



**2021-2022 FUNDING CYCLE**

# **Soybean yield components and seed nutrient concentration responses among nodes to phosphorus fertility**

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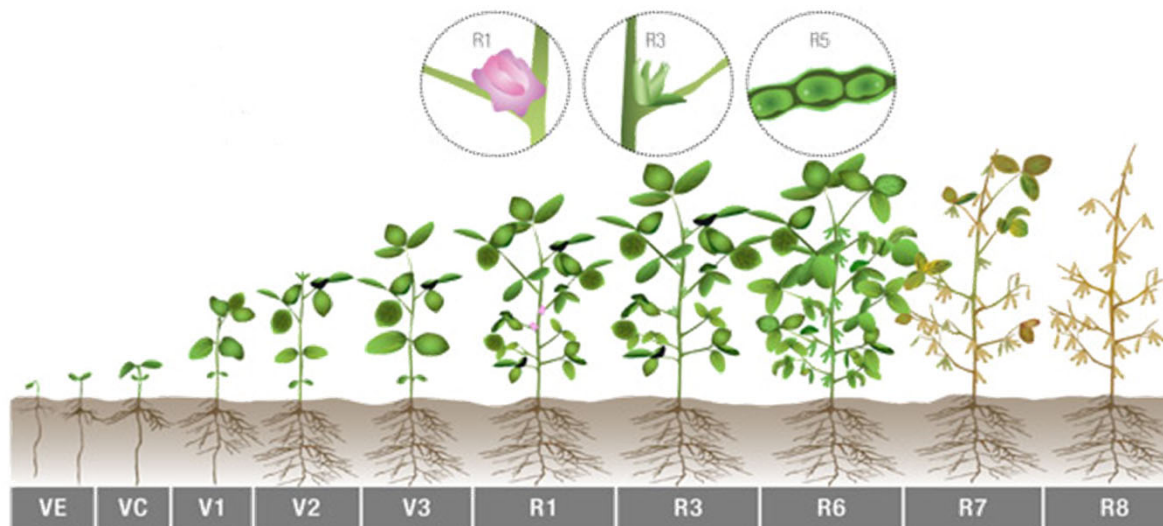
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Mid-South Soybean Board Summer Meeting, Monroe LA, September 8<sup>th</sup>, 2021

- Efficient fertilization recommendations depend upon our knowledge of how the nutrient deficiency influences crop yield components and our ability to diagnose deficiency either with timely soil or plant analysis.



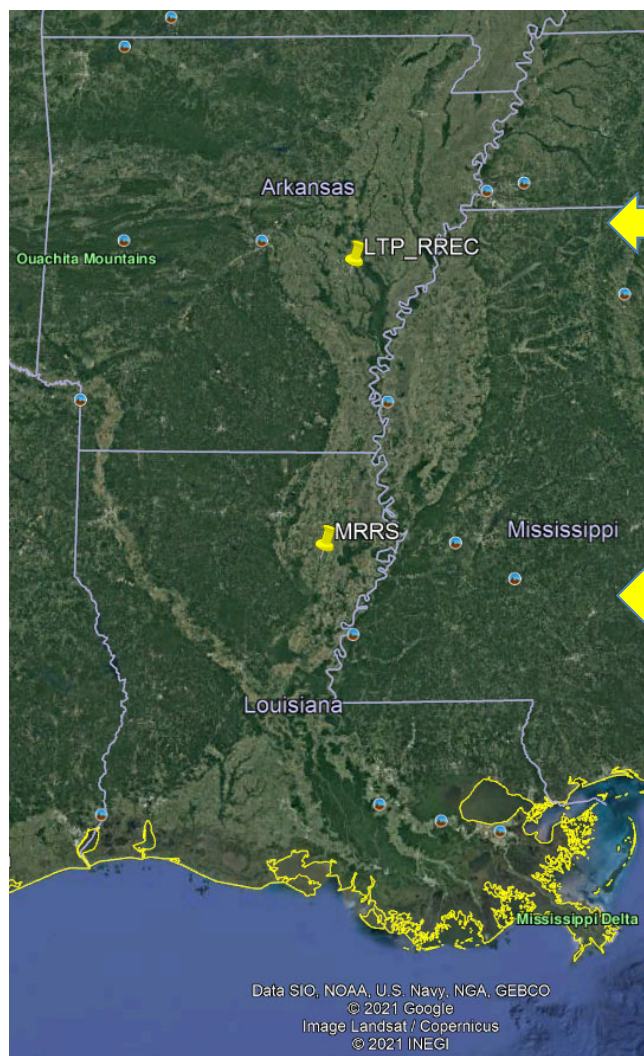
Source: <https://prairiecalifornian.com/soybean-growth-stages/>



### Objectives:

- Identify how seed yield, individual yield components, leaflet-P concentration, and the seed nutrient concentrations are affected by P deficiency.

## ➤ Progress made



### Rice Research and Extension Center - RREC

(Established in 2007 on a Dewitt silt loam)

- Randomized complete block design with 6 blocks;
- Five fertilizer-P rates (**0, 40, 80**, 120, and 160 lb  $P_2O_5$ /acre/year) applied preplant as triple superphosphate;
- Soil-test P ranging from **8 to 89 ppm**;
- Pioneer 52A43L planted May 26<sup>th</sup>;
- Two vegetative leaf sampling (V4/5 & V6/7) and weekly samples collected after R1 (starting on July 21<sup>st</sup>) until R6.

### LSU AgCenter – Macon Ridge Research Station

(Established in 2021 on a Gigger-Gilbert silt loam)

- Randomized complete block design with 4 blocks;
- Five fertilizer-P rates (**0, 40, 80**, 120, and 160 lb  $P_2O_5$ /acre/year) as triple superphosphate broadcast on the top of the seedbed at planting;
- Mean soil-test P of **13 ppm**;
- Pioneer P48A60X planted April 27<sup>th</sup>;
- Weekly leaf samples collected from R1 (June 4<sup>th</sup>) to R6 (August 16<sup>th</sup>).

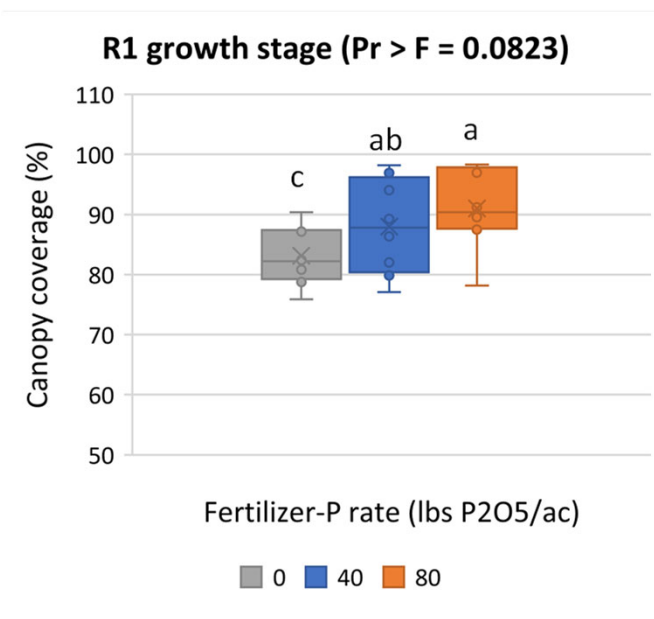
## ➤ Progress made & preliminary results

- P-deficiency at early soybean vegetative growth stages: smaller trifoliolate leaves, shorter plants, and less lateral branches!



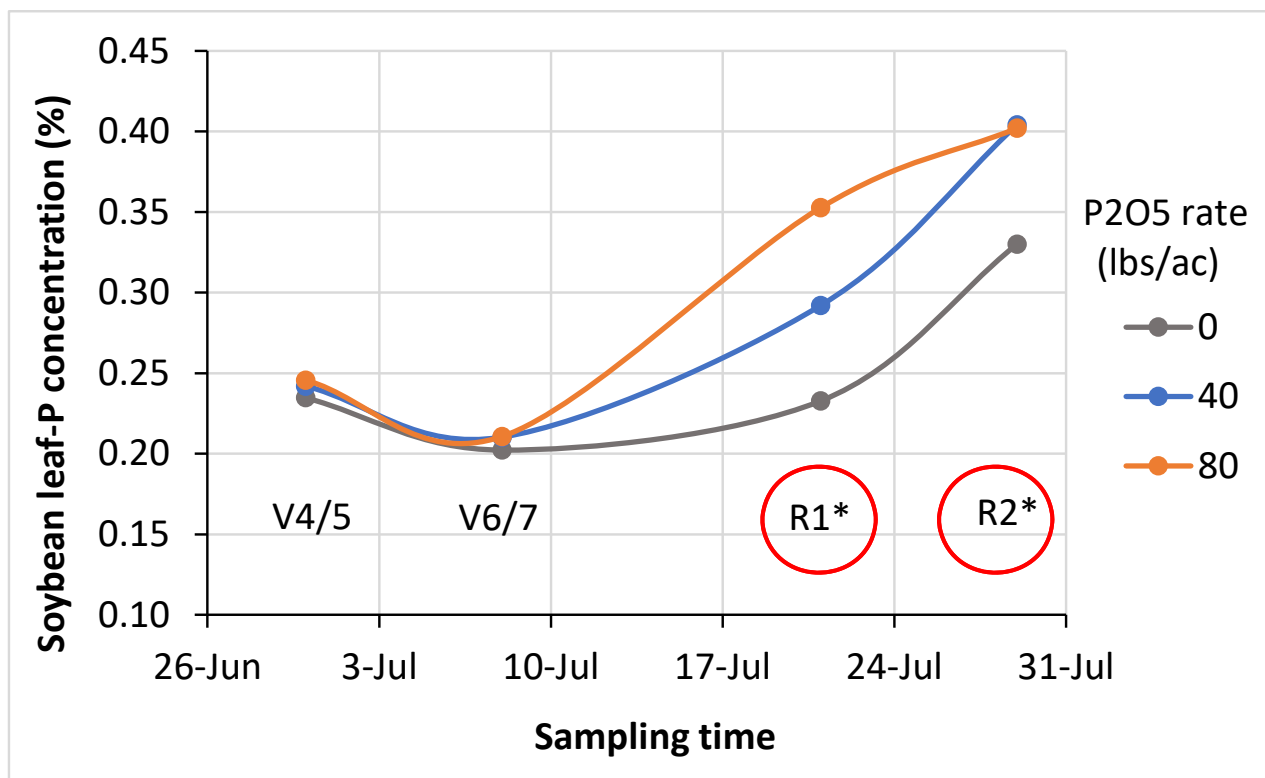
## ➤ Progress made & preliminary results

0 lbs  $P_2O_5$ /ac, 13 ppm P    40 lbs  $P_2O_5$ /ac, 23 ppm P    80 lbs  $P_2O_5$ /ac, 47 ppm P



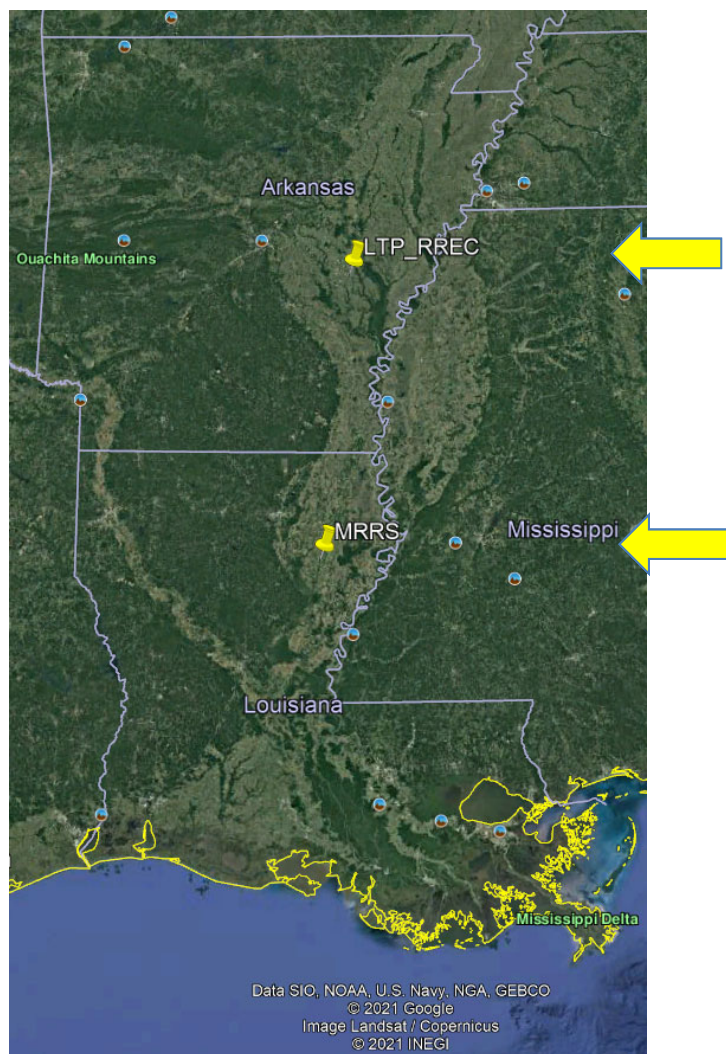
- Birdseye view of soybean canopy (left) and percentage canopy coverage (right) at the R1 growth stage as affected by fertilizer-P rate and soil-test P. Pictures were taken at a 32-inch height from the soil level. RREC, Stuttgart AR, 2021.

## ➤ Progress made & preliminary results



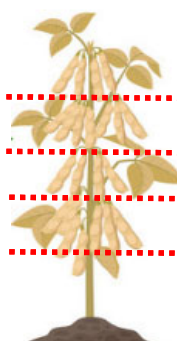
- Soybean leaf-P concentration as affected by fertilizer-P rates and leaf sampling time.  
RREC, Stuttgart AR, 2021. \*  $P < 0.01$ .

## ➤ Next steps...



## Soybean yield, yield components, and seed nutrient content

- Collect six whole mature plants from an interior row/plot;



Plants dissected in node segments and tissues separated into (i) stem internodes, (ii) pods, and (iii) seeds;

Evaluations at each node segment:

- Number of pods and seeds per pod;
- Seed abortion;
- Individual seed weight;
- Seed nutrient concentration (acid digestion and analysis by ICP–AES; N by dry combustion);

- Field seed yield (bu/ac) measured by harvesting each plot with a small plot combine;
- Seed P removal through harvest (lb/ac).

## ➤ **Likelihood to success**



### **Long-term trials and MSSB Multistate Project**

- **Year 1:** One long-term trial (RREC) and a P-deficient soil from LA (MRRS);
  - Visual growth differences
  - Different tissue-P concentrations
  - Grain yield, yield components and seed nutrient concentration...?
- **Year 2 and 3:** Repeat trials at RREC and MRRS



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***Thank you for your attention!***

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