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U.S.D.A. Hardiness Zones as Applied to Cultivated Palms, and Other Horticultural Comments[1]

DENT SMITH

Using the USDA Hardiness Zones Map[2] for palms in the continental United States poses very knotty problems in many cases. If I know anything on the subject of palm hardiness, it is not only because I have learned the hard way but because, and chiefly because, I have for years been studying as a contributing sideline meteorology and comparative climatology. Add to this that I have been everywhere in these states where palms are grown, whether few or many, and I have observed with all the zealous fanaticism that could be mustered just what palms are grown where—as well as checking with local growers and fanciers in very state where any palms can be grown, minus only Pennsylvania and Rhode Island. Them's my credentials for what follows.

The absolute yearly minima from 1932 to 1960, as averaged out on the color map, cover entirely too wide a range for the palms. Zoning for palms is impractical for the reason that within the mapped zones, or any other imaginary zones of good extent, there are several distinct climates (especially here in Florida) in some of which certain palms may be grown with assurance of success and others in which the same palms positively will fail. Let's take one zone, which on this map is 9b, in which I grow now (in 1960) 150 species belonging to about 55 genera. Zone 9b in Florida is delineated as far north as Jacksonville and as far south as Lake Okeechobee. Within this zone the climatological differences in winter are huge. Here there have always been hibiscus plants in virtually every dooryard—in Jacksonville none, because they are winter killed. For palms, Jacksonville, Ocala, and many other parts of the zone are limited to a handful of the very hardiest palms, and their climate is colder than parts of the South Carolina and Georgia immediate coasts. Frost occurs at Homestead, thirty miles south of Miami, about twice as often as it does where I live. Zone 10, the warmest in the continental U.S., contains climates too rigorous for at least fifty of the palms that are successfully grown right here (Daytona Beach).

Continuing with my own zone, 9b: This zone takes in outside of Florida a large area around New Orleans, another radiating out and northward from Brownsville, Texas, one in southwestern Arizona, and various in California and on north to Oregon. Well, you see, it would be a pretty forlorn distortion to name the palms hardy enough for a zone of this scope. The heck of it is, though, that one can't explain away the differences just within one zone by compartmenting the zone into 9a, 9b, 9c, 9d, and all the way to 9z, without

[1] This article is an edited digest of information contained in several lengthy communications to Walter Hodge from Dent Smith (in Daytona Beach, Fl.) and intended as raw data of possible use in the preparation of "Cultivated Palms" (the Special Issue of the *American Horticultural Magazine*, published in January, 1961) and for *Hortus III* (1976). The material here presented brings useful details on the relative hardiness of cultivated taxa into one convenient place—W.H.H.

[2] See "Plant Hardiness Zone Map," *Miscellaneous Publication* Number 814, Agricultural Research Service, United States Department of Agriculture, May 1960.

writing a complementary explanation about the great differences between a subtropical humid climate (Florida) and a Mediterrean climate (Southern California) with much further discussion about the frequency and duration of cold weather, neither of which is accounted for in any way on the map.

The isotherms from which the map was compiled are fairly correct. It should be obvious, though, between the two extremes given for my zone, 9b, 20° F to 30° F, that the ten-degree difference means life or death for most of the palms, save only the hardiest. Palms are never killed either here or in Miami by a brief temperature of 30° F or even 29° F, but most of the palms (which, of course, excludes the few hardy ones) will be fatally affected by 20° F. Thus the fallacy, for palms, of a zone in which the worst that can be expected is anywhere from 20° F to 30° F.

Whoever compiled the map (no, whoever finally selected the terms used) should have had guidance right then from a meteorologist. The "Approximate Range of Average Annual Minimum Temperatures" means something quite different from what it was intended to convey. This would ordinarily be interpreted as the average annual mean temperature for the years included instead of the average of the absolute annual minima. The job appears not to have been properly coordinated. Very erroneous in the "Indicator Plant Examples," for instance, is the assignment of the Queen Palm, *Syagrus romanzoffianum* to Zone 10—as "coldest zone in which they will normally succeed." This is the only palm mentioned, and it's lamentably wrong. This palm thrives in Orlando and here in 9b, whereas it is indifferent and sparsely planted in the zone assigned to it, providing a good example of the absurdity one can get into trying to go by rote. *Syagrus* in central Florida is the commonest of all exotic palms, and it always has been, outnumbering those in the map version area by 100 to 1. But, and it's a big but, there are many parts of zone 9b in which it cannot be grown at all.

The same problem would apply in assigning USDA zones to certain other palms. The only effective way to deal with this, it seems to me, is to affix a symbol to the zone number, as for example an asterisk, which would signify ONLY IN THE WARMER PARTS OF THE ZONE. Thus we would have for *S. romanzoffianum*, 9b*.

There must be twenty distinct zones within Zone 9b alone, perhaps more. The isotherms correspond, but we can't do much here anywhere in Florida with *Jubaea, Howeia, Erythea*, etc. Why not? Because we don't duplicate the cool, dry winters of southern California, even though we duplicate the worst sudden plunges in temperature. Here it usually recovers quickly; there it stays cool and lacks our humidity.

I feel that zoning cannot be made 100% exact, no matter how one goes about it. In relation of palms to cultivation, the zones sometimes overlap. It's surely best to be conservative, yes, but at the same time it should be explained, perhaps, that minimum temperatures are by no means the only guide to the suitability of certain palms for restricted areas beyond the assigned zones. The most noticeable disparity is between the same zones in Florida and California. We can grow a fair number of palm kinds here in Florida that cannot be grown in the same zones in California because of the higher average temperatures, even though the minimum temperatures are often lower than anything experienced in California. I have tried to be conservative and at the same time not deceptive to gardeners and growers, but occasionally I feel as if I'm trying to balance on a high wire.

As for other horticultural comment, one or two things might be amplified or modified (in the new *Hortus III*), as for example the usual warning not to overpot. The

warning should still be heeded for seedlings, but nowadays the tendency is to "step up" into containers larger than immediately required once the very small seedling stage has been passed. This is to assure faster growth by providing room for root expansion and to reduce labor factors. Not too much can be said about the desirability—even the necessity—of providing containered palms with good drainage. In large cans, an inch of gravel plus two inches of coarse sand would be good insurance. Many quite different potting media are used, but all should provide a fair amount of organic matter. Sand, perlite, sawdust, peat moss, ordinary topsoil, wood shavings, rotted leaves, pulverized manure, and several other substances are used in combinations to suit one's preferences, which sometimes amount to fervid conviction not open to question by anyone. Even with good drainage provided, it still is possible to overwater containered palms. Only a few kinds will tolerate soggy soil indefinitely. When to water? Only when the soil has dried out on its surface, which can be determined by sight if one is experienced, and by feel if not.

When small palms are planted in the ground, a hole much larger than the young palm requires should be dug and backfilled with topsoil mixed with a liberal quantity of manure or the best organic matter obtainable. In extremely sandy soils it is preferable to remove most or all of the sand and replace with soil high in organic content. When transplanting large palms from the wild, or from wherever they have been firmly established, it is best to follow the ancient adage to plant a fifty-cent palm in a fifty-dollar hole. If then backfilled with good topsoil mixed with rotted manure or other good organic matter, the palm should be healthy and vigorous without any additions of fertilizer in future years. Wherever palms are thriving in the wild, it is not because anyone has applied any kind of fertilizer. Plant it right, and there's an end on't. Unluckily, most transplants get indifferent treatment, and such subjects do require endless fertilizing and watering to withstand the deficient treatment. Hundreds of times, I guess, people have asked me how I fertilize my palms. Answer: I don't, they don't need it. 'Course, if I had to grow my palms in limerock, as they do at Fairchild Tropical Garden, I'd have to feed 'em.

Now I'll try to go methodically through the genera listed, making any observations I can for *Hortus III* about either genera or species, but skipping entirely those I know nothing about or to which I can add nothing of the slightest interest apart from anything already said in *Hortus II.*

Acrocomia. The species are still confused—at least in the trade and among gardeners. If one has a very cold-tolerant species, it is assumed to be *A. totai.* There is reason to believe it to be, since it is the southernmost. Bailey's treatment (in *Gent. Herb.*) even refers to "the Florida *Totai,*" by which he meant that there was still uncertainty about the specific identity. I believe I have here several examples of *A. totai,* which are all certainly very cold tolerant. And I've got several of what I take to be *A. aculeata,* which loses its foliage in hard freezes but always fully recovers. Midway between the two, for cold tolerance, is *A. mexicana* (my plant grown from a seed collected in Valles, S.L.P.). What I suppose to be *A. totai* is suitable for Zone 9b, but only the most favorable locations in 9a. I would assign the other species to 9b*. I have noticed that, whenever I have been in close proximity to any acrocomia in flower, a fetid odor permeates the air, indistinguishable from the odor of a dead animal. All the acrocomias I have planted are of extremely rapid growth, exceeded at this location only by the two species of *Archontophoenix.*

Areca. *A. catechu* 10b. *A. langloisiana* 10b. *A. triandra* 10a and marginal in warmest parts of 9b. Like most other multiple-stem palms, will rise from the roots if killed to ground by cold.

Arenga. *A. pinnata* 10b but marginal in colder sections of 10a and warmer sections of 9b. *A. engleri* 9b. The ripe fruits should be handled with rubber gloves, for the juicy pulp irritates human skin.

Arikuryroba. See *Syagrus.*

Asterogyne. 10b.

Astrocaryum. *A. mexicanum,* warmer sections of 10a and marginal in warmer parts of 9b.

Attalea. 10b.

Bismarckia. *B. nobilis* 9b*. Many palms are successfully bare-rooted for shipment, but bismarckias will not tolerate that kind of treatment.

Brahea. *Brahea* species are said to occur only in areas of limestone outcropping, and hence agricultural lime should be applied under cultivation in normally acid soil. Full sun is required for good development.

Butia. *Butia* species 9a, but several reported vigorous in Virginia Beach, Virginia.

Calamus. *Calamus* species 10b.

Caryota. 10a, but several species may be grown to perfection in the warmer sections of 9b except for a destructive freeze at unpredictable intervals. The soboliferous kinds will slowly rise from the roots following the total loss from freezing of not only foliage but stems also.

Ceroxylon. (I'd hardly want to guess at a zone for this one.) One or more species are said to be moderately successful in California, but all efforts to grow these palms outdoors in Florida have ended in failure.

Chamaedorea. *C. microspadix* and *C. radicalis,* both red-fruiting species, are probably the most cold-tolerant species in cultivation, withstanding the lowest temperatures occurring in the warmer sections of 9a. Many other species are remarkably hardy to cold, but unluckily many species succumb to attack by certain nematodes where present. *C. seifrizii* has been wiped out in some localities, but not attacked in others. The two species named above are less susceptible to nematode attack, and one of them, *C. microspadix,* is virtually immune.

Chrysalidocarpus. 10a*. The species are successfully cultivated in the warmest parts of 9b barring an occasional killing freeze.

Chamaerops. 9a. Not so widely planted in Florida as it deserves to be.

Coccothrinax. 10a, but the species thrive in the warmest parts of 9b in all but the coldest winters.

Cocos. 10a*.

Copernicia. 9b*. Six species have survived the coldest weather of record at one location in this zone.

Corypha. 10a.

Cryosophila. *C. nana* 9b*.

Daemonorops. 10b.

Deckenia. 10b.

Desmoncus. 10a.

Dictyosperma. 10a.

Drymophloeus. 10a.

Elaeis. 10b.

Euterpe. Perhaps some species of this genus may now be cultivated outdoors in Florida, but only a few years ago there were none—except for one example of *Euterpe edulis*

that prospered at my place in Daytona Beach, until March of this year (1974) when it died of unknown causes. Stanley Kiem used to say that every euterpe tried at Fairchild Garden had petered out for no assignable reason. Possibly some species is making the grade somewhere outdoors in the U.S. If so, it's news that is not general.

Gastrococos. Noteworthy about this palm in cultivation is that it is a laggard for two or three years when first planted out as a juvenile, but then its growth is sudden and no less than phenomenal. 10a except in colder locations within the zone.

Gaussia. 10b. *G. maya* (formerly *Opsiandra*), 10b. Reaches 90′ in height at Tikal, Guatemala.

Geonoma. *G. schotiana* 9b—perhaps hardiest species cultivated in U.S.

Hedyscepe. 10a*. Growers have had better success with *H. canterburyana* in California than Florida.

Heterospathe. 10a, in warmer sections.

Howea. 9b*. Both species are much happier in California than in Florida.

Hydriastele. 10b.

Hyophorbe. 10a except in colder parts.

Hyphaene. 9b. Though injured by hardest freezes, the species recover.

Jubaea. The full cold-tolerance of this Chilean palm is not yet known, but it has withstood 22° F in zone 9b without injury.

Jubaeopsis. 10a in California, but its hardiness in Florida not known.

Latania. 10a in Florida, not enough protracted warm weather in 10a in California.

Licuala. 9b*. The species are remarkably hardy in Florida, but prolonged cold of 25° F or lower is usually fatal.

Livistona. 9b, though some of the hardier species have survived for long periods in the warmest sections of 9a. *L. australis* is perhaps the hardiest, and *L. rotundifolia* is one of the tenderest.

Lodoicea. 10b in warmer sections, but nowhere vigorous in the continental U.S.

Lytocaryum (*Microcoelum*) 9b*. In this case the asterisk, signifying marginal, derives from killing cold of 22° F at my own place in the zone. Such a low temperature had never before occurred in the history of the Weather Service at this location, and might not occur again for 50 years, or might occur any winter, even next year.

Mauritia. 10b. The species require flooding with fresh water for good development. Two or more specimens are growing where planted in a very deep pothole at Chapman Field, the idea being to place the roots near the water table.

Nannorrhops. *N. ritchiana* 8b. Very likely 8a also, but not verified.

Neodypsis. *N. decaryi* 9b. Zones for other species uncertain.

Normanbya. *N. normanbyi.* Warmer sections of 10a.

Nypa. *N. fruticans* 10b.

Opsiandra. See *Syagrus.*

Orbignya. *O. cohune* 9b*. *O. guacuyule* 9b*. *O. spectabilis* 9b*.

Parajubaea. *P. cocoides* 9b in California, but apparently not suitable for Florida.

Phoenicophorium. *P. borsigianum* 10b.

Phoenix. *P. abyssinica* 9b. *P. canariensis* 9a in warmer sections. *P. dactylifera* 9a in warmer sections. *P. paludosa* 9b. *P. reclinata* 9b. *P. roebelenii* 9b in warmer sections. *P. sylvestris* 9a.

Pinanga. *P. kuhlii* 10a. It has thrived at my place since 1962, but this hardly qualifies it for Zone 9b. Another thing I strive to bear in mind is that what applies to my palms, so far as cold tolerance is concerned, applies to very few exotic palms located elsewhere in the same zone 9b. Two miles west from my location, where normally 160 or more

species are faring more than moderately well, it's doubtful that over 20 species could survive 2 or 3 winters.

Polyandrococus. *P. caudescens* 9b*.

Pritchardia. *P. pacifica* and *P. thurstonii,* 10b. All 7 species endemic in the Hawaiian Islands have made the grade here so far—that is, since 1962, but I can only guess how they would fare elsewhere in zone 9b. (I meant the 7 Hawaiian species I have here, which of course are not nearly all of the species.)

Pseudophoenix. 10b.

Ptychosperma. 10a. But, several species of this genus grow normally in my small part of 9b, except in those offbeat years when the temperature drops below 27° F, which is not often—not, in fact, since 1962. The same thing would definitely NOT apply to most of the same zone 9b.

Raphia. *R. farinifera,* 9b in warmest sectors only.

Reinhardtia. 10a.

Rhapidophyllum. *R. hystrix.* Not possible as yet to mark limits by zoning. This palm has not been injured by temperatures of 9 below zero. It is very much more tolerant of cold than the *Trachycarpus* species.

Rhapis. *R. excelsa* and *R. humilis,* 9b, but succeed in some of the warmer parts of 9a.

Rhopalostylis. *R. sapida,* 10a in California, but virtually absent in Florida, probably because it is not well adapted to the climate. *R. baueri,* 9b in warmest sections.

Roystonea. *R. regia* 10a. *R. elata* 10a. *R. oleracea* 10b. The royal palms have been sporadically grown in Zone 9b, but have been virtually wiped out by "hard" freezes at intervals usually, though not always, many years apart.

Sabal. Most of the species are fully hardy or half-hardy in Zone 9b. *S. palmetto* is hardy in 9a. *S. minor* 8b.

Scheelea. *S. liebmannii* 10a. Marginal in warmer parts of 9b.

Schippia. *S. concolor* 9b*.

Serenoa. *S. repens* 9a.

Syagrus. *amara* (*Rhyticocos*) 10b. *S. flexuosa, S. comosa, S. coronata,* all 9b. *S. romanzoffianum* (*Arecastrum*) 9b*. Commonest exotic in central Florida, except in coldest sections. In some locations, subject to attack by a fatal fungus disease. Hardiest strains are obtained from its native land, southern Brazil. *S. schizophylla* (*Arikuryroba*) 10a, and marginal in warmest parts of 9b.

Synechanthus. 10a*.

Thrinax. *T. floridana* 10a and only marginal in warmest sections of 9b.

Trachycarpus. 8b. Reports of living palms persist from colder zones.

Trithrinax. 9b.

Veitchia. 10b. Numbers of the species are grown elsewhere, but approximately 5,000 small field-grown *V. merrillii* were destroyed by the 1962 freeze in Stuart, Florida, which is itself in Zone 10b.

Verschaffeltia. 10b.

Wallichia. 9b*.

Washingtonia. *W. filifera* 9a. *W. robusta* 9b. A few examples of both species are reported from colder zones.

Zombia. *Z. antillarum* 9b*.