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Ireland, Sustainable Agriculture

Sustainable Agriculture: The Path to a Flourishing Future

Ireland is working to become one of the global leaders in agriculture. According to the Central Statistic Office, Ireland accounted for 8.7% of global merchandising exports in 2020. The total land in Ireland is about 6.9 million hectares; farming and agriculture take up around 4.9 million hectares. That is 62% of the total land area that is occupied by farms. If Ireland wants to keep its farms in great condition to be able to pass them down from generation to generation and to keep its products healthy and thriving, Ireland needs to become more sustainable. But, how can they become more sustainable? More importantly, what is sustainable agriculture? Sustainable agriculture is a type of agriculture that meets societies' present food, textile, and livestock needs without compromising the environment and future generations.

Before we can answer the question as to how Ireland can become more sustainable, we must first understand Ireland as a whole. Ireland's total population is 5.01 million. 63.9% of people live in urban areas while 36.1% live in rural areas (Ireland Urban Population, 1960-2021). Farming is the most popular job thereafter retail and sales. Ireland's minimum wage is €10.20 per hour. The average yearly earnings are €40,283 per year or €3,356 per month ("Average Salary and Wage in Ireland." *Jobted*). In Ireland, the average family is a three-person family. Houses are around an average floor space of 81 square meters. Urban houses are usually 3-4 bedrooms. In rural areas, the houses are usually free-standing while urban houses are usually terraces and apartments. There is health care and education in Ireland. Residents in Ireland are entitled to public health services. Irish residents are given a medical card that gives them free or reduced-cost health care for themselves and their immediate families (Entitlement to Health Services, Citizensinformation.ie). Education is also free and a right for every child living in Ireland. There are private schools where the family has to pay yearly fees, or public schools are available where everything is free except supplies, uniforms, and trips. Education is a requirement from age 6 to 16. In Ireland, there is access to clean water, food, electricity, roads, and local markets. The majority of the food supplied in the markets is agriculture from the surrounding farms. Ireland has 139,000 farms each with an average size of 32.5 hectares. This is huge compared to average European Union farms where each one is 16 hectares respectively. (Agriculture and Horticulture in Ireland, Climatechange.org). Ireland's climate makes it a perfect place for agriculture. The climate is humid with abundant rainfall and a lack of extreme temperatures. There are warm summers and cool winters. Because Ireland is such a great place for agriculture there are about 69,375 farmers or farm workers in all of Ireland. Because farming is such an important part of Irish life it is crucial that the farms in Ireland all become sustainable to ensure they stay for generations.

Sustainable agriculture has to be the new way of farming if future farmers want to pass down their farms to coming generations and to be able to provide healthy produce and meat. A goal that Ireland has set is to totally eliminate carbon dioxide emissions by 2050 and hence be a climate-neutral country. To better the country, Ireland is striving to improve the air, environment, and water quality, and to lower carbon sequestration and encompassing emissions. They also want to make their farming sustainable. That means not using pesticides, improving the soil quality, water quality, and more. Trends are improving because of the new laws and goals that Ireland wants to act on to improve agriculture and the environment. Unsustainable agriculture has many negative impacts on the environment. The most notable is pollution.

In many countries, agriculture is a leading source of pollution. Marine ecosystems like rivers, lakes, and freshwater, can all be contaminated and polluted by toxic chemicals, pesticides, and fertilizers. They can also pollute the air and surrounding wildlife. Those toxic chemicals remain in the environment for years, especially in water, forests, and the air. Pesticides are bad for the health of those who consume them. When soil is contaminated with pesticides the runoff from a rainstorm will take that soil and contaminate the water and the environment. If Ireland wants to help make its farming more sustainable and reduce the negative impacts that agriculture has they have to make changes. The ASSAP (Agricultural Sustainability Support and Advisory) stated that in order to improve the quality of water biogenic methane has to be reduced to at least 10% by 2030, and ammonia emissions need to be reduced by 107,500 tons. Ammonia is a gas that is toxic to those who are put in contact with it. It causes burning of the eyes, throat, and nose and causes coughing, irritation, and sometimes blindness. These are just some of the negative side effects of farming that need to be completely gone or reduced if agriculture in Ireland wants to stay sustainable and healthy not only for those eating the produce but for the environment.

One of the best ways that Ireland can become fully sustainable is by having quality soil and getting rid of pesticides. A natural way to get rid of pests is using hedgerows. Hedgerows are rows of bushes and/or trees that enclose or separate fields. When farmers plant hedgerows they provide food and shelter to predators who prey on pests and to important pollinators like bees. Planting more diverse crops can confuse or deflect pests which helps maintain a high degree of genetic diversity by conserving animal and crop breeds; this will provide genetic resources for breeding resistance to diseases and pests. Pesticides kill both bacteria and fungi. If both fungi and bacteria are gone the soil degrades. When chemicals, fertilizers, and pesticides are overused they affect the soil. Thoughtless and careless use of chemicals works for a few years but after time there is a decrease in beneficial soil organisms that hold onto nutrients. Using chemical fertilizers and pesticides is not a sustainable farming practice because they work for a few years but then they cause damage to the soil and plants that they were supposed to be helping. They damage and leave the farm and its produce worse off than when it started.

Some alternative practices instead of pesticides are soft chemicals and biopesticides. Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides. (EPA, Biopesticides). A helpful biopesticide is B.T. "B.t. is the abbreviation for a species of bacteria, *Bacillus thuringiensis*, commonly found in nature. For B.t. to be effective its spores or crystal toxins must be eaten by the insect. Inside the insect, the crystal toxins bind to cells of the gut wall and cause these cells to break apart. Within minutes of eating B.t, the insect stops feeding. Death will occur, primarily by starvation, in about 2 to 5 days. B.t. is considered non-toxic to plants and animals other than certain insects. It is highly selective and only kills certain insects. It does not kill most beneficial insects such as lady beetles and parasitic wasps. B.t. is also non-polluting and can be safely used where other pesticides may cause contamination to surface and groundwater. B.t. is cost-effective when compared with other pesticides" (EPA, Biopesticides). BT is a great biopesticide that can help farmers control pests while also having minimal to no harm to the environment. Soft chemicals are also an alternative to pesticides which are usually made from natural ingredients. Soap, stinging nettles, and rhubarbs can be used instead of pesticides. *Allium* species (such as onions, chives, garlic, leeks, and shallots) are great to plant around vegetables and roses to help get rid of pests. They help repel aphids, slugs, carrot flies, Japanese beetles, and cabbage worms. Petunias repel aphids, tomato hornworms, leafhoppers, and squash bugs while Lavender repels moths and their caterpillars, fleas, flies, and mosquitoes. It is excellent on garden paths or near entryways (Science Connected Magazine). Predators like ladybugs and birds can also be great pest control because they eat and scare away pests. Not only would pesticides affect the environment but they would also harm the birds and bugs that attack pests. Stinging nettles could be planted around fields and field rows as pesticides, and they are extremely good for the soil. Their roots go

deep into the foundation and extract vitamins A and C and the minerals iron, potassium, manganese, and calcium. If they are cut and placed back into the soil they will be a great layer of green manure.

Farmers who are interested in long-term sustainability should also focus on soil quality. According to “The New Organic Grower” by Eliot Coleman “Green manure crops help protect against erosion, retain nutrients that might otherwise be leached from the soil, suppress the germination and growth of weeds, cycle nutrients from the lower to the upper layers of the soil, and- in the case of legumes-leave to the following crop a considerable quantity of nitrogen. Other contributions of green manure are improved soil structure, additional organic matter, enhanced drought tolerance, and increased nutrient availability for plants” Green manure is a much better alternative than chemical fertilizers. Chemical fertilizers are harmful not only to the soil but to the earth because “overuse can contribute to soil acidification and soil crust, thereby reducing the content of organic matter, humus content, beneficial species, stunting plant growth, altering the pH of the soil, growing pests, and even leading to the release of greenhouse gasses.” (Bisht & Chauhan, Soil Contamination). Soil is a big factor that contributes to healthy crops and livestock. To maintain soil, one has to maintain and sometimes increase soil organic matter. Soil organic matter is an extremely important source for sink nutrients as a substrate for microbial activity, water content, contaminants, and as a protectant against fluctuations in acidity, and more. The better quality of the soil the more nutrients and vitamins in it which can help the fruits and vegetables grow. This leads to an overall increase in the quality of the product. Soil organic matter is also a better soil structure which leads to less runoff, better absorption of water and nutrients, and higher stability which reduces wind and water erosion. The less erosion the better because erosion can carry harmful chemicals that can hurt the surrounding environments. So, if Ireland were to focus more on stopping the use of pesticides and having better quality, one would see improvements in the quality of produce being grown, an increase in environmental health, and an increase in human health.

An influential country that Ireland should try to resemble is France. France is the most agriculturally sustainable country in the world. Sustainable development became a top priority when the government created the Ministry of Ecology and Sustainable Development in 2007 (France’s Sustainable Agriculture Initiatives, USDA). The French government is reducing pesticide use, increasing farms’ energy independence, and launching new research and innovation programs in plant biotechnology and renewable energies. The constant need for innovation and sustainable agriculture is what makes France such a leading country in agriculture. Ireland should have a country-wide change in agriculture to make all farming more sustainable. Ireland should seek to model France’s agricultural policies because what France is exceeding in, Ireland could improve on. Ireland would do this with the main help of the Irish government, the EU, ASSAP, and of course, local help. Communities and schools could help by teaching why sustainable agriculture is important not only to the environment but to the countries as a whole because it ensures the prosperity of farms and their products. Organizations could help by bringing awareness to sustainable agriculture and organizing charity and volunteer work to visit farms and help with whatever is needed. Some policies that would need to be placed would be a law that requires the amount of carbon dioxide emissions to go down, the ban of pesticides, and having ‘check-ups’ on farms to confirm that they are following all the laws and to see how they can become more sustainable. This could mean implementing laws about the required quality of soil, water, and air.

Agriculture is one of the leading causes of methane and nitrous oxide release into the atmosphere. Agriculture alone was responsible for 32%, or one-third, of global human-caused methane emissions. This is a result of livestock and manure emissions. Greenhouse gas emissions could be lowered by “reducing enteric fermentation in cattle, sheep and other ruminants through feed changes and supplements, selective breeding to improve productivity and animal health/fertility, livestock manure

management, treatment in biogas digesters, decreased manure storage time, manure acidification, and improvement of manure storage covering, housing and bedding systems” (Page 16, Global Methane Assessment). Animals can be provided with healthier more nutritious feed, therefore, growing larger and not needing as many animals to supply the same quantity of food. If manure was managed more efficiently by covering it, composting it, or using it to produce biogas, methane emissions could also be reduced. Changes to the food system would encourage citizens to make more environmentally friendly dietary decisions. Up pricing meat, reducing the cost of fresh fruits and vegetables, and making them more widely available would help consumers buy more fruits. “Addressing inefficiency would also help: thanks to food loss, waste, and overeating, fewer than 50% of the calories currently produced are actually used effectively. There is a way to have low productivity systems that are high in animal and environmental welfare – as well as profitable – because they’re producing meat as a treat rather than a daily staple. In this situation, farmers get the exact same income. They’re just growing animals in a completely different way.” (BBC Future). If people were educated on the health and environmental impacts that vegetarianism has, many people would be more willing to try it. Not everyone would have to become fully vegetarian but if more people would make the switch to fully stop or reduce the amount of meat they eat there would be less demand for animal agriculture. Farmers would not be making fewer profits because with the extra space they have (either land, or fewer crops needed) they could plant vegetables and fruits, and sell them. If more people become vegetarians or reduce the amount of meat they consume, the demand for meat would decrease and the demand for vegetables and fruits would increase, which would essentially never leave a farmer without a job. The government can also help by involving themselves more in the lives of farmers via financial support, education, or agricultural help.

France one of the leading countries in agriculture in the world; has passed many laws and bills to help the country reduce its greenhouse gas emissions, strengthen sustainability, and help farmers. “The 2010-2013 National Strategy for Sustainable Development aims to develop a more sustainable food production and support green economy and business innovation, and have resulted in higher domestic organic production and consumption, testing environmental labeling on certain food products, combining efforts to reduce pesticide use, increasing farms energy independence, and launching new research and innovation programs in plant biotechnology and renewable energies” (France’s Sustainable Agriculture Initiatives, page 2). The French Parliament added the ‘Charter for the Environment’ to France’s Constitution. “According to the Charter, ‘public policies must promote sustainable development’ and three major principles were proclaimed: the prevention principle, the precautionary principle, and the polluter-pays principle.” (France’s Sustainable Agriculture Initiatives, page 3) Not only were these committees made to help with agriculture and innovation, but laws and bills were passed to help the new generation of farmers. The installation aid is a bill that was passed by French legislation with the contribution of the EU to help support the new youth of farming. The aid helps young farmers who want to grow their agricultural businesses. According to France’s Sustainable Agriculture, Initiatives ‘youth wishing to set up in farming can apply for three types of financial support: an installation grant, special loans at reduced interest rates, and tax and other types of benefits.’ This helps farmers, not only financially, but it shows them that the government is actively trying to help and support them and they have not been forgotten.

If Ireland were to implement more laws, bills, and committees to help support, educate, and encourage the youth of Ireland, more people would be less afraid of agriculture and the farming business. France is also a leading country in agriculture because of their modernity and improving farming techniques. France had a budget of 35 billion Euros to improve and fund five strategic priorities. The strategies included the funding of higher education and training, research, industry, sustainable development, and the development of a numeric economy. The development of biotechnology is a great new innovative technological advancement that will impact farming, “biotechnology is a range of tools, including

traditional breeding techniques, that alter living organisms, or parts of organisms, to make or modify products; improve plants or animals; or develop microorganisms for specific agricultural uses. Modern biotechnology today includes the tools of genetic engineering” (USDA, Biotechnology). Another helpful policy is the common agricultural policy (CAP). CAP was launched in 1962 to improve the relationship between European countries and their farmers. CAP was made to “support farmers and improve agricultural productivity, ensuring a stable supply of affordable food; safeguard European Union farmers to make a reasonable living; help tackle climate change and the sustainable management of natural resources; maintain rural areas and landscapes across the EU; keep the rural economy alive by promoting jobs in farming, agri-food industries, and associated sectors.” The CAP is a common policy for all EU countries which manage and fund the policy. (European Commission, Agriculture, and Rural development).

To look at more local organizations National Parks and Wildlife Service, Origin green, Hedgerows Ireland, Woodlands of Ireland, Science Foundation Ireland, and Teagasc could all help in a variety of different ways. For change to happen local communities and organizations need to make changes in their communities and call for their government representatives to do more. National Parks and Wildlife Service is a national organization dedicated to the conservation and education concerning the national parks and wildlife in Ireland. Their website has hundreds of sources with information about sustainability and ways to help the environment. Organizations like Hedge Rows Ireland, and Origin Green are dedicated to helping Ireland to become a better country in relation to sustainable practices. I believe that if Ireland wants to see change in their country, it has to start with better education. Schools should prioritize educating the youth on climate change, sustainability, development, wildlife, etc. Because Ireland is so big in terms of agriculture, teaching a new generation about farming and food production will positively impact their view on sustainability in their communities and their country. Some ways that Ireland could educate future generations is by having programs like the Science Foundation Ireland. The only barrier to this solution is starting the program because substantial funding and public support are needed. But it is a reachable goal, as seen in programs developed before.

Organizations could also talk to the government and try to get a law passed that enforces schools to teach about sustainable agriculture and farming practices. This would help raise the general education levels and awareness of environmental problems in Ireland. If a whole generation is trained to think about the environment and how our lives impact it, great change can occur. Another way to help get programs like these started is by talking to the public and to school boards. In the beginning, programs would start by having volunteers that go to schools and teach about sustainable agriculture and farming practices and then over time, getting more funding and recognition. This would lead to expanding and making the program bigger and hopefully make it into a countrywide movement. Another thing that communities could do is talk to existing foundations and programs like the Science Foundation Ireland. If you were able to get a meeting with the representatives or the people in charge you could state your cause and take a step further to teach about sustainable agriculture and farming practices in Ireland. Because it also ties in with the goals of this program it would be more or less easy to integrate. Not only would you be teaching kids about STEM, but you'd also be teaching them about the environment they are living in and how they can make a difference in it.

If Ireland were to focus on getting rid of pesticides, focusing on the quality of soil, and reducing harm in animal farming Irish agriculture would see significant changes. If Ireland follows some of France's agricultural practices the Irish population would have access to healthy, high-quality, nutrient-filled food. Once the agricultural practices improve not only would Ireland have food security, because of the

guarantee that all citizens have access to food but, they would be guaranteed healthy fruits, vegetables, and meats.

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