**Introduction Draft 2**

*What is the current problem? The current problem is the need for increasing amounts of food to feed the growing population, however agricultural intensification/expansion goes hand in hand with biodiversity loss. Conventional agricultural management practices include tillage, fertilisation and pesticides.*

Today, you will struggle to find an ecosystem on Earth that has not felt the influence of Man. Land use change is a significant dichotomy promoting and resulting from the interaction of Man with the environment (Verburg et al., 2009). For millennia, humans have been exploiting the environment for its vital ecosystem services (Holman et al., 2017). At present, almost 40% of the total surface of the Earth is agricultural land, with around 5 billion ha currently in use (Alexandratos et al., 2012), and there is no sign of this anthropogenic change slowing down. By 2100, the population is projected to be ~10 billion (Gerland et al., 2014). In half of that time, global food demand is expected to feel the strain of a 60% increase (Alexandratos et al., 2012), requiring up to 1 billion ha of additional land (Tilman et al., 2011). The food and drink industry is the biggest manufacturing sector in the European Union, with a turnover of €1.2 billion (Mc Carthy et al., 2018). Almost half (45%) of Europe’s terrestrial land mass is used for agriculture (Overmars et al., 2013). While the rate of agricultural expansion may be worrying, an additional concern should be agricultural intensification. Traditional farming systems in Europe were characterised by low levels of agro-chemical input and little mechanisation (Dorresteijn et al., 2015), and often correlated to high biodiversity (Marini et al., 2009). However, in the second half of the 20th century, after the second World War, the intensification gradient of European land increased exponentially. Now, Europe holds some of the most intensively managed agricultural lands on the planet (Kuemmerle et al., 2016).

Soil erosion and loss of Soil Organic Matter (SOM) with the conversion of natural ecosystems to permanent agriculture are the most important and intensively studied and documented consequences of agriculture (Quinton et al., 2010). Intensive farming exacerbates these phenomena, which are threatening the future sustainability of crop production on a global scale, especially under extreme climatic events such as droughts (Lal., 2010).

A total of 10 million ha of land is lost each year through soil erosion and a further 10 million had due to irrigation related issues (Maggio et al., 2016).

Agricultural practices have been shown to have a significant effect on soil properties and biodiversity (Tsiafouli et al., 2015). It is well known that soil microorganisms are influenced by these practices, thereby affecting different soil ecosystem processes and possibilities to develop sustainable agriculture to meet growing global demand for food (Bender et al., 2016).

There is considerable agreement, therefore, that humans should minimise further expansion of agricultural land.

With a growing population and with climate change threatening to make food harder and more expensive to produce, it is difficult not to conclude that it shall be challenging to maintain global food security over upcoming generations (Fraser et al., 2013).

The environmental sustainability of the global food system must also be questioned and it is well acknowledged that global food systems are responsible for approximately one quarter of the world's greenhouse gas emissions, are the world's largest source of fresh water pollution, use more water than any other human endeavour, and that food and farming systems are driving much of the global biodiversity crisis (Fraser, 2020).

With respect to the numerous publications, whitepapers, action groups and national strategies it is clearly evident that maintaining the “status-quo” in terms of simply increasing production to meet current needs is no longer viable. This strategy is not applicable because the global population is expanding rapidly while our food is being produced using shrinking natural resources (Mc Carthy et al., 2018).

The recent use of policy by the European Union to develop more environmentally sensitive farming practices and the importance of surplus reduction has led to a widespread interest in organic farming (Diepeningen et al., 2006). Under organic management, traditional conservation-minded farming methods are combined with modern farming techniques but conventional inputs such as synthetic pesticides and fertilisers are excluded. Instead of synthetic inputs, compost and animal and green manures are used to build up soil fertility; pests are controlled naturally, crops are rotated, and both crops and livestock diversified (Reganold et al., 2001)

*The EU Biodiversity Strategy to 2020 (2011-2020) aimed to halt the loss of biodiversity and ecosystem services in the EU by 2020, and to restore them as far as possible, while also helping to curb global biodiversity loss. Target 3a of the strategy was to achieve more sustainable agriculture. “By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity and to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by agriculture and in the provision of ecosystem services as compared to the EU2010 Baseline, thus contributing to enhance sustainable management.” The EU aims to do this by: ACTION 8: enhancing direct payments for environmental public goods in the EU Common Agricultural Policy, The Commission will propose that CAP direct payments will reward the delivery of environmental public goods that go beyond cross-compliance (e.g. permanent pasture, green cover, crop rotation, ecological set-aside, Natura 2000), ACTION 10: conserve Europe’s agricultural genetic diversity, The Commission and Member States will encourage the uptake of agri-environmental measures to support genetic diversity in agriculture and explore the scope for developing a strategy for the conservation of genetic diversity. In other words, promoting the increase of organic/conservation agricultural management practices in order to conserve/restore biodiversity in Europe.*

While this may seem to be an obvious solution to the global biodiversity crisis, the contribution of certified organic agriculture to stop the losses in biodiversity appears to be exaggerated in the public perception. Organic systems are defined by their ban on the use of synthetic agrochemicals, reduced tillage, and emphasis on techniques such as crop rotation. However, it is a myth that organic agriculture is a consequence-less solution. Legally, pesticides are permitted under organic labels as long as they are derived from natural substances, and can do as much damage as their synthetic counterpart. Additionally, overfertilisation is a just as real a problem, not only with mineral fertilisers, but also manure. Finally, current estimations are showing that organic systems are becoming increasingly intensified, specialised and further away from the idealism of the original organic movement.

This paper will aim to: (1) assess the impacts of organic and conventional management practices in agricultural landscapes in Europe on the soil microbiota, and to (2) analyse the success and achievability of The EU Biodiversity Strategy to 2020.