Going Dutch with Bell Peppers

By - Paul W. Bosland

Windmills, canals, and tulips reign as symbols of the Netherlands. However, in the last couple of decades a new symbol of the Netherlands has emerged - colored bell peppers. The Dutch greenhouse industry has become famous producing colored bell peppers that are available in supermarkets all over the world.

In May I set off to the triennial 2004 European Association for Research on Plant Breeding (EUCARPIA) Meeting for Capsicum and Eggplant that was being held in the Netherlands, which is a very pleasant country to visit. The art collections are spectacular, the historic cities and towns are fascinating, and the flat landscape is dotted with wonderful old farmhouses, modern electric generating windmills and small herds of dairy cows grazing on verdant grasses. One-third of the Netherlands is below sea level, and on this precious reclaimed land, intensive farming is very important. The Dutch excel at greenhouse production of vegetables, including high quality colored bell peppers that are shipped globally.

The EUCARPIA meeting is dedicated to researchers presenting their latest scientific findings about chile peppers and eggplants, and one of those days is always allocated for a field trip. One of the stops on our trip was a visit to a Dutch greenhouse operation that grows colored bell peppers. Each greenhouse specializes in one color of bell pepper; our visit was to the Bos Greenhouses, which grows and ships yellow bell peppers. The greenhouse operation was so large the employees used bicycles to get from one end to the other. Greenhouse production of peppers is highly innovative as well as a capital intensive production system. Most of the greenhouses use an “Integrated Pest Management” (IPM) system to control insect pests and diseases. IPM is an approach to pest management designed to control pests and diseases with as little chemical use as possible. An IPM grower will employ many crop protection techniques including monitoring, crop sanitation, cultural and mechanical control, and the introduction of beneficial insects and mites.

More than 90% of all sweet peppers are produced using IPM in the Netherlands. (For more on the use of beneficial insects, see Bio-control popular in chile greenhouse, CPI Newsletter Winter 97-98). Of course, to grow the best possible peppers the grower has to start with seeds of superior genetic and physiological quality. Several Dutch seed companies have breeders who work exclusively on developing cultivars that will do well
under greenhouse conditions. The breeders also introduce host-plant resistance to fungi, bacteria, viruses, and physiological disorders like fruit cracking and russetting into the cultivars. The most popular yellow bell pepper cultivar is "Derby" developed by DeRuiter Seeds of the Netherlands. DeRuiter Seeds is also developing resistant pepper rootstocks. Young bell peppers are grafted onto the rootstock to give the plant resistance to several root rotting diseases and nematodes.

One of the innovations applied to the greenhouse environment is the pumping of carbon dioxide (CO₂) into the greenhouse to enrich the air. Chili peppers, like all green plants use CO₂ and water in the presence of light to synthesize organic compounds through the process of photosynthesis. Although CO₂ is one of three main components necessary for plant growth, the amount of CO₂ in the air is only 0.03% (250 to 600 parts per million). This compares to 78% nitrogen and 21% oxygen in normal air. Tests have shown that in an enclosed growing area, as plants use up available CO₂, their growth will slow down. The CO₂ concentrations inside greenhouses can be much lower than the outside air. The average CO₂ level that is recommended for the Dutch greenhouses is 1000 to 2000 parts per million. The grower we visited believed he could realize up to a 25-40% increase in yield with CO₂ enrichment.

Another recent development is the use of bumblebees for pollination. The bumblebees land on the pepper flower and vibrate it, increasing fruit set and therefore yield.

Dutch greenhouses have been successfully growing bell peppers using artificial substrates instead of soil for more than two decades. The artificial substrate most often used is rockwool. Rockwool is a sterile planting medium made from volcanic rock that is melted and spun into fibers. The fibers are then packed into a block and the grower transplants directly into the rockwool.

Peppers are grown in rockwool to eliminate soilborne diseases and weeds. This technique is very conducive to hydroponic technology. Hydroponics provide a system where a majority of a pepper plant's nutrients are provided by mixing water-soluble nutrients with water. Hydroponic systems that use only a nutrient solution are categorized as water culture or solution culture. However, if the nutrient solution is used in combination with solid inert matter, i.e., rockwool, to physically support root systems and hold the hydroponic solution, it is technically categorized as substrate culture or aggregate culture.

By using alternative cropping methods, such as hydroponics on artificial substrates, growers in the Netherlands have successfully eliminated the risk of infestation by soilborne pests, while increasing crop yield and quality.

Because of this success, the Netherlands phased-out the use of methyl bromide as a soil fumigant by 1992. The Netherlands was formerly one of Europe's largest users of methyl bromide for soil fumigation.

Hydroponics also brings fresh oxygen to the root zone and takes away "off-gases," the waste by-product of the root zone. Because nutrients are readily available in hydroponic systems, plants have smaller, more efficient root systems and can spend more energy growing the more valuable above ground stems, foliage, and fruit. Furthermore, growers can space plants closer together, and produce more yields per given area, while avoiding competition for scarce nutrients in the root zone.

The nutrient solution is recycled in many of the Dutch greenhouses. The hydroponic solution is pumped to the plants using a regulated trickle/drip irrigation system. The wastewater from the roots is recaptured, sterilized, and reused to reduce environmental waste and contamination, and to conserve water. Growers sterilize the recycled nutrient water by heating it to about 90°C (194°F). The recycling hydroponic system uses only one-tenth the amount of water as does field irrigated agriculture. Additionally, after each growing season, the used rockwool is melted again, and pressed into bricks. These bricks are
then used in the construction of buildings in the Netherlands.

After the fruits are harvested by hand, and placed in harvest carts that run on rails in between the rows of tall trained peppers, they are washed, sorted, and boxed. If they are going to the United States, the boxes are loaded onto transport ships. It takes about 10 days for the peppers to arrive in New York. From there, they are trucked or flown to stores all over the United States.

Even though you may think of bell peppers as defanged chile peppers, one has to respect these colorful fruits. With this integration of technology from seed to the supermarket, consumers can expect fresh, large, beautiful, and sweet bell peppers year-round. The following recipe using colored bell peppers is from The Pepper Harvest Cookbook, which can be purchased at the Chile Pepper Institute.

**RECIPE - Penne with Pine Nuts and Peppers**

16 ounces penne  
2 tablespoons olive oil  
1 clove garlic  
1 yellow bell pepper, seeded & sliced in 1/2-inch-wide strips  
1 red bell pepper, roasted, peeled, seeded and sliced into 1/2-inch-wide strips  
4 plum tomatoes seeded & chopped  
2 tablespoons dry sherry  
3 leaves fresh sweet basil finely chopped  
2 leaves lemon basil, finely chopped  
1 fresh mint leaf, finely chopped  
1 tablespoon balsamic vinegar  
1/2-1/3 cup toasted pine nuts  
salt & pepper to taste  

Cook penne in a large pot of salted, boiling water 12-15 minutes or until *al dente*. Set aside in a colander to drain.

In a large frying pan, heat the oil over medium-low heat. Add the garlic and peppers and cook 10 minutes, or until the peppers become soft. Add the tomatoes, sherry, basil, and vinegar, stirring to blend the flavors. Add the penne, cover, and cook over low heat 5 minutes. The penne should be warm but not hot. Remove the lid and add the pine nuts. Season with salt and pepper. *Serves 4*
Company Profile - La Posta de Mesilla

Earliest records indicate that what is currently known as the world famous La Posta De Mesilla Mexican Restaurant, located in Mesilla, N.M., was originally constructed in the 1840’s. Sam Bean and his brother Roy Bean, operated a freight and passenger service line to Pinos Altos, N.M., from this building in the 1850’s. After the Civil War, the La Posta Compound became an important stop on the Butterfield stagecoach line. During the 1870’s and 1880’s, the Corn Exchange Hotel, one of the finest lodges in the Southwest, operated from the building. John Davis, the proprietor of the hotel, died in the late 1870’s. However, his wife Augustina continued to operate the hotel, a restaurant and other businesses in the building until the early 1900’s.

La Posta de Mesilla Restaurant originated in the northwest corner of the building in 1939 by Katy Griggs Camunez. The business has grown to become one of the most famous restaurants in the Southwest, occupying 10,000 square feet of the La Posta Compound, that now includes several shops. After Katy passed away, the property and business was acquired by a great niece, Jerean Camunez Hutchinson and her husband Tom, a.k.a. "Hutch", who continue to offer the same quality food and great service in the unique dining environment Katy created. The restaurant offers many fine traditional “New Mexico” chile dishes made from century- old recipes handed down over the years from the Fountain, Chavez, and Griggs families. The La Posta Compound is on the National Register of Historic Buildings. The building is Territorial Style with a zaguan leading into a patio now used as a lobby for the restaurant and displays tropical plants, birds and fish, and even piranhas, for all to see. Constructed primarily of adobe, the north and west sides of the building have doors and windows retaining the Greek revival pediments so typical of Territorial style. The west wall still retains the parapet topped by a broad space where the Corn Exchange Hotel sign once was proudly displayed in the 1870’s!

Located in Mesilla two miles southwest of Las Cruces, New Mexico, La Posta is situated on the Southeast corner of the Mesilla Plaza.

New Product Speeds Metabolism with the Power of Chile Peppers

According to pepperhealth.com there is now the world’s first liquid capsaicin supplement known as Pepper Boost. It is being publicized as a breakthrough in promoting natural weight loss by suppressing appetite and boosting metabolism. Pepper Boost uses oleoresin capsicum as one of its main active ingredients. Used primarily in the food industry, liquid capsicum is a powerful concentrated form of chile pepper with the active ingredient being capsaicin.

There are some very well regarded studies that show capsaicin can increase metabolic activity dramatically while simultaneously suppressing the appetite. One such study was conducted in 1986 at the Oxford Polytechnic Institute in England. This small case study used twelve volunteers from various backgrounds who ingested capsaicin through various food sources. Their data showed that digestion of spicy foods boosted the metabolism in all the volunteers. According to this study, ingestion of capsaicin triggers a thermodynamic burn that can last up to five hours thus speeding up the metabolism and melting calories. It’s this thermal heat action that makes capsaicin so unique. “It’s been proven that capsaicin definitely boosts your metabolism, but the medicinal benefits go way beyond that. Capsaicin has also been shown to prevent abnormal blood clotting that can lead to stroke and heart attack, and it absolutely can help with circulatory disorders,” said Wayne Perry, President of SiCap Industries, makers of Pepper Boost. Pepper Boost may also be beneficial for diabetics who face a host of circulatory problems. Although Pepper Boost does contain a small amount of honey, the manufacturer claims it’s not enough to adversely affect the average diabetic under a doctor’s direct supervision. “The label warns that Pepper Boost isn’t meant for diabetics. This is done as a general warning, but as long as diabetics monitor their sugar and follow the directions, most diabetics can use this formula. The amount of honey is very low. Less than one half of a milliliter, or one eighth of a teaspoon per bottle. At 60 servings per bottle we’re talking about one five hundredth of a teaspoon of honey per serving.

From Altamont, NY (PR Web) May 24, 2004
Important Information for Commercial Chile Producers

By, Jan Brydon

This summer the Chile Task Force will release four new reports with valuable information for New Mexico’s commercial chile growers. Research findings in areas that range from plant density for mechanical harvest to international trade information reflect the Task Force’s many approaches to improving efficiency and profitability throughout the chile industry.

In Plant Spacing/Plant Population for Machine Harvest, recent Agronomy and Horticulture M.S. graduate, Margery Paroissien, and Extension agronomist, Robert Flynn, report on three years’ research on how plant spacing affects yields, extractable color and plant structural characteristics, and show that a shift in current thinning practices may have merit. Overall, the study found a density nearly triple that achieved at a standard spacing did not reduce yields and as plant density increased, stem thickness and main fork angle decreased, while fruit and plant height increased. These structural characteristics may improve machine harvesting efficiency. The pluses for increasing plant density include a more uniform stand that can better withstand environmental attacks, such as curly top and harsh winds, and a constant stream of material for the machine harvester. While hand thinning to a 2-inch spacing would be difficult, a mechanical thinner could accomplish the task with a simple blade change. Reducing hand thinning and harvesting costs could help sustain New Mexico chile’s profitability.

In Economic Return to Adoption of Mechanical Thinning: The Case of New Mexico Chile, NMSU ag economists, Jay Lillywhite, Jerry Hawkes and Jim Libbin, and engineer, Ryan Herbon, analyze the economic returns available to chile producers who adopt mechanical thinning as a substitute for contract hand thinning. Basing their analysis on performance of the NMSU prototype chile thinner currently being tested on chile acreage across the state, they found that producers operating a 500-acre farm, 30 acres of which are planted in chile peppers, may expect to save an estimated $4.04 per acre over hand thinning. They also provide cost/return scenarios that take into account increases in machine prices, operator and hand labor costs, interest rates, fuel costs and changes in the number of acres on which the machine is used.

In Incidence of the Beet Leafhopper, Circulifer tenellus (Homoptera: Cicadellidae) in New Mexico Chile, NMSU plant pathologist, Rebecca Creamer, and research assistants, Jared Carpenter and Jaime Rascon, provide a New Mexico beet leafhopper update. Migratory patterns have not been well studied since the 1930s when sugarbeet was a primary crop in the region. Land use patterns have changed dramatically since that time. The authors also look at the incidence of Beet Curly Top Virus (BCTV) in weed hosts, updating information from the 1930s. Given the changes in crops and weeds in the past 60 years and the reoccurring losses to chile due to BCTV, the New Mexico beet leafhopper status update is timely, pointing to the stringent need to control weed hosts at field margins.

In U.S. Imports and Exports of Chile Pepper and Onion Products: Frequently Asked Questions, NMSU Ag Economics graduate, Leslee Morris, and ag economist Rhonda Skaggs, consolidate import and export information for chile and onions. They provided an introduction to use of the Harmonized Tariff Schedule of the United States and to the U.S. system of tracking transactions in the international marketplace.

These Task Force Reports will be available from the NMSU Agricultural Communications Department or on the Web at: www.chiletaskforce.org and cahe.nmsu.edu/pubs/research/

Other Task Force Reports include:

Report 1: An Industry-University Response to Global Competition
Report 2: Chile Seed Germination as Affected by Temperature and Salinity
Report 3: Yield and Quality of Machine-Harvested Red Chile Peppers
Report 4: Chile Seed Quality
Report 5: Guidelines for Chile Seed Crop Production
Report 6: Improving Chile Harvesting and Cleaning Technologies
Report 7: Farm Labor Employers’ Handbook
Report 8: New Mexico’s Chile Pepper Industry: Chile Types and Product Sourcing
Report 9: Economic Impact of Southern New Mexico Vegetable Production and Processing
Report 10: Chile Pepper Growers’ Notes: 2003
Report 11: Developing New Marketing Strategies for the Southwestern Chile Industry
Capsaicin Aides Asthmatics
A recent study on the effects of capsaicin on histamines was conducted. A group of 17 people with asthma inhaled five to seven increasing doses of capsaicin on one day, and placebo on another day. Compared with the a placebo treatment, capsaicin cut in half the amount of histamine that was released — a chemical that is released when the lungs are irritated. Reduced histamine means reduced airway inflammation. The participants also had improved breathing with the capsaicin treatment versus placebo. It wasn’t all pleasant: Five patients had a bout of coughing after the capsaicin treatment, while two had watery noses and a burning sensation in their throats. However, all the side effects were resolved within minutes.

From: ABC News online, Sunday, May 16, 2004...

Are Wild Bees Better Pollinators?
Native bees are effective pollinators of chile peppers. In a recent study in south-central Brazil (Patos de Minas and Brasilia) flowers of three chile pepper cultivars were studied and data were collected on the behavior and foraging of wild bees. Data collected from the study suggested that small native species of bees pollinate the flowers more effectively than hybrid bees that have been introduced to the area. The study also suggests that a wild bee’s small foraging area is important in keeping the cultivars of both hot and sweet peppers genetically distinct when several cultivars are grown close together.

From the Department of Science and Biology Universidade Estadual de Santa Cruz, Bahia, Brazil.

Island Hopes Hot Pepper Will Fire up Economy
A small island in the Northern Marianas is hoping to make money from a super hot chile pepper that grows locally. The residents of the remote, tiny island of Tinian are hoping someday to export chile pepper products to the United States. The residents had their first ever soba (noodles) eating contest to jumpstart awareness about their chile pepper products. They claim their chile pepper is hotter than the Vietnamese product, which is reputedly the hottest in Asia. Tinian promotions and tourism executive director Ramon Dela Cruz says Tinian’s chile pepper locally known as ‘doni-sali’ grows everywhere on the island. Mr. Dela Cruz says ‘doni’ refers to the chile pepper and ‘sali’ is the name of the black bird that spreads the seeds. He says the Tinian pepper is becoming increasingly popular among natives as well as foreign visitors because of its unusually hot taste.

From Fiery Foods Supersite May 2004

Poblanos for Health
It is known that the poblano green pepper, a significant component in the Mexican diet, contains certain natural compounds such as chlorophyll, carotene, and vitamins, and may also have antimutagenic and/or anticarcinogenic properties. A study at the University of Mexico – Mexico City, fed a specific species of fruit fly poblano juice. The results of the experiments suggested that the poblano juice had an antimutagenic effect by interfering with the nitrosation process (the process that leads to cell mutation and cancer cell formation).

From: Facultad de Ciencias, Universidad Nacional Autónoma de Mexico, Mexico City, Mexico Dept. Biologia
**Burning Questions**

Q. Why are some chile peppers called “aji’s?”
A. The Spanish word “aji” is a variation of “axi” from the extinct Arawak language of the Caribbean. The Spanish took a phonetic word and gave it a written explanation form.

Q. What are birds eye peppers and where can I locate the seeds?
A. This variety is also known as Tepin, Chiltepin or Bird Pepper. These are the small chile pepper fruits found growing wild or in kitchen gardens. They are native to mild climates of southern Arizona and south Texas. The small size resembles a “birds eye” and are eaten and disseminated by birds. Seeds are available at the Chile Pepper Institute.

Q. Are chile pepper seeds hot?
A. Although many people believe the seeds to be the hottest part, they actually do not produce any capsaicinoids. The seeds are attached to the placenta and are in very close proximity to capsaicin oil glands. The seeds can become covered with the capsaicin oil when the fruit is processed.

Q. How long can I expect to harvest fruits from my plants?
A. With proper cultivation practices you should be able to harvest from 1-4 months. Depending on your climate and location, a chile pepper plant could produce pods for years. However a chile pepper plant will produce for about 4 months then go through a month long resting period, then start producing again.

Q. How do you keep a virus from spreading in a chile pepper garden?
A. Once the chile pepper plant has been infected with a virus it has to be destroyed. There is no way to kill the virus once it is in the chile pepper plant. It is best to remove the plant because aphids and other insects can move the virus and infect other plants.

Q. How do I know how to purchase a good quality chipotle?
A. The key to purchasing a good quality chipotle is the aroma. Smell the fruits – if it is aromatic with a mellow smoke overtone then it has been prepared correctly. Beware of artificiaily dried jalapenos that have been prepared with “liquid-smoke”.

Q. I have a recipe that calls for a “Hatch” pepper, I cannot find this variety in our local grocery store. Is there another name for this chile pepper?
A. There is no chile pepper variety named “Hatch,” but rather it refers to the area where the chile peppers are grown. The town of Hatch, New Mexico is located about 40 miles north of Las Cruces, NM. The “Hatch” chile pepper is a New Mexican pod type first commercially grown in the Hatch area and then spread to other growing areas.

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**Upcoming Events**

- **Hatch Chile Festival** - Hatch, NM - September 4-5, 2004
- **Really Chile Festival** – Santa Fe, NM – September 18, 2004
- **Santa Fe Wine and Chile Fiesta** - Santa Fe, NM - September 22-26, 2004
- **Whole Enchilada Fiesta** – Las Cruces, NM - September 24-26, 2004

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