

Chile Pepper Institute

N E W S L E T T E R

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Chile Peppers in Benin - by Paul Bosland

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Benin is a small country in West Africa where chile peppers are widely cultivated and considered an economically important vegetable and spice. Most of the chile peppers are grown in small kitchen gardens. A recent research article explained production constraints and varietal diversity in southern Benin. The article was published in the *International Research Journal of Agricultural Science and Soil Science*, and is available online at: <http://www.interesjournals.org/IRJAS>. The Republic of Benin, formerly known as Dahomey, is bordered by Togo to the west, Nigeria to the east, and Burkina Faso and Niger to the north. Benin covers an area of approximately 42,000 sq. miles, with a population of approximately 10 million. Benin is a tropical, sub-Saharan nation, highly dependent on agriculture with two rainy seasons that produce about 36 to 46 inches of rain a year.



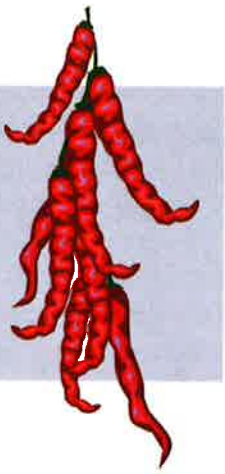
Map of Benin, courtesy nairaland.com

groups living there each have a special preference for a different type of chile pepper. The researchers surveyed 31 villages and found 197 named landraces of chile peppers.

Farmers noted the existence of many varieties within each class of chile pepper. There were many varieties based on slight differences in size and fruit

shape, the origin of the seed, the specific use and the heat level. Each village has its own series of names for chile peppers. The 36 named varieties were associated with 14 types in the *frutescens* group (small chile), 12 in the *annuum* group (long chile) and 10 in the *chinense* group (round chile).

The chile peppers are also known under different appellations or African names: "Ata" (Nagot and Holli), "Yébéssé" (Mina), "Takin" (Aïzo, Cotafofon, Fon, Goun, Mahi, Ouémé, Sahoué) and "Vavo" (Adja, Cotafofon, Fon, Goun, Sahoué). Each of the chile pepper landraces can be classified into three groups: the long chile pepper class called "Takingaga" (Fon) and "Adôllôgbô" (Adja); the round chile pepper class called "Gbatakin" (Fon), "Gbôwoungodoui" (Adja); and the very hot small chile pepper class known under the name of "Danhométakin" (Fon). These three classes correspond exactly to three species, i.e., *Capsicum annum*, *C.*



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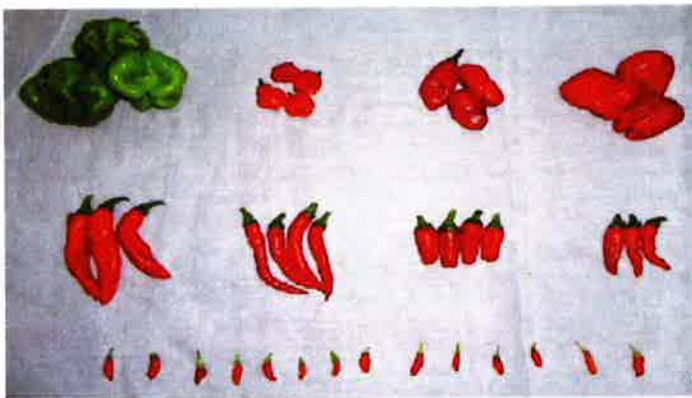
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Researchers from four institutions in Benin documented the diversity of chile peppers, and identified the best performing varieties that could meet both producer and consumer needs. The research was conducted in the southern part of the country within six departments (states): Atlantique, Littoral, Mono, Couffoo, Oueme, and Planteau. An interesting feature of this region is that the ten ethnic

Cont.

chinense and *C. frutescens*, respectively. This specificity of naming indicates that farmers have a good knowledge of the differences among their chile pepper plants.

The three types of chile peppers, Gbatakin, Danhomètakin, and Takingaga were widespread and were found in all 31 villages surveyed. The Gbatakin chile pepper is popular because in the kitchen, its round fruit can be broken by pressing it between two fingers. In fact the words "Gba" and "takin" in Fon mean "break" and "chile pepper," respectively. They are used in many sauces without grinding, which is believed to keep the heat intensity lower in the sauce. The fresh, green Gbatakin has a flavor that is highly desired. The Takingaga chile pepper has been adapted to drying and processing into powder. It is easy to store, and sells for a high price during the dry seasons. Danhomètakin is not as common in the villages because of its extremely high heat level, which is disliked. It is also a very low yielding



Fruits of selected varieties showing morphological variability with chile pepper groups in Benin. Top row is C. chinense, middle row is C. annum and bottom row is C. frutescens. Photo courtesy of University of d'Abomey—Calavi, Benin.

landrace, making its production not economically profitable.

The researchers also identified constraints to growing chile peppers, both biotic and abiotic, in southern Benin. They identified 10 production constraints causing most of the damage to chile peppers. These included insects attacking fruits, viral infection, flower and fruit drop, and anthracnose (fungal disease).

Some of the landraces were endangered, cultivated by only a few households and on small areas. The researchers stated that the rate of diversity loss per village varies from 20% to 83%. This rate of loss is alarming and the researchers want to collect germplasm to preserve the genetic resources of chile peppers in villages of southern Benin. Recently, scientists in Benin have created a national inventory of priority crops, of which chile pepper is one. They also established a Phytogenetic Genetic Resource (PGR) strategy to help safeguard their chile pepper germplasm for the future.

Recipe: Sauce d'Arachide (Peanut Sauce)

This is a traditional Beninese recipe for a classic sauce of onion, peanut butter and tomato paste flavored with ground chile peppers that is served with meat on a bed of rice.

Ingredients:

- 3 tbsp peanut oil
- 1/2 tsp hot chile powder
- 1 Maggi (or stock) cube
- 1/2 cup peanut butter (smooth, unsweetened)
- 1 4 oz can tomato paste
- 1/2 cup water
- 1 small onion, chopped



Fry the onion in the oil until soft then add the chile powder, salt, and Maggi cube. Fry for a few minutes more then add the peanut butter and water and stir to a smooth paste. Bring to a boil and serve on a bed of rice with fried chicken, vegetables, fish etc.

Chile Pepper Consumption and Preferences in the United States

Hot and spicy plants have been consumed by humans for millennia, even though this “heat” is an adaptation meant to be a deterrent. In the United States, an increasing number of people are consuming hot and spicy foods. Per capita consumption of hot peppers in the United States has more than doubled since 1980, but the United States is now a net importer of hot chile peppers. Although there are assuredly differences in the preferences of individuals regarding hot foods, spicy flavors are increasingly appealing in the United States. Moreover, consumers appear to enjoy hot peppers for their heat. Consumers rank pungency as the most important quality factor when choosing hot chile peppers.

Capsaicin is measured in Scoville Heat Units (SHU). Early on the SHU was traditionally measured using the human palette. However, in today’s quickly advancing technological world, it is now quantified using high performance liquid chromatography (HPLC) and converted to SHU. Naturally occurring hot foods can vary in heat as well as their SHU’s. For example, bell peppers are not hot, rating zero on the SHU scale, while Trinidad Moruga Scorpion, one of the hottest chile peppers in the world, can measure more than 2 million SHU. While some people like chile peppers, others do not. Much research has explored the psychological and physiological reasons behind variations in preference toward chile peppers.

Researchers at New Mexico State University have published results from a study that suggest genetic factors may help explain differences in heat preferences. Although some research suggests exposure can improve liking other findings suggest

no difference between “non-likers” and “likers” in their exposure to hot foods when young. Likers of hot foods may have thrill-seeking personality traits or derive pleasure from the fact that “heat” only appears harmful. Cultural influences (e.g., role models, early introduction) may also affect consumption of chile peppers. Researchers surveyed



Commonly consumed hot chile pepper variety in the United States, the jalapeno. - CPI photo

respondents from all 50 states and found that 41% of the respondents enjoyed eating spicy foods, 33% “loved” eating spicy foods while 13% disliked eating spicy foods, and 8% “hated” eating spicy foods. 5% of

respondents didn’t care either way. Researchers

also found that jalapenos were the number one consumed fresh pepper while New Mexican types came in second. - *From HortTechnology, December 2013*

Table 1. Comparisons between respondents to a Web-based survey who self-identified as spicy pepper likers and non-likers (sample size = 1096). *From HortTechnology, Lillywhite et al. 2013*

Demographic variable		Spicy pepper likers (%)	Spicy pepper non-likers (%)	χ^2	P value
Gender	Male	76.8	23.2	3.75	0.05
	Female	71.6	28.4		
Ties to southwestern United States	Yes	76.0	24.1	4.51	0.03
	No	69.9	30.2		
Age	Under 20 years of age	87.1	12.9	8.50	0.07
	20–34 years of age	74.4	25.7		
	35–54 years of age	77.3	22.7		
	55–64 years of age	70.8	29.2		
	65 years of age or older	70.1	29.9		
Income	Less than \$24,999	67.3	32.7	12.13	0.02
	\$25,000–\$49,999	73.9	26.1		
	\$50,000–\$99,999	76.9	23.2		

New Mexico's First Lady of Chile Passes Away

"I've known chile all my life, so it is rewarding to be able to share my experiences with others," Emma Jean Cervantes had been known to say. Emma Jean Cervantes, a Mesilla Valley matriarch passed away on August 30, 2014 (Las Cruces SunNews http://www.lcsun-news.com/las_cruces-news/ci_26454423/emma-jean-cervantes-longtime-community-leader-dies-at). Once cautioned by her father 'that agriculture was a jungle' Emma Jean was an exhaustible and admirable role model for women and men alike.



Known for her generous contributions of time and resources to many community causes, she served as Chairwoman of the Chile Pepper Institute's Advisory Board for thirteen years. Emma Jean also made it her

personal goal to make jalapeno and cayenne peppers an important agricultural focus beyond just the traditional New Mexican green and red peppers. Within ten years of taking over her family's farm, Emma Jean expanded her father's farming operation into Cervantes Enterprises eventually becoming one of the largest chile processing businesses in New Mexico. These efforts earned her the moniker "New Mexico's First Lady of Chile."

Emma Jean was known to say about chile peppers that "We grow it, process it, market it, distribute it, and worship it." Emma Jean will be remembered for her compassion, her attentiveness, her eloquence, her professionalism, and her leadership. She will be sorely missed at the Chile Pepper Institute.

New Chile Pepper Institute Merchandise

Will that be Red or Green? The Chile Pepper Institute's family of T-shirts has grown to include red and green, in addition to the white and black T-shirts. The new T-shirts are decorated with our bright, four chile block, Chile Pepper Institute logo. T-shirts come in sizes from Small to XXL and are \$15.00 plus shipping when ordered through the websites online shop and \$15.00 for visitors to the Chile Pepper Institute gift shop.



The Chile Pepper Institute's Development Leadership Council

The Development Leadership Council is a dynamic group of chile pepper industry leaders. Their purpose - to raise \$1 million to fund an Endowed Chair and \$15 million to build the new energy efficient Chile Pepper Institute, featuring a tourist venue for a sustainable teaching and demonstration garden/greenhouse to continue the legacy of NMSU's chile pepper research.

Leadership Council members provide:

- A yearly sustaining donation of \$2,500;
- Facilitation of corporate sponsorships;
- Recommendations of industry colleagues who have the financial capacity to support the Institute's adventures; and
- Encouragement of chile pepper aficionados to become Chile Pepper Institute members.

Interested in joining the Council? Contact Wendy Hamilton whamilto@nmsu.edu, 575-646-5284 or Terra Winter tvwinter@nmsu.edu, 575-646-5787

Birthplace of the Domesticated Chile Pepper Identified in Mexico

The world's most widely grown spice crop, the *Capsicum annuum*, was birthed in central-east Mexico, reports an international team of researchers, led by a plant scientist at the University of California, Davis. Results from the four-pronged investigation, based on linguistic and ecological evidence as well as the more traditional archaeological and genetic data, suggest a regional, rather than a geographically specific birthplace for the domesticated *Capsicum annuum*.

Researchers found that region, extending from southern Puebla and northern Oaxaca to southeastern Veracruz, is the perceived region for *Capsicum annuum* domestication.

The region is also different from areas of origin that have been suggested for common beans and corn, which were presumably domesticated in Western Mexico. The findings were published online in April in the Proceedings of the National Academy of Sciences, as part of a series of research papers on plant and animal domestication.

Crop domestication, the process of selectively breeding a wild plant or animal species, is of increasing interest to scientists.

"Identifying the origin of the chile pepper is not just an academic exercise," said UC Davis plant scientist Paul Gepts, the study's senior author. "By tracing back the ancestry of any domesticated plant, we can better understand the genetic evolution of that species and the origin of agriculture, a major step in human evolution in different regions of the world," he said.

"This information, in turn, better equips us to develop sound genetic conservation programs and increases the efficiency of breeding programs, which will be critically important as we work to deal with climate change and provide food for a rapidly increasing global population," Gepts added.

Study co-author Gary P. Nabhan, an ethnobiologist and agroecologist at the University of Arizona's Southwest Center noted: "This is the first research ever

to integrate multiple lines of evidence in attempts to pinpoint where, when, under what ecological conditions, and by whom a major global spice plant was domesticated.

"In fact, this may be the only crop-origins research to have ever predicted the probable first cultivators of one of the world's most important food crops," Nabhan said.

To determine crop origins, scientists have



Photo showing the morphological differences among species of *Capsicum*. Photo- CPI.

traditionally studied the plant's genetic makeup in geographic areas where they have observed high diversity among the crop's wild ancestors. More recently, they have also examined archaeological remains of plants, including pollen, starch grains and even mineralized plant secretions. For this chile pepper study, the researchers used these two traditional approaches but also considered historical languages, looking for the earliest linguistic

evidence that a cultivated chile pepper existed.

They also developed a model for the distribution of related plant species, to predict the areas most environmentally suitable for the chile pepper and its wild ancestors.

The genetic evidence seemed to point more to northeastern Mexico as the chile pepper's area of domestication; however there was collectively more evidence from all four lines of study supporting the central-east region as the area of origin. -*University of California – Davis, April 2014*

Updated NMSU Extension Circular:
Growing Chiles in New Mexico - Guide H-230
 Find it in PDF format on the Chile Pepper Institute's
 'Chile Info' page.
www.chilepepperinstitute.org

C A P S I C U M N E W S

2014 Chile Pepper Institute Teaching Garden

The 2014 Chile Pepper Institute Teaching Garden is open to the public through October 2014 or the first frost. This year's theme is "All-America Selections (AAS)." 'NuMex Easter,' one of our newest ornamental chile pepper cultivars is a 2014 AAS winner. We have also included in the garden 21



of the past AAS chile pepper winners since 1935. The Chile Pepper Institute Teaching Garden at New Mexico State University has been an integral part of the

Chile Pepper Institute's teaching resources since 1991. Located at the Fabian Garcia Science Center, 113 West University Ave, Las Cruces, NM. The Garden has more than 150 different varieties of chile peppers and is open to the general public for self-guided tours seven days a week from 8:00 am to 5:00 pm. Garden maps and information can be found in the mailbox attached to the Garden sign. There are also guided tours available for a small donation. A big thank you to Amy Goldman for her sponsorship of the 2014 Garden. For more information visit the CPI's Garden webpage at www.chilepepperinstitute.org, or call 575-646-3028.

Holiday SALE – December 1st – 19th

The holidays are right around the corner and the Chile Pepper Institute will hold its annual Holiday sale beginning December 1st. Various items will be up to 15% off in addition to your membership discount! Check our social media sites in November for hints on sale items. Proceeds from all Chile

Pepper Institute sales go toward raising funds for the Chile Pepper Endowed Chair.

The Institute has also designed a colorful and informational new chile pepper calendar for 2015. Each month contains beautiful pictures of various chile peppers, and a large array of recipes ranging from traditional New Mexican cuisine to some of the more exotic. Calendars will be available on our website



October 1st, and are \$10.00 plus shipping and \$10.00 for visitors to the Institute.

Blocking Pain Receptors Extends Lifespan, Boosts Metabolism in Mice

Chronic pain is known to shorten a lifespan, and pain tends to increase with age. Researchers have found that mice lacking the capsaicin pain receptor live around 14 percent longer than other mice, and they retain a more youthful metabolism as well. We already know the pain receptor called TRPV1 is often called the capsaicin receptor. Researchers at the University of California-Berkeley found that constant activation of the receptor on a nerve cell resulted in death of the neuron, mimicking a loss of TRPV1, which could explain why diets rich in capsaicin have been linked to a lower incidence of diabetes and metabolic problems in humans. Receptor blockers could not only relieve pain, but increase lifespan, improve metabolic health and help diabetics and the obese.



For the latest, up-to-date, research based news and information on chile peppers follow us on Twitter, Pinterest and like us on Facebook

BURNING QUESTIONS

Q. I've been growing New Mexican chile peppers in Oakland, CA for several years now, and have had



Pods of NuMex Heritage 6-4, developed at New Mexico State University - Photo CPI

great success except that nothing I grow is ever hot. I've tried several cultivars, 'NuMex Big Jim,' 'Sandia,' 'NuMex Joe E. Parker.'

A. The environment plays a big role in how hot a chile pepper becomes. If your environment is very mild, ie. lots of rainfall,

moderate air temperatures, etc. then the pods will not be as hot as the same variety grown somewhere where there is very little rainfall and multiple days reaching 100°F. There are several publications on the Chile Pepper Institute's 'Chile Info' page, www.chilepepperinstitute.org, that address this issue.

Q. I have about a dozen chile pepper seedlings in the fourth true leaf stage. The newest set of leaves seem to be deformed. There seems to be a crook in each leaf and the leaves seem to be curling a bit with a bumpy nature. I have also noticed that several of my full grown chile pepper plants have these same



Western flower thrips - Photo courtesy UCONN.

deformities on the new growth as well. Can you advise me on what could be causing this?

A. Most likely Thrips are causing the damage. Look at an open chile pepper flower from one of the full grown plants with a magnifying glass and see if you can spot very small spear shaped, tan insects around the anthers and pollen. A Google search for "thrip



Western flower thrips damage on a chile pepper seedling - Photo courtesy UCONN.

damage on pepper seedlings" may help, as well. Thrips are tiny sucking insects that like to feed on new growth, often times causing the damage you describe.

Q. How do I know when to pick my New Mexican type chile peppers?

A. First decide which stage you would like to harvest them, as green or red chile peppers. If you will be harvesting them at the green stage feel a pod and check to make sure it is very firm and gives a slight crackle when the pod is squeezed. If you will be harvesting for red, wait until the pods turn a deep red color. You can harvest red chile at the plump stage or you can wait until the red pods start to dry on the plant. At this stage the drying process can be finished in the sunlight or with a food dehydrator.