costs  
• Yield level  
• Cabbage quality  
• Size and taste  
• Extra materials and resources  
• Extra mental work load  
• Complexity, specialist knowledge |
| Organic transplant production | UK | Contentious input: Peat | • Scenario without peat using 100 % peat-free growing media  
  - Specialised commercial greenhouse production  
  - On farm production | • Specific actions taken to replace peat  
  - Greater use of direct sowing or use of bare-root transplant  
  - Use of on farm plant based growing media  
  - Use of bio waste input materials blended on farm | • Costs of alternatives  
• Yield level and product quality  
• Size, shape and taste  
• Extra materials and resources  
• Extra management time  
• Complexity, specialist knowledge |
| Organic field vegetable production | UK | Contentious input: Fossil-fuel derived plastic mulch | • Scenario without fossil-fuel derived plastic mulch  
  - On farm use of alternative mulch materials | • Specific actions taken to replace peat  
  - System redesign with better management  
  - More precise weeding (robots), state seeds  
  - Precision farming with fixed beds  
  - Cover crops and direct seeding technology  
  - Use of on farm plant derived mulches  
  - Commercial non-fossil fuel derived plastic | • Costs of alternatives  
• Yield level and product quality  
• Size, shape and taste  
• Extra materials and resources  
• Extra management time  
• Complexity, specialist knowledge |
| Organic field vegetables | UK | Contentious input: Animal manure from conventional and organic sources | • Scenario without animal manure  
  - 600 mm rainfall/y  
  - Yield level in organic vegetable rotation 20 – 25 t/ha  
  - Price for organic potato 300 euro/t  
  - Price for conventional potato 160 euro/t | • Specific actions taken to replace any animal manure source  
  - System redesign with different rotation of crops  
  - Mulches and winter green manures and intercropping  
  - Greater use of on farm plant based fertility products (compost teas, comfrey liquid)  
  - Greater use of green waste inputs  
  - Greater use of commercial organic fertilizers from certified organic sources  
  - Greater use of approved mineral derived fertilisers | • Costs of alternatives  
• Yield level and product quality  
• Size, shape and taste  
• Extra materials and resources  
• Extra management time  
• Complexity, specialist knowledge |
| Organic greenhouse tomato dominated rotation | UK | Contentious input: Animal manure from conventional and organic sources | • Scenario with animal manure  
  - Temperate climate zone  
  - Protected cropping in heated or unheated greenhouse | • Specific actions taken to replace any animal manure source  
  - System redesign with different rotation of crops  
  - Greater use of fertility building crops | • Costs of alternatives  
• Yield level and product quality  
• Size, shape and taste  
• Extra materials and resources  
• Extra management time  
• Complexity, specialist knowledge |
|   | Yield level in organic vegetable rotation 20 – 25 t/ha  
Price for organic potato 300 euro/t  
Price for conventional potato 160 euro/t | Mulches and winter green manures and intercropping  
Greater use of on farm plant based fertility products  
Greater use of green waste inputs  
Greater use of commercial organic fertilisers from certified organic sources  
Greater use of approved mineral derived fertilisers |
|---|---|
| **Cow/milk Italy** | Contentious input: Antibiotics  
Scenario with no use of antibiotics to controls mastitis  
800 mm rainfall/y  
Production level of dairy cow 6500 kg/cow/y  
Milk losses of about 9 % in case of parasitoids | Specific actions taken to reduce antibiotics especially for mastitis treatments  
Use of essential oils from plants to cows with clinical mastitis  
Improved management strategies of dry period and milking  
Use of phytotherapeutic remedies for mastitis control during dry period and milking  
Use alternative bedding materials |
| **Sheep/milk Italy** | Contentious input: Antiparasitics  
Scenario with no use of antiparasitics to controls helminths  
800 mm rainfall/y  
Production level of dairy sheep 300 kg/sheep/y  
Price organic sheep milk 1,20 euro/kg  
Milk losses between 19 – 44 % in case of parasitosis | Specific actions taken to reduce antiparasitics especially anti-helminth treatments  
Use of condensed tannins and other extracts as natural strategies  
Increased indoor spacing/animal  
Grazing management, mixed or alternative  
Grazing with other host spacing  
Change of pasture between seasons  
Grazing forage crops that contain condensed tannins  
Use of products on the pasture to reduce parasite charge |
|   | Cost for prevention  
Milk yield and milk quality  
Extra materials and resources  
Extra mental work load  
Complexity, specialist knowledge |