Project Title: Soil residual herbicide micro-rate combinations based on standard curve waterhemp control increments at 50%, 75%, and 100%, derived from 2019 herbicide rate screen data.

Private Investigator (P.I.): Next Gen Ag, LLC/Andrew Lueck

Quarter Report: #2 August 2020-October 2020

Objectives: (List project objectives as submitted in final proposal. Describe activity for each during this reporting period.)

1. Build a standard curve for each herbicide tested based on the 0.25X, 0.5X, 1X, and 2X weed control ratings observed in 2019
    a. Goal #1: Collect 2019 data (Done).
    b. Goal #2: Determine rates required to achieve 70, 90, and 100% waterhemp control based on standard curve equation (Done).
    c. Goal #3: Combine 3+ product rates that achieved 70% control alone; 2-3 product rates that achieved 90% control alone; and 2 product rates that achieved 100% control alone in 2019 for the 2020 combinations (Done).
2. Develop more diverse combinations of herbicides at lower rates while maintaining 90% waterhemp control utilizing tendencies presented in standard curve data.
    a. Goal #1: Protocol treatment diversity decrease risk of resistance development (Done; 2020 data collected).
    b. Goal #2: Lower rates are more affordable while increase diversity compensates for risk of resistance development for lower rates (Done; 2020 data collected).
3. Develop effective treatments with range of $15.00 to $40.00 and average of $30.00 per acre.
    a. Goal #1: Develop protocol treatments that meet requirements based off of ND Weed Guide appendum (Done).
    b. Goal #2: Determine effectiveness of treatments providing greater than 85% weed control (Done).
4. Use 2020 data to select competitive treatments for 2021 proposal.
    a. Determine the “champion treatments” from 2020 (all significantly similar treatments to best treatment) (Done).
    b. Communicate with all industry partners including Valent, Bayer, BASF, Syngenta, FMC, and Corteva to determine their portfolio “champion” that meets the equivalent criteria for treatment cost and place in a competitive trial setting in 2021 with my “champions” (Done…..really great feedback from industry partners).
    c. Take yield data from all 2020 “champion” treatments to ensure no yield reductions present (Done).

Achievements: (Specific project achievements during this reporting period.)

1. Trial was successfully planted in an area of intense waterhemp pressure.
2. Every plot was planted and sprayed according to plans, NO MISTAKES!
3. No crop injury noted from any treatments.
4. 45 DAA drone picture taken and proves intriguing. 45 and 60 DAA individual plot photos taken.
5. 15, 30, 45, 60, and 75 DAA waterhemp control notes taken (still have some PRE combos holding strong above 90% control).
6. No yield lose from herbicide injury on any treatments.

Challenges: (Challenges encountered. Specific request for assistance from Production AT on any challenges listed above.)

1. None really, this has been a PERFECT year for research in the area and I'm excited about the results!

Publications/Symposium:

1. I will provide a one or two page "extension formatted" summary of the data and provide outcomes. This will occur in quarter 2. (DONE)
2. If granted the venue and requested by the soybean growers I anticipate presenting a poster of data conclusions. (Pending)

Tech Transfer: (General audience identification and approximate number attending.)

1. Multiple large companies have had a research representative tour the trial and the final summary was sent to them all, whether they use the information or transfer it is unknown to me. (Done)
2. Anticipate the summarization article of the study in quarter 2 (Done)
3. Anticipate a forum to present data and conclusions at this winter (quarter 3?...Pending).

Drone images taken 6-22-20. Treatment Comparisons on next page down.

Example of gain from rate increase at 45 (June 15th) and 60 (June 30th) DAA, respectfully.

#1 (Baseline): PRE Valor SX + Warrant + Blanket @ 1.5 oz + 22 fl oz + 6.2 fl oz;
Baseline 60 DAA Control= 75%; **Baseline Cost=$23.10**

#2 (Rate Bump #1): PRE Valor SX + Warrant + Blanket @ 2.1 oz + 42 fl oz + 8.6 fl oz;
Increase over baseline: 60 DAA Control= +12.5% (87.5%); **Cost=+$11.90** ($35.00) OR **$1.05/1%**

#3 (Rate Bump #2): PRE Valor SX + Warrant + Blanket @ 2.5 oz + 54 fl oz + 10 fl oz;
Increase over rate bump #1: 60 DAA Control= +1.3% (88.8%); **Cost=+$7.25** ($35.00) OR **$5.57/1%**

Example of gain from Flexstar tank mix at 45 (June 15th) and 60 (June 30th) DAA, respectfully.

#1 (Baseline-No Flexstar): PRE Valor SX + Warrant + Blanket @ 2.1 oz + 42 fl oz + 8.6 fl oz;
Baseline-No Flexstar: 60 DAA Control= 87.5%; Cost= $35.00

#2 (+Flexstar PRE): PRE Valor SX + Warrant + Blanket + Flexstar @ 2.5 oz + 54 fl oz + 10 fl oz + 11 fl oz;
Increase over baseline-no Flexstar: 60 DAA Control= +5% (92.5%); **Cost= +$5.75** ($40.70) OR **$1.15/1%**

#3 (+Flexstar EPOST): PRE Valor SX + Warrant + Blanket / Flexstar @ 2.5 oz + 54 fl oz + 10 fl oz / 11 fl oz;
Increase over baseline-no Flexstar: 60 DAA Control= +9.8% (98.3%); **Cost= +$5.75**($40.70) OR **$0.59/1%**