Edible Vaccines From Plants

Injectable Vaccines

- Expensive
- Need sterile syringes
- Need refrigeration
- Need skilled staff to administer injections
- Only gives systemic immunity

Edible Vaccines

- Cheaper
- Safer
- Easy to store
- Can be grown or freeze dried
- Gives systemic & mucosal immunity
- Mucosal immunity fights infections in mucous membranes of the nose, mouth, lungs, gut & genital areas

Why Use Bananas?
- Common food in many countries
- No refrigeration needed
- More readily available
- Usually eaten raw
- They taste great
- Kids love them

Making Cholera Vaccine
- Cholera structural gene is spliced into E.coli
- E.coli multiplies, creating millions of copies
- This recombinant DNA is spliced again into Agrobacterium, a common infectious bacterium in plants
- Agrobacterium then infects the banana plant
- Banana cells produce cholera protein
- Banana cells are cloned & develop into seedlings
- When bananas are eaten, cholera proteins cause an immune response

Clinical Trial using Potatoes:
- In 2005, Dr. Arntzen gave pieces of raw potato, engineered with the protein from Hepatitis B, to 42 volunteers
- Antibodies rose in over 60% of the volunteers

Vaccines for Hepatitis B, Rabies, Plague, Norwalk Virus, Diarrhea, SARS, Cholera, Bird Flu & RSV have been engineered from:

- Potatoes
- Tobacco
- Tomatoes
- Bananas

"Father" of Plant-Based Vaccines
Dr. Charles Arntzen
Arizona State University & The Boyce Thompson Institute for Plant Research at Cornell University

World Health Organization estimates that about 10 million kids die in 3rd World countries from infectious diseases that could have been prevented by vaccination.