Table 1. List of the studies species of *Vicia*, information on vouchers, and synopsis of the infra generic taxa according to Kupicha, 1976; Hanelt & Mettin, 1989 and Leht, 2009.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Leht, 2009** | **Hanelt & Mettin, 1989** | **Kupicha, 1976** | **Voucher** | **Taxon** | **N** |
| Subgenus *Vicia* L.  Sect. *N*a*rbonensi****s*** (Radzhi) Maxted | Subgenus *Vicia* L.  Sect. *Faba* (Mill.) Ldb. | Subgenus *Vicia* L.  Sect. *Faba* (Mill.) Ldb. | Israel, Negev, Omer N. of Beersheva, Angelis & Amdursky 542 (WAG). | *Vicia narbonensis* L. | **1** |
| Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn. | Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn | Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn | Turkey, Diyarbakir, between Elazig and Diyarbakir, E. Hennipman et al. 1495 (WAG). | *V. lutea* L. | **2** |
| Subgenus *Vicia L.*  Sect. *Vicia* L. | Subgenus *Vicia L.*  Sect. *Vicia* L. | Subgenus *Vicia L.*  Sect. *Vicia* L. | Egypt, Allagi village, Abdel Khalik s.n. (SHG). | *V. sativa* L. subsp*. sativa* | **3** |
| Subgenus *Vicia L.*  Sect. *Vicia* L. | Subgenus *Vicia L.*  Sect. *Vicia* L. | Subgenus *Vicia L.*  Sect. *Vicia* L. | Netherlands, Prov. Gelderland, Wageningen, A. de Boer-Kool 52 (WAG). | *V*. *angustifolia* L. | **4** |
| Subgenus *Vicia* L.  Sect. *Peregrinae* Kupicha | Subgenus *Vicia* L.  Sect. *Peregrinae* Kupicha | Subgenus *Vicia L.*  Sect*. Peregrinae* Kupicha | Israel, Judean mountain, Jerusalem, Leinkram & Grizi 661 (WAG). | *V. peregrina* L. | **5** |
| - | Subgenus *Cracca* Peterm.  Sect. *Ervoides* (Godr.) Kupicha | Subgenus *Cracca* Peterm.  Sect. *Ervoides* (Godr.) Kupicha | Egypt, Faiyum, in the garden of the University, Abdel Khalik s.n. (SHG). | *V. articulata* Hornem. | **6** |
| Subgenus *Ervum*  Sect. *Ervum* (L.) Taub. | Subgenus *Cracca* Peterm.  Sect. *Ervum* (L.) Taub. | ­­ Subgenus *Cracca* Peterm.  Sect. *Ervum* (L.) Taub. | Netherlands, Prov. Gelderland, on the ruins of Castle Batenburg, J. de Brujn 836 (WAG). | *V. tetrasperma* (L.) Schreber | **7** |
| Subgenus *Ervum*  Sect. *Lenticula*(Endl.) Asch. & Graebn | Subgenus *Cracca* Peterm.  Sect. *Lenticula*(Endl.) Asch. & Graebn | Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | Turkey, Antalya, Kiremithaneler, 12 km SW of Antalya, E. Hennipman et al. 549. (WAG). | *V. hirsuta* (L.) Gray | **8** |
| - | Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | Egypt, Sohag, between fields, Abdel Khalik s.n. (SHG). | *V. monantha* Retz. | **9** |
| Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | Subgenus *Cracca* Peterm.  Sect. *Cracca* Dumort. | France, Soler, Milas, de Wilde, P.W.J. s.n. (WAG). | *V. villosa* Roth subsp. *varia* (Host) Corb. | **10** |
| Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn. | Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn | Subgenus *Vicia* L.  Sect. *Hypechusa* (Alef.) Asch. & Graebn. | Israel, Jerusalem, Mt. Scopus, N. Feinbrun, Grizi & Jacobovitch 346 (WAG). | *V. hybrida* L. | **11** |

Table 2. Seed morphological characteristics of the investigated species of the genus *Vicia*.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Periclinal walls of epidermal cells** | | **Anticlinal walls of epidermal cells** | | | **Hilum shape** | **Luster** | **Seed color** | **Seed size (mm)** | **Seed shape** | **Taxon** | **N** |
| **Secondary sculpture** | **Level** | **Secondary sculpture** | **Undulation** | **Level** |
| Striate | Papillose | Stellate | Slightly undulate | Level to sunken | Oblong | Matt | Dark brown | 4-6 | Ellipsoid | *Vicia narbonensis* L. | 1 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Oblong | Shiny | Brown | 3-4 | Spherical | *V. lutea* L. | 2 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Oblong | Matt | Black to brown | 4.5-6 | Spherical | *V. sativa* L. subsp*. sativa* | 3 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Oblong | Matt | Black | 2.5-4 | Spherical | *V*. *angustifolia* L. | 4 |
| Irregular to ribbed | Sharply papillose | Stellate | Slightly undulate | Leveled to sunken | Ovate | Matt | Dark brown | 3-4 | Spherical | *V. peregrina* L. | 5 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Linear | Shiny | Black to brown | 2-4 | Sub-orbicular | *V. articulata* Hornem. | 6 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Ovate | Matt | Red-brown | 1.5-2 | Spherical | *V. tetrasperma* (L.) Schreber | 7 |
| Ribbed to faveolariate | Lophate | Rodlike | Sinuate | Irregular | Linear | Shiny | Yellowish | 3-4 | Spherical | *V. hirsuta* (L.) Gray | 8 |
| Irregular to ribbed | Sharply papillose | Stellate | Slightly undulate | Irregular | Oblong | Shiny | Dark brown | 3-4 | Spherical | *V. monantha* Retz. | 9 |
| Irregular to ribbed | Papillose | Stellate | Slightly undulate | Irregular | Oblong | Matt | Dark brown | 3-4 | Spherical | *V. villosa* Roth | 10 |
| Irregular to ribbed | Papillose | Stellate | Sinuate | Irregular | Ovate | Shiny | Red-brown | 3-4.5 | Ellipsoid | *V. hybrida* L. | 11 |

Table 3. Comparative analysis of molecular weight (Mol.wt), relative front (RF) of SDS-PAGE protein profile of the genus *Vicia*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band**  **No** | **Relative**  **front** | **Mol.wt.**  **Kda** | **species** | | | | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| **1** | 0.145 | 529.85 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2** | 0.151 | 500.74 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **3** | 0.188 | 398.47 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **4** | 0.208 | 311.60 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **5** | 0.225 | 283.50 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6** | 0.231 | 268.52 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **7** | 0.245 | 257.10 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **8** | 0.253 | 236.28 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **9** | 0.281 | 228.53 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **10** | 0.300 | 202.66 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **11** | 0.302 | 167.35 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **12** | 0.310 | 154.78 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **13** | 0.313 | 141.33 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **14** | 0.364 | 110.18 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **15** | 0.275 | 100.50 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| **16** | 0.283 | 95.51 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **17** | 0.323 | 87.45 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| **18** | 0.346 | 82.80 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| **19** | 0.342 | 75.02 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| **20** | 0.408 | 67.31 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| **21** | 0.414 | 65.24 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| **22** | 0.424 | 63.76 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| **23** | 0.465 | 58.43 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| **24** | 0.493 | 55.16 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| **25** | 0.508 | 51.12 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| **26** | 0.556 | 44.69 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| **27** | 0.596 | 38.66 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| **28** | 0.633 | 33.14 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| **29** | 0.720 | 28.63 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **30** | 0.756 | 25.52 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| **31** | 0.785 | 23.73 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **32** | 0.841 | 19.28 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| **33** | .0.852 | 17.66 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| **34** | 0.879 | 16.98 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| **35** | 0.900 | 15.79 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| **36** | 0.933 | 14.18 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **37** | 0.937 | 13.75 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| **38** | 0.971 | 12.30 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| **39** | 0.979 | 12.45 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | | | **17** | **7** | **6** | **14** | **11** | **14** | **14** | **11** | **12** | **14** | **17** |

Table 4. Similarity matrix between all pairs of studied taxa based on the combination of seed proteins and seed morphology by SEM.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sp.** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| **1** | 100 |  |  |  |  |  |  |  |  |  |  |
| **2** | 25 | 100 |  |  |  |  |  |  |  |  |  |
| **3** | 34.78 | 30.76 | 100 |  |  |  |  |  |  |  |  |
| **4** | 32.25 | 38.09 | 30 | 100 |  |  |  |  |  |  |  |
| **5** | 50 | 55.55 | 23.52 | 32 | 100 |  |  |  |  |  |  |
| **6** | 38.7 | 38.09 | 20 | 28.57 | 56 | 100 |  |  |  |  |  |
| **7** | 38.7 | 38.09 | 10 | 14.28 | 40 | 42.85 | 100 |  |  |  |  |
| **8** | 50 | 55.55 | 35.29 | 32 | 45.45 | 40 | 72 | 100 |  |  |  |
| **9** | 48.27 | 42.1 | 44.44 | 38.46 | 52.17 | 53.84 | 61.53 | 69.56 | 100 |  |  |
| **10** | 58.06 | 38.09 | 40 | 35.71 | 40 | 35.71 | 71.42 | 72 | 69.23 | 100 |  |
| **11** | 41.17 | 41.66 | 26.08 | 38.7 | 35.71 | 32.25 | 77.41 | 57.14 | 55.17 | 77.41 | 100 |