

DRAFT KENYA STANDARD

DKS 2077: 2019

ICS 67.060

Seed potato — Specification

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Second Edition 2019

TECHNICAL COMMITTEE REPRESENTATION

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Kenya Plant Health Inspectorate Services (KEPHIS)

Government Chemist's Department

University of Nairobi — Department of Plant Science and Crop Protection

Kenya Organic Agriculture Network(KOAN)

Kenya Agricultural and livestock research Organization (KALRO)-Horticultural Research institute

National Potato Council of Kenya(NPCK)

AFA- Horticultural Crops Directorate

Ministry of Agriculture, Livestock and fisheries

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REVISION OF KENYA STANDARDS

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PUBLIC REVIEW DRAFT

DRAFT KENYA STANDARD

DKS 2077:2019

ICS 67.060

Seed potato — Specification

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Foreword

This Kenya Standard was prepared by the Propagation materials Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards

This second edition cancels and replaces the first edition (KS 2077:2007), which has been technically revised. The standard has been revised to address sanitary and phytosanitary aspects of seed potato that were missing in the previous edition. these include the tolerance levels for pests and diseases during storage and the quality requirements of a lot.

During the preparation of this standard, reference was made to the following documents

MS 371 — Specification for vegetable seed for planting.

The Seeds and Plant Varieties Act, Cap. 326, of the Laws of Kenya.

Acknowledgement is hereby made for the assistance derived from this (these) source (s)

1 Scope

This Kenya Standard specifies requirements and methods of sampling and test for seed potato and other propagation materials of the species *Solanum tuberosum*. It specifies requirements for field inspections varietal identity, purity; genealogy, traceability, pests and diseases, internal and external quality, physiology, sizing, packaging and labelling.

2 Normative references

The following referenced documents referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CAP 326: *National seed certification legislations*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

black leg:

Commonly used name of a bacterial disease of potatoes, caused by *Erwinia carotovora* subsp. *atroseptica*. Similar symptoms may, however, be caused by *E. carotovora* subsp. *carotovora*, *E. chrysanthemi* and bacteria of the genus *Dickeya* and *Pectobacteria*.

3.2

certification:

An official control procedure which aims at ensuring the production and supply of seed potato which satisfy the requirements of this standard.

3.3

consignment

a quantity of seed potato consisting of one or more lots destined to a party and covered by one set of documents.

3.4

contaminated field:

a field whose history and regulatory action indicates presence of a specific pathogenic organism in the soil.

3.5

disease:

any disturbance of a plant caused by pathogenic organisms which interferes with its normal structure, physiological function or economic value.

3.6

field:

a defined area of land used for cultivation of seed potato

3.8

generation

the number of growing cycles since the first introduction in the field.

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3.9

homogeneous

uniform in composition and appearance.

3.10

initial Stock

the initial pathogen free microplants, tubers or other propagation materials produced and maintained under an official control programme.

3.11

inspection

examination of plants, tubers, units of presentation, equipment or facilities by National Designated

Authority, to determine compliance with regulatory requirements.

3.12

lot

a quantity of seed potato bearing the same reference number, and being of the same variety, category, class, size and origin and covered by one sets of documents

3.13

National Designated Authority (NDA):

organization, or agency empowered by national legislation to administer the certification of seed potato under this Standard.

3.14

origin

officially defined area where a lot of seed potato was grown.

3.15

phytosanitary measures

provisions in accordance with the National or Regional Plant Protection legislation and/or International Plant Protection Convention.

3.16

primary virus infection:

attack occurring during the current growing season and not arising from the seed tuber.

3.17

quality:

the sum of all characteristics that determine the acceptance of seed potatoes in relation to the specifications of this Standard.

3.18

quality Control:

the control by the NDA of all activities encountered in the process of producing and marketing seed potato in conformance with the Standard.

3.19

pest

any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.

3.20

quarantine pest

A pest of potential national economic importance to the country endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.

3.21**regulated non-quarantine pest**

A non-quarantine pest whose presence in plants for planting affects the intended use of these plants with an economically unacceptable impact and which is therefore regulated with the territory of the importing 'contracting' party

3.22**sampling**

The procedure of drawing at random a number of tubers, plants or parts of plants, which may be taken as representative of the lot or the field.

3.23**seed potato**

tubers of *Solanum tuberosum* L which are certified by the NDA.

3.24**sprout inhibitor**

chemical substance, applied either to the plants during the growing season or to the tubers after harvest which suppresses the normal development of sprouts.

4 Provisions for variety

Varieties shall be accepted into the Standard only if it has been officially released by the NDA.

5 General requirements

5.1 Seed potato shall be free from pests of quarantine importance and meet the thresholds stated in this standard in regard to the regulated non-quarantine pests, injurious diseases and pests and from any defects likely to impair their quality as seed.

5.2 Seed potato shall be substantially dry outside and, in general, of normal shape for the variety.

5.3 Seed potato or growing crops of potato shall not be treated with sprout inhibitors. Neither growing crops of seed potato nor seed potato shall be treated with sprout inhibitors without permission from the NDA.

6 Classification

Seed potato shall be classified according to variety, standards and generations. Classification shall be subject to official control in the producing country. Seed potato shall be placed in three classes as defined in Table 1:

Table 1: Seed Potato Classes

Code	Classes	Seed Parents	Colour of labels
SS	Breeders Seed	Progeny of parental stock	White with a diagonal purple stripe
B.	Basic	Progeny of certified breeders seed or certified pre-basic seed	White
C.1	Cer. 1st gen.	Progeny of certified pre-basic seed or certified basic seed	Blue
C.2	Cert. 2nd Gen.	Progeny of certified basic seed or certified 1st generation	Blue red?
C.3	Cert. 3rd gen. (Standard)	Progeny of certified 2nd generation or certified 3rd generation	Blue grey?

6.1 Breeders seed

Progeny of parental stock. The breeders seed may include pre-basic seed.

6.2 Basic Seed

Seed potato descended directly from breeders seed or produced under special provisions of a national certification scheme and are mainly intended for the production of certified seed potatoes.

6.3 Certified Seed

Seed potato descended directly from breeder Progeny of basic seed or certified seed of higher classes, Basic or Certified seed and are mainly intended for the production of potato other than seed potato. Seed shall be classified as Certified I, Certified II or Certified III according to the minimum requirements given in sections 7.2, 7.3 and 7.4

7 Requirements for seed potato

7.1 General requirements

7.1.1 The parent material shall be true to type for the variety.

7.1.2 Seed potato shall be produced from officially certified initial stock, which shall be practically free from the current most limiting pests and diseases including but not limited to the following;

- a) Potato spindle tuber viroid
- b) *Clavibacter michiganensis* spp. *sepedonicus* (ring rot)
- c) *Ralstonia solanacearum* (Bacterial wilt)
- d) *Pectobacteria* spp and *dickeya* spp
- e) Potato viruses X, Y, S, M and A
- f) Potato Leafroll Virus
- g) Late blight
- h) Nematodes
- i) *Synchytrium endobioticum* (Schilb or Wart disease)

7.1.3 The facilities and procedures used for seed potato production shall be subject to official approval by the NDA.

7.2 Requirements for the field

Field for the production of seed potato shall meet the requirements specified under table 2

Table 2: Field requirements

	Seed Classes			
	Basic	C1	C2	C3
Land requirements (seasons free of potato or related family)	5	3*	3*	3*
Isolation (meters)	10	5	5	5
Maximum off-types	BR=0 PB=1 B=2	2/100 plants	2/100 plants	3/100 plants
Minimum number of inspections	4	4	4	4

*for Bacterial Wilt, 7 year rotation is required.

7.2.3 Tolerances for pests and disease for field

Tolerance limits for pest and disease allowed for seed potato fields shall be as specified under table

4;

Table 3 Tolerance limits for pests and disease

	Seed Classes			
	Basic	C1	C2	C3
Mycoplasma	1/1000 plants	1/1000 plants	1/1000 plants	1/1000 plants
Potato Virus YSMV	1/1000 plants	10/1000 plants	13/1000 plants	13/1000 plants
SMV potato virus Y	0	13/1000 plants	15/1000 plants	15/1000 plants
Fusarium wilt	0	2/1000 plants	3/1000 plants	3/1000 plants
Verticillium wilt	0	2/1000 plants	3/1000 plants	4/1000 plants

7.3 Quality requirements for seed potato

7.3.1 General

The seed potato shall be free from *Globodera rostochiensis* (Woll), *Globodera pallida* (Stone), *Synchytrium endobioticum* (Schilb.) Prc, *Clavibacter michiganensis* Spp. *sepedonicus* (Spieck. And Kotth.) Skapt. and Burkh., *Ralstonia solanacearum* (E.F. Smith) E.F. Smith, Potato spindle tuber viroid, Tomato Stolbur and mycoplasma

7.3.1 Tolerance requirements for a lot

During inspection, the allowed tolerance limits for a lot shall be as specified under table 4 below;

Table 4 Tolerance levels - pests and diseases for seed potato

	Seed Classes			
	Basic	C1	C2	C3
Scab % max (No more than 50%tuber covered) per 50Kg bag	25	50	50	50
Pink rot (Phytophthora erythroseptica) %	0	1	1	1
Soft rot (Pectobacteria and Dickeya)p) %	0	1	1	1
Severe Tuber Moth %	2	5	5	5
<i>Ralstonia</i>				
<i>pectobacteria</i>				
Presence of earth and extraneous matter (%by weight),max	1%	2%	2%	2%
Dry and wet rot	0%	1%	1%	1%
External defects (e.g. malformed or damaged tubers),max	3%	3%	3%	3%
Common scab tubers affected over a specified percent of their surface	0%surface cover	33.3% surface cover	33.3% surface cover	33.3% surface cover
Max by weight	0	5	5	5
Powdery scab 5: tubers affected over a specified percent of their surface	0%surface cover	10% surface cover	10% surface cover	10% surface cover
Max % by weight	0	3	3	3
Rhizoctonia tubers affected over a specified percent of their surface	0%surface cover	10% surface cover	10% surface cover	10% surface cover
% by weight max	0	5	5	5
Shrivelled tubers which have become excessively dehydrated and wrinkled.	0	1	1	1
% by weight,max				

8 Requirements for sizing

8.1 General requirements

Breeder seed are exempted from the minimum sizing requirements. Sizing shall be as specified under Table 5.

Table 5: Size requirements

Seed Classes				
Size	Basic	C1	C2	C3
28-35 mm	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag
36 –45mm	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag
46-55	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag	5 tubers/25kg bag

9 Packaging

9.1 Presentations

9.1.1 Condition of units of presentation

The package shall not be more than 50kg, shall be clean and allow for aeration and which conforms to the regulations in the destination country. The reuse of packages shall not be allowed.

9.1.2 Sealing of units of presentation

The corresponding NDA shall supervise the sealing of containers. In case of need, re-sealing of the package or container shall be done under the official control by the NDA.

10 Labelling

10.1 Official label

Units of presentation shall bear an official label in accordance with 10.2 and which has not been previously used; the label shall be white with a diagonal purple line for breeder seed white for basic seed and blue for certified seed.

10.2 Required information the official label

10.2.1. Name of the product shall be "Seed potato"

10.2.2. The National Designated Authority (NDA) or its recognized initials

10.2.3. Origin of the product

10.2.4. Official lot number

10.2.5. Month and year of harvesting

10.2.6. Date of packaging

10.2.7. Variety

10.2.8. Class

10.2.9. Tuber size

10.2.10. Declared average net weight at packaging

10.2.11. Warning "Not for human consumption"

10.3 Additional information

Without contradicting the information on the official label, the producer may provide additional information and such information may not be misleading.

10.4 Chemical treatment

The nature of the active substance of any chemical treatment of the seed potato shall be indicated either on the outside of the unit of presentation, on the official label or a label provided by the supplier, or printed on the unit of presentation. This information may also appear inside the unit of presentation.

10.5 Re-inspection and re-labelling

If re-inspection is conducted, the authority which carried out the re-inspection shall be stated on the new label, as well as the date of the re-sealing. Re-labelling shall be done under the supervision of the NDA. The new label shall show the particulars which appeared on the old label. If a new label is necessary, this shall show the particulars, which appeared on the old label, the date of the re-closing and the authority concerned.

11 Sampling

Sampling of seed potato for certification purposes shall be carried in accordance with Annex A.

12 Comparative tests

It is recommended that trials be established by the NDA to ascertain the condition of the certified seed potato. The NDA shall provide the test guidelines to be followed. The results of such trials shall be treated in

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confidence but on request the results relating to individual consignments may be exchanged between the NDA of the importing and exporting countries concerned.

13 Compliance

A seed potato lot shall be deemed to comply if upon inspection and testing, the provisions under this standard are met.

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Annex A (Normative)

A. Organizing the inspection of crops grown from sample lots of seed potato

(certified according to this standard)

A.1. Purpose of the inspection

The examination of seed potato in crop tests enables the quality (vigour, purity, healthiness, productivity) of home grown and imported lots put on the market to be checked at random.

A.2. Organization

A.2.1. Place of sampling

Depending on the mode of transport (road, rail or waterway), the sample shall preferably be taken when the lot arrives at its destination.

A.2.2. Organs responsible for the sampling

The sampling shall be done by the NDA.

A.2.3. Sampling

(a) The lot as defined in section 3.12 of this standard is the unit represented by a sample. If the lot is a large one, the number of samples shall be increased to:

- i) One sample per wagon or vehicle, in the case of transport by rail or road,
- ii) One sample for every 50 tonnes, in the case of transport by ship.

(b) A sample consists of 110 tubers, taken from different places in the container or from at least 10 sacks.

(c) The sample shall be placed in a sealed sack; its label shall bear the number of the wagon or the name of the ship.

A.2.4. Preservation of samples

Samples shall be preserved in a uniform manner in favourable conditions.

A.2.5. Trial fields

(a) The land shall be suitable for potato growing.

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(b) Planting shall be done in plots of 100 plants. The plots shall be grouped by variety in order to facilitate comparison.

(c) Manuring shall be adapted to the needs of the crop, but moderate; the use of nitrogen during growth shall be prohibited.

(d) The usual cultural care shall be conducive to keeping the field clean and the foliage intact

A.2.6. List of plots

A nomenclature of all the samples planted in the same field with the number of the plot concerned shall be sent to the organs responsible for evaluating them.

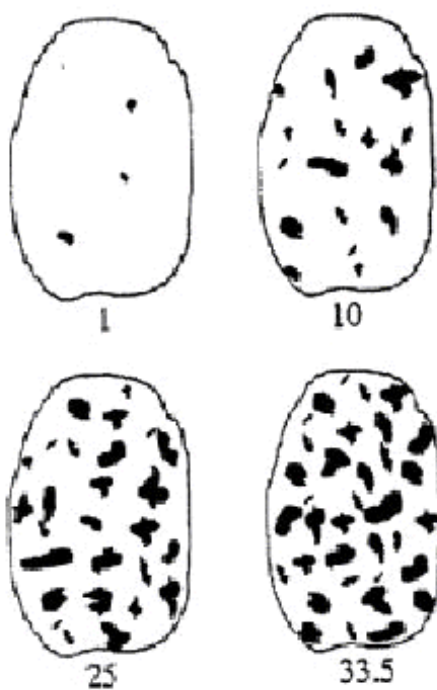
A.2.7. Evaluation of the crop inspection

In order to be accurate, the evaluation shall in principle be carried out in two stages, with an interval of 10-15 days between them. Primary virus infections shall not be taken into consideration.

Annex B (Informative)

Assessment Key for percentage tuber surface area coverage

Common Scab



Rhizoctonia

1% surface area coverage



Homogeneous



Concentrated

10% surface area coverage



Homogeneous



Concentrated

Annex C

(Informative)

C.1 Sampling tubers for virus testing

In testing seed stocks for the incidence of virus, it is seldom feasible to test the entire stock, so a test is done on a sample from the stock. Ideally, only seed stocks with infection levels below the tolerance would be accepted and those above the tolerance rejected. However, taking a sample from a stock means that only estimation of the actual incidence of virus can be made. The reliability of this estimation will vary with the size of the sample, relative to the size of the lot, and the Population standard, which is set for the test. Defining an acceptable population standard for any sample entails two types of risk.

The first is that of rejecting a stock containing less virus than the tolerance and is often described as the A grower = s at risk. The risk of accepting a stock containing more virus than the tolerance is known as the A buyer = s at risk.

From the point of view of classification authorities, this could also be described as the risk of passing a stock which fails to meet the official tolerances. Such testing makes a number of important assumptions, which are, primarily, that the infected tubers are distributed homogeneously in the stock and that tubers are sampled randomly. In addition, the choice of the size of sample to be tested will need to be balanced by other practical factors such as cost, available facilities, labour, logistics of handling samples, seed stock size, etc. The following tables and graphs illustrate some of the principles involved in sampling tubers for testing for virus.

C.2 Confidence limits

Testing different samples from the same seed stock will give a range of results, which, statistically, will lie within a specific interval with a certain percentage confidence. This interval is known as the confidence interval. The acceptable level of confidence or probability should be decided before the testing is conducted but 95% confidence/probability is normally used. The accuracy of the estimation can be improved by increasing the sample size and by adjusting the allowable number of infected tubers in the sample, i.e. the sample tolerance. (Table C.1).

For example, the size of the confidence interval for a sample tolerance of 4% (4 allowable tubers) is

8.8% based on a sample of 100 tubers but, on a sample of 200 tubers, the interval decreases to 6% i.e. 7.7-1.7. The effect on the confidence interval of increasing the sample size does, however, become smaller at the larger sample sizes. Increasing the sample size from 100 to 200 tubers improves the accuracy of the estimation by 32

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%, i.e. confidence interval reduced from 8.8 to 6.0%, whereas increasing the sample size from 300 to 400 tubers only gives an improvement of 15%.

In practice, therefore, the benefits of increasing the sample size have to be weighed up against the additional cost of the testing. The accuracy of the estimation can also be affected by changing the allowable number of infected tubers in the sample (table 4). For example, by decreasing the number of allowable tubers from 4 to 3, i.e. changing sample tolerance from 4 to 3 %, the confidence interval is decreased from 8.8 to 7.9 % and the confidence limits themselves become lower. Decreasing the allowable number of infected tubers in the sample also has a significant effect on the probability of classifying at higher tolerances than those allowed in the sample as illustrated in the next paragraph.

Table C.1: Confidence limits, at a probability of 95%, for various sample tolerances of virus in relation to the size of the sample.

Tolerance (%) for virus in a seed stock	Size of sample	Allowable No of infected tubers	Confidence limits	
			Lower	Upper
4	100	4 (3)	1.1(0.6)	9.9(8.5)
	200	8(7)	1.7(1.4)	7.7(7.1)
	300	12(11)	2.1(1.8)	6.9(6.5)
	400	16(15)	2.3(2.1)	6.4(6.1)
10	100	10(8)	4.9(3.5)	17.6(15.2)
	200	20(18)	6.2(5.4)	15.0(14.0)
	300	30	6.9	13.8
	400	40	7.2	13.8

Probability of classifying stocks to meet specified tolerances

From the confidence intervals, it can be seen that classifying stocks based on a sample will contain a risk that some stocks, which fail a test, do, in fact, meet the tolerance and others, which pass, should fail.

Table C.2 and Figure 1 show the effect of varying sample size and the number of virus infected tubers allowed in the sample on the probability of classifying seed stocks with different incidences of virus infection. For example, in a test on a sample of 100 tubers where 3 virus infected tubers were allowed, there would be a 14% chance of classifying a stock containing 6% virus as meeting a tolerance of 4%. Probability of classifying seed stocks at two tolerances for virus based on a laboratory test in relation to the size of sample and the allowable number of virus-infected tubers in

the sample:

Table C.2

Tolerance (%) for virus in a seed stock	Size of sample	Allowable no of infected tubers	Probability of acceptance or classification						
			% infected tubers in stock						
			0.5	1	2	4	6	8	10
4	100	3	100	98	86	43	14	4	1
	200	7	100	100	95	45	8	1	0
	300	11	100	100	98	46	5	0	0
	400	15	100	100	99	46	3	0	0
10	100	8	100	100	100	98	85	59	32
	200	18	100	100	100	100	97	75	37
	300	30	100	100	100	100	100	91	55
	400	40	100	100	100	100	100	94	54

1. Note: The allowable number of tubers is, often, set at a lower level than the overall seed stock tolerance of 4 and 10% respectively, particularly in the case of a relatively small sample size. By lowering the tolerance in a Sample the > buyers risk = is reduced.

2. Figure 1: Probability of classifying seed stocks with different incidences of virus as meeting a tolerance of 4% or 10% for virus in a laboratory test in relation to the size of sample and the allowable number of virus infected tubers in the sample;

3. tolerance up to 4%

4. tolerance up to 10%

Figure 1a

BASIC SEED (4%)
Probability of classification

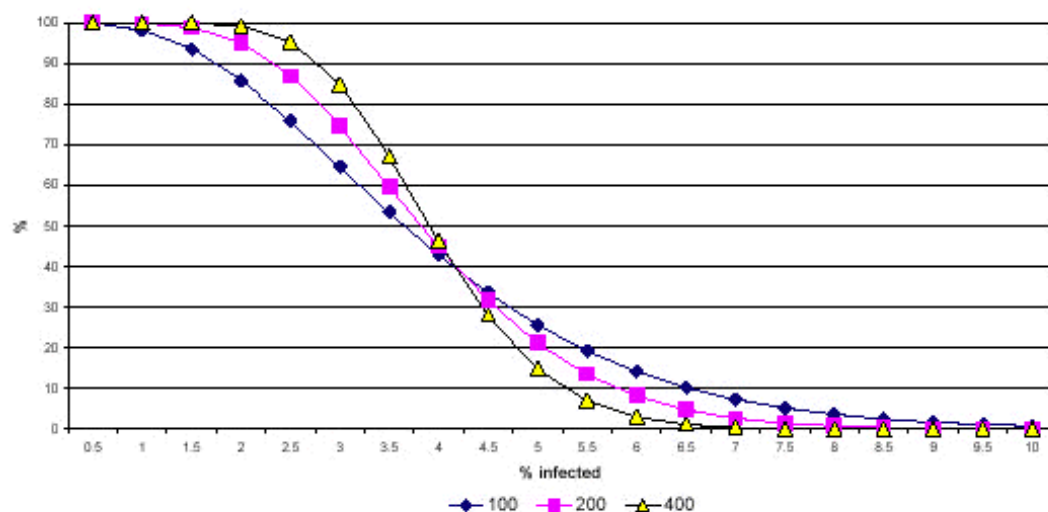
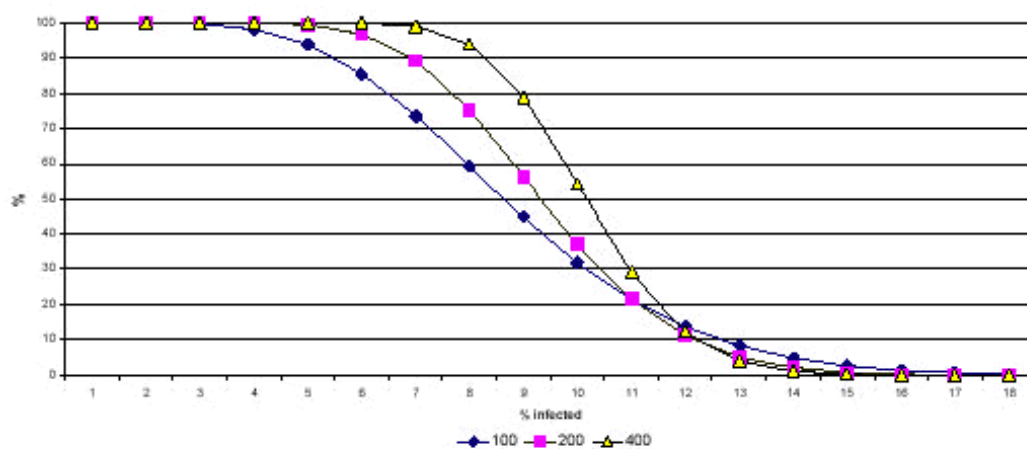


Figure 1b

CERTIFIED SEED(10%)
Probability of classification



Bibliography

EAC Plant protection legislation

CAP 326- Seed and plants varieties act

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