Hot Chile Peppers in China

By Dr. Deyuan

The People’s Republic of China is one of the largest countries in the world and has extremely diverse climates, from tropical in the south to sub-arctic in the north (figure 1). China encompasses an area of about 2.5 million square miles, which is about 6.5 percent of the world's total land area. There are more than 1.3 billion people in China, most are farmers and herders. The farmers and herders have a major challenge keeping China’s large population fed. Thus, agriculture is an important industry in China.

Chile peppers, both hot and sweet, are one of the most important vegetable crops, cultivated year-round in China. The annual growing area is more than 2.5 million acres. The two main markets for chile peppers are the domestic fresh market and the processing industry that is located mainly in Shaanxi, Sichuan, and Guizhou provinces, where there are several large processing facilities. Chile pepper products (dry red fruits, pepper sauces, etc.) are exported to more than ten countries.

Germplasm and Commercial Cultivars

Chile pepper was introduced into China at the end of the 16th century, and over the years has spread throughout the country. There are only three Capsicum species grown commercially in China C. annuum, C. chinense, and C. pubescens. Almost all chile pepper grown are C. annuum. Currently only one commercial C. chinense variety is cultivated in a very limited area of Hainan Province, in southern China.

More than 2000 hot and sweet chile pepper accessions are stored in the National Crop Germplasm Bank located in Beijing, most are landraces. It is estimated that about 3000 breeding lines and other germplasm are kept at research institutes and private companies throughout the country.

figure 1

PLEASE SEE CHINA, P. 2
More than 200 commercial cultivars are grown throughout China, most are *C. annuum* F, hybrids. There are three main fruit types for green fruit consumption (ox-horn-shaped, sheep-horn-shaped, and blocky bell) and three main fruit types for red fruit consumption and processing (“linear”, small sheep-horn-shaped, and upright cluster). These varieties were developed by both national research institutes and private companies. Before new cultivars are released to growers, the government examines and approves the cultivars for release. Recently, foreign vegetable seed companies, like Seminis and Syngenta, are marketing chile pepper varieties in China, and are also establishing chile pepper breeding programs and facilities.

**Problems in Pepper Production**

Chile pepper production in China is either open field or protective production (greenhouses, plastic sheds, etc.). The latter are used mainly in early spring, and late autumn in areas of northern China like Beijing, Tianjin, Hebei, Henan, Shandong, Shanxi, and Shaanxi. Growers utilize protective facilities (greenhouses, etc.) to produce chile pepper and increase profits because chile pepper cannot be planted in the open field in early spring and late autumn. When the demand for chile pepper increases greatly.

There are large differences in chile pepper preference in China. Northeasterners love the sweet blocky pepper with mild heat and thin walls. Northwesterners like chile peppers with high heat, while the people in south China prefer the chile pepper with no heat because of the hot and humid weather. A common saying in China is; “Sichuaners don’t fear hot pepper, Hunaners fear peppers are not hot, and Guizhouners don’t fear the heat of hot peppers.”

Disease and insects are the biggest problems facing open field chile pepper production. The main diseases are tobacco mosaic virus (TMV), cucumber mosaic virus (CMV), *Phytophthora* blight, bacterial leaf spot, anthracnose, and *Fusarium* wilt. The major insect pests include aphids, thrips, and fruitworms. While under protective production, soil-borne diseases, such as *Phytophthora* blight, are the biggest problems.

**Research**

Chile pepper research is mainly done by the research institutes and the universities, which are funded primarily by the government. Chile pepper germplasm collection and evaluation, breeding, cultivation techniques, and disease control are the research emphasis for the future. Currently, the goal of research activities is producing organic foods. The breeding objectives are 1) maturity, including early, medium, and late maturity; 2) high yield; 3) disease resistance, including resistance to *Phytophthora* blight, anthracnose, TMV, and CMV; and 4) nutritional quality and market quality, which are becoming more important each year. Increased nutritional quality of fruits, heat levels, and dry matter content are the most important. Marketing quality includes uniform fruits and a longer shelf-life.

Chinese researchers have established a series of breeding techniques from germplasm evaluation to variety development. Almost all chile pepper breeders are using methods that maximize uniformity. New cultivars are F, hybrids because seed production is inexpensive, and for the protection of intellectual property. Chinese breeders have developed an outstanding F, hybrid, *Fukang* No. 5, which has larger, more uniform, and attractive fruits. ‘Fukang No. 5’ is high-yielding with up to 30-35 tons/hectare in Guangdong, China.

As marketing networks gradually became established abroad, chile pepper products from China will be found in international markets.

Dr. Wang received his Ph. D from Northwest Sci-tech University of Agriculture and Forest in China, 1997, and is currently an associate professor at the Vegetable Institute, Guangdong Academy of Agricultural Sciences, P. R. China.
Did You Know?

Rodents seasoned with sweet chile peppers, fresh shellfish, yams, fish fried in corn oil, fermented corn juice, and the hallucinogenic flowers of the *campana* tree—do these sound like what would be featured on a menu at your favorite Puerto Rican restaurant today? These are just a few things the Taino Indians, people native to Puerto Rico before Spanish colonialism, would prepare at an *areyto*, or celebration, which often took place after victorious battles against the Caribs, a competing tribe who also lived on the island. Many of these recipes continue to thrive—with modifications—in Puerto Rican cuisine today.

Such historic foodstuffs have blended remarkably well with later culinary traditions brought by Spanish colonists and enslaved Africans. The Spaniards expanded food choices by bringing cattle, pigs, goats; and sheep to the island. The Africans created dishes that blended contrasting, yet strikingly flavorful tastes in dishes like *piñón*—ripe plantains layered in seasoned ground beef. Ironically, much of the food Puerto Rico is famous for—plantains, coffee, sugarcane, coconuts, oranges—was actually imported by foreigners to the island.

A common—and false—assumption many people make about Puerto Rican cuisine is that it is spicy. The food is well-seasoned with spices but not fiery-hot spicy; a variety of condiments are used to give savory flavor. At the core of many staple dishes is *sofrito*, a sauce made from tomatoes, chopped onions, garlic, green bell peppers, *ají dulces* (sweet chile peppers), oregano, cilantro, and a handful of other spices. The sauce is fried in oil, and *achiote* (anatto seeds) are added in for color. This base is then added to rice, bean, or stewed dishes.

—Christy Ullrich, writer for National Geographic

Recipe: *Sofrito Básico - Basic Sofrito*

Note: This sofrito recipe is prepared as the first step in many Puerto Rican bean, rice, and stewed dishes.

**Directions:**

Remove skins from onion and garlic. Remove seeds from green and sweet chile peppers. Rinse in water. Then finely chop these ingredients, including the cilantro. Place a heavy-bottomed pot over low heat; add oil and onion and garlic. Remove seeds from green and sweet chile peppers. Rinse in water. Then finely chop these ingredients, including the cilantro. Place a heavy-bottomed pot over low heat; add oil and oregano. Add the chopped ingredients. Continue cooking for about 3 to 4 minutes, stirring occasionally to ensure an even blending of the flavors. Now you are ready to continue with the rest of the dish being prepared.

**Ingredients:**

- 1 yellow onion
- 2 cloves garlic
- 1 green bell pepper
- 3 to 4 mild chile peppers (*aji dulces*)
- 3 cilantro leaves
- 1 tablespoon olive oil or corn oil
- 1/4 teaspoon dried whole oregano

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*The Chile Pepper Institute Newsletter*

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New Food Product Development Lab at NMSU to Open

The New Mexico State University (NMSU) College of Agriculture and Home Economics is excited to open its new 800-square-foot food production lab and adjacent sensory lab designed for testing food products for commercial formulation.

The food production lab will allow small and medium sized producers to test family recipes and perfect commercial formulations before starting full-scale production. The lab is located on the west side of the NMSU main campus in the Tejada Building and is equipped with a $150,000 commercial kitchen that includes a pasteurizer, freeze dryer, and industrial-sized oven/stove combination. Funding for the lab and equipment came from state grants, as well as a $130,000 capital outlay appropriation from the New Mexico Legislature.

The sensory lab allows testers to analyze the texture, flavor, and appearance of products in a strictly controlled environment. The testing room contains a very controlled environment. Cooking odors are kept separate and the color of the lighting in the room is controlled to allow the tester not to be influenced by the appearance or smell of the product, thus, focusing on the taste.

The main goal of the research and sensory labs are to help New Mexico businesses that are not large enough to have their own research and development capabilities. The lab is also used for classes in food product development research. The lab provides services to businesses outside of New Mexico*. For additional information contact NMSU Extension Food Technology Specialist, Nancy C. Flores. (505)646-1179 or naflores@nmsu.edu

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Xian Jiao 8819, *(Capsicum annuum L.)*

The Chile Pepper Institute’s complimentary seed packet for 2006 is the Chinese cultivar Xian Jiao 8819. “Xian Jiao” chile pepper is famous in the Shaanxi Province, which is located in the northwest region of China. It was developed by Northwest Sci-tech University of Agriculture and Forest, and examined and approved by Shaanxi Province in 1991.

Since 1991, ‘Xian Jiao’ has become one of the most popular chile pepper cultivars, and is highly praised by the experts at the Foreign Agriculture Organization. The cultivar name, “Xian” and “Jiao” means “linear” and “hot pepper”, respectively.

This vigorous open-pollinated cultivar shows medium maturity, high yield (4500 Kg dry fruits/ hectare), good fruit setting ability, and intermediate resistance to Fusarium wilt and viruses. It produces long, thin fruits that are 15 cm in length and 1.3 cm in width and has medium pungency.

This variety is grown for the fresh red market and is also used dry and in processing, including dried powder and oil extraction. Red dry fruits have been exported to Southeast Asia, Europe, Japan, and Korea.

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**Extension Food Technology Service Fees**

Fees effective Jan 1st, 2006

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<td>Nutritional Information Panel (English/Spanish)</td>
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* Fees for non-New Mexico businesses are double.  
** Process review fees include basic microbiological analysis, water activity and pH measurement.
Researchers Couple Chile Harvester with Improved Field Cleaners

By, Norman Martin, NMSU Agriculture Communications

Scientists at New Mexico State University have unveiled the second phase of a mechanical chile cleaner that removes field trash and leaves, leaving only pure peppers for processing. Experts with the New Mexico Chile Task Force believe the upgraded device is another major milestone in mechanizing New Mexico’s labor-intensive chile industry.

“Mechanizing cleaning is a critical element in our overall goal of making New Mexico chile producers and processors more competitive,” said task force coordinator Richard Phillips, a project manager with NMSU’s Cooperative Extension Service. “This is a giant step toward saving New Mexico’s signature industry.”

During the past two decades, labor cost and availability have created huge hurdles for New Mexico chile growers, so the task force’s most recent efforts have been aimed at mechanizing as much of the industry as possible. Along with mechanizing field cleaners, agricultural engineers are developing mechanical chile de-stemmers and thinners.

Recent changes in U.S. trade policies have made New Mexico’s chile industry vulnerable to competition from lower-priced foreign imports, he said. American producers pay considerably more for agricultural labor, and crews often are unavailable when needed. Cleaning chile fresh from the field is no simple task because condition of the peppers changes throughout the harvesting season. Early in the season, when the plants are green and fresh, there’s little field trash. Later in the harvest cycle, after the first frost, mechanical harvesters can pull in large amounts of brittle branches and leaves.

It’s one reason why NMSU engineers focused the second phase of their attack on field trash by emphasizing adjustability to meet the crop’s condition. “Today, we can tune these cleaners to any chile variety and harvest condition,” said Ed Eaton, an Extension agricultural engineer who is leading construction and testing of the cleaners. In NMSU’s latest two-phase machine, experimental batches of machine-harvested red chile are tumbled and turned across two different prototype cleaners to remove leaves, sticks and other unwanted plant material that were harvested along with the chile pods. The experimental cleaners separate material by length and diameter. The first cleaner, which was developed last year, moves the harvested chile across a bed of 6-inch, overlapping, square, plastic cards that rotate on parallel shafts. Card spacing on the first section of this tumble-type cleaner is adjusted so that small sticks fall through the spaces between the cards. In next section, a wider spacing between cards allows the marketable pods to drop through the cleaning bed, while sticks that are longer than pods are discarded.

This season, NMSU agricultural engineers have added a second machine, known as a Creager cleaner, which is designed to remove trash missed by the first cleaner. Made up of a series of big coils all turning in the same direction, the device sorts chile by diameter rather than length. It allows trash and sticks that are thinner than the pods to fall between the coils. The remaining peppers move across the coil bed into a storage bin for processing.

“Our initial tests indicate that, used in tandem with the card sorter, it will produce a very clean product,” said Eaton, who received his doctorate in agricultural and biosystems engineering from the University of Arizona. Another plus is that the Creager cleaner may also be effective in removing leaves from fresh jalepeño harvests, allowing growers to store more pods and less trash, he said.

Is Your Label RED?
It’s Time To Renew!
Korea’s Red Chile Pepper Consumption Increasing

The rising popularity of hot dishes in Korea has contributed to increases in the consumption of dried red pepper, a major ingredient in spicy food. The Korea Rural Economic Institute estimated that around 242,000 tons of dried red peppers have been consumed in the first seven months of 2005, already surpassing the total local consumption of 231,000 tons for 2004. Even global and local fast food and family restaurant chains have started introducing hot and spicy menu items. For instance, McDonalds has been offering Crazy Hot Chicken since July, while Burger King is selling its Garlic Steak House Burger served with chili sauce. From fiery-foods.com

2006 New Mexico Conference Set for February 7

The 25th Anniversary of the New Mexico Chile Conference will be held at the Las Cruces Hilton on Tuesday February 7 with a welcome and silent auction the evening of the 6th. This year’s Conference will highlight “Tradition and Transition” with speakers covering disease and pest control, stand establishment, and mechanical technology advances. There will also be special sections on the history of the conference, and new breakout activities. For more information on the Conference please visit www.chilepepperinstitute.org or e-mail hotchile@nmsu.edu.

NMSU Chile Task Force Publications Available

The New Mexico State University Chile Task Force has two new reports in print. Report No. 19: Use of Kaolin to Suppress Beet Curly Top Virus in Chile Peppers and Report No. 20: Using a Color Sorter to Remove Sticks from Mechanically Harvested Red Chile. The NMSU Chile Task Force was formed in 1998 to ensure that New Mexico’s chile industry is cost-effective enough to be competitive in a global market place. Three working groups (mechanical harvesting, best management practices and drip irrigation) focus on modernizing the local industry. An additional two reports are expected soon with three more reports in February. An overview of all chile research will be given at the 2006 New Mexico Chile Conference.

New Mexico State University College of Agriculture & Home Economics Latest Publications Available

NMSU Communications has announced the newest research publications available on chile peppers. These include Powdery Mildew On Chile Peppers (H-248), Chile Pepper Disorders Caused By Environmental Stress (H-249), and Verticillium Wilt of Chile Pepper (H-250). These publications are available through the Chile Pepper Institute.
B U R N I N G  Q U E S T I O N S

Q. My son is doing his science project on chile pepper pungency. Is there any way to get pungency results without going to a lab?

A. Your son can always go the Wilbur Scoville route and gather up some taste testers. However the original Scoville test is very objective and does not yield accurate results because everyone’s mouths and taste buds are different. Your best bet for accurate results is to have your samples tested using High Performance Liquid Chromatography (HPLC) through a lab.

Wilbur Scoville was an American chemist and is best known for his creation of “The Scoville Organoleptic Test”, now standardized as the Scoville scale. He devised the test and scale in 1912 while working at the ParkeDavis pharmaceutical company to measure “hotness” of various peppers.

Q. How dry do my chile pepper pods have to be before making powder?

A. Optimally you would like to get pod moisture down to between 8 and 12 percent. At this moisture level the pods will crumble easily.

Q. I need to have an ongoing argument resolved between my brother-in-law and myself. Are there different types of Paprika and if so, are some hot and others not hot?

A. Yes, there are actually three different regional forms of Paprika. The most commonly known is the traditional Hungarian Paprika can be non-pungent or hot. There is also Paprika grown here in the United States and is one of the five main types of chiles grown in New Mexico. The Paprika produced in New Mexico comes from a non-pungent New Mexican pod type. Some of the varieties include ‘NuMex Sweet’ and the newest, high-color variety ‘NuMex Garnet’. There is also Spanish Paprika that is mildly pungent. Seed for these varieties is available through the Chile Pepper Institute.

Q. During the winter months I really miss my chile pepper plants. Is there anyway I can grow them indoors and yield the same results as if they were planted outside?

A. It is possible to grow chile pepper indoors. However there are a few things that are essential. Growing chile pepper plants in pots is very different from growing them in the ground, the root zone is restricted. Therefore, you will usually not get the same yield or pod sizes from your plants. You must have a very bright, sunny location because chile pepper plants require at least 13 hours of sunlight. You must not place the plants in the way of heater drafts, do not let plants sit in water and do not let the soil dry out. You must fertilize regularly. A good balanced fertilizer (12-12-12) is best, and you must check the plant often for signs of insect invasion, chile pepper plants are prone to whitefly, mealy bug and aphid infestations. Nevertheless you can grow healthy, vibrant chile pepper plants during the Winter months.