

THE INSPECTION OF DUTCH SEED POTATOES;

The importance of approval





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Contents

The importance of approved seed potatoes	4
Minimum quality requirements	5
Major advantages	5
Who monitors and inspects the quality of Dutch seed potatoes?	6
Diseases	8
Virus diseases	8
Bacterial diseases	9
Clonal selection and classification	12
Clonal selection system	12
Classification	13
NAK inspection requirements are stringent	15
A statutory basis	15
The inspection process	17
Field inspections	19
Varietal purity	19
Diseases	20
Other factors	20
Haulm destruction at the right time	21



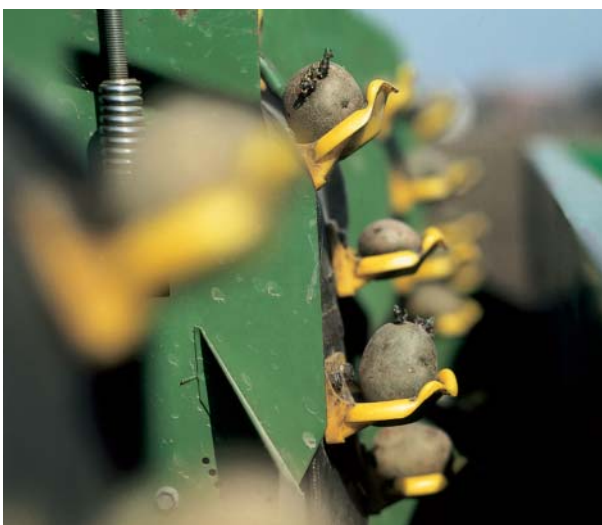


Post-harvest inspections	23
Lot inspections	25
Tighter standards	26
Phytosanitary aspects	26
Different customers, different requirements; a comparison	29
The certificate/plant passport	31
Statutory requirement	31
Information on the certificate	31
Inspected and approved Dutch seed potatoes	32
Appendix	34
ELISA test	34
Colophon & Addresses	36

The importance of approved seed potatoes

There can be no doubt that potatoes are of significant economic and nutritional importance to the producers and consumers of many countries. One of the major benefits of potatoes is that they can be utilised in many different ways. But while potatoes are very versatile and interesting, they are also susceptible to many pests and diseases. These occur in all areas where potatoes are grown. Some are soil-borne, but many diseases are also transmitted by seed potatoes. Many of the widespread diseases are regarded as **quality diseases**. Examples of these are late blight, scab, rhizoctonia canker, blackleg, fusarium and several virus diseases. Infections of such quality diseases in seed potatoes are only allowed to a very limited extent. In addition to quality diseases there are **quarantine diseases**. These are diseases that are assumed to be so dangerous that they must not be allowed to occur in seed potatoes at all (for example golden nematode, brown rot and ring rot). Besides soil-borne diseases there are diseases that can infect potato plants via a different route. The most important are the fungus disease late blight,

“It is important to minimise the number of sources of infection as effectively as possible. One of the best ways of doing this is by using approved seed potatoes.”



which is transmitted through the air via spores, and diseases caused by viruses which are transmitted by aphids (e.g. leafroll and potato virus Y). The larger the number of sources of infection in the basic stock, the greater the damage these diseases may cause. So it is important to

minimise the number of sources of infection as effectively as possible. One of the best ways of doing this is by using approved seed potatoes.

Minimum quality requirements

Approved seed potatoes must comply with a wide range of requirements. Individual countries formulate their own requirements for seed potatoes. After all, different buyers have different wishes. However, the European Union (EU) has laid down minimum quality requirements for seeds and seed potatoes to co-ordinate the demand and supply as effectively as possible. These requirements hold for all seeds and planting material traded within the EU. All seed potatoes traded in the EU member states must comply with at least these EU minimum requirements. The individual member states may use stricter national requirements if they wish. For its part, the Dutch seed potato sector has laid down stringent national requirements in collaboration with the NAK and the Dutch government. These high standards have earned the Dutch seed and seed potato sector a strong competitive position.

Major advantages

The Dutch agricultural sector is able to comply with these strict requirements thanks to a number of major advantages, such as a favourable climate, an almost perfect soil and the high level of expertise



“The Dutch agricultural has a number of major advantages, such as a favourable climate, an almost perfect soil, the high level of expertise of the growers and a long tradition of record keeping, inspection and registration.”

of the growers. Other great advantages in the Netherlands include the good relations with the relevant agricultural organisations and an excellent infrastructure. Moreover, Dutch agriculture also has a long tradition of record keeping, inspection and registration.

Who monitors and inspects the quality of Dutch seed potatoes? The NAK, the Dutch General Inspection Service for Agricultural Seed and Seed Potatoes, has many years' experience in inspection and certification. Indeed, it has been doing this work since 1932 - and with evident success,

“Collecting leaf samples”



because the quality of Dutch basic stock is highly appreciated. Every year, seed potatoes from between 35,000 and 40,000 hectares are multiplied and inspected. Dutch seed potatoes are high-quality products, for which the demand is steadily increasing. Of course, Dutch seed potatoes do not owe their favourable position to the NAK alone. Their excellent reputation is based primarily on the high level of expertise of the many people involved in their production, from the breeders and growers through to the traders. Together they produce the high-quality seed and seed potatoes that meet the stringent requirements in the areas of health, varietal purity and physiological capacity. This is why buyers all over the world have great confidence in the product, which is partly due to the independent inspections of the NAK, the organisation that monitors the products' quality.

The Plant Protection Service (PD) of the Dutch Ministry of Agriculture, Nature and Food quality also plays an important part in monitoring the quality of Dutch seed potatoes. This service is responsible for controlling quarantine diseases in the Netherlands and performs the phytosanitary inspections for the presence of quarantine and quality diseases to which all batches intended for export outside the EU must be submitted.

Decisive factors as far as the quality and vitality of seed potatoes are concerned are:

- health
- varietal purity
- physiological condition

This brochure discusses these factors in various chapters, successively focusing on diseases (virus and bacterial diseases), clonal selection and classification, field inspections, post-harvest inspections, lot inspections, the standards employed in the Netherlands in relation to the EU standards, and the NAK certificate/plant passport.

The brochure ‘**The Inspection of Dutch Seed Potatoes; The importance of approval**’ is a joint publication of the NAK and the NIVAP.



NAK: *Nederlandse Algemene Keuringsdienst voor zaaizaad en pootgoed van landbouwgewassen* (Dutch General Inspection Service for Agricultural Seed and Seed Potatoes), Emmeloord, the Netherlands.



NIVAP: *Nederlands Instituut voor Afzetbevordering van Pootaardappelen* (Netherlands Potato Consultative Foundation), Den Haag, the Netherlands.

Diseases

Virus and bacterial diseases are the most important diseases that have to be taken into account in the cultivation of seed potatoes in the Netherlands.

Virus diseases

The most important virus diseases occurring in the Netherlands are the diseases caused by the leafroll virus and potato viruses Y (especially Yⁿ), X and A. Of lesser importance are the potato virus S and the tobacco rattle virus. The symptoms that these viruses can cause differ substantially

*“Virus diseased
plant”*



Important facts on virus diseases:

- Viruses are transmitted by seed potatoes;
- They are usually transmitted by aphids, but sometimes also by contact (viruses X and S) or by nematodes (tobacco rattle virus);
- It takes some time for a virus to reach the tubers and for an infection to result in symptoms;
- The susceptibility and vulnerability to viruses differ from one potato variety to another and older crops are less susceptible than younger crops (maturity) resistance;
- Each virus comprises several strains.

and depend on the type of virus involved, the virus strain, the potato variety and the growing conditions. The only way of finding out which virus has caused particular symptoms is by carrying out laboratory analyses (ELISA tests, see Appendix).

Bacterial diseases

The pathological bacteria that are found in the Netherlands and belong to the so-called Erwinia complex are distinguished on the basis of the symptoms caused by these bacteria, notably blackleg and stem wet rot. The quality of a batch of seed potatoes is greatly dependent on the presence or absence of these bacteria. Therefore, it is of great importance



“Potato-peach aphid (Myzus persicae)”

that bacterial diseases are effectively controlled during the cultivation of seed potatoes. Bacterial diseases are transmitted by infected seed potatoes, but it is by no means always possible to detect a bacterial infection in the field or in tubers. That is why we speak of **latent** (hidden) infections.

Various factors occurring during the growth of a crop, harvest or storage can cause the number of bacteria present in a crop to increase substantially. Indeed, the number of bacteria present in some tubers may become so great that the disease will be visible in the field in the next crop.

Unfortunately it is impossible to predict how long it will take for a latent infection to become visible. The factors involved are too complex. What we do know for certain is that an infected batch always involves a certain risk. Fortunately, it is possible to minimise the spread of an infection by

*“Identifying
and counting
the daily aphid
catch”*



adhering to specific cultivation, harvesting, storage and handling techniques. This way it is also possible to prevent the risk of new infections or re-infection. There are no agents that are capable of effectively controlling bacterial diseases.

All Dutch seed potatoes are intensively tested for the presence of quarantine bacterial diseases, brown rot and ring rot. These tests are carried out under the responsibility of the PD. Consequently, the NAK can only issue the certificate/plant passport after approval by the PD. To prevent infection with brown rot irrigation with surface water is forbidden.

Important facts on bacterial diseases:

- The diseases spread predominantly from infected seed potatoes. In particular, they spread from lots containing rotting tubers;
- Infections spread more readily when seed potatoes are cut;
- The bacteria can survive in the soil, for example in ground keepers
Surface water (irrigation) may also become infected;
- Infections on or in tubers do not always cause symptoms. Plots that may appear healthy at first sight sometimes produce disappointing second crops.

Clonal selection and Classification

Clonal selection system

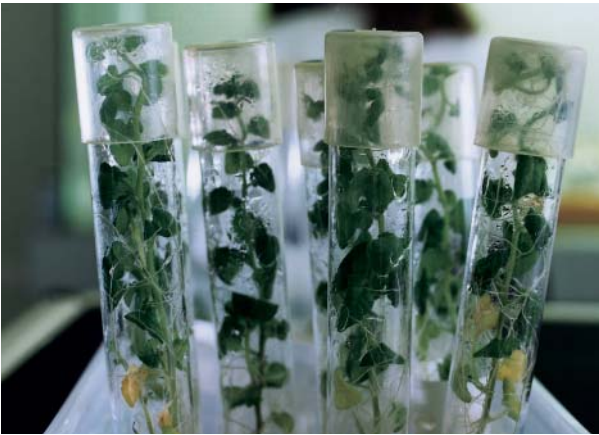
The most important part of any potato inspection system is monitoring and establishing the **health status** of the potatoes. Particular attention must be given to identifying the presence of virus diseases that cause only slight symptoms in the basic stock used for the production of potatoes (e.g. viruses X and S). That is why we have been using the clonal selection system as a basis for the cultivation of seed potatoes in the Netherlands since 1948. This system is based on a single plant (initial clone). Every year, specialised growers (clonal selectors) select healthy, varietally-pure plants from their one-year, two-year or three-year clones. These initial clones are then multiplied for a few years (three to four years

“Trueness to type is assessed in the central clone field of the NAK.”



at most) to obtain potatoes of the highest category, class S. These tubers form the basis for further multiplication in a number of quality classes. Instead of using initial clones as the starting material, it is also possible to start with in-vitro plantlets, mini tubers or micro tubers obtained from rapid multiplication. This stock, which is produced by certified producers under the NAK's supervision, is incorporated in the same clonal selection system. When inspecting clones, the NAK also assesses the potatoes' **varietal purity** and **trueness to type**. Trueness to type is assessed by planting samples, of all varieties produced at a clone farm, in the NAK's central clone field. The results obtained in the central clone field constitute an extra link in the overall inspection process and also play a part in the NAK's internal quality control system. The NAK checks

whether lots of stocks of potatoes submitted under the name of a particular variety do indeed belong to that variety. The NAK also performs varietal purity tests, in which the NAK inspectors look for deviating plants in the field - which may be plants of a different variety and/or varietally impure plants (mutants).



*“In-vitro
plantlets”*

Classification

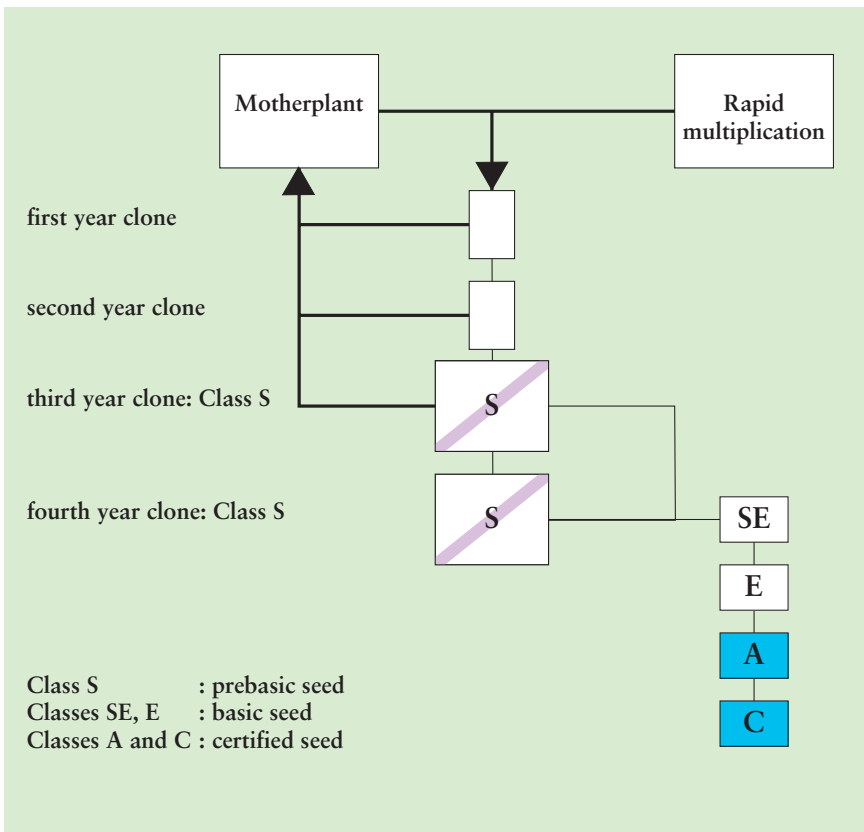
Seed potatoes of classes S, SE, E and A are automatically classified in a lower class after each year. This automatic reduction in class is also known as the flush-out system. The aim of this system is to ensure a regular supply of healthy seed potatoes, so as to prevent degeneration (i.e. a reduction in productivity and quality). A plot of seed potatoes will only be classified in the highest possible class if all the relevant requirements are met (health, varietal purity, etc.). If they are not met, the plot will be classified in a lower class or it may even be rejected.

To summarise the classification of seed potatoes, close attention is paid to the following:

1. the class of the seed stock used
2. the results of the field inspections
3. whether the haulm has been destroyed on the prescribed days, where relevant
4. the results of the testing of samples, the so-called post-harvest inspections

As a result, the seed stock, the results of the field inspections, the date of haulm destruction and the results of the post-harvest inspections together determine in which class seed potatoes are classified.

Outline of the clonal selection system used in the Netherlands



The NAK's stringent inspection requirements

The aim of the inspections is to encourage the production and use of high-quality seed potatoes. Consequently, seed potatoes must meet the high quality requirements laid down in the NAK's inspection regulations.

A statutory basis

The NAK was established in 1932. The Dutch Ministry of Agriculture, Nature and Food quality has appointed the NAK to be the only organisation authorised to inspect and certify agricultural seed and seed potatoes in the Netherlands. The NAK performs the inspections in question on the basis of the Dutch Seeds and Planting Materials Act, and the regulations of the Dutch Ministry of Agriculture, Nature and Food quality. Anybody who grows and/or handles agricultural seed and/or seed



“Inspection activities: field inspections”

potatoes in the Netherlands and submits them for certification must be affiliated with the NAK. Moreover, in the Netherlands, only certified seed (potatoes) may be used and traded.

Growers and traders must comply with the requirements and regulations formulated by the Ministry and NAK. ‘Standing committees’ of the NAK have a role in setting the inspection regulations for the crop groups:

*“Inspection
activities: post-
harvest
inspections”*



cereals, fodder crops and seed potatoes. Like the NAK's board, these committees consist of representatives of the agricultural sector: growers, breeders, propagators and traders. The inspections are consequently widely supported and the producers feel closely involved in 'their' NAK's activities. The inspections are paid for entirely by the growers and traders themselves. This system, in which the agricultural sector formulates its own standards in compliance with the relevant national and international rules and regulations, places the Netherlands in a unique position. The NAK's quality standards can compete with the strictest requirements demanded by any country.

De NAK in figures

Inspections

- seed potatoes 39,000 ha.
- grass seeds 24,000 ha.
- cereals and other crops 10,000 ha.

Certification

- seed potatoes 1,000,000 tonnes
- seeds 60,000 tonnes

The inspection process

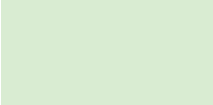
To be able to determine whether basic stock complies with the relevant requirements, inspections have to be carried out in various stages of production. In the case of seed potatoes, the emphasis is on diseases that can be transmitted to a following generation via tubers. Moreover, seed potatoes may only be grown in plots that are free of potato cyst nematodes. Tests for this pest are carried out by taking soil samples of all the plots intended for the cultivation of seed potatoes, and analysing these samples. Only seed potatoes from plots that have been found to be free of nematodes are accepted for inspection.

The inspection process **starts** when the growers report their plots to the NAK in the first half of May. The growers must specify the source (and submit the relevant documents), variety and class of the seed and the number, area and location of the plot concerned. This information is stored in a computer on a per plot basis, along with the results of the inspections. Every plot (lot) has a unique code, by which the source of any problems can later be **traced**. This system, which enables the NAK to trace the eventual sources of problems, is unique in the world.

Throughout the overall inspection process, the NAK regularly checks the identity of the lots. From the beginning of June onwards, more than



“Inspection activities: lot inspections”



100 experienced NAK inspectors set out to inspect some 39,000 hectares of seed potatoes in the field. In addition to these visual inspections, additional tests are carried out in the laboratory to check whether all the requirements are met. In the case of seed potatoes the NAK pays most attention to health aspects. The NAK inspectors critically assess over 400 potato varieties in the field and lot inspections.

The inspection activities comprise the following main **elements**:

- field inspections
- post-harvest inspections
- lot inspections

In addition to the inspections focusing on quality aspects, the NAK also performs phytosanitary tests to check for the presence of quarantine diseases under the supervision of the Dutch Plant Protection Service (PD).

Field inspections

The field inspections begin in the first half of June, after an entire potato crop has emerged. The NAK inspectors inspect each plot at least three times. In this way, each plot is covered in its entirety.



“Each plot is inspected at least 3 times”

As well as being inspected for varietal trueness, seed potatoes are inspected to determine:

- varietal purity
- presence of diseases
- other factors

Varietal purity

Potato crops of classes S, SE or E may not include any plants of a different variety and/or varietally impure plants (mutants). The standard for class A is not more than 1 out of every 10,000 plants, that for class C not more than 2 out of every 1000 plants.

Diseases

A crop's health status is assessed by determining the extent to which the following diseases are present:

- virus diseases (leafroll, mosaic, stem mottle and aucuba mosaic virus)
- blackleg and stem wet rot (*Erwinia spp.*)

The tolerances specified in Table 1 apply to these diseases.

The percentages of the various diseases are determined by inspecting at least 4 x 100 plants. Virus and bacterial diseases are given close attention in the inspections. The NAK employs strict standards for these diseases. The most important are specified in Table 1.

Table 1: Tolerances (%) employed in field inspections in the Netherlands

	Class S	Class SE	Class E	Class A	Class C
Severe mosaic/ leafroll	0.025	0.05	0.1	0.25	2
Mild mosaic	0.025	0.05	0.1	2	10
Total	0.025	0.05	0.1	2	10
Blackleg (<i>Erwinia spp.</i>)	0	0	0	0.03	0.1

In addition to the visual inspections, the NAK inspectors pick the leaves of symptom-less varieties. These leaves are inspected for the presence of viruses in ELISA tests in the laboratory. Of great importance with respect to clonal-selection material in particular is the determination of the plants' varietal trueness. No clonal material is classified in class S until a sample has been checked to assess the plants' varietal trueness in the NAK's central clone field.

Other factors

Other factors and conditions, that may influence the inspections, may partly determine the quality of the seed potatoes and may affect the



*“Timely
haulm-killing,
essential to
avoid virus
infection of the
tubers”*

general impression made by a crop, are:

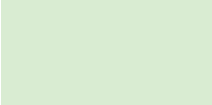
- the the crop’s earliness and its degree of homogeneity
- the risk of infection in the plot’s surroundings
- the risk of infection in the plot itself
- the presence of ground keepers
- the occurrence of primary virus diseases
- the occurrence of ‘little potato’ disorder, Rhizoctonia canker or injuries, such as e.g. injuries caused by drought, hail, night frost, bugs at forest edges, etc.

All these factors are considered in classifying lots of seed potatoes. Any one of these factors, or several combined, may cause a lot to be classified in a lower class or to be rejected.

Haulm destruction at the right time

How well a grower may rogue his crop (remove diseased plants), the odd virus-infected plant will usually be overlooked in a plot. Such plants may serve as sources of infection throughout the growing season. As a result, a crop may become infected at any time during the growing season (= primary infections). In addition, a crop may be infected from other plots nearby.

Virus infections are by no means always visible, especially those occurring late in the season. Therefore, it is not really possible to rogue plants infected by viruses. To prevent the risk of a virus being transmitted to the tubers, it is essential that the haulm is destroyed at the right time - at least



before viruses can reach the tubers. Each season, the NAK determines the best times for destroying the haulm.

The time at which the haulm is to be destroyed will depend on:

- the aphid counts, which are recorded with the aid of suction traps and yellow traps that are checked every day
- the varieties' susceptibility to the potato virus Yⁿ
- the infection pressure in the field and the crops' maturity

These are the factors considered by the NAK in determining the most favourable haulm-destruction dates (final dates and recommended dates). Final dates are always determined for classes S and SE, and final dates or recommended dates for the other classes, depending on the conditions. After the haulm has been destroyed, the growers and the NAK keep a close eye on the plots so as to detect regrowth in good time. Regrown plants are highly susceptible to virus infections. However, destroying the haulm at the right time will not guarantee that the seed potatoes will comply with the virus standards. This is why, in addition to the field inspections, extra laboratory tests are carried out to search for the presence of viruses (known as 'post-harvest inspections'). Every year, the NAK tests three million tubers on average.

Post-harvest inspections

In the post-harvest inspections the harvested tubers are inspected for the presence of viruses. Virus infections, particularly late infections, are not always visible in the field. This is why the NAK performs laboratory tests in addition to its field inspections, to search for the presence of viruses and obtain greater certainty with respect to a plot's health status. To this end, the NAK takes samples of on average 200 tubers per plot. The apical



“Post-harvest control: scooping out the top eyes”

eye of each tuber is planted in a greenhouse. Each of the plants grown from these eyes is ELISA tested. The tolerances employed in the post-harvest inspections are listed in Table 2.

Table 2: Tolerances employed in post-harvest inspections in the Netherlands

Class	Tolerances
Class S	0 in 200
Class SE	1 in 200
Class E	2 in 200
Class A	5 in 100
Class C	10 in 100

“Post-harvest control: planting top eyes in the greenhouse”



Post-harvest inspections must always be carried out in the case of potatoes of classes S and SE. In the case of potatoes of the other classes, exemption from post-harvest inspection may be granted, especially for less susceptible varieties, but depending on the conditions and providing the haulm has been destroyed on the recommended date and the crop is not infected with a primary virus disease.

Lot inspections

A seed potato's physiological condition is an important influence on its quality and vitality. Close attention is therefore paid to this aspect in the production and logistics of seed potatoes in the Netherlands.

Seed potato growers store their seed potatoes in well ventilated stores that are protected from frost. These days, an increasing number of stores are mechanically cooled. In this way, growers can prevent the risk of their seed potatoes sprouting too early.

Seed potatoes are prepared for delivery by growers or traders. But no lot of seed potatoes may be transported to its intended destination until it has been inspected by the NAK's inspectors. They inspect each lot to determine:

- the presence of tuber diseases (e.g. dry or wet rot, scab or Rhizoctonia canker)
- the presence of abnormalities (e.g. sprouts, blue spots, pressure spots, deformations or injuries caused by low temperatures)
- the weight
- the presence of contaminations (adhering soil)
- the tubers' physiological condition (soft tubers)

The standards employed in lot inspections in the Netherlands are listed in Table 3 (*see next page*).



“Lot inspection before delivery”

Table 3: Standards employed in lot inspections in the Netherlands

Disease/disorders	Standards
Wet rot	Sporadic
Dry rot	1-4 tubers/50 kg
Late blight	Up to and including 35 mm: 1 tuber/50 kg from 35 mm: 1 tuber/100 kg
Common scab	Scab scale 2.5 (max. 1/8 of total area)
Rhizoctonia canker Classes S/SE Classes E to C	10% light 25% light
External disorders	4-12 tubers/50 kg
Soil etc.	1%

Tighter standards

While a grower is preparing a lot for delivery, a NAK inspector will visit the farm at least once a day. Only lots or parts of lots that have been approved may be delivered to their intended destinations. The standards employed by the NAK are stricter than the minimum standards formulated by the EU for trade in seed potatoes within its area.

Phytosanitary aspects

The NAK also inspects phytosanitary aspects of seed potatoes intended for countries within the EU under the supervision of the Dutch Plant Protection Service. If a lot is found to be free of quarantine diseases, it is granted a EU plant passport combined with the NAK certificate as proof of its approval.

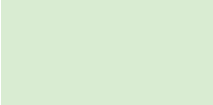


“The NAK inspector completes the lot form.”

The NAK employs fixed minimum standards, irrespective of the destination of a lot of seed potatoes. This means the NAK employs the same standards in inspecting all lots. Nevertheless, some countries or buyers outside the EU require stricter standards with respect to certain criteria. The Dutch Plant Protection Service of the Ministry of Agriculture is responsible for inspecting seed potatoes for compliance with these requirements. The Plant Protection Service grants all lots that comply



“All the relevant information on each lot is specified on the NAK certificate.”



with the other countries' requirements a phytosanitary certificate in addition to the NAK certificate. This certificate implies that the seed potatoes in question comply with all the relevant (phytosanitary) requirements. The NAK can carry out stricter additional lot inspections at the request of a seed potato supplier.

Different customers, different requirements; a comparison

In the Netherlands, seed potatoes are inspected in field inspections, post-harvest inspections and lot inspections. The seed potatoes must comply with the requirements of each of these inspections. As a result, approved seed potatoes meet all those requirements.

Individual countries formulate their own requirements for seed potatoes. To coordinate the diversity in demand and supply as efficiently as possible, the EU has laid down minimum quality standards to meet the requirements for seed and seed potatoes. The member states may, of course, employ stricter national standards if they so desire. For its part, the Dutch seed and seed potato sector has laid down stringent national standards, in collaboration with the NAK and the Dutch government. This has earned the Dutch seed and seed potato sector a strong competitive position.

Table 4 presents a comparison of the standards employed by the NAK in the Netherlands in field inspections, post-harvest inspections and lot inspections, and the corresponding standards laid down by the EU.



Table 4: The tolerances employed in field inspections, post-harvest inspections and lot inspections in the Netherlands in relation to the EU tolerances.

Aspect covered in the inspections	The Netherlands (NAK)			European Union (EU)		
	Class	Tolerance			Class	Tolerance
Field inspections						
Varietal purity	S,SE,E	0%			basic certified	0.25*% 0.5*%
	A	0.01%				
	C	0.05%				
<i>Erwinia spp.</i>	S,SE,E	0%			basic certified	2% 4%
	A	0.03%				
	C	0.1%				
Virus		severe mosaic/ leafroll	mild mosaic	total mosaic		total
	S SE E	0.025% 0.05% 0.1%	0.025% 0.05% 0.1%	0.025% 0.05% 0.1%	basic	4%*
	A C	0.25% 2%	2% 10%	2% 10%	certified	10%*
Post-harvest inspections						
Virus	S	0 in 200			basic	4%*
	SE	1 in 200				
	E	2 in 200				
	A C	5 in 100 10 in 100			certified	10%*
Lot inspections	Standards employed by the NAK within the EU	Standards employed by the Plant Protection Service outside the EU			EU-standards	
Wet rot	sporadic (1 tuber/ 250 kg)	0%			1% of total weight	
Late blight	<35mm: 1 tuber/50 kg >35mm: 1 tuber/100 kg	0.5% of total weight			1% of total weight	
Dry rot**	1-4 tubers/50 kg	0.5% of total weight			1% of total weight	
Common scab	scab scale 2.5 (at most 1/8 of total surface)	scab scales as required			max 5% of tubers showing lesions covering more than 1/3 of total surface	
Rhizoctonia canker						
Classes S/SE	10% light	10% light			not relevant	
Classes E tot C	25% light	25% light			not relevant	
External disorders	4-12 tubers/50 kg	1% of total weight			3% of total weight	
Soil, etc.	1% of total weight	1% of total weight			2% of total weight	

Notes:

* EU standard for immediate further cultivation

N.B.: not all parts (especially the EU tolerances)

may be simply added up. For example, the EU tolerance for dry and wet rot together is at most 1%

** before 1 February: sporadic

The certificate/plant passport

After a lot of seed potatoes has been definitively approved, it is certified.

Statutory requirement

The EU has prescribed that all plant material traded within the EU must be provided with a certificate. The colour, dimensions and minimum information to be specified on the certificate are laid down in the Guideline for Trade in Seed Potatoes. The member states are free to specify more than the prescribed minimum information. If so desired, the certificate may also specify a treatment with an agent against storage diseases and/or a specific cultivation technique.

The NAK specifies 'EU Plant Passport' on its well-known NAK certificate as proof that the material in question complies with the relevant phytosanitary requirements (i.e. that it is free from quarantine organisms). Only seed potatoes accompanied by a certificate specifying 'EU Plant Passport' may be marketed within the EU. Seed potatoes intended for destinations outside the EU must also be accompanied by a phytosanitary certificate supplied by the Plant Protection Service. Additional phytosanitary requirements may apply for certain 'protected' areas within the EU. In such cases, a specific code on a certificate/plant passport will indicate compliance with the requirements concerned.



Information on the certificate

All the relevant information on each lot is specified on the NAK certificate. This information comprises the variety, the grading and the class. The certificate also specifies whether the potatoes in question are basic seed potatoes or certified seed potatoes. Prebasic seed potatoes comprises class S, basic seed potatoes comprises potatoes of classes SE and E, while certified seed potatoes comprises potatoes of classes A and C. When seed potatoes are approved, they are classified in one of these classes. The NAK uses white certificates with purple diagonal line for prebasic seed, white certificates for basic seed potatoes (classes SE and E) and blue certificates for certified seed potatoes (classes A and C). The certificates also specify the grower's number, under which the grower of the lot in question is registered with the NAK. The certificates are sewn onto the bags when the bags are sealed. Certificates with an eyelet are used for bags that are sewn by hand and for bulk units (jumbo bags, containers, etc.). In these cases a special NAK seal must also be attached to the bag or bulk unit.

Inspected and approved Dutch seed potatoes
All packaging units containing approved lots of seed potatoes show the unique NAK certificate. Dutch buyers rightly regard this certificate as the one-and-only guarantee of good quality. Buyers outside the Netherlands evidently see this certificate in the same way, as we may infer from the fact that 70% of approved Dutch seed potatoes is exported.

Description of the NAK certificate/EU plant passport

- 1 Class (class S: white certificate with purple diagonal line; classes SE, E: white certificate, classes A, C: blue certificate)
- 2 Certified seed potatoes (blue certificate) or basic seed potatoes (white certificate)
- 3 Species: potato
- 4 The variety's name
- 5 Number under which the grower is registered with the NAK
- 6 Date of certification
- 7 Country in which the potatoes originated
- 8 Grading in millimetres
- 9 Year of production
- 10 Area
- 11 The unique certificate's number
- 12 Packaging unit
- 13 Requirements for relevant harmful organisms of Protected Zones are met
- 14 EU phytosanitary requirements are met
- 15 Inspections and certification in accordance with the relevant EU-directives

		NAK - NEDERLAND		E ¹	
		BASISPOOTGOED ²			
³	Soort:	AARDAPPEL		(Solanum tuberosum)	
⁴	Ras:	EPIMADO			
⁵	Telemr.:	51234			
⁶	Certificering:	XX-XX-XXXX			
⁷	Geteeld in:	NEDERLAND			
⁸	Maat:	35/45			
⁹	Oogstjaar:	XXXX			
¹⁰			¹⁴	¹³	
		EG - PLANTENPASPOORT		ZP -d1/ d2/ a6/ a13	
EG systeem		Model 3	900.000.001	¹¹	50 kg ¹²
¹⁵					¹²

Basic seed potatoes: classes SE, E

		NAK - NEDERLAND		A ¹	
		GECERTIFICEERD POOTGOED ²			
³	Soort:	AARDAPPEL		(Solanum tuberosum)	
⁴	Ras:	EPIMADO			
⁵	Telemr.:	51234			
⁶	Certificering:	XX-XX-XXXX			
⁷	Geteeld in:	NEDERLAND			
⁸	Maat:	35/45			
⁹	Oogstjaar:	XXXX			
¹⁰			¹⁴	¹³	
		EG - PLANTENPASPOORT		ZP -d1/ d2/ a6/ a13	
EG systeem		Model 3	900.000.001	¹¹	50 kg ¹²
¹⁵					¹²

Certified seed potatoes: classes A, C

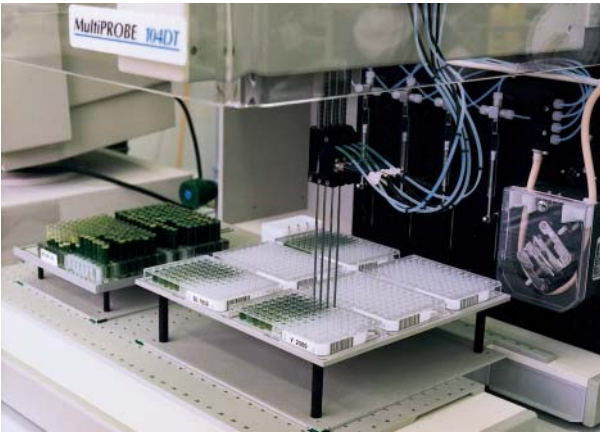
Appendix

ELISA Test

ELISA: Enzyme Linked Immuno Sorbent Assay



“To prepare the material for the ELISA test.”



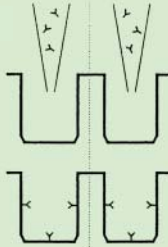
“ELISA test: filling the plates with the material.”

ELISA-METHOD POTATO VIRUS TEST

Potato "free of viruses"

Potato "virus infected"

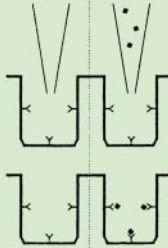
Coating of antibody



Y = Coating of antibody
incubation for at least
16 hours at 6°C

washing

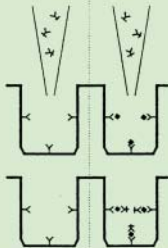
Addition of leafsap



◆ = Virus
incubation: 16 hours at 6°C

washing

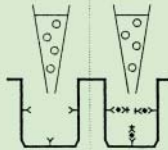
Addition conjugate



Y = Enzyme-labelled
anti body
incubation: 5 hours at 30°C

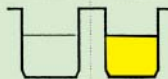
washing

Addition substrate



o = Substrate
incubation: one hour at 20°C

Reading results



Photometer
Visual

Colophon & Addresses

'The Inspection of Dutch Seed Potatoes and the importance of approval' is a joint publication of the Dutch General Inspection Service for Agricultural Seed and Seed Potatoes (NAK) and the Netherlands Potato Consultative Foundation (NIVAP).

The aim of this brochure is to explain the importance of intensive inspection of seed potatoes, and the way in which seed potatoes are inspected in the Netherlands.

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