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Efficacy and Efficiency of Potassium Sources

Excerpt from **AG** PROFESSIONAL

Efficiency as a metric of sustainable crop nutrition

by International Plant Nutrition Institute August 03, 2015 | 7:10 am EDT

“Nutrient use efficiency attracts increasing attention in today’s sustainability dialogue. Serving as one of the key metrics of crop nutrition, it reflects responsible management and relates to risks of nutrient loss.”

“That’s why the right source, rate, time and place of nutrient application optimizes nutrient use efficiency, yield, and soil fertility. Sound nutrient stewardship tracks all three.”

The role of potassium in plants

- Suppresses the incidence and severity of diseases
- Increases plant water use efficiency
- Helps cells maintain turgor pressure
- Aids in enzymatic actions
- Affects the speed of almost all plant biological systems, cycles, and processes
- Is the only element that is not incorporated into an actual plant component

FORMS OF POTASSIUM TAKEN UP BY THE PLANT

The plants absorb the ionic form of Potassium (K^+) from the soil. Plant roots will only come in contact with approximately 2% of the soil area. This is very critical in Potassium management. Once the plant is growing, the Potassium ion will only move a limited distance through the soil solution by diffusion during the growing season.

AVAILABILITY

Potassium is relatively immobile in the soil so availability depends on several factors. No-till and minimum tillage methods, as well as with compaction can limit soil aeration limiting root growth. Soil temperature and the pH of the soil can also limit availability. Optimum availability of Potassium is at a soil pH of 6.0 – 7.0. Soil moisture is essential for Potassium to move in the soil, so in dry years Potassium can be limiting.

Soils that have high clay content can retain high levels of Potassium reserves. Availability of the Potassium depends on the type of clay and several other factors.

Potassium Sources

- We Know There Are Different Sources of Potassium Fertilizers available for use as a Plant Nutrient
- Not all Potassium Sources are the same (Solubility, Availability, Efficiency, Compatibility, Deliquescence, etc...)
- Research has proven there *is* a direct correlation between plant productivity and the type of Potassium fertilizer used

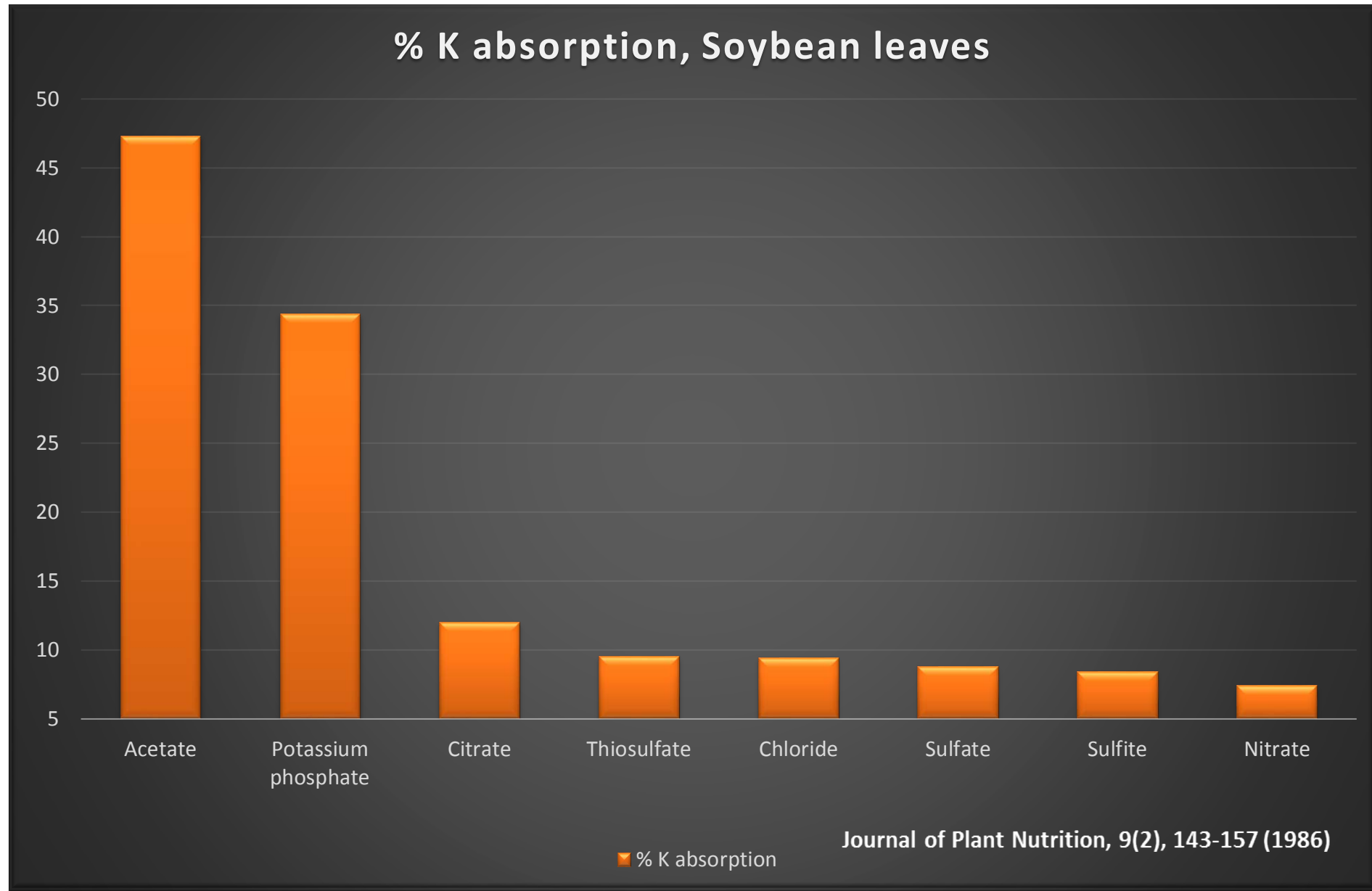
Salt index of potassium sources

| | |
|-----------------------|-------|
| Potassium acetate | 43.8 |
| Potassium sulfite | 46.0 |
| Potassium sulfate | 46.1 |
| Potassium carbonate | 68.0 |
| Potassium thiosulfate | 68.0 |
| Potassium nitrate | 90.6 |
| Potassium hydroxide | 91.3 |
| Potassium chloride | 116.2 |

Point of deliquescence of potassium sources (% RH)

| | |
|---------------------|------|
| Potassium acetate | 23.3 |
| Potassium carbonate | 44.0 |
| Potassium chloride | 85.0 |
| Potassium nitrate | 93.2 |
| Potassium sulfate | 97.2 |

Foliar absorption of potassium after 48 hours from organic and inorganic K carriers



What makes potassium acetate different?

- Improved plant uptake over other potassium sources
- Unique combination of inorganic fertilizer and an organic acid
- Non-corrosive to equipment
- Compatible with both fertilizers and pesticides
- Promoter of **soil health** and **soil chemistry** due to microbial benefits and non-aggressive characteristics
- Very low salt content and phytotoxicity
- Can be applied via irrigation water, also known as fertigation

What is potassium acetate used for?

- Fertilizer material for potassium source in agriculture and turf/ornamental industry
- Deicer for airport runways and processing equipment in cold climates
- Food preservative and acidity regulator
- Shale stabilizer in oil/gas industry
- Ingredient in fire extinguishers





Ground or Aerial Foliar Application

Side dress Applications



In-Furrow Applications



Pivot Irrigation

Drip Irrigation



Questions?



Thank You

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