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Author(s)	堀田, 禎吉
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Contributions to the Knowledge of the Systematics of *Morus* in Japan III

MORUS IN CULTIVATION (I)

By

Teikichi HOTTA*

(堀田 禎吉)

With one plate and two text-figures

The number of cultivated races of mulberry trees in Japan are generally reported to amount to over one thousand and six hundred. Among them, however, some are found to be synonymous. According to the writer's investigations, they are to be limited to not more than one thousand and four hundred. The writer has been engaged since 1929 in collecting the specimens of the cultivated mulberry trees in every district of Japan. From time to time the writer has travelled through most parts of these districts to make observation on the field conditions of the cultivated mulberry. As to some particular cultivated races of mulberry trees the writer has procured them from their habitats by request, and has made comparative studies on them by cultivating them in the nursery in the Botanical Garden of the Faculty of Agriculture of the Hokkaido Imperial University. The number of cultivated races of mulberry trees, that the writer has hitherto collected, have reached to over 1,300, and the specimens collected more than 10,000. Some scientific reports have already been made on cultivated mulberry trees in Japan, among which T. NAKAI,^{1), 6)} G. KOIZUMI,^{2), 3), 4)}

* Deep acknowledgement is due to Prof. Emer. K. MIYABE and Prof. S. ITO who have given to the written constant guidance, and to Prof. Y. TOCHINAI and Dr. M. TATEWAKI who have rendered kind suggestions and advice, and also to the Sericultural and Agricultural Colleges and Experiment Stations, all over the country for the specimens which they so kindly supplied.

1) NAKAI, T.:—*Jour. Coll. Sci., Imp. Univ. Tokyo*, XXXI, p. 193 (1911).

2) KOIZUMI, G.:—*Synopsis Specierum Generis Mori in Bull. Imp. Sericult. Exp. Stat.*, III, 1, p. 32, 51 et 53 (1917).

3) KOIZUMI, G.:—*Cultivated mulberry trees on type of *Morus bombycis* KOIZ.* (*Yamaguwagata-no-saibaihin*), in *Bull. Imp. Sericult. Exp. Stat.*, VI, 3, p. 86-127 (1921).

4) KOIZUMI, G.:—*Synopsis Specierum Generis Mori in Bull. Imp. Sericult. Exp. Stat.*, II, 1, p. 10, 25 et 28 (1923).

6) NAKAI, T.:—*Moraceae in Flora Sylvatica Koreana*, XIX, p. 94-95 (1932).

Trans. Sapporo Nat. Hist. Soc., Vol. XIV, Pt. 4, 1936.

Y. YENDO,⁵⁾ and likewise by T. HOTTA.^{7), 8)} They have mostly dealt with varieties and forms of *Morus alba* LINN., *Morus bombycis* KOIDZ., *Morus latifolia* POIRET and *Morus atropurpurea* ROXB.

**Key to the species, varieties and forms of
Morus found in cultivation**

1. Style long, divided into two parts of stigma at its apex.
 Sect. I. **Dolichostylae** KOIDZ.
 Morus bombycis KOIDZ. 2
 Style none or very short with sessile or subsessile stigma divided into
 two parts. Sect. II. **Macromorus** KOIDZ. 7
2. Leaf with dense hairs on both surfaces or only on the under surface. . . 3
 Both surfaces with a few short hairs. 5
3. Under surface with conspicuous hairs. 4
 Both surfaces with conspicuous hairs, the leaf deeply cordate.
 var. *Yamabe* HOTTA
4. Apex of the leaf usually acute, acuminate or short acuminate, the leaf
 usually not lobate or 2-4 lobate. var. *pubescens* HOTTA
 Apex of the leaf subtricuspidate, the leaf variously lobate.
 var. *vestita* KOIDZ.
5. Both surfaces of the leaf rather scabrous, and the leaf usually lobate or
 not lobate. var. *typica* HOTTA 6
 Both surfaces of the leaf rather smooth, and the leaf variously incised
 or lacerate. var. *Tachibanawase* HOTTA
6. Most of the leaves conduplicate, sessile or subsessile.
 f. *conduplicata* HOTTA
 Leaf even and flat, petiole 3-10 cm. in length. f. *normalis* HOTTA
7. Upper surface of the leaf is even and lustrous or not lustrous. Cystolith
 of mesophyll is obtuse or rarely acute at the apex. *M. alba* LINN. 8
 Upper surface of the leaf is rugose and has a strong lustre. Cystolith
 of mesophyll is papillate and obtuse, and deeply placed in tissue.
 *M. latifolia* POIRET 11
8. Margin of the leaf dentate-serrate, apex obtuse or rather acuminate or
 shortly acute, base usually cordate. var. *typica* HOTTA 9

⁵⁾ YENDO, Y.:—Traité sur la Cult. du Mûr. au Jap., p. 15, 17 et 20 (1930).

⁷⁾ HOTTA, T.:—Contributions of the knowledge of the systematics of *Morus* in Japan, I, in Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 195-205 (1936).

⁸⁾ HOTTA, T.:—Contributions of the knowledge of the systematics of *Morus* in Japan, II, in Bull. Soies Kinugasa 366, p. 9-26 (1937).

- Margin of the leaf dentate, dentate-sinuate or dentate-serrate, apex long acuminate, base truncate. var. *Kasasagi* HOTTA
9. Leaf is single and plain. 10
 Leaf usually duplicated, a small extra lobe produced on the under surface of the leaf. f. *duplicata* HOTTA
10. Young leaf is deep greenish-yellow, adult leaf light yellowish-green, ovate or ovato-lanceolate. f. *flavoviridia* HOTTA
 Young and adult leaves greenish-blue, ovate or ovato-elliptical.
 f. *normalis* HOTTA
11. Shoot and branch usually erect or more or less crooked. 12
 Shoot and branch spirated. var. *spirata* HOTTA
12. Apex of the leaf acute or obtuse. 13
 Apex of the leaf truncate, emarginate or rarely obtuse, base rather truncate or shallow-cordate. var. *Ohzu* HOTTA
13. Leaf cochleato-convex, upper surface of the leaf dark green colour.
 var. *planifolia* (SERING.) HOTTA
 Upper surface of the leaf convex, and strong green colour or green colour. var. *typica* HOTTA

Sect. I. **Dolichostylae** KOIDZUMI

Imp. Sericult. Exp. Stat., II, 1, p. 3 (1923).

(1) ***Morus bombycis*** KOIDZUMI*Morus bombycis* KOIDZUMI, Bot. Mag. (Tokyo), XXIX, p. 313 (1915).

Nom. Jap. *Yamaguwa*: *Aizujushima*,* *Aizutakasuke*, *Akaaburagi*, *Akagi* (*Akaichi*, *Dateakagi*, *Date-guwa*, *Datetsuruta*, *Hidakuwa*, *Murasaki-guwa*, *Oshu*, *Oshuakagi*, *Oshukaneko*, *Shirakumo*, *Yonezawaakagi*),** *Akayawase*, *Akazuru*, *Amagiyaso*, *Arakawa*, *Aritawase*, *A*, *Asahiwase*, *Awometakahashi*, *Awojiku*, *Ayado*, *Azumasaki*, *Azumashidare*, *Benten*, *Benikuki-guwa*, *Botanmaruba*, *Budo*, *Chikubayaso*, *Daichirimen*, *Daiho*, *Daisuisha*, *Dateakagi*, *Date-guwa*, *Dewayaso*, *Eijiwase*, *Fuguwa*, *Fuki-guwa*, *Fushi-guwa*, *Fushimagariichibei*, *Goromaru*, *Gorozi*, *Goroziwase*, *Gunmaakagi* (*Zinza*), *Gunmabanto*, *Gunmafushimagari*, *Hanzawa-guwa*, *Henshunyamaguwa* No. 1-3, *Hichiei-guwa*, *Hikage-guwa*, *Hirayamawase*, *Hirozuru*, *Hoki-guwa*, *Horai*, *Innoyohai*, *Isebudo*, *Iwama-guwa*, *Izeki*, *Jubei-guwa*, *Juniseiki*, *Juyemon*, *Kazayemon*, *Kahachi*, *Kamikura*, *Kaneko*, *Kaniwase*, *Kenmochi*, *Kenmochiwase*, *Kikuba*, *Kinka*, *Kiuei*, *Koki-guwa*, *Kokuni-*

* The Japanese names written in Italics are of the cultivated races.

** The Japanese names written in the parenthesis are synonym or vernacular names of the cultivated races.

guwa, Komaki (*Aokikobore*, *Aoziku*, *Furisode*, *Matsumoto-guwa*, *Naka-guwa*, *Nezumigaeshi*, *Nobuo*, *Onnaichibei*, *Oha*, *Shinshufurisode*, *Shinshu-guwa*, *Shinshuoha*, *Shinshushiroshita*, *Shiratama*, *Shiroshita*, *Sodefuri*, *Tanbataro*, *Yawata-guwa*), *Koshiro*, *Koshu-guwa*, *Kozakura*, *Kozayemon* (*Ashihawa*, *Shinanome*, *Shinshuwase*), *Kunimori*, *Kurojumonzi*, *Kuroki*, *Kurokikobore* (*Kurokobore*), *Kurofushimagari*, *Kutoichi*, *Kuwao-guwa* (*Tosayama*, *Tosayama-guwa*).

Hab. Japonia: in hortis culta.

var. ***Yamabe*** HOTTA, var. nov.

Folium cordatum, utrinque pubescens, margine fere crenato-dentata.

Nom. Jap. *Yamabe-guwa*.

Hab. Japonia: in hortis culta.

Remarks. Leaf is deeply cordate, both surfaces of the leaf have white hairs, margin is crenate-dentate.

var. ***pubescens*** HOTTA, Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 201 (1936).

Syn. *Morus japonica* AUDIB, var. *pubescens* YENDO, Traité sur la Cult. du Mûr. au Jap. p. 17 (1930). nom. seminud.

Remulus tenuis, fere declinatus. Folium subtus insigniter pubescens.

Nom. Jap. *Keyama-guwa*: *Kurokosaka*, *Yokoyamawase*.

Hab. Japonia: in hortis culta, sed in Hokkaido saepius inculta.

Remarks. *Henshun-yamaguwa No. 1* seems to be closely related to this variety.

var. ***vestita*** KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., II, 1, p. 13 (1923).

Syn. *Morus bombycis* KOIDZUMI, var. *tomentosa* KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., VI, 3, p. 103 (1921). nom. seminud.

Morus japonica AUDIB, var. *pubescens* YENDO, Traité sur la cult. du Mûr. au Jap. p. 17 (1930) nom. seminud., pro parte.

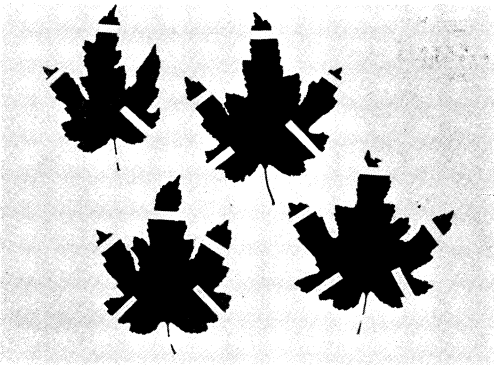


Fig. 1. *M. bombycis* KOIDZ., var. *vestita* KOIDZ.

Morus bombycis KOIDZUMI, var. *pubescens* HOTTA, Trans. Sapporo Nat. Hist. Soc., XIV, 3, p. 201 (1936) pro parte.

Folium varie lobatum subtus tomentosum, apice lobi fere subito cuspidato. Apex folii fere subtricuspidatus.

Nom. Jap. *Kirebakeyama-guwa* (nov.): *Chairowase-guwa*, *Kamekuwa*, *Satomi*, *Shiraume-guwa*, *Suyematsudoshu* in Hokkaido, *Tsurukuwa*, *Uguisuwase*.

Hab. Japan: in hortis culta.

Remarks. *Hidawase* is closely related to this variety and may better be treated as a less tomentose form of the variety.

var. ***Tachibanawase*** HOTTA, var. nov.

Folium varie incisum vel lacerum, utrinque fere laeve, apice caudato subtricuspidato.

Nom. Jap. *Tachibanawase*.

Hab. Japonia: in hortis culta.

Remarks. Leaf is variously incised or lacerate, both surfaces are rather smooth, apex caudate and subtricuspidate. According to K. TAKEDA of Chitose village, Higashimurayama district, Prov. Uzen, this variety perhaps originated from the cultivated variety "Akagi", in about 1907 in the Toyota village of this district.

form. ***conduplicata*** HOTTA, f. nov.

Folium parvum 6–7 cm. longum 7–9 cm. latum, plerumque cordatum vel fere rotundatum, supra conduplicatum, scabrum; petiolo nullo vel valde breve.

Nom. Jap. *Chizimi-guwa* (*Kinchaku-guwa*).

Hab. Japonia: in hortis culta.

Remarks. Leaf is small, 6–7 cm. in length 7–9 cm. in breadth, usually cordate or more or less depressed rotundate, surface scabrous and most of the leaves conduplicated. Leaf is sessile or subsessile.

Sect. II. **Macromorus** KOIDZUMI

Imp. Sericult. Exp. Stat., II, 1, p. 4 (1923).

(2) ***Morus alba*** LINN.

Morus alba LINN., Sp. Pl. ed. 1, p. 986 (1753) ed II, 1, p. 1398 (1763); Syst. Veget., p. 710 (1759)—HOUTTIN in LINN. Pfl. Syst., III, p. 284 (1777)—WILLDNENOW, Sp. Pl., IV, p. 368 (1805)—DIETRICH, Lexic. Gart. Bot., p. 260 (1806)—ROXBURG, Fl. Ind. ed. 2. III, p. 594 (1832)—SERINGE, Desc. et cult. Mûr., p. 10 tab. 1–17 (1855)—BUREAU in DC. Prodromus, XVII, p. 238 (1873)—HOOKER, fil. Fl. Brit. Ind., V, p. 492 (1888)—FORBES & HEMSLEY, Jour. LINN. Soci., XXVI, p. 455 (1889–1902)—E. H. WILSON, Pl. Wil., III, p. 294 et 302 (1907–1910)—NAKAI, Jour. Coll. Sci., Imp. Univ. Tokyo, XXXI, p. 193 (1911)—KOIDZUMI, Imp. Sericult. Exp. Stat., III, 1, p. 52 (1917) et II, 1, p. 28 (1923)—REHDER, Jour. Arn. Arb., IIX, p. 102 (1927)—YENDO et HIGUCHI, Traité sur la cult. du Mûr. au Jap., p. 17 (1930)—MAKINO & NEMOTO, Fl. Jap., p. 218 (1931)—TERAZAKI, Icon. Pl. Jap., p. 479 (1933).

Syn. *Morus indica* LINN., pro parte. Sp. Pl. ed. 2, p. 1398 (1763)—BURMAN in RUMPHIUS Hab. Amboin, p. 8, tab. 5 (1755) et in SERINGE. Desc. Cult. Mûr.,

atl. 13, tab. 21, fig. 1 (1855).

Morus tatarica LINN., Sp. Pl. ed. 1, p. 986 (1753); Syst. Vegt., p. 710 (1759) ed. 2, p. 1399 (1763)—HOUTTYN in Linn., Pfl. Syst., II, p. 290 (1777)—PALLAS, Fl. Ross., 1, 2, p. 9, tab. 2 (1784)—WILLDENOW, Sp. Pl., IV, p. 369 (1805)—DIETRICH, Lexic. Gart. Bat. Nachtr., V, p. 153 (1819).

Morus alba var. *vulgalis* BUREAU in DC. Prodrômus, XVII, p. 238 (1873)—C. K. SCHNEIDER, Illust. Handb. Laubholz., Bd., I, s. 237 (1904)—ASCHERS. et GRAEBN. Syn. Mitteleurp. Fl., Bd., IV, s. 579 (1911).

Morus italica POIRET, in LAMARK Encycl. Bot., IV, p. 377 (1797)—PERS. Syn. Pl., II, p. 557 (1807)—DIETRICH, Lex. Gart. Bot. Nachtr., V, p. 153 (1819).

Morus byzantina SIEBOLD, Herb. Fl. Gret., (1820) ex Steud. Nom. ed. 2, II, p. 162 (1840).

Morus macrophylla MORETTI, Del. Sem. Hort. Ticin (1829).

Morus Tok-wa SIEBOLD, ex PETZOLD et KIRCHNER, Muse., p. 547, pro syn. (1864).

Morus alba HEMSLEY, Jour. LINN. Soc., XXVI, p. 455, pro parte (1894)—PRITZEL in ENGLER, Bot. Jahrb., XXIX, s. 297, pro parte (1900)—KOMAROV, Fl. Mansch., II, p. 91, pro parte (1903)—C. K. SCHNEIDER in SARGENT Pl. wilsonianae, III, 2, p. 294, (1916), pro parte.

Morus heterophylla LOUDON, Arb. et Frut., II, p. 1361, sec. Ind. Kew (1838).

Morus tortuosa AUDIB, ex MORRETTI, Gional. Inst. Lomb. Sc., I, p. 182, sec. Ind. Kew (1841).

Morus nervosa DELILE ex SPACH ibid. II, p. 33 (1835).

Morus alba var. *tatarica* M. a BIEB. Fl. Taurio-caucasica, II, p. 398 (1808)—YENDO et HIGUCHI, Traité sur la Cult. du Mûr. au Jap., p. 32 (1930).

Morus patavina HORT, SPACH, Hist. Natur. Végét. Phanéro., Paris, XI, p. 43 (1834-48).

Morus lucida HORT, Arb. et Frut., III, p. 1350 (1836).

Morus tortuosa MORETTI, Gional. Inst. Lomb. Sc. lett., I, p. 181 (1841).

Nom. Jap. *Karayama-guwa*,¹⁾ *Shiromi-guwa*,²⁾ *Maguwa*.³⁾

Distr. China, Manchuria et Korea.

Remarks. According to Prof. Y. YENDO⁴⁾ the species is of Chinese origin. It is told that, in as early as 2697 B.C., *Sirintsu*, Empress of *Hoandi*, used its leaves raising silkworms. It was imported from China to Japan in *Hakuho* era of Emperor *Temmu* (about 677 A.D.) by a priest, *Joe-Osho*, who transplanted

¹⁾ KOIZUMI, G.: Synopsis Specierum Generis Mori, Imp. Sericult. Exp. Stat., II, 1, p. 30 (1923).

²⁾ C. a LINNEAUS: *Morus* in Species Plantarum ed. 1, p. 986 (1753).

³⁾ MAKINO, T. & NEMOTO, K.: Flora of Japan, p. 218 (1931).

⁴⁾ YENDO, Y.:—Agriculture and Horticulture, IIX, 9, p. 2099 (1933).

it in the grounds of Kuwami Temple at Azuchi village, Gamo district, Prov. Omi.

var. **Kasasagi** HOTTA, var. nov.

Folium ovato-oblongum, plerumque 2 lobatum vel non lobatum, margine dentata, dentato-sinuosa vel fere dentato-serrata, apice longiacuminato, basi truncata vel rotundata vel rarissime aperte cordator, petiolo circ. 4 cm. longo.

Nom. Jap. *Kasasagi-guwa*.

Hab. Japonia: in hortis culta.

Remarks. Leaf is ovate-oblong, usually 2 lobate or not lobate, margin dentata, dentato-sinuate or more or less dentato-serrate, apex long acuminate, base truncate or rotundate rarely shallow cordate, and petiole 4 cm. in length.

var. **duplicata** HOTTA, var. nov.

Folium plerumque duplicatum, supra magnum subtus parvum vel vestigium folii parvi conspicuum; apice acuto vel acuminato rarius longiattenuato.

Nom. Jap. *Ryomen-guwa* (*Kinchaku-guwa*).

Hab. Japonia: in hortis culta.

Remarks. Leaf is usually duplicate, a small extra lobe is produced on the under surface of the leaf, sometimes the lobe is degenerated and only its vestiges are to be seen. Apex is acute or acuminate rarely long attenuate.

This variety was originated in the Date district, Prov. Iwashiro. C. IKEDA in Awano village of this district is said to have propagated by grafting the mutant on an old tree of *Ichibei*.

form. **flavoviridia** HOTTA, f. nov.

Folium juvenale valde flavoviride, adultum leviter flavoviride, ovatum vel lanceolato-oblongum.

Nom. Jap. *Kibajumonji*.

Hab. Japonia: in hortis culta.

Remarks. Young leaf is deep greenish-yellow, adult leaf light yellowish-green, ovate or ovate-lanceolate. Groove of the petiole has rather dense white hairs.

(3) **Morus latifolia** POIRET

Morus latifolia POIRET in LAMARCK, Encycl. Bot., IV, p. 381 (1976).

Nom. Jap. *Roso*.

Distr. China.

Remarks. This species was imported in 1874 by the Production Bureau of the Department of Home Affairs from *Hanzou*, Prov. *Tsujian*, China.

var. **spirata** HOTTA, var. nov.

Ramulus spiratus. Folium fere obliquo-ellipticum vel ovatum, margine plerumque dentato-serrata vel argutiserrata.

Nom. Jap. *Fuseryu, Taihei-guwa.*



Fig. 2. *M. latifolia* PAIRET, var.
Ohzu HOTTA.

Hab. Japonia: in hortis culta.

Remarks. Shoots and branches are spirated. Leaf is rather oblique-elliptical or ovate, margin is usually dentato-serrate, acuto-serrate or rarely crenate-dentate.

var. *Ohzu* HOTTA, var. nov.

Folium subtus fere pubescens, apice truncato vel emarginato rare obtuso, basi fere truncata vel aperte cordata.

Nom. Jap. *Ozu-guwa.*

Hab. Japonia: in hortis culta.

Remarks. Upper surface of the leaf has rather dense white hairs, apex is truncate, emarginate or rarely obtuse, base is rather truncate or shallow-cordate.

var. *planifolia* (SERING.) HOTTA, comb. nov.

Syn. *Morus multicaulis* PERROTET, var. *planifolia* SERINGE, Descr. Cult. Mûr. p. 219 (1855); Gelsicoltura, p. 219 (1905)—KOIDZUMI, Bull. Imp. Sericult. Exp. Stat., II, 1, p. 28 (1923).

Folium valde cochleato-convexum, juvenum tantum bullatum, adultum planum, supra nitidum atro-viride, plerumque ovato-ellipticum vel ellipticum (ex opere KOIDZUMI).

Nom. Jap. *Hiraba-roso.*

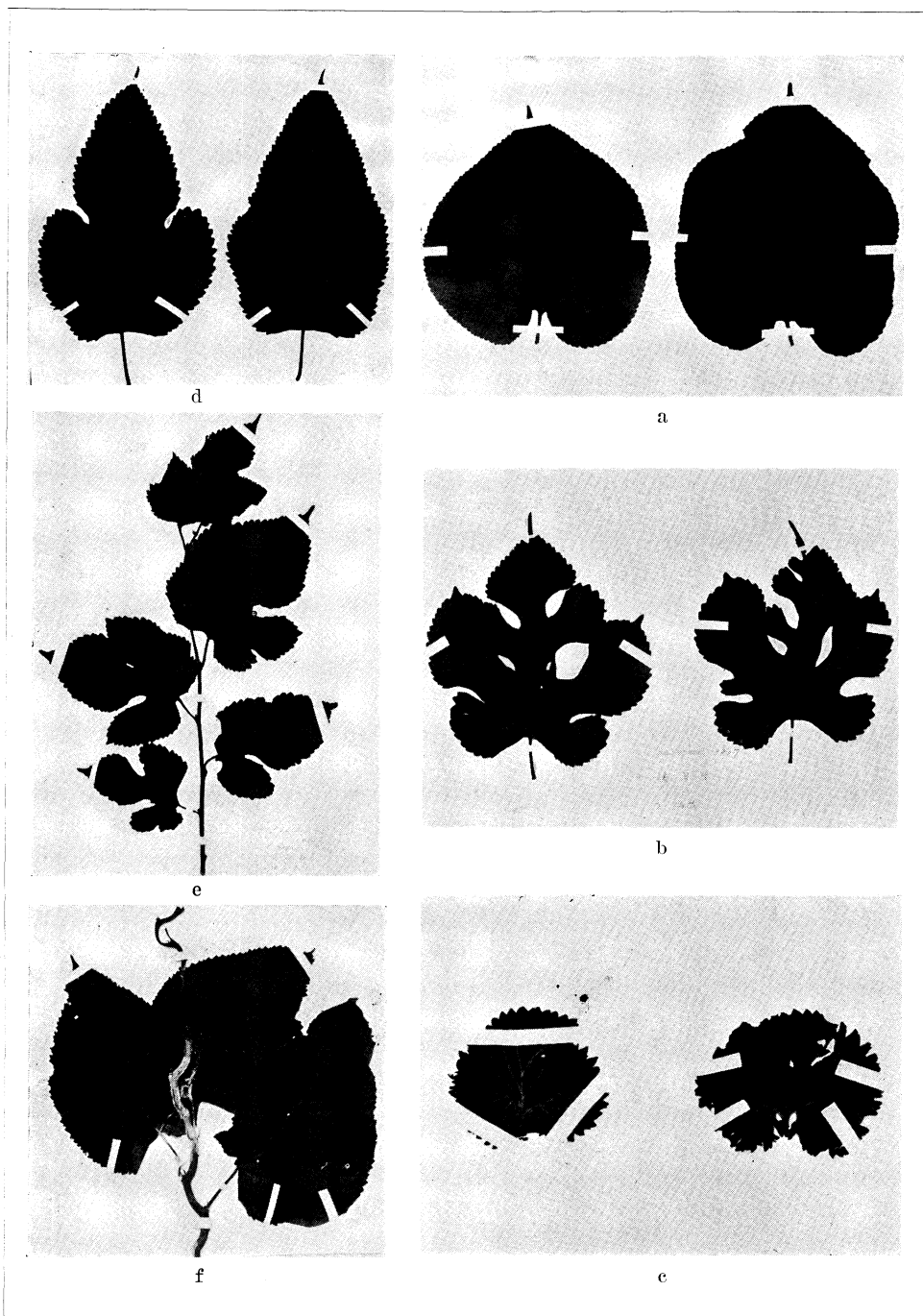
Hab. in hortis culta.

Botanical Institute, Faculty of Agriculture,
Hokkaido Imperial University, Sapporo, Japan.

Explanation of Plate

Plate XI.

- a. *M. bombycis* KOIDZ., var. *Yamabe* HOTTA.
- b. *M. bombycis* KOIDZ., var. *Tachibanawase* HOTTA.
- c. *M. bombycis* KOIDZ., f. *conduplicata* HOTTA.
- d. *M. alba* LINN., var. *Kasasagi* HOTTA.
- e. *M. alba* LINN., f. *duplicata* HOTTA.
- f. *M. latifolia* POIRET, var. *spirata* HOTTA.



摘 要

邦産桑屬ノ分類學的知見 (三)

Morus bombycis KOIDZUMI, var. *Yamabe*, 及 var. *Tachibanawase* の二新變種竝 = *f. conduplicata* の一新品種を創定し又 var. *pubescens* 及 var. *vestita* に新しく數種の栽培種を加へ尙 *Morus alba* LINN. var. *Kasasagi* の一新變種 *f. duplicata*, *f. flavoviridia* の二品種を創定し又 *Morus latifolia* POIRET に var. *spirata*, var. *Ohzu*, var. *planifolia* の三新變種を創定した。即栽培種に六新變種, 三新品種竝に新しく栽培種を加へた 二變種を合し八變種三品種を記載した。

尙 *Morus bombycis* KOIDZUMI に包含すべき栽培種七十九種を確認した。

更に *Morus alba* LINN., *Morus latifolia* POIRET を初め各變種及品種に屬する栽培種の起源も可及的報告した。