# Soybean yield fertilized with multiple nutrients source in integrated system in sand soil

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The rotation of annual crops with pastures, in the crop-livestock integration system (ILP), has been used as one of the alternatives for the economic and ecological sustainability of agricultural production systems. The area cultivated with soybeans in the western region of the State of São Paulo has been increasing. This increase has occurred in areas occupied by pastures, predominantly signal grass (*Urochloa decumbens*). Most of these areas have low clay content (less than 20%) and low natural fertility. In this condition of soil texture, there is a low capacity to retain water, organic matter and nutrients and high susceptibility to erosion. This research was aimed at evaluating the effect of multiple nutrient sources on soybean yield, physiological and phenological parameters in a sandy soil. The experiment was set up at the Experimental Farm - UNOESTE in Presidente Bernardes, SP in sandy soil. The experimental design of the experiment was in randomized blocks with four replications. The treatments were tested: i) Control (only with the supply of planting fertilizer); ii) KCl (60% $K_2O$); iii) KCl + Plaster (250 kg $ha^{-1}$); iv) KCl + So; v) Potashplus®; vi) KCl + Polysulfate; and vii) KCl + Plaster (1 t $ha^{-1}$). The evaluations were the insertion of the first pod and the grain yield. Photosynthesis (A), Perspiration (E), Water use efficiency (WUE) were obtained with IRGA gas exchange equipment The data were analyzed using variance analysis (ANOVA, $p < 0.05$). The mean values were compared using the Tukey test, considering the different fertilizer sources. The results indicated that multiple nutrient sources favor the growth and physiology of the soybean crop in sandy soil, but do not alter the soybean yield performance. The water use efficiency was significantly affected by fertilizers sources. Plants with high $CO_2$ absorption rates have a high loss due to transpiration, and a large water consumption implies a positive increase in productivity. The control treatment (no K, Ca, Mg or S) showed the lowest values (3.97 mol $CO_2$ mol H2O), and the highest was obtained with PotashpluS® (5.75 mol $CO_2$ mol $H_2O$). This reduction in efficiency can be explained by reducing plant photosynthesis due to the absence of nutrients, ultimately causing a reduction in the accumulation of biomass and, consequently, grain yield. Multiple nutrient sources favor soybean crop growth and physiology in sandy soil, but do not alter soybean crop performance.

**Keywords:** *Glycine max*, polyhalite, photosynthesis, water use efficiency.

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