NEW BIOSPHERE AGRICULTURE
Potatoes & Pumpkins

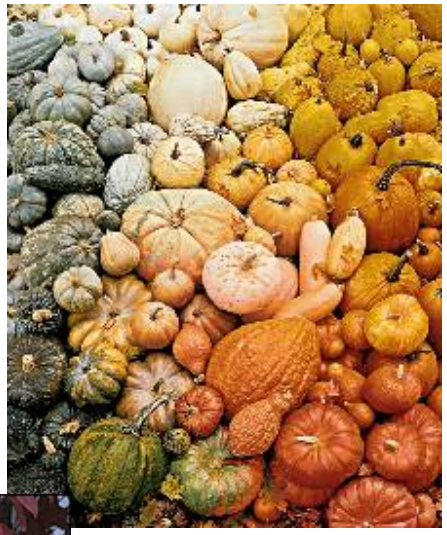
With notes on Ormus / Orme Fertilizing and Freeze Drying of Food

Varieties of

Potatoes

&

Pumpkins



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NEW BIOSPHERE AGRICULTURE – the GOAL:

It is possible to feed 2,000 people all year round from 1 acre of land, that is, 5,000 people can be fed all year round from 1 hectare of land. It is possible to do this almost anywhere on the planet. Okay, the diet may be limited however it will be nutritious, but it is possible without utilising large volumes of water, and it can be all vegetable and fruit based, with products appropriate for the community, thus complementing their existing diets.

The first objective for New Biosphere Agriculture (NBA) is to establish demonstration units of the production of appropriate vegetables and fruits. These core modules are to be demonstration units at the optimum commercially viable scales as well as demonstration of small cottage units. These demonstration units are to be training units.

A core aspect of these modules is the incorporation of viable, stable, sustainable, renewable energy supply technologies. Without a continuous supply of electricity, then these demonstration units cannot be deployed to remote and emerging communities.

Though the capital cost of establishing these units may be high, once they are in operation, their ongoing operating costs are nominal, thus once the capital equipments are installed into the remote community, they become viable within that impoverished community.

Consider bringing all these technologies together within a refugee camp of any proportions, but more appropriately, to their traditional home regions to enable their return. Train members from that community at the NBA demonstration unit whilst the equipment is being installed. Then leave the ongoing operations for the benefit of the community, whilst providing ongoing technical and administrative support.

We do not have to allow situations of mass hunger to continue. We have solutions!

PLANT PROFILE: POTATO (SOLANUM TUBEROSUM):

Solanaceae **http://www.sacredearth.com/ethnobotany/plantprofiles/potato.php**

Description

Who would have thought that the humble potato is in fact a widely travelled plant that in the course of its journey has changed world history? The potato plant originates in the high Andes, probably in the vicinity of Lake Titicaca, where native Aymara and Quetchua people are believed to have cultivated numerous different varieties, probably for about 7,000 years. In its homeland there are literally hundreds of varieties - large or small, white, pink, purple or black in colour, some hairy, others displaying carnivorous habits by growing hairs that can dissolve approaching insects. Another species merely imitates the scent of decomposing insects in order to warn off any predators.

Correspondingly, the actual potato plant also varies greatly in terms of its growth habits. Native species may be highly frost resistant or hugging the ground closely to protect themselves against the fierce winds of the high Andes. In general, the leaves are dark and deeply cut, while flowers closely resemble those of the bittersweet nightshade.

The edible part, which we call 'potato' and generally refer to as a 'root vegetable', is in fact not a root at all, but a specially adapted swollen storage organ that grows at the end of the roots and is botanically known as a 'tuber'. These tubers serve as the plant's energy storage system and consist largely of starch.

Native species of potatoes are often rather small and have many deep 'eyes', which are in fact the dormant buds from which new plants can sprout in vegetative reproduction. Potatoes are also able to reproduce sexually, through pollination, an important feature for plant breeders, who can thus cross particular varieties for their different attributes, a process that is not possible via vegetative reproduction, which produces offspring that is identical to the parent plant.

It is important to note that the green parts of the potato plant are poisonous to humans and animals due to an alkaloid known as 'solanine'. Solanine is also present in tubers that have been exposed to light and can be recognized by the green discolouration of the potato skin. It is important to remove these green parts prior to cooking and also to cut out any eyes that are beginning to sprout.

Ecology

The high Andes Mountains are an extremely hostile environment for plants. The days are short, the sun can be intense, yet the nights are often frigidly cold or freezing. Furthermore a sharp wind torments mountain plants. These environmental stresses have given rise to very particular adaptations that are able to withstand them. In the Andes potatoes are one of four major root / tuber staple crops. There are about 200 different wild types found from Venezuela to Chile, with the highest concentration around Lake Titicaca.

Indigenous farmers often plant many different varieties together in order to better withstand any possible disasters. I.e. they will grow in the same plot varieties that are resistant to draught and others that can withstand heavy rainfall and also some that are resistant to particular insect pests. In this way they can ensure that even if some of the crop fails, another part will survive and probably thrive. In general, potatoes are not very demanding plants and will grow in many different kinds of soils and environmental conditions. Although originally a high altitude crop, their adaptation to lower altitudes began early on in their cultivation history and varieties developed that were suitable for growing in the dry coastal regions of Peru. However, potatoes never adapted to the hot and humid tropics, although some varieties are found in the cloud forest.

Potatoes are not only an important food for people, but are also used to feed livestock.

History

In their native habitat potatoes enjoy a long and mutually beneficial co-relationship with humans. Their appetite for nitrogen rich soil has made them keen volunteers that enjoy the close proximity of human habitations, due to the common human habit of producing nitrogen rich waste heaps wherever they go. Thus, it is assumed that even long before people started to consciously grow them, the potato was a natural camp follower and companion plant to the pea family (beans), which fixes nitrogen in the soil.

Fossilized remains found in Chillca Canyon dating back to about 5000 BC suggest that these could have been one of the earliest cultivated types, though both cultivated and wild varieties were used. The descent to lower altitudes was a gradual one. Archaeological finds in these areas date to much later time periods, around 3500 BC.

Representations are also found in artefacts such as potato shaped urns that were placed in graves.

The ancient people of Peru revered the potato and many varieties were grown solely for religious and ceremonial purposes. So central was

the potato to the Aymara culture, that they measured time in terms of the period of time it takes to cook a potato.

The indigenous people of the high mountains were also so first to come up with an ingenious method of preserving potatoes for later use. Making use of the peculiar climatic conditions of the habitat, they developed a method of freeze drying them. At night the spuds would freeze. The following day, when they thawed again, they were mashed and watered, only to be frozen again at night. This was repeated several times until no moisture remained and the resulting substance could be ground into a fine, starchy flour that could be used for baking, but was usually added to soups and stews. This product is known as chuño and still forms a staple food for the Andean people, though it does not taste much like the 'instant potato' mixes we might be familiar with that commonly populate our supermarket shelves.

Another, similar method omitted the freezing step. The potatoes were soaked in water for an extended period of time until they had become half rotten, before being further processed. The resulting product is reported to be rather strong in flavour and may take some getting used to.

More like what we know as instant potatoes, is another product known as 'papas secas' - or dehydrated potatoes. To produce them the spuds are boiled, peeled, cut into chunks and sun dried. This form of potato constitutes a common staple, which is served with meat and stews and is especially popular in more urban and coastal areas, where it can even be purchased at supermarkets.

Potatoes also had a spiritual significance. They were associated with fertility, abundance and regeneration. Today, their ceremonial use has been transferred to the Catholic religion and they are used in the worship of the Virgin Mary on her festival day of the Immaculate Conception, which takes place in June.

The Spanish Conquistadores were the first Westerners to encounter the potato. As the story goes, Castellano, an early conquistador, and his party of looters once stormed a peasant village in the Andes. But instead of the pot of gold they were hoping to find, they only found a store of potatoes, which they believed to be some kind of truffles. This misidentification later gave rise to the German name for potatoes 'Kartoffel', which is derived from tartuffle, which denotes 'truffles'. Sometime between 1540 and 1565, they sent some back to the court of Spain as a sample of the indigenous flora of Cusco, as was their habit. This seemed to have been a red-skinned potato with large 'eyes'. The botanist Carolus Clusius was the first to describe and depict this new plant, which had large purple-white flowers. Several dispatches of potatoes were sent back to Europe from different parts of the new world and by 1570 they were being planted near the port towns where they had arrived and they were already recognized as a useful food that could sustain sailors during their arduous and lengthy sea voyages, not to forget their rich vitamin C content, which helped to control scurvy.

England was introduced to the potato via a different route. It is often said that Raleigh or Drake were responsible for bringing the spuds back to Britain, but evidence suggests that it was in fact John Hawkins in 1565, a slave merchant from Santa Fe in Venezuela. Furthermore, the type of potato he brought back was a white potato, not a purple one, like those that had been introduced to Spain.

At first there was much confusion about this new crop. The English herbalist Gerard believed potatoes to be native to north America and named it '*batata virginiana*'. He was fascinated by the plant and in his portray which precedes his 'English Herball' he is depicted with a sprig of the potato plant that shows the flowers, leaves and fruit. Sir Walter Raleigh, may have been responsible for introducing the potato to Ireland, though he is said to have known so little about the plant that he tried to eat the berries instead of the tubers.

As was the custom in those days, exotic new plants from the colonies were passed around from one royal court to another as 'royal gifts'. The potato also spread among herbalists and apothecaries, though at first ignorance was great as to how to use it. Subsequently there was much resistance to their adaptation as a food plant - which seems hard to believe, considering their present, firmly established position as the world's 4th most significant staple crop. In fact, so common are potatoes in the Western diet that most people have no idea that it was only recently introduced and most of what we now consider our national cuisines, be it in the US, Britain, Ireland, Germany, Poland or any other central European country, includes potatoes in innumerable variations. And even the emerging global 'fastfood diet' of burgers and chips, features potatoes - albeit, probably in their least healthful form.

When the potato was first introduced, acceptance did not come so easy. This may partly have been due to the fact that people recognized their relationship with other nightshade plants, and at that time Europeans were not familiar with edible species of nightshades. This family includes plants that were associated with witchcraft, magic and poisonous plants: henbane, thornapple, belladonna and mandrake were familiar and feared medieval herbs that were used for mostly dubious purposes. A Scottish clergyman deemed the potato unfit for human consumption on the grounds that it had not been mentioned in the Bible. Negative remarks from such authoritative sources as the Swiss botanist Caspar Bauhin, who declared that potatoes cause wind, leprosy and supposedly would 'incite Venus', only reinforced the habitual reluctance to accept a novel food among the peasantry.

Another factor for their initial rejection was probably biological. The species that were introduced to Europe were adapted to the short day cycle of the Andes and it took time before they adapted to the different day rhythm of Europe, which meant that the first plantations resulted in plants with long root systems and small potatoes. Furthermore, it is often reported that there was a scratching sensation when eating the tubers, which was disagreeable and believed to be harmful. This was probably due to the much higher solanine content of those early varieties.

But the nation's leaders quickly became wise to the many advantages the potato had to offer to their people and in some cases went so far as to order them to grow the crop by threat of force. By the middle of the 18th century potatoes were grown throughout Europe and proved to be a veritable 'population fuel'. **Providing far more calories per acre than the traditional staple foods, such a wheat and oats (1 acre provided about 6 tonnes of potatoes compared to 1 ton of oats or wheat grown on the same amount of space).** At last there was something that came close to 'food security' in the old World - or

so everybody thought. Potatoes saved the people in times of wars and famine and subsequently, almost magically, the population exploded. This population explosion in turn led to the social and economic revolutions that marked the early 19th century. A cheaply produced high calorie crop could feed the masses and sustain a cheap labour force.

By the early 19th century the peasant population of Ireland subsided almost entirely on potatoes (up to 200kg per capita per year were consumed!), since their greedy landlords only provided them with a miniscule amount of space on which they could grow their own foods in return for labour on the estate. What happened then is common knowledge - in 1845 disaster soon struck in the form of the infamous potato blight (Phytophthora infestans), which wiped out a large portion of the crop, leaving millions in want of food. Actually, the worst could have been avoided with a little more foresight, relief efforts and largess. But this was not the century for noble humanistic relief efforts to help the poor.

According to the Cambridge 'World History of Food'

"The blight of 1845 savaged 40% (not 100%) of the crop, but infected tubers were allowed to rot in the fields, where they incubated the spores of the following years' disasters. In 1846, ideal weather conditions for late blight aided the rapid infection of early tubers, so that barely 10% of the crop was salvaged. But in the aftermath of the less-than-total disaster of 1845, the 1846 emergency was largely ignored by the British government, which failed to suspend the Corn Laws and continued both to export Irish grain and to forbid emergency grain imports. Taxes continued to be enforced, evictions soared, and relief measures, which included food-for-work and soup kitchens, were too few and too late. Bourke (1993), among others, blamed the English as well as the Irish landlords, a well-off greedy few who benefited from the political and economic policies that impoverished the masses."

Thus, millions of Irish people died of starvation or were forced to migrate to America in search of food and labour. However, many of those who tried to leave were already too weak at the point of boarding the ships to ever stand a chance of arriving alive on the other side of the Atlantic.

It is interesting to note, that the commonly held belief that eating blighted potatoes causes no actual physical harm is in fact wrong. Recent scientific evidence has shown that consumption of blighted potatoes can cause birth defects.

Many factors have contributed to this disaster and we should learn our lesson from it. Highly cultivated potatoes become less resistant. Furthermore, monocultures that do not employ crop rotations run a great risk of depleting the soil and thus endanger the crop further. In the case of potatoes, breeding resistance into them by gene manipulation runs the risk of increasing their toxicity (remember, potatoes produce alkaloids that dispel insect pests, but these same alkaloids are harmful to humans). Excessive breeding has turned the potato into a pretty tasteless, homogenous vegetable which, due to its increased economic value (larger spuds, more yield per acre), is threatening old varieties and thus the genetic stock, a

problem that is especially serious in their Andean homeland. Loss of genetic variety harbours again the seed of disaster, as more and more people around the world have come to depend on potatoes for their sustenance.

Potato nutritional profile:

Diet faddists often regard potatoes with disdain, believing them to be fattening, but this accusation is not wholly justified. It all depends on how you prepare them and what else you eat. It is true that potatoes are a rich source of carbohydrates and as such provide the body with fuel, or calories which it needs to perform its daily chores. However, what makes them fattening is usually the fat that is used in processing them into ever popular potatoes chips (French fries) or crisps. In normal quantities, eaten as part of a balanced diet, they have great nutritional benefits, though people who are on a carbohydrate restricted diet should limit their consumption of potatoes and if they do eat them, make sure that they only eat potatoes with their nutrients preserved.

Potatoes lose a great deal of their nutritional value if they are peeled before boiling, as their nutrition ends up in the cooking water, which is then discarded. Potatoes are a rich source of vitamin C, Vitamin B6, copper, potassium, manganese and tryptophan, as well as fibre.

They also contain anti-oxidant constituents, which are very valuable in protecting the body cells against a number of degenerative diseases. Most of the fibre is found in the skin. Thus, it is best to use organic potatoes that can be boiled and eaten with the skin. Industrial potatoes are treated with quite massive amounts of pesticides, as these varieties have become very vulnerable to all sorts of pests. When buying potatoes avoid those that are already washed as the washing process destroys their natural protective coating, making them more vulnerable to bacteria and thus decay.

Potatoes should be stored in a cool, dark place, but not too cold. Don't store them in the fridge, as this turns their starches into sugar and alters their taste. Avoid exposure to sunlight, as this will encourage the potatoes to turn green and sprout, increasing their toxic alkaloid content. All green parts and the eyes should be removed before cooking. Potatoes have a tendency to oxidize quickly once they are cut and exposed to air, which will cause an unsightly discolouration. To avoid this, sprinkle them with lemon juice and cover with cold water until you are ready to use them.

Medicinal uses of potatoes

It may come as a surprise, but potatoes are not just a 'tummy filler', they also have medicinal properties that may come in handy one day. Potatoes are the sort of thing that can be found in most people's pantries and thus are a great 'kitchen medicine' for those who are familiar with their uses.

Potatoes are very alkalising and their raw juice can be taken internally to soothe peptic ulcers and excessive acidity. However, dosage should be limited to the juice of just one good sized potato per day.

Externally, boiled potatoes to can be mashed and applied as hot as can be borne, as a poultice to aching rheumatic joints. Or, better still, mash some raw potatoes, heat them up in the oven and apply as a poultice.

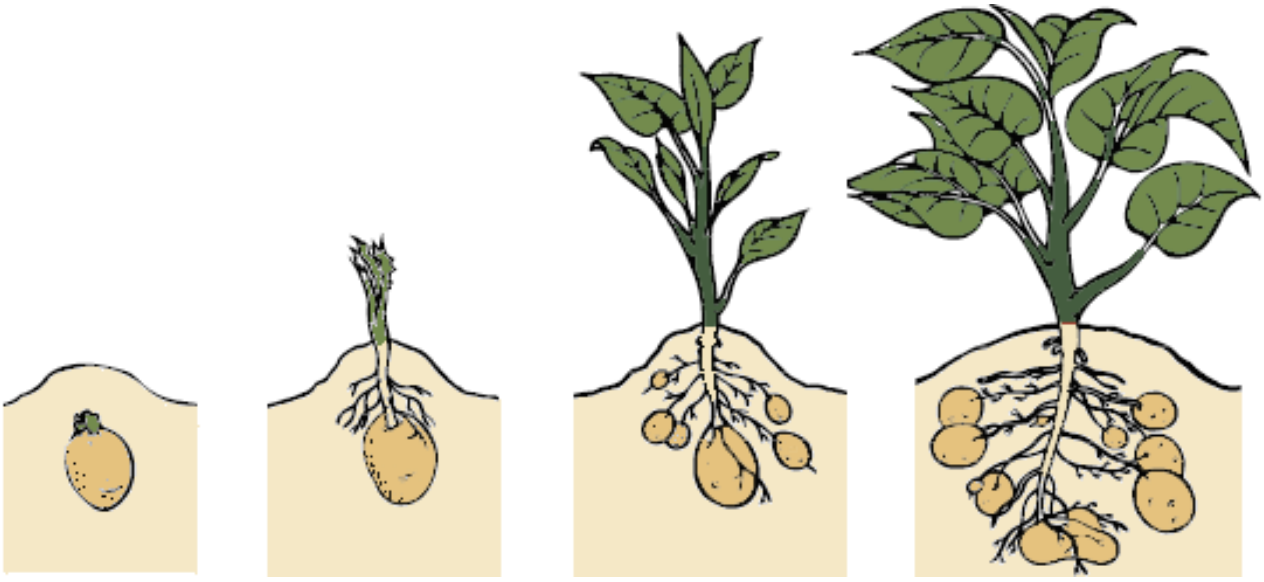
Raw mashed potatoes or even just their skins can be used as a soothing and healing plaster for scalds and burns, as well as ulcers, haemorrhoids and badly healing wounds.

Mashed potatoes are a very good and easily digested food in periods of convalescence. Cardiovascular patients should eat their potatoes without salt, to benefit from their diuretic, blood pressure lowering effect.

Other Uses:

Bio-engineers are tinkering with potato genes to create pre-cursors from which bio-plastics could be made.

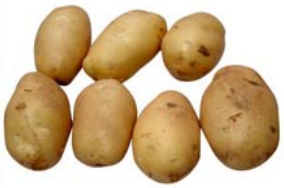
Potatoes are also used to distil spirits, such as vodka.



POTATO GROWING TOWERS:

HOW to GROW 100 POUNDS of POTATOES in 4 SQUARE FEET:

http://www.re-nest.com/re-nest/gardening/how-to-grow-100-pounds-of-potatoes-in-4-square-feet-081760

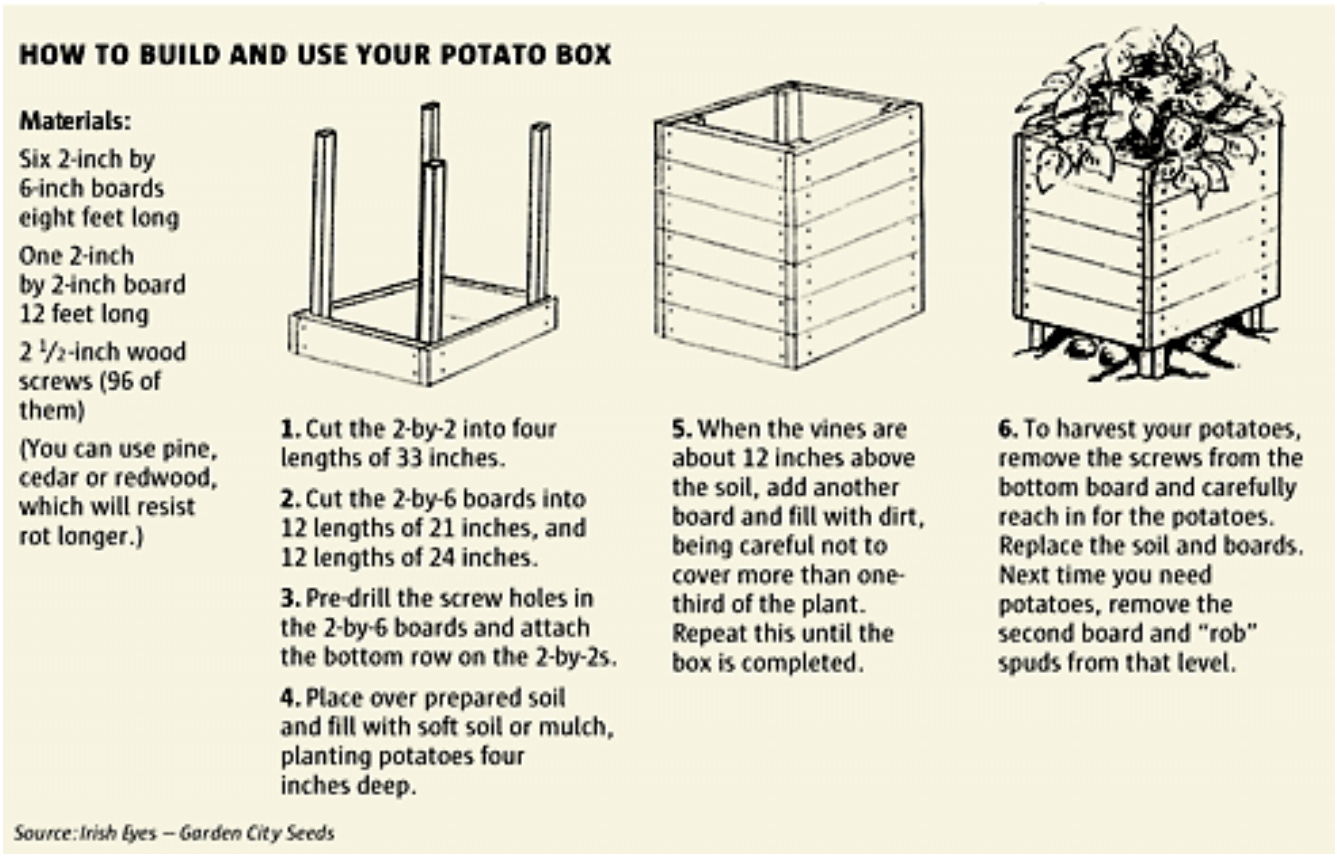


On many occasions, we've been tempted to grow our own potatoes. They're fairly low maintenance, can be grown in a pot or in the ground, last a fairly long time if stored properly, and can be very nutritious (high in potassium and vitamin C). Here's more incentive: according to this article, you can grow 100 pounds of potatoes in 4 sq. feet. Learn how after the jump...

According to this article from the Seattle Times, potatoes planted inside a box with this method can grow up to 100 pounds (45kg) of potatoes in just 4 square feet. All that is required:

- Lumber
- Seed potatoes
- Soil
- Careful attention to watering

The Times' guide for building a potato growing box yields up to a 100 lbs. of potatoes in a mere 4 square feet is shown below:



HOW TO BUILD AND USE YOUR POTATO BOX

Materials:

Six 2-inch by 6-inch boards eight feet long

One 2-inch by 2-inch board 12 feet long

2 1/2-inch wood screws (96 of them)

(You can use pine, cedar or redwood, which will resist rot longer.)

1. Cut the 2-by-2 into four lengths of 33 inches.

2. Cut the 2-by-6 boards into 12 lengths of 21 inches, and 12 lengths of 24 inches.

3. Pre-drill the screw holes in the 2-by-6 boards and attach the bottom row on the 2-by-2s.

4. Place over prepared soil and fill with soft soil or mulch, planting potatoes four inches deep.

5. When the vines are about 12 inches above the soil, add another board and fill with dirt, being careful not to cover more than one-third of the plant. Repeat this until the box is completed.

6. To harvest your potatoes, remove the screws from the bottom board and carefully reach in for the potatoes. Replace the soil and boards. Next time you need potatoes, remove the second board and "rob" spuds from that level.

Source: Irish Eyes – Garden City Seeds

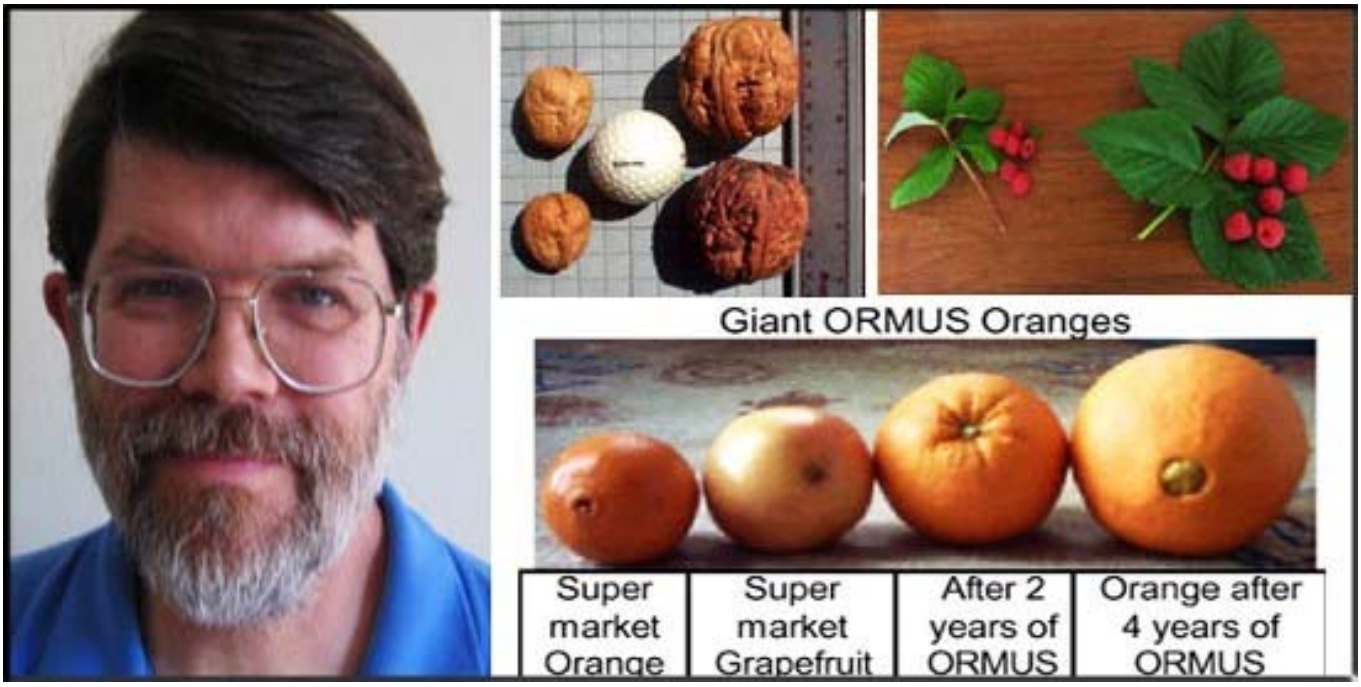
Plant as early as April or as late as August 1, with an approximated 3 month till harvest turnaround time. Here are some pointers from the article:

- Cut apart larger seed potatoes, making sure there are at least two eyes in each piece you plant.
- Dust the cut pieces with fir dust, which seals the open ends from bacteria.
- Fertilize with 10-20-20 fertilizer at planting and a couple of times during the season.
- Water so that the plants are kept at an even level of moisture.
- Don't plant in the same area in consecutive years or use the same soil to fill your potato box, as potatoes can attract various diseases.

"To save space, Lutovsky recommends building a box and planting inside it, adding sides to the box as the plant grows and filling the new space with mulch or soil. When the plant blossoms, it starts setting potatoes in this added soil. Soon after that, you can start removing the bottom boards from your box and "robbing" the plant, reaching in carefully and pulling out new potatoes."

And if you're unsure of the nutrition content of potatoes, here's a handy label, compliments of the US Potato Board:

ORMUS:



Barry Carter (USA), supported by Dennis Cooney (Gold Coast, Australia), makes available the natural fertiliser known as Ormus.

Ormus - what is it?

- Is Ormus a **superconductor** at room temperature?
- Is Ormus a **superfood** for plants, animals and people?
- Is the physical **youthing and happiness** commonly reported just a "placebo effect" when people have regular Ormus?

ORMUS is also known as o.r.m.e. (orbitally rearranged monoatomic elements), white powder gold, m-state elements and monoatomic gold. It may be the same substance/s that the ancients referred to as manna, shewbread, ch'i, prana, the Philosopher's Stone, shemanna and the Fountain of Youth. Barry discusses how these materials have been extracted from the air, water, soil, rock and some foods. He also describes how ORMUS researchers have observed levitation, superconductivity, agricultural, biological and psychic effects associated with these materials—and believes that these materials are going to change every aspect of human life and possibly the greatest scientific discovery in human history.

Ormus is to be made available to New Biosphere Agriculture families.

Pumpkins

Walnuts

Plums

ORMUS Plants by Barry Carter

In early May of 1997 I learned about a gentleman from the Northwest who knew of some new techniques for making ORMUS. I learned of this gentleman from an ORMUS colleague named John. John and I arranged to drive up and meet with this fellow.

When we got there we were greeted by a short, dark haired fellow in his late fifties. He gave us permission to record our conversations but requested that we keep his name and contact information anonymous. When we eventually put the methods that he taught us on the Internet we decided to call this gentleman the Essene because he did not want his real name revealed.

The Essene told us that he has always remembered a past life as an Essene on the Dead Sea. (Such impressions of such a life is conveyed by spirit to the person misunderstanding the source.) He said his first memories of this came when he was living on the coast as a child.

He said that at the age of six, he was allowed to go fishing on the pier by himself. He caught some fish and put them in a bucket but decided to dump them and fill the bucket with ocean water instead. He took this water home and added lye to it till precipitate fell out. Remembering the process from his life on the Dead Sea, he washed the precipitate and ate it. He says that he has been eating this in one form or another till the present.

We learned how to make the white precipitate of sea water using the Wet Method from the Essene on May 18, 1997.

About a year after my first visit with the Essene I wrote an article on ORMUS in Paramagnetic Forest Soils in which I speculated that ORMUS might have amazing agricultural and ecological benefits if applied to plants.

I actually visited the Essene at his place four times. The third time I visited him in October of 2000 he showed me some giant walnuts that he said were grown using the Wet Method ocean water precipitate

as a mineral supplement. He called this precipitate C-11 (or Sea-11) because he said it contains eleven m-state elements from sea water.

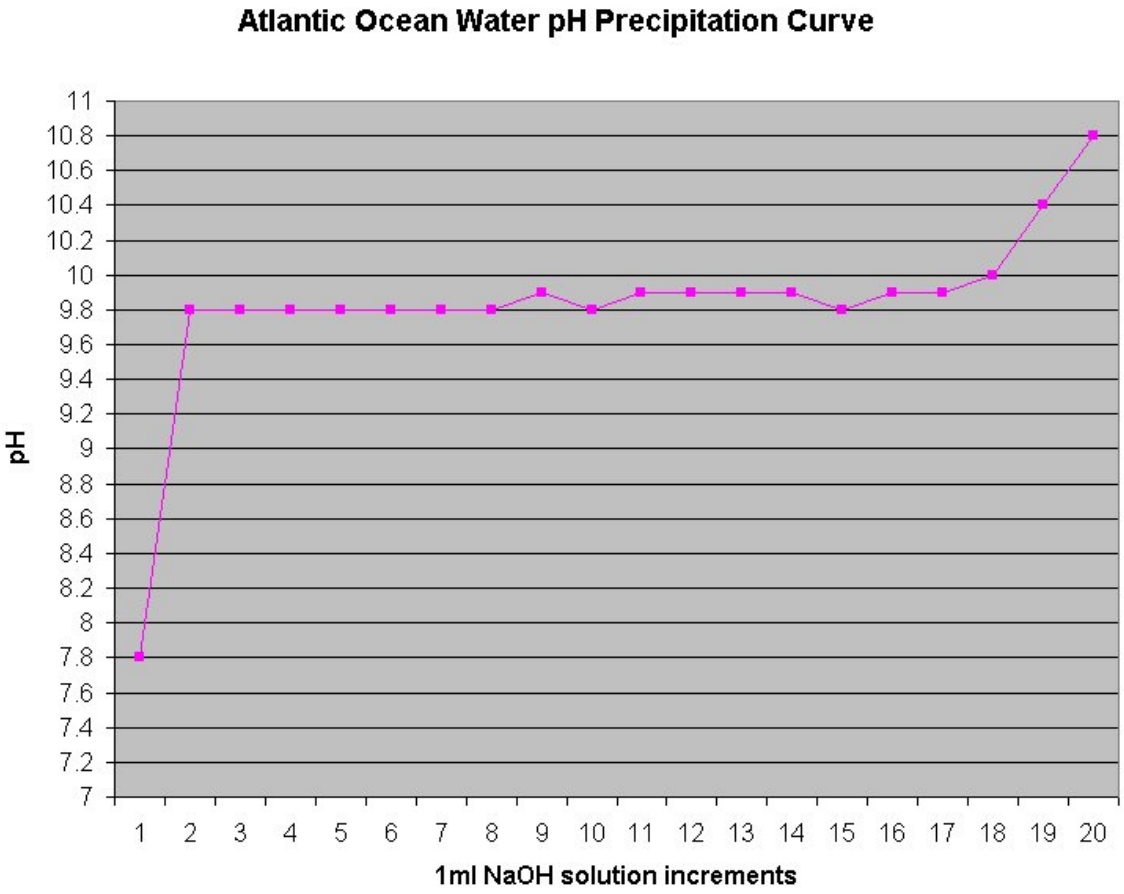
You can read the story of these giant walnuts here:

M-state Walnuts by Barry Carter

The benefits of ORMUS for plants are generally best realized by the Wet Method precipitate from salt sea water. Here is the Wet Method in review:

- Slowly bring the pH of ocean water, Dead Sea water or raw sea salt (dissolved in water) up to pH 10.78 and no higher using a tablespoon of lye (sodium hydroxide) dissolved in ½ cup water.
- Let the resulting precipitate settle, siphon the clear water off the top and add fresh water to wash it.
- Repeat the second step three or four more times.

As the pH is raised to 10.78 you will notice that the pH seems to hang for a long time around pH 9.8 - 9.9. This happens because the lye cannot raise the pH as long as it is being used up in reaction with the ORMUS and magnesium in the sea water. This pH curve looks something like this:



You can also purchase the precipitate from the ORMUS providers which are listed at:
http://www.subtleenergies.com/ormus/tw/sources.htm#2

Once you have the precipitate it is very important to apply it at the appropriate rate. It is typically applied at the rate of one to three gallons per acre (ten to thirty one litres per hectare) for each crop. (This is usually just once a year for trees but will be with each planting for grasses which get multiple cuttings.)

I have calculated the application rates for ORMUS precipitate in agriculture and Sea-Crop, one of the ORMUS providers, also has a page on this at:
http://www.sea-crop.com/application.html

My fourth visit with the Essene in October of 2001 corresponded with the visit of one of the ORMUS producers. He started making the C-Gro (now Sea-Crop) product in 2004. You can see pictures of some of the results of using this product on plants at:
http://www.subtleenergies.com/ormus/tw/c-groplants.htm
http://www.subtleenergies.com/ormus/tw/pears.htm
http://www.subtleenergies.com/ormus/tw/alfalfa.htm

and on the Sea-Crop site.

In August of 2003 I gave a series of presentations on ORMUS in North and South Carolina. These presentations were arranged by Dana Dudley. After hearing about how to do the Wet Method in one of my workshops Dana told me that she was working with some folks who had been using ORMUS precipitate from Great Salt Lake water for plants. Dana contacted these folks and got some ORMUS Oranges from them. These oranges were four and a half times as large as ordinary supermarket oranges.

Home gardeners are also sharing amazing results with the use of ORMUS precipitate on their plants. If you are interested in documenting and sharing the results you are getting with plants I have created a page with helpful suggestions at:
http://www.subtleenergies.com/ormus/tw/documenting.htm

At one of my ORMUS Workshops on May 16, 2004 I showed some folks how to make the ORMUS precipitate with Dead Sea salt. I gave the precipitate I made to several people and one of these people, a woman named Jane, wrote me a note telling me what she had done with the precipitate I made:

From: Jane
Subject: The Rose
Date: Sun, 18 Jul 2004 12:35:00 -0700

The roses are still alive, and growing. The first went into ORMES right after your second workshop in Kingston [May 16]. The second went into the same solution a month later. Both were cut long stem roses from the supermarket.

In October of 2004 Jane sent me a video description of this rose plant. The cut rose was still alive and growing in a bottle of water five months after her husband gave it to her.

A gentleman named Ted had several plant boxes on his deck. A couple days after he heard me talk about ORMUS at a lecture in Ashland on May 2, 2005 Ted watered his plants with Pacific Ocean ORMUS precipitate. When I returned to Ashland on May 20, 2005 Ted gave his report on the effects of the precipitate on his plants.

From all of these observations we are quite confident of the following results:

- Cellular respiration is increased
- Phototropism is increased
- Increases photosynthesis
- Increases carbohydrate content of sap
- Increases soil micro flora
- Increases nitrogen fixing bacteria in soil
- Increases phosphorous leaching fungi
- Improves soil tilth and aeration
- More resistant to insects and disease
- Has saved diseased orchards
- Less need for pesticides
- More drought tolerant
- More transplant tolerant
- Fruit is larger and better tasting
- Produce lasts longer on the shelf
- Mineral and vitamin content increased
- Plants produce sooner
- Crop yields are increased
- Application is easy
- Application is inexpensive
- Organic
- Non-toxic
- More resistant to freezing

There are also indications that animals receive great benefits from eating plants which have been grown with ORMUS. In an on-line book titled HEALTH & SURVIVAL IN THE 21st CENTURY by Ross Horne we find the following passage:

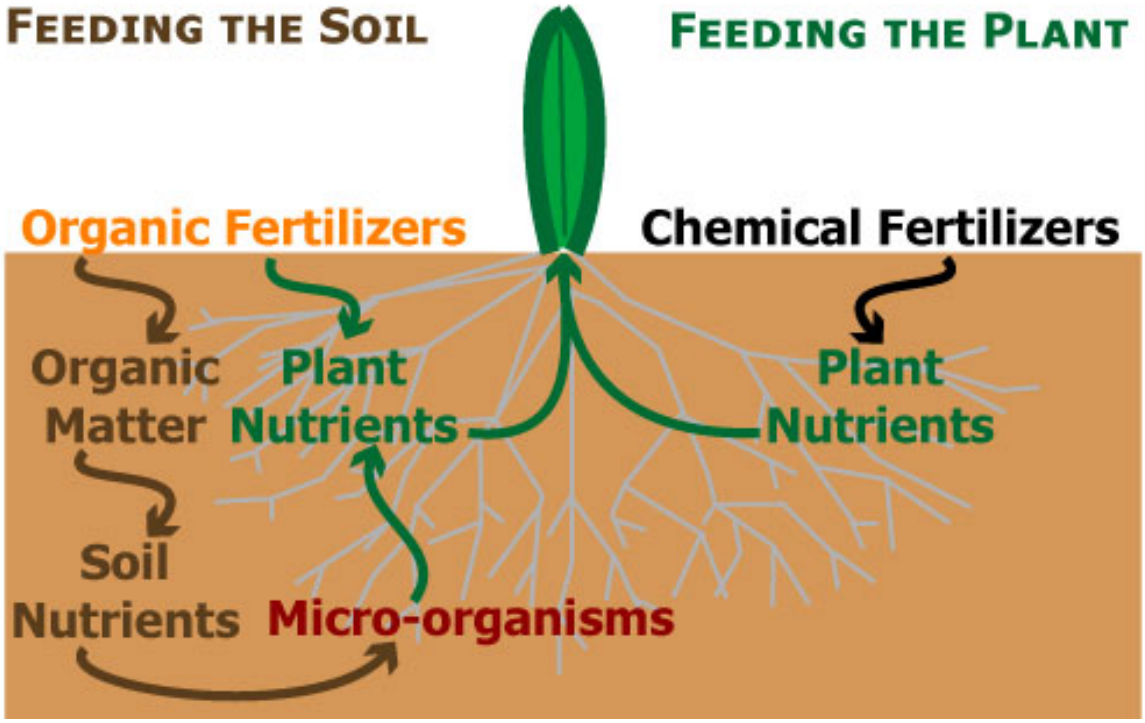
Started feeding mice both experimental and control, food that was raised on the Ray Heine and Sons Farm. The experimental food had been raised on soil fertilized with 2,200 pounds (per acre) complete sea solids. The control food was the same as the experimental with the exception that it was not fertilized with complete sea solids. The food consisted of a combination of one part soybean, two parts oats, four parts corn, balanced food proteins, carbohydrates and fats for mammals.

C3H mice were obtained for this feeding experiment. This strain of mice has been bred so all the females develop breast cancer which causes their demise. The mice were two months of age when received and started on the feeding experiments. The life expectancy of this strain for females is no more than nine months which included the production of two or three litters. The experimental and control groups both consisted of 200 C3H mice and those fed on control food were all dead within eight

months seven days. The experimental mice that were fed food grown on the sea solids fertilized soil lived until they were sacrificed at 16 months; definitive examination revealed no cancer

Though this experiment was done with whole sea solids (including the salt) I think we can presume that these benefits will also apply to animals that eat plants grown with the ORMUS precipitate.

Ormus is the complete periodic table of minerals, in a balanced state, as delivered by the world's oceans.



PUMPKINS make a tasty and nutritious addition to many meals and are relatively easy to grow in the home garden. Jerry Coleby-Williams shares his top tips and advice for growing these wonderfully versatile golden vegetables.

Gardening Australia magazine, May 2007

http://www.abc.net.au/gardening/stories/s1975765.htm

Pumpkins (*Cucubita spp.*) are members of the Cucurbitaceae family along with zucchini, gourd, squash and cucumber. Technically a fruit, pumpkins have been in cultivation for more than 5,000 years. This diverse group of frost-tender annuals and perennials has varied shapes, sizes, colours and patterns. Individual fruits can weigh from 1–600kg. The largest pumpkin on record was grown in the USA, weighing 667kg.

Getting started

Pumpkin vines need fertile, compost-rich, well-drained soil in full sun and are most easily grown as ground-cover plants. Bushy varieties, like Golden Nugget, can be container-grown, but most are too vigorous for pots. Vines can be trained over frames provided they can support the weight of the heavy fruit.

In frost-free tropical and subtropical gardens, pumpkins can be grown all year round. In temperate Australia plant or sow outside after the last frost. In cold climates sow pumpkins indoors or in a glasshouse so they can be planted immediately after the last frost to gain the full benefit of short summers.

Diverse varieties

The diversity of pumpkins equals that of tomatoes. Golden Nugget is best for small gardens. For gardeners who want record-breakers, Atlantic Giant produces massive fruit. Jap suits the tropical north, while Butternut crops reliably anywhere. Turk's Turban is an exotic-looking pumpkin (although its flavour is a little dry). There are Australian regional varieties, too. Beaudesert Blue and Queensland Blue come from Queensland and Jarrahdale is from Western Australia.

Planting and growing

Pumpkin seed needs a soil temperature of 20˚C for germination. Raise seedlings by sowing them individually in 10cm pots and plant when pots are filled with roots. Alternatively, sow seed or plant seedlings into mounds of rich compost formed over loosened soil. Plants take 70–120 days to mature. As pumpkins are shallow-rooted they need regular watering in dry or windy weather. Even moisture helps prevent fruit splitting.

Pumpkins produce short-lived male and female flowers that can close by mid-morning. Female flowers open above the swollen, distinctive embryo fruit and male flowers produce pollen. Native and honey bees are normally able to complete pollination, but sometimes ants harvest pollen before this occurs. High temperatures can affect fruit formation – over 30˚C, hand pollination is useful for improving fruit

set. To hand pollinate, pick male flowers, remove petals then dab pollen on the stigma of female flowers. Squeezing female flowers aids pollination in wet weather.

Adults and the larvae of leaf-eating ladybirds, which are also known as 28-spotted ladybirds, eat pumpkin leaves, so hand-pick them regularly. Watering in the morning and spraying fortnightly with a solution of one part cows milk to 10 parts water helps prevent mildew. Mildew-eating ladybirds, which are patterned with yellow and black bands, help control mildew naturally.

Harvesting and storing

Pinch out growing tips of rambling stems to contain plants. When fruits are finished swelling, remove them with as much of the stalk as possible. Ripe fruits with unbroken skin store very well if kept in a cool, dry, well-ventilated space. Seed can be saved from fruit one month after harvesting them. Scoop seed from flesh, wash, dry and store in a cool, dry spot away from sunlight. To ensure seed-grown progeny comes true, save seed from one variety grown in isolation.

Pumpkin Nutrition Facts

The following is the nutrients present in one cup of cooked, boiled and drained pumpkin:

Nutrients	Amount
Protein	2 grams
Dietary Fibre	3 grams
Carbohydrates	12 grams
Calories	49 Kcal
Vitamin A	2650 IU
Vitamin C	12 mg
Vitamin E	3 mg
Niacin	1 mg
Folate	21 mcg
Iron	1.4 mg
Calcium	37 mg
Potassium	564mg
Zinc	1 mg
Magnesium	22 mg
Selenium	0.50 mg

Pumpkin Nutritional Benefits

Carotenoids, present in large amounts in pumpkin, boost the body's immune system and help in keeping a person healthy and strong. Cucurbitacin is an active ingredient in pumpkins. It is very useful in preventing urinary tract infections and prostate cancer. Chances of a person having a stroke are reduced

because of the presence of beta-carotene in pumpkin. Beta carotene is an anti-inflammatory and a strong antioxidant, which prevents cholesterol from settling on the arterial walls. The dietary fibre in pumpkin assists in maintaining proper bowel movement. Alpha-carotene found in pumpkin has the ability to slow down the aging process along with preventing the formation of cataract in eyes. A major eye disorder, macular degeneration, can be avoided by consuming pumpkin. Pumpkins are rich in potassium, which keeps the heart beat healthy and also reduces chances of hypertension. Zinc improves bone density and is essential to maintain the body's immune system. Magnesium helps regulate blood sugar levels in the body and also helps in preventing many heart diseases. Pumpkins, being low in fat and high in water content, are a great snack for people who are weight conscious. Eating pumpkin is also recommended to people suffering from gastroenteric diseases. Including mashed pumpkin in their daily diet helps them to recover quickly as pumpkin helps in curing the ulcer scars faster.

Pumpkin Seeds Nutritional Benefits

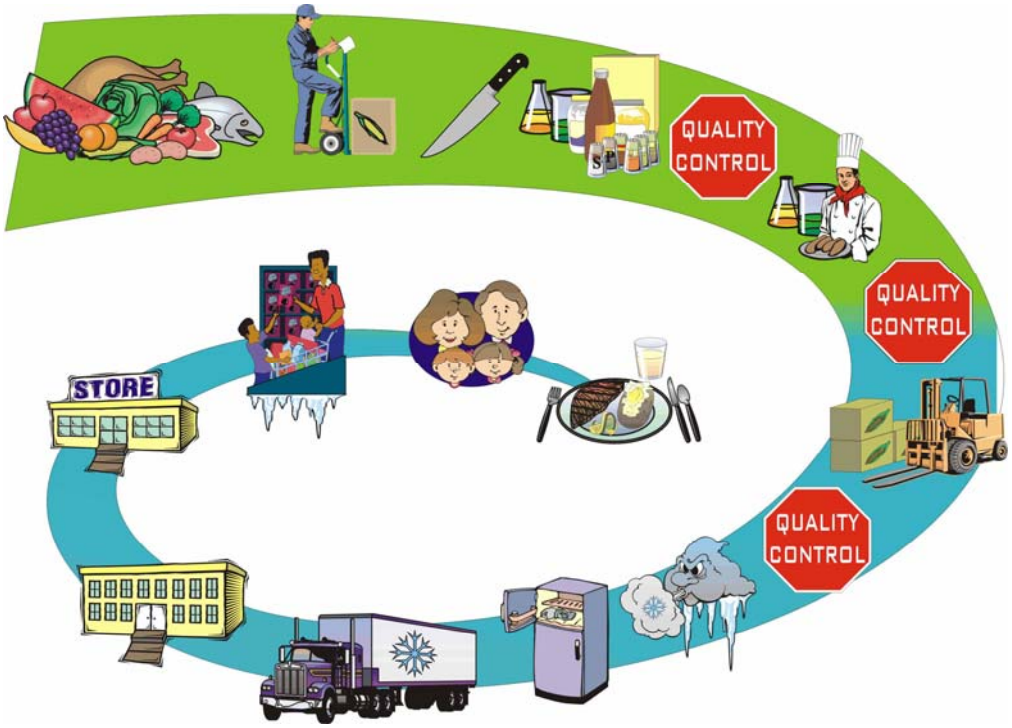
The best part about pumpkins is that even its seeds are highly nutritious. Pumpkin seeds, also known as *pepitas*, have been used since ancient days to treat various parasite infections and kidney problems. Pumpkin seeds are also known to facilitate better functioning of the brain. The phytosteroids present in pumpkins help in preventing certain kinds of cancers. Apart from these, pumpkin seeds are also rich in magnesium, iron, amino acids, vitamin K and zinc which provide numerous other health benefits. Pumpkin seeds are a great snack and can be eaten raw as well. People, however, do like to consume roasted pumpkin seeds or mix them in other foodstuffs like cereals, salads and bread. Read more on pumpkin seeds nutrition and how to cook pumpkin seeds.

Since pumpkins provide tremendous health benefits, it makes sense to include them in the daily diet. Pumpkins being versatile, can be included in a variety of foodstuffs. Apart from the usual pumpkin pie, innovative pumpkin recipes like pumpkin soup, pumpkin pancakes and pumpkin pudding can be tried.

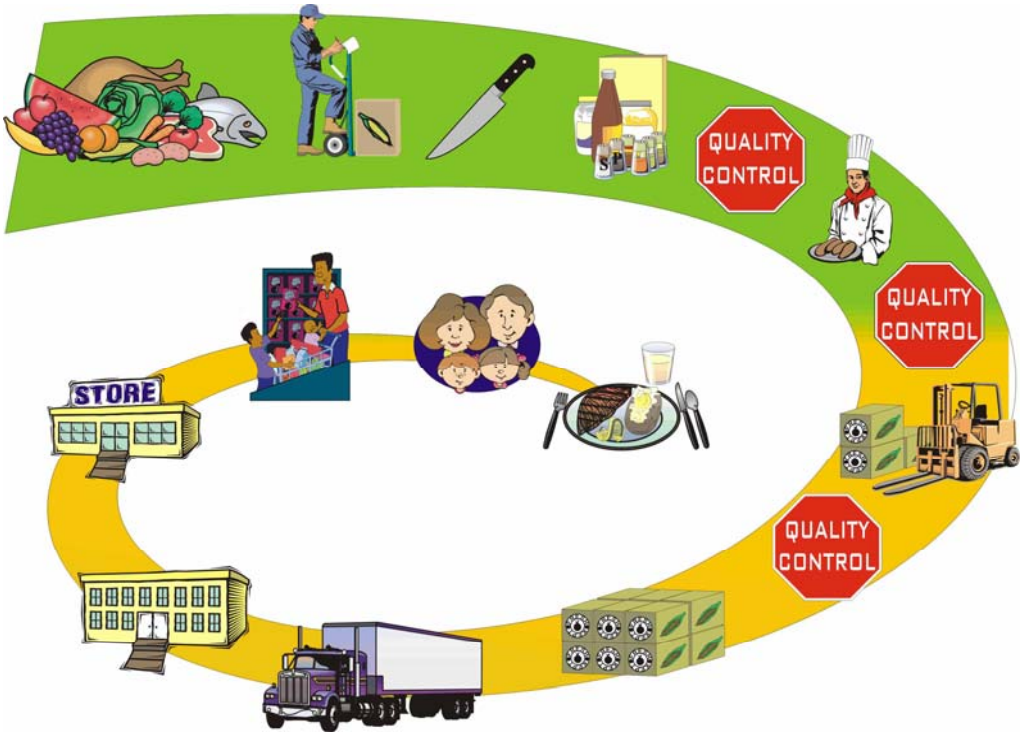
Pumpkin, being an attractive fruit, makes it a favourite among kids as well. Also, pumpkin nutrition the kids receive from its consumption helps them in their growing years to build a strong body along with developing a highly potent immune system to fight diseases.

FROZEN and FREEZE DRIED CHAINS:

Frozen Chain



Freeze Dried Chain



FREEZE DRYING PROCESS:

Freeze drying is a process which is suitable for a wide variety of industrial products. These include agrochemicals, pharmaceutical intermediates, biological products, foods and flavourings.

The purpose of freeze drying is to remove a solvent (usually water) from dissolved or dispersed solids. It is an excellent method for preserving materials that are unstable in the presence of water. In addition, freeze drying can be used to separate and recover volatile substances and to purify materials.

The freeze drying process is particularly suitable for products which are sensitive to heat, subject to oxidation, or shear sensitive.

Once freeze dried, food products have the following benefits:

- **Appearance** Freeze dried foods maintain their original shape and texture, unlike air dried foods which shrink and shrivel due to high temperature processing. Just add water and in minutes the food rehydrates to its original form.
- **Taste** Tastes as good as fresh. Freeze drying removes the water, not the flavour. So freeze dried foods retain virtually all their fresh food taste, vitamins and nutritional content.
- **Weight** Weighs less than fresh. Freeze dried foods have 98% of their water removed. This significantly reduces the food's weight, making it easier to handle and less costly to transport. For example, 3kg of chicken weighs only 1kg after freeze drying, and rapidly rehydrates back to its original weight.
- **Long Shelf Life** Freeze dried foods can be stored for months or years at room temperature without deterioration or spoilage.
- **Low Storage Costs** Because it can be stored at room temperature, freeze dried food does not require costly cold or chilled storage facilities, making it much cheaper to store.

Today, Oregon Freeze Dry is the world's technological leader in freeze-drying. Their freeze-dried ingredients are key components in the products of some of America's largest food companies. Their private label lines include such products as lunch and dinner entrees for the Nutri/System weight-loss program. They are a major supplier to the military, and their Mountain House® brand continues to be the favourite of backpackers and campers. Oregon Freeze Dry's Advanced & Specialty Products division processes pharmaceutical and specialty chemicals, medical devices, cultured microorganisms, enzymes, and other sensitive biological materials. For these products, freeze drying creates functional properties unattainable by other drying methods.

Oregon Freeze Dry is located on a 35 acre site in Albany, Oregon, and employs over 250 people, has internal R&D and

engineering support available to assist in the development and scale-up of commercial products. Their modern research and development centre is equipped with basic research facilities, development kitchens, and pilot processing and packaging equipment. Product and processing development - from prototyping new concepts to developing full-scale manufacturing systems - is one of our strengths.

The Freeze Drying Process

Freeze-drying has several advantages over other food preservation methods.

Frozen foods retain fresh flavour and nutritional value, but require uniform, low temperature storage conditions. Dehydrated and canned foods are shelf-stable, but high-temperature processing can degrade flavour, texture and nutritional content. Freeze-drying combines the best of these processing methods. It preserves freshness, colour and aroma similar to frozen food, while providing the shelf-stable convenience of canned or dehydrated food. Freeze-dried foods:

Taste fresh. Freeze-dried foods, like frozen, retain virtually all their fresh-food taste and nutritional content. Freeze-drying removes the water, not the flavour.

Look fresh. Freeze-dried foods maintain their original shape and texture, unlike dehydrated foods, which shrink and shrivel due to high-temperature processing. Freeze-drying removes water under low temperatures (typically a maximum of 100°F to 130°F), which keeps intact the moisture channels and food fibres. Just add water, and in minutes every fresh food detail returns.

Weigh less than fresh. Freeze-dried foods have 98% of their water removed. This reduces the food's weight by about 90%. Mountain House products light weight and compact so you can carry several days of food in a small backpack.

Stay fresh. Freeze-dried foods can be stored at room temperature, without deterioration or spoilage. This is because freeze-drying and packaging remove both water and oxygen - the two primary causes of food deterioration. Mountain House, backpacking products are immediately packed in a unique moisture and oxygen-barrier packaging to preserve the food's flavour, texture, colour, and nutrients. To "double" ensure freshness and prevent the food from turning rancid, an oxygen scavenger packet is placed in each pouch. The oxygen scavenger consists of iron oxide, which absorbs oxygen within the pouch. This product is not harmful to your health, but is not meant to be eaten.

Almost any food, from apples to zucchini, can be freeze-dried. So can entire meals, such as omelettes, hamburgers, over 400 different foods and beverages.

In the freeze-drying process deep-frozen products are dried at temperatures below -18°C (0°F).

No thawing of the product takes place and its quality is preserved.

Atlas is the world's leading supplier of freeze-drying equipment for the coffee and food industry. Atlas designs and delivers complete coffee freeze-drying plants, and the leading coffee brands are in fact freeze-dried by Atlas equipment.

Freeze drying is a superior preservation method for a variety of foods and food ingredients. Atlas freeze driers set the world standard for design, operation and quality. The delivery program includes plant sizes ranging from pilot scale to large industrial batch and continuous plants.

FREEZE-DRYER MACHINERY FOR FRUITS & VEGETABLES

There are indeed not many companies manufacturing food-production freeze-dryers. Here, however, are the most prominent ones in the market.

Cuddon
<http://www.cuddon.co.nz/> - the products of this company also came up in sites belonging to companies already freeze-drying food items.

Chang Jung Machinery Co., Ltd.
<http://www.foodmake.com.tw/>

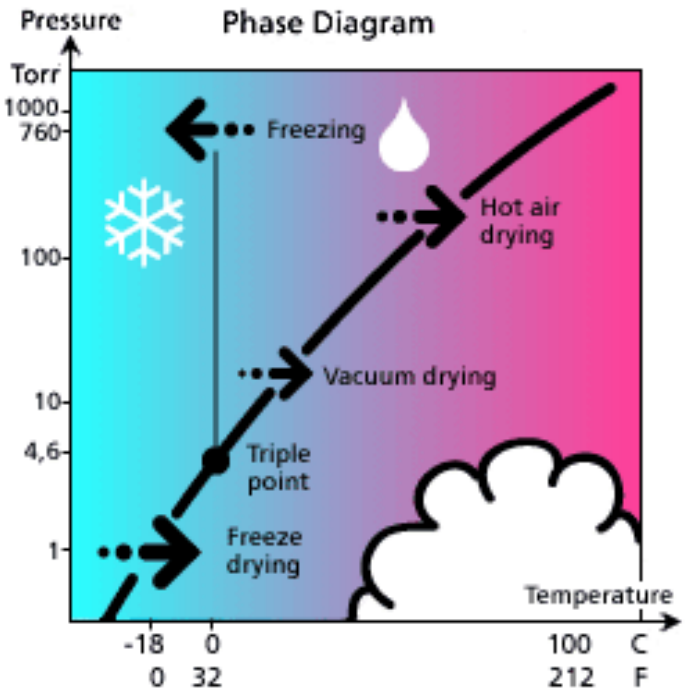
Frozen in Time
<http://www.freezedriers.com>
Food specific description:
<http://www.freezedriers.com/food.htm>

Martin Christ
<http://www.martinchrist.de/homeme.htm>
Food specific are the "Production Freeze Dryers"

Zirbus
<http://www.zirbus.de/default_e.htm>

Lyophilization Systems
<http://www.lyogroup.com/pages/1/index.htm>

TelStar
<http://www.etelstar.com/>
Look up for "Production Freeze Dryers"



FREEZE-DRYING & FREEZE-DRIED FOOD

By Mary Bellis

The basic process of freeze-drying food was known to the ancient Peruvian Incas of the Andes. Freeze-drying, or lyophilization, is the sublimation / removal of water content from frozen food. The dehydration occurs under a vacuum, with the plant / animal product solidly frozen during the process. Shrinkage is eliminated or minimized, and a near-perfect preservation results. Freeze-dried food lasts longer than other preserved food and is very light, which makes it perfect for space travel. The Incas stored their potatoes and other food crops on the mountain heights above Machu Picchu. The cold mountain temperatures froze the food and the water inside slowly vaporized under the low air pressure of the high altitudes.

During World War II, the freeze-dried process was developed commercially when it was used to preserve blood plasma and penicillin. Freeze-drying requires the use of a special machine called a freeze-dryer, which has a large chamber for freezing and a vacuum pump for removing moisture. Over 400 different types of freeze-dried foods have been commercially produced since the 1960s. Two bad candidates for freeze-drying are lettuce and watermelon because they have too high a water content and freeze-dry poorly. Freeze-dried coffee is the best-known freeze-dried product.

The Freeze-Dryer

Special thanks goes to Thomas A. Jennings, PhD, author of for his reply to the question, "Who invented the first freeze-dryer?"

"Lyophilization - Introduction and Basic Principles,"

There is no real invention of a freeze-dryer. It appears to have evolved with time from a laboratory instrument that was referred to by Benedict and Manning (1905) as a "chemical pump". Shackell took the basic design of Benedict and Manning and used an electrically driven vacuum pump instead of the displacement of the air with ethyl ether to produce the necessary vacuum. It was Shackell who first realized that the material had to be frozen before commencing the drying process - hence freeze-drying. The literature does not readily reveal the person who first called the equipment used to conduct this form of drying a "freeze-dryer". For more information on freeze-drying or lyophilization, one is referred to my book "Lyophilization - *Introduction and Basic Principles*" or to the INSIGHTs that appear on our web site.

Thomas A. Jennings - Phase Technologies, Inc.

Dr. Jennings' company has developed a number of instruments that are directly applicable to the lyophilization process, including their patented D2 and DTA thermal analysis instrument.

Freeze-Dried Trivia

Freeze-dried coffee was first produced in 1938, and lead to the development of powdered food products. Nestle company invented freeze-dried coffee, after being asked by Brazil to help find a solution to their

coffee surpluses. Nestle's own freeze-dried coffee product was called Nescafe, and was first introduced in Switzerland. Tasters Choice Coffee, another very famous freeze-dried manufactured product, derives from a patent issued to James Mercer. From 1966 to 1971, Mercer was chief development engineer for Hills Brothers Coffee Inc. in San Francisco. During this five-year period, he was responsible for developing a continuous freeze-drying capability for Hills Brothers, for which he was granted 47 U.S. and foreign patents.

How Freeze-Drying Works

According to Oregon Freeze Dry - The purpose of freeze-drying is to remove a solvent (usually water) from dissolved or dispersed solids. Freeze-drying is method for preserving materials, which are unstable in solution. In addition, freeze-drying can be used to separate and recover volatile substances, and to purify materials. The fundamental process steps are:

1. Freezing: The product is frozen. This provides a necessary condition for low temperature drying.
2. Vacuum: After freezing, the product is placed under vacuum. This enables the frozen solvent in the product to vaporize without passing through the liquid phase, a process known as sublimation.
3. Heat: Heat is applied to the frozen product to accelerate sublimation.
4. Condensation: Low-temperature condenser plates remove the vaporized solvent from the vacuum chamber by converting it back to a solid. This completes the separation process.

Applications of Freeze-Dried Fruits in Confectionery Products

In freeze-drying, moisture sublimes directly from the solid state to vapour, thus producing a product with controllable moisture, no need for cooking or refrigeration, and natural flavour and colour.

History of Food in Space

More than 20 years ago, astronaut John Glenn became the first American to orbit the Earth. Among the many tasks Glenn had to perform while in orbit were the first American space experiments in eating food in the weightless conditions of Earth orbit. Glenn's flight was too short to make eating a necessity, but future flights were expected to last many days and even weeks. His experience would help design space food systems.

"Astronaut ice cream," the classic freeze-dried treat for kids.

How Freeze-Drying Works

Freeze-drying, or **lyophilization**, is like "suspended animation" for food. You can store a freeze-dried meal for years and years, and then, when you're finally ready to eat it, you can completely revitalize it with a little hot water. Even after all those years, the taste and texture will be pretty much the same. That's some trick!

Why Freeze-Dry?

The basic idea of freeze-drying is to completely remove water from some material, such as food, while leaving the basic structure and composition of the material intact. There are two reasons someone might want to do this with food:

- **Removing water keeps food from spoiling for a long period of time.** Food spoils when microorganisms, such as bacteria, feed on the matter and decompose it. Bacteria may release chemicals that cause disease, or they may just release chemicals that make food taste bad. Additionally, naturally occurring enzymes in food can react with oxygen to cause spoiling and ripening.

  Like people, microorganisms need water to survive, so if you remove water from food, it won't spoil. Enzymes also need water to react with food, so dehydrating food will also stop ripening.

- **Freeze-drying significantly reduces the total weight of the food.** Most food is largely made up of water (many fruits are more than 80% to 90% water, in fact). Removing this water makes the food a lot lighter, which means it's easier to transport. The military and camping supply companies freeze-dry foods to make them easier for one person to carry. NASA has also freeze-dried foods for the cramped quarters onboard spacecraft.

A freeze-dried meal of spaghetti and meatballs, designed for campers: On the left is the dried version; on the right is the rehydrated version.

People also use freeze-drying to preserve other sorts of material, such as pharmaceuticals. Many pharmaceuticals will degrade pretty quickly when exposed to water and air, for the same basic reason that food degrades. Chemists can greatly extend pharmaceutical shelf life by freeze-drying the material and storing it in a container free of oxygen and water. Similarly, research scientists may use freeze-drying to preserve biological samples for long periods of time. Freeze-dried biological samples are also big in the florist world, oddly enough. Freeze-dried roses are growing in popularity as wedding

decorations. The freeze-drying process has also been used to restore water-damaged materials, such as rare and valuable manuscripts.

Photo courtesy NASA
Freeze-dried foods have been a staple onboard many of NASA's space missions.

It's pretty simple to dry food, drugs and just about any other biological material. Set it out in a hot, arid area, and the liquid water inside will **evaporate**: The heat gives the water molecules enough energy to "break free" of the liquid and become gas particles. Then you seal it in a container, and it stays dry. This is how manufacturers make dehydrated meals like powdered soup and baking mixes.

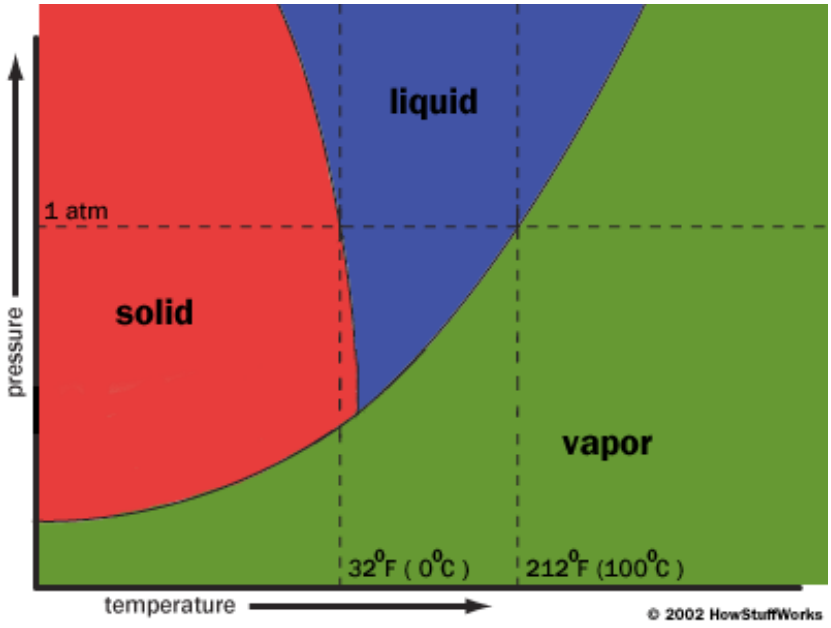
There are two big problems with this approach. First, it's difficult to remove water completely using evaporation because most of the water isn't directly exposed to air. Generally, dehydrating food in this way only removes 90% to 95% of the water, which will certainly slow down bacteria and enzyme activity, but won't stop it completely.

Secondly, the heat involved in the evaporation process significantly changes the shape, texture and composition of the material, in the same way that heat in an oven changes food. Heat energy facilitates chemical reactions in the food that change its overall form, taste, smell or appearance. This is the fundamental purpose of cooking. These changes can be good, if they make the food taste better (or taste good in a different way), but if you're drying something so you can revitalize it later, the process compromises quality somewhat.

The basic idea of freeze-drying is to "lock in" the composition and structure of the material by drying it without applying the heat necessary for the evaporation process. Instead, the freeze-drying process converts solid water -- ice -- directly into water vapour, skipping the liquid phase entirely. In the next section, we'll find out how freeze-drying machines pull this off.

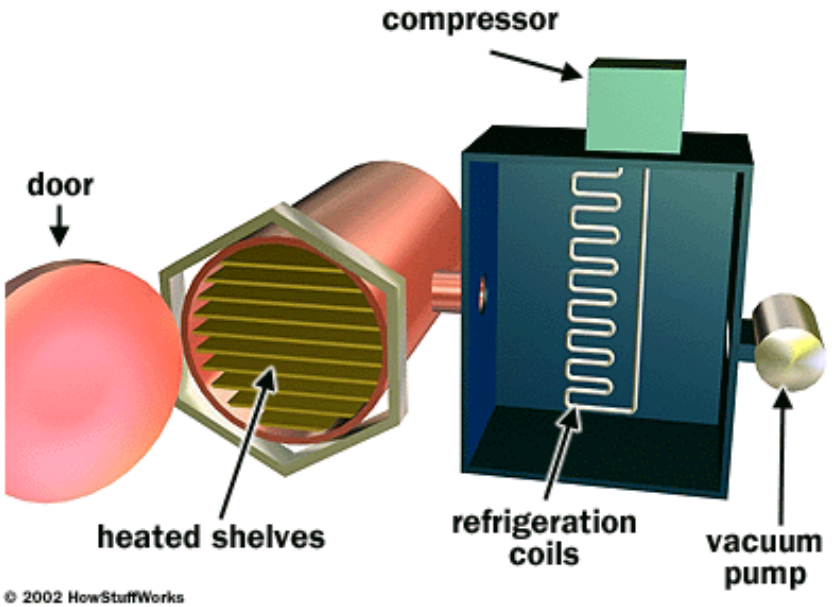
The Process

The fundamental principle in freeze-drying is **sublimation**, the shift from a solid directly into a gas. Just like evaporation, sublimation occurs when a molecule gains enough energy to break free from the molecules around it. Water will sublime from a solid (ice) to a gas (vapour) when the molecules have enough energy to break free but the conditions aren't right for a liquid to form.



There are two major factors that determine what **phase** (solid, liquid or gas) a substance will take: heat and atmospheric pressure. For a substance to take any particular phase, the temperature and pressure must be within a certain range. Without these conditions, that phase of the substance can't exist. The chart below shows the necessary pressure and temperature values of different phases of water.

You can see from the chart that water can take a liquid form at sea level (where pressure is equal to 1 atm) if the temperature is in between the sea level freezing point (32 degrees Fahrenheit or 0 degrees Celsius) and the sea level boiling point (212°F or 100°C). But if you increase the temperature above 32°F while keeping the atmospheric pressure below .06 atmospheres (ATM), the water is warm enough to thaw, but there isn't enough pressure for a liquid to form. It becomes a gas.



This is exactly what a freeze-drying machine does. A typical machine consists of a freeze-drying chamber with several shelves attached to heating units, a freezing coil connected to a refrigerator compressor, and a vacuum pump.

A simplified freeze-drying machine

With most machines, you place the material to be preserved onto the shelves when it is still unfrozen. When you seal the chamber and begin the process, the machine runs the compressors to lower the temperature in the chamber. The material is frozen solid, which separates the water from everything around it, on a molecular level, even though the water is still present.

Next, the machine turns on the vacuum pump to force air out of the chamber, lowering the atmospheric pressure below .06 ATM. The heating units apply a small amount of heat to the shelves, causing the ice to change phase. Since the pressure is so low, the ice turns directly into water vapour. The water vapour flows out of the freeze-drying chamber, past the freezing coil. The water vapour condenses onto the freezing coil in solid ice form, in the same way water condenses as frost on a cold day. This continues for many hours (even days) while the material gradually dries out. The process takes so long because overheating the material can significantly change the composition and structure. Additionally, accelerating the sublimation process could produce more water vapour in a period of time then the pumping system can remove from the chamber. This could rehydrate the material somewhat, degrading its quality.

The Low-Tech Version

Freeze-drying, as a general concept, has actually been around for centuries. The ancient Incas of Peru used mountain peaks along the Andes as natural food preservers. The extremely cold temperatures and low pressure at those high altitudes prevented food from spoiling in the same basic way as a modern freeze-drying machine and a refrigerator freezer.

Once the material is dried sufficiently, it's sealed in a moisture-free package, often with an oxygen-absorbing material. As long as the package is secure, the material can sit on a shelf for years and years without degrading, until it's restored to its original form with a bit of water (a very small amount of moisture remains, so the material will eventually spoil). If everything works correctly, the material will go through the entire process almost completely unscathed!

NEW BIOSPHERE AGRICULTURE

"Beacons of Light" around the globe