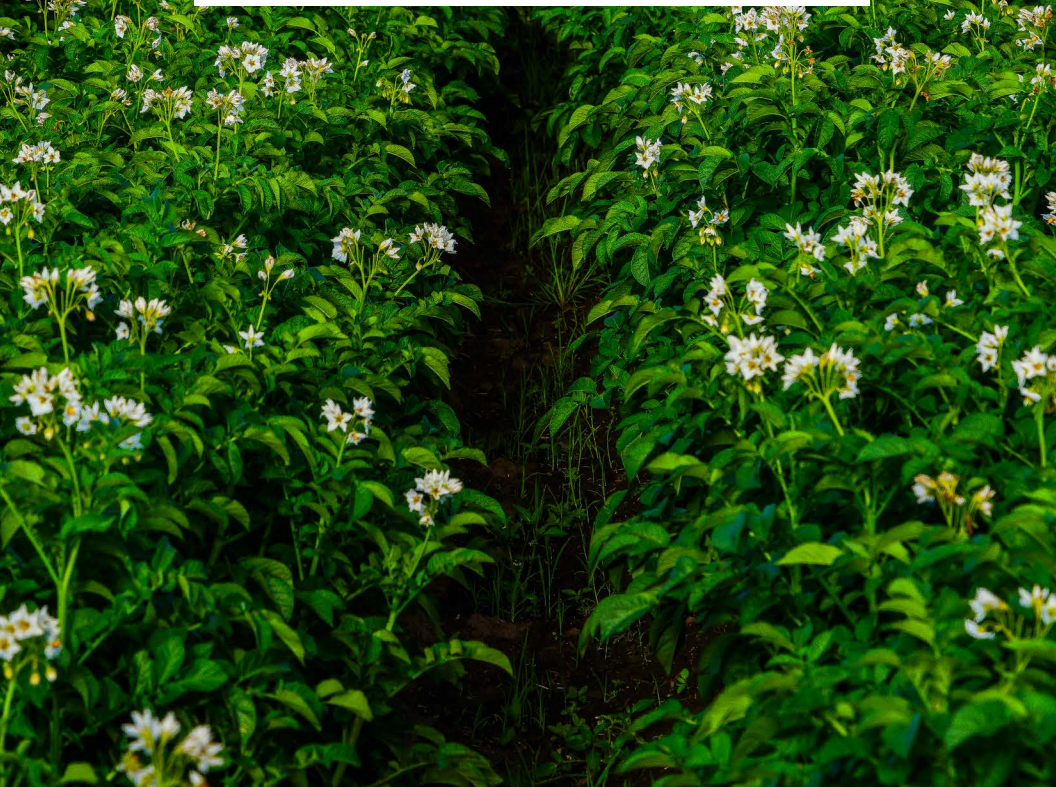
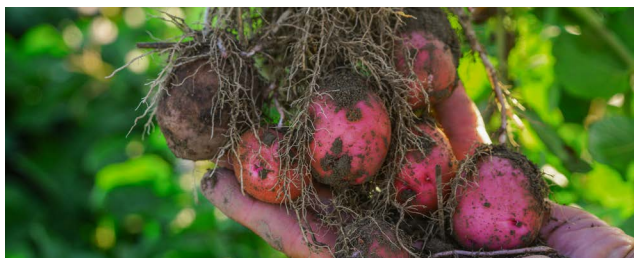




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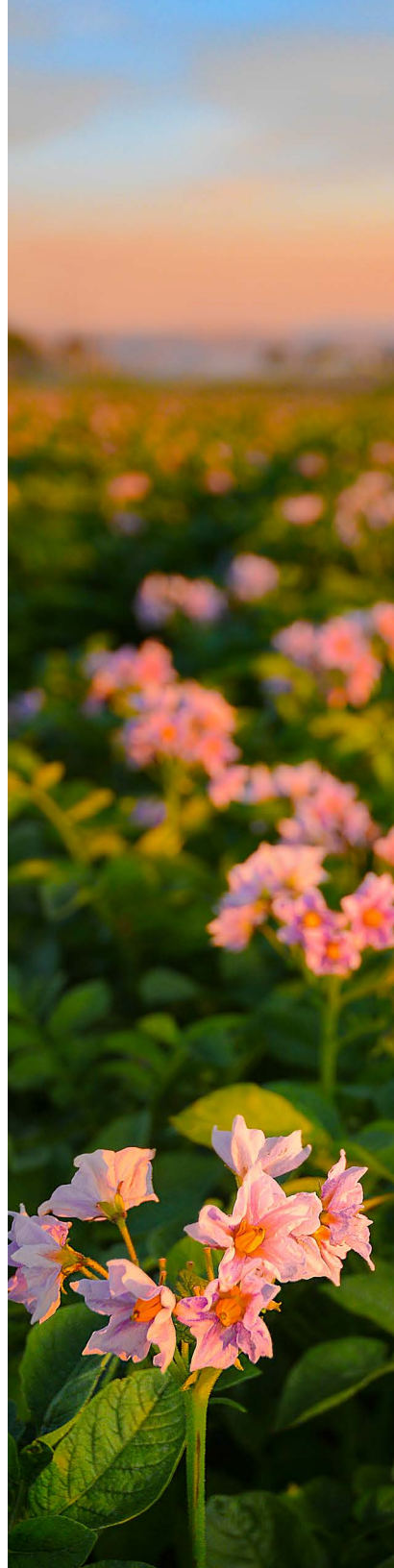
# U.S. SEED POTATO EXPORTS



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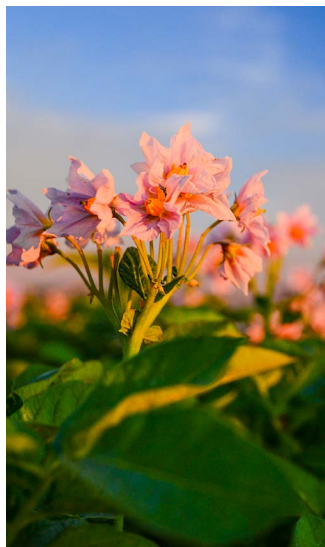
# Introduction

Global market factors and technology are altering the business environment in which the world's potato growers operate. Consumers are increasingly demanding new varieties and potato products. Multi-national processors and other international companies are expanding their global reach and customer base while making new demands on their potato suppliers. Technology is constantly working to improve growing practices, variety selection, and potato performance. Meanwhile, growers in different countries are learning ways to work together to improve their business practices.

In the United States, 2,500 potato growers are working to meet the challenges of the international marketplace. Every U.S. seed potato stems from the combined efforts of potato breeders, certification agencies, skilled technicians, experienced growers, government researchers, strict protocols, and a climate ideally suited to the production of high-quality seed potatoes. The large geographic spread over which U.S. seed potatoes are grown means U.S. seed is tested in a wide variety of growing conditions.

A strong collaboration of federal and state government agencies carefully monitors and regulates grower practices, ensuring that producers follow the best disease management and production techniques available. For all seed destined for markets outside U.S. borders, the government enforces strict U.S. Seed Export Standards. These standards provide assurance to buyers that their purchased seed potatoes are the best in the world.

Together, these factors give the United States a decisive advantage over other seed-producing countries. The result is high-quality seed stocks, coupled with extensive varieties suitable to a range of climates, that meet the needs of potato growers around the world. This Guide to U.S. Seed Potato Exports is published by Potatoes USA, a grower-funded marketing organization that helps U.S. potato growers increase demand for potatoes. Here you will find an introduction to U.S. seed potato production and seed certification.





# U.S. Seed Potato Varieties

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*This guide describes United States seed potato production and the seed certification system, including the U.S. regulatory structure, U.S. export standards, and U.S. quality standards.*

U.S. seed potato varieties are highlighted on accompanying cards outlining variety-specific traits. For each variety, you will find information on the origin, appearance, and specific characteristics, such as maturity, yield, and the application for which the variety is best suited. No potato variety is perfect, but some come close, depending on your environment and markets.

The variety cards include information about the plant variety protection (PVP) status of each variety. In the United States, varieties are protected for 20 years after initial approval.

Although Potatoes USA does not engage directly in commercial seed exports, it does conduct variety trials in numerous markets for many of these varieties and may be able to provide information about the varieties' performance in your region.





# U.S. Seed Potato Production

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*Combine the United States' diverse geography, exceptional technical expertise, and a solid commitment to quality and you get an ever-expanding selection of the best varieties and certified seed potatoes available. This high quality, along with technological advancements, has helped the U.S. become a world leader in potato production. The U.S. produced over 420 million hundredweight (cwt) of potatoes in 2020, with yields averaging 461 cwt per acre. (Source: USDA National Agricultural Statistics Service Potatoes 2020 Summary.)*

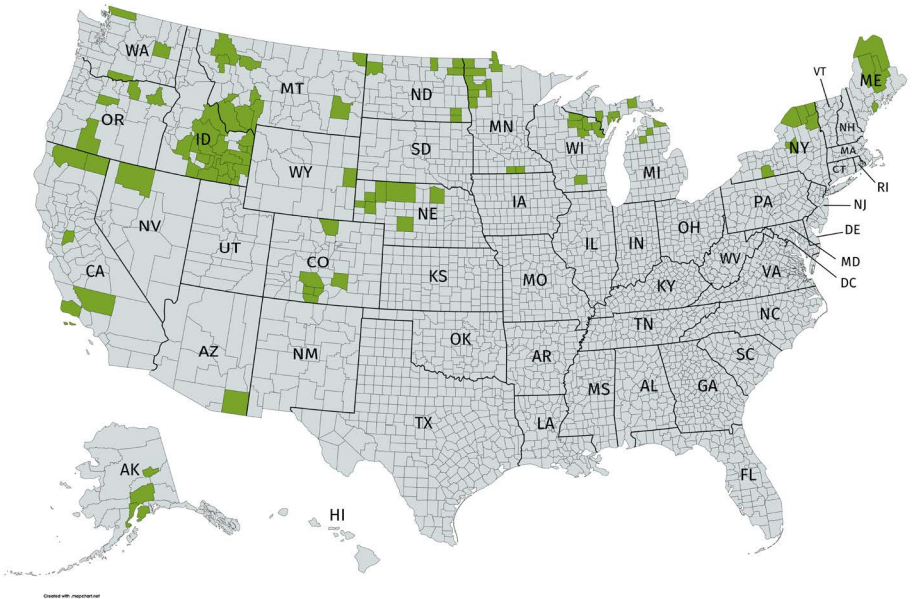
U.S. seed growers produce hundreds of varieties of potatoes, and more are constantly being developed to address the needs of markets worldwide. From frozen fries to chips to fresh table-stock, the U.S. cultivates a seed potato to suit every growing condition and every end product. Additionally, the U.S. has numerous public breeding programs through which high-yielding, disease-resistant varieties are constantly being developed. Thanks to its long breeding tradition, the U.S. has a large, diverse germplasm collection that responds to a variety of growing environments.

# Seed Producing States

All 50 states in the U.S. produce potatoes. However, the latitudes and elevations of only 16 states provide ideal climates for commercial production of seed potatoes. These seed potato producing areas produce the highest quality potatoes with very low incidence of pests and disease.

Cold, hard, long winters with extremely low temperatures are vital to seed potato growing. Low temperatures kill insects and diseases that reduce seed potato quality. Many of these remote growing regions are also isolated from other commercial production, thus ensuring a healthier seed piece. During the four-month growing season, long days, intense sunshine, and cool nights lead to vigorous plants and high yields.

## U.S. SEED PRODUCTION BY COUNTY



Source: March 2022. Compiled through interviews with U.S. state seed potato certification organizations.

## U.S. SEED POTATO CERTIFICATION BY STATE

State	Hectares Accepted for Seed Potato Certification 2021	Average Annual Lowest Temperature (°C)
Idaho	12,526	-40°
North Dakota	5,847	-45°
Montana	4,425	-40°
Maine	4,117	-45°
Wisconsin	3,862	-45°
Colorado	3,090	-40°
Nebraska	2,748	-35°
Minnesota	2,281	-55°
Washington	1,477	-5°
Oregon	1,242	-20°
Michigan	1,008	-45°
Arkansas	565	-5°
California	272	-20°
New York	221	-45°
Nevada	48	-20°
Alaska	16	-60°
<b>Total Hectares</b>	<b>43,745</b>	

Source: March 2022. Compiled through interviews with U.S. state seed potato certification organizations.

# Overview of the U.S. Seed System

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*The 16 U.S. seed potato producing states have seed certification programs under an overall national standard overseen by the U.S. Department of Agriculture (USDA). These programs ensure quality and viability of seed stocks through extensive field, laboratory, and point-of-shipment evaluations. These state-controlled certification programs are unique in the world and present clear advantages to importers, as well as to the U.S. potato industry in general. The certified seed programs are in full compliance with international norms and United Nations Economic Commission for Europe (UNECE) regulations.*

Certification programs have been in place in the U.S. since 1913 and have a long tradition of enforcing quality standards. Technological advances enable the U.S. to propagate quality seed stocks under laboratory and greenhouse conditions, while sophisticated and sensitive pathogen detection techniques eliminate stocks with potential problems. As a result, buyers are assured of seed that is true-to-type and meets all import requirements.





## These are the key elements of the U.S. seed system:

### U.S. SEED CERTIFICATION

Seed potato certification is a formal process in which a state agency sanctioned by the federal government certifies that participating U.S. growers followed certification requirements. U.S. seed certification requires limited generation seed production, strict testing, inspections for disease-causing organisms, and overall high quality. All seed to be exported must conform to U.S. federal standards, which ensure U.S. seed meets internationally accepted phytosanitary standards. Standards for U.S. seed exports are set forth by the U.S. government’s “U.S. Export Standards for Seed Potatoes” and are reprinted in the appendices of this guide. These standards were designed to ensure the uniform, high quality of the seed exported from the U.S. When a seed lot is destined for export, inspections are conducted specifically to comply with the export standard and also to address any pest issues raised by agencies in the destination country. The USDA’s Animal and Plant Health Inspection Service (APHIS) issues a phytosanitary certificate to document that all export and import standards have been met.

### LIMITED GENERATION SYSTEM

The certification of U.S. seed is based upon a “limited generation system.” This means that a seed lot is kept in the production cycle a relatively short time, usually only five years. This limits disease build-up. Planting stock for each generation must meet strict disease tolerances and quality expectations.

At the pre-nuclear stage, all seed is sourced from tissue-culture laboratories operated by certification agencies. No stem cuttings are used for greenhouse plantings. These laboratories produce the initial stocks of disease-tested planting material. Pre-nuclear stocks are tested and have zero tolerance for all potato viruses and bacteria.

### COMPARISON OF THE U.S. LIMITED GENERATION AND DUTCH SEED CLASS SYSTEMS

Years in the field	U.S. limited generation system	The Netherlands seed class
1	G1	PB1
2	G2	PB2
3	G3	PB3
4	G4	PB4
5	G5	S
6	G6	SE
7	G7	E

Source: <https://www.nak.nl/wp-content/uploads/2019/10/Inspection-of-seed-potatoes-DIS-2019-definitief.pdf>

## APPLICATION

Growers must apply for seed certification in order to export seed potatoes. Their compliance with all rules and standards under the certification process is closely monitored by an official agency designated by the state government. This agency uses a team of highly trained specialists to carry out inspections and surveys of the entire seed potato farm. Certification agencies also often work closely with local universities to analyze plant and soil samples for diseases and pests quickly and accurately.

## FIELD INSPECTION AND LAB TESTING

All seed lots applying for certification undergo regular laboratory testing for disease and are visually inspected two or more times during the growing season by certification officials. All certified seed must be kept isolated in the field from other certified and non-certified seed to provide security against contamination. Each classification of seed has its own disease tolerances at each point in the inspection sequence. If a seed lot is found to be above any of the disease tolerances, it is downgraded or rejected from the certification program.

## STORAGE INSPECTIONS

As in the field, seed lots for certification must be kept isolated while in storage to prevent cross-contamination and cultivar mixing. All storage facilities must meet stringent sanitary specifications. To ensure rules are followed, the certification agency carries out storage inspections after harvest. These inspections verify crop quality and compliance with storage and sanitation requirements.

## POST-HARVEST TESTING

Each seed lot to be recertified in the following season is required to be post-harvest tested. This is done by growing representative samples from each lot in a warm climate area of the United States, and by carrying out visual inspection and laboratory testing of the resulting plant. This helps detect late-season virus infections, germination problems, and potential herbicide carryover. Only seed that successfully passes this testing is eligible for recertification and classification in the seed program the following season.



## GRADING AND SHIPPING INSPECTIONS

At the time of shipping, seed lots are inspected by a federal or state inspection service. This inspection confirms the health, quality, size, and grade of the seed potatoes. All certified seed potatoes must be graded to conform with official grades and sizes. An official state tag or bulk certificate is used to mark each lot of seed as certified. All U.S. seed destined for export must meet U.S. No. 1 Seed Potato Grade and be identified by a tag. Under U.S. export standards, the U.S. enforces strict seed lot identification so that buyers receive exactly the lot they purchased with no substitutions.

## U.S. COMMITMENT TO QUALITY

The U.S. seed potato industry has a variety of other tools that help it maintain quality throughout the seed growing process. A key tool is technology. U.S. seed production has developed into a highly technical specialty. Soils are sampled for nutritional analysis and pest detection, and then mapped. Tractors guided by GPS deliver fertilizer tailored to the soils. Water content in the soil is measured by tensiometers and compared with evapotranspiration rates to determine irrigation needs. The latest technology is even used to carefully monitor the weather so growers can adapt their operations accordingly. Testing and inspection procedures also employ state-of-the-art data collection systems that provide easy desktop access to field tests.

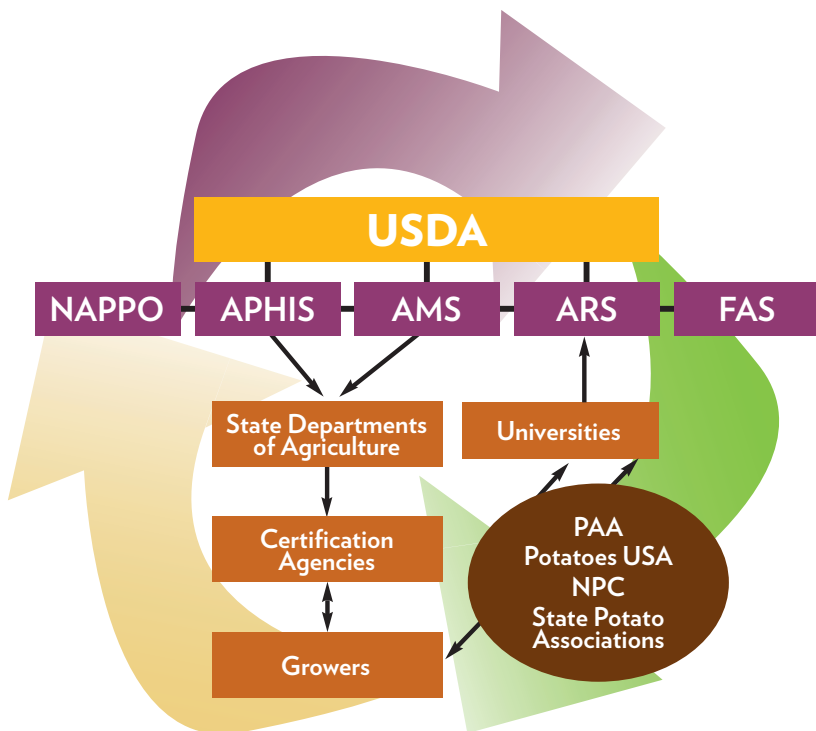
The U.S.' physical infrastructure is an additional advantage for U.S. seed. The infrastructure in the U.S. comprises roads, bridges, and ports that are among the best built and maintained in the world. This infrastructure helps deliver seed potatoes from the field to the port quickly and efficiently, so seed spends the least amount of time in transit.



# Seed Certification Regulatory Structure

*The strength of the U.S. seed potato growing and certification system is attributed to the U.S. government agencies that enforce stringent seed potato standards. Seed potato production and export of certified seed are carefully monitored at the federal and state level. Thus, U.S. government resources work in combination with universities, growers, and industry organizations to meet the ultimate goal of U.S. seed potato certification: to market the most productive seed potatoes possible.*

Oversight of U.S. seed potato certification and export begins at the top. At the federal level, the U.S. Department of Agriculture (USDA) holds ultimate responsibility for ensuring that seed programs address the goal. Several agencies of the USDA are charged with oversight of seed certification and export. These agencies work with and train personnel at the various state departments of agriculture. The state agriculture departments or their designees carry out inspections and surveys required under the seed certification and export programs. These designees work with growers to enforce standards at the local level.



**The following are descriptions of the players and their roles in the U.S. growing and seed certification process.**

**U.S. DEPARTMENT OF AGRICULTURE (USDA)**

The USDA is one of the largest departments of the U.S. government and has offices across the United States and around the world. Its mission is to encourage and support U.S. agricultural production, rural development, and human nutrition programs. One of the ways it does this is by expanding global markets for U.S. agricultural products, including seed potatoes, in partnership with Potatoes USA. Agencies of the USDA relevant to potato production or trade include:

• **North American Plant Protection Organization (NAPPO)**

NAPPO is an international advisory body made up of federal plant protection officials from Canada, the U.S., and Mexico. It was established to ensure plant health throughout the North American region by developing standards for plant quarantine, pest risk analysis processes, phytosanitary measures, and survey/pest management techniques. USDA/APHIS representatives serve on the advisory body and help the U.S. interact with NAPPO standards to harmonize requirements across countries. NAPPO provides standards for seed potato export certification that tie the U.S. certification system into their European equivalent. NAPPO is affiliated with the United Nations' Food and Agriculture Organization (FAO).



• **Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ)**

APHIS is an agency of the USDA and the world's largest national plant protection agency. It regulates and protects America's animal and plant health. It ensures the safety of all U.S. plant resources, including those destined for export markets. This is done through its Plant Protection and Quarantine (PPQ) unit. For seed potato certification programs, PPQ collaborates with state departments of agriculture and the Agricultural Marketing Service to enforce the uniform standards set by the U.S. Export Standards for Seed Potatoes. APHIS has a formal agreement with the seed certification agencies to provide supervision and a common regulatory framework. It issues phytosanitary documentation once seed is found to meet those stringent standards. APHIS/PPQ is also responsible for certifying that plant materials shipped to foreign countries meet any additional phytosanitary entry requirements of the destination country.

- **Agricultural Marketing Service (AMS)**

Another USDA agency, AMS, supports U.S. agricultural production by assuring the quality of the U.S. food supply. It sets and enforces uniform standards, carries out product grading, implements inspections and lab analyses, provides market news services, and carries out oversight of the U.S.' agricultural transportation system. For the potato industry, AMS enforces quality standards relating to potato size, shape, grade, and defects, and makes sure that all seed potatoes for export meet the quality standards cited in the U.S. Standards for Grades of Seed Potatoes. It issues shipping point certificates that are used by APHIS in determining a shipment's eligibility for export certification.



- **Agricultural Research Service (ARS)**

ARS is one of the largest agencies of the USDA. It collects, stores, and disseminates agricultural research information, and also develops new knowledge and technology through more than 100 national laboratories throughout the U.S. Research is often carried out in collaboration with agricultural researchers at universities. These cooperative partnerships with scientists at agricultural experiment stations help the U.S. maintain its technological advantages. ARS carries out research on potato diseases and their control, and sponsors breeding programs. It is responsible for storing the U.S.' large collection of germplasm that is the basis for its variety versatility. While not directly involved in the certification of U.S. seed potatoes for export, its research supports the U.S. industry by helping develop high-performing varieties and testing management practices to reduce disease and maximize quality.

- **Foreign Agricultural Service (FAS)**

FAS is the international trade agency of USDA which promotes exports, evaluates supply and demand, and expands market access for U.S. agricultural products. FAS agriculture offices around the world assist U.S exporters and foreign importers facilitate trade.

## **STATE DEPARTMENTS OF AGRICULTURE (SDA)**

Each state in the U.S. has its own department of agriculture committed to furthering its state's agricultural industry. These agencies participate in plant and animal health protection, oversee issues that affect product quality, and assist in agricultural product marketing. USDA/APHIS and USDA/AMS work closely with the state agricultural departments and maintain specially trained personnel at the state level who can enforce federal APHIS and AMS standards. Each state agricultural department is responsible for ensuring that its state seed potato certification program is carried out properly.

## CERTIFICATION AGENCIES

Certification offices are the agents with responsibility for regulating seed potato certification. In some states, these agencies are the state agricultural department itself. In others, it is a designated agency such as a university working closely with the state agricultural department. All agency personnel must meet education and experience requirements and undergo training.

Certification personnel work with the seed potato grower, carrying out disease testing, and monitoring growing, harvesting, storing, and sanitation issues through field and facility inspections. As a check upon the system, all state seed certification programs and personnel undergo annual evaluations for efficiency and effectiveness. This ensures that inspections are being carried out properly and that the prescribed testing is being properly implemented.

## GROWERS

Seed growers must comply with their state's seed certification requirements and with national export standards in order to sell their seed potatoes in the international marketplace. Seed growers pay fees at the time of application for certification, which are used to fund the certification process.



## UNIVERSITIES

Although not directly involved in seed certification, the comprehensive university research community and numerous industry groups provide additional support to ensure U.S. seed potatoes' high quality and productivity, and support a commitment to ongoing improvement.

The U.S.' many universities provide support to the certification process by carrying out research to get the best performance from U.S. seed potatoes. Scientists conduct research on breeding and disease management, often working with USDA/AMS. Every major research project includes a communication effort and growers stay attuned to this research and adopt best practices which can enhance the quality of all potatoes grown. University researchers also often work with state industry organizations, Potatoes USA, and the National Potato Council on research projects to enhance the industry's productivity. There are ongoing studies on enhanced field practices, storage practices, and a range of other topics. This ongoing research effort keeps the entire U.S. industry moving forward.

## POTATO ASSOCIATION OF AMERICA (PAA)

The PAA is an industry organization with national and international membership. Its role is to collect and disseminate technical information relating to all aspects of potato production, biology, and utilization. It also serves as a forum through which the various sectors of the U.S. potato industry can unify their growing practices. Members include

managers from state certification programs. Through the PAA, these certification managers work to harmonize standards across the U.S. seed industry. PAA also interacts with USDA/APHIS, providing a venue through which state certification managers and APHIS officials can communicate about issues. PAA works closely with the National Potato Council and other organizations.

### **POTATOES USA**

Potatoes USA is an industry organization located in Denver, Colorado. It represents the U.S.' 2,000 potato growers in addition to representatives involved in the packing, processing, and marketing of potatoes. Potatoes USA is not a government or regulatory agency, nor does it sell potatoes. Its major role is to promote U.S. potatoes by facilitating the exchange of information. For seed potatoes, it carries out variety trials in international markets, provides materials on the U.S. seed industry, and sponsors trade missions to the U.S. for foreign government agencies, importers, and growers.

### **NATIONAL POTATO COUNCIL (NPC)**

The NPC is a national non-profit trade association representing growers and related companies in the U.S. While Potatoes USA covers the research and promotion of potatoes, the NPC addresses legislative, regulatory, environmental, and trade issues. Thus, it serves as the voice of the U.S. potato industry on issues that relate to the well-being of the industry. Potatoes USA and NPC work in close cooperation with one another and with growers and state associations across the country. The NPC also works closely with the PAA to ensure seed potato certification rules and procedures are harmonized at the state and federal levels.

### **STATE POTATO ASSOCIATIONS**

Potato growers and packer/processors in individual states have banded together to form state potato organizations. These non-profit organizations carry out a similar function to Potatoes USA and the NPC, only at a local level. These groups are generally funded by a tax levied on state-grown potatoes. Duties of the various commissions include carrying out advertising, promotion, and research on behalf of the state's growers, and monitoring labeling requirements, international trade issues, and environmental and food safety issues. State potato associations are members of Potatoes USA and the NPC and have input into their programs.





# Appendices

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## Abbreviations

**Following is a list of abbreviations and their meanings found throughout this Guide to U.S. Seed Potato Exports and the Guide to U.S. Potato Varieties.**

AMS	Agricultural Marketing Service	PSTV	Potato Spindle Tuber Viroid
ARS	Agricultural Research Service	PVA	Potato Virus A
APHIS	Animal and Plant Health Inspection Service	PVM	Potato Virus M
BRR	Bacterial Ring Rot	PVMI	Potato Variety Management Institute
FAS	Foreign Agricultural Service	PVP	Plant Variety Protection
NAPPO	North American Plant Protection Organization	PVS	Potato Virus S
NPC	National Potato Council	PVX	Potato Virus X
PAA	Potato Association of America	PVY	Potato Virus Y
PLRV	Potato Leaf Roll Virus	USDA	United States Department of Agriculture
PPQ	Plant Protection and Quarantine		

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AK	Alaska	ND	North Dakota
AZ	Arizona	NE	Nebraska
CA	California	NY	New York
CO	Colorado	OR	Oregon
ID	Idaho	PA	Pennsylvania
ME	Maine	SD	South Dakota
MI	Michigan	WA	Washington
MN	Minnesota	WI	Wisconsin
MT	Montana	WY	Wyoming

# USDA/APHIS Export Certification Manual

## Appendix P

*U.S. Export Standards  
for Seed Potatoes*

### GENERAL DESCRIPTION

*U.S. Export Seed Potatoes consist of seed potatoes certified by an official state seed potato certification agency as having met the requirements of this article and to which the official indicia of certification has been affixed.*

### Definitions

#### APPROVED TESTING METHODS

Bioassay, serodiagnostic, or other testing methods including, but not limited to, gel electrophoresis, and molecular hybridization using methods which have been approved by the Certification Section of the Potato Association of America in consultation with the Pathology Section of the Potato Association of America.

#### DISEASE TESTED

A process where each explant has been tested for and found free from potato spindle tuber viroid (PSTV), potato virus A (PVA), potato virus M (PVM), potato virus S (PVS), potato virus X (PVX), potato virus Y (PVY), potato leaf roll virus (PLRV), bacterial ring rot (BRR), and bacterial soft rot/blackleg (*Pectobacterium* spp.) using approved methods.

#### VIRUS X-TESTED

Tested for and found to be within tolerance for PVX using approved testing methods.

#### CLASS

Seed quality level as it relates to compliance with the specified tolerances for diseases and varietal purity.

#### LIMITED GENERATION SYSTEM

A certification scheme wherein the planting stock for each seed class is limited as to eligibility by compliance with established disease tolerances and the number of increases made in the field. The classes or generations of the limited generation system included in this article are: Pre-nuclear, Nuclear, Generation 1, Generation 2, Generation 3, Generation 4 and Generation 5; where Pre-nuclear is laboratory production, Nuclear is greenhouse production and Generations 1-5 are the first and subsequent field increases.

#### SEED POTATOES

Potato plantlets, plants, microtubers, minitubers, tubercles, and tubers.

#### PLANTLETS

Small plants produced under aseptic culture conditions in a laboratory.

#### PLANTS

Rooted plants produced under a screenhouse, greenhouse, or field environment.

#### MICROTUBERS

Small tubers produced under aseptic culture conditions in a laboratory.

*Definitions continued*

### **MINITUBERS**

Small tubers produced in a soilless medium under greenhouse conditions controlled to exclude pests and diseases.

### **TUBERCLES**

Small tubers produced in leaf axils of leaf bud cuttings.

### **TUBERS**

Potatoes produced under field conditions.

### **OFF-TYPE**

Different from the cultivar, variety, strain, or selection on the application for certification.

### **GRADE**

A tuber quality as it relates to compliance with specific tolerances for tuber sizes, defects, diseases, and other factors outlined in the U.S. No. 1 Seed Potato Grade.

### **CERTIFICATION**

A process where employees of an official certification agency visually inspect growing grounds or facilities and crops thereon or therein and have determined that the standards applicable thereto as specified in this article have been met. It does not guarantee or warrant that the seed potatoes to which official indicia of certification are attached, or which are otherwise represented as certified, are merchantable or fit for particular purpose.

### **OFFICIAL STATE SEED POTATO CERTIFICATION AGENCY**

A state seed potato certification agency duly authorized by state law to provide seed potato certification services.

### **EXPLANT**

An in vitro potato plant or plantlet produced by rooting an excised tip of a tuber sprout or an axillary bud from a growing plant which shall serve as a parent for a whole clone or accession of micropropagated plants or plantlets.

### **CLONE**

All of the progeny of a single explant and/or plantlets.

## **General provisions**

*This article provides for the certification of seed potatoes for export by official state seed potato certification agencies. The standards specified are mandatory, but they shall not be construed to supplant or otherwise take the place of official state standards which may be designed for application to domestic seed potatoes. Whenever official state agencies, at the request of seed potato growers, seek to certify seed potatoes for export in compliance with this article, they should consult the USDA/APHIS Export Certification Manual for whatever current guidance it may provide.*

## **BASIS FOR CERTIFICATION**

Except as otherwise provided, certification is based solely on visual inspections of a sample of seed potatoes from each lot which are found to meet the tolerances prescribed in this article. Each planting shall be inspected visually at least two times and determined to be in compliance with specific tolerances.

General Provisions continued

## LIMITED GENERATION SYSTEM

The certification of U.S. Export Seed Potatoes is in conformance with the limited generation system specified by this article.

## PARTICIPANT RESPONSIBILITIES

The participant shall be a qualified seed potato grower raising certified seed potatoes in accordance with official state certification regulations. Farming, sanitation, and other seed production practices not addressed in this article are the responsibility of the participant. Failure of the participant to comply with the requirements of this article shall make seed potatoes ineligible for export as U.S. Export Seed Potatoes. In addition, the participant shall:

- Select the location of and properly maintain any planting being grown subject to the provisions of this article
- Maintain identity and grade of each lot of certified seed potatoes in the grower participant's possession in a manner approved by the official state seed potato certification agency.

## LOCATION OF PLANTING

Generally, each planting site shall be subject to the approval of the official seed potato certification agency to which the grower participant makes application.

Specifically, to be eligible for use to produce a class of U.S. Export Seed Potatoes, fields shall be at least 50 meters from any other potato planting which, by any means, would unduly expose seed potatoes entered for certification to infection by disease-causing pathogens.

## MAINTENANCE OF PLANTINGS

Plantings shall be kept in a good growing condition and general insect and seed pests shall be under effective control. Suitable precautions shall be taken in the cultivating, irrigating, digging, grading, movement, use of equipment, and in other farming practices to guard against the spread of disease and insect pests into or within plantings.

## HARVESTING AND GRADING EQUIPMENT AND STORAGE FACILITIES

Each lot of U.S. Export Seed Potatoes shall be stored so as to preclude intermixing with any other class of certified seed potatoes. U.S. Export Seed Potatoes shall not be stored in the same storage facility with potatoes found to be infected with bacterial ring rot (*Clavibacter michiganensis* spp. *sepedonicus*).

## CONTAINERS

All containers used for the harvest, storage, and handling of U.S. Export Seed Potato shall be new, or cleaned and disinfected, to the satisfaction of the official state certifying agency. All containers used for packaging and shipping U.S. Export Seed Potatoes shall be new.

## Authority

### FEDERAL

USDA, APHIS, Plant Protection and Quarantine (PPQ): Foreign countries have established plant quarantine regulations which exporters of U.S. agricultural products are required to meet. To enable USDA/APHIS/PPQ to help exporters meet the plant quarantine import requirements of foreign countries, the Organic Act was passed in 1944. The Organic Act as amended provides the authority for issuing Federal Phytosanitary Certificates (PCs) for the export of plants and plant products. The regulation for enforcing the Organic Act is 7 CFR

*Authority continued*

Part 353. Among other provisions, this regulation provides a list of PPQ offices where information can be obtained for issuing PCs, identifies the responsibilities of exporters and of certifying officials, and provides for issuing PCs and for entering into cooperative export certification programs.

## **STATE**

Authority for certifying seed potatoes at the state level shall reside with the agency granted the authority by state law to carry out these regulatory functions. The Department of Agriculture for the state from which the seed potatoes are originating may be contacted to obtain the name and address of the official agency with certification authority.

## **Responsibilities**

### **FEDERAL**

It is the responsibility of APHIS, Plant Protection and Quarantine (PPQ) to issue Federal phytosanitary certificates based on compliance with the export standard, to monitor the use of the standard and, to represent the United States growers in phytosanitary issues with other National Plant Protection Organizations. APHIS, PPQ will periodically review the export standard to ensure that it is in keeping with current biological information and requirements of international trade and will, in cooperation with state and industry representatives, effect any necessary changes to maintain its viability and integrity.

### **STATE**

The official state seed potato certification agency is responsible for verifying that the requirements of this article have been met within the limitations imposed by each state and accepted industry standards.

### **PARTICIPANT**

See General Provisions

## **Requirements for Classes of Certified Seed Potatoes**

*Wherever this section specifies a class or classes as being eligible for certification, it shall mean that the stock to be planted was previously certified as the specified class by an official seed potato certification agency. That certification shall have been to the same class as specified in this article. Also, all seed potatoes to be certified as seed potatoes shall be field monitored visually for trueness to plant type and tubers visually verified to type following harvest.*

### **PRE-NUCLEAR (IN VITRO PRODUCTION)**

To be eligible for certification as pre-nuclear stock, each explant shall have been diseasetested as described under the definition. Plantlets and microtubers shall be produced in aseptic culture. Records shall, at all times during normal business hours, be made available for inspection by representatives of the official state certification agency.

Requirements for Classes of Certified Seed Potatoes continued

**NUCLEAR (GREENHOUSE OR CONTROLLED ENVIRONMENT PRODUCTION)**

To be eligible for certification as nuclear stock seed potatoes, plant material shall have met pre-nuclear requirements. At least 5% of this increase shall be disease tested, except when there are fewer than 20 plants or minitubers, in which case, at least five plants or minitubers shall be disease tested. Plants or minitubers selected for such disease testing may be bulked following acceptable methods for test purposes. In the event that any test is positive for any disease infection, the whole clone, together with any progeny, shall be ineligible. Testing and regeneration records shall be maintained and made available for inspection at all reasonable times.

**GENERATION 1**

Only plant material that has met the requirements for pre-nuclear or nuclear stock shall be eligible for certification as Generation 1, U.S. Export Seed Potatoes. Each cultivar and field shall be individually tested by randomly collecting from separate plants a minimum of 250 leaflets or 1% of the hills for PVX testing in the laboratory. Tolerance for PVX shall be 0%. Plants shall be inspected at least twice while growing, and on each inspection, determined to be free of all other potato diseases that may be discovered by visual inspection.

**GENERATION 2**

Only plant material that has met the requirements for Generation 1 or earlier increases shall be eligible for certification as Generation 2, U.S. Export Seed Potatoes. Plants shall be sampled and PVX tested during the growing season by randomly collecting from separate plants 250 leaflets from each 10 acres or portion thereof. Each planting shall be inspected visually at least two times and determined to be in compliance with the tolerances specified in Table P-1-1.

**Table P-1-1: Tolerances for Generation 2**

Factor	First Field Inspection	Second Field Inspection
Bacterial Ring Rot	0	0
Blackleg	0.10	0
Wilts	0.10	0
Total, All Viruses	0.25	0.10
Varietal Mixture	0.10	0

Requirements for Classes of Certified Seed Potatoes continued

### GENERATION 3

Only plant material that has met the requirements for Generation 2 or earlier generations shall be eligible for certification as Generation 3, U.S. Export Seed Potatoes. Each planting shall be inspected visually at least two times and determined to be in compliance with the tolerances specified in Table P-1-2.

**Table P-1-2: Tolerances for Generation 3**

Factor	First Field Inspection	Second Field Inspection
Bacterial Ring Rot	0	0
Blackleg	0.25	0.10
Wilts	0.20	0.10
Total, All Viruses	0.25	0.10
Varietal Mixture	0.25	0.10

### GENERATION 4

Only plant material that has met the requirements for Generation 3 or earlier generations shall be eligible for certification as Generation 4, U.S. Export Seed Potatoes. Each planting shall be inspected visually at least two times and determined to be in compliance with the tolerances specified in Table P-1-3.

**Table P-1-3: Tolerances for Generation 4**

Factor	First Field Inspection	Second Field Inspection
Bacterial Ring Rot	0	0
Blackleg	0.50	0.25
Wilts	0.50	0.25
Total, All Viruses	0.50	0.25
Varietal Mixture	0.50	0.25

### GENERATION 5

Only plant material that has met the requirements for Generation 4 or earlier generations shall be eligible for certification as Generation 5, U.S. Export Seed Potatoes. Each planting shall be inspected visually at least two times and determined to be in compliance with the tolerances specified in Table P-1-4.

**Table P-1-4: Tolerances for Generation 5**

Factor	First Field Inspection	Second Field Inspection
Bacterial Ring Rot	0	0
Blackleg	1.00	0.50
Wilts	1.00	0.50
Total, All Viruses	1.00	0.50
Varietal Mixture	0.75	0.50

## **Refusal, Cancellation of Approval, and Rejection**

Failure to comply with any provision of this Standard shall constitute cause for refusal of certification services, cancellation of any approvals already granted, or rejection of seed potatoes entered for certification as a class of U.S. Export Seed Potatoes. In addition, the following shall be specific causes for refusal, cancellation, or rejection:

- Any field, storage, or other condition which an official state seed potato certification agency determines may be detrimental to the U.S. potato industry or to the U.S. seed potato export market, or which may hinder or prevent accurate determination of whether or not the disease, varietal purity, grade, or other requirements of this article have been met.
- Any seed potatoes entered for certification which are verified to be infested or infected with any serious pest which is new to (exotic) or of limited distribution in the United States. Gangrene (*Phoma exigua* pv. *foveata*) and wart (*Synchytrium endobioticum*) do not occur in the United States.
- Any seed potatoes which are determined to be infested with root-knot nematode (*Meloidogyne* spp.), potato rot nematode (*Ditylenchus destructor*), cyst nematode (*Globodera* spp.), or brown rot (*Ralstonia solanacearum*). United States quarantine restrictions do not permit the growing of seed potatoes in any golden (cyst) nematode-infested area.
- The basis for and scope of a refusal, cancellation, or rejection and reinstatement following such actions shall be determined by the official state potato certification agency in the state where the U.S. Export Seed Potatoes are produced.

## **Grade**

All U.S. Export Seed Potatoes shall be graded to meet U.S. No. 1 Seed Potato Grade. U.S. Export Seed Potatoes shall be identified by a blue-colored tag.

## **Identification**

All U.S. Export Seed Potatoes shall be identified by official state certification tags or other official indicia affixed to each container. Such official tags or indicia shall be approved by the Certification Section of the Potato Association of America.



# USDA/AMS Quality Standards

*U.S. Standards for  
Grades of Seed Potatoes*

51.3000 General.

51.3001 Grade.

51.3002 Tolerances.

51.3003 Application of tolerances.

51.3004 Samples for grade and size determination.

51.3005 Definitions.

51.3006 Classification of defects.

§51.3000 General.

Compliance with the provisions of these standards shall not excuse failure to comply with provisions of applicable Federal or State Laws.

§51.3001 Grade.

“U.S. No. 1 Seed Potatoes” consist of unwashed potatoes identified as certified seed by the state of origin by blue tags fixed to the containers or official State or Federal State certifications accompanying bulk loads, which identify the variety, size, class, crop year, and grower or shipper of the potatoes, and the State certification agency. These potatoes must meet the following requirements:

(a) Fairly well shaped.

(b) Free from:

(1) Freezing injury;

(2) Blackheart;

(3) Late Blight Tuber Rot;

(4) Nematode or Tuber Moth injury;

(5) Bacterial Ring Rot;

(6) Soft rot or wet breakdown; and,

(7) Fresh cuts or fresh broken-off second growth.

(c) Free from serious damage caused by:

(1) Hollow Heart; and,

(2) Vascular ring discoloration.

(d) Free from damage by soil and any other cause. (See §51.3005 – 06).

(e) Size:

(1) Minimum diameter, unless otherwise specified, shall not be less than 1-1/2 inches (38.1 mm) in diameter;

(2) Maximum size, unless otherwise specified, shall not exceed 3-1/4 inches (82.6 mm) in diameter or 12 ounces (340.20 g) in weight.

(f) Tolerances. (See §51.3002).

In order to allow for variations incident to proper grading and handling in the foregoing grade, the following tolerances, by weight, are provided as specified.

(a) For defects:

- (1) 10 percent for potatoes in any lot which are seriously damaged by hollow heart;
- (2) 10 percent for potatoes in any lot which are damaged by soil;
- (3) 5 percent for potatoes in any lot which are seriously damaged by vascular ring discoloration;
- (4) 11 percent for potatoes which fail to meet the remaining requirements of the grade including therein not more than 6 percent for external defects and not more than 5 percent for internal defects: Provided, that included in these tolerances not more than the following percentages shall be allowed for the defects listed:

	<b>Percent</b>
Bacterial Ring Rot	0.00
Serious damage by dry or moist type Fusarium Tuber Rot	2.00
Late Blight Tuber Rot	1.00
Nematode or Tuber Moth injury	0.00
Varietal mixture	0.25
Frozen, soft rot or wet breakdown	0.50

Provided, that en route or at destination, an additional 0.50 percent, or a total of 1 percent, shall be allowed for potatoes which are frozen or affected by soft rot or wet breakdown.

(b) For off-size:

- (1) For undersize: 5 percent for potatoes in any lot which fail to meet the required or specified minimum size.
- (2) For oversize: 10 percent for potatoes in any lot which fail to meet the required or specified maximum size.

§51.3003 Application of tolerances.

Individual samples (See §51.3004) shall not have more than double the tolerances specified, except that at least one defective and one off-size potato may be permitted in any sample; Provided, that en route or at destination, one-tenth of the samples may contain three times the tolerance permitted for potatoes which are frozen or affected by soft rot or wet breakdown; and provided further, that the averages for the entire lot are within the tolerances specified for the grade.

§51.3004 Samples for grade and size determination.

Individual samples shall consist of at least 20 pounds (9.06 kg). The number of such individual samples drawn for grade and size determination will vary with the size of the lot.

§51.3005 Definitions.

- (a) "Fairly well shaped" means that the potato is not materially pointed, dumbbell-shaped or otherwise materially deformed.
- (b) "Nematode or Tuber Moth injury" means the presence of, or any evidence of, Nematode or Tuber Moth.

(c) Soil:

- (1) "Fairly clean" means that at least 90 percent of the potatoes in the lot have no more than 10 percent of the surface covered with caked soil.
- (2) "Damage by soil" means that caked soil covers more than 25 percent of a potato's surface.
- (3) "Loose soil" – A lot of seed potatoes is not considered damaged by the presence of loose soil, clods, rocks, vines, and foreign material, but such will be considered a tare factor if the following allowances are exceeded:
  - 8 ounces (226.80 g) in a 100 pound (45.3 kg) container.
  - 4 ounces (113.40 g) in a 50 pound (22.65 kg) container.
  - 2 ounces (56.70 g) in a 25 pound (11.33 kg) container or less.
  - 1 percent in a bulk load.

(d) "Shriveling" – Damage by shriveling means that the individual potato is more than moderately shriveled, spongy or flabby.

(e) "Freezing injury" means that the potato is frozen or shows evidence of having been frozen.

(f) "Soft rot or wet breakdown" means any soft, mushy or leaky condition of the tissue.

(g) "Zero tolerance" (0.00) means none found during the normal inspecting procedures. Certification of a lot is not a guarantee that the lot inspected is free of a zero tolerance disease or injury.

(h) "Damage" means any defect or any combination of defects which materially detracts from the internal or external appearance of the potato, or any external or internal defect which cannot be removed without a loss of more than 5 percent of the total weight of the potato (See §51.3006).

(i) "Serious damage" means any defect or any combination of defects which seriously detracts from the internal or external appearance of the potato, or any internal or external defect which cannot be removed without a loss of more than 10 percent of the total weight of the potato (See §51.3006).

(j) "External defects" are defects which can be detected by examining the surface of the potato. Cutting may be required to determine the extent of the injury (See §51.3006, Table I).

(k) "Internal defects" are defects which cannot be detected without cutting the potato (See §51.3006, Table II).

(l) "Permanent defects" are defects which are not subject to change during storage or shipment.

(m) "Condition defects" are defects which may develop or change during storage or shipment. §51.3006 Classification of defects.

(a) Brown discoloration following skinning, dried stems, flattened depressed areas (showing no underlying flesh discoloration), greening, skin checks and sunburn do not affect seed quality and shall not be scored against the grade.

(b) Table I – External Defects

	Damage		
Defect	When materially detracting from the appearance of the potato	OR	When removal causes a loss of more than 5 percent of the total weight of the potato
Air cracks			
Bruises			
Cuts and broken-off second growth (healed)			
Elephant hide (scaling)			
Enlarged, discolored or sunken lenticels			
Folded ends			
Second growth			
Shriveling	When more than moderately shriveled, spongy, or flabby		
Sprouts	When more than 20 percent of the potatoes in any lot have any sprout more than 1 inch (24.4 mm) in length		
Surface cracking			
Flea Beetle injury			
Grub damage			
Rodent and/or bird damage			
Wireworm or grass damage	Any hole more than 3/4 inch (19.1 mm) long or when the aggregate length of all holes is more than 1 1/4 inches (31. mm)*		
Dry rots			
Rhizoctonia			
Scab, pitted			
Scab, russet	When affecting more than 1/3 of the surface		
Scab, surface	When affecting more than 5 percent of the surface		
Silver Scurf	When affecting more than 25 percent of the surface		
Growth cracks	When seriously detracting from the appearance		
Pressure bruises and sunken areas with underlying flesh discolored.			When removal causes a loss of more than 10 percent of the total weight.

(c) Table II – Internal Defects

	Damage		
Defect	When materially detracting from the appearance of the potato	OR	When removal causes a loss of more than 5 percent of the total weight of the potato
Ingrown sprouts			
Internal discoloration occurring interior to the vascular ring (such as, Internal Brown Spot, Mahogany Browning and Heat Necrosis).	When more than the equivalent of three scattered light brown spots 1/8 inch (3.2 mm) in diameter*		
All other internal discoloration excluding discoloration confined to the vascular ring.			
*Definitions of damage and serious damage are based on potatoes that are 2 1/2 inches (63.5 mm) in diameter or 6 ounces (170.10 g) in weight. Correspondingly lesser or greater areas are permitted on smaller or larger potatoes.			
	<b>Serious damage</b>		
Defect	When seriously detracting from the appearance of the potato.		When removal causes a loss of more than 10 percent of the total weight of the potato.
Internal discoloration confined to the vascular ring			
Hollow Heart or Hollow Heart with discoloration.	When affected area exceeds that of a circle 3/4 inch (19.1 mm) in diameter.*		

\*Definitions of damage and serious damage are based on potatoes that are 2-1/2 inches (63.5 mm) in diameter or 6 ounces (170.10 g) in weight. Correspondingly lesser or greater areas are permitted on smaller or larger potatoes.

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