From: Pesticides
Sent: Sunday, March 03, 2019 12:46 PM
To: jody spear; Pesticides
Subject: RE: corrections for 16 January minutes, link to supporting information

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Jody,

I will add your email and the article to the board packet for Friday's meeting. I will also request consideration of your comments during the review of minutes from the January meeting.

Thank you,

Megan

Megan L. Patterson
Director
Board of Pesticides Control
Maine Department of Agriculture, Conservation and Forestry
Phone: 207.287.2731

From: jody spear
Sent: Saturday, March 02, 2019 11:45 AM
To: Pesticides <Pesticides@maine.gov>
Subject: corrections for 16 January minutes, link to supporting information

Hello Megan,
The potential for modification (meaning cross-contamination) of conventional potatoes is only one of many reasons I am requesting withdrawal of the registration for Simplot GM potatoes. The PIPs in Innate, White Russet, and other bioengineered potatoes are dangerous for concealment of the bruises in which toxins accumulate -- as explained clearly in the materials I submitted by Caius Rommens, developer of the GM potato for Simplot. This work was not done for Monsanto, as your notes indicate.
Alvin Winslow's accusations -- that Rommens [author of Pandora's Potatoes] did not invent the Simplot potato and that he was forced to resign from Monsanto and Simplot -- are false, His defense of the "high standards for GM approval" [from my notes, taken at the Jan. meeting], which reputable scientists know to be a sham, is ludicrous.

Character assassination of this kind is only to be expected from Winslow, an industry promoter of biotech, but it is inaccurate, and the record must be corrected.
Rommens's revelations are a clear sign that the Simplot potato should not be allowed on the market.
I am submitting another article in which Rommens discusses his reasons for exposing the hazards for consumers and for agricultural sustainability. His many patents are referenced in this interview.
Jody Spear

https://www.ecofarmingdaily.com/rethinking-pandoras-potatoes/

ACRES USA
ECO FARMING DAILY
Grow Crops. Raise Livestock. Grow Your Farm.

Rethinking 'Pandora's Potatoes'

December 14, 2018 in **Eco-Farming**, **Eco-Living & Health**, **Eco-Philosophy**, **Grow Crops**, **Interview**

Former Genetic Engineer for J.R. Simplot & Monsanto, Dr. Caius Rommens Questions Biotechnology Safety, Authors Book on His Work with Potatoes

Dr. Caius Rommens

For 26 years, Dr. Caius Rommens was an ambitious and prolific genetic engineer. He held positions of great responsibility at major corporations. As director of the company's biotech effort from 2000 to 2013, he developed GM potatoes for the Idaho-based J.R. Simplot Company, the leading U.S. producer of frozen French fries. These GM potatoes are being sold under innocuous names such as Innate, Hibernate and White Russet in thousands of supermarkets across the United States and Canada. They are not labeled as GMO.

Eventually, growing doubts about his GM creations led Rommens to question the validity of the simplistic dogma of biotechnology and renounce his career. His re-evaluation of the data and study of the broader scientific literature has given him insight into the risks and fallacies of the GM potatoes he created. He recently published a slim volume entitled Pandora's Potatoes: The Worst GMOs *to communicate what he has learned.*

Today Rommens is a plant breeder who develops genetically diverse potato and tomato varieties for the public domain. He also creates new crops that can be used to create tastier and healthier alternatives to French fries. In his spare time, he continues to write about the hidden issues arising from his previous work in genetic engineering. Prior to his tenure at Simplot, from 1995 until 2000, he was employed as team leader at Monsanto Company in St.

Louis, Missouri. He completed his Ph.D. at the Free University of Amsterdam, in the Netherlands where he was born and raised, and carried out his postdoctoral work at the University of California at Berkeley.

Interviewed by Tracy Frisch

Technology Unfettered

ACRES U.S.A. After a long, successful career in the field, what motivated you to renounce genetic engineering and write a book pointing out its fallacies and dangers?

CAIUS ROMMENS. I never made a deliberate choice to become a genetic engineer — or to work at Monsanto and Simplot, to end my career and to write books about the hidden issues of genetic engineering. It just happened.

ACRES U.S.A. What were your goals and responsibilities as a research leader at Monsanto and Simplot?

ROMMENS. Monsanto had been very successful in weed and insect control, and the company wanted to branch out into disease control. It was interested in the work I had carried out at universities in Amsterdam and Berkeley and invited me to lead part of its new disease control program. I accepted the invitation, but I knew, even then, that I would not succeed. Pathogens are genetically more dynamic than weeds or insects so they evolve more quickly around any barrier to infection, whether that barrier consists of genes or pesticides. I ignored my gut feelings and began to try and develop GM disease control. I mostly worked on potatoes, but Monsanto lost interest in potatoes when public pressure pushed McDonald's to steer clear of GM potatoes. That was when I sent a letter to the owner of a company that I believed was more passionate about potatoes than any other company in the world: J.R. Simplot Company in Boise, Idaho. I proposed to develop a friendlier biotech effort that would avoid Monsanto's mistakes. I would create GM potatoes by modifying their native DNA without inserting foreign genes. And I would work on traits for processors and consumers as well as agronomic traits. Simplot liked the idea, and I became director of a new division called plant sciences.

ACRES U.S.A. Tell me about breakthroughs you were trying to achieve in each position.

ROMMENS. At Monsanto the most interesting gene for disease control we identified encoded a fungicidal “defensin” protein. However this protein is folded into a very tight knot that cannot be degraded in the gastrointestinal tract. That makes it a potential allergen. We also succeeded in enhancing the overall level of disease tolerance in plants, but this positive trait was linked to negative traits, including possibly a reduced tolerance to insects. I should have realized that every gain comes with losses, and that experimental failures may be due to technological limitations rather than personal limitations. But I didn’t allow myself to be critical of genetic engineering. Instead, I decided to work harder, 16 hours a day, six or seven days a week. At Simplot, we developed methods for marker-free transformation and gene silencing, and we also created a variety of GM traits. Some of these traits were scientifically interesting. For instance, by silencing a few potato genes, we transformed white potatoes into yellow or even orange (antioxidant carotenoids) potatoes, and by overexpressing a potato gene, we transformed white potatoes into purple (antioxidant anthocyanins) potatoes. We did many things, but I can only talk about what has been published, and I must say that 99 percent of our experiments failed to cause any meaningful changes. We eventually decided to commercialize four GM traits: resistance to black spot bruise, reduced accumulation of the carcinogen acrylamide in French fries, suppressed fry-induced browning and late blight resistance. What I didn’t realize was that all these seemingly positive traits were linked to more elusive negative traits. Only White Russet potatoes containing the first two traits have been commercialized. Since 2015 these GM potatoes have been sold at about 4,000 supermarkets in 40 states. The more advanced lines containing all four traits have been approved for commercial release by the regulatory agencies, and I assume Simplot has plans to bring them to market.

ACRES U.S.A. Do you understand Simplot’s economic motivation for developing GM potatoes?

ROMMENS. I believe it is difficult to make money on commodities such as French fries. It seems that the biotech program was meant to de-commoditize potatoes because it would be very beneficial for a company to own a superior potato variety.

ACRES U.S.A. Is there any estimate of the economic potential of the GM potatoes that you developed for Simplot?

ROMMENS. According to Joe Guenther, an economist at the University of Idaho who frequently collaborates with Simplot, the total economic benefits are $740 million annually. But this economist was not aware of the hidden issues, some of which I have described in my book. I believe these issues outweigh the benefits.

ACRES U.S.A. One of the hidden issues you discuss is yield depression, which obviously would negatively impact farmers. What should we know about the agronomic problems with these potatoes?

ROMMENS. It is important to understand that even normal potatoes are much more vulnerable to diseases, pests and environmental stresses than other major crops. The difference is tremendous. Farmers often spend just under $3,000 to grow an acre of potatoes, but they can only hope to earn just over $3,000. There is very little margin for error, and a 5 percent yield loss can turn a profit into a loss.

ACRES U.S.A. What sorts of toxic compounds of concern do these GM potatoes produce?

ROMMENS. The potential toxins that I am concerned about include alpha-aminoadipate, chaconine-malonyl, which is related to glycoalkaloids, and tyramine, which is toxic to people taking certain antidepressants called monoamine oxidase inhibitors or MAOIs. None of these toxins are mentioned in the petitions for deregulation of GM potatoes. I only learned about them by reviewing the scientific literature, after my departure from Simplot. Scientists have shown that PPO-silencing [silencing the PPO gene to reduce bruising] in potatoes causes a massive increase in levels of the toxin alpha-aminoadipic acid and a more modest increase in the levels of chaconine-malonyl. Furthermore, I learned that damaged potato tissues accumulate tyramine. In normal potatoes, such damaged tissues discolor and so they are ordinarily spotted and trimmed. But in GM potatoes the damaged tissues are at least partially concealed. Therefore they are not trimmed, so people may be exposed to tyramine when eating GM potatoes.

ACRES U.S.A. How does tyramine affect susceptible people?

ROMMENS. When tyramine cannot be degraded, it accumulates in the blood and triggers the release of norepinephrine, a hormone that constricts blood vessels and causes a rise in blood pressure, sometimes to dangerously high levels.

ACRES U.S.A. Is it fair to promote GM potatoes as less carcinogenic than normal potatoes? Or does this claim obfuscate important truths about GM potatoes?

ROMMENS. I believe it was in 2002 when scientists discovered that French fries contain acrylamide, a suspected carcinogen. I responded to this discovery by developing methods to lower the acrylamide-forming potential of potatoes. But I did so without asking myself the basic questions. Are French fries carcinogenic? Do the very low levels of acrylamide pose a threat to consumers? I studied these questions only after I had left Simplot, and I found out that there are no reliable studies proving that French fries cause cancer. There is a correlation between the consumption of French fries and various diseases, such as obesity, diabetes, heart disease, and perhaps even premature mortality, but the list of diseases does not include cancer.

ACRES U.S.A. What other unintended effects of your work manipulating genes especially trouble you?

ROMMENS. I am concerned that PPO-silencing not only conceals bruised and damaged tissues by making less them visible; it also conceals infected tissues. Because of this, a tuber that appears healthy may contain a viral, bacterial, or fungal infection. Normal potatoes allow farmers to quickly spot diseases and take appropriate action. But what happens if the disease is symptomless or if its symptoms are minimized? This will make it much harder to contain diseases and prevent potato disease epidemics. Furthermore, bacterial and fungal pathogens are known to produce toxins and allergens, so the concealment of infections may expose consumers to these undesirable compounds.

ACRES U.S.A. Are the GM potatoes you created transgenic? I am asking because they contain foreign genes, but not from other species.

ROMMENS. Transgenic means that the genes introduced into the GM crop are not native to that crop. Foreign genes can be derived from bacteria or other organisms or they can be entirely artificial and new. At Simplot, we created foreign genes by fusing parts of native genes to their mirror images. That was how we created the RNA interference (RNAi) technology. These fusions are artificial and don't exist in nature.

ACRES U.S.A. One of your significant contributions at Simplot was using this RNAi technology to silence key potato genes. What was gained by doing this, and what implications weren't considered?

ROMMENS. Silencing is based on two assumptions — first, that some of potato's genes are not just redundant but also undesirable and, second, that the inactivation of these genes has no unintentional effects. There is no evidence for these assumptions though, and it is obvious that potato plants, like all living things, preserve genes only if these genes are evolutionarily significant. Furthermore, it is becoming increasingly clear that the function of a particular gene is linked to the function of other genes, just like the meaning of a single word of a poem is dependent on the meaning of other words of that poem. For these reasons, it was narrow-minded of me to silence PPO and then believe that PPO-silencing would solve the bruise issue and have no other effects. And it was equally narrow-minded to believe that silencing INV would only prevent potatoes from browning when fried. I should have known that this genetic modification would affect the sensory profile of fried and roasted potatoes and all the other processes that use the INV products glucose and fructose, such as tuber sprouting spring, seed set in summer and so on. Furthermore, the ASN gene that I silenced to limit the acrylamide-forming potential of potatoes is important, for instance, in the efficient use of nitrogen, which is the most important component of fertilizers.

ACRES U.S.A. You spoke about genes being linked to other genes functionally. I'm also wondering if RNAi technology silences genes that aren't being targeted.

ROMMENS. Silencing is not gene-specific. The RNAi technology uses a long sequence motif to silence genes that share at least a short stretch of identity with that motif. Apart from the intended gene, RNAi may also affect other genes, both within the GM potatoes themselves and in some of the insects eating parts of the plant where the RNAi is active, including the tubers, roots, flowers and probably pollen. The unintended effects of RNAi are well documented, but I have not seen any studies demonstrating there are no such unintended effects associated with these GM potatoes. I am concerned, for instance, that bees may use GM potato pollen to produce royal jelly to feed their larvae. By doing so, the larvae may be affected in growth and development by the RNAi. Based on my assessment of the literature, it appears that the silencing constructs are active in pollen and potentially active in bees. So it is possible that certain genes in bee larvae could be inadvertently silenced.

ACRES U.S.A. That's frightening! Going back to INV-silencing, I'd like to better understand how that genetic modification causes changes in the sensory profile of Pandora's potatoes.

ROMMENS. In the second version of the GM potatoes, which has been approved but may not yet be commercialized, the potato's ability to make glucose and fructose is blocked. This modification benefits processors by preventing French fries from darkening as much as normal fries. However this modification also causes a decline in other sensory attributes that require glucose and fructose, namely aroma and taste. A person who uses the same process to make GM fries and normal fries will find that the GM fries are much lighter in color and have less aroma and taste than normal fries. The secret is that most sensory attributes of fries are Maillard reaction products, derived from the fry-associated oxidation of glucose and fructose.

ACRES U.S.A. I think the public would be surprised to hear that you succeeded in developing the genetic modifications used in GM potatoes by "working blindly" through a process of "trial and error." Can you elaborate?

ROMMENS. By "working blindly" I mean that I relied on scientific assumptions rather than personal experience to modify potatoes. For instance, the generally accepted assumption within the community of genetic engineers was that PPO-silencing had only one effect: it caused "black spot bruise resistance." I accepted this assumption without seriously challenging it. By "trial and error," I mean that, with the help of my teams, I often just modified genes and tested what happened. During my career as a genetic engineer, I have tested thousands of different genes in GM plants.

ACRES U.S.A. When you and your team determined that a certain gene controlled a particular trait, did you then explore further what else you might have affected?

ROMMENS. It took many years of work to identify the genes involved in bruising, fry-induced browning and acrylamide formation. When we finally succeeded in pinpointing the genes that should be silenced, we really didn't want to burst our bubble of success. It was a subconscious reluctance to consider the unintended effects of our modifications. Some basic tests were inevitable, of course, especially during deregulation. But I believe now that these tests were mostly set up to demonstrate that GM crops resembled their untransformed counterparts, not to identify risks. Genetic engineers are under tremendous pressure, and their work is highly specialized. Success provides job security, but failure will eventually lead to an uncertain future. It took me a long time, about 26 years, to accept failure. Before I could, I struggled with scientific impartiality. And I am not alone, because almost all academic and corporate genetic engineers find it difficult to remain impartial; they tend to exaggerate the benefits of their work and to overlook the detriments. For instance, genetic engineers have published hundreds of genes that, supposedly, increase crop performance, but hardly any of these genes confirm. I believe that the majority of published studies on GM crop improvement should be retracted.

ACRES U.S.A. In your book, you write, "Genetic engineers are still in their Conquistador phase as they steal R [resistance] — genes from exotic plants ... Pandora's Potatoes represent the first example of a GMO crop that contains an illegally acquired exotic gene." How was the gene in question acquired, and why was that unethical and illegal?

ROMMENS. There are still hundreds of wild species of potatoes that interbreed and evolve in South and Central America. The immense genetic diversity of potatoes and their wild relatives is essential for evolutionary survival. European genetic engineers obtained access to a wide variety of these wild potatoes and screened them for genes for control of late blight, the most important disease of potatoes. They isolated and patented their genes and licensed at least one of them to Simplot. But, according to Article 15 of the Convention on Biological Diversity, the actual owners of the resistance gene are not the European engineers but the country where the wild potatoes evolved, which is, in this case, Argentina.

ACRES U.S.A. Are there ways to breed resistance to late blight and other potato diseases that are superior to genetic engineering?

ROMMENS. Conventional methods in plant breeding are often more effective because they enable the transfer of clusters of linked resistance genes. But, again, I believe that any attempt to take advantage of biodiversity should be carried out in partnership with the country where this biodiversity evolved.

ACRES U.S.A. You have predicted that GM potatoes will contaminate normal potatoes. How would that occur?

ROMMENS. We only worry about contamination if what contaminates something is very different from what is contaminated. Potatoes tend to get mixed up, and we usually don't care. That happens, for instance, when a tuber is not picked up by the harvester and survives the winter, and then grows as a volunteer, contaminating the next crop. It is almost impossible to guarantee that not a single potato is left behind in the field, or on a conveyor belt, in a truck or warehouse. But that usually is not a big deal. It is possible to limit the risk of contamination by growing potatoes in an expensive, closed-loop system. But companies would only be so careful about preventing contamination if contamination were a major concern. Apart from Simplot's GM potatoes, I don't believe any other major GM crop is still grown in a closed-loop system four years after approval. Why did Simplot convince the regulatory agencies that GM potatoes are identical to normal potatoes and then spend extra money to keep them separate? Another question is will it succeed? Someone could buy GM potatoes in a supermarket, apply certain methods to break dormancy, and then grow the GM potatoes outside the closed-loop system, though I don't recommend doing this. Within a few years of Monsanto releasing its GM potato varieties, they were detected as contaminants in French fries in Japan, a country where they had not been approved. While Simplot is more careful, I don't believe that any biotech company would develop a GM crop, get it approved for commercialization, and then commit to growing it in a closed-loop system forever.

ACRES U.S.A. Was there an event or insight that led you to start re-evaluating your work as a genetic engineer?

ROMMENS. I became more hesitant in 2008, after I wrote some complicated papers and patents. Until that time my work had been an interesting but exhausting experience, but I felt increasingly ambivalent when the plans for commercialization became more serious. Wait a minute, I thought. Did I dot all the i's and cross all the t's? I was not sure anymore. Even though I was not ready yet to be critical of my own work, I sensed that something was wrong. I wanted to slow down the effort so I began to reallocate program resources to non-GMO projects. In 2012, I became aware of the first mistake. It was a sequence error of a tiny fragment that is used to transfer DNA from bacteria to plants that gets degraded during the process. The error confirmed that I was not completely in control of what had happened, what was happening, and what might happen. I retracted a research article related to the sequence mistake and wondered if there were bigger issues. Feeling uncomfortable about the GM crops and the push to market, I decided to leave the field of biotech. I did not try to identify the unintended effects of my work until years later.

ACRES U.S.A. Simplot used this sequence mistake as ammunition against you in response to the publication of your book. I want to ask you about it in order to dispel potential doubts about your integrity.

ROMMENS. The single technical mistake I made during my long career as genetic engineer was minor, especially when compared to the major oversights I discovered afterwards. It was a sequence mistake made in 2001, mostly by me and published in 2004. I discovered it by evaluating old data in 2012. The mistake relates to one of the many “tools” we used to produce the GM plants, but it did not affect the GM plants, and it neither invalidated any of the nearly 60 patents I wrote for Simplot nor affected my many other publications. It was kind of like having used an orange-colored hammer instead of a red hammer to build a piece of furniture. An auditor concluded there were no other technical mistakes, but by then I was feeling conflicted about the fundamentals of genetic engineering. I also didn’t agree with certain business decisions, and I was ready for change and decided to distance myself from the field of biotechnology.

ACRES U.S.A. What enabled you to finally look closely at the consequences of the genetic modifications you made to the potato, and what did you find?

ROMMENS. I had relocated to a small farm in Colville, Washington, to breed animals and plants. I enjoyed my new work but still felt bothered about the GM crops. The questions would come up as I was tilling the ground or watering my crops so I used the evenings to re-evaluate my old papers and patents and to study the literature. It took me several years to understand the issues. For instance, I had believed that silencing one of the most conserved genes of potatoes, PPO, only caused a single intentional effect — that is, taking care of black spot bruise. Only in 2017 did I understand that PPO-silencing actually does something differently. Rather than providing bruise resistance, it hides the symptoms of tissue damage by preventing damaged tissues from darkening. A compounding factor is that melanin-deposition in normal potatoes is often an early symptom of infection, so inhibiting melanin-deposition may make it more difficult to detect infection in GM potatoes. Farmers and processors thus lost the marker they needed to identify the potatoes that were compromised. Without this marker, consumers may eat GM potatoes that are bruised and infected and may contain toxins. And given these symptomless infections, GM potatoes may complicate efforts to contain potato diseases. I started wondering why I had silenced a gene that potatoes (and numerous other living things, including people) had conserved for millions of years. I realized that PPO had to be very important for evolutionary survival. Looking back into the scientific literature, I discovered the enormity of studies demonstrating that PPO is involved in stress tolerance and found that many living things — not just plants, but also bacteria, fungi, animals and even people — need PPO to produce the melanin that protect them from stress. Imagine what would happen if we blocked a person’s ability to produce melanin. That person would become an albino and develop sensitivities to UV radiation and other stresses. In plants, numerous scientific studies have shown that PPO-silencing lowers their tolerance to diseases, pests and stresses caused by oxidation, water, drought, and so on. PPO is not silenced in potatoes’ leaves, so I expect most issues to occur in the GM potato tubers, especially when they are stored.

ACRES U.S.A. Will advances in biotechnology allow us to overcome those barriers, or do they reflect our mistaken understanding of biology?

ROMMENS. Most people overpromise and overestimate the potential of new technologies. In contrast, there are hardly any attempts to define the limitations of new technologies. This is partly due to the need to secure funding. I had to learn the hard way that the products of science and genetic engineering are not as perfect as they may seem

— that every single modification triggers not just the one obvious and intended effect, but also an unintended ripple effect that is very hard to study. At Monsanto, I worked with an excellent scientist who had developed some of the strongest insecticidal Bt genes. I admired this man. He was not just smart but also honest and sincere. He told me with all his conviction that insects would never be able to overcome his Bt toxins. I believe he said he would bet his life on it. But nature proved him wrong in a matter of two decades. I also remember the early excitement about Roundup Ready weed control. The scientists who had developed this technology would never have anticipated the speed in which weeds developed resistance to glyphosate. The devastating effects that the Roundup Ready system had on benign insect populations — in part, by decimating weeds — also came as a shock to all of us. Genetic engineering is just like chemical engineering in that it takes a lot of time to understand the many unintended effects of a product. While I would never make the claim that that there is no value in any form of genetic engineering or gene editing, it is essential to understand their limitations and risks.

ACRES U.S.A. I was surprised that you virtually never visited a farm or even an experiment station during your decades-long career as a genetic engineer. Why weren't such field visits considered to be an integral part of your work? What does that failure to leave the laboratory tell us about genetic engineering?

ROMMENS. There is a disconnection between the reality in the field versus the way that genetic engineers try to improve on this reality in the lab. Genetic engineers are intellectuals. They study the literature, talk with the experts and then decide how to change crops without really understanding these crops. I did have the GM crops tested in the field, but it is almost impossible to mimic the way that potatoes are grown by farmers. Ultimately, I believe that my failure to leave the laboratory was a matter of naïve arrogance. I assumed that I could revolutionize agriculture by changing some genes.

ACRES U.S.A. What allowed you, and presumably everyone else who worked with you, to deny your daily experience that "most GMO varieties were stunted, chlorotic, mutated, or sterile, and most of them died quickly, like prematurely-born babies?"

ROMMENS. When you are taught from the first day on, in my case in 1987, that most GM plants don't look as good as normal plants, you eventually get used to it! Instead of understanding this important limitation of the technology, you work around it by creating many more plants than you need. If you plan to test the effect of a modification in a plant, you don't just produce one GM plant; you use the same process to create dozens or even hundreds of independent GM plants. Each of these plants contains the inserted DNA at a different location in the genome. And you then focus on the few plants that seem the most similar in appearance to normal plants. These few GM plants have issues, too, but the issues are less obvious.

ACRES U.S.A. What makes GM potatoes less healthy and less vigorous than normal potatoes?

ROMMENS. Another issue I only understood after I left the industry is that the genetic engineering process compromises the integrity of plant genomes in unpredictable ways. Each GM plant contains hundreds of mutations. These mutations are removed from crops such as corn and soybeans through a process of post-transformation breeding. But, since potatoes are propagated asexually and are very complex genetically, these mutations cannot be removed from potatoes without a dramatic change in appearance. This means that the genome of commercialized GM potato varieties is inferior to that of normal potatoes. The inferiority reveals itself as yield drag and other detriments. A second problem is that each modification of potato's own genes causes an unintended ripple effect that can further affect plant performance. For instance, PPO-silencing compromises a basic stress tolerance response in plants, and it is also shown to increase the levels of alpha-aminoadipate.

ACRES U.S.A. Is that what led you to conclude that potatoes are simply not amenable to genetic engineering?

ROMMENS. Yes, I believe that GM potatoes derived from conventional varieties lost some of the qualities that made these conventional varieties so successful. This issue is specific to GM potatoes and does not apply to crops such as corn and soybeans.

ACRES U.S.A. I'm assuming that GM potatoes are propagated clonally, like ordinary potatoes. Normal potatoes remain pretty much the same from year to year. Are GM potatoes equally predictable, or given their poor vigor, wouldn't a GM line run out quickly?

ROMMENS. That is another issue. I believe there is a problem with the stability of GM traits in potatoes. The inserted DNA has certain features that make it potentially unstable. By analyzing Simplot's own data, I have to conclude that the silencing of both PPO and ASN show signs of potential instability. This instability may be due to genetic recombination or genetic inactivation. Furthermore, two other genes that were supposedly silenced don't seem silenced at all. These apparently unstable traits (PHL and R1) are hardly discussed at all in the petitions that Simplot submitted for deregulation. And the VNT gene belongs to a class of disease resistance genes that may be broken at any time by the evolving pathogens they are supposed to control, so I believe that VNT may eventually lose functional efficacy as well. Therefore it seems that the biotech traits of the GM potatoes are not as predictable as normal traits.

ACRES U.S.A. In the U.S. we've experienced an exponential increase in food allergies and autoimmune diseases in recent decades. Does your work suggest a relationship between genetically engineering crops and the rise of such health problems?

ROMMENS. I don't know. I do believe that our diet lacks diversity, and that the conversion of normal crops to GM crops further limits diversity.

ACRES U.S.A. How do you assess the regulatory process? Would you say it's skewed to give GMOs a pass, or is it equipped to catch potential issues before release to market?

ROMMENS. In the U.S. the regulatory agencies determine the safety of GM crops based on the data provided by the developer of these crops. The regulatory agencies assume that the developer is not biased. Their simple approach only requires that GM crops appear "similar," or "substantially equivalent," to their non-GMO counterparts, in terms of their nutritional profile and agronomic performance. For instance, the level of a sugar or an amino acid cannot be lower than the lowest level ever recorded for any potato, and it cannot be higher than the highest level ever recorded for any potato. Even if there are differences, as there always are, the agencies just ask for explanations or assurances that the differences are not meaningful. But GM crops may take one or two decades before an unintended issue becomes apparent. That’s why I believe the U.S. regulatory agencies should adopt the precautionary principle of the European Union, which carefully studies the risks of GM crops. Under the precautionary principle GM crops are not deregulated if scientific evidence is insufficient, inconclusive, or uncertain, or if a preliminary objective scientific evaluation indicates reasonable grounds for concern about potentially dangerous effects on the environment or human, animal or plant health.

ACRES U.S.A. In its October 2018 response to your book, your former employer J.R. Simplot Company attacked your credibility as a scientist, dismissed your concerns as false and hinted that they are malicious, and sought to distance its GM Innate potatoes from you and your work. It also defended its GM potatoes as safe and well-tested. What most troubled or disappointed you about the company’s statement?

ROMMENS. Unfortunately, my book was taken as an inconvenient threat rather than what I believe is a necessary warning. Simplot responded with indignation and then failed to address any of my concerns. If my concerns had been false, I believe that Simplot would have dismissed them immediately by presenting the facts. I am quite sure that the book surprised Simplot, and that Simplot is working very hard now to collect its own data on the questions that I raised: Is it true that PPO-silencing does not prevent bruising but conceals the symptoms of bruising, as well as of certain infections? Is it true that PPO-silencing has unintentional effects? Is the scientific literature correct in that PPO-silencing elevates the levels of certain toxins, either directly or indirectly? Is it true that the GM varieties are compromised agronomically compared to their untransformed counterparts? Are there differences in sensory profiles when GM potatoes are fried in the same way as normal potatoes? And so on. I assume that Simplot hopes to refute my concerns, or, at least to show that my concerns are manageable. But it will be difficult for the company to be truly unbiased and to take the time needed for careful analysis. I am concerned about its defensive response.

ACRES U.S.A. What should be the next step in determining the validity of the issues you’ve raised?

ROMMENS. Ideally, members of the scientific community will stand up and confirm the unintended effects of genetic engineering in potatoes — and, undoubtedly, identify other issues). Independent scientists could request GM lines and study some of the concerns I raised in my book. Dr. Jiming Jiang at the University of Wisconsin, Madison, may have INV-silenced lines, and PPO-silenced lines may be available from Dr. Louise Shepherd at The James Hutton Institute in the United Kingdom. It is also possible, of course, to study the White Russets that are sold at supermarkets and Potandon Produce. I am willing to help in any way I can.

ACRES U.S.A. In your reply to Simplot, you state that, “I never criticized the company about anything. I only criticized one person, and that is me.” What are you taking responsibility for?

ROMMENS. I take responsibility, not for what I had done, but for what I had failed to see were the unintentional consequences. I was wearing a ‘pro-biotech’ filter and did not allow myself to think critically of the genetic modifications. I should have realized that every change we made would not only have one obvious and positive effect, but also had many more elusive, negative effects.

ACRES U.S.A. Let's go back to your decision to study genetic engineering. How was genetic engineering a departure from what had drawn you to the study of biology in the first place?

ROMMENS. I don't think genetic engineering is anyone childhood's dream. I was interested in animals and plants but not in DNA. I had the feeling that genetic engineering was too intrusive. But if your professor tells you that ecology is a hobby at best, and that genetic engineering is the best way to get a decent job, then you do what seems inevitable. And you then tell yourself that you are fortunate and convince yourself that you like what you do.

ACRES U.S.A. What about your early experience manipulating genes made it "a dangerous addiction?"

ROMMENS. I felt stuck. This was my field of expertise and I not only had to succeed but also to excel. Genetic engineering began to occupy my mind. I fell asleep with unanswered questions and woke up with what seemed like answers. A little later, I lost my ability to sleep. My brain was filled with theories, dogmas, assumptions and ideas about DNA and genetic engineering. This was not a unique experience. Many ambitious colleagues had similar experiences. I am sure the same is true for other over-specialized disciplines of science and technology.

ACRES U.S.A. Did the training you received in graduate school serve to exclude understandings about biology that might challenge the premises of genetic engineering?

ROMMENS. Graduate school in Amsterdam was about one thing only: I had to publish at least four articles in peer-reviewed journals. I would receive my Ph.D. if I did, and I would be disqualified if I did not. I didn't have time to think about anything but my immediate goals. Graduate school is a little friendlier in the United States.

ACRES U.S.A. In debates about GMOs and other controversial scientific issues, the evidence presented in peer-reviewed journals plays a central role. Are we placing too much confidence in peer-review publications?

ROMMENS. I have learned to distrust publications, unless they describe very specific details of GM crops, such as the molecular structure of an insert or the level of a chemical. Publications on the general characteristics of GM crops should be taken with a grain of salt. When GM crops are described as higher-yielding, drought tolerant, salt tolerant, and so on, the data are often irreproducible, unless it's based on multi-site/multi-year field trials and good statistics. Of the hundreds of proposed genetic modifications, it is my personal experience that only a handful can be confirmed. Many publications should be retracted but they are not, because retractions are frowned upon. I believe that our scientific progress would benefit from the encouragement of retractions. Another issue with publications is that the presented data only scratch the surface. How many of them describe the sensory qualities of GM crops? How many feeding studies are performed? How many studies attempt to uncover unintended effects?

ACRES U.S.A. How have your former Simplot colleagues and elsewhere reacted to your decision to leave the firm and the field? Have you been able to engage in frank conversations with any of them?

ROMMENS. The departure of genetic engineers is a very common event. In my experience, about 10 percent are fired each year and another 10 percent burn out. Interestingly, this drain of people is a bonding experience for those who stay, and stayers almost never maintain contact with leavers. Simplot was not interested in any contact with me, and I was not interested in contact with Simplot. I had to move on and get some distance. Several years later, in 2017, after I had reevaluated my old work, I contacted Simplot again. I told the company that I had identified issues that were potentially serious, and I suggested a way for Simplot to test my concerns before I went public. Such tests might have made it unnecessary for me to go public. But Simplot was not interested in critical feedback, just like I had not been when I was still a genetic engineer.

ACRES U.S.A. How did the culture of genetic engineering keep you and your colleagues from noticing flaws in your thinking and problems with your gene manipulations?

ROMMENS. The first dogma is that the essence of life is a dead molecule (DNA) that can and should be modified at will. The second dogma is that we are acceptable members of the community of genetic engineers only if we make new discoveries and publish them and get them patented. The third dogma is that nothing else really matters.

ACRES U.S.A. Even the most careful critiques of GMOs continue to be met with charges of ignorance and anti-science bias. How do you/should we counter such attacks?

ROMMENS. Another problem with genetic engineers is their intellectual arrogance. Genetic engineers insist we speak their language. Anti-GMO activists fall in this trap by trying to word their concerns as scientific arguments. It is an impossible battle to fight. Instead of trying to talk their language, we need to be more trusting of our own gut feelings. Gut feelings may hint at issues that take many years of scientific research to be confirmed. Indeed, there is no reason that emotional arguments should not be heard.

ACRES U.S.A. After all that time not setting foot on farms, you now live on a small farm. What were you looking for when you made this move?

ROMMENS. I wanted to breed animals and plants and enjoy the silence. Growing your own crops and raising your own animals is among the greatest joys of life.

Pandora's Potatoes: The Worst GMOs by Caius Rommens is available on Amazon.