

# RESEARCH WITH IMPACT

## THE CHALLENGE:

Fire strikes many fields in the Cerrado region of Brazil every winter due to weather conditions of high temperatures and low humidity that may last for many months. Some fires happen accidentally or farmers intentionally burn cover crops, crop residues, and pastures. In certain cases where fields burned, farmers had broadcasted phosphorus (P) fertilizer for the next season and wondered if the fire had an effect on their fertilizer, or if reapplication was needed.

## THE RESEARCH SOLUTION:



A partnership with IPNI and local researchers was established to investigate the effect of high temperatures on two common P fertilizers, single superphosphate (SSP) and triple superphosphate (TSP). The group initially established a lab study to examine the characteristics of heated (calcined) fertilizer. Greenhouse trials were then used to evaluate the agronomic performance of P fertilizers exposed to a range of furnace temperatures that simulated their burning in the field.

## Fire Does Not Reduce the Nutrient Value of Phosphorus Fertilizers

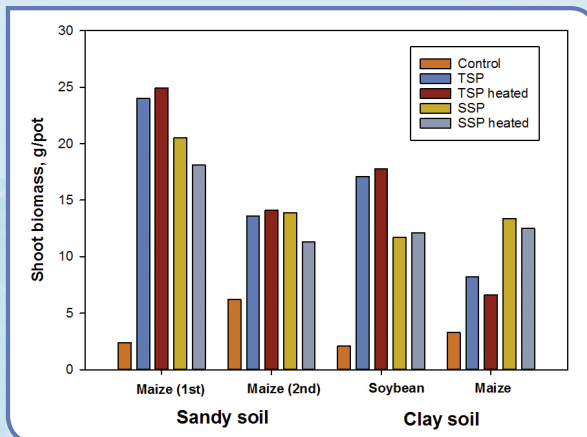
### THE RESULTS:

There was no loss of P observed during the simulated burning in the lab. However, the solubility of the P fertilizer decreased by an average of 20% following more extended heating, and higher temperatures resulted in 75% lower P solubility.

In a first greenhouse study, heated or unheated fertilizer was mixed in a sandy soil that was low in P and maize was planted. A first crop was harvested 35 days later, which was followed by a second maize crop that was also allowed to grow for 35 days before its harvest.

Heat-treated SSP led to a 15% decrease in maize shoot growth compared with untreated SSP, but no such difference was noted for TSP. Growth of corn in all the treatments receiving P was far greater than in those that did not.

In a second greenhouse study, either soybean or maize was planted in a low-P



clay soil that received heated or unheated fertilizer. Soybean growth was slightly higher and maize growth was slightly lower with the heat-treated P fertilizer, compared with unheated fertilizer.

Both heat-treated TSP and SSP were still effective at supplying adequate nutrition for maize and soybeans in two P-deficient soils. The length of exposure to heat did not significantly decrease the effectiveness of the P fertilizers in either trial.

Although these studies only approximate the conditions experienced in burned fields, the results provide confidence to farmers that SSP and TSP will continue to be excellent nutrient sources for crops, even after the fields have burned.



**Dr. Eros Francisco**, Deputy Director, IPNI Brazil Program visits the greenhouse trial testing the effects of heat treatment on P fertilizer in soybean. The inset photo shows the visual impact of the heat treatment (samples on left and right) compared to untreated fertilizer (center).



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