

POTATO (*Solanum tuberosum* L.) DESCRIPTORS

III CHARACTERIZATION AND EVALUATION DESCRIPTORS

Potato genetic resource evaluation methodology:

The plot size for assessment - 4.2 m², seed tubers has been planted in two ridges 0.7 m wide, with 0.3 m distance, 16 plants in one plot. The morphological characters have been described visually for whole plants in plot. For tuber assessment in lab 70 tubers have been collected. The evaluation in lab has been done according particular trait evaluation methodology. The data of three years is acceptable for characterization and evaluation of traits. The evaluation of yield has to be done in three replications for significant results.

Characterization of testing location:

- a. Country of characterization
- b. Institute name and address
- c. Institute site (latitude, longitude, elevation)
- d. Planting date
- e. Harvest date
- f. Distance between rows and plants
- g. Plot size
- h. Number of replications
- i. Fertilizer (types, doses)
- j. Plant protection
- k. Applied tillage

ENVIRONMENT CHARACTERISTIC

- l. Soil type
- m. Relief
- n. Soil pH
- o. Soil organic matter content
- p. Soil texture
- q. Temperature range (growing period mean, maximum, minimum)
- r. Precipitation (sum in growing period)

Descriptor code	Number of trait in other descriptors	Descriptor scale (score)	Reference values	Remarks
		Plant characteristics		
III/1		Maturity		
	NPDP Nr.69 AGPE:IBPGR/ 85/160 Nr.2.1	1 Very late 3 Late 5 Intermediate 7 Early 9 Very early	>125 days 100-120 <95	The number of days from planting to foliage destruction (Gaujers, 1969)
III/2		Growth habit		
	UPOV TG/23/5 Nr.15 NPDP Nr.29 AGPE:IBPGR/ 77/32 Nr.3.6.1 AGPE:IBPGR/ 85/160 Nr.2.2	1 Very erect 3 Erect 5 Semi erect 7 Spreading 9 Very spreading		The 2. plant development stage (UPOV) (Appendix, Picture 1.)
III/3		Foliage cover		
	UPOV TG/23/5 Nr.14 NPDP Nr.30 AGPE:IBPGR/ 85/160 Nr.2.3	1 Sparse 3 Poor 5 Moderate 7 Good 9 Dense		The 2. plant development stage (UPOV)
III/4		Flower frequency		
	UPOV TG/23/5 Nr.35 NPDP Nr.46 AGPE:IBPGR/ 77/32 Nr.3.5.14 AGPE:IBPGR/ 85/160 Nr.2.4	1 No flower 3 Rare 5 Occasionally 7 Frequent 9 Very frequent		The 3. plant development stage (UPOV)
III/5		Flower colour		
	UPOV TG/23/5 Nr.38 NPDP Nr.57 AGPE:IBPGR/ 77/32 Nr.3.5.4-3.5.6 AGPE:IBPGR/ 85/160 Nr.2.5	In words		The 3. plant development stage (UPOV). Photo
III/6		Pollen fertility		
	NPDP Nr.168 AGPE:IBPGR/ 85/160 Nr.2.6	1 Sterile 3 Low 5 Moderate 7 High 9 Very high		The 3. plant development stage (UPOV)..
III/7		Berries		

	UPOV TG/23/5 Nr.42 NPDP Nr.67 AGPE:IBPGR/ 77/32 Nr.3.5.23 AGPE:IBPGR/ 85/160 Nr.2.7	1 No berries 3 Rare 5 Occasionally 7 Frequent 9 Very frequent	Single berries <10 10-20 >20	The 4. plant development stage (UPOV).
III/8		Tuber shape		
	UPOV TG/23/5 Nr.44 NPDP Nr.12 AGPE:IBPGR/ 77/32 Nr.3.2.8 AGPE:IBPGR/ 85/160 Nr.3.1	1 Round 2 Oval to round 3 Oval 4 Oval to long 5 Long to oval 6 Very long	<1.1 1.11-1.4 1.41-1.7 1.71-2.0 >2.0	Ratio of length/width, 10 tubers (Skrabule 2003) The 5. plant development stage (UPOV). Photo
III/9		Tuber skin colour		
	UPOV TG/23/5 Nr.47 NPDP Nr.16 AGPE:IBPGR/ 77/32 Nr.3.2.1- 3.2.2 AGPE:IBPGR/ 85/160 Nr.3.2	In words		The 5. plant development stage (UPOV). Photo
III/10		Tuber eye colour		
	UPOV TG/23/5 Nr.48 AGPE:IBPGR/ 85/160 Nr.3.3	1 Yellow 2 Red 3 Blue		The 5. plant development stage (UPOV). Photo
III/11		Light sprout colour		
	UPOV TG/23/5 Nr.3 NPDP Nr.24 AGPE:IBPGR/ 77/32 Nr.3.3.1 AGPE:IBPGR/ 85/160 Nr.3.4	1 Pink 2 Blue 3 Green		The 5. plant development stage (UPOV). Photo
III/12		Primary tuber flesh colour		
	UPOV TG/23/5 Nr.49 NPDP Nr.21 AGPE:IBPGR/ 77/32 Nr.3.2.5 AGPE:IBPGR/ 85/160 Nr.3.5	1 White 2 Cream 3 Light yellow 4 Yellow 5 Deep yellow 6 Blue 7 Red		The 5. plant development stage (UPOV). Photo
III/13		Secondary tuber flesh colour		

	UPOV TG/23/5 Nr.49 NPDP Nr.22 AGPE:IBPGR/ 77/32 Nr.3.2.6 AGPE:IBPGR/ 85/160 Nr.3.5	1 White 2 Cream 3 Light yellow 4 Yellow 5 Deep yellow 6 Blue 7 Red		The 5. plant development stage (UPOV). Photo
III/14		Tuber eye depth		
	UPOV TG/23/5 Nr.45 NPDP Nr.14 AGPE:IBPGR/ 77/32 Nr.3.2.10 AGPE:IBPGR/ 85/160 Nr.3.6	1 Very deep 3 Deep 5 Medium 7 Shallow 9 Very shallow	≥2.00 mm 1.7-1.99 mm 1.4-1.69 mm 1.1-1.39 mm ≤1.0 mm	The 5. plant development stage (UPOV), one eye measurement of 10 tubers (Skrabule 2003)
III/15		Tuber skin texture		
	UPOV TG/23/5 Nr.46 NPDP Nr.20 AGPE:IBPGR/ 77/32 Nr.3.2.4 AGPE:IBPGR/ 85/160 Nr.3.7	1 Very russet 3 Rough 5 Intermediate 7 Smooth 9 Very smooth		The 5. plant development stage (UPOV).
III/16		Dormancy period		
	NPDP Nr.82 AGPE:IBPGR/ 77/32 Nr.4.1 AGPE:IBPGR/ 85/160 Nr.3.8	1 Very short 3 Short 5 Medium 7 Long 9 Very long	<1 month 1-3 months 3-5 months 3-5 months >7 months	The 5. plant development stage (UPOV).
III/17		Resistance to external damage		
	NPDP Nr.78-81 AGPE:IBPGR/ 85/160 Nr.3.9	1 Very susceptible 3 Susceptible 5 Moderate 7 Resistant 9 Very resistant		The 5. plant development stage (UPOV). (Zariņa 1995)
III/18		Resistance to internal bruising		
	NPDP Nr.78-80 AGPE:IBPGR/ 85/160 Nr.3.10	1 Very susceptible 3 Susceptible 5 Moderate 7 Resistant 9 Very resistant		The 5. plant development stage (UPOV). (Zariņa 1995)
III/19		Storage ability		
	NPDP Nr.81 AGPE:IBPGR/ 85/160 Nr.3.11	1 Very poor 3 Poor 5 Moderate 7 Good 9 Very good		The 5. plant development stage (UPOV).
III/20		Tuber glikoalkaloid		

	NPDP Nr.90 AGPE:IBPGR/ 77/32 Nr.7.4 AGPE:IBPGR/ 85/160 Nr.3.12	1 Very high 3 High 5 Medium 7 Low 9 Very low		
		Utilization characteristics		
III/21		Cooking type		
	AGPE:IBPGR/ 85/160 Nr.4.1	1 A 2 B 3 C 4 D 5 AB 6 BC 7 CD	Firm (salad type) Fairly firm (multi purpose type) Mealy (floury type) Very mealy (floury type) Firm and fairly firm Fairly firm and mealy Mealy and very mealy	Cooking in high pressure pot
III/22		After cooking blackening		
	AGPE:IBPGR/ 85/160 Nr.4.2 SIN	1 Severe 3 Some 5 Little 7 Trace 9 None		Evaluation of boiled tubers after 2 – 3 hours.
III/23		Frying colour		
	AGPE:IBPGR/ 85/160 Nr.4.3	1 Very dark 3 Dark 5 Medium 7 Pale 9 Very pale		
III/24		Crisp suitability		
	NPDP Nr.96 AGPE:IBPGR/ 85/160 Nr.4.4	1 Very poor 3 Poor 5 Moderate 7 Good 9 Very good		
III/25		French fry suitability		
	NPDP Nr.97 AGPE:IBPGR/ 85/160 Nr.4.5	1 Very poor 3 Poor 5 Moderate 7 Good 9 Very good		
III/26		Enzymic browning		

	AGPE:IBPGR/ 85/160 Nr.4.6	1 Severe 3 Some 5 Little 7 Trace 9 none		
III/27		Dry matter content		
	NPDP Nr.84 AGPE:IBPGR/ 77/32 Nr.7.1 AGPE:IBPGR/ 85/160 Nr.4.7	1 Very low 2 Very low to low 3 Low 4 Low to medium 5 Medium 6 Medium to high 7 High 8 High to very high 9 Very high	≤15.0 % 15.1-16.0 % 16.1-17.0 % 17.1-19.0 % 19.1-23.0 % 23.1-24.0 % 24.1-26.5 % 26.6-29.5 % >29.6 %	Weightening in air and water (Gaujers 1969)
III/28		Starch content		
	NPDP Nr.85 AGPE:IBPGR/ 85/160 Nr.4.8 SĪN	1 Very low 2 Very low to low 3 Low 4 Low to medium 5 Medium 6 Medium to high 7 High 8 High to very high 9 Very high	≤8.0 % 8.1-9.0 % 9.1-10.0 % 10.1-12.0 % 12.1-16.0 % 16.1-17.0 % 17.1-19.0 % 19.0-22.0 % >22.0 %	Weightening in air and water (Gaujers 1969)
III/29		Protein content		
	NPDP Nr.88 AGPE:IBPGR/ 85/160 Nr.4.9	1 Very low 3 Low 5 Medium 7 High 9 Very high	<1.3 % 1.3-1.6 % 1.7-2.0 % 2.1-3.0 % >3.0 %	
III/30		Taste		
	SĪN	1 Very poor 3 Poor 5 Moderate 7 Good 9 excellent		Sensory cooked tubers
		Tubering characteristics		
III/31		Yield potential		
	NPDP Nr.74 AGPE:IBPGR/ 85/160 Nr.5.1 SĪN	1 Very low 2 Very low to low 3 Low 4 Low to medium 5 Medium 6 Medium to high 7 High 8 High to very high 9 Very high	<30 % no st. 31-50 % 51-70 % 71-90 % 91-110 % 111-130 % 131-150 % 151-170 % >171 %	Comparing with standard variety from SĪN methodology

III/32		Adaptability		
	AGPE:IBPGR/ 85/160 Nr.5.2	1 Very narrow 3 Narrow 5 Medium 7 Wide 9 Very wide		
III/33		Rate of bulking		
	AGPE:IBPGR/ 85/160 Nr.5.3	1 Very slow 3 Slow 5 Medium 7 Fast 9 Very fast		
III/34		Tubers per plant		
	NPDP Nr.84 AGPE:IBPGR/ 77/32 Nr.7.1 AGPE:IBPGR/ 85/160 Nr.4.7	1 Very few 3 Few 5 Medium 7 Many 9 Very many		
III/35		Tuber size		
	NPDP Nr.73 AGPE:IBPGR/ 77/32 Nr.4.4.2 AGPE:IBPGR/ 85/160 Nr.5.5	1 Very small 2 Very small to small 3 Small 4 Small to medium 5 Medium 6 Medium to large 7 Large 8 Large to very large 9 Very large	<11 g 11-30 g 31-50 g 51-70 g 71-90 g 91-110 g 111-130 g 131-150 g >150 g	Average size of tubers
III/36		Tuber shape uniformity		
	NPDP Nr.75 AGPE:IBPGR/ 77/32 Nr.4.4.4 AGPE:IBPGR/ 85/160 Nr.5.6	1 Very variable 3 Variable 5 Medium 7 Uniform 9 Very uniform		
III/37		Secondary growth		
	NPDP Nr.164 AGPE:IBPGR/ 77/32 Nr.4.4.3.2 AGPE:IBPGR/ 85/160 Nr.5.7	1 Very high 3 High 5 Medium 7 Low 9 Very low		
III/38		Hollow heart tendency		
	NPDP Nr.162 AGPE:IBPGR/ 77/32 Nr.4.4.3.3 AGPE:IBPGR/ 85/160 Nr.5.8	1 Very high 3 High 5 Medium 7 Low 9 Very low		
III/39		Growth cracking		

	NPDP Nr.165 AGPE:IBPGR/ 77/32 Nr.4.4.3.1 AGPE:IBPGR/ 85/160 Nr.5.9	1 Very high 3 High 5 Medium 7 Low 9 Very low		
III/40		Tuber greening before harvesting		
	AGPE:IBPGR/ 85/160 Nr.5.10	1 Very high 3 High 5 Medium 7 Low 9 Very low		
III/41		Length of stolons		
	AGPE:IBPGR/ 77/32 Nr.4.4.5 AGPE:IBPGR/ 85/160 Nr.5.11	1 Very long 3 Long 5 Medium 7 Short 9 Very short	>60 cm 41-60 cm 21-40 cm 6-20 cm <6 cm	
III/42		Attachment of stolons		
	AGPE:IBPGR/ 85/160 Nr.5.12	1 Very strong 3 Strong 5 Medium 7 Loose 9 Very loose		
III/43		Internal rust spot		
	NPDP Nr.160- 161 AGPE:IBPGR/ 85/160 Nr.5.13	1 Very frequent 2 Frequent 3 Medium 4 Infrequent 5 Very infrequent		
		Resistance to fungal diseases		
III/44		Resistance to common scab (<i>Streptomyces scabies</i>)		
	NPDP Nr.112- 113 AGPE:IBPGR/ 77/32 Nr.6.1.3.6 AGPE:IBPGR/ 85/160 Nr.6.1.1	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/45		Resistance to dry rot (<i>Fussarium spp.</i>)		
	NPDP Nr.116- 117 AGPE:IBPGR/ 77/32 Nr.6.1.3.4 AGPE:IBPGR/ 85/160 Nr.6.1.4	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/46		Resistance to early blight (<i>Altenaria solani</i>, <i>Macrosporium solani</i>)		

	NPDP Nr.108-109 AGPE:IBPGR/77/32 Nr.6.1.1.2 AGPE:IBPGR/85/160 Nr.6.1.3	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/47		Resistance to fusarium wilt (<i>Fusarium oxysporum</i>)		
	AGPE:IBPGR/77/32 Nr.6.1.2.2 AGPE:IBPGR/85/160 Nr.6.1.4	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/48		Resistance to gangrene (<i>Phoma exigua</i> var <i>foveata</i>)		
	NPDP Nr.114-115 AGPE:IBPGR/77/32 Nr.6.1.1.3 AGPE:IBPGR/85/160 Nr.6.1.5	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/49		Resistance to late blight on foliage (<i>Phytophthora infestans</i>)		
	NPDP Nr.103-104 AGPE:IBPGR/77/32 Nr.6.1.1.1 AGPE:IBPGR/85/160 Nr.6.1.6	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/50		Presence of late blight R gene		
	NPDP Nr.107 AGPE:IBPGR/77/32 Nr.6.1 AGPE:IBPGR/85/160 Nr.6.1.6	State, if known		
III/51		Resistance to late blight on tubers (<i>Phytophthora infestans</i>)		
	NPDP Nr.106-107 AGPE:IBPGR/77/32 Nr.6.1.3.1 AGPE:IBPGR/85/160 Nr.6.1.7	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/52		Resistance to stem cancer (<i>Rhizoctonia solani</i>)		
	NPDP Nr.118-119 AGPE:IBPGR/77/32 Nr.6.1.3.7 AGPE:IBPGR/85/160 Nr.6.1.8	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/53		Resistance to powdery scab (<i>Spongospora subterranea</i>)		

	NPDP Nr.120-121 AGPE:IBPGR/77/32 Nr.6.1.3.8 AGPE:IBPGR/85/160 Nr.6.1.9	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/54		Wart (<i>Synchytrium endobioticum</i>)		
	NPDP Nr.101-102 AGPE:IBPGR/77/32 Nr.6.1.3.3 AGPE:IBPGR/85/160 Nr.6.1.10	1 Susceptible 2 Field immune		
III/55		Resistance to wart races		
	AGPE:IBPGR/85/160 Nr.6.1.10	Specify races (S)		
		Resistance to bacterial diseases		
III/56		Resistance to bacterial soft rot (<i>Erwinia spp.</i>)		
	NPDP Nr.110-111 AGPE:IBPGR/77/32 Nr.6.2.1 AGPE:IBPGR/85/160 Nr.6.2.1	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/57		Resistance to bacterial wilt, brown rot (<i>Pseudomonas solanacearum</i>, <i>Ralstonia solanacearum</i>)		
	AGPE:IBPGR/77/32 Nr.6.2.2 AGPE:IBPGR/85/160 Nr.6.2.2	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/58		Resistance to blackleg (<i>Erwinia spp.</i>)		
	AGPE:IBPGR/77/32 Nr.6.2.3 AGPE:IBPGR/85/160 Nr.6.2.3	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/59		Resistance to ring rot (<i>Coronibacterium sepedonicum</i>)		
	AGPE:IBPGR/85/160 Nr.6.2.4	1 Very low 3 Low 5 Medium 7 High 9 Very high		
		Resistance to virus diseases		
III/60		Resistance to potato leaf roll virus (PLRV)		

	NPDP Nr.128-129 AGPE:IBPGR/77/32 Nr.6.3.1 AGPE:IBPGR/85/160 Nr.6.3.1	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/61		Resistance to mop top virus		
	AGPE:IBPGR/85/160 Nr.6.3.2	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/62		Resistance to tobacco rattle virus		
	AGPE:IBPGR/85/160 Nr.6.3.3	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/63		Resistance to PVA		
	NPDP Nr.136-137 AGPE:IBPGR/77/32 Nr.6.3.5 AGPE:IBPGR/85/160 Nr.6.3.4	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/64		Resistance to PVB		
	AGPE:IBPGR/85/160 Nr.6.3.5	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/65		Resistance to PVC		
	AGPE:IBPGR/85/160 Nr.6.3.6	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/66		Resistance to PVM		
	NPDP Nr.138-139 AGPE:IBPGR/85/160 Nr.6.3.7	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/67		Resistance to PVS		
	NPDP Nr.134-135 AGPE:IBPGR/85/160 Nr.6.3.8	1 Very low 3 Low 5 Medium 7 High 9 Very high		

III/68		Resistance to PVX		
	NPDP Nr.132-133 AGPE:IBPGR/77/32 Nr.6.3.3 AGPE:IBPGR/85/160 Nr.6.3.9	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/69		Resistance to PVY (strain not specified)		
	NPDP Nr.130-131 AGPE:IBPGR/77/32 Nr.6.3.4 AGPE:IBPGR/85/160 Nr.6.3.10	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/70		Resistance to PVYn		
		1 Very low 3 Low 5 Medium 7 High 9 Very high		
		Resistance to pests		
III/71		Resistance to nematodes (<i>Globodera spp.</i>)		
	NPDP Nr.146-147 AGPE:IBPGR/77/32 Nr.6.4.1-6.4.4 AGPE:IBPGR/85/160 Nr.6.4.1	State species (<i>rostochiensis vai pallida</i>), pathotype(s), and criteria used (ABCDE) Ro1-5, (ABC) Pa1-3 1 No resistance		
III/72		Resistance to aphids		
	NPDP Nr. 156 AGPE:IBPGR/85/160 Nr.6.4.2	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/73		Resistance to slugs (<i>Deroceras spp</i>, <i>Milax spp.</i>)		
	AGPE:IBPGR/85/160 Nr.6.4.3	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/74		Resistance to tuber moth		
	AGPE:IBPGR/85/160 Nr.6.4.4	1 Very low 3 Low 5 Medium 7 High 9 Very high		
		Resistance to environmental stress factors		

III/75		Drought resistance		
	NPDP Nr.76-77 AGPE:IBPGR/ 77/32 Nr. 5.2 AGPE:IBPGR/ 85/160 Nr.7.1	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/76		Frost resistance		
	AGPE:IBPGR/ 77/32 Nr. 5.1 AGPE:IBPGR/ 85/160 Nr.7.2	1 Very low 3 Low 5 Medium 7 High 9 Very high		
III/77		Notes	Any other additional information	
III/78		Cytological characteristics and identified genes		
III/79		Molecular markers		
III/80		Pictures		

UPOV optimal stages for assessment of characteristics

- 1 about 12 weeks after starting (harvesting) (December)
- 2 bud stage
- 3 flowering stage
- 4 ripening stage

Explanations and references

Photo-AGPE:IBPGR/77/32 – Photography available 1977, Descriptors for the cultivated potato, ed. Huaman Z., Williams J.T., Salhuana W., Vincent L., IBPGR, Rome , Italy,
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NPDN Nr.76-77 – Nordiska genbanken, Nordic potato database.

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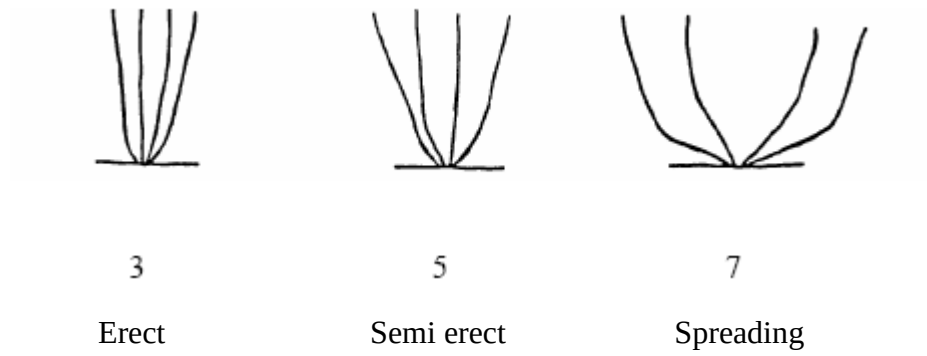
Appendix 1. Descriptors for the European database of potato varieties and breeding lines, 2000, Report of a working group on potato, IPGRI, Rome, pp. 69 - 80.

The international comecon list of descriptors of potato species of the section Tuberarium (Dun) Bu8k of the Genus Solanum L. (Международный классификатор СЭВ видов картофеля (Dun) Buk рода Solanum L.), 1984, Leningrad.

Gaujers V., 1969., Kartupeļi, Liesma, Rīga, 216 lpp.

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Appendix



Picture 1. **Growth habit**