

Path-Away Agricultural Applications

The history of agriculture dates back thousands of years, and its development has been driven and defined by greatly different climates, cultures, and technologies. However, all farming generally relies on techniques to expand and maintain the lands that are suitable for raising domesticated species. For plants, this usually requires some form of irrigation, although there are methods of dry-land farming. In the developed world, industrial agriculture based on large-scale monoculture has become the dominant system of modern farming, although there is growing support for sustainable agriculture (e.g. permaculture or organic agriculture). After 1492, a global exchange of previously local crops and livestock breeds occurred. Key crops involved in this exchange included the tomato, maize, potato, manioc, cocoa bean and tobacco going from the New World to the Old, and several varieties of wheat, spices, coffee, and sugar cane going from the Old World to the New.

The Green Revolution refers to a series of research, development, and technology transfer initiatives, occurring between the 1940s and the late 1970s, that increased agriculture production around the world, beginning most markedly in the late 1960s. The initiatives, led by Norman Borlaug, the "Father of the Green Revolution" credited with saving over a billion people from starvation, involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers.

The Green Revolution exported the technologies of the developed world to the developing world. Thomas Malthus famously predicted that the Earth would not be able to support its growing population, but technologies such as the Green Revolution have allowed the world to produce a surplus of food.

Although the "Green Revolution" significantly increased rice yields in Asia, yield increases have not occurred in the past 15–20 years. The genetic "yield potential" has increased for wheat, but the yield potential for rice has not increased since 1966, and the yield potential for maize has "barely increased in 35 years". It takes a decade or two for herbicide-resistant weeds to emerge, and insects become resistant to insecticides within about a decade. Crop rotation helps to prevent resistances.

Agriculture imposes external costs upon society through pesticides, nutrient runoff, excessive water usage, and assorted other problems. A 2000 assessment of agriculture in the UK determined total external costs for 1996 of £2,343 million, or £208 per hectare. A 2005 analysis of these costs in the USA concluded that cropland imposes approximately \$5 to 16 billion (\$30 to \$96 per hectare). The study concluded that more should be done to internalize external costs, and did not include subsidies in the analysis, but noted that subsidies also influence the cost of agriculture to society. The study focused on purely fiscal impacts. The 2000 review included

reported pesticide poisonings but did not include speculative chronic effects of pesticides, and the 2004 review relied on a 1992 estimate of the total impact of pesticides.

In 2010, the International Resource Panel of the United Nations Environment Programme published a report assessing the environmental impacts of consumption and production. The study found that agriculture and food consumption are two of the most important drivers of environmental pressures, particularly habitat change, climate change, water use and toxic emissions.

Agriculture accounts for 70 per cent of withdrawals of freshwater resources. However, increasing pressure being placed on water resources by industry, cities and the involving biofuels industry means that water scarcity is increasing and agriculture is facing the challenge of producing more food for the world's growing population with fewer water resources. Scientists are also realizing that water resources need to be allocated to maintain natural environmental services, such as protecting towns from flooding, cleaning ecosystems and supporting fish stocks. In the book *Out of Water: From Abundance to Scarcity and How to Solve the World's Water Problems*, authors Colin Chartres and Samyukta Varma of the International Water Management Institute lay down a six-point plan of action for addressing the global challenge of producing sufficient food for the world with dwindling water resources. One of the actions they say is required is to ensure all water systems, such as lakes and rivers, have water allocated to environmental flow.

Pesticide use has increased since 1950 to 2.5 million tons annually worldwide, yet crop loss from pests has remained relatively constant. The World Health Organization estimated as far back as 1992 that 3 million pesticide poisonings occur annually, causing 220,000 deaths. Pesticides select for pesticide resistance in the pest population, leading to a condition termed the 'pesticide treadmill' in which pest resistance warrants the development of a new pesticide.

Scientific innovation in the production of natural based solutions to pest and disease control are critical to not only crop production but also the health and sustainability of the crop. Path-Away® Solutions, both Domestic and Global configurations, can play a significant role. Path-Away® Anti-Pathogenic Solution was successfully tested against *pseudomonas syringae* pv *actinidae* a bacterium attacking the kiwi crop in New Zealand. Further field tests are needed and overcoming the entrenchment of the chemical industry is difficult but there is positive proof that Path-Away® Anti-Pathogenic Solution is the innovation of the future.

Path-Away® Anti-Pathogenic Solution received approval by the New Zealand Environmental Protection Authority and is positively identified as being of extreme low toxicity, non-harmful to aquatic animals and easy to use. The low toxicity is a factor that all farmers need to be aware of.



It doesn't make sense to use a product on your crops that will leave residual contamination in the soil. It doesn't make sense to use a product that is aquatically dangerous.

Path-Away® Anti-Pathogenic Solution is the future of crop sustainability and increased yield.

Contact us to speak to an expert.

Arthur V. Martin, President
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