



Fertilizers/Nutrient Sources

Commercial, Synthetic, Organic, By-product, Sustainable

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What is a fertilizer?

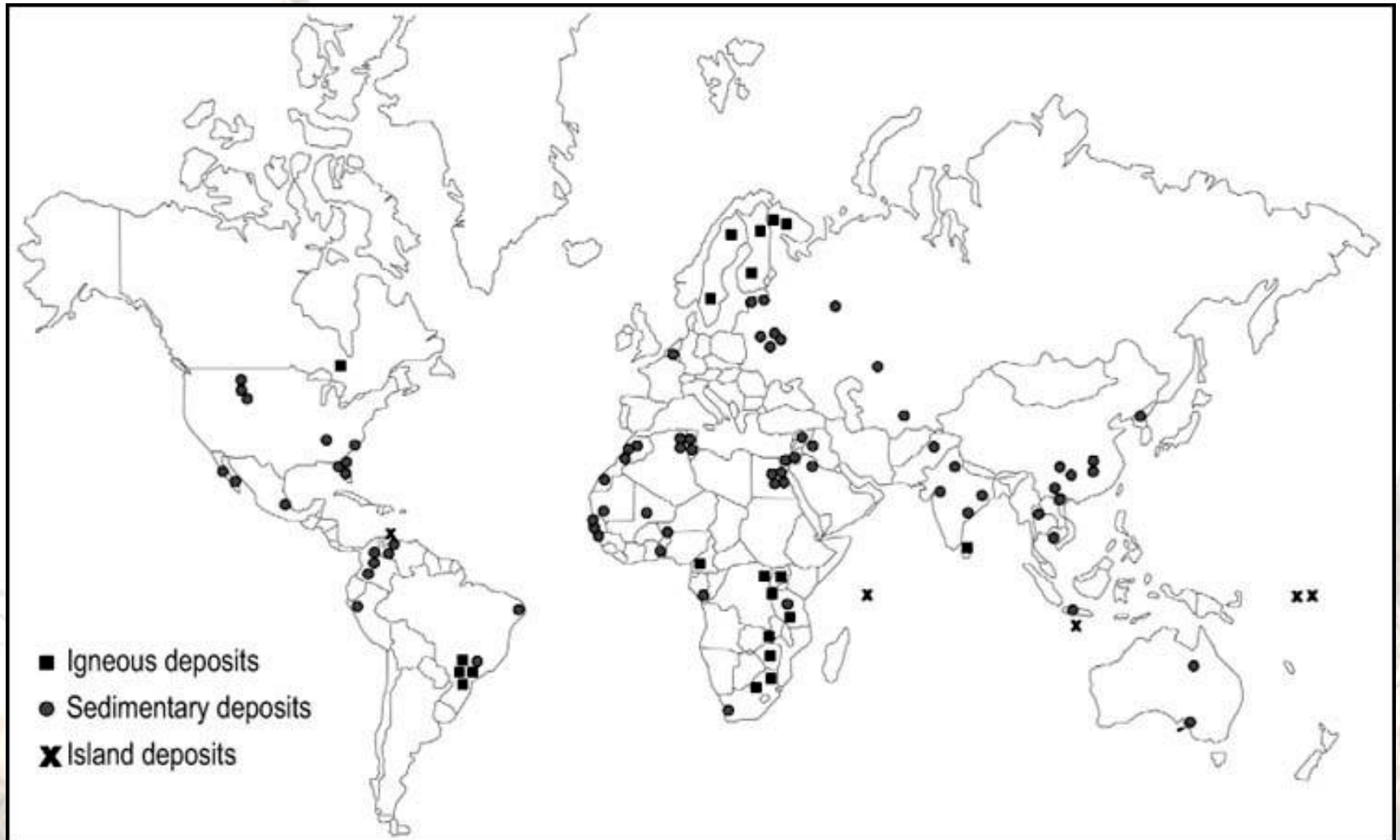
- a compound that contains at least 1 plant nutrient
 - ammonium nitrate (NH_4NO_3) – 34-0-0
 - potassium nitrate (KNO_3) – 13-0-44
 - Epsoma's Garden-Tone – 3-4-4
 - hydrolyzed feather meal, poultry litter, cocoa meal, bone meal, alfalfa meal, greensand, humates, potassium sulfate, sulfate of potash-magnesia
 - most materials are by-products of animal or crop production
- registered with and regulated by state department of agriculture
- guarantees the integrity of fertilizer products



Where do N, P and K in fertilizers originate?

- N originates from the atmosphere
 - hydrogen and energy originate from natural gas
- P originates from rock phosphates
- K originates from K-bearing minerals, usually chlorides or sulfates

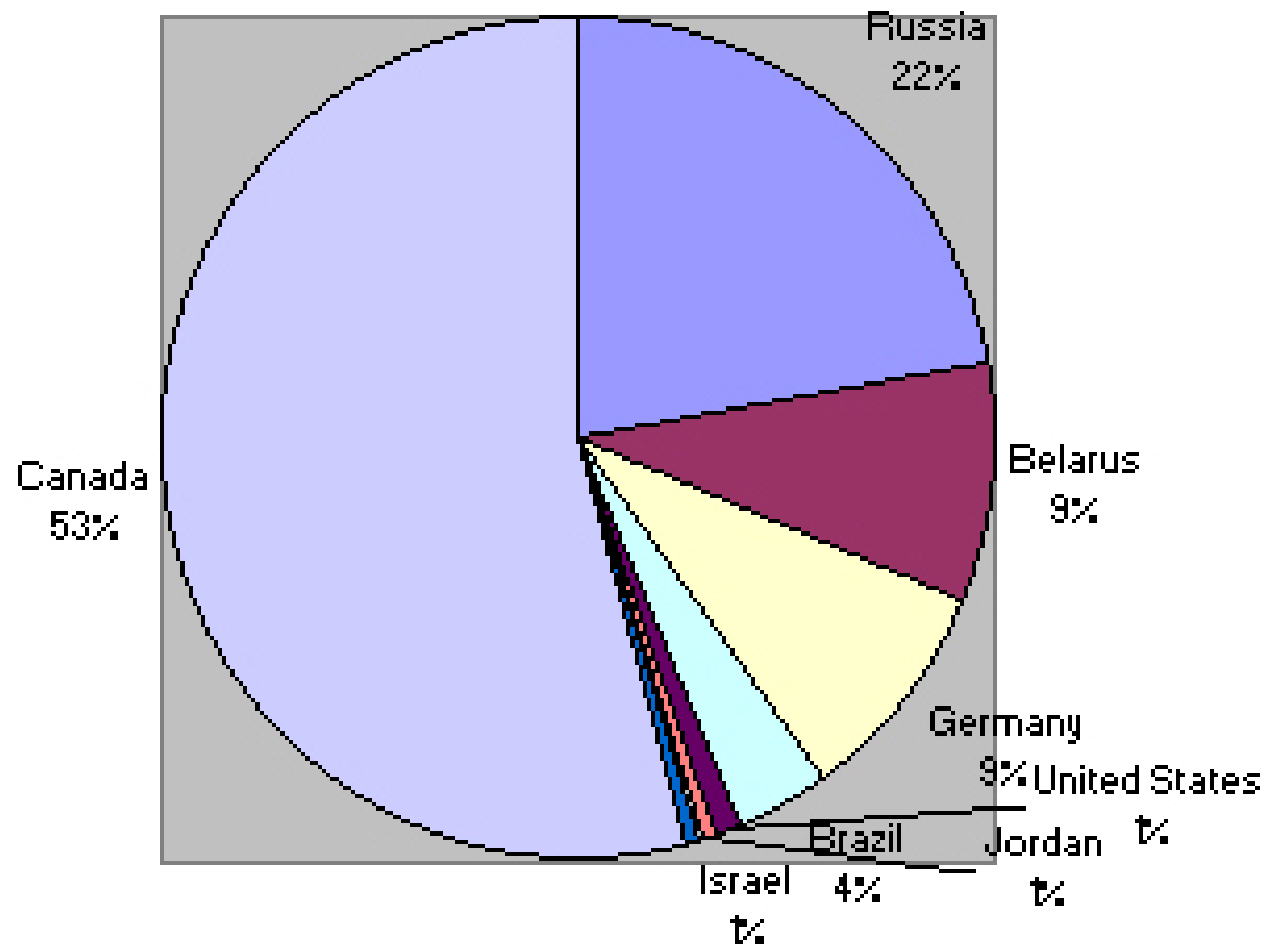
World P Deposits



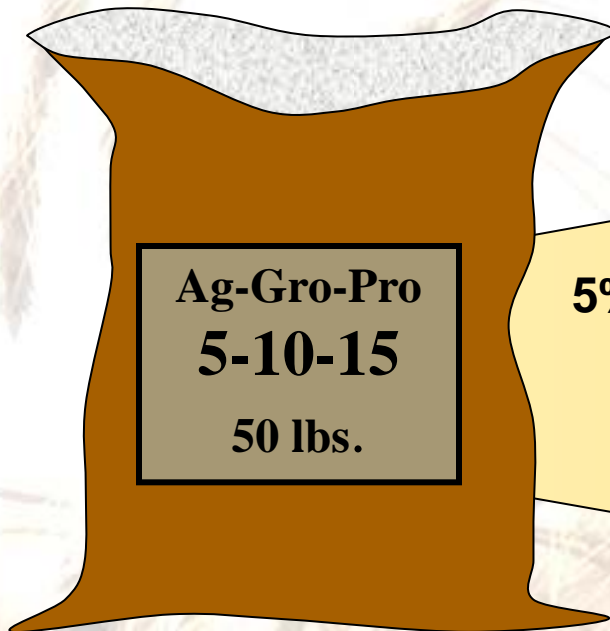


Is Peak Phosphorus Approaching?

- phosphate reserves will be exhausted in 50 – 100 years
- US has 30 year supply left
- Peak P - 2033
- control of strategic material is subject to political influence
 - a geostrategic time bomb



How do we describe the nutrient content of fertilizers?



This bag contains:
5% nitrogen--10% phosphate--15% potash
or
2.5 lbs. nitrogen
5 lbs. phosphate
7.5 lbs. potash

The fertilizer guarantee

- % nitrogen (total)
- % phosphate, P_2O_5 (citrate-soluble)
- % potash, K_2O (soluble)
- Epsoma's Garden-tone (3-4-4)
 - 0.8% water-soluble N
 - 2.2% water-insoluble N (organic N)



Common Synthetic N Fertilizers

Material	Analysis
ammonium nitrate	34-0-0
urea	46-0-0
calcium nitrate	15-0-0
sodium nitrate	16-0-0
ammonium sulfate	21-0-0



Less Common Synthetic N Fertilizers

sulfur-coated urea (SCU)	40-0-0
ureaform	38-0-0
methylene urea	28-0-0
isobutylidene diurea (IBDU)	30-0-0



Common Synthetic P Fertilizers

Material	Analysis
superphosphate	0-18-0
triple superphosphate	0-46-0
monoammonium phosphate (MAP)	11-48-0
diammonium phosphate (DAP)	18-46-0
ammonium polyphosphate	10-34-0



Common Synthetic K Fertilizers

Material	Analysis
muriate of potash	0-0-60
sulfate of potash	0-0-50
potassium-magnesium sulfate	0-0-22-22S-11Mg
potassium nitrate	13-0-44



By-Product and Organic Sources

- animal manures and composts
- rock phosphate
- green sand
- bone meal, crab meal, blood meal, feather meal
- alfalfa meal, corn gluten, cottonseed meal

Let's Compare

	synthetic	by-product
flexibility	tailor nutrient sources to soil test and crop requirements	get what you get
long-term sustainability	finite supply of Earth materials	utilize materials that already exist and might otherwise be considered a waste

Let's Compare

	synthetic	by-product
effect on soil microbes	minimal and very localized	organic materials will temporarily cause a flush of microbial growth
effect on water quality (due to runoff and leaching)	minimal when used at appropriate rates	often leads to high P levels in soil and can contribute to poor water quality

Are Organic Sources Sustainable?

- rock phosphate and green sand – no
 - mined earth materials with very low plant availability
- by-products
 - where are they coming from?
 - composted cow manure from Oklahoma



Questions and Discussion

