Case Study 1 Open farming of GM corn. Is it ethical?

By:

This case study examines the current situation in Italy in which a group of farmers in the north of Italy began using bt resistant GM corn in order to enhance their crop yield and profit and also to reduce the amount of pesticides being used on the farm. The farmers exposed this idea in order to promote GMO foods. However, local authorities were against the idea of GMO's and put a ban on open-field use of these pesticides and seized the fields. It is claimed these BT crops could damage biodiversity and potentially cross-contaminated with non-GM crops.

The group have been tasked with putting together a report where we recconmend/ not reccomend whether the farmers should be refunded and also whether the current laws in Italy should be changed regarding GM crops. Each member of the group has a different role regarding GM corn.

Insect Biologist

It is the role of insect biologist to examine the potential risks on insects and their populations regarding BT corn. She will be looking how BT corn affects the different insects and also to look at how to prevent insects being affectet by BT corn.

Environmental Ethicist.

It is her role to assess the environmental impact BT corn has on both the environment and the consumers. This role will examine whether BT corn is ethical to produce taking into account biodiversity, nearby fields and soils and ecosystems.

XX is a plant scientist working in an industry. She will be looking at how Bt resistant corn effects plant diversity and the agricultural industry as a whole.

XX - Scientific Expert on the Genetically Modified Organisms Panel

His role is to provide independent scientific advice and clear communication on existing and emerging risks associated with GM crops such as Corn. As part of this

role he will assess current legislation by the EU based on GM crops and the differences between that and its member states.

XX – Corn Market Expert

As a corn market expert it is my role to examine the potential profitability from GM corn and also the affects this will have on both small and large scale farmers. This means researching the costs of the fertilizers it takes to grow gm and non-gm corn and to look at the costs of herbicides and pesticides which are typically used in non-gm crops. It is also important to identify the potential crop yields (gain/loss) regarding gm and non-gm crops.

Objective

The objective of this project is to determine whether Bt corn is a viable option for Italian agriculture and whether or not the local authorities in Italy were wrong to destroy the gm crops being grown by local farmers and to seize their land. Added to this the legislations surrounding gm corn in Italy shall also be examined and debated whether or not the laws should be changed. As a corn market expert it will be my role to discuss the advantages and disadvantages of Bt corn in terms of its economical properties i.e. profitability and also the amount of food (crop) being produced.

BT Corn

Bt corn is a genetically engineered corn which contains a gene derived from the bacterium Bacillus Thuringiensis. This particular corn was developed for insect control. (Sanglestsawai, S., Rejesus, R.M. and Yorobe, J.M. 2014.) It does so using a protein which negatively affects insects if they were to consume the protein. Monsanto introduced a coleopteran-active BT corn which has a Cry3Bb1 protein in the root on the corn plant to control rootworm larvae. (Wu, F., Miller, J.D. and Casman, E.A. 2004.)This Bt corn is expected to pose very little environmental impact due to the selective nature of the proteins. The protein present in Bt corn will also not effect humans because it can be broken down by the acid within our stomachs. Over 47 studies have shown no unexpected ecological risks.

Genetically modified corn have been developed to potentially increase the yields of those crops and also to limit pesticide and herbicidal use. These benefits of gm crops are some of the reasons why they are being developed and are increasing worldwide. Bt corn is one of the most widely used gm crop due to its insect resistance. This gene will lead to a reduction in the use of pesticides potentially saving farmers a lot of money. (Engel, K.-., Frenzel, T. and Miller, A. 2002) Bt corn has its greatest effects (in terms of crop yield) in countries that do not use as much pesticides as other countries such as Argentina and India. In other countries that use a lot of pesticides the crop yield is not as dominant. (Sanglestsawai, S., Rejesus, R.M. and Yorobe, J.M. 2014) However, the pesticides usage is greatly decreased due to Bt corn. (Afidchao, M.M., Musters, C.J.M., Wossink, A., Balderama, O.F. and de Snoo, G.R.) In developing countries small scale farmers and large scale farmers benefit from the effects of Bt corn in terms of the crop yield. Developing countries have a particularly high interest in incorporating Bt corn into their agricultural industries. One of the main advantages of introducing gm corn is because it will bring more of a guarantee to the crop yield. This means more food and profit for the country as a whole. As well as financial benefits Bt corn will also bring environmental benefits. The reduction in pesticides will lower the contamination levels caused by these particular pesticides which usually bring health and environmental concerns. In developing countries the estimated crop income for bt corn was $302 million.

The Philippines Corn Market

The Philippines are the only country to have embraced GM corn on the continent of Asia. When Bt corn was first introduced in 2003 there was a massive increase in the production of Bt corn. Bt corn occupied over 270,000 hectares within the Philippines. However, due to the high cost of GM corn seeds only the large scale farmers with high earnings adopted genetically modified crops. In the past number of years small ‘poor’ farmers have started using GM corn in the hope that it will bring a higher crop yield due to insect control and a larger profit. Small farmers have suffered when it comes to Bt corn though due to the high cost of GM corn seed. Genetically modified corn seed can be 84% higher in price compared to conventional corn seed. (Afidchao, M.M., Musters, C.J.M., Wossink, A., Balderama, O.F. and de Snoo, G.R.) This high price makes it hard for poor farmers to grow gm crops and make a considerable profit from the crops as they usually take money loans to pay for the seed and end up paying quite substantial loans.

In the Philippines there is a total of 1.8 million corn farmers of which 60% grow yellow corn. Most of these farmers are classed as small farmers who own an area of less than 4 hectares each. The small farmers tend to have poorly situated land. The large scale rich farmers have better placed land in the lowlands or highlands. Poorly situated land makes it hard for the small scale farmers to grow any crop including Bt corn as these crops still need a considerable amount of nutrients and water to flourish. In fact Bt corn needs a greater amount of nitrogen fertilizer compared to conventional corn. This increased amount of fertilizer promotes the endotoxin production in Bt corn that enables it to resist insects. (Engel, K.-., Frenzel, T. and Miller, A. 2002) However, the increased cost of fertilizer for Bt corn will cost much less than using pesticides on non-gm corn. In the Isabela province of the Philippines there was found to be no reduction in pesticide usage with Bt corn. This was due to the local farmers fears of crop loss this led to them still using pesticides. (Afidchao, M.M., Musters, C.J.M., Wossink, A., Balderama, O.F. and de Snoo, G.R.) The use of pesticides, extra fertilizer and loans with high interest meant that poor farmers in the Philippines actually made a 5% loss on average with Bt corn compared to conventional corn. GM corn in the Philippines did not show a major advantage in terms of profit compared to conventional corn.

The American Corn Market

The U.S is the largest producer of corn in the world with 32% of the worlds corn being produced there. Corn crops take up an estimated 84 million acres of agricultural land in the U.S and equates to sales of $63.9 billion. About 80% of all corn grown in the U.S is actually consumed by livestock, poultry and for fish production. From 2012 88% of the corn grown in the U.S is genetically modified corn. 63% of corn grown in America corn acres is Bt corn. American farmers adopted Bt corn due to the billions of dollars worth of damage caused by insects such as the corn ear worm and other root worms alike. (Babu, A., Cook, D.R., Caprio, M.A., Allen, K.C. and Musser, F.R. 2014.) In America it is becoming more difficult for farmers to get conventional corn seed such is the prominence of Bt and other gm corn seed. The reason the U.S has adopted Bt corn is due to the higher yields of corn which arise from it. There have been many studies to prove that Bt corn increases crop yields by quite a number of bushels per acre though these numbers tend to vary due to variables such as climate soil nutrients and moisture content. (Jorge Fernandez-Cornejo and Seth Wechsler. 2012) Adopters of Bt corn have also seen a major decrease in insecticides in the U.S, a country which had previously been renowned for its use of insecticides and other chemical sprays.

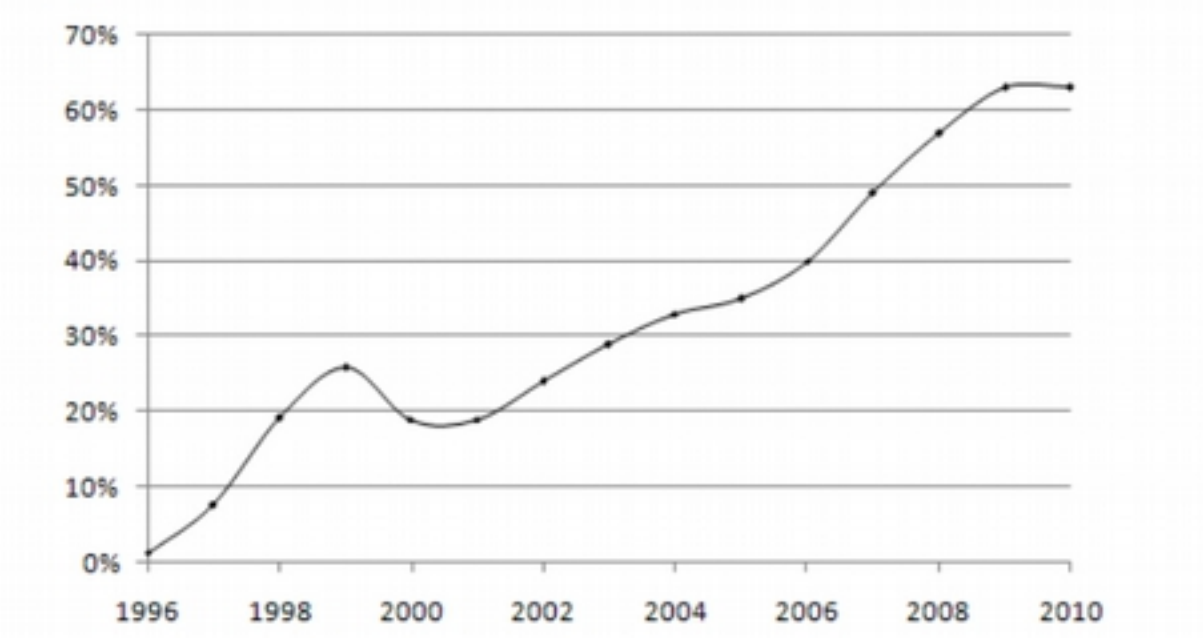

Figure 1. Bt Adoption Rates for U.S. Corn Farmers (1996–2010)

Source: NASS/ERS ARMS data, the NASS Objective Yield Survey, and the NASS June Agricultural Survey.

Figure. 1 shows the increase of adoption of Bt resistant corn from the turn of the century right up to 2010. The increase in the use of Bt corn shows the faith farmers show in Bt corn in terms of profitability and yield. Farmers would not adopt Bt corn if they could not make more money from it. Since the turn of the century corn farmers have experienced a change in both the corn market and the environment in which corn is grown. For example, Corn infestations have greatly reduced new strains of rootworm resistance have been introduced. Bt Corn seed prices have increased. The reduced insect infestations has also led to a reduction in the use of insecticides. This will in turn lead to a reduction in the profitability of insecticidal use.

Conclusion

In conclusion Bt resistant corn strains have shown major advantages in the corn market. The United States of America have embraced Bt corn to the extent that it is now being used more than conventional corn seed. With Bt corn strains the average crop yield across America has increased due to the decrease in corn borer infestations. With this increase in yield it has brought an increase to individual farmers profit. The increase in yield also means that the

price of Bt corn is less than the price of conventional corn. The cut price of Bt resistant corn has led to more industries and people buying the cheaper Bt corn. Due to the Bt strains resistance the use of insecticides has also fallen, saving farmers money. This reduction in pesticides has great benefits for our environment. In the Philippines Bt corn has had the same effects for large scale farmers as it does in America. However, small scale farmers suffered from the introduction of Bt corn. Although Bt corn brought with it an increased yield to the small scale farmers who adopted it was found that they ended up with a decreased profit when compared to conventional corn. This was due to the high cost of GM seeds. These small scale farmers had to take out loans in order to buy GM corn seed and these loans had high interest of up to 12%. This coupled with the added fertilizer and their insistence on using pesticides meant that they had a 1% loss on average when compared to conventional corn. Overall Bt corn was found to be an extremely useful crop with more advantages when compared to regular corn crops. I think the Italian Nation could benefit from Bt corn if they were to adopt the crop. With Bt corn it will bring a resistance to root worms increasing crop yields all over Italy. It will also add financial benefits to Italy as higher crop yield will bring a larger profit. I propose that the Italian nation should embrace Bt corn to help their financial situation and also to limit their use of harmful pesticides.

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