

Supplemental file 3 Characters used in the phenetic analysis of the cultivated potato species in the Russian National Potato Collection. See text for our method of "decomposition to binary variables" (Fil and Novikova, 2000; Sokolova and Razorenova, 1996). Such characters are indicated by the character number followed by an underscore and the character state, as stem color, character 1 below)

Stem and habit characters

1. Stem color: (1_1) entirely green, (1_2) mostly green, (1_3) evenly green and purple, (1_4) mostly purple, (1_5) entirely purple
2. Stem diameter from 1 cm above ground
3. Plant height (cm)
4. Plant habit: (4_0) rosette, (4_1) slightly rosette, (4_2) semi-erect, (4_3) erect, (4_4) decumbent, (4_5) prostrate
5. Number of primary stems per plant from base to 30 cm

Leaf characters

6. Length of average adaxial leaf pubescence (mm)
7. Density of adaxial leaf pubescence (number of hairs/cm²)
8. Length of average abaxial leaf pubescence (mm)
9. Density of abaxial leaf pubescence (number of hairs/cm²)
10. Leaf surface: (10_0) dull, (10_1) shiny, (10_2) very shiny
11. Length of leaf (cm)
12. Ratio: length of leaf/width of leaf
13. Ratio: length of the most distal lateral leaflet/distance on leaf rachis between the junction of the petiolules of the most distal lateral leaflet and the fourth-most distal lateral leaflet
14. Ratio: length from widest part of leaf to apex/length of leaf
15. Length of petiolule (cm)
16. Number of lateral leaflet pairs
17. Number of interjected leaflets
18. Number of secondary lateral leaflets
19. Leaflet margin: (0) undulate [waxy at margins], (1) straight [+ wavy]
20. Length of terminal leaflet (cm)
21. Ratio: length of terminal leaflet/width of terminal leaflet
22. Ratio: length from widest point of terminal leaflet to apex/length of terminal leaflet

23. Width of terminal leaflet from a point 5 mm below apex
24. Terminal leaflet base: (24_1) evidently cuneate, (24_2) truncate to slightly cuneate, (24_3) truncate to slightly cordate, (24_4) evidently cordate
25. Length of terminal leaflet petiolule
26. Length of most distal lateral leaflet petiolule
27. Angle of most distal lateral leaflet from leaf rachis as measured by the ratio: one half of width between apices of most distal lateral leaflet pair/length of most distal lateral leaflet
28. Ratio: terminal leaflet length/length of most distal lateral leaflet
29. Width of most distal lateral leaflet
30. Ratio: length from widest part of most distal lateral leaflet to apex/length of most distal lateral leaflet
31. Width of most distal lateral leaflet from a point 5 mm below apex
32. Ratio: length of most distal lateral leaflet/width of most distal lateral leaflet
33. Length of decurrency of first lateral leaflet on basiscopic side as measured from leaflet petiolule to end of decurrency
34. Length from widest part of most distal lateral leaflet to apex
35. Ratio: length of third most distal lateral leaflet/length of second most distal lateral leaflet
36. Angle of base of leaf rachis to stem of fifth leaf down from apex of plant
37. Angle of base of leaf rachis to stem on center leaf of plant
38. Distal leaf (leaf tip) arching: (38_1) slightly arched up, (38_2) straight, (38_3) slightly arched down, (38_4) highly arched down

Floral and fruit characters

39. Length of peduncle (mm)
40. Number of flowers per inflorescence
41. Ratio: number of flowers per inflorescence/number of peduncle forks per inflorescence
42. Length of pedicel (mm)
43. Ratio: length of pedicel from base to articulation/length of pedicel
44. Ratio: width of pedicel 2 mm below the base of the calyx/width of pedicel 2 mm below the articulation
45. Pedicel articulation: (0) distinct, (1) indistinct
46. Calyx symmetry: (0) symmetric, (1) asymmetric

47. Calyx base: (47_0) smoothly arched, (47_1) slightly angled without ribs, (47_2) greatly angled and ribbed
48. Length of calyx acumen
49. Length of calyx lobe
50. Ratio: length of calyx lobe/width of calyx lobe
51. Radius of corolla (mm)
52. Ratio: length of center to base of corolla lobe/radius of corolla
53. Ratio: width of corolla lobe at base of junction of corolla lobes/lobe length from base to tip of corolla lobe
54. Length of anther
55. Length of style exertion from apex of anthers to apex of stigma
56. Color of adaxial interpetolar tissue: (56_1) white, (56_2) light red, (56_3) intense red, (56_4) light blue, (56_5) intense blue, (56_6) light purple, (56_7) intense purple.
57. Color of abaxial interpetolar tissue: (57_1) white, (57_2) light red, (57_3) intense red, (57_4) light blue, (57_5) intense blue, (57_6) light purple, (57_7) intense purple.
58. Color of adaxial corolla ray: (58_1) white, (58_2) light red, (58_3) intense red, (58_4) light blue, (58_5) intense blue, (58_6) light purple, (58_7) intense purple.
59. Color of abaxial corolla ray: (59_1) white, (59_2) light red, (59_3) intense red, (59_4) light blue, (59_5) intense blue, (59_6) light purple, (59_7) intense purple.
60. Color of adaxial corolla acumen: (60_1) white, (60_2) light red, (60_3) intense red, (60_4) light blue, (60_5) intense blue, (60_6) light purple, (60_7) intense purple.
61. Color of abaxial corolla acumen: (61_1) white, (61_2) light red, (61_3) intense red, (61_4) light blue, (61_5) intense blue, (61_6) light purple, (61_7) intense purple.
62. Fruit length (cm)
63. Fruit length/fruit diameter at widest point

Tuber characters

64. Predominant tuber skin color: (64_1) white-cream, (64_2) yellow, (64_3) orange, (64_4) brownish, (64_5) pink, (64_6) red, (64_7) purplish-red, (64_8) purple, (64_9) intensely dark purple
65. Secondary tuber skin color: (65_0) uniform color throughout, (65_1) white-cream, (65_2) yellow, (65_3) orange, (65_4) brownish, (65_5) pink, (65_6) red, (65_7) purplish-red, (65_8) purple, (65_9) intensely dark purple
66. Secondary tuber skin color distribution: (66_0) uniform throughout, (66_1) in the eyes, (66_2) in the eyebrows 5 the curved depression adjacent to the eye, (66_3) splashed, when the pigmented areas are around the eyes, (66_4) spectacled, when the non-

pigmented areas are around the eyes, (66_5) scattered pigmented areas, (66_6) spots few and scattered, (66_7) stippled (66_spots small and uniformly distributed).

67. Predominant tuber flesh color: (67_1) white, (67_2) cream, (67_3) pale yellow, (67_4) yellow, (67_5) intense yellow, (67_6) red, (67_7) purple, (67_8) violet

68. Secondary tuber flesh color: (68_0) uniform color throughout, (68_1) white, (68_2) cream, (68_3) pale yellow, (68_4) yellow, (68_5) intense yellow, (68_6) red, (68_7) purple, (68_8) violet

69. Distribution of secondary flesh color: (69_0) uniform color throughout, (69_1) scattered spots, (69_2) stippled small spots, (69_3) scattered areas, (69_4) in a narrow vascular ring, (69_5) in a broad vascular ring, (69_6) in the vascular ring and medulla, (69_7) in all flesh except medulla.

70. Tuber shape: (70_1) globose, (70_2) ovate, (70_3) obovate, (70_4) elliptic, (70_5) oblong, (70_6) long-oblong, (70_7) elongate

71. Tuber eye position: (71_1) protruding, (71_2) shallow, (71_3) medium deep, (71_4) deep, (71_5) very deep

72. Tuber knobs: (72_1) relatively smooth, (72_2) slightly knobby, (72_3) strongly knobby, (72_4) digitate

73. Tuber curvature: (73_1) curvature, as globose, to elongate, (73_2) reniform, (73_3) falcate, (73_4) spiral

74. Tuber compression: (1) symmetrical in cross section, (2) flattened

75. Tuber dormancy: (1) tubers with sprouts at harvest, (2) tubers without sprouts at harvest

76. Existence of flowers: presence (0), absence (1)

77. Existence of fruits: presence (0), absence (1)

78. Existence of tubers: presence (0), absence (1)