

Plant		Sweet potato		431	Primary essential character
No	Characters	No. of samples	Methods	Rank or measurement unit	Remarks
1	Plant type	Block	Observation	1:Erect 2:Nearly erect 3:Semi-erect 4:Slightly semi-erect 5:Intermediate 6:Slightly spreading 7:Semi-spreading 8:Nearly spreading 9:Spreading	Plant type 50-60 days after transplanting (intermediate: Kou-kei 14, Beniazuma)
2	Twining	Block	Observation	1:Non-twining 2:Very low 3:Low 4:Slightly low 5:Moderate 6:Slightly high 7:High 8:Very high 9:Extremely high	Twining of vines 80-90 days after transplanting
3	Natural flowering ability	Block	Observation	1:None 2:Very low 3:Low 4:Slightly low 5:Moderate 6:Slightly profuse 7:Profuse 8:Very profuse 9:Extremely profuse	Flowering habit under natural conditions
4	Vine pigmentation	5 plants	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark	Anthocyanin pigmentation present in the 10th vine internode from top besides the green color 50-60 days after transplanting
5	Vine node pigmentation	5 plants	Observation	1:Absent 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high	Anthocyanin pigmentation present in the 10th vine node from top besides the green color 50- 60 days after transplanting
6	Mature leaf shape	5 plants	Observation	1:Heart-shaped 2:Toothed heart-shaped 3:Triangular 4:Toothed-triangular 5:Slightly three lobed 6:Three lobed with teeth 7:Deeply three lobed 8:Five to seven lobed 9:Multi (>7) lobed	Shape of the 10th leaf from top 50-60 days after transplanting
7	Immature leaf color	5 plants	Observation	1:Pale green 2:Green 3:Dark green 4:Yellowish green 5:Pale brown 6:Brown 7:Pale purple 8:Purple 9:Dark purple	Uppermost fully expanded leaf color 50-60 days after transplanting
8	Abaxial leaf vein	5 plants	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark	Anthocyanin pigmentation present in the lower surface of the 10th leaf from top 50-60 days after transplanting
9	Leaf nectary pigmentation	5 plants	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark	Anthocyanin pigmentation around the nectary present in the base of the lower surface of the 10th leaf from top 50-60 days after transplanting

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10	Leaf base pigmentation	5 plants	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark		Anthocyanin pigmentation present in the base of the lower surface of the 10th leaf from top 50-60 days after transplanting
11	Storage root shape	Block	Observation	0:Flat 1:Round 2:Round-Round elliptic 3:Round elliptic 4:Round elliptic-Elliptic 5:Elliptic 6:Elliptic-Long elliptic 7:Long elliptic 8:Very long elliptic 9:Extremely elliptic		Storage root outline shown in longitudinal section
12	Storage root skin color	Block	Observation	1:White 2:Yellow 3:Brown 4:Orange 5:Red 6:Reddish purple 7:Dark reddish purple 8:Purple 9:Other		The most representative skin color of stored root
13	Storage root flesh color	5 roots	Observation	1:White 2:Pale cream 3:Cream 4:Pale yellow 5:Yellow 6:Pale orange 7:Orange 9:Purple		Predominant color of cross and longitudinal sections made about the middle of freshly harvested storage roots
14	Anthocyanin pigmentation of storage root flesh	5 roots	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark		Anthocyanin pigmentation of cross and longitudinal sections of roots
15	Carotene pigmentation of storage root flesh	5 roots	Observation	1:Absent 2:Very pale 3:Pale 4:Slightly pale 5:Intermediate 6:Slightly dark 7:Dark 8:Very dark 9:Extremely dark		Carotene pigmentation of cross and longitudinal sections of roots

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1	Vine internode length	5 plants	Obs.&Mear.	1:Extremely short 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Vine internode length 50-60 days after transplanting
2	Vine tip pubescence	5 plants	Observation	1:Absent 2:Very sparse 3:Sparse 4:Slightly sparse 5:Moderate 6:Slightly heavy 7:Heavy 8:Very heavy 9:Extremely heavy		Degree of hairiness of the vine apex 50-60 days after transplanting
3	Mature leaf color	5 plants	Observation	1:Yellow 2:Yellowish green 3:Pale green 4:Green 5:Deep green 6:Dark green 7:Pale brown 8:Brown 9:Purple		Color of the 10th fully expanded mature leaf from top 50-60 days after transplanting
4	Mature leaf size	5 plants	Observation	1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Size of the 10th leaf from top 50-60 days after transplanting
5	Petiole length	5 plants	Obs.&Mear.	1:Extremely short 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Petiole length of the 10th leaf from top 50-60 days after transplanting
6	Petiole diameter	5 plants	Obs.&Mear.	1:Extremely thin 2:Very thin 3:Thin 4:Slightly thin 5:Intermediate 6:Slightly thick 7:Thick 8:Very thick 9:Extremely thick		Petiole diameter of the 10th leaf from top 50-60 days after transplanting
7	Storage root stalk length	10 plants	Obs.&Mear.	1:Extremely short 2:Very short 3:Short 4:Slightly short 5:Intermediate 6:Slightly long 7:Long 8:Very long 9:Extremely long		Length of stalk joining the storage roots to the stems
8	Variability of storage root shape	Block	Observation	1:Extremely uniform 2:Very uniform 3:Uniform 4:Slightly uniform 5:Intermediate 6:Slightly variable 7:Variable 8:Very variable 9:Extremely variable		Variability of storage root shape
9	Variability of storage root size	Block	Observation	1:Extremely uniform 2:Very uniform 3:Uniform 4:Slightly uniform 5:Intermediate 6:Slightly variable 7:Variable 8:Very variable 9:Extremely variable		Variability of storage root size
10	Longitudinal groove of storage root	Block	Observation	1:Absent 2:Very shallow 3:Shallow 4:Slightly shallow 5:Intermediate 6:Slightly deep 7:Deep 8:Very deep 9:Extremely deep		Depth of longitudinal grooves of storage root skin

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11	Storage root cracking	Block	Observation	1:Absent 2:Almost none 3:Very little 4:Little 5:Intermediate 6:Some 7:Much 8:Very much 9:Extremely much		Cracking on the storage root skin
12	Veins on storage root	Block	Observation	1:Absent 2:Very few 3:Few 4:Slightly few 5:Intermediate 6:Some 7:Much 8:Very much 9:Extremely much		Veins on the storage root skin
13	Smoothness of storage root skin	Block	Observation	1:Extremely smooth 2:Very smooth 3:Smooth 4:Slightly smooth 5:Intermediate 6:Slightly rough 7:Rough 8:Very rough 9:Extremely rough		Smoothness of storage root skin
14	Secondary skin color of storage root	Block	Observation	1:Absent 2:White 3:Yellow 4:Brown 5:Orange 6:Pink 7:Red 8:Purple		Secondary skin color of storage root
15	Size of storage root	Block	Observation	1:Extremely small 2:Very small 3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large 8:Very large 9:Extremely large		Storage root size

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1	Grafting compatibility	3 plants	Observation	1:Incompatible 3:Slightly compatible 5:Moderately compatible 7:Compatible		Judge from rootstock wilting and scion growth after top grafting of sweet potato onto dwarf type of morning glory
2	Cross-incompatibility group	4 pollinations reciprocally	Others	1:Group A 2:Group B 3:Group C 4:Group D 5:Group E 9:Other		Identify cross incompatibility by reciprocal crosses with testers (A,B,C,D and E), according to pollen germination rate on the stigma.
3	Self-incompatibility	5 flowers	Others	1:Incompatible 3:Slightly compatible 5:Moderately compatible 7:Compatible 9:Highly compatible		Judge from pollen germination rate of self-pollination. Incompatible:0%, slightly compatible:20%, moderately compatible:20-50%, compatible:50-80%, highly compatible:>=80%
4	Time of sprouting	Block	Observation	1:Extremely early 2:Very early 3:Early 4:Slightly early 5:Intermediate 6:Slightly late 7:Late 8:Very late 9:Extremely late		Time of sprout emergence after root bedding into a nursery bed
5	Number of sprouts	Block	Observation	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many		Observation of number of sprouts from bedded storage roots
6	Uniformity of sprouting	Block	Observation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Moderate 6:Slightly high 7:High 8:Very high 9:Extremely high		Degree of uniformity of sprout emergence
7	Sprouting ability	Block	Others	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		Judge from characters 4,5 and 6
8	Elongation of sprouts	Block	Observation	1:Extremely fast 2:Very fast 3:Fast 4:Slightly fast 5:Intermediate 6:Slightly slow 7:Slow 8:Very slow 9:Extremely slow		Elongation speed after sprout emergence
9	Storage root formation ability	Block	Observation	1:Excellent 2:Very good 3:Good 4:Slightly good 5:Intermediate 6:Slightly poor 7:Poor 8:Very poor 9:None		Compare the storage root number and size to control cultivar

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10	Storability of storage root in winter	20 roots	Measurement	1:Excellent 2:Very good 3:Good 4:Slightly good 5:Intermediate 6:Slightly poor 7:Poor 8:Very poor 9:Extremely poor		Root storability in a non climate-controlled room in winter. Count rotten roots 4-5 month later
11	Tolerance to storage root to low temperature	50 roots	Measurement	1:Excellent 2:Very good 3:Good 4:Slightly good 5:Intermediate 6:Slightly poor 7:Poor 8:Very poor 9:Extremely poor		Keep storage roots in an incubator of 7 centi degrees and above 70% RH for 90 days, and count rotten roots 60 and 90 days after incubation
12	Stem rot resistance	5 plants, 2 replications	Obs.&Mear.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant in the field just after inoculation of Fusarium oxysporum to sprouts, and investigate the damage of stem rot 40-50 days after planting.
13	Black rot resistance	10 plants, 2 replications	Obs.&Mear.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant in the field 3-4 days after inoculation of Ceratocystis fimbriata to sprouts. Investigate the damage of black rot 2-3 months after planting
14	Soil rot resistance	5 plants, 2 replications	Obs.&Mear.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant sprouts in the field where Streptomyces ipomoea has severely proliferated. Investigate the damage 50-60 days after planting.
15	Root knot nematode resistance	5 plants, 2 replications	Obs.&Mear.	2:Very high 3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant sprouts in the field where Meloidogyne incognita has severely proliferated. Investigate the damage 60 days after planting.

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1	Flower color (limb)	Block	Observation	1:White 2:Pink 3:Red 4:Purple 9:Others		Flower limb color
2	Flower length	10 flowers	Obs.&Measr.	3:Short 5:Intermediate 7:Long		Average length of flower (limb to bottom). Short:<=3.4 cm, intermediate:3.5-4.4 cm, long:>=4.5 cm
3	Flower width	10 flowers	Obs.&Measr.	3:Small 5:Intermediate 7:Large		Average width of flower limb. Small:<=3.4 cm, intermediate:3.5-4.4 cm, large:>=4.5 cm
4	Equality of sepal length	10 flowers	Observation	1:Outer two shorter 2:Equal		Compare outer two sepals to inner three sepals
5	Sepal shape	10 flowers	Observation	1:Ovate 2:Elliptic 3:Obovate 4:Oblong 5:Lanceolate		Shape of sepal apex
6	Sepal apex	10 flowers	Observation	1:Acute 2:Obtuse 3:Acuminate 4:Caudate		Sepal apex shape
7	Resprouting ability	Block	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		Sprouting ability after the first picking of sprouts
8	Regrowth vigor	Block	Observation	1:Extremely poor 2:Very poor 3:Poor 4:Slightly poor 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		Vine growth activity after pruning in the field
9	Sprout weight	10 sprouts	Measurement	3:Light 4:Slightly light 5:Intermediate 6:Slightly heavy 7:Heavy		Average weight of 10 sprouts, light:<=10 g, intermediate:13-15 g, heavy:>=18 g
10	Root lesion nematode resistance	5 plants, 2 replications	Obs.&Measr.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant sprouts in the field where <i>Pratylenchus coffeae</i> has severely proliferated. Investigate the damage 90 days after planting
11	Sweet potato weevil resistance	5 plants, 2 replications	Obs.&Measr.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant sprouts in the field where <i>Cylas formicarius</i> has severely proliferated. Investigate the damage compared to control cultivars

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12	West Indian sweet potato weevil resistance	5 plants, 2 replications	Obs.&Measr.	3:High 4:Slightly high 5:Intermediate 6:Slightly low 7:Low 8:Very low		Plant sprouts in the field where Cylas puncticollis has severely proliferated. Investigate the damage compared to control cultivars

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1	Storage root number per plant	Block	Measurement	1:Almost none 2:Extremely few 3:Very few 4:Few 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many		Average number of storage root (>=50 g) produced from 10-40 plants
2	Storage root weight per 100 square meters	Block	Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly heavy 7:Heavy 8:Very heavy 9:Extremely heavy		Convert to the weight per 100 square meters
3	Percentage of storage root	Block	Calculation	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Storage root weight/total root weight (including roots below 50 g) X 100 (%)
4	Yield	Block	Others	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Judge from 1,2 and 3 items
5	Dry matter content of storage root	1 kg of storage roots	Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Cut roots into small pieces, take two samples of 100 g dry at 70-80 centi degree preliminary and dry again at 105 centi degree for 6 hours. Dry matter/fresh weight (g)
6	Starch content of storage root	1 kg of storage roots	Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		Cut roots into small pieces, take two samples of 100 g, then crush by electrical mixer for 90 seconds, sieve them and remove the debris. Starch in 5 liters of water is settled overweight. Remove the top, and dry the starch under natural conditions and at 105 centi degree for 6 hours
7	Flesh color of steamed storage root		Observation	0:Gray 1:White 2:Pale yellow 3:Yellowish white 4:Yellow 5:Pale orange 6:Orange 7:Red 8:Reddish purple 9:Purple		Flesh color of storage root after steaming
8	Texture of steamed storage root flesh		Observation	1:Extremely moist 2:Very moist 3:Moist 4:Slightly moist 5:Intermediate 6:Slightly dry 7:Dry 8:Very dry 9:Extremely dry		Texture of storage root flesh after steaming

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9	Fiber content of steamed storage root flesh		Observation	1:Extremely little 2:Very little 3:Little 4:Slightly little 5:Intermediate 6:Some 7:Many 8:Very many 9:Extremely many		Rating of objectionability due to fiber content of steamed storage root
10	Taste of steamed storage root flesh		Sensory	1:Extremely bad 2:Very bad 3:Bad 4:Slightly bad 5:Intermediate 6:Slightly good 7:Good 8:Very good 9:Excellent		Taste of steamed root flesh
11	Sweetness of steamed storage root flesh		Measurement	% (round to the 1st decimal place)		Add 3 times volume of water to steamed root and mash. Measure the brix (%) of exudate from mash by refractometer
12	Blackening of steamed storage root flesh		Observation	1:None 2:Extremely little 3:Little 4:Slightly little 5:Intermediate 6:Slightly abundant 7:Abundant 8:Very abundant 9:Extremely abundant		Blackening of the cut surface of the steamed storage root flesh 24 hours after cutting

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1	Top weight per 100 square meters	Block	Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Top weight of investigated block, convert to the weight per 100 square meters
2	Adaptability for early harvest	Block	Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Investigate the storage root weight within 90 days after transplanting. Compare to the storage root weight of control cultivar and in standard cultivation
3	Adaptability for late planting	Block	Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Investigate the storage root weight transplanting in late June. Compare to the storage root weight of control cultivar and in standard cultivation
4	Adaptability for heavy fertilization	Block	Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Investigate the storage root weight under the high nitrogen manuring conditions. Compare to the storage root of check cultivar and standard cultivation.
5	Top dry matter content	6 kg of top , 2 replications	Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Take 2 samples of 3 kg top, initially dry at 70-80 centi degrees, and dry again at 105 centi degrees for 6 hours. Dry weight/fresh weight (%)
6	Fragility of boiled storage root	5 slices	Observation	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Boil 1 cm thick root slices for 20 minutes. Compare their fragility to control cultivar
7	Starch whiteness		Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Use Color analyser
8	Starch particle size		Measurement	3:Small 4:Slightly small 5:Intermediate 6:Slightly large 7:Large		Use Centrifugal particle size analyzer
9	Starch viscosity		Measurement	3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High		Use Viscograph

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10	Storage root alpha-amylase activity		Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		
11	Storage root beta-amylase activity		Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		
12	Storage root polyphenol content		Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		
13	Storage root flavonoid content		Measurement	1:Extremely low 2:Very low 3:Low 4:Slightly low 5:Intermediate 6:Slightly high 7:High 8:Very high 9:Extremely high		