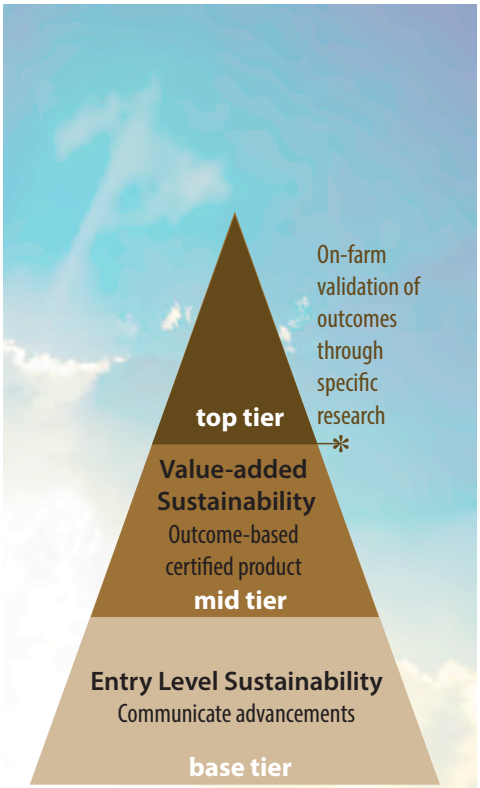
Potato sustainability in Wisconsin

Results of an industry-wide sustainability assessment for 2013

The Wisconsin potato industry is taking a pro-active approach to documenting the sustainability of their growers. The industry is working with the National Institute for Sustainable Agriculture (NISA), to assess the sustainability of practices currently being used on potato farms across the state. The Wisconsin Potato and Vegetable Growers Association (WPVGA) is employing an entry level assessment approach developed by NISA to ensure maximum grower engagement in the sustainability arena. This assessment process is used to determine a baseline for the industry, and to communicate where the industry currently stands in adopting within farm gate practices that encourage sustainable agricultural systems. The results of this assessment define the baseline for the 2013 potato production year. The industry will re-assess within 5 years to evaluate continuing advancement.



"The tiered approach to sustainability is reasonable as it allows for grower involvement in the discussion, and provides a mechanism for value added products to be part of the equation."

Andy Diercks, Coloma Farms, Wisconsin potato grower

What is Sustainability?: Sustainability was initially stressed in business and industry but it is a just as essential in agricultural systems. In agriculture, however, which is a complex and ever-changing biological system, sustainability is difficult to measure. In general, agricultural sustainability is a balance of Environmental (ecosystems, biodiversity, soil, water, crop nutrients, pest management), Social (labor, community, consumer) and Economic (profitability, energy, carbon, value added) criteria. Maintaining a balance among all aspects of sustainability is important. Growers can't survive without economic stability, but they must also protect the natural resources and ecological landscapes that they depend on while producing a safe and secure food supply. In addition to being good stewards of the land, they must encourage thriving rural communities and provide viable workplaces for their employees.

Wisconsin potato growers are committed to all aspects of sustainability and this industry-wide assessment will allow them to determine where they are currently positioned on the sustainability continuum and identify areas where improvements can be made.

Process of assessment: The WPVGA worked with NISA to employ whole farm (45 questions) and potato specific (18 questions) survey tools in an online survey which allowed for a quick assessment timeline. The whole survey could be completed in 30 minutes, and was anonymous with growers completing their own assessments. Growers could retain their individual answers for future comparison with industry averages. Due to the simplicity of the assessment process and the ease of using the on-line format, data was collected from 90% of the state potato acreage in less than a month.

Data Collected: Seventy-one growers returned assessments representing 56,785 acres of potatoes. Growers from the fresh (20,400 acres), chip (17,900 acres), frozen (10,400 acres), and seed markets (7400 acres) all participated in the assessment to provide an excellent representation of the industry. This assessment represented over 200,000 total farmland acres, with the farms being active for an average of over 53 years. All results were received from family owned farms, with an average of 2.33 generations actively working and involved in the farming operations.

Data Analysis: The data shown demonstrates the percentage of growers using practices which encourage sustainable agricultural advancements. Detailed analysis of the data will be done to show the industry variation in practices. This analysis uses Principal Component Analysis (PCA) with a Data Envelopment Analysis (DEA) to identify key drivers of sustainability, and graphically represent the breadth of sustainability advancements within the industry. This approach helps define key drivers for sustainability and conservation, and graphically identify where the greatest needs and advancements may occur.

This entry level survey is the base tier of sustainability assessment where all growers can easily participate. When the base tier has been established, growers can elect to participate in more data-intensive tiers requiring specific input data, such as the market based, mid tier standard effort of the Wisconsin Healthy Grown® potato program and/or other outcome-based prediction models.

Assessment response averages

Whole Farm Practices

ENVIROMENTAL

Field rotations:

A perennial crop rotational system	0
A three year or more rotation	81%
A two year rotation	13%
Same annual crop as last year	3%

Practices used to limit soil compaction:

Correcting tire inflation and/or tracks	75%
Controlling traffic patterns	55%
Adding a deep tap rooted crop to your rotation (e.g. alfalfa)	33%
Avoiding equipment traffic on wet soils	83%

Practices used to increase productivity:

Planting equipment is calibrated to ensure accurate planting rates	100%
Auto steer technology is used	86%
GIS/GPS technologies are used for production	81%

Practices implemented to prevent wind erosion:

Using conservation tillage practices that maintain 30% plant residue on soil surface at planting	59%
Planting winter covers	70%
Using filter strips and/or biofilters for environmental benefits and/or to prevent soil movement near sensitive areas	17%
Using existing windbreaks	62%
Planting a new windbreaks	25%
Using other wind erosion prevention techniques	17%

Nutrient and water management practices:

Soil samples for nutrients are taken in accordance with research-based guidelines regarding frequency and number of samples	97%
An annually updated nutrient management plan that follow science-based application guidelines is on file	62%
Nutrient & lime application guidelines are followed for crop type to ensure optimal productivity	97%
Soil and water conservation plan is available	33%
Irrigation scheduling programs are used	57%
Irrigation and water use records are maintained	90%

Scouting practices:

Scouting is used to determine when levels of a pest in a field reach or exceed treatment thresholds	96%
Scouting is used to reduce the amount of pesticides you use in order to minimize environmental impact	86%
Scouting is used to check on the effectiveness of a pest control measure already implemented	88%
Scouting is used to respond to a local or recent pest report you heard about	55%
Scouting records are kept on file for future decision-making longer than 5 years	57%
Scouting records are kept on file for future decision-making 2-4 years	28%
Scouting records are kept on file for future decision-making 1 year	13%
Remote sensing or other advanced technologies to aid in scouting and diagnosis of pest problems are used	23%

ENVIROMENTAL (continued)

Education and technology:

Attend science-based field days or educational meetings to learn about farm, crop and ecosystem mgmt	94%
On-farm research is conducted in collaboration with science-based partners	61%
Crop updates or internet newsletters are used on farm	90%

Chemical applications:

Applicator for pesticides is certified	96%
Spray equipment (or the custom applicator's equipment) is calibrated 4x per year	16%
Spray equipment (or the custom applicator's equipment) is calibrated 3x per year	7%
Spray equipment (or the custom applicator's equipment) is calibrated 2x per year	29%
Spray equipment (or the custom applicator's equipment) is calibrated 1x per year	43%
Written drift management plan for pesticide applications is available	32%
Pesticide applications are timed to limit volatilization	93%

Practices used to manage weeds:

Scouting fields for weeds shortly after emergence in a systematic pattern and continued each week until control options are no longer available	80%
Spot spraying/cultivating for perennial weeds or patches of annual weeds are based on scouting reports	75%
Using diverse herbicide chemical groups with different mode-of-actions in rotational crops to avoid potential herbicide resistance	86%
Controlling known problem weed in previous years' crops	57%
Using mechanical methods for weed control for weed management	81%
Using mowing or tillage equipment to control weeds on the field edges and adjacent areas to reduce the chance of weeds migrating into fields	74%
Keeping field records for long term weed species and density comparisons	22%
Using recommended agronomic practices to maximize early season crop growth, thus minimizing weed competition to crops	64%
Controlling noxious weeds on farm	74%
Cleaning machinery when moving from field to lessen the chance of spreading weeds	42%
Using sterile seed bed with burn down treatments to eliminate weeds prior to planting	19%

Practices used to manage insects:

Rotating insecticides chemical groups with different mode-of-actions specifically to avoid the emergence of insect resistance	93%
Selecting an insecticide based on preserving or enhancing natural enemies	52%
Scouting for insect pests at critical periods throughout the growing season in a systematic pattern	91%
Keeping field records on the density of each insect pest for lont-term comparisons	45%
Managing cropping system locations to avoid pest concerns from previous to current year's crop	48%
Using augmentative biological control with beneficial insects released in the area either prior to or during the growing season	1%
Managing or enhancing the habitat in or around the field to encourage or conserve beneficial insect populations	20%
Managing the health of the crop to enhance its ability to withstand increased degrees of pest pressure	77%
Selecting resistant or tolerant varieties	38%

ENVIROMENTAL (continued)

Practices used to manage diseases:

Rotating fungicides chemical groups with different mode-of-actions specifically to avoid the emergence of resistance	94%
Applying an effective biocontrol agent to reduce the chance of disease	26%
Changing the crop rotation to lower the probability of certain soil-borne diseases occurring	74%
Monitoring plant health and disease spread with aerial monitoring or aerial photography	22%
Monitoring disease using crop management websites	28%
Selecting resistant or tolerant varieties for the suppression of plant disease	51%
Scouting crops for disease weekly in a systematic pattern throughout the growing season	88%
Keeping field records of disease frequency and severity for long-term comparisons	46%
Managing fertility for healthy plants in order to resist disease	78%
Planting, harvest, tillage & field equipment is cleaned and sanitized at least 2x per year	77%

Practices to enhance conservation of native wildlife or general biodiversity in and/or around farms and/or privately owned lands:

Grower has worked with an ecologist and/or qualified individual to discuss the natural area on farm and to develop a plan for proper maintenance and/or restoration	32%
Natural plant and ecosystem community types and biodiversity on private lands are known by grower	30%
Restoration and/or conservation activities on lands are documented	35%
Planting diverse native vegetation for pollinators	16%
Planting native vegetation in buffer zones	10%
Protecting endangered species	26%
Enrolling in conservation incentive programs	30%
Planting and/or protecting native ecosystems such as wetlands, prairie or woodlands	33%
Attending a training session related to conservation of native ecosystems	14%
Having pollinator protection plan	3%
Using locally appropriate conservation practices	32%

ECONOMIC

Have completed a cost of production for major crops by field and crop	32%
Have completed a cost of production for major crops by crop only	48%
Marketing plan is available for the farm	45%
Maintain economic diversity by growing multiple agriculture crops	88%
Maintain economic diversity by having livestock species	17%
Maintain economic diversity by managing forestry lands	28%
Maintain economic diversity by having hunting or tourist lands	14%
Work off the farm	4%
Sell by-products of crop production	22%
Create and sell value-added products	7%
Have a risk management plan for responding to major natural and family disasters	70%
Have a succession plan for the farm operation	64%

SOCIAL

Outcome or market based mid-tier sustainability assessments have been completed	17%
Ability to trace product from field to distribution chain is available	93%
A GAP and/or other food safety audit been completed	78%

SOCIAL (continued)	
Use upgraded tools to reduce energy use	81%
Recycling operation on the farm is used	80%
A written human resources plan is available for the farm that contains any of the following: a company mission, company values, strategy for staffing and recruiting, discrimination policy, training and employee development, performance measures, compensation and benefits and record keeping	55%
An employee handbook is available for the operation, which each employee receives at hiring, that explains policies and procedures for your farm?	52%
Full time employees are provided benefits such as health, retirement, and/or paid holidays	77%
Educational opportunities for employees are provided by your company/farming operation	52%

Grower community involvement

Serving on local governmental, civic and/or cultural boards to aid the local community	39%
Informing neighbors of changing production practices	41%
Involvement in local service organization	45%
Participation in functions that promote the benefits of agriculture in my community	45%
Working on local land issues	28%
Buying production inputs from a local source when possible	70%
Inviting community members and schools to visit my farm to learn about agriculture	45%
Hosting tours/visits from state and federal agencies	22%

Potato Specific Practices

Practices for general potato productivity and management

Soil samples are taken and assayed for plant parasitic nematodes and verticillium and thresholds used in your management decision for potato early drying	61%
Certified seed is planted	97%
Proper temperatures and conditions are used during planting	86%
Weather data is used for potato-specific concerns	83%
Computer based decision support software is used for potato disease management	32%
Irrigation scheduling tools are used to match irrigation to crop need	49%
Split applications of in-season nitrogen are used and/or are slow release fertilizers used	82%
Supplemental nitrogen is based on petiole sampling	67%
Rotations are planned to limit weed, disease and/or insect pests	84%
Cover crops are planted specifically for suppression of potato early dying	29%
Biocontrol agents are used when applicable	42%

Practices for potato insect management

Completely kill foliage to reduce aphid transmission of viruses after vinekill	59%
Avoid planting potatoes within 1/4 mile from previous potatoes to avoid overwintering insect pests	22%
Target Colorado potato beetle eggs and/or small larvae for control with foliar insecticides	70%
Promote natural control with pest specific insecticides	45%
Avoid planting potatoes into sod or grassy areas to limit soil insects	57%
Use heat units to predict insect development	45%
Monitor corn borer adults in traps or grassy areas	36%

Potato Specific Practices (continued)

Practices for potato disease management

Store seed for 5-7 days after cutting to suberize potatoes	58%
Use varieties with resistance to pathogens	52%
Eliminate nightshade weeds and volunteer potatoes to limit late blight	65%
Eliminate cull piles for late blight control	88%
Remove potato vines to reduce verticillium	7%

Practices to ensure food safety

Potatoes harvested at proper temperatures	88%
Practices and/or equipment are used to limit contaminants during the size grading, sorting, packaging and/or canning process	90%
Potatoes are stored using practices that promote quality and food safety	83%
Storage quality is continually monitored	86%

WISCONSIN HEALTHY GROWN POTATOES

The Wisconsin Healty Grown® Potato Program

For over a decade, the Wisconsin potato industry have been innovators in the advancement of ecologically grown potatoes with it unique Healthy Grown® program.

Healthy Grown® is a collaborative initiative of the University of Wisconsin, World Wildlife Fund (WWF), and the WPVGA that has been working to advance growers' use of biointensive IPM, reduce reliance on high-risk pesticides, and to enhance ecosystem conservation efforts through the development and implementation of standards for the sustainable production of fresh potatoes. The Healthy Grown® program has become a national model for the successful adoption of sustainable agricultural practices by the potato industry.

The Healthy Grown® potato program has enjoyed continual success since its inception in 2001 enrolling 4000-6000 acres annually (10-15% of the Wisconsin fresh potato crop). A major goal of the Healthy Grown® programs is to develop marketplace incentives that reward farming practices which promote agricultural sustainability and enhance environmental farming systems. This voluntary, tier 2 standard satisfies the growing consumer demand for products that are produced using sustainable methods. The activity benefits Wisconsin by putting its growers in a leading position to capture this expanding market.

Highlights of assessment results

ECONOMIC

- 88% grow multiple crops to maintain economic diversity.
- 70% have risk management plans.
- 64% have succession plans in place.

ENVIROMENTAL

- **Soil conservation.** To preserve structure, 81% employ a 3 year rotation, 81% use practices to avoid compaction; to prevent erosion, 59% use conservation tillage, 70% plant winter cover crops and 87% use living windbreaks.
- **Water use.** 57% use computer-based irrigation scheduling, 90% retain water use records.
- **Biodiversity.** Over 30%worked with an ecologist to identify native habitat types and implemented practices to enhance biodiversity, 52% use pest-specific insecticides to preserve natural enemies.
- **Energy.** Over 70% use at least 4 different approaches to conserve energy and 80%recycle
- **Improving production efficiency.** 100% calibrate planters and 86% use auto-steer to improve land use efficiency. 94% attend annual educational meetings and 61% conduct on-farm research with scientists.
- **Using nutrients efficiently.** 97% sample soil to determine crop need, 82% split nitrogen applications or use slow release formulations and 67% use petiole sampling to determine need for supplemental N.
- **Pest management.** 96% scout fields to determine pest levels and treat with pesticides only at thresholds to reduce environmental impact.

  90% rotate pesticide mode of action to manage pesticide resistance.

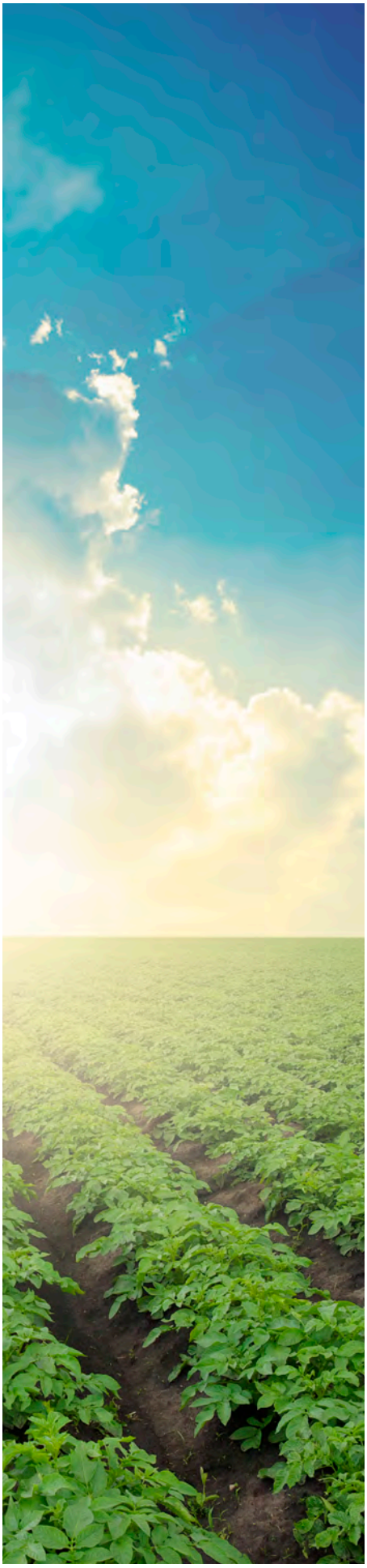
  73% use at least 4 non-chemical approaches to manage weeds.

  60% use at least 4 non-chemical approaches to manage insects.

  74% use at least 8 non-chemical approaches to manage diseases.

SOCIAL

- 70% purchase inputs and supplies locally.
- 77% have employee benefits and 52% provide educational opportunities.
- Over 40% interact with neighbors on agricultural issues.
- 45% are actively involved in community service organizations.
- 93% have the ability to trace product from field to consumer.
- 78% conduct GAP and food safety annually.
- 83% use storage practices and 90% use practices to reduce contamination during handling and packaging.



Where we excel: The Wisconsin potato industry has long worked to improve their production while advancing sustainability practices. The industry has been recognized for this leadership with national awards, including the World Wildlife Fund "Gift to the Earth" award, the USDA award for "Enhancing Natural Resources and the Environment", the International Crane Foundations "Good Egg" Award for ecological restoration, the International IPM Achievement Award in 2006, and the Potato Association of America Outstanding Extension Project Award in 2011.

To maintain its leadership role in agricultural sustainability, the Wisconsin potato growers pay of portion of their sales each year to provide research funding to the UW which is used to leverage further funding to address the short term and long range needs of the industry.

Issues to work on: Most of Wisconsin's potato production, which ranks 3rd nationally, occurs on coarse, sandy soils in the central sands , the north west and the north east, where irrigation is an essential component of production systems. Water is drawn primarily from groundwater aquifers which are naturally replenished by precipitation and the sustainability these essential natural resources is a vital to the future of the potato industry. In recent years, increasing demand for water has occurred from a number of sources which include expanding center pivot irrigation, growing rural communities, food processing, dairy and industry, which have resulted in declining aquifer levels and accompanying impacts on lake levels and stream flows. These impacts have been exacerbated by a warming climate and caused concerns over the long term protection of groundwater resources.

The Wisconsin potato industry is working proactively to address these issues by sponsoring scientific and community forums to identify research needs and funding research to develop short and long-term solutions. Sustainable practices which enable growers to irrigate more efficiently , use less water by modifying crop types and landscapes, monitor fluctuations in groundwater levels across space and time and incorporate these practices into dynamic models which can accurately predict outcomes of potential solutions at the local level, will be important components of emerging sustainability programs for the industry.

What's Next?: An important component off sustainability is the ability to document improvement through time, and the Wisconsin potato growers, as an organization and growing community is committed to this goal. The WPVGA will re-assess the industry every 5 years to obtain data to document these advancements and encourage implementation of new and cutting edge practices. Duane Maatz, Executive Director of the WPVGA states: "We want to shift the entire industry, moving the upper end higher and lower end up, so we will work closely with growers to ensure they are getting the needed information to keep advancing."

NISA
National Initiative for Sustainable Agriculture

HOME GROWN
WISCONSIN
POTATOES

College of
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UNIVERSITY OF WISCONSIN–MADISON

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