CHAPTER 5

NEW AND FUTURE GM CROP APPLICATIONS

The previous chapter has shown that the cultivation of GM crops has increased rapidly during the last 20 years with sizeable areas in North and South America, Asia, and to a lesser extent in Africa. However, of the 182 million hectares under GM crops in 2014, 99 percent were grown with only four different crop species (soybean, maize, cotton, and canola) and two modified traits (herbicide tolerance and insect resistance). Almost all of the GM crops available so far were developed and commercialized by the private sector.

The relatively narrow focus of GM crop applications up till now has different reasons. One reason is that certain traits are more complex to develop than herbicide tolerance or insect resistance; these two traits are coded by only one single gene each. Different HT and Bt genes with different modes of action are now stacked, but the genetics are still much simpler than for other traits. Most tolerances to abiotic stress factors and many relevant quality traits are coded by multiple genes, making the process of genetic engineering much more complex. However, the more important reason for the narrow crop and trait focus so far is the low public acceptance of this technology and, coupled with this, the complex regulatory systems. Several GM technologies were extensively tested but never approved for commercial use because of overly precautious regulators, highly politicized policy processes, and extensive lobbying efforts of anti-GMO pressure groups. Examples are virus-resistant papaya in Thailand, Bt eggplant in India, or Bt rice in China (see chapter 4). Other technologies were tested and approved for commercial use, but withdrawn from the market due to concerns of low consumer acceptance. Examples are the Flavr Savr tomato (chapter 3) and insect- and virus-resistant potato (chapter 4). The German company BASF decided to withdraw its Amflora potato from the European market in 2012 due to lack of public acceptance. The Amflora potato with improved starch
properties for industrial purposes was commercially approved in 2010. Other readily developed technologies were shelved by biotech companies for fear of consumer boycotts. A case in point is HT wheat that was ready to be commercialized by Monsanto in 2004.

The complex and politicized processes of biosafety and food safety regulation do not only delay the final approval and commercialization, but also the development of new GM crops, as in most countries each field trial needs a separate approval. Field trials are important to test the agronomic performance of GM crops, select preferred events for further development, and produce material required for feeding trials. When approvals for field trials are not issued on time, or when field trials are vandalized by anti-GMO activists, GM crop and trait developments can be seriously delayed or thwarted altogether. Thus, the public opposition could well contribute to a self-fulfilling prophecy: some of the public resistance is based on the argument that the promises of GM crops have been oversold because so far only very few technologies by a handful of multinational companies are actually available. Further details of regulatory processes, public concerns, and the wider implications of the anti-biotech propaganda will be discussed in chapters 6 and 7. In this chapter, I discuss some of the technologies that may make it through to farmers’ fields in the next few years in spite of the many regulatory hurdles.

A few new GM technologies were recently commercialized in the United States, namely HT alfalfa and HT sugarbeet accounting for almost 1 million and 0.5 million hectares, respectively. Smaller areas of virus-resistant squash are also grown in the United States. In 2014, a new GM alfalfa technology with lower levels of lignin was commercialized in the United States. This new application helps to increase fodder quantity and digestibility of the perennial alfalfa crop. Also in 2014, Innate potato was commercially approved in the United States (James, 2014). Innate technology was developed by Simplot, a US agribusiness company, and features a quality trait to reduce the bruising of fresh potatoes. Moreover, the engineered genes help to significantly reduce the formation of acrylamide during the processing of potato. Acrylamide, a potential carcinogen, is formed naturally when potatoes are fried at high temperatures to produce French fries or crisps. While genetic engineering was used to develop this technology, no genes from species other than potato were introduced, which also explains the chosen brand name “Innate.” Recent research carried out at Iowa State University showed that US consumers are willing to pay more for these GM potatoes with positive health effects than for conventional potatoes.

Another GM potato technology, for which an application for commercial approval was already filed in the United States, is late blight