

Winter Pea in Ohio and the Nitrogen Contribution to Corn

Harold D. Watters*, Ohio State University, Extension Agronomist, Bellefontaine, OH and and Robert Mullen, Ohio State University/OARDC Adjunct Professor and Director of Agronomy Potash Corp, Wooster, OH

*Presenting author. For further information: watters.35@osu.edu, 937 604-2415c



A five-year study was created to determine if cover crops could be managed to aid in nitrogen management for corn. Trials were conducted at the Western Agricultural Research Station in west central Ohio to evaluate the contribution of nitrogen from fall planted winter pea in Ohio.

Corn grown after winter pea planted at two or three timings was compared to a wheat stubble check. In the first two trial years, annual ryegrass was also observed. Corn was planted by no till methods at three to four nitrogen levels to measure uptake following winter pea.

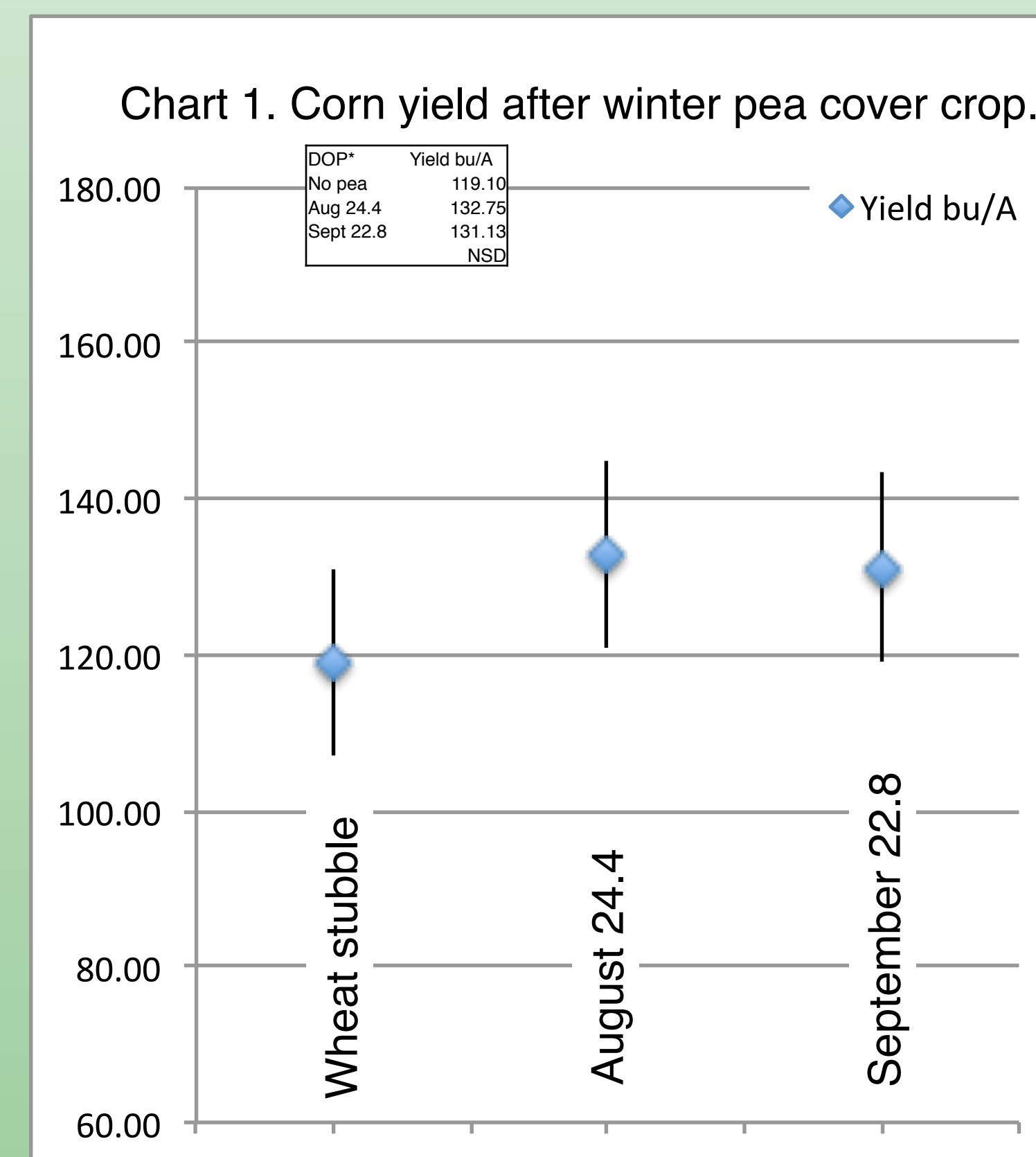
Trial results for corn yield from 2006, 2007, 2009, 2010 and 2011 are included. Early planted pea provided an excellent stubble for planting of no till corn. While there was some rotation benefit to winter pea, little response was seen for nitrogen supply to the succeeding corn crop. The reports that “winter peas provide 75 to 125 lb N to the next crop” may need to be re-evaluated.

Introduction and procedures:

Project initiation:

- A local producer asked the question, “can I grow my own nitrogen for corn?”.
- Other Ohio State University co-workers were working to reduce nitrogen loss over the winter months to local streams and lakes by growing a cover crop.
- Winter pea is the cover crop reported in this work, planted no till after wheat harvest, the variety is common Austrian winter pea – sometimes Forage Master or Frost Master.
 - Comparisons are made between wheat stubble and winter pea cover at two planting dates – late August and the 3rd week of September. Dates average August 24.4(+/-7 days) and September 22.8 (+/-2 days).
 - Since some tillage is suggested in Ohio after wheat and before corn, the empty no till drill used to plant the winter pea was pulled through the stubble plots at the August timing.

- Results are measured by yield of harvested corn in the year following establishment of the cover crop.
- Trial results – corn yield is summarized across the years 2006, 2007, 2009, 2010 and 2011.
 - 2008 was lost due to carryover from an in-wheat herbicide application
- Two hybrids were split-planted with a six-row John Deere no till planter, three rows of each, two harvested for a yield estimate.
- One location – the university research farm at South Charleston, Ohio. Soils are Crosby, Brookston and Miami and varied by year. Artificial drainage is adequate to allow good growth of both winter and summer crops.
- The project was modified over the years due to farmer, co-worker and fellow researcher remarks and suggestions:
 - Winter peas provide “75 to 125 lb N to the next crop”
 - This influenced the treatment design with 75 N increments
 - After two years of work, “you have to wait for the spring growth” to build that nitrogen.
 - For 2006 and 2007 corn was planted in early May, after the remark the date of planting was delayed until late May for 2009, 2010 and 2011.
 - This allowed approximately three weeks more growth for the September planting date.
 - But also potentially reduced yield – no early May check was planted.
 - The 150N rate doesn’t appear adequate to maximize yield.
 - Increase the maximum rate to 225N.
 - Typically we increase N by 40 units following wheat.



The No pea treatment was corn planted into wheat stubble; Aug 24.4 and Sept 22.8 are the average planting dates across the five trial years.

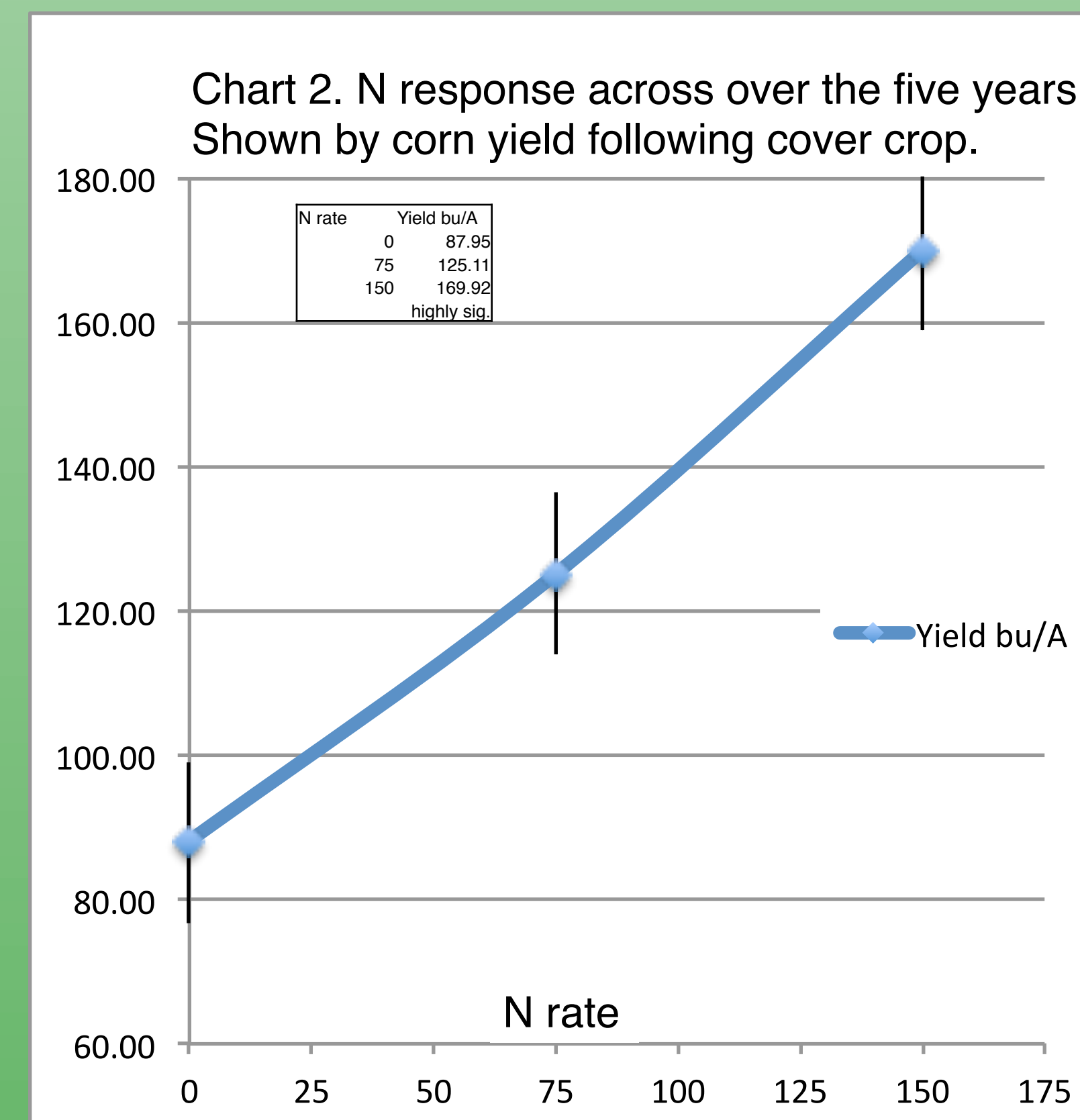


Table 1. Fixed effects table for SAS Proc Mixed analysis of winter pea treatments across the years 2006, 2007, 2009, 2010 and 2011.

Effect*	Num DF	Den DF	F Value	Pr>F
DOP	2	6	1.14	0.3819
N rate	2	6	81.22	< 0.0001
DOP by N	4	314	0.90	0.4664
Hybrid	3	314	1.03	0.9914

* DOP reflects the winter pea planting date - no pea (wheat stubble), late August or late September. N rate reflects the 0, 75 or 150 N/A rate.

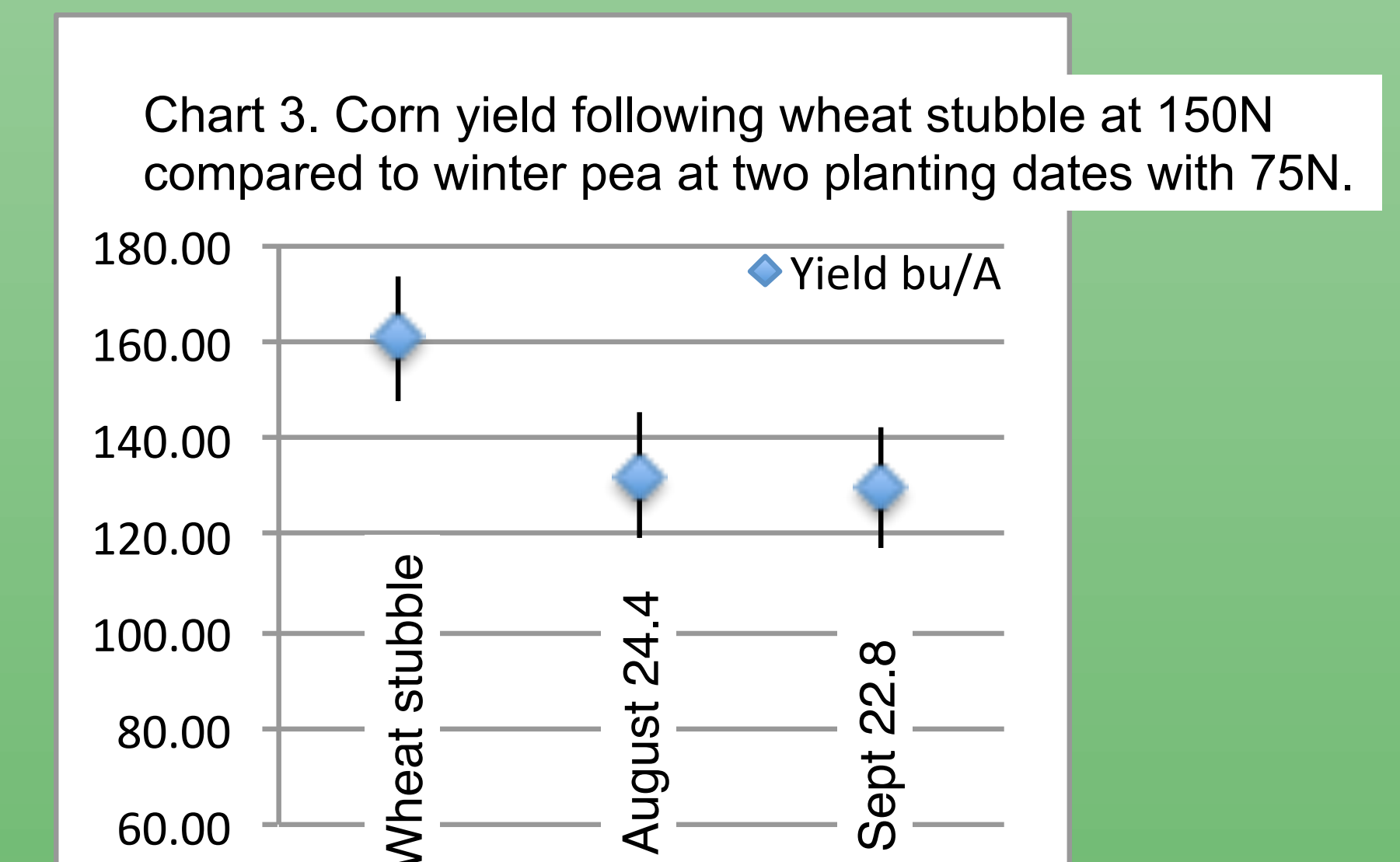
Results:

Across the five years of the trial, winter pea cover crop did not react significantly different from winter wheat stubble as noted in Table 1 for DOP and shown graphically in Chart 1.

Results for nitrogen (N) rate were highly significant (Chart 2) with yield of corn increasing dramatically with increasing N rates across prior crops of wheat stubble and winter pea.

From remarks made by others and statements made in several cover crop texts an interaction between winter cover and N rate was expected; this was not the case for the five year analysis of this trial.

- Chart 3 shows a comparison of wheat stubble with 150N to winter pea cover at 75N. The goal to produce 75 to 125N with pea was not successful.

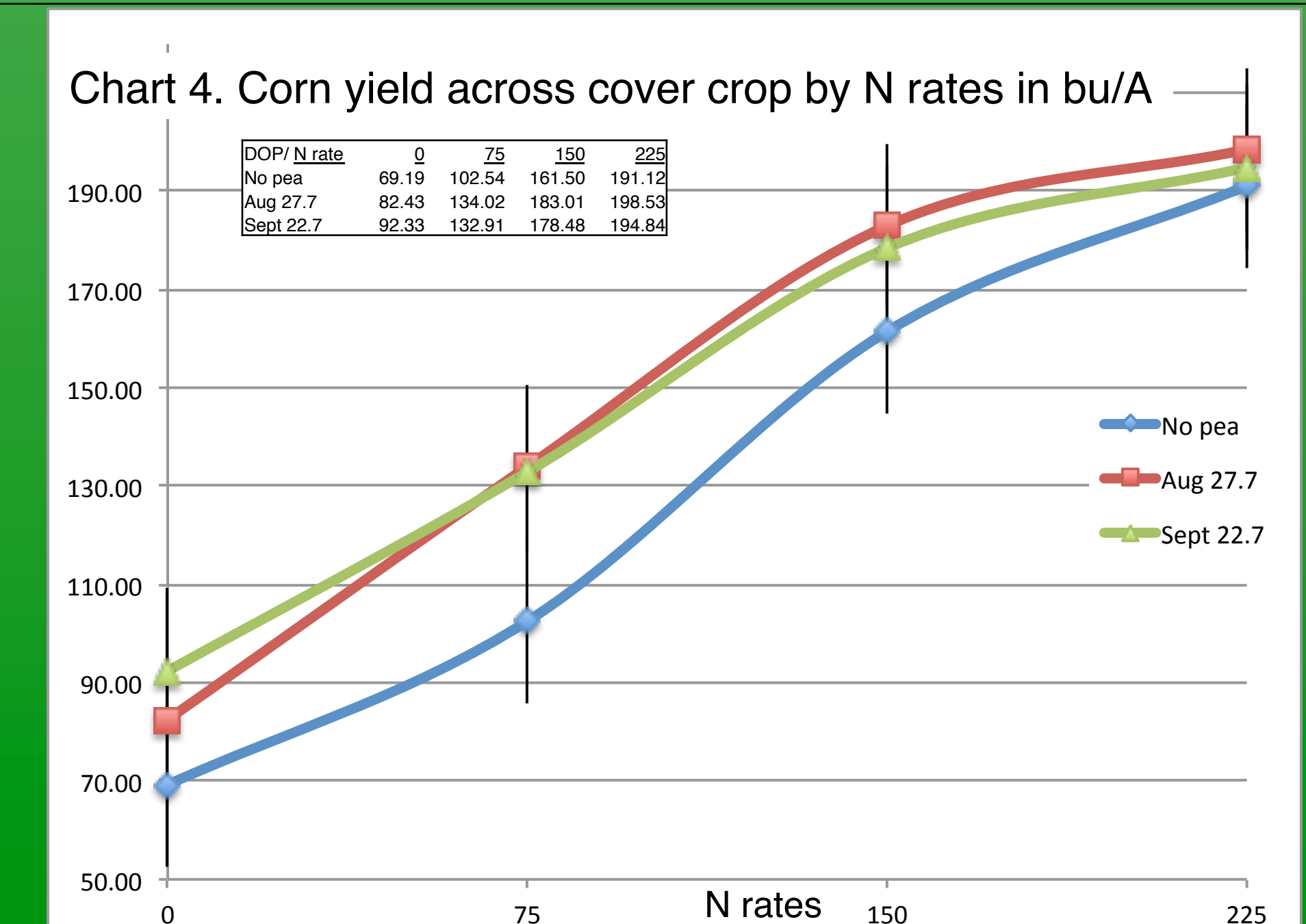


Three year analysis – 2009, 2010 & 2011

To complicate the discussion, we ran a separate analysis on the final three years of the project since we had a common set of treatments and a higher rate of N. Table 2 shows the results with significant effects for DOP, N rate and DOP by N. Chart 4 shows graphically the interaction effects.

Table 2. Fixed effects table for SAS Proc Mixed analysis of winter pea treatments across the years 2009, 2010 and 2011.

Effect*	Num DF	Den DF	F Value	Pr>F
DOP	2	4	7.24	0.0469
N rate	3	6	202.34	< 0.0001
DOP by N	6	245	3.64	0.0018
Hybrid	1	245	3.26	0.0723



Summary observations on the use of winter pea as a cover crop:

- After five years of observations
 - winter pea planted the third week of September makes limited fall growth but will overwinter in central Ohio.
 - winter pea planted in late August makes abundant growth but will not overwinter.
- The benefit to the following corn crop is similar for both the August and September planting.
- Winter pea makes an excellent previous crop for no till corn – from the standpoint of seedbed.
 - But plan to manage pests

Thanks to the management and staff of the Western Agricultural Research Station at South Charleston, Ohio particularly Joe Davlin, and to Seed Consultant's Inc. for their support.