2020 Annual Report for the North Dakota State University Extension Plant Diagnostic Lab

January 1 through December 31, 2020

Available on-line at http://www.ag.ndsu.edu/pdl

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About the Lab

Since 1962, the NDSU Plant Diagnostic Lab has helped individuals and professionals in agriculture and horticulture identify plant pests, diseases, cultural and environmental problems. While the majority of our samples come from the local community, in 2020, samples originated from 22 different states and one Canadian province. Before submitting a sample to the NDSU Plant Diagnostic Lab, consider calling or emailing us. In many cases we are able to assist you without receiving a physical sample. In other instances, our expertise may be necessary to direct sample collection. For more information, please visit our webpage: https://www.ag.ndsu.edu/pdl.

If you submit a sample to the NDSU Plant Diagnostic Lab for seed health or phytosanitary testing, a modest fee is applied to offset the cost of supplies and lab technicians' salaries. Routine diagnostic fees are waived for some services in certain situations. Commercial entities are not exempt from fees. For more information, please refer to page 4, or contact the lab directly. Current fee rates for commonly requested services are available online at https://www.ag.ndsu.edu/pdl/services-and-fees. Other services or prices not listed on our website may be available on request.

Personnel

The lab supports a lead diagnostician/director and up to three full-time support personnel. The lab also employs several hourly students at various times throughout the year. Lab technicians and hourly help (as well as supplies and equipment) are supported through funds generated by the lab.

Jesse Ostrander (MS, Plant Pathology) had been with the lab since 2013. From 2013-2016, he served as the Assistant Diagnostician. In 2016, he became the Lab Director and Lead Diagnostician. Jesse left the lab in November 2020.

Aimee Thapa (BS, Horticulture) is an Extension Administrative Assistant who supports the lab with plant identifications and with billing/payments. She began as a part-time summer assistant for the lab in 2006. In spring 2010, she became the labs' full-time receptionist/lab technician/plant identifier. In September 2012 she moved to her current position.

Christine Ngoan (MS, Botany) joined the lab as the Seed Health Technician in July 2017. Prior to joining the lab, she was a Research Specialist with the department of Plant Pathology and has been with the department since 1995.

Alex Knudson (MS, Entomology) has been the Entomological Diagnostician since 2017 and is currently working towards his Ph.D. in Entomology.

Presley Mosher (BS, Horticulture) joined the lab in November 2018 as the Assistant Diagnostician, and is currently working towards a master's degree in Plant Sciences. He previously worked for the PDL for several years as an undergraduate student. Presley has also been serving as Interim Lab Director since November 2020.

National Plant Diagnostic Network

The National Plant Diagnostic Network (NPDN) was established in 2002 and consists of five regions. The NDSU Plant Diagnostic Lab is a member of the Great Plains Diagnostic Network (GPDN), a 9-state region of the NPDN. The NPDN provides critical diagnostic training for plant diagnosticians around the country, as well as a means of secure communication among plant diagnosticians and regulatory personnel if a high-risk plant pest threat should occur. Its mission stresses the importance of early detection of pests that can negatively impact our agricultural,

forestry, natural, or horticultural resources. Members of the Plant Diagnostic Lab are actively involved with NPDN subcommitties and help develop network structure and policy.

Activities of the NDSU Plant Diagnostic Lab

Our goal is to provide economical, unbiased plant and pest diagnostic services to agricultural professionals, the horticulture/turf/forestry industries, homeowners, and individuals in North Dakota and the surrounding region. We can accept plant, insect, and soil samples from throughout the United States, including Alaska and Hawaii. Please contact us if you would like a copy of our permit to receive samples.

2020 Accomplishments and Highlights

- The lab helped the NPDN Professional Development Committee draft policies for the NPDN content development pipeline.
- The lab once again processed a higher-than average number of samples in 2020.
- The lab continued to maintain USDA certification to test for bacterial ring rot to fulfill requirements of the Canadian Seed Potato Certification Program, for seed destined to be sold as certified seed in Canada.
- The lab continued to support local potato growers with *Dickeya* spp. and *Potato mop-top virus* (PMTV)/*Tobacco rattle virus* (TRV) screening services, as well as soil testing for several pathogens, including quantifying the powdery scab pathogen, *Spongospora subterranea.*
- In addition to offering routine diagnostic services, we continued to provide:
    - Seed health testing for seed growers
    - Phytosanitary testing to support the efforts of the North Dakota Department of Agriculture to facilitate exportation of ND crops
    - Research support services for faculty and private entities

Services and Fees

While it may not be possible to list everything we can do, we are flexible and adaptable to your diagnostic needs. For a list of our most common services and their current fee rates, please visit our webpage at: https://www.ag.ndsu.edu/pdl/services-and-fees. Please contact the lab (phone: 701-231-7854; email Presley.mosher@ndsu.edu) for information on special tests, bulk pricing, or research/survey support options not listed – **we may be able to offer the services necessary to fulfill your needs, even if they are not listed.**

Fee Waivers for Extension Personnel

The lab offers fee waivers for Extension personnel. In 2020, samples referred (or submitted) to the lab by Extension personnel for non-commercial clients usually qualified for a fee waiver. The purpose of these waivers is to help foster relationships between Extension personnel and their stakeholders. These waivers were used to waive the following fees:

- Routine diagnosis
- Culturing
- Herbicide injury evaluation
    - Visual only; NDSU Plant Diagnostic Lab does not offer wet chemistry residue analysis at this time

- Plant/insect/fungus identification
    - For common organisms; especially difficult identification requests or requests for a formalized report may be subject to an hourly fee rate at the discretion of the lab director

Note: The fee waiver cannot be applied to seed health/phytosanitary tests, DNA and RNA-based tests, most serological testing, and certain other tests. If you have any questions, please contact the lab.

Turn-Around Time

The NDSU PDL is a first-come first-serve lab, with some exceptions. Under certain circumstances, commercial samples, or those suspected to be infected by a 'high risk' pest (as defined by USDA-APHIS or the National Plant Diagnostic Network), may be given priority, especially if a very narrow window of time for treatment or response exists.

Turn-around times may vary, depending on complexity of the problem, availability of expert consultants, types and number of tests needed, number of samples, and availability of PDL staff.

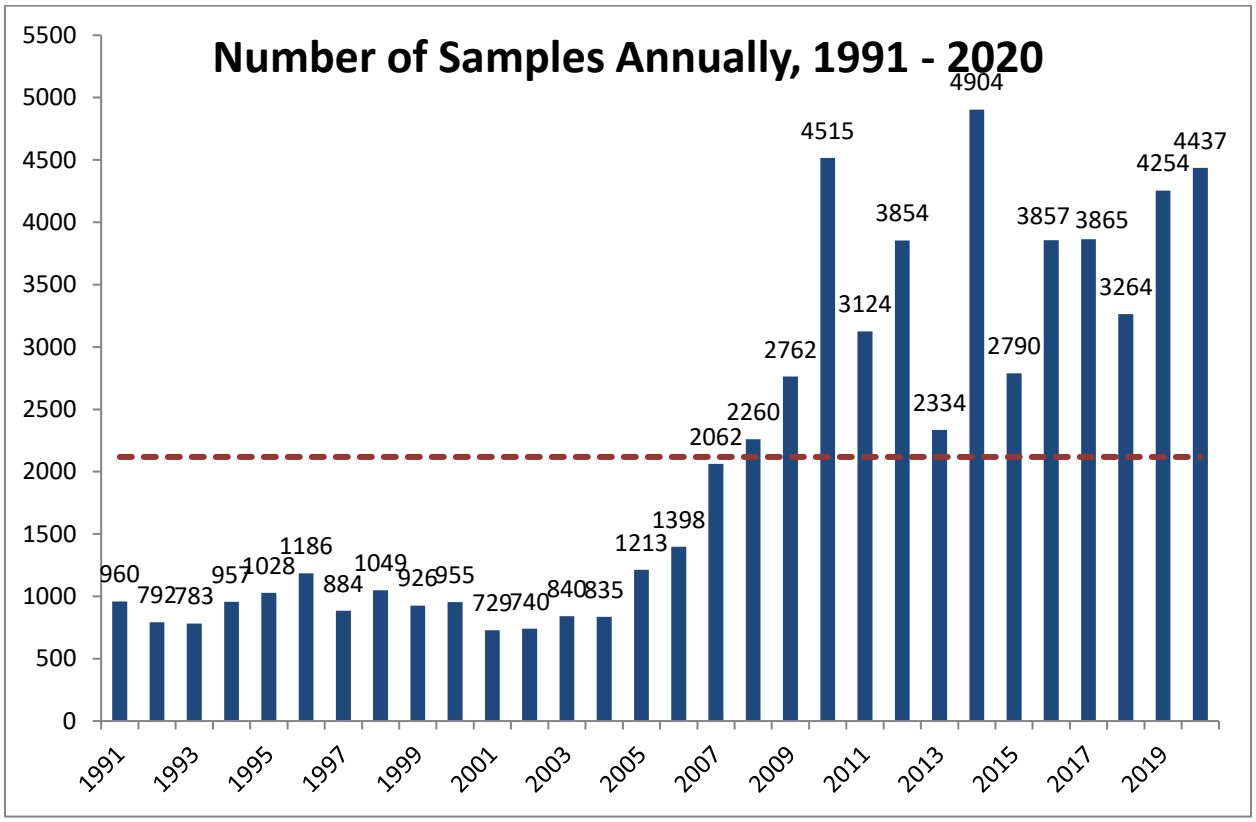
Turn-around times for certain tests, like PCR or ELISA, are generally within one work week, however, it may take longer depending on which day of the week the sample was received on, quantity of material submitted for testing, and the amount of available reagents. Additionally, conferences and utilization of annual leave time may interfere with average turn-around time.

Often by the time a sample is submitted to the lab, corrective measures for the current season may not be available; thus, the problem may be a management issue for subsequent seasons. In some cases, if the problem is especially new or unusual, there is no realistic way to determine the turn-around time. All submitters should contact the lab with any concerns regarding turn-around times.

Lab Statistics

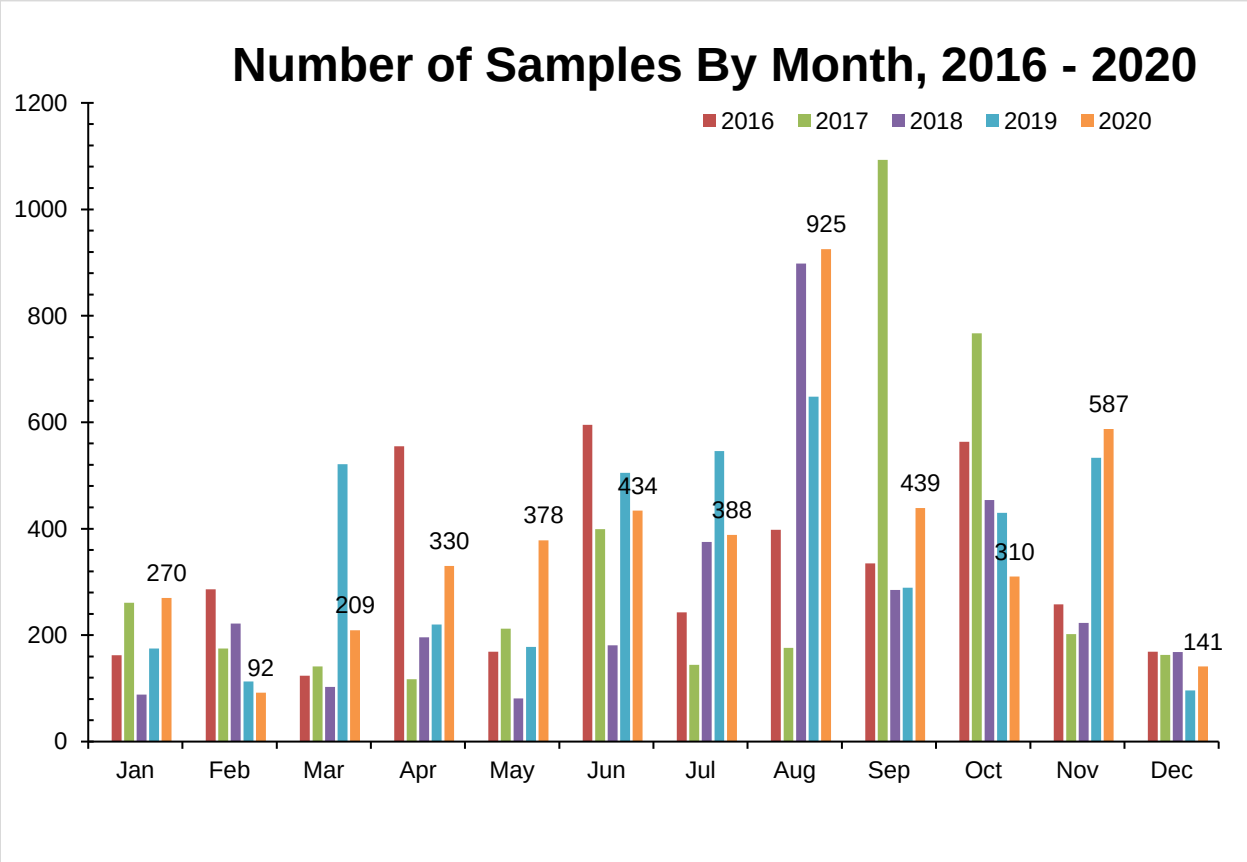
Total Samples Received by Year, 1991 through 2020

A historical perspective of total number of samples received by the lab is presented in the graph below. The total number of samples received per year includes routine diagnosis, phytosanitary certification, seed health, research, and survey samples. The average total sample number has been steadily on the rise, albeit inconsistently. A historical average of 2,118 samples have been processed per year (dotted red line).



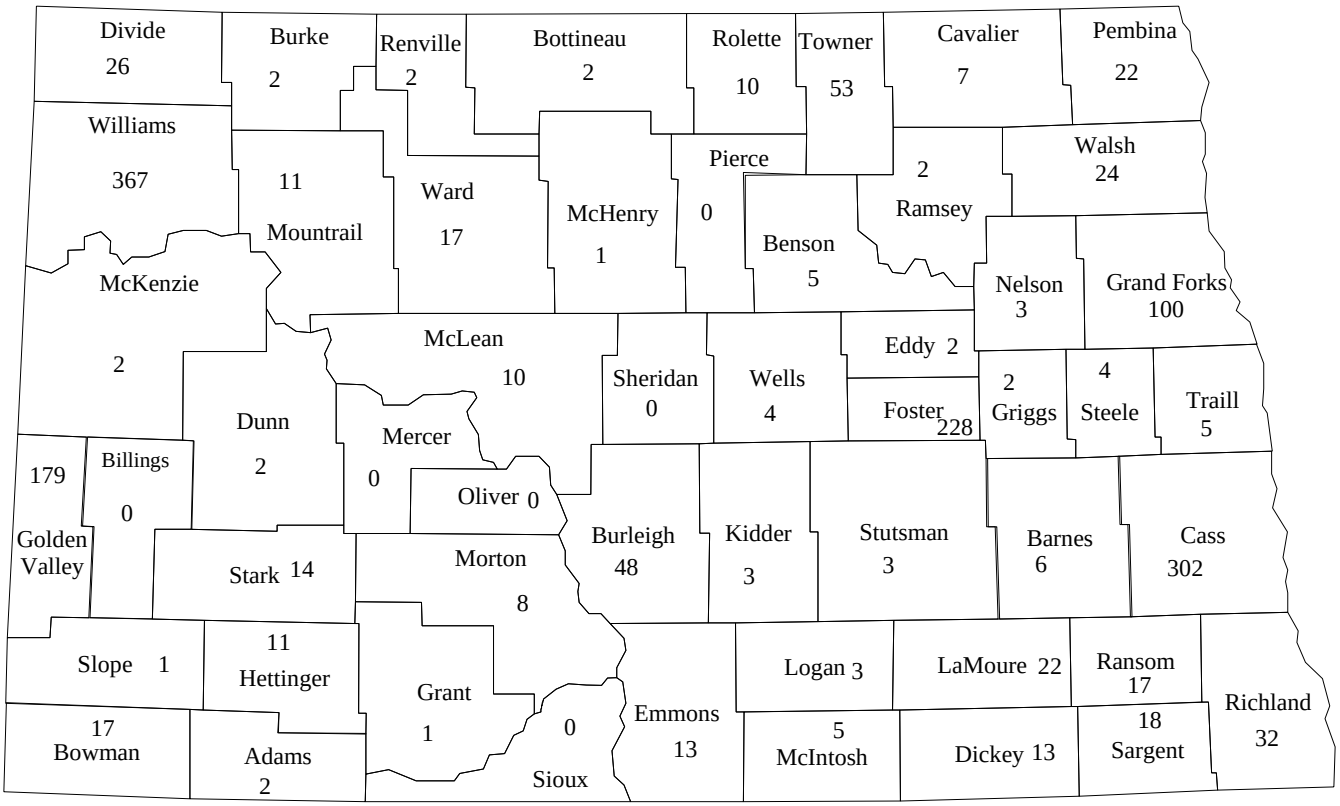
Monthly Sample Submissions, 2016 through 2020

Samples for routine diagnosis, seed health testing, phytosanitary testing, surveys, and research support are received throughout the year. A large proportion of samples received during June, July, and August are sampes for routine diagnosis, although survey samples and phytosanitary samples are also received during this time. Seed health testing occurs largely during fall, winter, and spring. The numerical data labels in the chart below correspond to 2020 data only.



North Dakota Samples by County, 2020

All samples submitted to the PDL from North Dakota.



Out-of-State Samples, 2020

All samples received from outside North Dakota within the United States.

Location	# Samples
Arizona	7
California	48
Colorado	410
Florida	6
Idaho	349
Indiana	90
Maine	2
Manitoba	2
Maryland	9
Massachusetts	1
Michigan	5

Location	# Samples
Minnesota	693
Montana	17
Nebraska	509
Oklahoma	1
Oregon	233
South Dakota	4
Texas	5
Washington	20
Wisconsin	56
Wyoming	1
Total Out of State	2468

Photo Insect Identification Requests by Country, 2020

This section only includes photos submitted to the PDL from other countries.

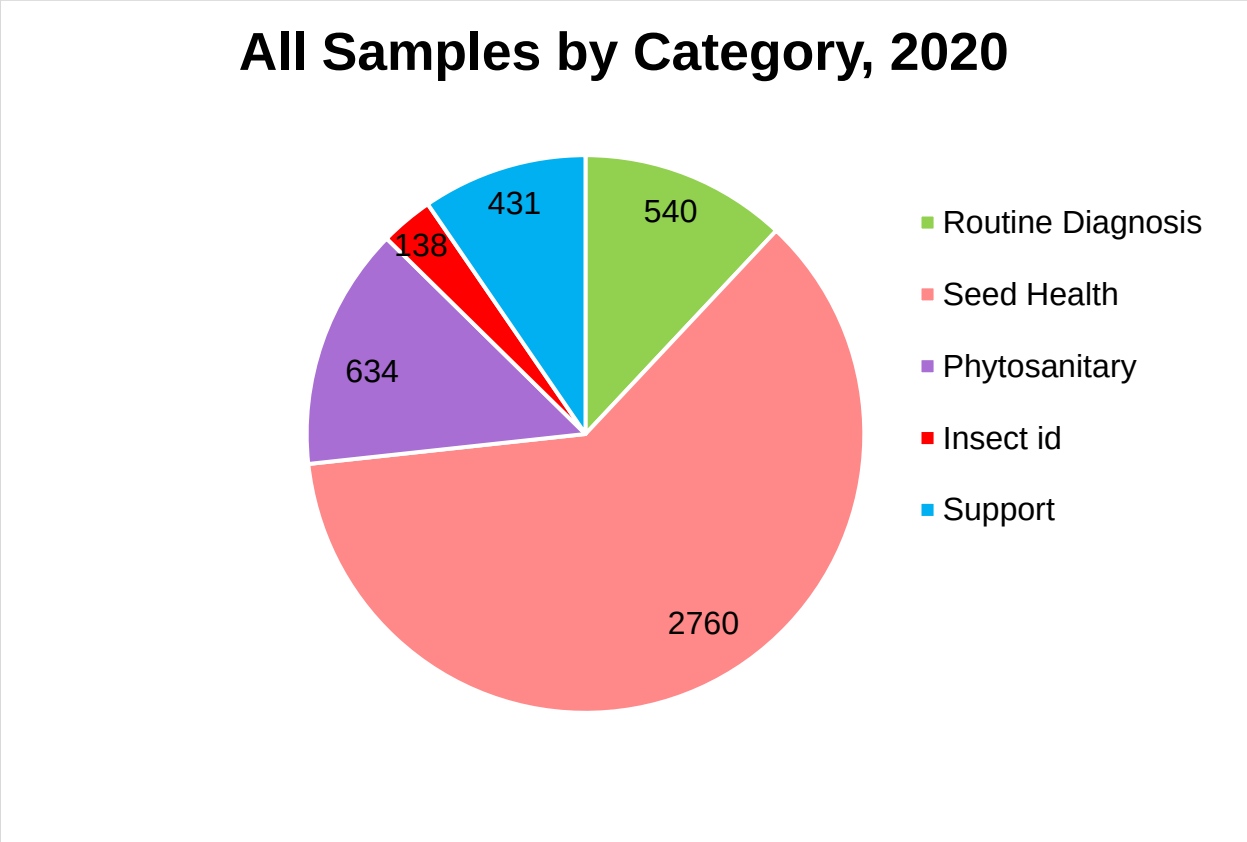
Location	# Samples
Bulgaria	1

Total Number of Samples Received by Sample Category, 2020

Samples processed by the lab are separated into five main categories:

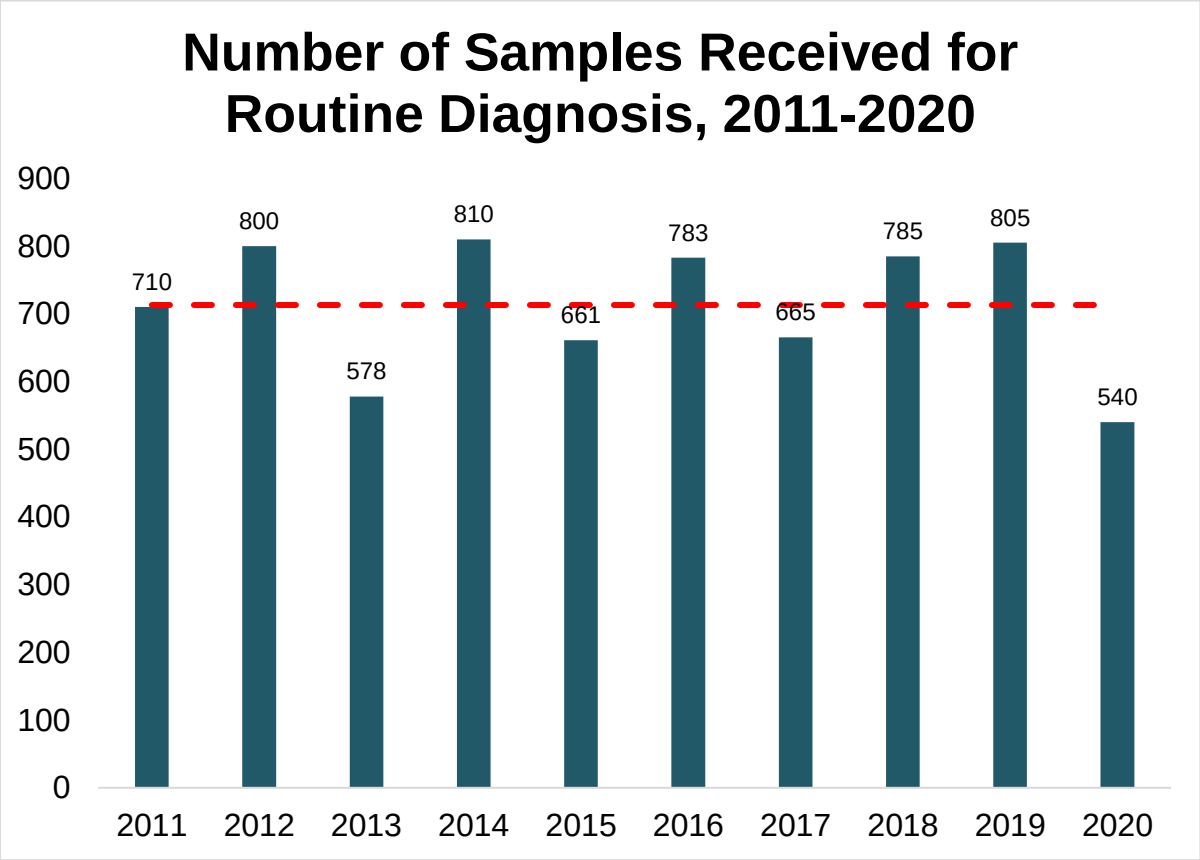
- Support
- Routine Diagnosis
- Insect ID
- Seed Health
- Phytosanitary

A total of **4,503** samples were submitted in 2020. The pie chart below summarizes the total number of samples submitted by main category.



Routine Diagnoses Received, 2011 through 2020

The following figure details sample numbers for **Routine Diagnosis** only (phytosanitary, seed health, and research samples are not included). The ten-year average is 733.7 (dashed red line). Sample totals were highest in 2014, and are lower then average for 2020. Insect identification request totals were added to routine diagnostic samples for years 2017 to 2020.



Dutch Elm Disease in ND and MN, 2016 through 2020

Dutch elm disease continues to infect American elm trees throughout the Red River Valley and the state of ND. The data presented here is limited to samples submitted to the Diagnostic Lab and as such cannot fully indicate whether incidence has increased or decreased from one year to the next. While symptoms of Dutch elm disease are easily observed by experienced tree health professionals, only a laboratory test can confirm the presence of the Dutch elm disease pathogen.

Keeping American elm trees healthy is the best defense against infection, as the bark beetle vectors can be attracted to stressed trees and healthy trees can delay the rate of movement of the pathogen via grafted roots, providing additional time to implement control measures. An NDSU Extension bulletin is available with more information on managing Dutch elm disease. An electronic version of this publication is available online at:

http://www.ag.ndsu.edu/publications/landing-pages/gardens-lawns-trees/dutch-elm-disease-in-nd-pp-1635.

Dutch Elm Disease Samples by ND County, 2016 - 2020

Number of samples submitted by county	2016		2017		2018		2019		2020	
	Positive	Not Detected	Positive	Not Detected	Positive	Positive	Positive	Not Detected	Positive	Not Detected
Barns	--	--	--	--	--	1	--	--	--	--
Burleigh	--	--	--	--	--	--	--	1	--	--
Cass	3	2	2	5	2	3	5	2	6	2
Clay, MN	--	1	2	--	--	--	--	1	--	--
Dicky	--	--	--	--	1	--	--	--	--	--
Eddy	--	--	1	--	--	--	--	--	--	--
Emmons	--	--	--	--	--	--	--	1	--	--
Griggs	--	--	--	1	--	--	--	--	--	--
Grand Forks	--	--	1	--	--	--	--	--	2	--
Mountrail	--	--	1	--	--	--	--	--	--	--
Stutsman	--	--	--	--	--	1	--	--	--	--
Total:	**3**	**3**	**7**	**6**	**3**	**5**	**5**	**5**	**8**	**2**

2020 Sample Details

The table below summarizes all diagnoses by the NDSU Plant Diagnostic Lab, sorted by host or habitat. Note that the level of confidence of the diagnosis is included, where **Confirmed or Suspected** indicates that the pest or pathogen was keyed out (morphology) or verified with serological or genetic testing, or based on general morphology, microscopy, or other evidence; **Not Detected** means that the pathogen was not detected using one or more tests, such as microscopy, culture, serology, or PCR; or test results were contradictory or unresolved.

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Adzuki Bean (*Vigna angularis)*				
	Chemical injury (Abiotic disorder)	0	1	0
	Insect damage (Unidentified insect)	0	1	0
	Physiological responses (Abiotic disorder)	0	1	0
Alfalfa (*Medicago sativa*)				
	Aphanomyces root rot (*Aphanomyces euteiches*)	0	0	1
Amur Maackia (*Maackia amurensis*)				
	Fungal leaf spot (Order Pleosporales)	0	1	0
Apple, Domestic (*Malus domestica*)				
	Apple maggot (*Rhagoletis pomonella*)	0	2	0
	Apple scab (*Venturia inaequalis*)	1	0	0
	Bitter pit (Abiotic disorder)	0	1	0
	Environmental stress; Problem (Abiotic disorder)	0	1	0
	Fire blight (*Erwinia amylovora*)	1	1	0
	Leaf scorch (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	2	0	0
	Spider mites (Family Tetranychidae)	1	0	0
Crabapple *(Malus* sp./spp.*)*				
	Black rot (*Botryosphaeria obtusa*)	1	0	0
	Pale tussock moth (*Halysidota tessellaris*)	1	0	0
Arrowwood (*Viburnum dentatum*)				
	Leaf scorch (Abiotic disorder)	0	1	0
	Ramorum blight (*Phytophthora ramorum*)	0	0	1
Ash (*Fraxinus* sp./spp.)				
	Ash anthracnose (*Gnomoniella fraxinii)*	1	0	0
	Ash plant bug *(Tropidosteptes* sp.)	0	1	0
Green Ash (*Fraxinus pennsylvannica*)				
	Ash plant bug *(Tropidosteptes* sp.)	0	1	0
	Blackheaded ash sawfly (*Tethida barda*)	0	1	0
Azalea (*Rhododendron* sp./spp.)				
	Ramorum blight (*Phytophthora ramorum*)	1	0	2
Barberry (*Berberis* sp./spp.)				
	Bacterial leaf spot (Unidentified bacteria)	0	1	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Barley (*Hordeum* sp./spp.)				
	Bacterial leaf streak (*Xanthomonas* sp./spp.)	3	0	0
	Dwarf bunt (*Tilletia controversa*)	0	0	12
	Flag smut (*Urocystis agropyri*)	0	0	7
	Karnal bunt (*Tilletia indica*)	0	0	5
Barley (*Hordeum vulgare*)		1	0	0
	Bird cherry-oat aphid (*Rhopalosiphum padi*)	1	0	0
	Dwarf bunt (*Tilletia controversa*)	0	0	9
	Flag smut (*Urocystis agropyri*)	0	0	9
	Karnal bunt (*Tilletia indica*)	0	0	8
Bean; Dry Bean (*Phaseolus vulgaris*				
	2,4-D injury (Abiotic disorder)	0	1	0
	Bacterial brown spot (*Pseudomonas syringae* pv. *syringae*)	1	0	0
	Bacterial leaf blight (*Pseudomonas* sp./spp.)	1	0	0
	Bean anthracnose (*Colletotrichum lindemuthianum)*	1	0	4
	Bean halo blight (*Pseudomonas syringae* pv. *phaseolicola*)	0	0	2
	Dome Test	5	0	0
	Fusarium crown and stalk rot (*Fusarium* sp./spp.)	1	0	0
	Fusarium wilt (*Fusarium oxysporum*)	0	2	0
	Growth regulator effect (Abiotic disorder)	0	1	0
	Herbicide injury (Abiotic disorder)	0	2	0
	Insufficient sample (Identification analysis)	2	0	0
	No virus found (No virus found)	1	0	1
	Soil compaction (Abiotic disorder)	0	1	0
	Stalk rot (*Fusarium solani*)	1	0	0
	Unspecified pathology (*Pseudomonas* sp./spp.)	0	1	0
Black Turtle Bean (*Phaseolus vulgaris*)				
	Alfalfa mosaic *(Alfalfa mosaic virus* (AMV))	0	0	1
	Bean pod mottle (*Bean pod mottle virus (*BPMV))	0	0	1
	Cucumber mosaic (CMV) (*Cucumovirus Cucumber mosaic virus*)	1	0	0
	Potyvirus Group (*Potyvirus* Group)	0	0	1
	Soybean mosaic (SMV) (*Potyvirus Soybean mosaic virus)*	0	0	1
Kidney Bean *(Phaseolus vulgaris)*				
	Fusarium wilt (*Fusarium oxysporum*)	0	1	0
	Halo blight (*Pseudomonas syringae* pv. *phaseolicola*)	1	0	0
	Rhizoctonia root rot (*Rhizoctonia* sp./spp.)	1	0	0
Navy Bean (*Phaseolus vulgaris*)				
	Alfalfa mosaic (*Alfalfa mosaic virus* (AMV))	0	0	1
	Bean pod mottle (*Bean pod mottle virus* (BPMV))	0	0	1

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Navy Bean (*Phaseolus vulgaris*) cont.				
	Cucumber mosaic (CMV) (*Cucumovirus Cucumber mosaic virus*)	1	0	0
	Potyvirus Group (Potyvirus Group)	0	0	1
	Soybean mosaic (*Soybean mosaic virus* (SMV))	0	0	1
Snap Bean; Green Bean (*Phaseolus vulgaris*)				
	Bean leaf beetle (*Cerotoma trifurcata*)	1	0	0
	Unspecified pathology (*Xanthomonas* sp./spp.)	0	1	0
	Western flower thrips (*Frankliniella occidentalis*)	1	0	0
Bean (*Phaseolus* sp./spp.)				
	Alfalfa mosaic (*Alfalfa mosaic virus* (AMV))	0	0	1
	Bean pod mottle (*Bean pod mottle virus* (BPMV))	0	0	1
	Cucumber mosaic (*Cucumber mosaic virus* (CMV))	0	0	1
	Potyvirus Group (*Potyvirus* sp./spp.)	0	0	1
Beet, Sugar (*Beta vulgaris vulgaris* (Cultivar group) Altissma group				
	Alternaria leaf spot (*Alternaria* sp./spp.)	1	0	0
	Bacterial blight (*Pseudomonas syringae* pv. *aptata*)	0	0	1
	Bacterial soft rot (*Pectobacterium* sp./spp.)	5	1	3
	Fusarium crown rot (*Fusarium* sp./spp.)	0	1	0
	Fusarium root rot (*Fusarium* sp./spp.)	11	3	15
	Fusarium root rot; Stalk rot (*Fusarium oxysporum*)	1	3	0
	Herbicide injury (Abiotic disorder)	0	1	0
	Herbicide injury G;4 Synthetic auxin (Abiotic disorder)	0	1	0
	Nitrogen deficiency (Abiotic disorder)	0	1	0
	Rhizoctonia root rot; *(Rhizoctonia* sp./spp.)	22	1	16
	Rhizoctonia crown and root Rot (*Rhizoctonia solani*)	2	1	0
	Root rot (*Aphanomyces* sp./spp.)	1	0	9
	Root rot (*Aphanomyces cochlioides*)	2	2	15
	Root rot (Unidentified agent)	2	0	0
	Wireworms (Click beetles) (Family Elateridae)	0	1	0
Birch (*Betula* sp./spp.)				
	No pathogen found (Identification analysis)	1	0	0
	Transplant shock; Stress (Abiotic disorder)	0	1	0
Blackeyed Susan (*Rudbeckia hirta)*				
	Septoria leaf spot (*Septoria* sp./spp.)	0	1	0
Rudbeckia (*Rudbeckia* sp./spp.)				
	Goldenrod crab spider (*Misumena vatia*)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Buckwheat (*Fagopyrum esculentum*)				
	Chemical injury (Abiotic disorder)	0	1	0
	Cucumber mosaic (CMV) (*Cucumovirus Cucumber mosaic virus)*	0	0	1
	Fusarium canker (*Fusarium acuminatum*)	0	1	0
	No pathogen found (Identification analysis)	1	0	0
	Potyvirus Group (*Potyvirus* sp./spp.)	0	0	1
	Thrips (Order Thysanoptera)	1	0	0
Cherry (*Prunus* sp./spp.)				
	Graft failure (Abiotic disorder)	1	0	0
Plum (*Prunus* sp./spp.)				
	Environmental stress; Problem (Abiotic disorder)	0	1	0
Chickpea (Garbanzo) (*Cicer arietinum*)				
	Alfalfa mosaic (*Alfalfa mosaic virus* (AMV))	0	0	3
	Ascochyta blight (*Ascochyta* sp.)	0	1	0
	Bean pod mottle (*Bean pod mottle virus* (BPMV))	0	0	3
	Bulb; Stem nematodes (*Ditylenchus* sp./spp.)	0	0	17
	Cyst nematodes (*Heterodera* sp./spp.)	0	0	17
	Environmental stress; Problem (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	1	0	0
	Non-pathogenic; Saprophyte (Secondary agents; Saprophytes)	0	1	0
	Pea seed-borne mosaic (*Pea seed-borne mosaic virus* (PSBMV))	0	0	3
	Potyvirus Group (*Potyvirus* sp./spp.)	0	0	4
	Pythium root and/or crown rot (*Pythium* sp./spp.)	0	1	0
	Unspecified pathology (*Botrytis* sp./spp.)	1	0	0
Chokeberry, Black (*Aronia melanocarpa*)				
	Nutrient imbalance (Abiotic disorder)	0	1	0
Cauliflower (*Brassica oleracea* var. *botrytis*)				
	Crown gall (*Agrobacterium* sp./spp.)	0	1	0
	Crucifer clubroot (*Plasmodiophora brassicae*)	0	0	2
Brussels-sprouts (*Brassica oleracea* var. *gemmifera*)				
	Crown gall (*Agrobacterium* sp./spp.)	0	1	0
	Crucifer clubroot (*Plasmodiophora brassicae*)	1	0	0
Rape; Canola (*Brassica napus* var. *napus*)				
	Crucifer black leg; Root rot (*Leptosphaeria macullans*)	1	0	0
	Unspecified pathology (*Fusarium solani*)	2	0	0
	Crucifer clubroot (*Plasmodiophora brassicae*)	0	0	9
Cole Crops (*Brassica* sp./spp.)				
	Flea beetle *(Phyllotreta* sp./spp.)	0	1	0
	Insufficient sample (Identification analysis)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Coneflower (*Echinacea* sp./spp.)				
	White smut (*Entyloma* sp./spp.)	0	1	0
Corn (*Zea mays*)				
	Anthracnose stalk rot (*Colletotrichum graminicola*)	1	0	0
	Anthracnose (*Colletotrichum graminicola*)	0	1	0
	Bacterial leaf streak (*Xanthomonas vasicola* pv. *vasculorum*)	0	2	0
	Corn stalk rot (*Gibberella zeae*)	0	1	0
	Fusarium acuminatum	1	0	0
	Goss's wilt/Goss's bacterial blight (*Clavibacter michiganensis* subsp. *nebraskensis*)	4	2	0
	No pathogen found (Identification analysis)	4	0	1
	Physiological responses (Abiotic disorder)	0	1	0
	Rhizoctonia root rot (*Rhizoctonia* sp./spp.)	1	0	0
	Stalk rot; Crown rot; Seedling blight (*Fusarium verticillioides*)	1	0	0
	Stewart's wilt (*Pantoea stewartii* subsp. *stewartii*)	0	1	0
	Tomato spotted wilt (*Tomato spotted wilt virus* (TSWV))	0	0	1
	Twospotted spider mite (*Tetranychus urticae*)	1	0	0
Cucumber (*Cucumis sativus*)				
	Dicamba injury (Abiotic disorder)	0	1	0
Dog (*Canis familiaris*)				
	Cat flea (*Ctenocephalides felis*)	1	0	0
Dogwood (*Cornus* sp./spp.)				
	Armored scales (Family Diaspididae)	1	0	0
	Canker (Unidentified fungus)	0	1	0
	Freeze; Frost; Cold damage (Abiotic disorder)	0	1	0
	Glyphosate injury (Abiotic disorder)	0	1	0
Dracaena (*Dracaena* sp./spp.)				
	Fluoride toxicity (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	1	0	0
Elderberry, Red (*Sambucus racemosa*)				
	Crown canker (Unidentified agent)	1	0	0
Elm (*Ulmus* sp./spp.)				
	Dutch elm disease (*Ophiostoma* sp./spp.)	2	0	2
	Elm leafminer (*Fenusa ulmi*)	0	1	0
Elm (*Ulmus* sp./spp.) cont.				
	European elm flea weevil (*Orchestes steppensis*)	0	1	0
	Winter injury (Abiotic disorder)	0	1	0
Elm, American (*Ulmus americana*)				
	Dutch elm disease (*Ophiostoma* sp./spp)	6	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Elm, American (*Ulmus americana*) cont.				
	Twospotted spider mite (*Tetranychus urticae*)	1	0	0
Elm, Siberian (*Ulmus pumila*)				
	European elm flea weevil (*Orchestes steppensis*)	0	1	0
Flame Nettle; Painted Leaves (*Coleus* sp./spp.)				
	Unidentified virus (Unidentified virus)	1	0	0
Fungus Identification Request (General)				
	Sclerotinia blight (*Sclerotinia sclerotiorum*)	3	0	0
Goatsbeard (*Aruncus* sp./spp.)				
	Fungal leaf spot (Undetermined genus)	0	1	0
Grape (*Vitis* sp./spp.)				
	Chemical injury (Abiotic disorder)	0	1	0
	Grape downy mildew (*Plasmopara viticola*)	1	0	0
Hawaiian Blue Ginger (*Dichorisandra thyrsiflora*)				
	Environmental stress (Abiotic disorder)	0	1	0
Hemp (*Cannabis sativa*)				
	Alfalfa mosaic (AMV) (*Alfamovirus Alfalfa mosaic virus)*	0	0	1
	Aphids; Plant lice (Family Aphididae)	0	0	0
	Beet curly top (BCTV) (*Curtovirus Beet curly top virus)*	0	0	1
	Bipolaris sp./spp.	1	0	0
	Cucumber mosaic (CMV) (*Cucumovirus Cucumber mosaic virus*)	0	1	0
	Erineum galls (Family Eriophyidae)	0	1	0
	Flea beetles (Subfamily Galerucinae; Tribe Alticini)	0	2	0
	Fusarium root rot (*Fusarium* sp./spp.)	0	1	0
	Fusarium root; Crown rot (*Fusarium* sp./spp.)	0	1	0
	Herbicide injury G; 2 ALS inhibitor (Abiotic disorder)	0	1	1
	Insufficient sample (Identification analysis)	2	0	0
	Leaf spot (Unknown cause)	1	0	0
	Mechanical damage (Abiotic disorder)	1	3	1
	Mold (*Ulocladium* sp./spp.)	1	0	0
	No pathogen found (Identification analysis)	37	1	0
	Oedema; Edema (Abiotic disorder)	1	0	0
	Rhizoctonia root rot (*Rhizoctonia* sp./spp.)	21	1	0
	Shothole feeding injury	0	1	0
	Soil compaction (Abiotic disorder)	0	1	0
	Spider mites (Family Tetranychidae)	1	0	0
	Thrips (Order Thysanoptera)	1	1	0
	Unidentified bacteria (Unidentified bacteria)	3	11	0
	Unspecified pathology (*Alternaria* sp./spp.)	3	0	0
	Wireworms (Click beetles) (Family Elateridae)	0	3	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Hosta (*Hosta* sp./spp.)				
	Sunscald (Abiotic disorder)	0	1	0
Insect Identification				
	Acarines (Order Acari)	2	0	0
	Alfalfa weevil (*Hypera postica*)	1	0	0
	American dog tick (*Dermacentor variabilis*)	1	0	0
	Ants (Family Formicidae)	1	1	0
	Aphidlions (Green lacewings) (Family Chrysopidae)	1	0	0
	Army cutworm (*Euxoa auxiliaris*)	1	0	0
	Arthropods (*Arthropoda* sp./spp.)	0	0	1
	Asian cockroach (*Blattella asahinai*)	3	0	0
	Asian giant hornet (*Vespa mandarinia*)	0	0	1
	Atomaria sp.	0	1	0
	Bed bug (*Cimex lectularius*)	5	0	0
	Black and red horntail (*Urocerus cressoni*)	2	0	0
	Black blister beetle (*Epicauta pennsylvanica*)	1	0	0
	Black witch (*Ascalapha odorata*)	1	0	0
	Blacklegged tick (*Ixodes scapularis*)	1	0	0
	Booklouse (*Liposcelis* sp./spp.)	0	1	0
	Broad-headed bug (*Megalotomus quinquespinosus*)	1	0	0
	Brownbanded cockroach (*Supella longipalpa*)	0	1	0
	Bumble flower beetle (*Euphoria indus*)	1	0	0
	Cantharid beetle (*Chauliognathus pennsylvanicus*)	1	0	0
	Carabid beetle (*Amara* sp./spp.)	0	1	0
	Carabid beetle (*Pasimachus* sp./spp.)	0	1	0
	Carpenter ant (*Camponotus* sp./spp.)	1	0	0
	Carpet beetles (Family Dermestidae)	2	0	0
	Chrysomelid flea beetle (*Altica bimarginata*)	2	0	0
	Cicada killer (*Sphecius speciosus*)	1	0	0
	Cigarette beetle (*Lasioderma serricorne*)	2	0	1
	Cimicid bat bug (*Cimex adjunctus*)	5	0	0
	Cimicid bug (*Cimex* sp./spp.)	1	0	0
	Cluster fly (*Pollenia* sp./spp.)	1	0	0
	Combfooted spider (*Steatoda borealis*)	0	1	0
	Common house fly (*Musca domestica*)	1	0	0
	Common sawflies (Family Tenthredinidae)	1	0	0
	Crane flies (Family Tipulidae)	1	0	0
	Currant spanworm (*Macaria ribearia*)	0	1	0
	Darkwinged fungus gnats (Family Sciaridae)	1	0	0
	Drugstore beetle (*Stegobium paniceum*)	1	0	0
	Elm sawfly (*Cimbex americana*)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Insect Identification cont.				
	Elm sphinx (*Ceratomia amyntor*)	1	0	0
	Firebrat (*Thermobia domestica*)	1	0	0
	Flatheaded borer (*Dicerca tenebrosa*)	0	1	0
	Foreign grain beetle (*Ahasverus advena*)	2	0	0
	Fourlined plant bug (*Poecilocapsus lineatus*)	0	1	0
	Fungus gnat (*Sciara* sp./spp.)	1	0	0
	Funnelweb spiders (Family Agelenidae; Araneae)	1	0	0
	German cockroach (*Blattella germanica*)	1	0	0
	German yellowjacket (*Vespula germanica*)	0	1	0
	Giant waterbug (*Lethocerus americanus*)	1	0	0
	Golden tortoise beetle (*Metriona bicolor*)	0	1	0
	Grass spider (*Agelenopsis* sp./spp.)	0	1	0
	Gray comma (*Polygonia progne*)	1	0	0
	Green lacewing (*Chrysoperla* sp./spp.)	1	0	0
	Green stink bug (*Chinavia hilaris*)	0	1	0
	Ground beetles (Family Carabidae)	1	0	0
	Hackberry nipplegall maker (*Pachypsylla celtidismamma*)	1	0	0
	Hairy fungus beetle (*Mycetophagus quadriguttatus*)	1	0	0
	Hairy fungus beetle (*Typhaea stercorea*)	1	0	0
	Ichneumons (Wasps) (Family Ichneumonidae)	2	0	0
	Insects (Class Insecta)	1	0	0
	Isopod; Woodlouse (*Porcellio spinicornis*)	1	0	0
	Julid millipedes (Family Julidae; Order Julida)	1	0	0
	Lasius ant (*Lasius* sp./spp.)	1	0	0
	Lauxaniid fly (Family *Lauxaniidae*)	1	0	0
	March flies (Family Bibionidae)	1	0	0
	Mayflies (Order Ephemeroptera)	1	0	0
	Meal moth (*Pyralis farinalis*)	0	2	0
	Merchant grain beetle (*Oryzaephilus mercator*)	1	0	0
	Mesostig mites (Order Mesostigmata)	1	0	0
	Midges (Family Chironomidae)	1	0	0
	Mirid bug (*Lygus* sp./spp.)	1	0	0
	Multicolored Asian lady beetle (*Harmonia axyridis*)	1	0	0
	Neotibicen sp.	1	0	0
	Nitidulid beetle (*Glischrochilus quadrisignatus*)	1	0	0
	Noctuid moth (*Agrotis* sp./spp.)	0	1	0
	Noctuid moths (Family Noctuidae)	0	0	0
	Pale bordered field cockroach (*Pseudomops septentrionalis*)	1	0	0
	Pale tussock moth (*Halysidota tessellaris*)	1	0	0
	Palestriped flea beetle (*Systena blanda*)	0	1	0
	Pandorus sphinx moth (*Eumorpha pandorus*)	0	1	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Insect Identification cont.				
	Pentatomid bug (*Podisus* sp./spp.)	1	0	0
	Pigeon tremex (*Tremex columba*)	1	0	0
	Pillbugs; Sowbugs (Order Isopoda)	1	0	0
	Pine engraver (*Ips pini*)	0	1	0
	Raphignathidae	0	1	0
	Sap beetle (*Carpophilus* sp./spp.)	0	1	0
	Scarab beetle (*Osmoderma* sp./spp.)	0	1	0
	Seed bug (*Nysius* sp./spp.)	0	1	0
	Seed bug (*Xyonysius californicus*)	1	0	0
	Slender springtails (Family Entomobryidae)	2	0	0
	Spotted wing Drosophila *(Drosophila suzukii*)	0	1	0
	Springtails (Order Collembola)	2	0	0
	Straight-faced solifugid (*Eremobates pallipes*)	1	0	0
	Swift spider (*Trachelas tranquillus*)	0	1	0
	Virginia ctenucha (*Ctenucha virginica*)	1	0	0
	Warehouse beetle (*Trogoderma variabile*)	2	0	0
	Western black flea beetle (*Phyllotreta pusilla*)	2	0	0
	Western flower thrips (*Frankliniella occidentalis*)	1	0	0
	Wireworms (Click beetles) (Family Elateridae)	1	0	0
	Wolf spider (Family Lycosidae; Order Araneae)	1	0	0
Juniper (*Juniperus* sp./spp.)				
	Kabatina tip blight; Needle blight *(Kabatina juniperi*)	2	0	0
	Orb weaver spiders (Family Araneidae; Order Araneae*)*	1	0	0
	Rust (*Gymnosporangium* sp./spp.)	1	0	0
	Twospotted spider mite (*Tetranychus urticae*)	1	0	0
Rocky Mountain Juniper (*Juniperus scopulorum*)				
	Kabatina tip blight; Needle blight (*Kabatina juniperi*)	3	0	0
Lentil (*Lens culinaris*)				
	Aphanomyces root rot (*Aphanomyces euteiches*)	11	0	109
	Fusarium root; Stem rot (*Fusarium solani*)	3	0	117
	Nematodes, bulb & stem (*Ditylenchus* sp./spp.)	0	0	283
	Nematodes, cyst (*Heterodera* sp./spp.)	0	0	283
	High soluble salt (Abiotic disorder)	0	1	0
	Stalk rot; Seedling root rot (*Fusarium avenaceum*)	1	0	119
	Unspecified pathology (*Stemphylium* sp./spp.)	0	1	0
Lilac, Common (*Syringa vulgaris*)				
	Ramorum blight (*Phytophthora ramorum*)	1	0	0
	Planting too deep (Abiotic disorder)	0	1	0
	Root girdling (Abiotic disorder)	0	1	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Lilac (*Syringa* sp./spp.)				
	Cold wet soils (Abiotic disorder)	0	1	0
	High soil moisture (Abiotic disorder)	0	4	0
	Powdery mildew (*Microsphaera* sp./spp.)	0	1	0
	Unidentified fungus (Unidentified fungus)	1	0	0
	Unspecified pathology (*Cytospora* sp./spp.)	0	1	0
	Verticillium wilt (*Verticillium* sp./spp.)	0	1	0
Miss Canada Lilac (*Syringa* x *prestoniae* 'Miss Canada')				
	No pathogen found (Identification analysis)	1	0	0
Lily *(Lilium* sp./spp.*)*				
	Insufficient sample (Identification analysis)	1	0	0
Maple (*Acer* sp./spp.*)*				
	Bacterial leaf scorch (*Xylella fastidiosa)*	0	0	1
	Canker (Unidentified agent)	1	1	0
	Eriophyid mites (Family Eriophyidae)	1	0	0
	Frost; Cold damage (Abiotic disorder)	0	1	0
	Ichneumonid wasp (*Megarhyssa atrata*)	1	0	0
	Iron deficiency (Abiotic disorder)	0	2	0
	Leaf scorch (Abiotic disorder)	0	1	0
	Phyllosticta leaf spot (*Phyllosticta* sp./spp.)	0	1	0
	Root girdling (Abiotic disorder)	0	1	0
	Sunscald (Abiotic disorder)	1	0	0
Maple, Amur (*Acer tataricum ginnala*)				
	Leaf scorch (Abiotic disorder)	0	1	0
	Leafminer feeding (Undetermined family)	0	1	0
Maple, Freeman's (*Acer freemanii*)				
	Maple anthracnose (*Gloeosporium apocryptum*)	0	1	0
Maple, Sugar (*Acer saccharum*)				
	No pathogen found (Identification analysis)	1	0	0
Milkweed (*Asclepias* sp./spp.)				
	Milkweed tussock moth (*Euchaetes egle*)	1	0	0
Millet, Proso (*Panicum miliaceum*)				
	Nematodes	0	0	1
Mold Identification Request				
	Aspergillus (*Aspergillus* sp./spp.)	1	1	0
	Black mold (*Stachybotrys chartarum*)	1	2	6
	Mold (*Ulocladium* sp./spp.)	1	1	0
	Mold (Unidentified fungus)	1	0	2
	Gonatobotrys spp.	0	1	0
	No mold detected (Identification analysis)	5	0	0
	Unspecified pathology (*Alternaria* sp./spp.)	1	0	0
Oats (*Avena sativa)*				
	Barley yellow dwarf virus (BYDV-MAV)	0	0	1

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Oats (*Avena sativa)* cont.				
	Barley yellow dwarf virus (BYDV-PAV)	0	0	1
	High plains disease (HPV) (*Emaravirus High plains wheat mosaic virus*)	1	0	0
	Wheat streak mosaic (WSMV) (*Tritimovirus Wheat streak mosaic virus)*	0	0	1
Oak (*Quercus* sp./spp.)				
	Anthracnose (*Apiognomonia* sp./spp.)	0	1	0
	Coccinellid (*Scymnus* sp./spp.)	1	0	0
	Twospotted spider mite (*Tetranychus urticae*)	1	0	0
Ohio Buckeye (*Aesculus glabra)*				
	Physiological drought (Abiotic disorder)	0	1	0
Pea Shrub; Pea Tree (*Caragana* sp./spp.)				
	Chemical; Environmental injury (Abiotic disorder)	0	1	0
Pear (*Pyrus* sp./spp.*)*				
	Fire blight (*Erwinia amylovora*)	0	1	0
	Stem canker (Unidentified canker)	1	0	0
	Twig blight (*Diaporthe* sp./spp.)	2	0	0
Peas, Dry Field Peas (*Pisum sativum*)				
	Aphanomyces root rot (*Aphanomyces euteiches*)	29	0	83
	Bacterial blast (*Pseudomonas syringae*)	0	2	0
	Fusarium root rot (*Fusarium solani)*	7	0	101
	Nematodes, bulb & stem (*Ditylenchus* sp./spp.)	0	0	229
	Nematodes, cyst (*Heterodera* sp./spp.)	0	0	231
	Pea enation mosaic virus (PEMV)	0	0	2
	Pea seed-borne mosaic virus (PSbMV)	0	0	2
	Stalk rot; Seedling root rot (*Fusarium avenaceum*)	0	0	108
Peas, Garden (*Pisum sativum*)				
	Insufficient sample (Identification analysis)	1	0	0
Pine (*Pinus sp.*)				
	Aphids; Plant lice (Family Aphididae)	0	1	0
	Cytospora canker (*Cytospora kunzei*)	1	0	0
	Diplodia blight (*Sphaeropsis sapinae)*	1	2	0
	Diplodia tip blight; Canker (*Diplodia sapinae)*	2	0	0
	Leafroller moth (*Retinia metallica*)	2	0	0
	Pine bark adelgid (*Pineus strobi*)	1	0	0
	Pine needle scale (*Chionaspis pinifoliae*)	3	2	0
	Root girdling (Abiotic disorder)	0	1	0
	Spider mites (Family Tetranychidae)	1	0	0
	Tight spacing	0	1	0
	Transplant shock; Stress (Abiotic disorder)	0	1	0
	Wound canker (Abiotic disorder)	0	1	0
Pine, Austrian (*Pinus nigra*)				

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
	Pine needle scale (*Chionaspis pinifoliae*)	1	0	0
Pine, Mugo (*Pinus mugo*)				
	Arthropods (*Arthropoda* sp./spp.)	0	0	1
	No pathogen found (Identification analysis)	1	0	0
	Rodent damage (Vertebrate damage)	0	1	0
Pine, Ponderosa (*Pinus ponderosa*)				
	Cold wet soils (Abiotic disorder)	0	2	0
	Dieback; Canker (*Diplodia* sp./spp.)	1	0	0
	Diplodia blight (*Sphaeropsis sapinea*)	1	0	0
	Diplodia tip blight; Canker (*Diplodia pinea*)	1	0	0
	Diplodia tip blight; Canker (*Diplodia sapinea*)	0	1	0
	Dothistroma needle blight (*Dothistroma* sp./spp.)	0	1	0
	Environmental stress; Problem (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	1	0	0
	Pine bark adelgid (*Pineus strobi*)	1	0	0
	Pine needle scale (*Chionaspis pinifoliae*)	2	0	0
	Spider mites (Family Tetranychidae)	1	0	0
Pine, Scots (*Pinus sylvestris*)				
	Dothistroma needle blight (*Dothistroma* sp./spp.)	0	1	0
Plant Identification				
	Barnyardgrass (*Echinochloa crus-galli*)	1	0	0
	Black nightshade (*Solanum nigrum*)	1	0	0
	Brittlestem hempnettle (*Galeopsis tetrahit*)	0	1	0
	Bull thistle (*Cirsium vulgare*)	1	0	0
	Cheatgrass; Downy brome (*Bromus tectorum*)	1	0	0
	Climbing nightshade; Bittersweet (*Solanum dulcamara*)	0	1	0
	Common waterhemp (*Amaranthus rudis*)	1	0	0
	Ground ivy; Creeping charlie (*Glechoma hederacea*)	0	1	0
	Hairy false goldenaster (*Heterotheca villosa*)	1	0	0
	Hairy Golden Aster (*Chrysopsis villosa*)	0	1	0
	Hoary Alyssum (*Berteroa incana*)	0	1	0
	Honeysuckle (*Lonicera* sp./spp.)	1	0	0
	Horseweed (*Conyza canadensis*)	1	0	0
	Kochia (*Kochia scoparia*)	0	1	0
	Lesser (common) burdock (*Arctium minus*)	1	0	0
	Pursh seepweed (*Suaeda calceoliformis*)	1	1	0
	Rocky Mountain beeplant (*Cleome serrulata*)	0	1	0
	Roving bellflower (*Campanula rapunculoides*)	0	1	0
	Smooth crabgrass (*Digitaria ischaemum*)	1	0	0
	Tatarian honeysuckle (*Lonicera tatarica*)	0	1	0
	Velvetleaf (*Abutilon theophrasti*)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Plant Identification cont.				
	Western sticktight (*Lappula occidentalis*)	0	1	0
	Wild cucumber (*Echinocystis lobata*)	0	1	0
	Yarrow; Common (*Achillea millefolium*)	1	0	0
Poplar (*Populus* sp./spp.)				
	Cryptosphaeria canker (*Cryptosphaeria sp./spp*	1	0	0
	Cytospora canker; Dieback (*Cytospora* sp./spp.)	0	1	0
Potato (*Solanum tuberosum*)				
	Alfalfa mosaic virus (AMV)	0	0	14
	Alternaria leaf spot (*Alternaria* sp./spp.)	1	0	0
	Bacterial rot; Bacterial blight (*Dickeya* sp./spp.)	5	0	358
	Bacterial soft rot (*Pectobacterium* sp./spp.)	22	1	257
	Bt-Cry3A protein (GMO test)	0	0	128
	Crown rot; Root rot; Stem rot (*Phytophthora* sp./spp.)	0	0	3
	Early blight; Leaf spot (*Alternaria solani*)	1	0	1
	Fusarium dry rot; Bulb rot (*Fusarium* sp./spp.)	1	0	1
	Fusarium wilt; Fusarium wilt complex (*Fusarium* sp./spp.)	1	0	0
	Growth regulator effect (Abiotic disorder)	0	1	0
	Herbicide injury (Abiotic disorder)	0	1	0
	Hollow heart (Abiotic disorder)	1	0	0
	Insufficient sample (Identification analysis)	2	0	0
	Late blight (*Phytophthora infestans*)	0	0	8
	No pathogen found (Identification analysis)	1	0	0
	No virus found (No virus found)	1	0	0
	Pectolytic bacteria	2	0	0
	Potato bacterial ring rot (*Clavibacter michiganensis* subsp. *sepedonicus*)	71	0	1942
	Potato black dot (*Colletotrichum coccodes*)	14	0	8
	Potato black leg (*Pectobacterium atrosepticum*)	0	0	3
	Potato brown rot; Wilt (*Ralstonia solanacearum*)	0	0	225
	Potato common scab (*Streptomyces scabies*)	8	1	0
	Potato latent virus (PotLV)	0	0	257
	Potato leafroll virus (PLRV)	2	0	360
	Potato mop-top virus (PMTV)	11	0	330
	Potato powdery scab (*Spongospora subterranea*)	7	0	15
	Potato spindle tuber viroid (PSTVd)	0	0	225
	Potato virus A (PVA)	0	0	349
	Potato virus M (PVM)	0	0	350
	Potato virus S (PVS)	20	0	348
	Potato virus X (PVX)	0	0	350
	Potato virus Y (PVY)	38	0	782

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Potato (*Solanum tuberosum*) cont.				
	Potato virus Y necrotic strain (PVY^{N})	0	0	14
	Silver scurf (*Helminthosporium solani*)	0	0	5
	Spotted snake millipede (*Blaniulus guttulatus*)	0	1	0
	Tobacco rattle virus (TRV)	4	0	343
	Tobacco streak virus (TSV)	0	0	14
	Tomato spotted wilt virus (TSWV)	0	0	274
	Unknown abiotic disorder (Abiotic disorder)	0	1	0
	Verticillium wilt (*Verticillium* sp./spp.)	0	0	1
	Water rot; Potato leak (*Pythium* sp./spp.)	0	0	1
Potato (*Solanum tuberosum*); **Soil Health Testing**				
	Potato bacterial ring rot (*Clavibacter michiganensis* subsp. *sepedonicus*)	0	0	2
	Black dot (*Colletotrichum coccodes)*	1	0	3
	Common scab (*Streptomyces scabies)*	0	0	3
	Potato mop-top (PMTV) (*Pomovirus Potato mop-top virus)*	0	0	21
	Powdery scab (*Spongospora subterranea*)	181	0	161
	Scab (*Streptomyces* sp./spp.)	57	0	0
	Silver scurf (*Helminthosporium solani*)	0	0	1
	Verticillium wilt (*Verticillium* sp./spp.)	44	0	15
Potting Soil; Growing Media				
	Slime mold (Class Myxomycetes; Division Myxomycota)	0	1	0
Pumpkin (*Cucurbita* sp./spp.)				
	Cucumber mosaic virus (CMV)	0	0	1
	Cucurbit bacterial wilt (*Erwinia tracheiphila*)	0	1	0
	Potyvirus Group (*Potyvirus* sp./spp.)	0	0	1
	Tobacco mosaic virus (TMV)	0	0	1
Raspberry (*Rubus* sp./spp.)				
	Anthracnose (*Elsinoe* sp./spp.)	1	0	0
	Dieback (Unknown cause)	1	0	0
	Fire blight (*Erwinia amylovora*)	0	0	1
Rye (*Secale cereale*)				
	Dwarf bunt (*Tilletia controversa*)	0	0	3
	Flag smut (*Urocystis agropyri*)	0	0	2
	Flag smut (*Urocystis tritici*)	0	0	1
	Karnal bunt (*Tilletia indica*)	0	0	3
Serviceberry (*Amelanchier* sp./spp.)				
	Brown rot (*Monilia* sp./spp.)	0	1	0
	Hawthorn lace bug (*Corythucha cydoniae*)	2	0	0
Soybean (*Glycine max*)				
	Bean leaf beetle *(Cerotoma trifurcata*)	0	1	0
	Cold wet soils (Abiotic disorder)	0	1	0
	Corn stalk rot (*Fusarium solani*)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Soybean (*Glycine max*) cont.				
	Dicamba injury (Abiotic disorder)	0	4	0
	EPSPS protein expression	3	0	3
	Fusarium canker (*Fusarium* sp./spp.)	0	1	0
	Fusarium root; Stem rot (*Fusarium solani*)	0	1	0
	Iron deficiency (Abiotic disorder)	0	2	0
	Herbicide carryover (Abiotic disorder)	0	1	0
	Herbicide injury (Abiotic disorder)	0	2	0
	Insufficient sample (Identification analysis)	1	0	0
	Iron deficiency (Abiotic disorder)	0	1	0
	Leaf scorch (Abiotic disorder)	0	1	0
	Nutrient imbalance (Abiotic disorder)	0	2	0
	Painted lady (*Vanessa cardui*)	1	1	0
	Phytophthora stem rot (*Phytophthora* sp./spp.)	0	0	2
	Phytophthora root and stem rot (*Phytophthora sojae*)	5	0	0
	Pod and stem blight (*Diaporthe* sp./spp.)	1	0	0
	Pythium root and/or crown rot (*Pythium* sp./spp.)	0	0	1
	Rhizoctonia root canker (*Rhizoctonia* sp./spp.)	2	0	0
	Root-knot nematodes (*Meloidogyne* sp./spp.)	0	0	1
	Soil compaction (Abiotic disorder)	0	3	0
	Soybean bacterial pustule (*Xanthomonas axonopodis* pv. *glycines*)	2	0	0
	Soybean Brown stem rot (*Phialophora gregata*)	3	0	2
	Soybean cyst nematode (SCN) (*Heterodera glycines*)	1	0	1
	Soybean frogeye leaf spot (*Cercospora sojina*)	2	0	0
	Soybean Fusarium blight (*Fusarium oxysporum*)	0	1	0
	Soybean sudden death syndrome (*Fusarium virguliforme*)	0	0	2
Soybean (*Glycine max*); **Soil Health Testing**				
	Soybean cyst nematode (*Heterodera glycines*)	17	0	8
Spruce (*Picea* sp./spp.)				
	Aphids; Plant lice (Family Aphididae)	0	1	0
	Canker; Dieback (*Leucostoma kunzei*)	0	0	2
	Chemical injury (Abiotic disorder)	0	2	1
	Cytospora canker (*Cytospora kunzei*)	0	2	0
	Cytospora canker; Dieback (*Cytospora* sp./spp.)	0	2	0
	Eriophyid mites (Family Eriophyidae)	1	0	0
	Insect damage (Unidentified insect)	0	1	0
	Insufficient sample (Identification analysis)	1	0	0
	Leucostoma canker (*Leucostoma* sp./spp.)	0	2	7
	Nitrogen deficiency (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	3	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Spruce (*Picea* sp./spp.) cont.				
	Non-pathogenic; Saprophyte (Secondary agents; Saprophytes)	0	1	0
	Nutrient imbalance (Abiotic disorder)	0	1	0
	Pine needle scale (*Chionaspis pinifoliae*)	4	1	0
	Rhizosphaera needle cast (*Rhizosphaera* sp./spp.)	1	0	1
	Spider mites (Family Tetranychidae)	0	6	0
	Spruce needle cast (*Stigmina* sp./spp.)	3	0	0
	Spruce bud scale (*Physokermes* sp./spp.)	5	0	0
	Spruce needle cast (*Stigmina* sp./spp.)	0	0	1
	Spruce spider mite (*Oligonychus ununguis*)	2	0	0
	Tight planting	0	1	0
	Transplant shock; Stress (Abiotic disorder)	0	2	0
	Undetermined injury (Identification analysis)	1	0	0
	Winter injury (Abiotic disorder)	0	3	0
Spruce, Black Hills (*Picea glauca* 'Densata')				
	Chemical injury (Abiotic disorder)	0	1	0
	Cold wet soils (Abiotic disorder)	0	3	0
	Cooley spruce gall adelgid (*Adelges cooleyi*)	1	0	0
Spruce, Black Hills (*Picea glauca* 'Densata') cont.				
	Cytospora canker (*Cytospora kunzei*)	1	0	0
	Gall wasps (Family Cynipidae)	0	1	0
	Pine needle scale (*Chionaspis pinifoliae*)	1	0	0
	Spider mites (Family Tetranychidae)	0	1	0
	Spruce bud scale (*Physokermes* sp./spp.)	1	0	0
	Spruce gall midge (*Mayetiola piceae*)	0	1	0
Spruce, Colorado Blue (*Picea pungens fastigiata*)				
	Cold wet soils (Abiotic disorder)	0	3	0
	Cytospora canker (*Cytospora kunzei*)	1	0	0
	Cytospora canker; Dieback (*Cytospora* sp./spp.)	0	1	0
	Drought stress damage (Abiotic disorder)	0	1	0
	Freeze; Frost; Cold damage (Abiotic disorder)	0	1	0
	Herbicide injury (Abiotic disorder)	0	1	0
	Insufficient light (Abiotic disorder)	0	1	0
	Pine needle scale (*Chionaspis pinifoliae*)	1	0	0
	Spider mites (Family Tetranychidae)	0	1	0
	Transplant shock; Stress (Abiotic disorder)	0	1	0
	Yellowheaded spruce sawfly (*Pikonema alaskensis*)	0	1	0
Strawberry (*Fragaria* sp./spp.)				
	Insufficient sample (Identification analysis)	1	0	0
	Nitidulid beetle (*Glischrochilus quadrisignatus*)	1	0	0
Sugar (Food)				
	Asian cockroach (*Blattella asahinai*)	1	0	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Sunflower (*Helianthus annuus)*				
	Chemical injury (Abiotic disorder)	0	1	0
	No pathogen found (Identification analysis)	1	0	0
Sunflower (*Helianthus* sp./spp.)				
	Fusarium crown rot (*Fusarium* sp./spp.)	2	0	0
	Northern corn rootworm (*Diabrotica barberi*)	1	0	0
Supertunia (*Petunia hybrida*)				
	Aerial stem blight (*Phytophthora* sp./spp.)	0	0	1
	Various fungi (Various fungi)	0	1	0
Thistle, Canada (*Cirsium arvense*)				
	Canada thistle rust (*Puccinia punctiformis*)	0	1	1
	Leaf rust; Rust (*Puccinia* sp./spp.)	1	0	0
	No pathogen found (Identification analysis)	1	0	0
Tomato (*Solanum lycopersicum*)				
	Brown stink bug (*Euschistus servus*)	1	0	0
Tomato (*Lycopersicon* sp./spp.)				
	Bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*)	2	1	0
	Blossom end rot (Abiotic disorder)	0	1	0
	Chemical injury (Abiotic disorder)	0	4	0
	Dicamba injury (Abiotic disorder)	0	1	0
	Early blight; Leaf spot (*Alternaria solani*)	1	0	0
	Late blight (*Phytophthora infestans*)	0	0	1
	Potassium deficiency (Abiotic disorder)	0	1	0
	Tomato spotted wilt virus (TSWV)	1	0	1
	Yellow shoulder	0	1	0
Triticale (*Triticosecale rimpaui*)				
	Barley yellow dwarf virus (BYDV)	0	0	1
	Cereal yellow dwarf virus (CYDV)	0	0	1
	High plains virus (HPV)	0	0	1
	Wheat streak mosaic virus (WSMV)	0	0	1
Turfgrass (Turfgrass mixed species)				
	Brown patch (*Rhizoctonia* sp./spp.)	2	0	0
	Chinch bug complex (*Blissus* sp./spp.)	0	1	0
	Dense thatch layer (Abiotic disorder)	2	0	0
	Dollar spot (*Clarireedia homoeocarpa*)	0	0	1
	Heavy soil	1	0	0
	High pH damage (Abiotic disorder)	1	0	0
	Insufficient sample (Identification analysis)	6	0	0
	Magnaporthe summer patch (*Magnaporthiopsis poae*)	1	0	0
	Melting out (Turfgrass) (*Drechslera* sp./spp.)	0	3	0
	Nitrogen deficiency (Abiotic disorder)	0	1	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Turfgrass (Turfgrass mixed species) cont.				
	No pathogen found (Identification analysis)	3	0	0
	Patch disease (Unidentified fungus)	1	0	0
	Phosphorus deficiency (Abiotic disorder)	1	0	0
	Potassium deficiency (Abiotic disorder)	0	1	0
	Pythium root and/or crown rot (*Pythium* sp./spp.)	0	1	0
	Red thread (*Laetisaria fuciformis*)	1	0	0
	Scarab beetle (*Phyllophaga* sp./spp.)	0	2	0
	Snow mold (*Typhula* sp./spp.)	0	2	0
	Soft scales (Family Coccidae)	1	0	0
	Soil compaction (Abiotic disorder)	0	1	0
	Turfgrass necrotic ring spot (*Ophiosphaerella korrae*)	1	2	0
	Western chinch bug (*Blissus occiduus*)	1	1	0
Virginia Creeper (*Parthenocissus quinquefolia*)				
	Virginia creeper leafhopper (*Erythroneura ziczac*)	0	1	0
Watermelon (*Citrullus lanatus*)				
	Twospotted spider mite (*Tetranychus urticae*)	1	0	0
Western Snowberry (*Symphoricarpos occidentalis*)				
	Yellow woollybear (*Spilosoma virginica*)	0	1	0
Wheat (*Triticum* sp./spp.)				
	Bacterial leaf streak (*Xanthomonas* sp./spp.)	5	0	0
	Cereal/grass disease (*Bipolaris* sp./spp.)	0	1	0
	Drought stress damage (Abiotic disorder)	0	1	0
	Dwarf bunt (*Tilletia controversa)*	0	0	2
	Flag smut (*Urocystis agropyri*)	0	0	2
	Glume blotch (*Septoria tritici*)	1	0	0
	Insect damage (Unidentified insect)	1	0	0
	Wheat streak mosaic virus (WSMV)	1	0	0
Wheat (Spring/Winter) (*Triticum aestivum*)				
	Bacterial leaf streak (*Xanthomonas* sp./spp.)	13	0	1
	Barley stripe mosaic virus (BSMV)	0	0	1
	Barley yellow dwarf virus (BYDV-MAV)	0	0	8
	Arthropods (*Arthropoda* sp./spp.)	0	0	1
	Bacterial leaf streak (*Xanthomonas* sp./spp.)	1	0	0
	Bacterial stripe; Black chaff (*Xanthomonas campestris* pv. *translucens*)	0	0	1
	Barklice (Order Psocoptera)	1	0	0
	Barley yellow dwarf virus (BYDV-MAV)	0	0	2
	Barley yellow dwarf virus (BYDV-PAV)	0	0	2
	Dwarf bunt (*Tilletia controversa*)	0	0	7
	Flag smut (*Urocystis agropyri*)	0	0	7
	Glume blotch (*Parastagonospora nodorum*)	1	0	0
	Fusarium head blight (*Fusarium graminearum*)	0	1	0

Host	Diagnosis (Pathogen)	Confirmed	Suspected	Not Detected
Wheat (Spring/Winter) (*Triticum aestivum*) cont.				
	High Plains disease (WMoV)	1	0	4
	Karnal bunt (*Tilletia indica*)	0	0	2
	Larder beetle (*Dermestes lardarius*)	1	0	0
	Merchant grain beetle (*Oryzaephilus mercator*)	1	0	0
	Pythium root and/or crown rot (*Pythium* sp./spp.)	0	1	0
	Tan spot; Yellow leaf spot (*Pyrenophora tritici-repentis*)	1	0	0
	Wheat seed gall nematode (*Anguina tritici*)	0	0	50
	Wheat streak mosaic virus (WSMV)	5	0	8
Durum (*Triticum turgidum*)				
	Bacterial leaf streak (*Xanthomonas* sp./spp.)	4	0	0
	Barley yellow dwarf virus (BYDV-MAV)	0	0	2
	Barley yellow dwarf virus (BYDV-PAV)	0	0	2
	High Plains disease (WMoV)	0	0	2
	Leaf spot (*Stagonospora* sp./spp.)	1	0	0
	Tan spot (*Drechslera* sp./spp.)	2	0	0
	Wheat streak mosaic virus (WSMV)	2	0	0
Kamut (*Triticum turanicum*)				
	Dwarf bunt (*Tilletia controversa*)	0	0	2
	Flag smut (*Urocystis agropyri*)	0	0	2
	Karnal bunt (*Tilletia indica*)	0	0	1
Willow (*Salix* sp./spp.)				
	Willow sawfly (*Nematus ventralis*)	0	1	0

Specialists Consulted

Given the broad nature of samples received by the NDSU Plant Diagnostic Lab, accurate diagnoses often rely on collaboration with members of the Department of Plant Pathology, other departments at NDSU, and industry experts.

We would like to take this opportunity to acknowledge all faculty and specialists associated with NDSU, as well as experts in private industry, for their continued support of the lab. Without the expertise of a wide range of individuals, the quality of diagnoses from the lab would suffer tremendously.

Thank You