



Newsletter of the Workgroup Pineapple, International Society for Horticultural Science
Issue No. 23, July, 2016

Table of Contents

Pineapple Working Group News	2
From the Editor.....	2
Proceedings of the 8th International Pineapple Symposium.....	3
Proper Naming of Pineapple Cultivars: Problems and Recommendations for Improvement.....	3
New Sources for Pineapple Cultivar Names and Descriptions: Contributions from “Pineapple People” Invited ..	5
News from Brazil.....	7
IX International Pineapple Symposium – Plans for Costa Rica Canceled.....	7
VI Brazilian Pineapple Symposium.....	8
Embrapa Held First Course on Cryopreservation of Plants With Emphasis on Pineapple	8
Organic Pineapple Production System for the Region of Lençóis, Chapada Diamantina, Bahia, Brazil	9
Cultivation of Pineapple in Organic System – Recommendations Based on Studies in the Semiarid Region of the Chapada Diamantina, Bahia, Brazil	16
Use of Baits for Integrated Pest Management (IPM) of Ants, Pineapple Mealybugs, and Mealybug Wilt Disease of Pineapple in Espírito Santo, Brazil.....	20
Influence of Washing and Plastic Packaging on Post-harvest Quality of Ornamental Pineapple Stalks	22
News from Costa Rica	26
Burdown of Pineapple Plants in Costa Rica	26
News from Cuba	31
Hardening of ‘MD-2’ Micropropagated Pineapple Plants by Drought to Improve the Acclimatization-field Transition	31
Response of ‘MD-2’ Pineapple Plantlets (<i>Ananas comosus</i> var. <i>comosus</i>) to a Controlled Release Fertilizer During the Acclimatization Stage.....	37
News from France.....	41
Claude Py: In Memorium.....	41
The Last Revision of Pineapple Nomenclature	45
News from the USA (Hawaii)	49
Solar Injury Causes Crown Deformities of ‘CO-2’ Fruits	49
Commercial and Professional Services.....	53
Book Reviews and Web Sites of Possible Interest	53
New References on Pineapple	54
Contributions to Pineapple News	61

Click the link below to access an abbreviated index of all issues of Pineapple News

https://docs.google.com/spreadsheets/d/1ePrvbOxZK_fAetf5dDG9KSJ-iI3TGbWEuVPqNWSIC1k/pubhtml

The Last Revision of Pineapple Nomenclature

Geo Coppens d'Veckenbrugge

CIRAD, UMR AGAP, Avenue Agropolis, 34398 Montpellier Cedex 5

The revision of synonymies in pineapple taxonomy, announced in the last issue of our newsletter (Coppens d'Veckenbrugge, 2015), has been completed and published (Coppens d'Veckenbrugge and Govaerts, 2015). This publication does not alter the current classification (Coppens d'Veckenbrugge and Leal, 2003), except for one name. Thus, for those researching any aspect of pineapple cultivated for its fruit the name of the plant is *Ananas comosus* var. *comosus*. If the author name is required, as for example in the title of a scientific article, it should be written *Ananas comosus* (L.) Mill. var. *comosus*.

From a taxonomic point of view, the first practical consequence of this formal work is the restoration of *Ananas comosus* var. *microstachys* (Mez) Smith instead of *Ananas comosus* var. *ananassoides* (Baker) Coppens & F.Leal. A second consequence is that our classification, and the associated synonymies, is now fully recognized in the World Checklist of Selected Plant Families (WCSP) (<http://apps.kew.org/wcsp/qsearch.do>), which should widen its acceptance well beyond the circle of plant breeders and germplasm curators.

A search on the WCSP website currently yields as many as 88 synonyms for our two species and five botanical varieties. Most of them are anecdotal, and after revision we can bury them back in our memory, as their interpretation does not interfere appreciably with the modern classification. Others correspond to more important steps in the evolution of pineapple nomenclature. Below are listed the most important synonyms recognized by Coppens d'Veckenbrugge and Leal (2003) and Coppens d'Veckenbrugge and Govaert (2015).

***Ananas macrodentes* Morren (1878) (modern)**

This is the *yvira*, a wild tetraploid pineapple without crown, propagated vegetatively by stolons instead of suckers. Key synonyms: *Pseudananas macrodentes* (Morren) Harms (1930), *Pseudananas sagenarius* (Arruda da Câmara) Camargo (1939).

***Ananas comosus* (L.) Merrill (1917) (modern, as are the botanical varieties listed below)**

This diploid species includes the following five botanical varieties (1 – 5 below), three of which are domesticates.

(1) *Ananas comosus* var. *comosus* (the edible pineapple)

This is the edible pineapple, known as *Ananas comosus* from 1917 to 2003, then classified more precisely as a botanical variety, to accommodate four other, wild and cultivated, forms at the same rank in the same species.

Key synonyms: *Ananas sativus* Schultes & Schultes (1830; spiny cultivars), *Ananas semiserratus* (Willd.) Schultes & Schultes (1830; cultivars with spines at leaf apex), *Ananas lucidus* (Aiton) Schultes & Schultes (1830; smooth-leaved cultivars), *Ananas debilis* (Lindley) Schultes & Schultes (1830; a lost wave-leaved cultivar), *Ananas comosus* f. *sativus* (Schult. & Schult.f.) Mez (1934), *Ananas comosus* f. *lucidus* Mez (1934).

(2) *Ananas comosus* var. *microstachys* (Mez) Smith (1934)

This is the most common wild pineapple, with long and narrow leaves and a small fruit, from which the edible pineapple was domesticated. It is distributed in neotropical areas east of the Andes, under conditions of climatic and/or edaphic drought (rocks and sandy soils).

Key synonyms: *Acanthostachys ananassoides* Baker (1889), *Ananas microstachys* Lindman (1891), *Ananas sativus* Schult. & Schult.f. var. *microstachys* Mez (1892), *Ananas ananassoides* (Baker) Smith (1939), *Ananas comosus* var. *ananassoides* (Baker) Coppens & F.Leal (2003), *Ananas ananassoides* Baker var. *nanus* Smith (1939), *Ananas microstachys* var. *nanus* (L.B.Sm.) Camargo (1942), *Ananas nanus* (L.B.Sm.) Smith (1962).

(3) *Ananas comosus* var. *parguazensis* (Camargo & L.B.Sm.) Coppens & Leal (2003)

Another wild botanical variety of pineapple, with wider leaves and some retrorse spines, mostly found in the basins of Rio Orinoco (south-eastern Colombia and southern Venezuela) and Rio Negro (north-western Brazil), and more rarely in the Guianas, together with *Ananas comosus* var. *microstachys*, and forms that appear intermediate between the two wild botanical varieties.

Key synonym: *Ananas parguazensis* Camargo & Smith (1968)

(4) *Ananas comosus* var. *erectifolius* (L.B.Smith) Coppens & Leal (2003)

This is the *curagua*, a small-fruited pineapple, cultivated only for fiber (Leal & Amaya, 1991), north of the Amazon River (Guianas and Venezuela). This cultigen (known in cultivation only) evolved from *Ananas comosus* var. *microstachys* through multiple domestication events (Duval et al. 2003), which determined its most characteristic features: erect leaves, related to selection for a high fiber content, and absence of marginal spines, related to a dominant mutation (Collins 1960).

Key synonym: *Ananas erectifolius* Smith (1939). The synonymy with *Ananas lucidus* Miller, a large-fruited and smooth-leaved cultivar, proposed by Smith and Downs (1979) is not founded.

(5) *Ananas comosus* var. *bracteatus* (Lindley) Coppens & Leal (2003)

This cultivated botanical variety is particular in resulting from the introgression of *A. macrodontes* genes into *A. comosus*. It includes two forms that have been propagated vegetatively, which explains their very low genetic diversity. The very rare form, corresponding to *A. fritzmuelleri* Camargo, shares nuclear and cytoplasmic genes with *A. macrodontes*, as well as more morphological traits (longer bracts, retrorse spines). The second form, quite common as an ornamental in tropical gardens, has been given the specific epithets or botanical variety names *bracteatus* (referring to its long bracts) and *sagenaria* (from the Latin word for net, referring to its ancient use as a fiber plant). It appears to share a lesser proportion of nuclear genes and no cytoplasmic genes with *A. macrodontes* (Duval et al. 2001, 2003).

Key synonyms: *Bromelia sagenaria* Arruda da Câmara (1810). *Ananas sagenaria* (Arruda da Câmara) Schultes & Schultes (1830). *Bromelia silvestris* Vellozo (1829). *Ananas silvestris* Müller (1896). *Ananas fritzmuelleri* Camargo (1943), *Ananassa bracteata* Lindley (1827). *Ananas bracteatus* (Lindley) Schultes & Schultes (1830), *Ananas sativus* var. *bracteatus* (Lindley) Mez (1892).

For readers interested in understanding better the history of these synonyms and the evolution of pineapple taxonomy, I present hereafter a summary inspired from the paper of Leal et al. (1998).

Pineapple taxonomy long focused on the description of variation among clones cultivated for the fruit. Indeed, from the late 18th century, pineapple was mostly known from cultivation in European glasshouses, and most cultivars of *A. comosus* var. *comosus* were first given Latin names, generating much confusion with the Latin binomials used for species in the Linnaean system. Botanical knowledge of wild forms was very limited. Beer (1856) examined a herbarium specimen of a small-fruited wild type (“a botanical rarity”) and concluded that the differences with the cultivated pineapples (hypertrophy of the syncarp) were only the result of cultivation. Further in the same document, he gave more importance to smaller differences observed among groups of cultivars, raising some of them to the species rank. In 1879, when Morren described a second species of pineapple, *Ananas macrodontes*, from glasshouse plants, he ignored its ecology. Finally, Baker (1889) was the first to give a species rank to a wild pineapple. However, he classified it in the genus *Acantostachys* (*A. ananassoides*), an error which was half-corrected by Lindman in 1891, when the latter classified it as *Ananas microstachys* (in fact, he should have maintained the epithet and named it *Ananas ananassoides*).

Mez (1892) proposed a first simplification, downgrading the common cultivar groups to botanical varieties of a unique species, *Ananas sativus*, and considered the wild pineapple as another botanical variety, *A. sativus* var. *microstachys*. Mez (1892) included *A. macrodontes* within *A. sativus* var. *bracteatus*, because he supposed that the absence of a crown in Morren’s description was only the result of observing a juvenile inflorescence. In 1919, two years after Merrill established the binomial *Ananas comosus*, Bertoni (1919) took an opposite direction and divided *Ananas* into five species with many botanical varieties, producing a very confused classification that was never used later. In 1930, Harms created a new, monotypic genus, raising again Morren’s *A. macrodontes* to the species rank, under the binomial *Pseudananas macrodontes*.

In 1934, Mez maintained his parsimonious vision, with one genus and only three species. Within *A. comosus*, he included cultivated pineapples as simple “forms” (not botanical varieties), based on leaf spininess and shape. In addition, he recognized *A. macrodontes*, and retained *A. sagenaria* instead of his *A. sativus* var. *bracteatus* of 1892. Surprisingly, he retained no particular status for the wild representatives of *A. comosus*. However, their botanical variety rank was restored by Smith (1934), who proposed *Ananas comosus* var. *microstachys*.

After Mez, pineapple classification returned to a more complex system, as Smith (1939, 1961, 1962, 1971), together with Camargo (1939, 1942, 1943; Camargo and Smith, 1968), multiplied species and botanical varieties without describing significant new variation (except for the re-discovery of the curagua). Many varieties were raised to the species rank, and the genus *Pseudananas* was restored, a process which culminated in a list of two genera and eight species (Smith and Downs, 1979).

The classification of Coppens d'Eeckenbrugge and Leal (2003) may be compared with the parsimonious views of Mez. Although Mez's treatment varied from 1892 to 1934, he mostly considered differences among wild and cultivated crowned pineapples, selected or maintained for distinct purposes (fruit, fiber, ornamental), at the infraspecific level. The similitude is clearer when one compares the synonymies given by Mez and those given in Coppens d'Eeckenbrugge and Leal (2003) and Coppens d'Eeckenbrugge and Govaert (2015). Mez lacked our modern knowledge based on direct observations in the wild, in living collections, and in the field, as well as more data from reproductive biology and molecular genetics, but his acute and critical reading of all the literature then available allowed him to comprehend the essence of pineapple diversity.

References

- Baker, J.G. 1889. Handbook of the Bromeliaceae. George Bell & Sons, London, 22–25.
- Bertoni, M.S. 1919. Contribution à l'étude botanique des plantes cultivées. I. Essai d'une monographie du genre *Ananas*. Anales Científicos Paraguayos (Serie II) 4: 250–322.
- Camargo, F.C. 1939. Ananás e abacaxí. Revista de Agricultura (Piracicaba) 14: 331–338.
- Camargo, F.C. 1942. Pesquisas taxonômicas sobre os gêneros *Pseudananas* e *Ananas*. Proceedings of the Eighth American Scientific Congress 3: 178–192.
- Camargo, F.C. 1943. Vida e utilidade das Bromeliáceas. Boletim Técnico Instituto Agrônomo do Norte 1: 1–31.
- Camargo, F.C. and Smith, L.B. 1968. A new species of *Ananas* from Venezuela. Phytologia 16: 464–465.
- Collins, J.L. 1960. The pineapple, botany, utilization, cultivation. Leonard Hill, London.
- Coppens d'Eeckenbrugge, G. 2015. A Short Update on the Pineapple Taxonomy Debate. Pineapple News 22: 28.
- Coppens d'Eeckenbrugge, G. and Govaerts, R. 2015. Synonymies in *Ananas* (Bromeliaceae). Phytotaxa 239 (3): 273–279.
- Coppens d'Eeckenbrugge, G. and Leal, F. 2003. Morphology, anatomy and taxonomy. In: Bartholomew, D.P., Paull, R.E., and Rohrbach, K.G. (Eds.) The pineapple: botany, production and uses. CABI, Wallingford, Oxford, UK, 13–32.
- Duval, M-F., Noyer, J-L., Perrier, X., Coppens d'Eeckenbrugge, G., and Hamon, P. 2001. Molecular diversity in pineapple assessed by RFLP markers. Theor. Appl. Gen 102(1): 83-90.
- Duval, M-F., Buso, G.C., Ferreira, F.R., Bianchetti, L.B., Coppens d'Eeckenbrugge, G., Hamon, P., and Ferreira, M.E. 2003. Relationships in *Ananas* and other related genera using chloroplast DNA restriction site variation. Genome 46: 990–1004.
- Harms, H. 1930. Bromeliaceae. Die natürlichen Pflanzenfamilien 15a: 153.
- Leal, F. and Amaya, M-L. (1991) The curagua (*Ananas lucidus*, Bromeliaceae) crop in Venezuela. Economic Botany 45: 216–224.
- Leal, F., Coppens d'Eeckenbrugge, G., and Holst, B. 1998. Taxonomy of the genera *Ananas* and *Pseudananas* - An historical review. Selbyana, 19: 227–235.
- Lindley, J. 1827. Edwards's Botanical Register. Vol. 13. John Ridgway & Sons, London, pp. 1069 & 1081.
- Lindman, C.A.M. 1891. Bromeliaceae. Herbarii Regnellianii. I. Bromeliae. Kongl. Svenska Vetenskaps Akademiens Handlingar 24 (8): 1–49.
- Merrill, E.D. 1917. An interpretation of Rumphius's Herbarium Amboinense. Manila Bureau of Printing, pp. 46, 133–134.
- Mez, C. 1892. Bromeliaceae; *Ananas*. Martius, Flora Brasiliensis 3(3). Reprinted 1965 Verlag von J. Cramer, Weinheim, Codicote (Hertfordshire), Wheldon & Wesley, New York, pp. 288–294.
- Mez, C. 1934. Das Pflanzenreich. Bromeliaceae. *Ananas* Adans. Engler Prantl, 160. Reprinted 1965 Verlag von J. Cramer, Weinheim, pp. 101–104.
- Morren, E. 1878. Description de l'*Ananas macrodentes* sp. nov. *Ananas* à fortes épines. La Belgique Horticole - Annales d'Horticulture 28: 140–172.
- Müller, F. 1896) Die Bromelia silvestris der Flora fluminensis. Berichte der Deutschen Botanischen Gesellschaft 14: 3–11.

- Schultes, J.A. and Schultes, J.H. 1830. *Systema Vegetabilium* 7: 1283–1287.
- Smith, L.B. 1934. IV. Studies in the Bromeliaceae. *Contributions from the Gray Herbarium* 104: 72.
- Smith, L.B. 1939. Notes on the taxonomy of *Ananas* and *Pseudoananas*. *Botanical Museum Leaflets Harvard University* 7: 73–81.
- Smith, L.B. 1961. Notes on Bromeliaceae, XVII. *Phytologia* 8 (1): 1–13.
- Smith, L.B. (1962) A new look at the species of pineapple. *Bulletin of the Bromeliad Society* 12: 54–55.
- Smith, L.B. and Downs, R.J. .1979. Bromelioideae (Bromeliaceae). *Flora Neotropica*, Monograph 14(3). New York Botanical Garden, New York, pp. 1493–2142.