

ENVIRONMENTAL IMPACTS OF AGRICULTURE

A REALITY THAT MUST CHANGE

Laura Piera Perez. Grau de Biologia Ambiental. Universitat Autònoma de Barcelona

BACKGROUND

Over the last century, global population has increased from 1.6 to 7.2 billions and it's expected to be 11 billions by 2100. With it, food demand has also increased and it has been thanks to crop intensification that food production has reached a level high enough to, theoretically, feed the world. This intensification implies certain agricultural practices (heavy modern machinery, abuse of synthetic fertilizers and pesticides, large amounts of water extraction ...) which are causing huge environmental impacts, a lot of times being irreversible, that need to be stopped in order not to end up with Earth's ecosystems, which actually are the only ones capable of feeding people. That's why it has to be found an alternative way that is both respectful with the environment and capable of producing enough food to supply global increasing food demand. Since it's a very big change, globally it seems a very difficult challenge if not impossible, specially taking into account different country's interests. For this reason, it is important to see which impacts are affecting one's own country, and which ways are there to mitigate them so that, country by country, certain changes can be adopted that would, one day, change the global system.



IMPACTES AMBIENTALS DE L'AGRICULTURA

FRAGMENTATION AND HABITAT LOSS

Change in land use due to the increase of agriculture is the major agent of the biggest environmental impacts. It involves deforestation and wetlands drying all over the world which causes habitat loss or fragmentation, leading to the reduction of biodiversity.

➤ **Deforestation:** agriculture is the main driver of global deforestation, causing 80% of it. Besides biodiversity loss, it also affects the water cycle reducing rain frequency, and the carbon cycle, causing the release of high amounts of CO₂ when cutting or burning forests (increasing climate change velocity).

SOIL DEGRADATION

Soil degradation causes the change on soil structure (physical, chemical and biological) which leads to effects like the increase on drought stress sensibility on plants, loss of biodiversity, specialization of adventitious fauna... And, in long term, it leads to the decrease of soil fertility and the loss of arable land, also due to bad irrigation management.

AGENTS AND ENVIRONMENTAL IMPACTS DERIVED FROM AGRICULTURE ACTIVITIES

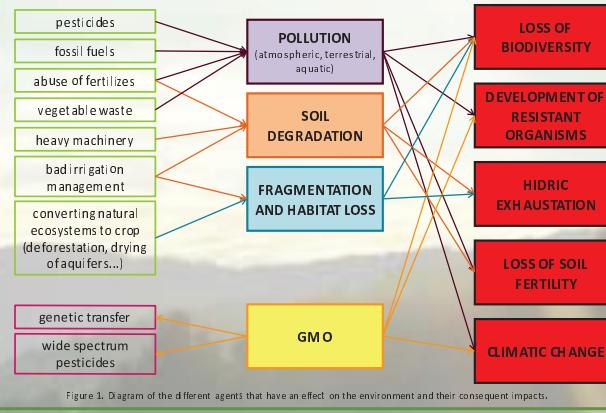


Figure 1. Diagram of the different agents that have an effect on the environment and their consequent impacts.

POLLUTION

➤ **Atmospheric:** caused by fossil fuels consumption in production, transport and processing of food, fertilizers and pesticides. Added to CO₂ emitted in deforestation, it is the 33% of global greenhouse emissions. Also caused by pesticide use. The main derived impact is the increase in climate change velocity.

➤ **Terrestrial:** caused by the excessive use of fertilizers and pesticides, which leads to soil degradation.

➤ **Aquatic:** caused by pesticides, fertilizers and vegetable wastes. Can lead to eutrophication and loss of biodiversity, besides leaving the aquifers useless.

GENETIC MODIFIED ORGANISMS (GMO)

The use of GMO causes loss of biodiversity and rapid resistant organisms development due to:

➤ Wide spectrum pesticides not only eliminates pests but also non target organisms.

➤ Genetic transfer, which takes to the substitution of wild varieties by the most resistant ones (GMO).

And in Catalonia?

IRRIGATION IN CATALUNYA

➤ The main environmental impact derived from agriculture in Catalonia is related to water management. It includes water exhaustion, contamination of aquatic systems and habitat fragmentation as the most important problems.

➤ Another problematic issue comes from the use of GMO.

POLLUTION IN CATALUNYA

By fertilizers:

➤ The excessive use of synthetic fertilizers and the bad application of manures, as well as intensive animal husbandry, are the main causes of Catalan aquifer contamination.

➤ As well as vegetable wastes, they also cause eutrophication.

➤ Over the last years, fertilizer use has decreased. Even though, higher levels than the maximum concentration allowed are being found.

By pesticides:

➤ They cause loss of biodiversity and pollution of aquatic systems.

GMO CROPS IN CATALUNYA

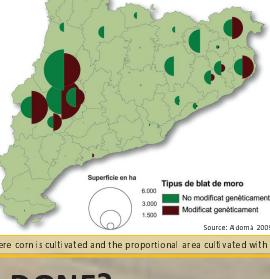


Figure 2. Map showing the different areas where corn is cultivated and the proportional area cultivated with GMO.

FINDING SUSTAINABLE ALTERNATIVES

There are three agriculture system tendencies. Firstly, and being globally dominant, there is conventional agriculture, which is based in a continuous overexploitation of soil resources, causing the bunch of impacts already exposed. Secondly, there are two alternative systems which, from little different approaches, try to put into practice a more sustainable agriculture. These are integrated agriculture and organic agriculture.

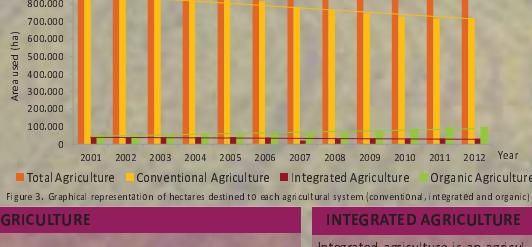


Figure 3. Graphical representation of hectares destined to each agricultural system (conventional, integrated and organic).

ORGANIC AGRICULTURE

Organic farming is an agricultural system characterized by:

- Promoting biodiversity.
- Avoiding the use of phytosanitary products and mineral synthesis fertilizers.

It combines traditional and modern techniques with the aim of enhancing the soil's own properties to achieve high yields without damaging the environment.

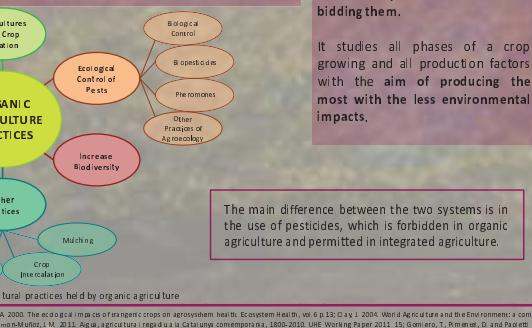


Figure 4. Diagram of the different agricultural practices held by organic agriculture.

FARMERS

- Replace conventional farming practices by more sustainable ones.
- Prioritize a more responsible production which assures long term viability of agriculture.
- **ORGANIC AGRICULTURE.**

GOVERNMENT

- Enhance organic agriculture promotion and farmers counseling.
- Promote associations who manage programs of agrarian custody.
- Encourage small farmers. It is linked to global food safety and promotes a strong local economy, besides reducing environmental impacts.
- Limit certain agricultural practices through making a more restrictive legislation.
- Apply the principle of precaution with GMO, which now would be forbidding them.
- Environmental education. Will permit people to understand their relationship to the environment and the importance to conserve it. Therefore they will act in a more critical, reflexive and conscious way.

CONSUMERS

- Reduce food waste. One third of food production ends up in the garbage. If it would be managed in the correct way, it could be enough to end global hunger or to reduce the amount of cultivated area (reducing derived impacts).
- Lower meat consumption. Livestock has a greater cost than crop production (6kg of grains are needed to produce 1kg of meat). 70% of global cereal crops are destined to cattle feed. Reducing meat consumption would reduce crop area and its derived impacts.
- Consume organic food. There is the false myth that ecological food is more expensive, but it's not totally true: organic farming incorporates environmental prices while conventional agriculture exclude them but the citizens pay it through taxes.
- Get proximity products. It favors small farming and transport impacts are reduced.

WHAT CAN BE DONE?

In conclusion

- Conventional agricultural practices have huge global and local environmental impacts.
- Agriculture depends on the environment and human beings depend on agriculture. So unsustainable agricultural practices do not only have impacts on environment but on agriculture itself.
- Therefore, preventing pollution, soil degradation and habitat loss is essential to conserve the environment so that it is assured a viable agriculture in the future. And this is only achievable through a change on our actual agricultural system.
- To change is possible only if we all take conscience that our acts have repercussions that will endanger the future of all living beings on Earth.