How implementing more GMO's into the farming industry will get us to our ag2030 $100 billion goal

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abstract

Australia's goal of producing $100 billion of agricultural goods is an ambitious goal that will require new innovations in farming to achieve by the 2030 deadline. Every day there are more advances in farming techniques that are working to get us closer to this goal. Techniques such as indoor vertical farming, smart farming and modern greenhouses all provide practical supply advantages that increase out crop output and help with the imminent issue of climate change. However, I believe our future lies in new genetic technologies being used to produce more sustainable and resilient crops to reach our goal as well as having a great impact on many of the climate problems too face in the future. The genetic modification of our crops will not only increase our supply and efficiency without impacting land size but have the power to adapt our crops to solve countless other issues faced by the agriculture industry that extend passed out ag2030 goal.

Direction I want to take GMO's

Although the application of genetically modified crops are already having an effect on many markets, I believe that higher application of new technologies will have great benefits and not only allow us to reach our 2030 goal, but better communities as a whole in ways previously not thought of. Firstly, I want to talk about how GMO's have already had a positive impact in communities, more specifically, in the Philippines with the example of Golden Rice. Vitamin A Deficiency was becoming a serious problem in the Philippines, with 23-34% of all children's deaths below the age of 5 being caused by the deficiencies. This lack of Vitamin A, combines with the measles outbreak at the time, lead to around 800,000 deaths and approximately 31% of children endured visual loss, 75% of which were directly linked to Vitamin A Deficiencies. Seeing these statistics, Ingo Potrykus and Peter Beyer developed by the late 90's Golden rice, A rice variant which produces its own beta-carotene, supplying 60% of ones daily vitamin A intake in one sitting. After introducing Golden Rice to the Philippines, less than 2% of children's deaths were due to a lack of Vitamin A, saving millions of lives all across South East Asia. Since then, it is no secret that issues have arisen surrounding Golden Rice to do with farmers and in some cases antibiotic resistance. However, my point is, this was developed in 1999, 23 years ago. And with new technologies like CRISPR rising up every day, and this technology becoming cheaper and more readily available to farmers, there is no doubt in my mind that it is time to start implementing these new technologies in more Australian markets than just cotton and flowers.

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Introduction to GMO's

Genetically modified organisms, or GMOs are organisms that had gene altering technologies applied to them in order to express favourable traits or the generation of desired biological products. As of now, Australia's biggest GMOs are cotton, Canola and Safflower, all being genetically modified for increased herbicide resistance, pesticide resistance and in the case of Safflower increased oil production. What makes these GMO's such an advantage to have in the agricultural sector is how they can increase productivity in ways that no other farming technique could allow. In recent years, the CSIRO have established the Crop Bifactors Initiative (CBI) to engineer Safflower seeds to contain more fatty oils in their seeds, in order to create a high value chain. Since then, the CBI have produced Safflower seeds that contain 92% oleic acid, a result that would have taken decades of selective breeding.

What makes these GMO's such an incredible solution is they can touch every field of the supply chain, solving problems that simple would not be able to be solved otherwise. More later but in summary, I believe the versatility if GMO's is what gives it an edge over other solutions that target just one aspect of the supply chain.

Direction I want to take GMO's

As of now, 7.6 million tons of food is wasted across the supply line in Australia every year and another one of Australia's goals is to halve its food wastage in half by 2030. 5% of all food in hospitality is thrown away due to spoilage. 20-40% of all fruits and vegetables don't make it to market shelves because they don't meet consumer 'cosmetic standard', not to mention all this food waste costs the Australian government over $36.6 billion to keep up with. There are investments being made into education and food waste management, however these solutions don't fix the problem that farmers still need to produce good looking, undamaged goods and that supermarkets need to produce goods that are appealing to consumers. This is part of the reason why I believe GMOs are such an appealing prospect to dealing with issues like these. Prof. Avtar Handa, buy inserting one yeast gene into a batch of tomatoes, was able to delay microbial decay and add weeks onto a tomatoes shelf life. This doubling of shelf life would not only be appealing to supermarkets, but also consumers who suddenly don't have to throw out their perfectly good tomato after a week and have a much higher likely hood of using it, rather than letting it rot.

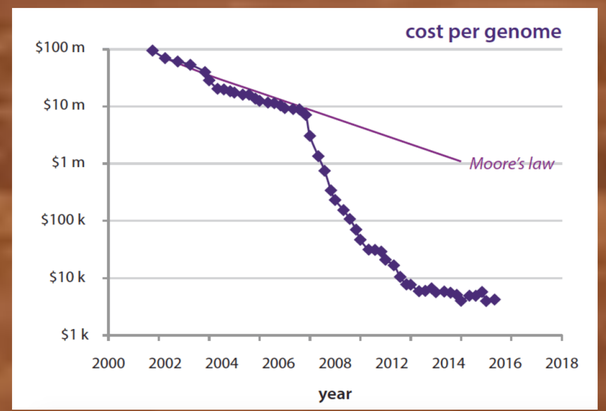
The purpose of bringing this up is it shows the of the health benefits that GMOs possess, something which, if marketed properly could have a huge impact on consumers. Being able to market fruits and vegetables that last longer in the fridge, or mushrooms with increased iron percentage so that vegans won't need supplements. Many possibilities that come from GMO's are major untapped parts of the market that I'm sure many may not exist. Better yet, the more we use these GMO's, the more we discover and innovate, it becomes cheaper and more accessible and the more efficiently we will be able to design foods that solve our wastage problems, become immune to different diseases, and help with a whole range of other market wide problems.

https://www.goldenrice.org/

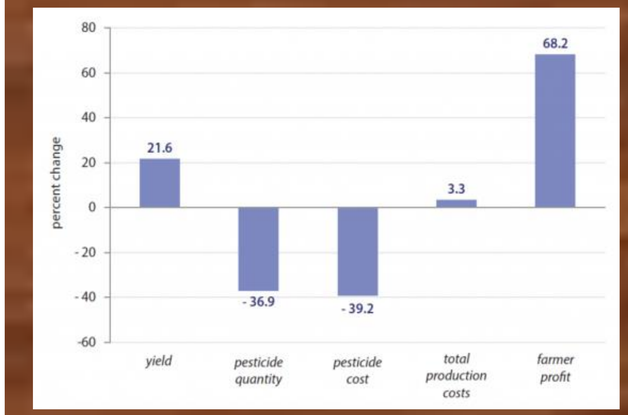
This link refers to the Golden Rice project, sharing statistics on Southeast Asia before and after the introduction of golden rice as well as its path to approval by the Filipino government.

https://www.youtube.com/watch?v=7TmcXYp8xu4

Is a link to a video (9 minutes) by Kurzgesagt – in a nutshell, summarizing how different GMOs could have different impacts in the farming industry and dispelling some issues I could not cover brought up by consumers.



This graph shows the decreasing cost of genome sequencing of different organisms. Moore's law was the predicted path this graph would take, however it is has been shown evidently that the cost per genome is much cheaper than predicted.



This graph highlights how just one gene modification, in this case resistance to pests, can turn almost a 70% profit and greatly increase sales as well as crop yield.

Collaboration with farmers

One of the biggest problems facing GMOs in agriculture is being able to collaborate with both big and small farmers to ensure that there will be equal access to these new technologies so there will be no monopolies forming of in the GMO industry. To solve this problem, I propose it is in our best interest to start innovating and start innovating rather rapidly when we do. The more varieties of crops we can introduce, the more we have to market to farmers of all varieties in all environments, including larger farming industries. The best part is, as we keep innovating, the highest profits would be placed on the newest varieties that provide the newest benefits to consumers. What this means is it would no longer be viable for companies to horde their variants and try to maximise profit would soon find themselves losing money to the most resent variant that they weren't focused on developing, naturally creating a more open market. All that would be needed to achieve this is perhaps a new program that supports the innovation of new genetic technologies that were made public and accessible to farmers of all kinds across Australia. The more we innovate the more genetic variants we will produce, the more variants we produce the cheaper and more accessible they will become for farmers, increasing the allocative and dynamic efficiencies of all farmers, as we shift to a ever moving market. The more these farmers increase their efficiencies, the more will be produced and the more will be profited, bringing us to our long-term goal of $100 billion produced by 2030.

Conclusion

In closing, reaching our goal of $100 billion by 2030 requires a solution that can impact all sectors of the agriculture industry. From minimising waste, to increasing production and making a shift to a more open market, genetically modified crops are an innovative way to bring the agriculture sector to new highs, benefiting both farmers and consumers in the process. There has never been a better time to start either, with new technologies such as CRISPR expanding our possibilities and new techniques making it cheaper with every variant, I have no doubt that these GMO's will be a panacea to all our agricultural problems.