

Kathryn Strehle
Pinecrest High School/NCSSM Online
Southern Pines, NC/Durham, NC
Vietnam, Sustainable Agriculture

Increasing Education to Decrease Agricultural Chemical Abuse in Vietnam

Vietnamese agriculture has many repercussions for those living in the country. It accounts for 15.3 percent of the country's GDP, and employs 40.3 percent of the labor force (The World Factbook). A major dilemma currently affecting the industry today is the rapid increase of overuse of chemical pesticides, herbicides, and fertilizers. While these are helpful in correct amounts, overuse contributes to pollution and inefficient agriculture.

With such a large proportion of the population employed in agriculture, it is vital that it remains a successful industry. Vietnam has a population of 97 million people as of 2018, with 35.9 percent living in urban areas (The World Factbook). That leaves the majority to live in rural, agriculture-dominated areas.

The typical Vietnamese family is fairly typical of a rapidly growing, yet still developing, nation. With a primarily agricultural job force, many work laborious jobs in order to take care of themselves and their families. The labor force of industrial Vietnam is similar in exports (clothes, shoes, electronics, machinery) to China, but with different outlooks on life through the culture (The World Factbook). Vietnamese workers often will require that they do not work on Sundays, and only work on Saturdays if need be. Companies in Vietnam aim to reflect the values of their employees, and are noted to often "have in-house cafeterias serving free lunches," fostering a unitive workspace for factory workers (Russell). In spite of this, malnutrition of children is a large problem, with about 14.1 percent of children under five underweight (The World Factbook).

Other means of observing the welfare of the nation include access to clean water and readily available healthcare. An astounding 97.6 percent of the population has access to clean, reliable means of water. This is primarily in urban areas, but rural Vietnam also has a 96.9 percent rate of access to improved water systems. Healthcare, however, is rather limited in the nation. The physician density is at a measly 0.82 physicians per thousand people. This is very low, and keeps many citizens from getting necessary medical attention. The maternal mortality rate is still very high, at 54 deaths per one hundred thousand live births (The World Factbook). The Vietnamese government is looking to address these problems, however, and there is hope for their population's healthcare looking to the future. The current healthcare system in Vietnam is a combination of both public and private systems. They spend a low percentage of their GDP on healthcare, at only 6.6 percent in 2015. The nation has already begun to make and see improvements, as Vietnam nearly met the United Nations' Millennium Development Goal for its infant mortality rate for 2015 with 19.61 deaths per thousand live births, just above the 19.3 goal. There are multiple levels of Vietnam's health care, serving different groups of people and regions of the nation. At each of these levels, there are two tracks: one focused on prevention of disease and other healthcare problems, and one focusing on treatment in the form of acute clinical care. Dr. Minister Nguyen, who studies epidemiology of Vietnam, noted that "Almost all of the preventive services are free, like immunizations, hygiene, nutrition, mother and child health care, et cetera," which helps make healthcare more readily available to people of any socioeconomic status in Vietnam. However, patients also have the

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option to choose private healthcare if they would like to refuse the communal system. Some advancements already made by Vietnam's medical push include an over 99 percent vaccination rate and being the first nation to successfully control SARS, or severe acute respiratory syndrome (Cheng). While Vietnam still has advancements to be made in order to provide safer, more stable lives in terms of water and healthcare, they have already grown much in the past couple decades and are continuing to make strides that show the promise of the quickly developing country.

Food struggles in Vietnam do not only arise from scarcity. Vietnam currently faces a food scandal problem that many citizens are aware and wary of. According to the World Bank, food safety is the top concern of Vietnamese citizens, while it is costing the nation roughly \$740 million in productivity costs per year (Vietnam: Food scandals). These productivity costs arise from illness in workers and animal and plant waste when those goods become infected and must be disposed of. Consumers have noticed the potential of various foods to cause their illnesses, and thus are beginning to choose chain stores and packaged goods, due to the consistency of product delivered. This unfortunately lessens the purchases of local and market foods. As of 2018, the number of food purchases at open markets was still about 80 percent of all food purchases, though, so local farms are being relied on to provide meat, fish, and produce, even if consumers are skeptical of the quality.

The 40.3 percent of Vietnamese workers who are employed in agriculture produce crops such as rice, coffee, rubber, tea, pepper, and soybeans (The World Factbook). The typical farm size ranges from 5,000 to 20,000 square meters, depending on the region (Marsh). Farmers recently have gained opportunities to grow their farms, and income, through the establishment of modern techniques: including the use of crop protection materials. While pesticides, herbicides, and fertilizers initially saw a large increase in Vietnamese farm output, there have been significant repercussions due to their overuse recently. In the past twenty years, the amount of fertilizer used in agricultural production has quadrupled. Overall in the country, this has led to an expense of \$955 million for fertilizer and \$739 million for pesticides and materials in the first nine months of 2017 (Vietnam incurs losses from pollution from agricultural production).

While pesticide, herbicide, and fertilizer use, even utilizing chemicals, is not always a problem, its abuse is. In Vietnam, there is an estimated half to two-thirds of fertilizer used is wasted. Farmers are spending more on fertilizer than can be used to generate income; the abundance is double to triple that which would be necessary or beneficial (Vietnam incurs losses from pollution from agricultural production). Not only are there economic issues arising from this waste, through all the money spent which could be invested in capital or land; but environmental issues are as well.

Many farmers simply do not have the education to use more responsible farming methods. Many farmers see the benefit of some chemical fertilizer, pesticide, and herbicide, and add more the next season- even if over the dosage. This leads to buildup and can even have adverse effects on the crops. "Some people even create their own mixture from several types of products to maximize their farming productivity, a highly dangerous practice" according to Le Van Da, deputy head of the Plant Protection Department in Kien

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Giang Province. He also states that many farmers ignore chemical regulations, which only furthers the problem of establishing safe use of chemicals in Vietnamese agriculture, without harming the industry.

Some environmental repercussions of overuse of agricultural chemicals include an increase in human illness and harmful benefits to further agriculture. Chemical pollution in Vietnam has been shown to pose threats to human health due to increased levels of DDTs, HCHs, and Drin compounds in soil. These compounds can lead to illness in people when consumed through food exposed to it in soil (Hoai). Environmental harm includes the loss of productivity of farms and eutrophication of areas; especially noticeable in Vietnam's vast water and marshy environments, where farming of rice thrives.

Some companies have made the decision to push for more sustainable chemical use independently. For example, Phoenix, a rice trading company, is against the use of excessive chemical pesticides and herbicides on rice fields. In order to combat this, the organization has begun encouraging farmers to reduce the need for fungicides by draining rice fields earlier than they typically would, mitigating the risk of mold growth (Vietnam: Food scandals). This is wonderful for fighting the impacts of chemical overuse in Vietnam, but there needs to be outreach to farmers of other products and who are not necessarily associated with companies like Phoenix.

Vietnam is in need of agricultural extension to farmers that will help them understand the correct use of chemical materials, and how abuse hurts their farm and the environment. However, farmers may still be cautious about reducing the use of chemicals they have found effective in the past. A plausible solution is to gradually decrease chemical pesticide, herbicide, and fertilizer overuse, focusing on educating farmers about how much of each is truly beneficial versus waste and alternative farming methods which can be integrated to find affordable, sustainable solutions. Vietnam lacks many options, through lack of education and resources, that North American and European countries have. These countries which have had the resources to attempt methods such as organic farming and GMO crops can introduce them to Vietnamese farms in manageable methods that have been found effective.

One analysis utilizing 147 studies across the world found that genetically modified organisms (GMO) use in agriculture can decrease chemical pesticide use by 37 percent, while increasing yields by 22 percent and profit by 68 percent. It is generally understood that the responsible use of approved chemical pesticides is not a negative for farms, but simply the economic gain makes GMOs an appealing choice for those working in agriculture (ACSH Staff). In Vietnam, this could mitigate misunderstandings about pesticide applications, and create a more responsible use of the chemicals when they will truly be beneficial to yield and income. GMO use in Vietnam would largely begin in the form of insect-resistant Bt crops, like eggplant and soybeans. This would mitigate much need for pesticides in Vietnamese agriculture. GMO agriculture is most popular amongst American researchers and farmers, and so those supporting the project from the United States would contribute this aspect in educating Vietnamese farmers.

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European researchers and farmers often utilize organic farming methods over GMOs. Thus, education to Vietnamese agriculturalists can incorporate both methods and encourage finding the most effective practices for their specific farm. Organic farming according to many European standards excludes the use of GMOs; however, the methods can be combined based on legislation, or lack thereof, in Vietnam, allowing an efficient middle ground. Organic farming focuses on promoting biodiversity and alleviating environmental stress caused by farming. The market for organic foods in the European Union has increased by 47.7 percent in recent years, increasing trade opportunities for Vietnamese agriculture (The EU's organic food market).

Currently, EU standards for organic produce include such limitations: “prohibition of the use of GMOs, forbidding the use of ionising radiation, limiting the use of artificial fertilisers, herbicides and pesticides, [and] prohibiting the use of hormones and restrict the use of antibiotics and only when necessary for animal health”. These regulations come directly from the European commission’s website. In practice, they do not currently allow GMOs to be sold as organic, even if they are grown in line with the organic practices of limiting chemicals in the form of fertilizers, herbicides, and pesticides. This does, at the moment, limit how Vietnam would be able to sell genetically modified, but otherwise organic, products to the EU. However, laws are highly controversial in this area and are subject to change in a matter of years, as more and more research on genetic modification and its effects on food is conducted. For now, any Vietnamese products grown through organic methods that are not genetically modified would still benefit from the European organic market. This also supports Vietnamese farmers in adopting other sustainable farming practices, such as crop rotation, nitrogen fixing crop cultivation, and reduction of excessive chemical fertilizers, herbicides, and pesticides. All of these methods would both benefit the efficiency and increase the output of Vietnamese farms, while allowing for the products to be exported to the European Union as organically grown foods (European Commission).

Vietnam has little organic or GMO legislation. What they do have includes required labelling of GMO products. Labelling is required to state “genetically modified” in Vietnamese for any food item with a genetically modified ingredient which “exceeds the level of 5% of the total ingredients”. The genetically modified ingredient(s) must also be labelled in the ingredient list (Huong). This does mean that Vietnam allows for the sale of GMO products. However, in order to be labelled organic, products currently cannot contain genetically modified ingredients (PGS Organic Standards). This comes to a similar problem as with exporting goods produced this way to Europe. While this leaves the Vietnamese internal market open for sales of agricultural products produced through combination GMO/organic methods, the products must be labelled genetically modified and cannot be labelled as organic.

Monumental change such as this, decreasing the waste of fertilizers and mitigating overuse of chemicals in agricultural herbicides, pesticides, and fertilizers, will take years to accomplish. Hopefully, through structured education and careful implementation to Vietnamese farmers about sustainable practices and alternative methods will allow for Vietnam’s agricultural industry to become increasingly sustainable, efficient, and safe. With the help of researchers and farmers from both the United States of America and Europe, with experience with genetically modified organisms and organic farming, respectively, this can

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be accomplished. Recognizing the significance of agriculture to the population and economy in Vietnam, this education must be gradual and carefully implemented; but if done well could see a better situation for all those working in agriculture in Vietnam.

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