Whole-Farm (Cash Grain) and Soybean Specific Sustainability Assessment

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This sustainability self-assessment for Midwestern dryland soybean farmers contains the questions and the response options organized by category and was prepared as a supplement to Dong et al. 2015. Assessing Sustainability and Improvements in U.S. Midwestern Soybean Production Systems Using a PCA-DEA Approach. *Renew Ag Food Syst* doi:10.1017/S1742170515000460.

Whole-Farm (Cash Grain) Sustainability Assessment

Farm Soil and Nutrient Management

1A Do you maintain and/or implement any practices to prevent wind erosion (e.g., windbreaks, conservation tillage)? *(Check all that apply)*

- ☐ Use conservation tillage practices that maintain 30% plant residue on soil surface at planting.
- ☐ Use existing windbreaks
- ☐ Plant a new windbreak
- ☐ Other Please describe: _____
- ☐ Do not maintain or implement any practices to prevent wind erosion.

1B Are effective winter covers planted? *(Yes or No)*

1C Are grass filter strips used to prevent soil movement sensitive areas (houses, schools, waterways, surface waterways, conduits to groundwater, sinkholes, etc.)? *(Yes or No)*

1D Have you established and maintained bio-filters on your farming landscape? *(Yes or No)*

1E Do you sample soil for nutrients in accordance with University guidelines regarding frequency and number of samples? *(Yes or No)*

1F Do you have an annually updated nutrient management plan that follows University recommended application guidelines? *(Yes or No)*

1G Are nutrient and lime application guidelines followed for crop type to ensure optimal productivity? *(Yes or No)*

1H Do you have and follow a soil and water conservation plan for your farm? *(Yes or No)*

1I Do you have waste water, and if applicable, do you land spread according to local and state regulations? *(Yes or No)*

Crop Scouting

2A What method of scouting do you most commonly use? *(Check only one)*

- ☐ Crop scouts follow specific patterns along field borders and in the interior of the field and track hot spots
- ☐ Crop scouts focus mostly on looking for potential hot spots and spot-checking where problems have occurred in the past
- ☐ Informal observations during routine farming operations (e.g., while spraying or while going out to check irrigation equipment)

2B Why do you scout? *(Check all that apply)*

- ☐ To determine when pest levels in a field reach or exceed thresholds
- ☐ To reduce pesticide use and so minimize environmental impacts
- ☐ To check on the effectiveness of a pest control measure used
- ☐ In response to a local or recent pest report heard or read about
- ☐ To monitor areas of fields where pests were a known problem

2C Whose scouting data do you use to make management decisions? *(Check all that apply)*

- ☐ Independent crop consultant
- ☐ Certified Crop Advisor
- ☐ Farm employee
- ☐ IPM-trained farm employee
- ☐ Farm owner/manager
- ☐ Farm dealer/co-op

2D Which of the following best represents how you or your farm manager kept track of the scouting information collected? *(Check only one)*

- ☐ Either my scout or I analyzed scouting records by moving them onto a field map to more effectively identify "hot spots" and observe general patterns of change across time within the field
- ☐ Written or electronic records were kept in a file to track changes in pest pressure over time on fields
- ☐ Written or electronic records were kept in a file
- ☐ No written or electronic records were kept of scouting reports on fields

2E Do you use computer generated geo-referenced images of pest populations to identify "hot spots" within fields to keep on file for long-term population comparisons? *(Yes or No)*

2F How long are field scouting records kept on file for future use? *(Check only one)*

- ☐ Records are kept for longer than 5 years
- ☐ Records are kept between 2 and 4 years
- ☐ Records are kept for 1 year
- ☐ No written or electronic records are kept

2G Do you use remote sensing to aid in scouting and diagnosis of pest problems?

- ☐ Yes, more than twice during the season
- ☐ Yes, once during the season
- ☐ No

Farm Pest Management

3A Which of the following practices did you do on the farm for **weed** management? *(Check all that apply)*

- ☐ Scouted fields for weeds shortly after emergence in a systematic pattern and continued each week until control options were no longer available
- ☐ Spot sprayed or cultivated (if appropriate) for perennial weeds, or patches of annual weed escapes, based on scouting reports
- ☐ Used diverse herbicide mode-of-actions in rotational crops to avoid potential herbicide resistance
- ☐ Controlled a known problem weed in previous years' crops
- ☐ Used mechanical methods for weed control (e.g., preplant tillage, row cultivation, rotary hoeing) for weed management
- ☐ Used mowing or tillage equipment to control weeds on the field edges and adjacent areas to reduce the chance of weeds migrating into fields
- ☐ Kept field records for long-term weed species and density comparisons
- ☐ Used recommended agronomic practices (planting date, row spacing, seeding rates, fertility) to maximize early season crop growth, thus minimizing weed competition to crops
- ☐ Controlled noxious weeds on farm
- ☐ Cleaned machinery when moving from field to field to lessen the chance of spreading weeds
- ☐ None of these practices were used

3B Which of the following practices did you use on your farm for **insect** management? *(Check all that apply)*

- ☐ Rotated classes of insecticides specifically to avoid the emergence of insect resistance
- ☐ Selected an insecticide based on preserving or enhancing natural enemies
- ☐ Scouted for insect pests at critical periods throughout the growing season in a systematic pattern
- ☐ Kept field records on the density of each insect pest for long-term comparisons
- ☐ Managed cropping system locations to avoid pest concerns from previous to current year's crop
- ☐ Used augmentative biological control with beneficial insects released in the area either prior to or during the growing season
- ☐ Managed or enhanced the habitat in or around the field to encourage or conserve beneficial insect populations
- ☐ Managed crop health to enhance crop ability to withstand increased degrees of pest pressure
- ☐ Selected resistant or tolerant varieties
- ☐ None of these practices were used

3C Which of the following practices did you implement during the season for **disease** management? *(Check all that apply)*

- ☐ Rotated chemistry families of fungicides specifically to avoid the emergence of resistance
- ☐ Applied an effective biocontrol agent to reduce the chance of disease. Specify Product: _____
- ☐ Changed the crop rotation to lower the probability of certain soil-borne diseases occurring (e.g., planted a crop that decreases nematode populations)
- ☐ Monitored plant health and disease spread with aerial monitoring or aerial photography
- ☐ Monitored disease using crop management websites (e.g., soybean rust)
- ☐ Selected resistant or tolerant varieties for the suppression of plant disease
- ☐ Scouted crops for disease weekly in a systematic pattern throughout the growing season
- ☐ Kept field records of disease frequency and severity for long-term comparisons
- ☐ Managed fertility for healthy plants in order to resist disease
- ☐ None of these practices were used

Resistance Management

4A Do you monitor for field level failures through scouting that could be a sign of resistance development for pests (insects, diseases, and weeds)? *(Check all that apply)*

Insects: *(Yes or No)* Diseases: *(Yes or No)* Weeds: *(Yes or No)*

4B Do you monitor for pest (insect, disease, and weed) resistance development through local or regional information sites (e.g., websites, newsletters)? *(Check all that apply)*

Insects ☐Yes. Provide specific program_____ ☐No
Diseases ☐Yes. Provide specific program_____ ☐ No
Weeds ☐Yes. Provide specific program_____ ☐ No

4C Are consultants or University Extension specialists consulted when a resistance concern arises? *(Yes or No)*

4D Do you work with pest management practitioners, crop consultants, or University personnel to develop or map-out season-long pest management plans to lower the risk for resistance development? *(Yes or No)*

4E Do you apply an appropriate pesticide to match the stage of the insect present in the field? *(Check only one)*

- ☐ I use short residual and reduced-risk insecticides targeting only vulnerable stages of the pest
- ☐ I use short lasting, broad spectrum, or long lasting specific materials to target pests
- ☐ I apply long-lasting, broad spectrum insecticides to minimize the risk of recurrent infection or insect re-infestation

4F Before planting, do you consider fully integrated options to control weed competition, infection by disease pathogens, or attack by insect pests? *(Check only one)*

- ☐ I integrate combinations of pest management practices, including biological control agents, bio-rational pesticides, cultural practices, crop-rotation, and pest-resistant varieties preventatively to limit insect infestation, disease development, or weed populations
- ☐ I apply pesticides preventatively to minimize risk associated with damage by pests

4G Do you use FRAC, IRAC, or HRAC information or chemical group numbers (fungicide/ insecticide/ herbicide resistance action committee) in pesticide selection?

Fungicide resistance action committee (FRAC) information *(Yes or No)*
Insect resistance action committee (IRAC) information *(Yes or No)*
Herbicide resistance action committee (HRAC) information *(Yes or No)*

4H Do you rotate modes of action to limit resistance selection? *(Yes or No)*

4I Do you choose pesticide rates within the labeled range to be sufficient to prevent pest reproduction or resistance selection? *(Yes or No)*

4J Do you incorporate disease, insect, or weed resistant/tolerant varieties into your cultural resistance management program? *(Check only one)*

- ☐ I select varieties with resistance to common insects and diseases or tolerance to weed competition to minimize use of pesticides
- ☐ I select resistant varieties when appropriate but primarily rely upon pesticides to manage pests in the production season
- ☐ I do not make variety selections based on tolerance or resistance to pests but rely entirely upon pesticides to manage insects, diseases, and weeds in the production season

4K Specific to insecticides, do you rotate chemicals with single site modes of action (e.g., chemical classes) with chemicals that possess different modes of action over successive generations of insects? *(Yes or No)*

4L Do you monitor and keep records for individual fields of the performance of pesticides with high risk for resistance? *(Yes or No)*

Chemical and Worker Safety

5A Is the person who makes pesticide applications on your farm a certified applicator (private or commercial)? *(Yes or No)*

5B Was your spray equipment (or the custom applicators' equipment) calibrated before this crop season (e.g., each nozzle with same flow and coverage rate)? *(Check only one)*

☐ 4 times per year ☐ 3 times per year ☐ 2 times per year
☐ 1 time per year ☐ ☐ Not at all

5C Is all personal protection clothing and equipment used during pesticide applications appropriate for worker safety? *(Yes or No)*

5D Do you have a written drift management plan for pesticide applications? *(Yes or No)*

5E Do you have an appropriate pesticide storage facility? *(Yes or No)*

5F Do you have an appropriate fertilizer storage facility? *Yes or No)*

5G Do you have an approved pesticide mixing and loading facility? *(Yes or No)*

5H If specified on the label, do you have back flow or siphon prevention for pesticide delivery and handling? *(Yes or No)*

5I Are pesticide applications timed to limit volatilization (e.g., temperatures, winds, and humidity monitored)? *(Yes or No)*

5J Do you minimize off-target spray concerns (e.g., using spray buffers, using technology to minimize drift, monitoring winds)? *(Yes or No)*

5K Are pesticide applications discussed with neighbors prior to application? *(Yes or No)*

5L Do you recycle pesticide containers (including bulk returnable containers)? *(Yes or No)*

Ecosystem Restoration

6A Have you met with an ecologist and/or qualified individual (conservation, restoration, NRCS employee, biologist or ecology specialists) and reviewed your individual natural areas' documentation to develop a plan for restoration and land management for your farm? *(Yes or No)*

6B Do you know what natural plant and ecosystem community types and biodiversity you have on your land? ☐Yes Please specify source_____ ☐No

6C Have you documented restoration activities on your lands? *(Yes or No)*

6D Did you attend any ecological educational opportunities (individual or group, public or private, conservation, ecological or restoration training events)? *(Yes or No)*

6E Did you implement any practice to enhance conservation of native wildlife or general biodiversity in and/or around your farm and/or privately owned lands? (*Check all that apply)*

☐ Planted diverse native vegetation for pollinators (e.g., prairie seed mixes in landscapes that were historically grassland
☐ Planted native vegetation in buffer zones
☐ Targeted endangered species
☐ Enrolled in conservation incentives
☐ Planted or protected native ecosystems such as wetlands, prairie, or woodlands
☐ Attended a training session related to conservation of native ecosystems
☐ Had a pollinator protection plan (e.g., limited spraying during peak flights, maintained water supply, had adequate diversity of species, etc.)
☐ Other Please describe: _____
☐ Did not implement wildlife enhancement practices

Farm Production Management

7A Is all planting equipment calibrated to ensure accurate planting rates? *(Yes or No)*

7B Is all planting, harvest, tillage, and field equipment cleaned and sanitized at least twice per year? *(Yes or No)*

7C Do you use auto steer technology? *(Yes or No)*

7D Do you have grain storage and drying facility on farm? *(Check all that apply)*

☐ Yes, grain storage ☐ Yes, grain dryer ☐ No

7E This farm's rotation for a typical field is: *(Check only one)*

☐ On a three year or more rotation (one year of current crop and two or more years of other crops)

☐ On a two year rotation (an alternate planting of current harvested crop and another harvestable crop)

☐ Fields have the same annual crop last year

7F Do you use practices to limit compaction on the farm? *(Check all that apply)*

☐ Correct tire inflation and/or tracks (reduce psi as much as practical)

☐ Control traffic patterns

☐ Add a deep tap rooted crop (e.g., alfalfa)

☐ None of these practices

Farm Learning and Research

8A Do you attend educational meetings where you receive CEU credits? *(Check all that apply)*

☐ Yes, and I incorporate specific practices during the growing season. Please provide a specific example:_____

☐ Yes, I attend management conferences

☐ Yes, I attend professional development seminars

☐ No

8B In the past year, did you or your farm manager attend any University or Extension-sponsored field days or educational meetings with regards to farm, crop, and ecosystem management (other than winter educational meetings)?

☐ Yes List Specific Meetings: _____ ☐No

8C Have you conducted on-farm research (replicated) in collaboration with the University, Extension, or other agricultural entities? *(Check all that apply)*

☐ Yes, with University specialists ☐Yes, with private industry specialists ☐ No

8D To keep informed on industry news, I subscribe to at least one trade journal *(Yes or No)*

8E Do you receive crop updates or internet newsletters? *(Check all that apply)*

☐ Yes, University-sponsored ☐Yes, industry-sponsored ☐ No

8F Do you maintain records of farm production practices for 5 or more years to track practice efficiency? *(Yes or No)*

8G Do you use GIS/GPS technology to monitor field yields, hot spots, or less productive areas? *(Check only one)*

☐ Yes, and I identify cause of concern in that area of field

☐ Yes, but I don't identify cause

☐ No

Farm Sustainability and Community

9A I have a sustainability mission statement for my operation that contains information on my sustainable farming/operations philosophy. This information is presented to all employees *(Yes or No)*

9B I have conducted a sustainability assessment (Field to Market, STARRS, life cycle analysis, Cool Farm Tool) for my farm and/or crops in the last five years (i.e., some type of environmental impact evaluation such as for greenhouse gas emission). *(Yes or No)*

9C I have implemented a recycling program for my operation. *(Yes or No)*

9D I am a member of a trade organization (e.g., USB, ASA, NCGA, etc.) *(Yes or No)*

9E I participate in functions to promote the benefits of agriculture in my area and community. *(Yes or No)*

9F I work on local land issues (e.g. conservation easements, farmland development rights). *(Yes or No)*

9G I buy my production inputs from a local (e.g. state) source. *(Yes or No)*

9H I have a plan for succession of my farming operation. *(Yes or No)*

9I I am involved in the community (e.g., political involvement, service in informing neighbors of changing production practices, gathering input from local stakeholders). *(Check all that apply)*

- ☐ Yes, I am politically involved
- ☐ Yes, I inform neighbors of changing production practices
- ☐ Yes, I gather input from local stakeholders
- ☐ Yes, I am involved in a local service organization (e.g., church, civic group)
- ☐ Yes, I am a local community leader
- ☐ None of these apply

Farm Economics

10A Each year I perform a cost of production analysis for my major crops. *(Check only one)*

☐ Yes, by field and crop ☐ Yes, by crop ☐ No

10B Each year I track revenues and net returns for my major crops. *(Check only one)*

☐ Yes, by field and crop ☐ Yes, by crop ☐ No

10C I have a recent balance sheet and income statement for my farm on file. *(Yes or No)*

10D I meet with a financial or business advisor to review my farm's financial status and profitability. ☐ Yes, 3 or more times per year ☐ Yes, 1-2 times per year ☐ No

10E I have a production plan for the most recent year for my farm on file. *(Yes or No)*

10F I have a marketing plan for the most recent year for my farm on file. *(Yes or No)*

10G I use a marketing service (e.g. Doane's newsletter, industry representative) to help develop our marketing strategy. *(Yes or No)*

10H I use the following marketing strategies: *(Check all that apply)*

- ☐ Forward contracting
- ☐ Future contracting
- ☐ Buy back forward contracts
- ☐ Average price contract
- ☐ Minimum price contracts
- ☐ Cash sales
- ☐ Future hedging
- ☐ Options contracts
- ☐ Not applicable, I do not use these tools

10I How many times per week do you look at market information? *(Check only one)*

- ☐ 0-1 times per week
- ☐ 2-3 times per week
- ☐ 3-5 times per week
- ☐ More than 5 times per week
- ☐ Not applicable or I do not look at market information

10J I stay economically diverse by: *(Check all that apply)*

- ☐ Growing multiple agriculture crops
- ☐ Having livestock species
- ☐ Maintaining forestry lands
- ☐ Maintaining hunting or tourist lands
- ☐ Having outside work off the farm
- ☐ Not applicable to my farming operation

10K I have a farm disaster plan on file with business continuation procedures for responding to major natural and family disasters. *(Yes or No)*
10L I enroll in federal disaster programs (e.g., SURE) each year. *(Yes or No)*
10M I purchase federal crop insurance for my major crops each year. *(Yes or No)*
10N I currently have property insurance for my farm's buildings and structures. *(Yes or No)*
10O I currently have business liability insurance for my farm. *(Yes or No)*

Farm Energy Management

11A I have a renewable energy plan for my farm. *(Yes or No)*
11B I have conducted an energy audit on my farm. *(Yes or No)*
11C I have improved fuel efficiency over time by changing vehicle size, fuel efficiency, load, scale or using other methods. ☐Yes Please specify_____ ☐ No
11D What is the primary source of energy used on your farm? *(Check only one)*
- ☐ Renewable energy sources (digested materials, solar, etc.) % used_____
- ☐ Electricity % used_____
- ☐ Diesel % used_____
- ☐ Other Please specify_____

11E Do you limit energy use by using sustainable methods? *(Check all that apply)*
- ☐ Use power timing to limit peak energy
- ☐ Use biofuels
- ☐ Use and manage energy efficient lighting
- ☐ Use no-till system to limit fuel use
- ☐ Encourage practices to limit idling of vehicles and equipment
- ☐ Calculate food miles in product distribution
- ☐ Other Please specify_____
- ☐ None of these practices are used

11F I have adjusted my energy use based on peak demand (e.g., timing of drying, irrigation timing)? *(Yes or No)*
11G I have used tools to reduce energy use (e.g., efficient pumps, variable frequency drive fans, new mechanisms)? *(Yes or No)*

Soybean-Specific Sustainability Assessment **December 2012**

Soybean Production and Management

12A How many scouting trips were made during each of the following stages of plant growth in this field? *(Enter number of trips on all that apply)*
- ☐ Planting to emergence Number of Trips: _____
- ☐ Emergence through V stages (VE–V4) Number of Trips: _____
- ☐ R stages (R1-R8) Number of Trips: _____
- ☐ Maturity to harvest Number of Trips: _____

12B Did you use weather data for soybean specific concerns? *(Check all that apply)*
- ☐ Scheduling planting and harvest date. Please specify: _____
- ☐ Crop growth, development, and water use
- ☐ Insect, disease, or weed management
- ☐ Do not have access to weather data

12C The typical rotation for my soybean crop is: *(Check only one)*

- ☐ On a three or more year rotation (one year of soybean and two or more years of other crops)
- ☐ On a two year rotation (an alternate planting of soybean and a non-soybean crop)
- ☐ Fields usually had soybean last year

12D My fields had the following rotational practices: *(Check all that apply)*

- ☐ Small grains and/or corn were used in rotation
- ☐ Peas, snap beans, lima beans and/or edible beans were NOT used in rotation
- ☐ Alfalfa was part of cropping history during the last 6 years
- ☐ Other (please specify)_____
- ☐ None of these practices were used

12E Was quality, clean (disease-, insect-, and weed-free) seed used? *(Yes or No)*

12F Did you consult with your seed supplier to determine growing conditions and/or disease concerns? *(Yes or No)*

12G Which of the following practices did you use to promote soybean establishment? *(Check all that apply)*

- ☐ Planter adjusted to equally place 70,000 to 180,000 (average 150,000) plants per acre
- ☐ Planter set to ensure optimal seed-to-soil contact
- ☐ Seed planted on 30-inch rows for conventional and reduced till; 7-20-inch rows for drilled seed
- ☐ Seed planted at 1- to 1.5-inch planting depth to allow for optimal crop emergence
- ☐ Seed planted when soil temperatures were above 50 degrees Fahrenheit
- ☐ None of these practices were used

12H What practices were taken to promote a good seed bed? *(Check all that apply)*

- ☐ No-till planter was correctly adjusted for planting conditions
- ☐ Proper seed bed preparation was completed and maintained residue on surface at planting
- ☐ Soil was firm but friable over seed to allow for emergence of crop
- ☐ Crops were planted with GPS guidance
- ☐ None of these practices were used

12I Did you follow a nutrient management plan with University guidelines for your soybeans? *(Yes or No)*

12J Which of the following practices did you use to maintain soil quality and quantity? *(Check all that apply)*

- ☐ Managed pH levels to encourage optimal productivity of soybeans (target pH levels at least 6.2)
- ☐ Used tillage and management practices which maintain residues on soil surface
- ☐ Fields were worked perpendicular to dominant slopes of greater than 4% (e.g. contour strips)
- ☐ Soybeans were planted no-till
- ☐ None of these practices were used

12K Can you account for how much fuel you used to grow soybeans by field or acre? *(Check all that apply)* ☐ Yes, diesel ☐ Yes, natural gas ☐ No

12L Do you know how much water and energy you use to grow soybeans? *(Check all that apply)*

- ☐ Not applicable, I do not irrigate
- ☐ Yes, direct electricity
- ☐ Yes, water use
- ☐ No, I do not have that data

12M Did you use a winter cover crop? ☐Yes, please specify: _____ ☒No

12N At harvest, which of the following did you use for information? *(Check all that apply*

- ☐ Used RTK technology at harvest
- ☐ Grower received harvesting maps
- ☐ Harvested at moistures between 11-13%
- ☐ Limit dust contaminants into field
- ☐ Avoided dryers that re-circulate air
- ☐ Dried at air temperatures of 130-140 degrees Fahrenheit for commercial beans, and 100-100 degrees Fahrenheit for seed beans
- ☐ Maintained soybean temperatures during storage of 35-40 degrees Fahrenheit in winter and 40-60 degree Fahrenheit in summer
- ☐ Checked soybean moistures and conditions in storage every 2 days
- ☐ None of these practices were used

12O Productivity and/or yield have increased over 5% in the last 10 years? *(Yes or No)*

Soybean Weed Management

13A Which of the following practices did you use **during** this growing season? *(Check all that apply)*

- ☐ Used a different previous crop or planned for a different succeeding crop in a rotation that has more/better options for controlling weeds competitive with soybean
- ☐ Reviewed previous scouting records and planned a weed management strategy focused on key weed challenges
- ☐ Reviewed previous herbicide records to ensure that herbicide carryover from a previous crop is not a concern
- ☐ In a cropping system with no preplant tillage, used an effective burndown herbicide program and planted into a seedbed without established weeds
- ☐ In a cropping system with preplant tillage, used an effective tillage operation just prior to planting and planted into a seedbed without established weeds
- ☐ Rotated herbicide mode-of-action and/or utilized tank-mixtures to slow the development of herbicide resistance in accordance with manufacture and Extension recommendations
- ☐ Scouted soybean for weeds just prior to V1 in wide rows, and just prior to V3 in narrow rows, and planned effective and timely post-emergence herbicide applications based on present weed species and sizes
- ☐ Scouted at the end of the season and documented weed specie escapes and estimated seed production to help plan future weed management programs
- ☐ Followed label recommendations for post-emergence herbicide rates based on weed species and weed sizes at the time of post-emergence application/s
- ☐ Planted at optimal timing, with optimal seeding rates, and with optimal row spacing to utilize crop competition for weed suppression
- ☐ Scouted soybean 7 and 14 days after post-emergence herbicide application to ensure adequate herbicide efficacy and planned succeeding weed control operations as necessary
- ☐ Monitored and managed field edges to limit weed seed migration into fields
- ☐ If planting seeds with herbicide tolerant traits, read manufacturer herbicide resistance management program and recommendations
- ☐ None of these practices were used

Soybean Insect Management

14A Which of the following practices did you use to manage insects? *(Check all that apply)*

- ☐ Rotated classes of insecticides specifically to avoid the emergence of insect resistance
- ☐ Used threshold for bean leaf beetle control (threshold based on economic assessment, growth stage, and number of bean leaf beetles per plant)
- ☐ Used thresholds for soybean aphid (when 80% of the field averages 250 aphids per plant and population is increasing)
- ☐ Soybean aphids were scouted weekly to account for rate of population increase
- ☐ Minor pests (grasshoppers, PLH, etc.) were controlled only when threshold levels are reached
- ☐ Biocontrol methods (beneficial insects, augmentative releases, or biological products) were used for insect control
- ☐ Field conditions and weather were used in treatment conditions (e.g., mites treatment delayed if cool temperatures and high humidity were expected to permit follow-up scouting assessment for fungal pathogen infection of mites and potential population decline before applying treatment)
- ☐ Scouted soybean for insect pests at least weekly in a systematic pattern throughout the field and over the growing season
- ☐ Culturally managed a soybean insect pest (e.g. wireworm, white grubs) with the crop planted prior to soybean in this field
- ☐ Used insecticide seed treatment if early season insect pests were likely (e.g. seed corn maggot, cutworms, white grubs, or wireworms)
- ☐ Followed surveys of bean leaf beetle overwintering sites and legume spring feeding sites prior to movement into soybeans to assess population levels
- ☐ None of these practices were used

Soybean Disease Management

15A Which of the following practices did you use to control diseases? (*Check all that apply)*

- ☐ Sampled for soybean cyst nematode populations (one sample per each 10 acres)
- ☐ Planted a disease tolerant variety
- ☐ Limited plant wetness to minimize disease spread (e.g., irrigation, airflow management)
- ☐ Scouted soybean for disease weekly in a systematic pattern throughout the growing season
- ☐ Used thresholds for rust control
- ☐ Used foliar fungicides only when risk to plant for disease infection was high
- ☐ When foliar fungicides were used, spray pattern was maximized to cover all plant material
- ☐ None of these practices were used

