MSU Revises Soybean K Fertility Recommendation

By Dr. Larry Oldham, MSU Extension Soil Specialist

January 16, 2020

The Mississippi State University Extension Soil Testing Laboratory has revised the soil test-based potassium fertility recommendations for soybeans in Mississippi.

This announcement by Dr. Keri Jones is the culmination of many years of **work supported by the Mississippi Soybean Promotion Board.**

2020 Revision MS K Soybean Recommendation--See below

MSU Soil Testing Laboratory

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MSU Soil Testing Laboratory announces new potassium recommendations for soybean

Thanks to the efforts from our soil scientists and graduate students with backing from the **Mississippi Soybean Promotion Board,** we have sufficient data to support changes in MSU soil testing's soybean potassium recommendations. Currently soil samples are categorized into one of 5 categories (Very Low to High) based on extractable potassium level and CEC (Table 1). From the assigned category, samples are given a fertilizer recommendation (Table 3). Samples that are categorized as "Very Low" will remain at 120 pounds per acre of K20. All samples that are categorized "Low" will now receive a recommendation of 90 pounds per acre (previously 60). Samples that are categorized as "Medium" will continue to get a recommendation of 60 pounds per acre. No fertilizer recommendations are given for samples in the "High" or "Very High" categories. As an example of how this change might impact a sample recommendation, under current recommendations soils testing at 250 pounds per acre extractable K with a CEC of 30 would be classified as a High rate and thus not get a potassium recommendation. Data from Dygert (Figure 2) suggests this is not sufficient, and additional K would trigger a yield response. A minimum of 250 pounds per acre of extractable K is required for K to not be a limiting factor in soybean yield. Additionally, data from research trials conducted from 2011-2019 in the Delta area of MS suggests that when soil test values are in the responsive range, 80 pounds per acre of K_2O are required to maximize agronomic yield of Soybean (Figure 1). **Therefore, beginning January, 2020, soybeans will move to groupings with a lower threshold to trigger a potassium rate recommendation (Table 2). In addition, soybean recommended rates for K_20 fertilizer in the Low category will change (Table 3)**. In making these changes we hope soil testing recommendations will assist producers in optimizing fertilizer rates toward reaching yield goals.

Table 1. Current Soybean Potassium groupings based on soil test extractable K in pounds per acre

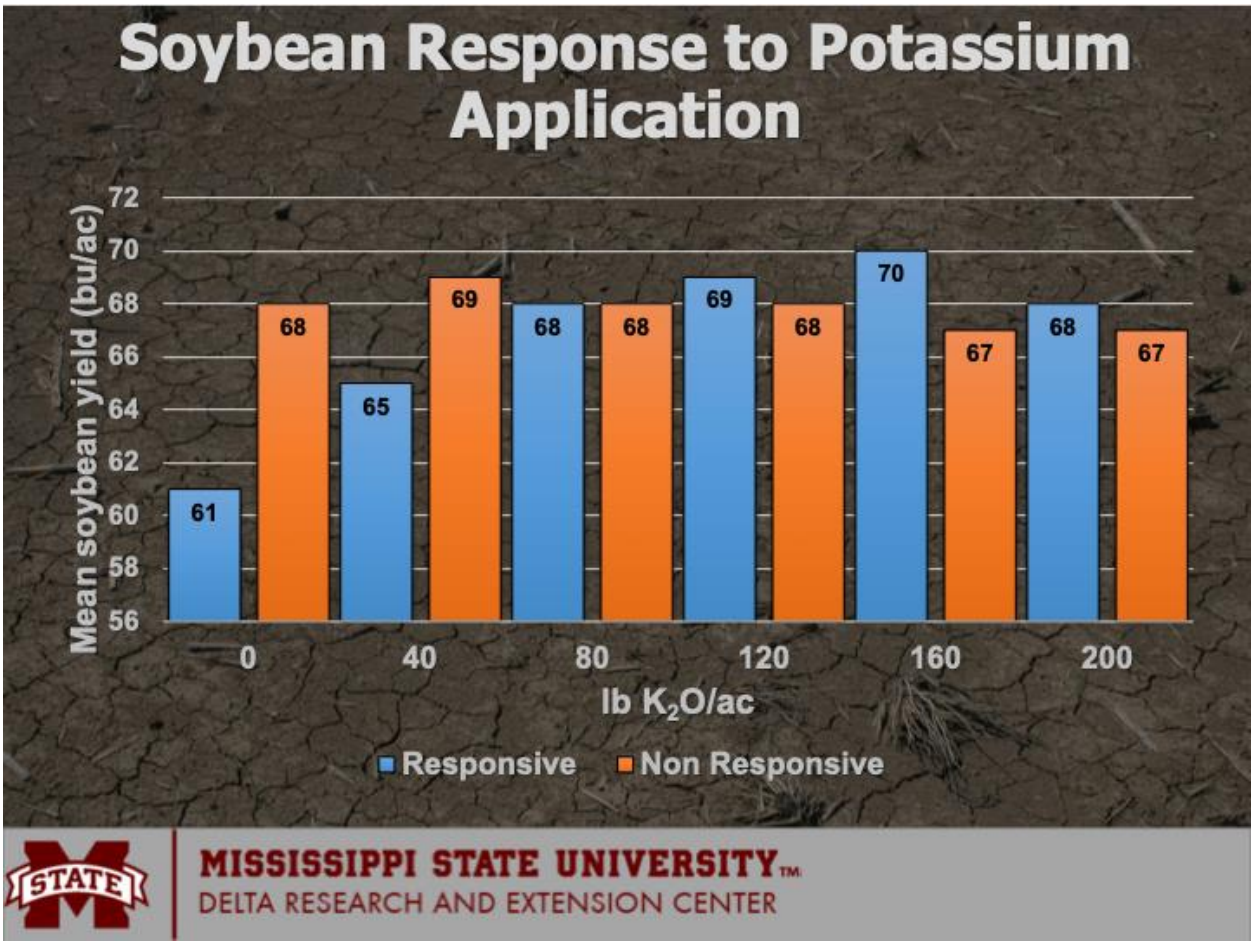
Category	CEC ≤7	CEC 7-14	CEC 14-25	CEC 25+
Very Low	0-50	0-60	0-70	0-80
Low	51-110	61-140	71-160	81-180
Medium	111-160	141-190	161-210	181-240
High	161-280	191-335	211-370	241-420
Very High	280 +	335 +	370 +	420 +

Table 2. Revised Soybean Potassium groupings based on soil test extractable K in pounds per acre

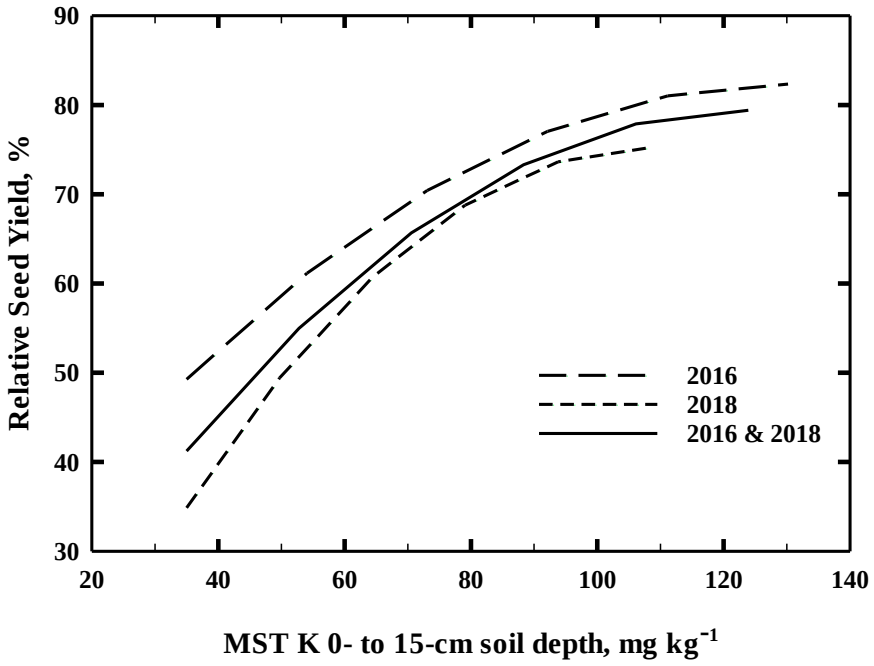
Category	**CEC ≤7**	**CEC 7-14**	**CEC 14-25**	**CEC 25+**
Very Low	0-70	0-90	0-120	0-150
Low	71-150	91-190	121-240	151-260
Medium	151-200	191-240	241-290	261-320
High	201-350	241-420	291-510	321-560
Very High	350 +	420 +	510 +	560 +

Table 3. Current and revised soybean recommended fertilizer rates in pounds per acre for K_20.

Category	Current	Revised
Very Low	120	120
Low	60	***90***
Medium	60	60
High	0	0
Very High	0	0



Data from research trials conducted between 2011-2019 in the Delta area of MS from Bobby Golden.



Response curve of relative seed yield influenced by increasing MST K for the 0- to 15-cm up to the relative seed yield plateau. Data from Dygert, 2019. Varietal and Residual soil test K level effects on soybean leaf K status and yield. MS Thesis. Mississippi State University.

MSU Extension revises soybean fertilizer info

extension.msstate.edu/news/feature-story/2020/msu-extension-revises-soybean-fertilizer-info

Filed Under:
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Feature Story

The Mississippi State University Extension Service recently updated potassium fertilizer recommendations for soybean fields. Keri Jones, manager of the MSU Soil Testing Lab, prepares to test a soil sample. (Photo by MSU Extension Service/Kevin Hudson)

Ms. Bonnie A. Coblentz
MSU Extension Service

STARKVILLE, Miss. -- Fertilizer recommendations are constantly examined and rarely modified, but change came this year after Mississippi State University research demonstrated higher potassium recommendations increase soybean yields.

Larry Oldham, soil specialist with the MSU Extension Service, said the MSU Soil Testing Laboratory announced the changes. The Mississippi Soybean Promotion Board backed the

research that lead to the updated recommendations.

“We have sufficient data to support changes in MSU soil testing’s soybean potassium recommendations,” Oldham said. “The potassium recommendations for soybean were too low for certain soil test recommendation categories.”

Oldham said soil samples are categorized in one of five categories from very low to high based on extractable potassium levels. Samples are given a fertilizer recommendation based on their category.

“We adjusted the potassium thresholds for each of these categories,” Oldham said. “For example, soil with a potassium reading of 120 used to be rated as medium, but now is rated as low in potassium.”

While the categories grouping potassium content changed, the only change in recommended potassium rates was made to the low category. MSU now recommends potassium be applied at the rate of 90 pounds per acre rather than 60 pounds per acre as previously indicated.

“As an example of how this change might impact a sample recommendation, under old recommendations, soils testing at 250 pounds per acre of extractable potassium with a CEC of 30 would be classified as a high rate and thus not get a potassium recommendation,” Oldham said. “Our new data suggests this is not sufficient, and additional potassium would trigger a yield response.”

CEC stands for cation exchange capacity and refers to the soil's ability to hold onto essential nutrients and provides a buffer against soil acidification. These recommendations went into effect Jan. 15.

The MSU Soil Testing Lab, under the management of Keri Jones, conducted the needed tests.

“Soil testing is an important management tool that can provide assistance with decisions concerning fertilizer and lime application,” Jones said. “Our lab analyzes soil from agricultural fields as well as homeowners interested in healthier lawns and gardens.”

Bobby Golden, a rice agronomist with the Mississippi Agricultural and Forestry Experiment Station, said researchers regularly revisit recommendations to ensure they account for current conditions and practices.

“As our soybean production practices change over time and genetic gain occurs with new varieties, soil test recommendation need to be updated,” Golden said.

Golden said he uses at least 30 site years of data to ensure sufficient information to warrant a change. Site years is a measure of the number of sites tested multiplied by the number of years over which data is collected.

In this case, Golden used five years of data from test sites before recommending the change to rates of potassium required in soils being used for soybean production.

This work involved several researchers and was conducted at MSU's Delta Research and Extension Center in Stoneville and the R.R. Foil Plant Science Research Center in Starkville, as well as on commercial fields of cooperating Delta producers. MSU Extension, MAFES and the Soybean Promotion Board funded and supported the research.

"To find responsive sites you generally have to go to the problem," Golden said. "The on-farm trials we conducted that are contained in this data set ranged from Tunica to Redwood and as far east as Sidon."

These recommendations and research data will become available online at http://extension.msstate.edu/.

Revised Soybean Potassium groupings based on soil test extractable K in pounds per acre

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Low	71-150	91-190	121-240	151-260
Medium	151-200	191-240	241-290	261-320
High	201-350	241-420	291-510	321-560
Very High	350 +	420 +	510 +	560 +

Current and revised soybean recommended fertilizer rates in pounds per acre for K20.

Category	Current	Revised
Very Low	120	120
Low	60	***90***
Medium	60	60
High	0	0
Very High	0	0

Released: March 17, 2020
Contacts: Dr. Larry Oldham, Dr. Bobby Richard Golden
Photos for publication (click for high resolution image):

The Mississippi State University Extension Service recently updated potassium fertilizer recommendations for soybean fields. Keri Jones, manager of the MSU Soil Testing Lab, prepares to test a soil sample. (Photo by MSU Extension Service/Kevin Hudson)