

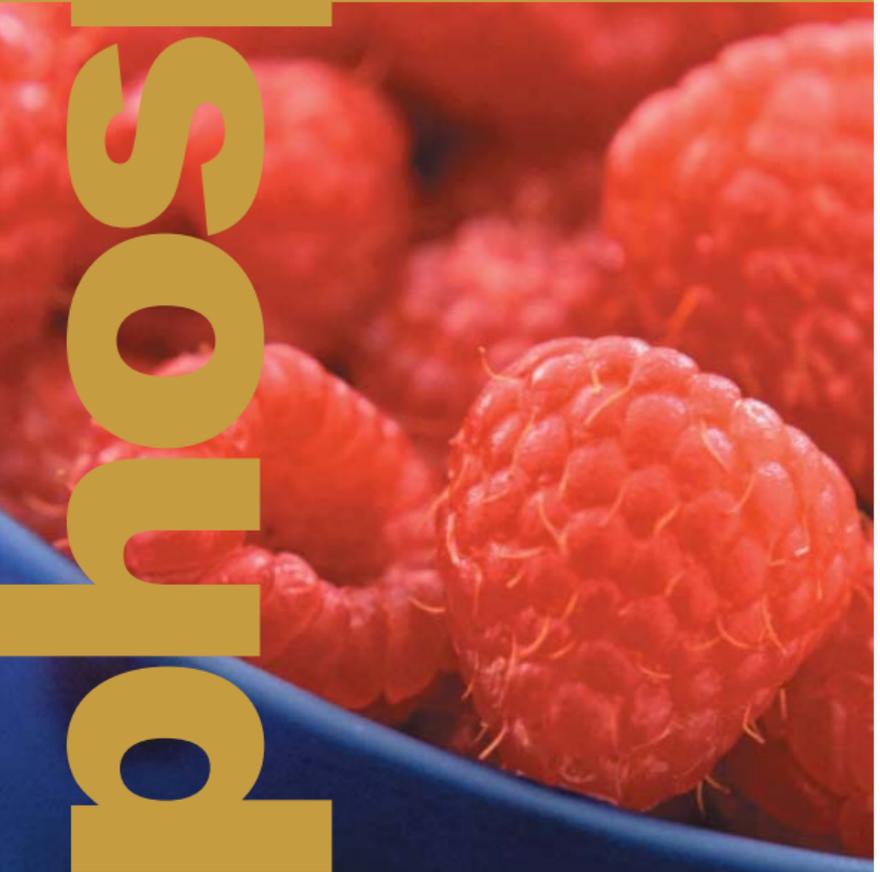
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Agrium

where the **future** is growing

phosphate

a natural
mineral
resource
important to
everyday
living





what is phosphate?

Phosphate, or phosphorous, is a non-metallic element which energizes plant production. Phosphorus is found in every living cell and is crucial to photosynthesis, converting the sun's energy into forms used by the plant for the production of food and fiber. Phosphorous is commonly referred to as phosphate and originates from phosphate rock.

Furthermore, phosphorus is second only to calcium as the most abundant of all mineral nutrients contained in our bodies. Accordingly, phosphates are vital in human metabolism - approximately 80% of the body's phosphorous combines to form calcium phosphate, which is used for the development of strong teeth and bones. The remainder of the body's phosphates are found in a variety of forms, including sodium phosphate - which is involved in acid-base balance - and phospholipids - which helps form cell membranes and DNA.

where does it come from?

Phosphorus used in fertilizers comes from the fossilized remains of ancient marine life found in rock deposits across the globe. The phosphate



manufacturing process combines phosphate rock from these natural geological deposits with sulfuric acid to produce a concentrated phosphorus solution.



why use phosphate?

Phosphorus is the plant world's equivalent of carbohydrates, providing the energy that plants need to grow. It improves seed germination and ensures the efficient use of water. Plants



need phosphorus to stimulate root development and flowering, as well as help in the prevention of disease. Crops supplied with adequate amounts of phosphorus grow and develop more efficiently and are, in turn, more profitable for farmers. Fertilizer phosphate is an effective means of correcting soil phosphorus deficiencies and supporting the production of high-yield, high-quality crops.

what is the role of phosphate?

Phosphate and potash, along with nitrogen, are known as the three major plant nutrients because they are needed in much larger amounts than other nutrients. They are the main nutrients around which the fertilizer industry worldwide revolves.

Phosphorus plays a vital role in energy transfer, photosynthesis, nutrient transportation, sugar metabolism, plant genetics, cell division and the structural integrity of plants. Crops with adequate phosphorus show vigorous growth and advanced maturity. Earlier maturing crops are less susceptible to drought, disease, infection, frost and harvest damage. Plants absorb soil solution phosphorus in both the $\text{H}_2\text{PO}_4\text{-1}$ and $\text{HPO}_4\text{-2}$ forms.



how is it used?

Half the mined phosphate is used to create agricultural fertilizers that have helped establish North America as a leader in food production. The



other half is used to make phosphorus.

Phosphorus puts the fire in fireworks, allows for the bubbles in soft drinks, enables the picture on the television screen, supplies the spring in a telephone cord and makes automobile tires more durable. It is required to preserve many different foods, is used in toothpaste and, of course, is the chemical that causes matches to catch fire.

where do we get phosphate?

Phosphate ore usually lies in tilted blocks that are mined in long narrow pits within several hundred feet of the surface. The dirt and rocks covering the ore, called overburden, are removed



and placed nearby or returned to the pit to be reclaimed (see environmental stewardship for more details). Shovels and trucks are used to remove the ore. Once the ore is mined, it is transported to processing facilities where it is converted into useable products. Once the ore arrives at a fertilizer plant, it is washed, crushed, and treated with sulfuric acid to produce phosphoric acid, the basis for all phosphate fertilizers.



why environmental stewardship?

Reclamation activities are concurrent with mining and include the application of an indigenous seed mix so that, when re-vegetated, the area can be used as grazing land for livestock and home to a variety of wildlife. Reclamation begins at the first stage of mining. Soil is removed and stockpiled for later reclamation use.

The overburden is removed to expose the phosphate ore beds, and is placed in existing open pits (backfill) as often as possible. Re-contouring, fertilizing and seeding the backfill and roads complete the reclamation process. Several years of monitoring are needed before the reclamation is considered to be final.



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| FACT | Phosphate is critical to early season growth under cool, moist soil conditions. |
| FACT | Phosphorus is present in all living cells - life would not exist without it. |
| FACT | Liquid and solid forms of phosphate fertilizers are equally effective. |



conda phosphate operations

Agrium's Conda Phosphate Operations is located north of the community of Soda Springs, Idaho, roughly 50 miles (80 km) southeast of Pocatello. The complex consists of the Dry Valley Phosphate Mine and the Conda production facility, pictured here. Conda is proud of its outstanding record of safe operations. It is a participant in the OSHA Voluntary Protection Program and has achieved the highest level of recognition as a Star site.

Each year, Conda Phosphate Operations produces approximately 550,000 tons (500,000 tonnes) of phosphate fertilizers, including Monoammonium Phosphate (MAP 11-52-0), Super Phosphoric Acid (SPA), Ammonium Phosphate Sulfate (APS 16-20-0) and Merchant Grade Acid (MGA). Conda also produces sulfuric acid and phosphoric acid, which are used in its fertilizer production processes.

Phosphate ore is obtained from Agrium's Dry Valley Mine, located about 15 miles (24 kilometers) north of the production facility. The ore is mined using conventional open-pit mining techniques and is shipped to the plant by rail between the months of April and November each year. About 20,000 carloads of phosphate ore are received and offloaded during this period, enough to sustain production year round.



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