

Bibliographic inventory of Smuts of Morocco

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1 SUMMARY

An inventory of smuts of Morocco is prepared into bibliographic databases. The 132 species are distributed into 5 orders, 10 families and 11 genera. 26 species are pathogenic on cereals and 106 species are related to wild plants.

RESUME. Un inventaire des Charbons du Maroc est élaboré sur des bases bibliographiques. Les 132 espèces recensées sont réparties en 05 ordres, 10 familles et à 11 genres. 26 espèces sont pathogènes sur les céréales et 106 espèces sont liées à des plantes sauvages.

2 INTRODUCTION

The smuts are parasitic fungi affecting mostly the inflorescences of flowering plants including cereals. Mycelial development occurs inside the host and generates a quantity of blackish spores (ustilospores) (Boedyn 1966; Lepoivre, 2003). The latter subsequently germinate outside the host and produce basidiospores on the basidia. The diseases caused by fungi of the genus « *Cintractia*, *Doassansia*, *Farysia*, *Melanotaenium*, *Entyloma*, *Graphiola*, *Sorosporium*, *Sphalotheca*, *Tilletia*, *Tuburcinia* and *Ustilago* » are distinguished by the name of smuts (Bovey et al., 1979). The species of these genres grow on a single host and partially or totally destroy the grains and the rest of the ear, forming an abundant black dust formed by millions of spores which spread the disease (Corbaz, 1990). Some species of smuts can be optional saprophytes (Boedyn, 1966). There are two smuts: covered smuts where the responsible fungi convert all grain, but leave the glumes resist. The bare smuts destroy all spikelets and finally leave the axis of the spike or panicle (Bovey et al., 1979).

Regarding the biology of these fungi, there are two groups that differ in the terms of mode of transmission of the disease.

In smuts with embryonic infection, the infection occurs during the time of germination, as is the case of caries: covered smut of barley, covered and naked smut of oats. In smuts with a floral infection, the infection takes place during the flowering by spores transported by the wind and which germinate on the stigmas such as pollen. They penetrate enter the ovary and contaminate the grain: smut of wheat and barley (Bovey et al., 1979). Early work on the Moroccan flora of smuts goes back to the early 20th century with the work of Maire (1906, 1929, 1931a and 1931b), Unamuno (1933), Maire and Werner (1937) and Malençon and Yen (1937). Between 1940 and 1942, Unammuno published the mycological notes in the Mauritania journal on the smuts (*Entylomatales*, *Exobasidiales*, *Microbotryales*, *Ustilaginales* and *Tilletiales*) encountered in the area of the North occupied

at that time by the Spaniards. Rieuf's work, published during the period from 1969 to 1971 in the Journals of agricultural research, has enriched the inventory of the fungal flora of Morocco. The analysis of all this work shows that the data in Morocco on the mycoflora smuts are fragmented, dispersed and need to be consolidated and updated. The assembly of all the bibliographic data is valuable for future studies and therefore this study presents a first step in conducting an inventory on the Smuts, associated with host plants wild and cultivated

in Morocco. In this work, species are arranged in alphabetical order, the authorities, current names and synonyms and basynonyms are indicated. Scientific names are corrected and updated according to the ninth edition of "Ainsworth and Bisby's Dictionary of the Fungi" (Kirk, 2005). Some abbreviations have been introduced: SNS: substrate not reported. N.c: current Name. Syn.: Synonym. Byn.: Basynonyme. The underlined species are conserved in the Herbarium of the Scientific Institute of Rabat (Morocco).

3 LIST OF SPECIES

Cintractia lygei (Rabenh.) Maire (1907). Byn.: *Ustilago lygei* Rabenh. On *Lygeum sparalum* in Dar Caïd Tounsi (Doukkala) (Maire et Werner, 1937).

Cintractia hypodytes (Schltld.) Maire (1907). Byn.: *Caeoma hypodytes* Schltld. 1824. N.c: *Tranzscheliella hypodytes* (Schltld.) Vánky & McKenzie, *Fungal Diversity Res. Ser.* (Hong Kong) 8: 156 (2002). Syn.: *Caeoma hypodytes* Schltld., *Fl. berol.* (Berlin) 2: 129 (1824), *Cintractia hypodytes* (Schltld.) Maire, *Bull. Soc. bot. Fr.* 54: CXCVIII (1907), *Uredo hypodytes* (Schltld.) Pers., *Syn. meth. fung.* (Göttingen) 1: 214 (1801), *Ustilago hypodytes* (Schltld.) Fr., *Syst. mycol.* (Lundae) 3(2): 518 (1832) and *Ustilago hypodytes* var. *lolii* Thüm., in Thümen, *Herb. myc. oeconom.*: no. 162 (1874). On *Brachypodium romasum* and *Haynaldia hordeacea* in Aknoul (Rif) and Azrou (Maire et Werner, 1937).

Cintractia stipae-barbatae Maire (1937). Byn.: *Ustilago stipae-barbatae* Maire 1917. N.c: *Tranzscheliella stipae-barbatae* (Maire) Vánky, *Mycotaxon* 106: 138 (2008). Syn.: *Ustilago stipae-barbatae* Maire, *Bull. Soc. Hist. nat. Afr. N.* 8: 139 (1917). On *Stipa barbata* in Taourirt (Maire et Werner, 1937).

Doassansia martianoffiana (Thüm.) J. Schröt. (1887). Byn.: *Protomyces martianoffianus* Thüm. 1878. N.c: *Doassansiopsis hydrophila* (A. Dietr.) Lavrov, in Engler & Prantl, *Nat. Pflanzenfam.*, Teil. I (Leipzig) 1*: 15, 21 (1897). Syn.: *Cercospora aquatilis* (Peck) Gonz. Frag., *Revta R. Acad. Cienc. exact. fis. nat. Madr.* 15: 724 (1917), *Doassansia hydrophila* (A. Dietr.) B. Lindeb., *Symb. bot. upsal.* 16(no. 2): 23 (1959), *Doassansia martianoffiana* (Thüm.) J. Schröt., in Cohn, *Krypt.-Fl. Schlesien* (Breslau) 3.1(17-24): 287 (1887) [1889], *Doassansiella aquatilis* (Peck) Zambett., *Revue Mycol.*, Paris 35(1-2): 165 (1970), *Doassansiopsis martianoffiana* (Thüm.) Dietel, in Engler & Prantl,

Nat. Pflanzenfam., Teil. I (Leipzig) 1(1*): 21 (1897), *Entylomella aquatilis* (Peck) U. Braun, *Monogr. Cercospora, Ramularia Allied Genera (Phytopath. Hyphom.)* 1: 101 (1995), *Phyllosticta potamia* Cooke, *Grevillea* 14(no. 70): 39 (1885), *Protomyces martianoffianus* Thüm., *Bull. Soc. Imp. Moscou* 53: 207 (1878), *Ramularia aquatilis* Peck, *Ann. Rep. N.Y. St. Mus. nat. Hist.* 35: 142 (1884) [1882], *Savulescuella aquatilis* (Peck) Cif., *Lejeunia Mém.*: 179 (1959) and *Sphaeria hydrophila* A. Dietr., 1: 512 (1859). On *Potamogeton polygonijolius* near Oued Akhal (Gharb) (Maire et Werner, 1937).

Entyloma ambiens (P. Karst.) Johans. On *Briza maxima* (Rieuf, 1969).

Entyloma atlantica Massenot (1958). On *Geranium malvijlorum* (Rieuf, 1969).

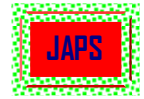
Entyloma brizae Unamuno & Cif. (1931). N.c: *Jamesdicksonia brizae* (Unamuno & Cif.) Piątek & Vánky, in Piątek & Prończuk 2006. On *Briza maxima* (Rieuf, 1969).

Entyloma calendulae (Oudem.) de Bary (1874). N.c: *Entyloma calendulae* (Oudem.) de Bary, *Bot. Ztg.* 32: 105 (1874). Syn.: *Protomyces calendulae* Oudem., *Arch. Néerlandaises des Sc. exacts et nat.* 8: 384 (1873). On *Calendula officinalis* and *Dahlia* sp (Rieuf, 1969).

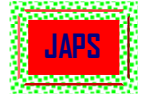
Entyloma catananchis Cif. ex Vánky (1988). N.c: *Entyloma catananchis* Cif. ex Vánky, *Mycotaxon* 33: 366 (1988). On *Leotodon* sp (Rieuf, 1969). On *catananche caerulea* in Tazzeka (Maire et Werner, 1937).

Entyloma compositarum* var. *bellidis (Krieg.) Cif., *Quaderno Ist. Bot. Univ. Pavia* 27: 89 (1963). N.c: *Entyloma bellidis* Krieg. 1896. Byn.: *Entyloma bellidis* Krieg. 1896. On *Leotodon* sp (Rieuf, 1969).

Entyloma compositarum Farl. (1883) var. ***catananches*** (Cif.) Cif. (1963). On *Catananche caerulea* (Rieuf, 1969).



- Entyloma corydalis* de Bary (1874). On *Fumaria agaria* (Rieuf, 1969).
- Entyloma corydalis-lutea* Voglino (1896). On *Fumaria agaria* (Rieuf, 1969).
- Entyloma crastophilum* Sacc., *Michelia* 1 (no. 5): 540 (1879). N.c: *Jamesdicksonia dactylidis* (Pass.) R. Bauer, Begerow, A. Nagler & Oberw. 2001. On *Briza maxima* (Rieuf, 1969). On *Briza maxima* in Tanger (Maire et Werner, 1937).
- Entyloma crastophilum* var. *cynosuri* (Gonz. Frag. & Cif.) Cif. (1963). On *Cynosurus echinatus* (Rieuf, 1969).
- Entyloma crastophilum* var. *spinosum* (Unamuno) Cif. (1963). On *Koeleria caudata* (Rieuf, 1969).
- Entyloma cynosuri* Gonz. Frag. & Cif. (1925). Syn.: *Entyloma cynosuri* Gonz Frag. & Cif; *Entyloma crastophilum* var. *cynosuri* (Gonz Frag. & Cif.) (1963). On the leaves of *Cynosurus echinatus* and *Briza maxima* in Ceuta (Unamuno, 1940a and d; Unamuno, 1941). On *Cynosurus echinatus* (Rieuf, 1969).
- Entyloma dahliae* Syd. & P. Syd. (1912) & (Sternon) Cif., *Boll. Soc. bot. ital.* 2: 48 (1924). N.c: *Entyloma dahliae* Syd. & P. Syd., *Annls mycol.* 10(1): 36 (1912). Syn.: *Entyloma calendulae* f. *dahliae* (Syd. & P. Syd.) Viégas, *Bragantia* 4(1-6): 748 (1944) and *Entylomella dahliae* Cif. ex Boerema & Hamers, *Netherlands Journal of Plant Pathology*, Supplement 96(1): 7 (1990). On *Dahlia* sp (Rieuf, 1969).
- Entyloma dietelianum* Bubák, *Annls mycol.* 1 (3): 255 (1903). N.c: *Entylomaster dietelianus* (Bubák) Vánky & R.G. Shivas 2006. Syn: *Urophlyctis pulposa* Bib., *Melanotaenium ari* var. *dietelianum* (Bubák) Cif., (1963) and *Elantaenium dietelianum* (Bubák) Cif. On *Aracea* sp (Unamuno, 1942a and Rieuf, 1969).
- Entyloma erodianum* Saccardo. On *Geranium malvijlorum* (Rieuf, 1969).
- Entyloma eryngii* (Corda) de Bary (1874). N.c: *Entyloma eryngii* (Corda) de Bary, *Bot. Ztg.* 32: 105 (1874). Syn.: *Physoderma eryngii* Corda, *Icon. fung.* (Prague) 3: 3 (1839). On *Eryngium tricuspidatum* and *E. maroccanum* (Rieuf, 1969).
- Entyloma eryngii-dichotomi* Maire. On *Eryngium maroccanum* (Rieuf, 1969).
- Entyloma eryngii-tricuspidati* Maire. On *Eryngium tricuspidatum* in Arbaoua, Azrou and Ourika (Maire et Werner, 1937). On *Eryngium maroccanum* (Rieuf, 1969).
- Entyloma espinosae* Unamuno (1940). On *Koeleria caudata* (Rieuf, 1969).
- Entyloma ficariae* A.A. Fisch. Waldh. (1877). N.c: *Entyloma ficariae* A.A. Fisch. Waldh., *Bull. Soc. nat. Moscou*, *Biol.* 52: 309 (1877). Syn.: *Protomyces microsporus* sensu Cooke [Grevillea 3: 181 (1875)], *Cylindrosporium ficariae* Berk., *British Fungi*: no. 212 (1837), *Gloeosporium ficariae* (Berk.) Cooke, *Handb. Brit. Fungi* 1: 475 (1871), *Entylomella ficariae* (Berk.) Höhn., *Annls mycol.* 22(1/2): 193 (1924), *Fusidium ranunculi* Bonord., *Handb. Allgem. mykol.* (Stuttgart): 43 (1851), *Entyloma ranunculi* (Bonord.) J. Schröt., in Cohn, *Beitr. Biol. Pfl.* 2: 370 (1877), *Cylindrosporium ranunculi* (Bonord.) Sacc., *Michelia* 1(no. 5): 504 (1879), *Entylomella ranunculi* (Bonord.) Höhn., *Öst. bot. Z.* 66: 105 (1916), *Entylomella ranunculi* (Bonord.) Cif., *Lejeunia Mém.*: 177 (1924), *Entyloma ungerianum* f. *ficariae* G. Winter, in Rabenhorst, *Fungi europ. exsicc.* 4: no. 1873 (1874), *Protomyces ficariae* Cornu & Roze, *Bull. Soc. bot. Fr.* 21: 161 (1874) and *Entyloma ungerianum* f. *ficariae* Thüm., *Mycoth. Univ.*: no. 219 (1875). On *Ranunculus ficaria* ssp. *ficariiformis* (Rieuf, 1969 and 1971).
- Entyloma fumariae* J. Schröt. On *Fumaria agaria* (Rieuf, 1969).
- Entyloma fuscum* J. Schröt. (1877). N.c: *Entyloma fuscum* J. Schröt., in Cohn, *Beitr. Biol. Pfl.* 2: 373 (1877). Syn.: *Entyloma bicolor* Zopf, in Rabenhorst, *Hedvigia* 17: 88 (1878) and *Entylomella fusca* Cif., *Lejeunia Mém.*: 177 (1959). On *Papaver* sp (Rieuf, 1969 and 1971).
- Entyloma helosciadii* Magnus (1882). N.c: *Entyloma helosciadii* Magnus, *Hedvigia* 21: 129 (1882). Syn.: *Entylomella helosciadii-repentis* (Magnus) Höhn. [as 'helioscladii-repentis'], *Öst. bot. Z.* 66: 105 (1916) and *Cylindrosporium helosciadii-repentis* Magnus [as 'helioscladii-repentis'], *Annls mycol.* 22(1/2): 193 (1924). On *Helosciadium nodiflorum* in Ras-el-Ma (Maire et Werner, 1937). On *Apium graveolens* (Unamuno, 1942a). On *Apium graveolens* and *Helosciadium nodiflorum* (Rieuf, 1969).
- Entyloma henningsianum* Dietel & P. Syd. (1900). N.c: *Entyloma henningsianum* Dietel & P. Syd., *Hedvigia* 39: 123 (1900). SNS (Unamuno, 1940d). On *Samolus valerandi* (Rieuf, 1969).
- Entyloma leproideum* Trab. (1894). SNS (Rieuf, 1969).
- Entyloma linariae* J. Schröt. (1877). N.c: *Entyloma linariae* J. Schröt., in Cohn, *Beitr. Biol. Pfl.* 2: 371 (1877). Syn.: *Tuburcinia linariae* (J. Schröt.) Sacc., in Berlese, De Toni & Fischer, *Syll. fung.* (Abellini) 7: 480A (1888). On *Veronica persica* (Rieuf, 1969).



Entyloma maroccanum Maire (1937). On *Eryngium maroccanum* (Maire et Werner, 1937; Rieuf, 1969 and 1971).

Entyloma microsporum (Unger) J. Schröt. (1874). N.c.: *Entyloma microsporum* (Unger) J. Schröt., in Rabenhorst, *Fungi europ. exsicc.*: no. 1872 (1874). Syn.: *Protomyces microsporus* (Unger) Cooke, (1833), *Protomyces microsporus* Unger, *Exanth. Pflanzen* (Wien): 343 (1834), *Entyloma ungerianum* de Bary, *Bot. Ztg.* 32(7): 101 (1874), *Cylindrosporium ranunculi* var. *microsporum* D. Sacc., *Mycotheca ital.*: no. 1456 (1904) and *Entylomella microsporum* (D. Sacc.) Cif., *Fl. ital. crypt.* 1(17, Ustil.): 197 (1938). On *Ranunculus dyris* in Ourika (Maire et Werner, 1937; Rieuf, 1969).

Entyloma pachydermum Liro (1935). On *Briza maxima* (Rieuf, 1969).

Entyloma ranunculi (Bonord.) J. Schröt., in Cohn, *Beitr. Biol. Pfl.* 2: 370 (1877). N.c.: *Entyloma ficariae* A.A. Fisch. Waldh. 1877. Syn.: *Fusidium ranunculi* Bonord. 1851. On *Ficaria calthaeifolia* and *Ranunculus* sp (Unamuno, 1942a). On *Ranunculus ficaria* (Rieuf, 1969).

Entyloma thrinciae Maire. On *Thrincia* sp (Unamuno, 1942a). On *Leotodon* sp (Rieuf, 1969).

Entyloma ungerianum de Bary, *Bot. Ztg.* 32(7): 101 (1874). N.c.: *Entyloma microsporum* (Unger) J. Schröt., in Rabenhorst 1874. On *Ranunculus dyris* (Rieuf, 1969 and 1971).

Entyloma veronicae (Halst.) Lagerh. (1891). N.c.: *Entyloma veronicae* (Halst.) Lagerh., *Bull. Soc. mycol. Fr.* 7: 170 (1891). Syn.: *Entyloma linariae* f. *veronicae* Halst., (1890), *Ramularia pygmaea* Lindr., *Acta Soc. Fauna Flora fenn.* 23(3): 33 (1902), *Entylomella pygmaea* (Lindr.) U. Braun, *Nova Hedwigia* 58(1-2): 217 (1994) and *Entyloma veronicicola* Lindr., *Acta Soc. Fauna Flora fenn.* 26: 13 (1904). On *Veronica persica* (Unamuno, 1942a; Rieuf, 1969).

Entyloma vulpiae Massenot (1960). On *Vulpia geniculata* ssp. *breviglumis* var. *glabriglumis* (Rieuf, 1969 and 1971).

Entyloma xauence Unamuno (1940). On *Leucanthemum vulgare* (Unamuno, 1942a). On *Leucanthemum* sp (Rieuf, 1969).

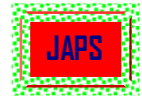
Farysia olivacea (Jaap) Höhn. (1917) & (DC.) Syd. & P. Syd. (1920). Byn.: *Stilbella olivacea* Jaap 1916. N.c.: *Farysia thuemenii* (A.A. Fisch. Waldh.) Nannf., *Symb. bot. upsal.* 16(no. 2): 51 (1959). Syn.: *Caeoma olivaceum* (DC.) Schldtl., *Fl. berol.* (Berlin) 2: 130 (1824), *Elateromyces olivaceus* (DC.) Bubák, *Arch. Přírodov. Vědy. Čech.* 15(3): 32 (1912), *Erysibe olivacea* (DC.) Wallr., *Fl. crypt. Germ.*

(Norimbergae) 2: 215 (1833), *Farysia caricis* (DC.) Liro, *Suomal. Tiedeakat., Toim.* A 42: 49 (1935), *Farysia jaapii* Syd., in Saccardo, *Syll. fung.* (Abellini) 23: 631 (1925), *Farysia olivacea* (DC.) Syd. & P. Syd., *Annls mycol.* 17(2/6): 141 (1920) [1919], *Farysia olivacea* (Jaap) Höhn., *Annls mycol.* 15(5): 293 (1917), *Farysia olivacea* (DC.) Syd. & P. Syd., *Annls mycol.* 17(1): 41 (1920) [1919] var. *olivacea*, *Farysia subolivacea* (Henn.) Cif., *Nuovo G. bot. ital.* 40(2): 258 (1933), *Stilbella olivacea* Jaap, *Annls mycol.* 14(1/2): 43 (1916), *Uredo olivacea* DC., in de Candolle & Lamarck, *Fl. franç.*, Edn 3 (Paris) 5/6: 78 (1815), *Uredo segetum* f. *caricis* DC., in Lamarck & de Candolle, *Fl. franç.*, Edn 3 (Paris) 2: 230 (1805), *Uredo segetum* var. *caricis* DC., in Lamarck & de Candolle, *Fl. franç.*, Edn 3 (Paris) 2: 230 (1805), *Ustilago caricicola* Tracy & Earle, *Bull. Torrey bot. Club* 26: 493 (1899), *Ustilago olivacea* (DC.) Tul. & C. Tul., *Annls Sci. Nat., Bot.*, sér. 3 7: 88 (1847), *Ustilago subolivacea* Henn., *Annuaire. R. Ist. bot. Roma* 6(2): 84 (1896) [1895] and *Ustilago thuemenii* A.A. Fisch. Waldh., *Hedwigia* 17: 40 (1878). On *Carex pendula* in Larache (Maire et Werner, 1937).

Graphiola phoenicis (Moug.) Poit. (1824). N.c.: *Graphiola phoenicis* (Moug.) Poit., *Annls Sci. Nat., Bot.*, sér. 1 3: 473 (1824). Syn.: *Phacidium phoenicis* Moug. ex Fr., *Syst. mycol.* (Lundae) 2(2): 572 (1823). *Phoenix dactylifera* in Ceuta (Unamuno, 1940a and 1942). On *Chamaerops humilis*, *Phoenix dactylifera* and *P. carariensis* (Rieuf, 1969 and 1971). feuilles vivantes de On the living leaves of *Phoenix* sp in Tanger (El Assfour et al., 2003). On *Chamaerops humilis*, *Phoenix dactylifera* and *P. carariensis* in Tanger, Rabat, Bou-Skoura, Marrakech and Tiznit (Maire et Werner, 1937).

Melanotaenium cingens (Beck) Magnus (1892) & Bref. (1892). N.c.: *Melanotaenium cingens* Bref., *Öst. bot. Z.* 42: 40 (1892). Syn.: *Cintractia cingens* (Beck) De Toni, in Berlese, De Toni & Fischer, *Syll. fung.* (Abellini) 7: 481 (1888), *Melanotaenium caulium* (A. Schneid.) J. Schröt., in Cohn, *Krypt.-Fl. Schlesien* (Breslau) 3.1(17-24): 285 (1887) [1889], *Melanotaenium cingens* (Beck) Magnus, *Öst. bot. Z.* 42(2): 40 (1892), *Ustilago caulium* A. Schneid., and *Ustilago cingens* Beck, *Öst. bot. Z.* 31: 313 (1881). On *Linaria tristis* in Ito (Middle Atlas) (Maire et Werner, 1937).

Schroeteria delastrina (Tul. & C. Tul.) G. Winter (1881). Byn.: *Thecaphora delastrina* Tul. & C. Tul. 1847. N.c.: *Schroeteria delastrina* (Tul. & C. Tul.) G. Winter, *Rabenb. Krypt.-Fl.*, Edn 2 (Leipzig) 1.1: 117 (1881) [1884]. Syn.: *Geminella delastrina* (Tul. & C.



Tul.) J. Schröt., *Hedwigia*, Beibl. 9: 137 (1870), *Schizonella delastrina* (Tul. & C. Tul.) Thirum. & M.D. Whitehead, *Am. J. Bot.* 55: 186 (1968), *Schroeteria delastrina* var. *reticulata* Cocc., *Mem. R. Accad. Sci. Ist. Bologna*, Ser. 6: 219 (1898) and *Thecaphora delastrina* Tul. & C. Tul., *Annls Sci. Nat., Bot.*, sér. 3 7: 108 (1847). On *Veronica arvensis* in Rabat (Maire et Werner, 1937).

Sorosporium bornmuelleri Magnus. On *Aristida caerulea* in Melilla (Maire et Werner, 1937; Rieuf, 1970).

Sorosporium consanguineum Ellis & Everh., *J. Mycol.* 3(5): 56 (1887). N.c: *Sporisorium consanguineum* (Ellis & Everh.) Vánky 1988. On *Aristida caerulea* and *A. plumosa* var. *floccosa* (Rieuf, 1970). On *Aristida plumosa* var. *floccosa* between Tinghir and Timatraouine (Morocco desert) (Maire et Werner, 1937).

Sorosporium icosiense Maire. On *Andropogon distachyus* (Maire et Werner, 1937; Rieuf, 1970).

Sorosporium maroccanum Unamuno. On *Aristida adscensionis* (Unamuno, 1940a; Rieuf, 1970).

Sorosporium overeimi (Ciferri) Malençon. On *Panicum repens* (Rieuf, 1970 and 1971).

Sorosporium punctatum Malençon et Yen. On *Panicum repens* in Kenitra, Oued Fouarat, Oued El Akhal (Gharb), Fes and Taourirt (Maire et Werner, 1937; Rieuf, 1970).

Sorosporium reilianum (J.G. Kühn) McAlpine, (1910). N.c: *Sphacelotheca reiliana* (J.G. Kühn) G.P. Clinton 1902. Byn.: *Ustilago reiliana* J.G. Kühn, in Thümen 1875. On *Andropogon halepense*, *A. sorghum* and *Sorghum saccharatum* (Rieuf, 1970).

Sorosporium saponariae F. Rudolphi, *Linnaea* 4: 116 (1829). N.c: *Thecaphora saponariae* (F. Rudolphi) Vánky 1998. On *Arenaria pungens*, *Cerastium gibraltarium* and *Dianthus virgineus* (Rieuf, 1970). On *Arenaria pungens*, *Cerastium gibraltarium* var. *boisieri* and *Dianthus virgineus* in Aguelman Sidi-Ali and Reraya (Maire et Werner, 1937).

Sphacelotheca andropogonis (Opiz) Bubák, *Arch. Přírodov. Vjzřk. Čech.* 15(3): 25 (1912). N.c: *Sporisorium andropogonis* (Opiz) Vánky 1985. Byn.: *Uredo andropogonis* Opiz 1824. On *Andropogon hirtus* (Rieuf, 1970). On *Andropogon distachyus* in Ourika near Ajaioua (El Assfour et al., 2003).

Sphacelotheca aristidae-lanuginosae Maire (1906). On *Aristida oranensis* (Maire et Werner, 1937; Rieuf, 1970).

Sphacelotheca columellifera (Tul. & C. Tul.) Cif. (1928). On *Andropogon laniger* (Rieuf, 1970).

Sphacelotheca foveolati Maire (1931). On *Andropogon faveolatus* (Maire et Werner, 1937; Rieuf, 1970).

Sphacelotheca holci-sorghii Cif., *Fl. ital. crypt.* 1(17, Ustil.): 267 (1938). N.c: *Sphacelotheca reiliana* (J.G. Kühn) G.P. Clinton 1902. On *Andropogon halepense*, *A. sorghum* and *Sorghum saccharatum* (Rieuf, 1970).

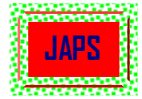
Sphacelotheca ischaemi (Fuckel) G.P. Clinton (1902). Syn: *Ustilago ischaemi* Fuckel. On *Andropogon hirtus* in El Houcema (Rif) (Maire et Werner, 1937; Unamuno, 1940a and c; Rieuf, 1970).

Sphacelotheca lanigeri (Magnus) Maire (1930). On *Andropogon schoenanthus* (Rieuf, 1970). On *Andropogon laniger* in Figuig and Skourat (Maire et Werner, 1937).

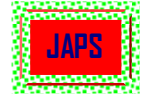
Sphacelotheca reiliana (J.G. Kühn) G.P. Clinton (1902). N.c: *Sphacelotheca reiliana* (J.G. Kühn) G.P. Clinton, *J. Mycol.* 8 (3): 141 (1902). Syn.: *Cintractia reiliana* (J.G. Kühn) Clinton, *Ustilago reiliana* J.G. Kühn, in Thümen, *Fungi europ. exsicc.*: no. 1998 (1875), *Sorosporium reilianum* (J.G. Kühn) McAlpine (1910), *Sporisorium reilianum* (J.G. Kühn) Langdon & Full., *Mycotaxon* 6(3): 452 (1978), *Ustilago holci-sorghii* Rivolta, *Sorosporium holci-sorghii* (Rivolta) Moesz, *Kárpát-Medence Üszöggombák.* 147 (1950), *Sporisorium holci-sorghii* (Rivolta) Vánky, *Symb. bot. upsal.* 24(no. 2): 117 (1985) and *Sphacelotheca holci-sorghii* Cif., *Fl. ital. crypt.* 1(17, Ustil.): 267 (1938). On *Andropogon halepense*, *A. sorghum* and *Sorghum saccharatum* (Rieuf, 1970). On *Sorghum halepense* and *S. vulgare* in Fes, Bou-Khamouj and Ouezzan (Maire et Werner, 1937).

Sphacelotheca schweinfurthiana (Thüm.) Sacc. (1908). N.c: *Sphacelotheca schweinfurthiana* (Thüm.) Sacc., (1908). Syn.: *Ustilago schweinfurthiana* Thüm., *Sporisorium schweinfurthianum* (Thüm.) Vánky, *Publications from the Herbarium, University of Uppsala, Sweden* 11: 12 (1983) and *Sporisorium schweinfurthianum* (Thüm.) Karatygin, in Karatygin & Azbukina, *Opredelitel' Gribov SSSR. Poryadok Golovnyye Fascicle 1. Semeštvo Ustilagorye* (Leningrad): 80 (1989). On *Imperata cylindrica* (Maire et Werner, 1937; Rieuf, 1970).

Sphacelotheca sorghii (Ehrenb. ex Link) G.P. Clinton, *J. Mycol.* 8(3): 140 (1902). N.c: *Sporisorium sorghii* Ehrenb. ex Link, in Willdenow 1825. Byn.: *Sporisorium sorghii* Ehrenb. ex Link, in Willdenow 1825. On *Andropogon halepense* and *A. sorghum* (Rieuf, 1970). On *Sorghum halepense* and *S. vulgare* in Rabat, Kenitra and Fes (Maire et Werner, 1937).



- Tilletia bromi*** (Brockmann) Brockmann (1959). N.c: *Tilletia bromi* (Brockm.) Brockm., in Lindeburg, *Symb. bot. upsal.* 16 (2): 69 (1959). Syn.: *Ustilago bromi* Brockm.; 233 (1863). On *Bromus bordaceus* (Rieuf, 1970).
- Tilletia bromina*** Maire (1929). On *Bromus bordaceus* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia caries*** (DC.) Tul. & C. Tul. (1847). N.c: *Tilletia caries* (DC.) Tul. & C. Tul., *Annls Sci. Nat., Bot.*, sér. 3 7: 113 (1847). Syn.: *Uredo caries* DC., in de Candolle & Lamarck, *Fl. franç.*, Edn 3 (Paris) 5/6: 78 (1815), *Lycoperdon tritici* Bjerck., *K. svenska Vetensk-Akad. Handl.* 36: 326 (1775), *Tilletia tritici* (Bjerck.) G. Winter, *Die Brand des Getreide.* 13 (1874) and *Fusisporium inosculans* Berk., *J. hort. Soc.*, London 2: 114 (1847). On *Triticum durum* and *T. sativum* (Rieuf, 1970 and 1971). On *Triticum durum* in Chaouia (Lyamani, 1975; Anonyme, 1976; Sayoud et al., 1999).
- Tilletia controversa*** J.G. Kühn (1874). N.c: *Tilletia controversa* J.G. Kühn, in Rabenhorst, *Hedwigia* 13: 188 (1874). Syn.: *Tilletia tritici* var. *controversa* (J.G. Kühn) Kawchuk, in Kawchuk & Nielsen, *Can. J. Bot.* 66(12): 2376 (1988), *Tilletia tritici-nanifica* F. Wagner [as '*tritici nanifica*'], 1: 12 (1950), *Tilletia nanifica* (F. Wagner) Sävul., *Phytopath. Z.* 25: 306 (1956) and *Tilletia brevifaciens* G.W. Fisch., *Res. Stud. State Coll. Wash.* 20: 11 (1952). On *Hordeum murinum* (Rieuf, 1970).
- Tilletia cynosuri*** Massenot (1955). On *Cynosurus effusus* (Rieuf, 1970).
- Tilletia decamarae*** Unamuno. On *Avellinae michelii* in Beni Hadifa (Unamuno, 1940b). On *Avellinae michelii*, *Catapodium tenellum*, *Vulpia geniculata* ssp. *glabriglumis* and *V. myuros* (Rieuf, 1970).
- Tilletia decipiens*** (Pers.) Körn., *Hedwigia* 16: 30 (1877). N.c: *Tilletia sphaerococca* A.A. Fisch. Waldh. 1867. Byn.: *Uredo segetum decipiens* Pers. 1801. On *Agrostis salmantica* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia epiphylla*** Berk. & Broome, *Trans. Linn. Soc. London, Bot.*, Ser. 2. 2: 67 (1882). N.c: *Puccinia sorghi* Schwein. 1832. On *Oxalis corniculata* and *Zea mays* (Rieuf, 1970).
- Tilletia foetens*** (Berk. & M.A. Curtis) Trel., (1884). N.c: *Tilletia laevis* J.G. Kühn 1873. Byn.: *Ustilago foetens* Berk. & M.A. Curtis 1860. On *Triticum durum* and *Triticum sativum* (Rieuf, 1970).
- Tilletia foetida*** (Wallr.) Liro, *Maanviljelys Talondellin Koelaitos Vuoskeinija 1915-1916*: 27 (1920) [1915-1916]. N.c: *Tilletia laevis* J.G. Kühn 1873. Byn.: *Erysibe foetida* Wallr. 1833. On *Triticum durum* and *T. sativum* (Rieuf, 1970). On *Triticum durum* (Lyamani, 1975; Anonyme, 1976; Sayoud et al., 1999).
- Tilletia fusca*** Ellis & Everh. On *Avellinia michelii*, *Catapodium tenellum*, *Vulpia geniculata* ssp. *glabriglumis*, *V. myuros* and *V. geniculata* (Rieuf, 1970 and 1971).
- Tilletia haynaldiae*** Maire (1927). On *Haynaldia bordeacea* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia hordei*** Körn. (1877). On *Hordeum murinum* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia laevis*** J.G. Kühn (1873). N.c: *Tilletia laevis* J.G. Kühn, *Rabenhorst's Fungi europ. exsicc.*: no. 1697 (1873). Syn.: *Tilletia tritici* var. *laevis* (J.G. Kühn) Kawchuk, in Kawchuk & Nielsen, *Can. J. Bot.* 66(12): 2376 (1988), *Erysibe foetida* Wallr., *Fl. crypt. Germ.* (Nürnberg) 2: 213 (1833), *Tilletia foetida* (Wallr.) Liro, *Maanviljelys Talondellin Koelaitos Vuoskeinija 1915-1916*: 27 (1920), *Ustilago foetens* Berk. & M.A. Curtis (1860) and *Tilletia foetens* (Berk. & M.A. Curtis) Trel., (1884). On *Triticum durum* and *T. sativum* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia narduri*** Unamuno (1933). On *Avellinia michelii*, *Catapodium tenellum*, *Vulpia geniculata* ssp. *glabriglumis* and *V. myuros* (Rieuf, 1970). On *Catapodium tenellum* in Khessana and Chaouen (Rif) (Maire et Werner, 1937).
- Tilletia salzmännii*** Maire (1937). On *Koeleria salzmännii* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia sterilis*** Ule. On *Koeleria caudata* (Rieuf, 1969).
- Tilletia tritici*** (Bjerck.) G. Winter, *Die Brand des Getreide.* 13 (1874). N.c: *Tilletia caries* (DC.) Tul. & C. Tul. 1847. Byn.: *Lycoperdon tritici* Bjerck. 1775. On *Triticum durum* and *T. sativum* (Maire et Werner, 1937; Rieuf, 1970).
- Tilletia vulpiae*** Magnus (1899). On *Avellinia michelii*, *Catapodium tenellum*, *Vulpia geniculata* ssp. *glabriglumis* and *V. myuros* (Rieuf, 1970).
- Tilletia vulpiae* var. *myuri*** Gonz. Frag. 1917. On *Vulpia myuris* in Melilla and Gourougou (Maire et Werner, 1937).
- Tubercinia ranunculi*** (Lib.) Liro 1922. Byn.: *Sporisorium ranunculi* Lib. 1832. N.c: *Urocystis ranunculi* (Lib.) Moesz, *Kárpát-Medence Üszögombái* 213(1950): 213 (1950). Syn.: *Sporisorium ranunculi* Lib., *Pl. crypt. Arduenna*, fasc. (Liège) 2: no. 195 (1832) and *Tubercinia ranunculi* (Lib.) Liro, *Ann. Univ., fenn. Aboënsis*, Ser. A 1(no. 1): 69 (1922). On *Ranunculus flabellatus* and *R. aleae* in Meknes and Azrou (Maire et Werner, 1937).
- Tubercinia poae*** Liro 1922. N.c: *Urocystis poae*



(Liro) Padwick & A. Khan, *Mycol. Pap.* 10: 2 (1944). Syn.: *Tuburcinia occulta* var. *poae* (Liro) Cif., *Quaderno Ist. Bot. Univ. Pavia* 27: 327 (1963) and *Tuburcinia poae* Liro, *Ann. Univ., fenn. Aboënsis*, Ser. A 1(no. 1): 22 (1922). On *Poa annua* var. *rivulorum* in Aouljdid (Maire et Werner, 1937).

Tuburcinia leimbachii (Oertel) Liro 1922. N.c: *Urocystis leimbachii* Oertel, *Irmischia Jahrg.* 2: 125 (1883). Syn.: *Tuburcinia leimbachii* (Oertel) Liro, *Ann. Univ., fenn. Aboënsis*, Ser. A 1(no. 1): 81 (1922). On *Adonis annua* in Ighrem (Maire et Werner, 1937).

Tuburcinia mustaphae (Maire) Liro 1922. N.c: *Urocystis mustaphae* Maire, *Bull. Soc. Hist. nat. Afr. N.* 7: 151 (1915). Syn.: *Tuburcinia mustaphae* (Maire) Liro, *Ann. Univ., fenn. Aboënsis*, Ser. A 1(no. 1): 79 (1922). On *Clematis cirrhosa* in Oued Cherrat (Maire et Werner, 1937).

Ustilago avenae (Pers.) Rostr. (1890). N.c: *Ustilago avenae* (Pers.) Rostr., *Overs. K. danske Vidensk. Selsk. Forh. Medlemmers Arbeider.* 13 (1890). Syn.: *Uredo segetum? avenae* Pers., *Syn. meth. fung.* (Göttingen) 1: 225 (1801), *Ustilago segetum var. avenae* (Pers.) Brunaud, *Act. Soc. linn. Bordeaux*, sér. A 32(2): 163 (1878), *Erysibe vera var. holci-avenacei* Wallr., *Fl. crypt. Germ.* (Nürnberg) (1833), *Ustilago holci-avenacei* (Wallr.) Cif., *Fl. ital. crypt.* 1(17, Ustil.): 293 (1938), *Uredo avenae* Castagne, *Observ. Uréd.* 1: 25 (1842), *Ustilago jensenii* Rostr., (1890), *Ustilago perennans* Rostr., *Overs. K. danske Vidensk. Selsk. Forh. Medlemmers Arbeider.* 15 (1890), *Ustilago avenae var. levis* Kellerm. & Swingle, 2: 214 (1890), *Ustilago levis* (Kellerm. & Swingle) Magnus (1894), *Ustilago avenae f.sp. avenae* Boerema & Verh., *Overs. K. danske Vidensk. Selsk. Forh. Medlemmers Arbeider.* 13 (1890), *Ustilago kollerii* Wille, *Bot. Notiser.* 10 (1893), *Ustilago rostrupii* Kitunen, (1922), *Ustilago nigra* Tapke, *Phytopath. Z.* 22: 869 (1932) and *Ustilago bordei f.sp. avenae* Boerema & Verh., *Netb. JI Pl. Path.* 83(5): 198 (1977). On *Avena algeriensis*, *A. barbata*, *A. longissima*, *A. sterilis* and *A. sativa* in the forest of Mamora, Casablanca, Rabat, Bab Taza, Zerhoune, Gharb and Zghariine (Maire et Werner, 1937; El Osfori et al., 2003).

Ustilago avenae f. foliicola D'Almeida. On *Arrhenatherum elatius*, *Avena alba*, *A. algeriensis*, *A. longissima*, *A. sativa* and *A. sterilis* (Rieuf, 1970).

Ustilago avenae var. levis. Kellerm. & Swingle (1890). N.c: *Ustilago avenae* (Pers.) Rostr. 1890). On *Avena sativa*, *Hordeum hexastichum* and *Hordeum vulgare* (Rieuf, 1970).

Ustilago brachypodii-distachyii Maire. On *Brachypodium distachyum* in Targuist (Maire et Werner, 1937). On *Stipa barbata* (Rieuf, 1971).

Ustilago bromivora (Tul. & C. Tul.) A.A. Fisch. Waldh. (1867). N.c: *Ustilago bullata* Berk (1855). Byn.: *Ustilago carbo d bromivora* Tul. & C. Tul. 1847. On *Bromus hordaceus*, *B. macrostachys*, *B. madritensis*, *B. rubens*, *B. sterilis*, *B. tectorum* in Dar Riffien (Maire et Werner, 1937; Rieuf, 1970). On *B. rubens* ssp. *eurubens*, *B. sp.*, and *B. villosus* (Rieuf, 1970). On *Bromus rubens* near Berquent (El Assfour et al., 2003).

Ustilago bullata Berk. (1855). N.c: *Ustilago bullata* Berk., in Hooker, *Fl. nov.-zél.* 2: 196 (1855). Syn.: *Ustilago carbo d bromivora* Tul. & C. Tul., *Annls Sci. Nat., Bot.*, sér. 3 7: 81 (1847), *Ustilago bromivora* (Tul. & C. Tul.) A.A. Fisch. Waldh., *Bull. Soc. Imp. nat. Moscou* 40: 252 (1867), *Cintractia patagonica* Cooke & Masee, in Cooke, *Grevillea* 18(no. 86): 34 (1899) and *Ustilago patagonica* (Cooke & Masee) Cif., *Annls mycol.* 26(1/2): 32 (1928). On *Bromus hordaceus*, *B. macrostachys*, *B. madritensis*, *B. Rubens*, *B. rubens* ssp. *eurubens*, *B. sp.*, *B. sterilis*, *B. tectorum* and *B. villosis* (Rieuf, 1970).

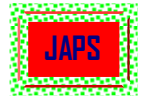
Ustilago camusiana G. Fragoso. On *Briza maxima* (Rieuf, 1970).

Ustilago crus-galli. Tracy & Earle (1895). N.c: *Ustilago crus-galli* Tracy & Earle, *Bull. Torrey bot. Club* 22: 175 (1895). Syn.: *Cintractia crus-galli* (Tracy & Earle) Magnus, *Ber. dt. bot. Ges.* 14: 392 (1896). On *Panicum colonum* (Rieuf, 1971).

Ustilago cynodontis (Pass.) P. Hennings (1891). N.c: *Ustilago cynodontis* (Pass.) Henn., *Bull. Herb. Boissier* 1: 114 (1893). Syn.: *Ustilago carbo β cynodontis* Pass., *Erb. critt. Ital.*, Ser. 2, fasc.: no. 450 (1871), *Ustilago segetum var. cynodontis* (Pass.) Henn., *Bot. Jb.* 14(4): 369 (1892), *Uredo carbo var. cynodontis* Pass., *Erb. critt. Ital.*, Ser. 2, fasc.: no. 450 (1870) and *Uredo cynodontis* (Pass.) Curzi, (1927). On *Cynodon dactylon* in Ceuta and Targuist (Unamuno, 1940a and f; Rieuf, 1970). On *Cynodon dactylon* in Ait Oufellah near Itzer (Maire et Werner, 1937; El Assfour et al., 2003).

Ustilago davisii Liro (1924), N.c: *Ustilago davisii* Liro, *Ann. Acad. Sci. fenn.* 17(1): 80 (1924). Syn.: *Ustilago longissima var. macrospora* Davis, in Ellis & Everhart, *N. Amer. Fung.*, Ser. 2: no. 3235 (1895) and *Ustilago macrospora* Davis, *Trans. Wis. Acad. Sci. Arts Lett.* 11: 174 (1898). On *Glyceria plicata* in Chaouia (Maire et Werner, 1937; Rieuf, 1970).

Ustilago duriaeana Tulasne (1847). N.c: *Microbotryum duriaeanaum* (Tul. & C. Tul.) Vánky 1998.



On *Cerastium glomeratum* (Maire et Werner, 1937; Unamuno, 1940c; Rieuf, 1970).

Ustilago foetens Berk. & M.A. Curtis (1860). N.c: *Tilletia laevis* J.G. Kühn 1873. On *Triticum durum* et *T. sativum* (Rieuf, 1970).

Ustilago holci-avenacei (Wallr.) Cif. (1938). N.c: *Ustilago avenae* (Pers.) Rostr. 1890. Byn.: *Erysibe vera* var. *holci-avenacei* Wallr. 1833. On *Arrhenatherum elatius*, *Avena alba*, *A. algeriensis*, *A. longissima*, *A. sativa* and *A. sterilis* (Rieuf, 1970).

Ustilago holci-sorghii Rivolta. N.c: *Sphacelotheca reiliana* (J.G. Kühn) G.P. Clinton 1902. On *Andropogon halepense* and *A. sorghum* (Rieuf, 1970).

Ustilago hordei (Pers.) Lagerh. (1889). N.c: *Ustilago hordei* (Pers.) Lagerh., *Mitteilungen des badischen botanischen Vereins* (59): 70 (1889). Syn.: *Uredo hordei* Pers., *Syn. meth. fung.* (Göttingen) 1: 224 (1801), *Ustilago segetum* var. *hordei* (Pers.) Rabenh., *Klotzschii* Herb. *Viv. Mycol.* 2: no. 397 (1856), *Reticularia segetum* sensu auct. p.p.; fide Checklist of Basidiomycota of Great Britain and Ireland (2005), *Reticularia segetum* Bull., *Herb. Fr.* 10: tab. 472 (1791), *Ustilago segetum* (Bull.) Roussel, *Fl. Cabvados*, Edn 2: 47 (1806), *Ustilago segetum* (Bull.) Roussel, (1817) var. *segetum*, *Ustilago segetum* (Bull.) Roussel, (1817) f. *segetum*, *Ustilago segetum* (Bull.) Fr., *Syst. mycol.* (Lundae) 3 (2): 519 (1832), *Uredo carbo* DC., in de Candolle & Lamarck, *Fl. franç.*, Edn 3 (Paris) 6: 76 (1815), *Ustilago carbo* (DC.) Tul. & C. Tul., (1847), *Yenia bromivora* (Tul. & C. Tul.) Liou, *Contrib. Inst. Bot. Nat. Acad. Peiping* 6(1): 45 (1949), *Tapesia decipiens* Wallr., (1924) and *Ustilago decipiens* (Wallr.) Liro, *Ann. Acad. Sci. fenn.*, Ser. A 17 (no. 1): 95 (1924). On *Avena sativa*, *Hordeum hexastichum* and *H. vulgare* (Unamuno, 1941a; Rieuf, 1970). On *Triticum hordeum* (Saadaoui et al., 1993; Sayoud et al., 1999). On grown of Barley, in track Tasaot, above Talambot in Rif (Maire et Werner, 1937; El Assfour et al., 2003).

Ustilago hypodytes (Schltld.) Fr. (1832). N.c: *Tranzscheliella hypodytes* (Schltld.) Vánky & McKenzie 2002. Byn.: *Caecoma hypodytes* Schltld. 1824. On *Brachypodium ramosum* and *Haynaldia hordeacea* (Rieuf, 1970).

Ustilago ischaemi Fuckel. On *Andropogon hirtus* (Rieuf, 1970).

Ustilago jensnii Rostr. (1890). N.c: *Ustilago avenae* (Pers.) Rostr. 1890. On *Avena sativa*, *Hordeum hexastichum* and *Hordeum vulgare* (Rieuf, 1970).

Ustilago leersiae Durieu. On *Avena sativa*, *Hordeum hexastichum* and *Hordeum vulgare* (Rieuf, 1970).

Ustilago levis (Kellerm. & Swingle) Magnus (1894). N.c: *Ustilago avenae* (Pers.) Rostr. 1890. Byn.: *Ustilago avenae* var. *levis* Kellerm. & Swingle 1890. On *Avena sativa*, *Hordeum hexastichum* and *Hordeum vulgare* (Rieuf, 1970).

Ustilago lychnidis-dioicae (DC.) Liro (1924). N.c: *Microbotryum lychnidis-dioicae* (DC. ex Liro) G. Deml & Oberw. [as '*lychnis-dioicae*'] 1982. Byn.: *Uredo violacea b lychnidis-dioicae* DC. 1815. On *Melandrium album* and *M. latifolium* At Mount of Khessana (Maire et Werner, 1937).

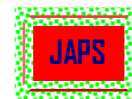
Ustilago Lygei Rabenh. On *Lygeum spartum* (Rieuf, 1971).

Ustilago maydis (DC.) Corda (1842). N.c: *Ustilago maydis* (DC.) Corda, *Icon. fung.* (Prague) 5: 3 (1842). Syn.: *Uredo maydis* DC., in de Candolle & Lamarck, *Fl. franç.*, Edn 3 (Paris) 5/6: 77 (1815), *Erysibe maydis* (DC.) Wallr., *Fl. crypt. Germ.* (Nürnberg) 2: 215 (1833), *Uredo zae-maydis* DC. [as '*zae-mays*']: 47, *Lycoperdon zae Beckm.*, *Hanover. Mag.* 6: 1330 (1768), *Uredo segetum ? mays-zae* DC., in Lamarck & de Candolle, *Fl. franç.*, Edn 3 (Paris) 2: 596 (1805), *Ustilago mays-zae* (DC.) Magnus, *Verh. bot. Ver. Prov. Brandenb.* 37: 72 (1896), *Uredo segetum ? zae-maydis* DC. [as '*zae-mays*'], *Encycl. Méth. Bot.* 8: 227 (1808), *Ustilago zae-maydis* (DC.) G. Winter [as '*zae-mays*'], Rabenh. *Krypt.-Fl.*, Edn 2 (Leipzig) 1.1: 97 (1881), *Uredo zae* Schwein., *Schr. naturf. Ges. Leipzig* 1: 71 (1822), *Caecoma zae* Link, *Willd., Sp. pl.*, Edn 4 6 (2): 2 (1825), *Ustilago zae* (Link) Unger, *Über den Einfluss des Bodens auf die Vertheilung der Gewächse*: 211 (1836), *Uredo zae* Desm., (1840) and *Ustilago euchlaenae* Arcang., *Erb. critt. Ital.*, Ser. 2, fasc.: no. 1152 (1882). On stems, leaves, tassels and ears of *Zea mays* (Wegrzecki, 1967; Rieuf, 1971). On ears of *Zea mays* in Rabat (El Assfour et al., 2003).

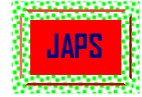
Ustilago mays-zae (DC.) Magnus (1896). N.c: *Ustilago maydis* (DC.) Corda 1842. Byn.: *Uredo segetum ? mays-zae* DC., in Lamarck & de Candolle 1805. On stems, leaves, tassels and ears of *Zea mays* (Rieuf, 1970 and 1971).

Ustilago nuda (C.N. Jensen) Rostr. (1889). N.c: *Ustilago nuda* f.sp. *hordei* Schaffnit 1928. Byn.: *Ustilago segetum* var. *nuda* C.N. Jensen 1888. On *Triticum hordeum* in Targuist (Maire et Werner, 1937). On *Triticum hordeum* and *T. durum* (Anonyme, 1976). On *Triticum hordeum* (Saadaoui et al., 1993; Sayoud et al., 1999).

Ustilago nuda* var. *foliicola. Trotter (1913). On *Triticum hordeum* (Maire et Werner, 1937; Rieuf, 1970).



- Ustilago nuda f. tritici***. Schaffnit (1928). N.c: *Ustilago nuda f.sp. tritici* Schaffnit, *Angew. Bot.* 10: 172 (1928). Syn.: *Ustilago tritici* C. Bauhin, *Ustilago nuda var. tritici* G.W. Fisch. & C.G. Shaw, *Ustilago vavilovi* Jacz., (1925). On *Triticum hordeum* (Maire et Werner, 1937; Rieuf, 1970).
- Ustilago ornithogali*** (J.C. Schmidt & Kunze) J.G. Kühn (1875). N.c: *Vankyia ornithogali* (J.C. Schmidt & Kunze) Ershad 2000. Byn.: *Uredo ornithogali* J.C. Schmidt & Kunze 1819. On *Gagia dutoitii*, *G. fistulosa var. dorys*, *G. sp* and *G. wilczekii* (Rieuf, 1970). On *Gagia dutoitii* and *G. fistulosa var. dorys* in Tizi-n-Tachdirt and Igherm (Maire et Werner, 1937).
- Ustilago otophora*** (Lavrov) Gutner (1941). N.c: *Tranzschbeliella otophora* Lavrov 1936. Byn.: *Tranzschbeliella otophora* Lavrov 1936. On *Stipa lagascae* (Rieuf, 1970 and 1971).
- Ustilago passerinii*** Fisch. De Waldh. On *Aegilops triuncialis* in Targuist (Maire et Werner, 1937).
- Ustilago penniseti*** Rabenh. (1871). On *Pennisetum ciliare*, *P. dichotomum* and *P. parisii* (Rieuf, 1971). On *Cenchrus ciliaris*, *Pennisetum dichotomum* and *P. parisii* in Marrakech, Figuig, Tirmi, Souss and Oued Darâa (Maire et Werner, 1937).
- Ustilago perennans***. Rostr. (1890). N.c: *Ustilago avenae* (Pers.) Rostr. 1890. On *Arrhenatherum elatius*, *Avena alba*, *A. algeriensis*, *A. longissima*, *A. sativa*, and *A. sterilis* (Rieuf, 1970).
- Ustilago phoenicis*** Corda (1842). N.c: *Aspergillus niger var. phoenicis* (Corda) Al-Musallam 1980. On *Phoenix dactylifera* (Rieuf, 1970).
- Ustilago reiliana***. J.G. Kühn (1875). N.c: *Sphacelotheca reiliana* (J.G. Kühn) G.P. Clinton 1902. On *Andropogon halepense*, *A. sorghum* and *Sorghum saccharatum* (Rieuf, 1970).
- Ustilago scitaminea*** Syd. (1924). N.c: *Sporisorium scitamineum* (Syd.) M. Piepenbr., M. Stoll & Oberw. 2002. Syn.: *Sphacelotheca sacchari* (Rabenh.) Cif., (1938), *Sporisorium sacchari* (Rabenh.) Vánky, *S. scitamineum* (Syd.) M. Piepenbr., M. Stoll & Oberw., (2002). On *Saccharum* sp (Touil et al., 1995; Touil, 1996; Mrhari et al., 2005).
- Ustilago segetum f. nuda***. C.N. Jensen (1888). On *Triticum hordeum* (Maire et Werner, 1937; Rieuf, 1970).
- Ustilago segetum var. nuda*** C.N. Jensen (1888). N.c: *Ustilago nuda f.sp. hordei* Schaffnit 1928. On *Triticum hordeum* (Maire et Werner, 1937; Rieuf, 1970).
- Ustilago sorghi***. (Ehrenb. ex Link) Pass. (1873). N.c: *Sporisorium sorghi* Ehrenb. ex Link, in Willdenow 1825. Byn.: *Sporisorium sorghi* Ehrenb. ex Link, in Willdenow 1825. On *Andropogon halepense* and *A. sorghum* (Rieuf, 1970).
- Ustilago tourneuxii*** (A.A. Fisch. Waldh.) Maire, (1931). N.c: *Antherospora tourneuxii* (A.A. Fisch. Waldh.) R. Bauer, M. Lutz, Begerow, Piątek & Vánky 2008. Byn.: *Ustilago vaillantii var. tourneuxii* A.A. Fisch. Waldh. 1880. On *Bellevalia dubia* and *B. mauritanica* (Rieuf, 1970). On *Bellevalia dubia*, *B. mauritanica* and *B. dubia* in Taza and Fes (Maire et Werner, 1937).
- Ustilago tritici*** C. Bauhin, and (Pers.) E. Rostr. (1890). N.c: *Ustilago nuda f.sp. tritici* Schaffnit 1928 and *Ustilago tritici* (Pers.) E. Rostr., *Overs. K. danske Vidensk. Selsk. Forb. Medlemmers Arbejder.* 15 (1890). Syn.: *Uredo tritici* Pers., *Ustilago segetum var. tritici* (Pers.) Brunaud, *Act. Soc. linn. Bordeaux*, sér. A 32 (2): 163 (1878). In different regions of Morocco (Chaouia, Tadla, Saiss and Gharb-Tangerois). On *Triticum durum* and *T. sativum* (Rieuf, 1970 and 1971; Anonyme, 1976; Lyamani, 1975; Sayoud et al., 1999). On cooked of wheat near Meknes (El Assfour et al., 2003). On *Triticum aestivum* and *T. durum* (Maire et Werner, 1937).
- Ustilago urginiae*** Maire (1931). N.c: *Antherospora urginiae* (Maire) R. Bauer, M. Lutz, Begerow, Piątek & Vánky 2008. On *Urginea maritima* in Oujda and Larache (Maire et Werner, 1937). On *Urginea maritima* (Rieuf, 1970). On *Urginea maritima* in Oued Beht between Rabat and Meknes (El Assfour et al., 2003).
- Ustilago urginede*** Maire. On *Urginea maritima* (Rieuf, 1970).
- Ustilago vaillantii*** Tul. & C. Tul., *Annls Sci. Nat., Bot.*, sér. 3 7: 90 (1847). N.c: *Antherospora vaillantii* (Tul. & C. Tul.) R. Bauer, M. Lutz, Begerow, Piątek & Vánky 2008. On *Urginea maritima* and *Muscari comosum* (Rieuf, 1971). On *Muscari comosum* in Taza (Maire et Werner, 1937).
- Ustilago violacea*** (Pers.) Roussel, *Fl. Calvados*, Edn 2: 47 (1806) et sensu auct. NZ; fide NZfungi (2008). N.c: *Microbotryum dianthorum* (Liro) H. Scholz & I. Scholz 1988 and *Microbotryum violaceum* (Pers.) G. Deml & Oberw. 1982. Byn.: *Uredo violacea* Pers. 1797. On *Tunica angustifolia*, *Melandrium album* and *Dianthus virgineus* in Souk Tnine, Mont Azrou and Ketama (Maire et Werner, 1937). On *Melandrium album*, *M. divaricatum*, *M. latifolium*, *Silene mellifera*, *S. mollissima* and *Tunica angustifolia* (Rieuf, 1971).
- Ustilago vulgaris*** Tul & C. Tul. On *Quercus ilex* in the forest of Azrou (El Assfour et al., 2003).



Ustilago zae (Link) Unger, *Über den Einfluss des Bodens auf die Vertheilung der Gewächse*: 211 (1836).

Byn.: *Caecoma zae* Link 1825. On *Zea mays* (Maire et Werner, 1937; Bovey et al., 1979).

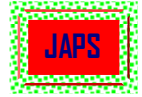
4 CONCLUSION

The analysis of the literature concerning the mycological flora smuts of Morocco has revealed the existence of 132 species including 26 species causing disease in cereals (*Ustilago avenae*, *Ustilago avenae f. foliicola*, *Ustilago avenae var. levis*, *Ustilago foetens*, *Ustilago holci-avenacei*, *Ustilago jensnii*, *Ustilago leersiae*, *Ustilago levis*, *Ustilago hordei*, *Ustilago maydis*, *Ustilago mays-zae*, *Ustilago nuda*, *Ustilago nuda var. foliicola*, *Ustilago nuda f. tritici*, *Ustilago segetum f. nuda*, *Ustilago segetum var. nuda*, *Ustilago tritici*, *Ustilago zae*, *Tilletia caries*, *Tilletia controversa*, *Tilletia epiphylla*, *Tilletia foetens*, *Tilletia foetida*, *Tilletia hordei*, *Tilletia levis* and

Tilletia tritici) and 106 species are related to wild plants. All these species belong to 05 order (*Entylomatales*, *Exobasidiales*, *Microbotryales*, *Ustilaginales* and *Tilletiales*), 10 families (*Anthracoideaceae*, *Doassansiopsidaceae*, *Entylomataceae*, *Glomosporiaceae*, *Graphiolaceae*, *Melanotaeniaceae*, *Microbotryaceae*, *Tilletiaceae*, *Urocystidaceae* and *Ustilaginaceae*) and 11 genera (*Cintractia*, *Doassansia*, *Farysia*, *Melanotaenium*, *Entyloma*, *Graphiola*, *Sorosporium*, *Sphalotheca*, *Tilletia*, *Tuburcinia* and *Ustilago*).

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