

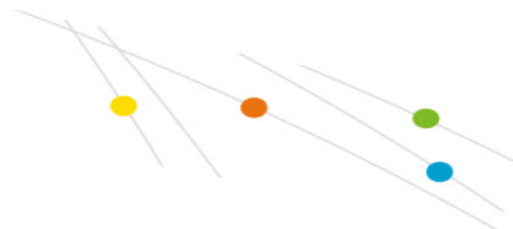


Potassium nitrate had better results for crops growing in desert soils under highly saline conditions

**Potassium nitrate outperformed potassium chloride and potassium sulphate as the K source in making up fertigation solutions for crops growing in desert soils under highly saline conditions**

In this study, differences in growth vigour of Valencia orange trees, or Williams banana or Rodade tomato plants, either potted in river sand or river sand/ $\text{CaCa}_3$ , was assessed in relation to fertigation solutions composition, the solutions having been made up with either  $\text{KNO}_3$ ,  $\text{KCl}$  or  $\text{K}_2\text{SO}_4$ . The experiment was conducted in South Africa in a nursery enclosed with 40% shade-cloth. 120 Valencia orange trees, and 120 Williams banana and 120 Rodade tomato plants, were transplanted into 2.7 l pots containing river sand or river sand/calcium carbonate (80:20 v/v), and treated with one of four nutrient solutions. One solution contained only  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NaCl}$ , and was applied to all the plants. The remaining three solutions were made up using the same fertilizers except for that supplying K. The K source was  $\text{KCl}$ ,  $\text{K}_2\text{SO}_4$  or  $\text{KNO}_3$ . As a consequence the  $\text{NO}_3^-$  to  $\text{NH}_4^+$  ratio differed between solutions as well as the  $\text{Cl}^-$  or  $\text{SO}_4^{2-}$  content.  $\text{NaCl}$  was added to every solution to impose salinity stress. Elemental content except for that of S and Cl was equal in the K-containing nutrient solutions. Identical experiments were performed on each plant type.

In banana, orange and tomato growth was most vigorous in the plants treated with the solution made up with  $\text{KNO}_3$  and least vigorous in the plants treated with the solution made up with  $\text{KCl}$  (Figures 1, 2 and 3). This was reflected by height increases, and fresh weight and number-of-leaf differences when the plants were lifted. Number



of primary roots in banana was commensurate with vigour. Enhanced vigour in the plants treated with the solution made up with  $\text{KNO}_3$  may have additionally resulted from promoted cationic nutrient uptake. The  $\text{NO}_3^-/\text{NH}_4^+$  ratio was greatest in the  $\text{KNO}_3$  solution. Number of leaves showing marginal necrosis in banana or number of wilted leaves in tomato indicated greatest salinity stress following fertigation with the solution made up with  $\text{K}_2\text{SO}_4$ . In tomato, number of flower trusses, fruit number and yield were greatest where the  $\text{KNO}_3$  solution was applied and least where KCl solution was applied. Differences in individual fruit weight were not observed.

The results clearly indicate a benefit in using  $\text{KNO}_3$  as opposed to KCl or  $\text{K}_2\text{SO}_4$  in fertigating crops growing in desert soils where the irrigation waters are generally saline.

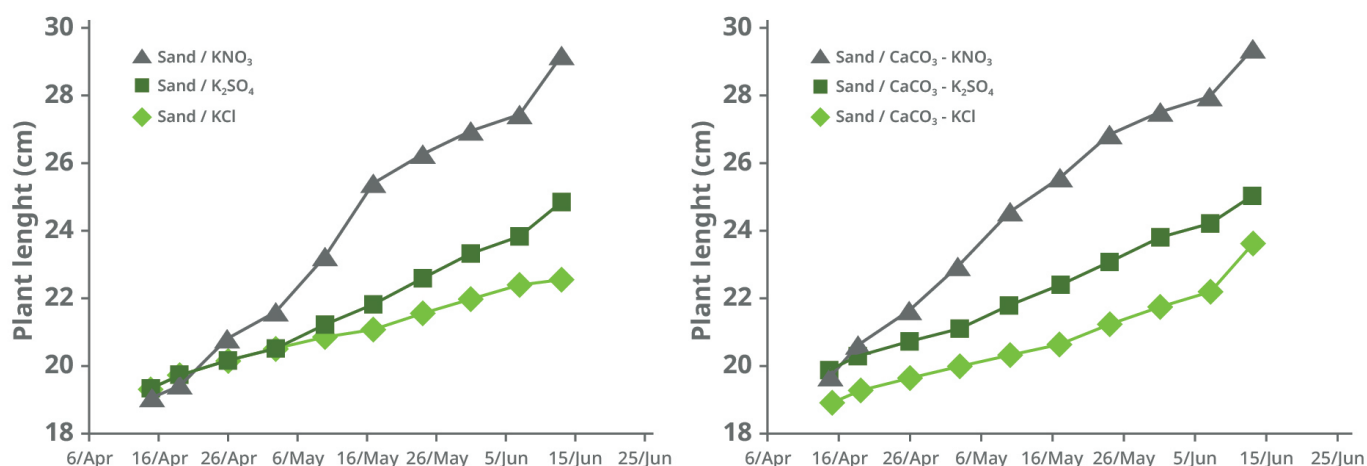


Figure 1. Banana plant lengths on each date of measurement. Left: Sand medium; Right: sand/ $\text{CaCO}_3$  medium.

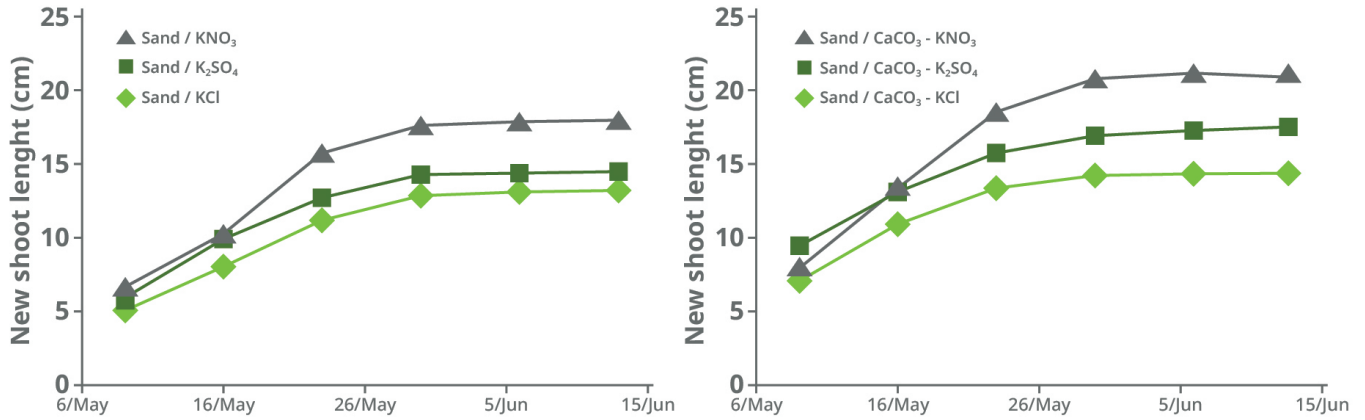
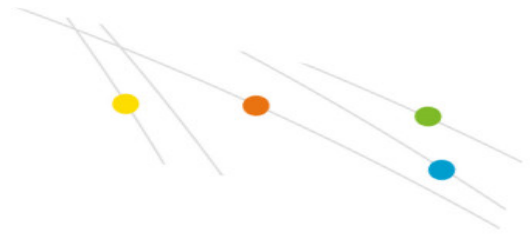


Figure 2. Orange new shoot lengths on each date of measurement. Left: Sand medium; Right: sand/CaCO<sub>3</sub> medium.

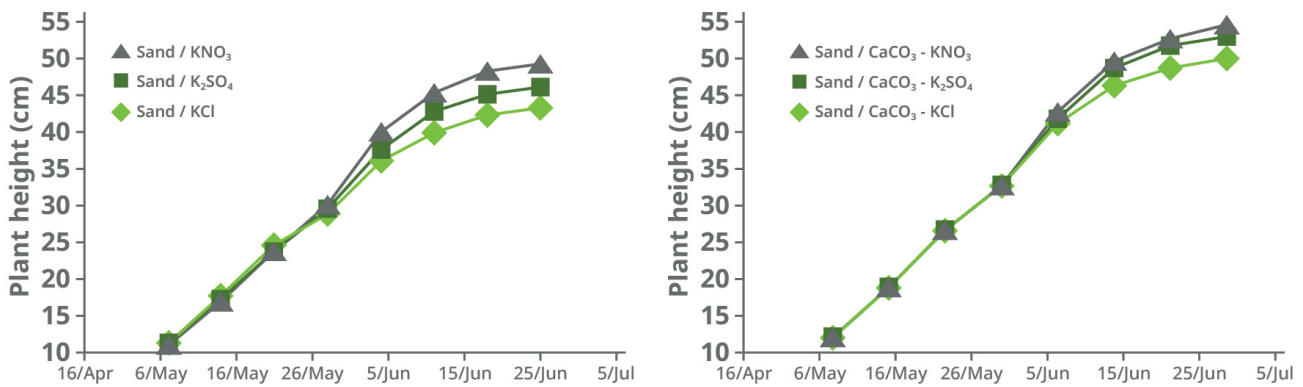


Figure 3. Tomato height on each date of measurement. Left: Sand medium; Right: sand/CaCO<sub>3</sub> medium.