Comparison of Potassium Sources and Rates for Tomato Production in Florida

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Essential Plant Nutrients

• Potassium (K) is one of the two most-absorbed nutrients for tomato production.
• Essential: Osmotic potential and fruit quality.
Determination of K Rates

Crop requirement + Leaching + Volatilization + Almost zero

Application rate
Sources

• **Preplant:**
  • Sulfate of potash (SOP; 0-0-50 + 17S).
  • Muriate of potash (MOP; 0-0-60).
  • Potassium nitrate (13-0-45).

• **Drip:**
  • Potassium nitrate.
  • Potassium thiosulfate.
Historical K Fertilizer Prices

Source: ERS-USDA
No longer “cheap insurance”.

400 to 500 lb/acre (2006).
  - $70 to 85/acre (2006).
  - $120 to 145/acre (2010).

275 to 350 lb/acre (2010).
  - $100 to 125/acre (2012).
Dry Fertilizer Placement

• Seepage irrigation:
  • “Cold mix”: Bottom of the bed.
    • 25% to 35% of K rate.
  • “Hot mix”: 1 or 2 bands.
    • 65% to 75% of K rate.
Current Situation

• Many tomato growers not transitioning to drip irrigation.
• Cheaper fertilizer blends are desirable.
• Growers were afraid of using MOP due to its high salt index.
  • Salt index: SOP - 46; MOP - 116.
  • Rate dependent!
High Salt Injury
Objective

Comparing tomato growth and yields using different K sources and rates.
Materials and Methods

- Two field trials:
  - Gulf Coast REC.
  - Spodosol, pH 6.7-7.0 and OM of 1.2%.
Materials and Methods

- **K sources and rates:**
  - SOP and MOP.
  - 0, 50, 100, 200, 300, 400 and 500 lb/acre.
  - Preplant: Two bands, 2 inches deep.
  - No other preplant or drip K application.
  - 4 weeks before transplanting.
  - S balanced with elemental S.
  - Irrigation: Seepage.
Materials and Methods

- Variables:
  - Two harvests: 10 and 12 WAT.
  - Fruit grading: XL and total marketable.
  - K foliar concentrations: 4 and 8 WAT.
  - Plant height: 4 and 8 WAT.
  - Soil EC: 4 WAT.
  - RCB design with 2 factors; 6 reps.
  - Regression and standard errors.
K Sources and Rates: Plant Height

- 100 lb/acre
- 200 lb/acre
- 300 lb/acre
K Sources and Rates: K Conc. (4 WAT)

[Graph showing foliar K concentration (%) vs. pre-plant K rates (lb/acre). The graph includes two lines: one for SOP and one for MOP, indicating sufficiency with a shaded area.]
K Sources and Rates: K Conc. (8 WAT)

![Graph showing foliar K concentration (%) vs. preplant K rates (lb/acre). The x-axis ranges from 0 to 500, with intervals at 50. The y-axis ranges from 0 to 5, with intervals at 1. Two lines represent SOP and MOP, with SOP (blue triangles) and MOP (red circles) showing different patterns. The sufficiency area is highlighted in green.]
K Sources and Rates: EC (4 WAT)

Critical EC: 2.5 dS/m
K Sources and Rates: Total XL Yield

![Graph showing the relationship between preplant K rates (lb/acre) and fruit weight (ton/acre). The graph compares SOP (blue triangles) and MOP (red circles). The fruit weight increases with preplant K rates up to a certain point and then decreases.]
K Sources and Rates: Total Marketable Yield

![Graph showing the relationship between preplant K rates and fruit weight (ton/acre) for SOP and MOP treatments. The graph plots fruit weight on the y-axis and preplant K rates on the x-axis. The data points are connected by blue and red lines, indicating the trend for SOP and MOP, respectively. Error bars show the variability in the data.]

- **Fruit weight (ton/acre)**
- **Preplant K rates (lb/acre)**

Legend:
- **SOP**
- **MOP**
Summary

- Differences on tomato performance due to:
  - K rates and sources.
  - SOP: No injury up to 500 lb/acre of K.
  - MOP: Same as SOP up to 400 lb/acre of K.
  - EC (salt injury): Higher than 400 lb/acre of K.
  - MOP could replace a proportion of SOP in preplant formulas to lower fertilizer costs.

- “Coming attractions”: What about drip K fertilization?
Thanks! Questions?

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http://grec.ifas.ufl.edu/SantosHortProgram/index.htm