

CONTROLLING THE ATMOSPHERE - NEW METHODS TO ADD SHELF AND STORAGE LIFE.

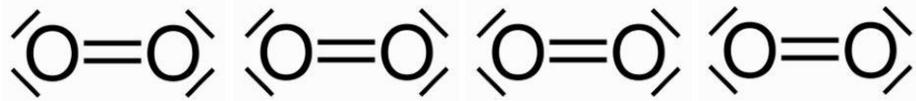
It was at an impromptu meeting in Lima in 2010 - a dozen fruit exporters and importers, Peruvian producers and packaging technicians sitting around a naked banquet table under a trade show tent - we were talking about new methods that would allow farmers to have better arrivals of fresh commodities to foreign shores with new plastics technologies. Sarah, a plastics researcher from England, said she would send us a new material she was working on to try out. A few months later, we received our first samples - hoods of blue plastic that sealed an entire pallet, and the test subject was to be, as she had suggested, a pallet of grapefruit.



We sealed the hood over the pallet, and within a few seconds it started to puff out, like someone was inside the pallet blowing up this giant balloon. Fifteen minutes later, with no intervention, we saw the opposite - now the plastic bag over the pallet was sucking in tight to the boxes, like there was a vacuum pulling air out of it. This little test was our first revelation that fruit and vegetables, even after cut, boxed and shipped, were not only live, but were hard-wired to do this – like they have little tiny brains, and were trying to control their own atmosphere - in this case by pushing out the oxygen surrounding them, and then sucking in carbon dioxide. Astounding but true, and vegans – don't stress out about this too much!

What were we witnessing? A collective decision of 3000 grapefruit in that pallet! They were not going to be able to rot and spill their seeds until it was hot and bright out - they had been in a dark truck and it was cold, so they made the mutual decision to control their own atmosphere and go to sleep until the conditions were right, sometime in the future, (so they hoped) – but this was definitely not the time to procreate! Funnily enough, as teenagers, we may have made the same decision, and just as quickly, when we heard our parent's car pull into the driveway unexpectedly early.





All fruit and vegetables (except pineapple) either contain seeds, are seeds themselves (garlic, potatoes) or are hard-wired to produce seeds at some point in their lives, and they all want to stay alive to see the process through. This is the cycle of plant life - to continue to propagate the species – no different than every living thing and being. Even vegetables after they are cut want to continue growing - potatoes will sprout in your fridge and carrots and beets will start to grow little green shoots when you leave them on the counter - desperate to meet the commitment to their species.

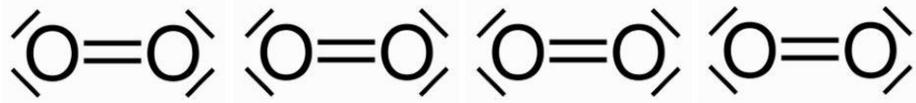
The trick with fresh produce is to sell it before a piece of fruit, in it's last gasp of life, rots, so its seed will (in theory) fall to the soil and start a new tree. Or, in the case of vegetables like root crops, sell them before green sprouts shoot out the tops of turnips and beets, or potatoes start to sprout.

Over the centuries, fruit and vegetable farmers found ways of storing apples, pears, squash, cabbage and root crops so they would hold for many, many months. Light, temperature and humidity were the three crucial controls that allowed Canadians historically to store some fruit and vegetables through our long winters. A potato has an expectation that it will sprout, root and produce a family of new potatoes when the soil starts to warm up in the following spring. Leeks start to bolt (produce seed heads) between 12 and 15 months after they were first planted, and the amount of daylight they feel is their trigger to move into reproductive mode and bolt. (Their allium family is phototropic - their growing periods are determined more by light, and not by temperature.)

80 years ago, farmers understood that oxygen was the key factor in allowing apples to store for a long period of time. Eliminating oxygen allowed fruit to go dormant for many months. The three primary gases in our atmosphere are carbon dioxide, oxygen and nitrogen. The first controlled atmosphere storage rooms for apples were designed to filter out the oxygen (hoping to reduce it from 22% down to close to 0%) and replace it with more nitrogen. You will often see "Apples CA" on price lists - this does not mean they are from California - instead it lets you know that the apples or pears were stored with very little oxygen, in a Controlled Atmosphere, and all going well, months later are as firm and snappy as they were just after harvest.

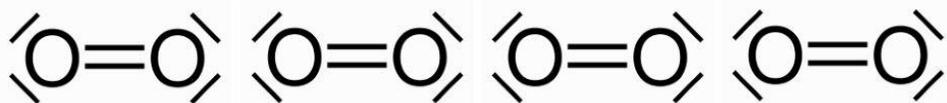
Many crops can survive a very long time in transit (especially in sea containers) if they are shipped in Controlled Atmosphere conditions, and recent improvements in gas blends can add substantial life to produce shipped by sea. For example: Chilean farmers can send cherries, blueberries, grapes and kiwis to foreign markets, including Russia and Asia, often on the ocean for up to a month, yet still have good quality arrivals. Grapes travel from Mexico to Europe, lemons from Africa to Canada etc. Good CA technology has allowed growers to ship volatile produce using sea containers instead of expensive air freight, and the carbon impact of sea container shipping compared to air freight is extremely impressive – 500 times less carbon per pound!

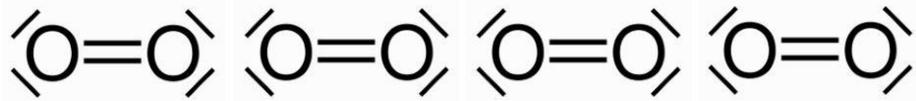




Other features have been added to both sea container transport and cold storage facilities over the past few decades. Ethylene scrubbers remove gases which fruit and tomatoes generate naturally as they ripen, to slow down that process. Generators trickle very small amounts of ozone into coolers to kill mold spores on fresh fruit - especially berries.

The idea of controlling atmosphere has also spread quickly with new packaging technology, like our grapefruit trial many years ago. Much research has proven that fruit and vegetables intrinsically know that they are at the wrong temperature or amount of light for reproduction, and will decide to go dormant hoping for better conditions - because they do want to ultimately produce viable seed - and that means controlling their own atmosphere while they wait for the promise of warmth and light - which, as produce merchants, you know is about the same time you put them out on your rack.





Modified Atmosphere Packaging use has grown substantially in the last 5 years, as new technology has created plastics with micro-pores that allow fruit and vegetables to pull carbon dioxide in through the plastic, and push oxygen out. Yes, it sounds a little like science fiction. You may receive local cherries or Mexican cucumbers now that are in these special bags - brand names on the bags include PeakFresh, Fresh n'Smart, or Stepak for example. These bags are not very expensive, and can literally add weeks to the shelf-life of zucchini, cucumbers, bell peppers and a whole range of fruit. Very few produce items do not benefit from this special plastic packaging. Expect to see more and more fruit and vegetables shipped this way in the future. Because the fruits and vegetables have simply gone dormant, their nutrition level and appearance do not change.

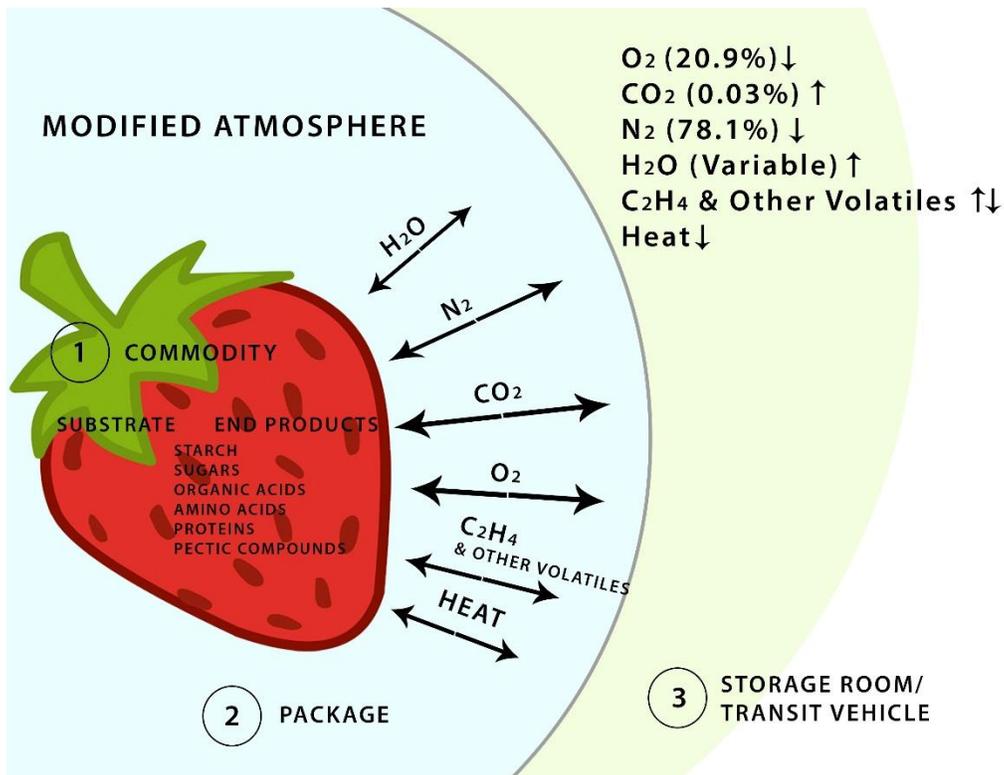
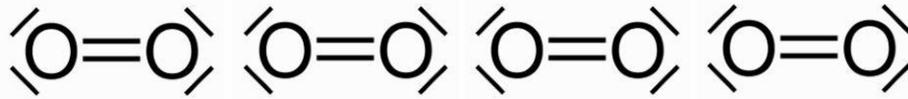


Imagine fresh broccoli harvested 20 days ago arriving crisp and perfect, without ice - or grapes harvested in May lasting until September? Our own trials have proven that even chard will go dormant and emerge from its MAP bags in perfect condition after 5 weeks. Over the past few years we have performed dozens and dozens of trials, and report back to growers when a certain bag has proven to work well. While all these technologies have given growers many options for transport, they have also substantially reduced the amount of food that goes to waste in transport and storage and cut the need for high cost and high carbon impact air freight. In fact, Sarah, who introduced us to her technology worked for an English dairy farmer whose motivation was primarily to see much more produce travel by sea instead of air, and also cut food waste.

MAP technology has extended to the processed food industry as well. That sealed package of sliced cheese or salami in your fridge has been flushed with nitrogen and other naturally occurring gases, but with no oxygen, and this modified atmosphere adds better appeal and much longer shelf life.

We are now seeing new innovations in modified atmosphere technology extend to clamshells, where the hard plastics are designed to breathe, in the same way the plastic bags in a cucumber box do. The secret is really that there is a substantial size difference between oxygen and carbon dioxide molecules and the plastics allow the fruit or vegetables to create their own oxygen-diminished atmosphere.





It's oxidation that causes cut apples or canned peaches to go brown as soon as they are exposed to air. Oxygen also is the culprit that causes metal to rust. Oxygen is actually a really bad gas, except for us mammals who would die without it. Did you ever consider that maybe we were "put on earth" simply to absorb the evil oxygen and breathe out carbon dioxide to sustain life for all the plants? Huh?

MAP bags can also be a useful tool for retailers – the ½ case of green chard or box of grapes you haven't racked yet would last a lot longer if you slid them into a MAP bag – and those bags can be re-used for up to 24 day

