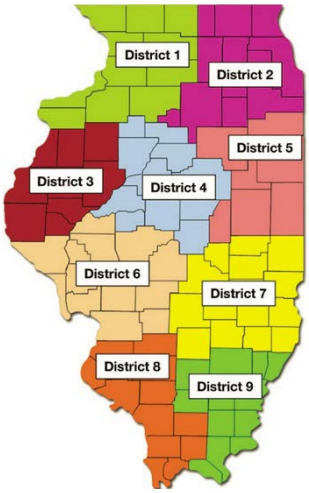
Villamil – Nafziger • NREC 2014-02377
Report of results 2015
Updating P and K Response and Crop Removal Numbers for Illinois

Project Objectives:

The goal of this project is to work with producers and retailers to improve N, P, and K fertilizer recommendations for Illinois. Specifically, we seek to modernize P and K removal rates by analyzing P and K concentrations in corn, soybean, and wheat grain samples collected from producers across Illinois. This information is essential for nutrient replacement plans and optimal crop management.

Preliminary Results

Sampling numbers: Number of samples collected and analyzed to this date is detailed in **Table 1**.



Year	CRD	Corn	Soy	Wheat
2014	1	183	131	0
	2	45	81	1
	3	60	78	0
	4	103	140	2
	5	86	113	5
	6	88	124	1
	7	36	135	4
	8	43	94	1
	9	39	55	4
	Sub-total	**684**	**951**	**18**
2015	1	62	104	8
	2	88	78	4
	3	69	79	1
	4	66	117	12
	5	110	85	22
	6	65	92	24
	7	122	145	44
	8	17	64	231
	9	18	59	19
	Sub-total	**617**	**823**	**365**
	pending	*195*	*16*	*0*
Total analyzed		**1,301**	**1,774**	**383**

We were able to collect samples from all nine Cropping Reporting Districts (CRD) for corn and soybean. The wheat crop was not well represented during our first year due to a general failure of the crop but sampling during 2015 achieved good numbers.

Relation with yields: Figure 1 shows the relationships between corn yield (bushels/acre) and P and K concentrations in grain (expressed as pounds P_2O_5, and K_2O/bushel) in samples collected in 2014 and 2015. Similar trends were found for the soybean crop in both years, with grain yield for both crops

unrelated to P_2O_5, and K_2O concentrations in harvested grain as revealed by the low values of the Pearson correlation coefficients and their non-statistically significant levels. Although preliminary, these values of nutrient removal along with appropriate soil testing can guide soil management for optimal nutrient budgeting.

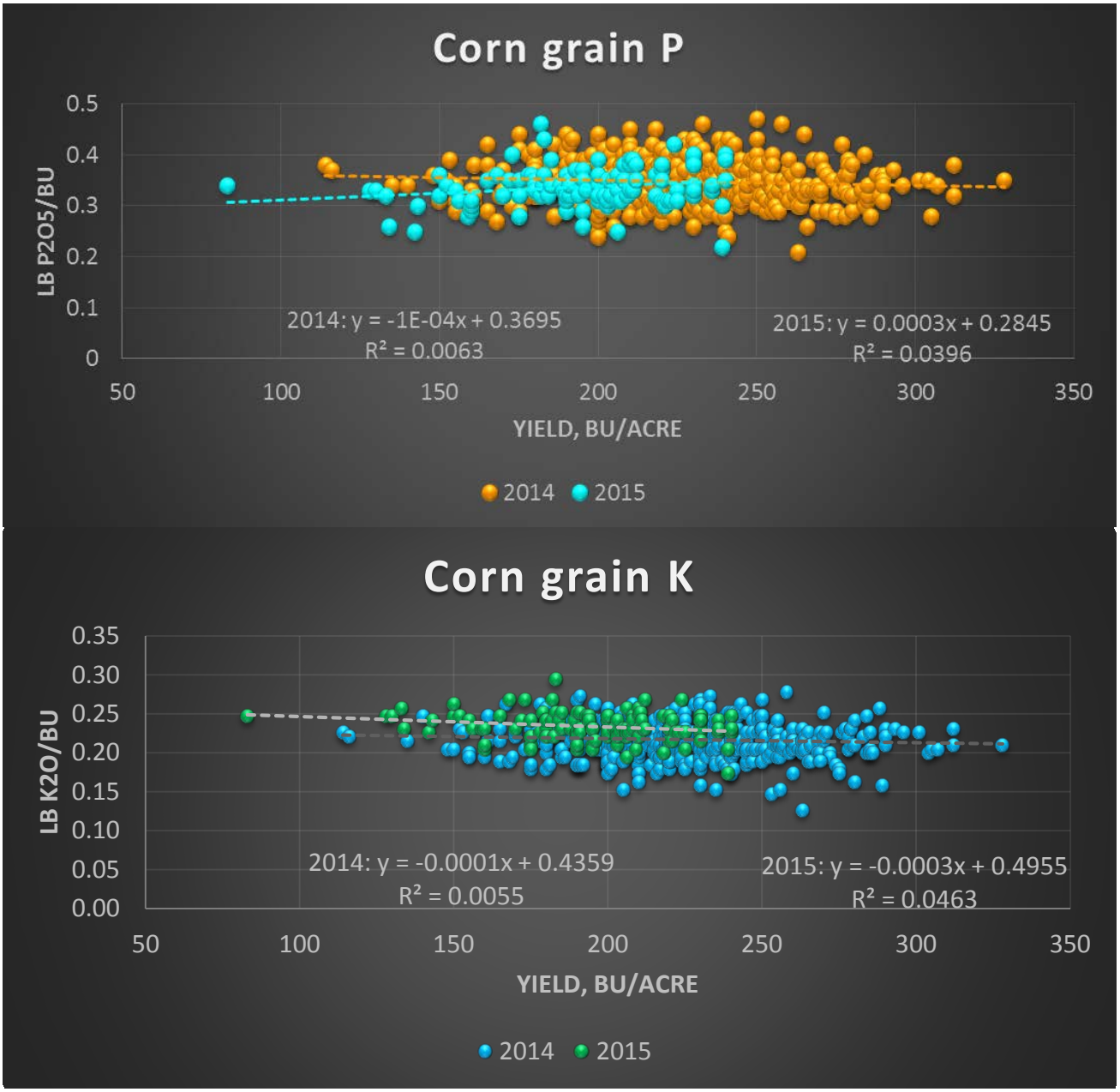


Figure 1. Corn yield (bu/ac) and P and K concentrations in grain (expressed as pounds P2O5, and K2O/bushel) in samples collected in 2014 and 2015.

Nutrient removal estimates: Estimates of P_2O_5 and K_2O per bushel of corn and soybean in this study were lower than the benchmark values suggested in the Illinois Agronomy Handbook (**Figure 2 and Table 2**).

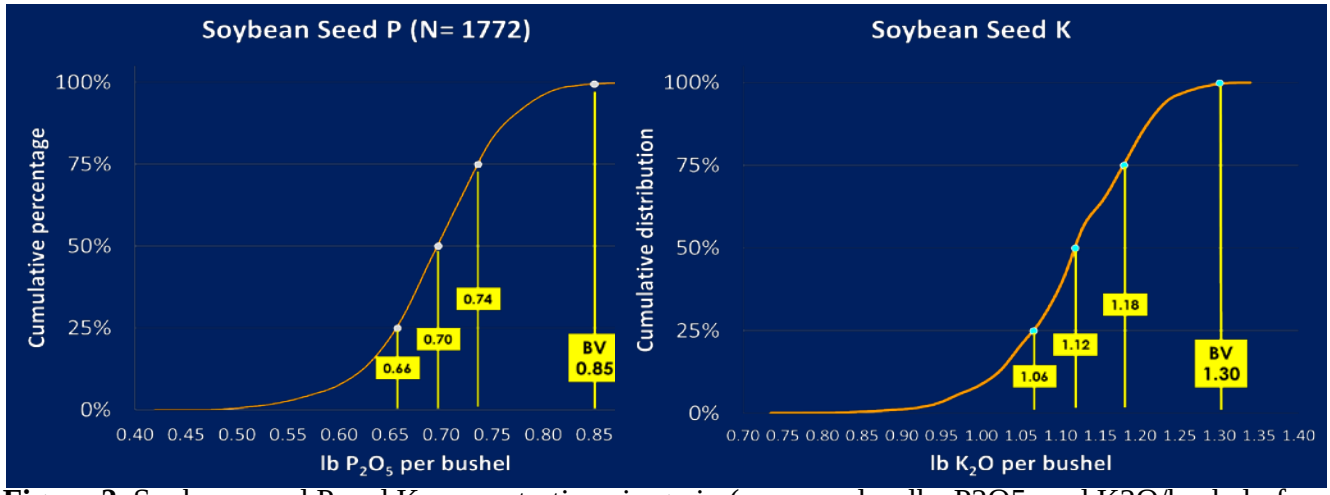


Figure 2. Soybean seed P and K concentrations in grain (expressed as lbs P2O5, and K2O/bushel of grain) in samples collected in 2014 and 2015 compared with the book values (bv) commonly used. The yellow boxes from left to right on each curve indicate the values obtained for 25%, 50% and 75% of the samples analyzed.

Nutrient	Average	Range	Book value	% below book value
	----------lb/bushel----------			
Corn P	0.34	0.16 - 0.46	0.43	98.0
Corn K	0.22	0.13 - 0.31	0.28	99.8
Soybean P	0.70	0.42 - 0.93	0.85	99.5
Soybean K	1.12	0.73 - 1.33	1.30	99.9
Wheat P	0.42	0.13 - 0.64	0.90*	100.0
Wheat K	0.24	0.09 - 0.49	0.24	21.0

Table 2. Estimates of P_2O_5 and K_2O removal per bushel of corn, soybean, and wheat determined in both years and compared with the reference book values.

Variability observed: The levels of nutrients removed for each crop was significantly different from year to year as we can observed in the **Figure 3** below. We are not sure about the reasons behind this trend and we need additional data to corroborate or refute this finding.

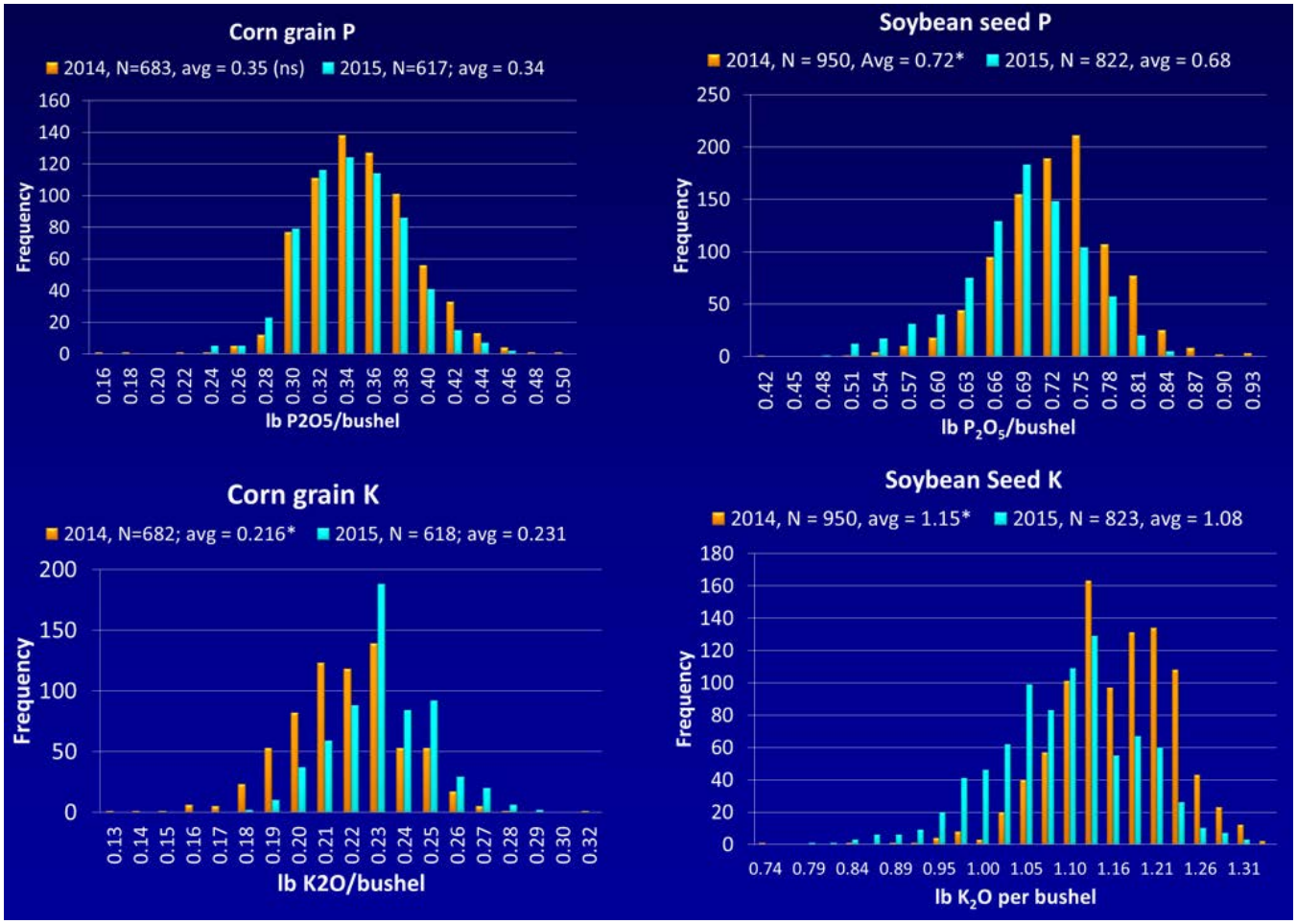


Figure 3. Levels of P and K removal in corn grain and soybean seed expressed as lbs P2O5, and K2O/bushel for both years in which sampling was conducted.

Please remember this is preliminary data - Not for distribution.

Budget: No changes needed at this point.