New Mexico Chile Task Force ♦ Report 5

Guidelines for Chile Seed Crop Production

College of Agriculture and Home Economics
Cooperative Extension Service
Agricultural Experiment Station

In November 1998, the New Mexico Chile Task Force was formed to identify and implement ways to keep chile pepper production profitable in New Mexico and to maintain and enhance the research and development partnership between the New Mexico chile industry and New Mexico State University.

Chile Task Force reports will be issued periodically to consider issues of concern to the industry and to document the Task Force's progress in developing techniques and technologies to improve industry competitiveness in the 21st century global trade environment.

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Guidelines for Chile Seed Crop Production[1]

by Arthur D. Wall[2], Richard Kochevar[3] and Richard Phillips[4]

Chile seed crops require careful agronomic management to assure genetic uniformity and field performance. Seed crop producers must ensure that crops are grown in isolation to avoid cross-pollination with other cultivars, off-type plants are rogued throughout the growing season, and plant health is monitored carefully. In addition, special harvesting practices are necessary to assure seed quality. This publication outlines recommendations for seed crop production and harvesting and seed disinfecting, drying and storage. Following these guidelines will help seed growers produce a certifiable crop.

The New Mexico Crop Improvement Association (NMCIA) manages seed certification programs in the state. NMCIA-certified seed is guaranteed to meet minimum standards for cleanliness and germination rate. A certified seed-lot contains more than 98% pure seed, has a germination rate greater than 80%, contains less than 1% seed of other chile types or other seeds, contains less than 2% inert matter and contains no weed seeds (Table 1). Certified seed analysis must be performed by a seed lab accredited by the American Association of Seed Analysts. The New Mexico Department of Agriculture State Seed Laboratory is an accredited lab.

Table 1. NMCIA minimum standards for certified chile seed.

Characteristic	Standard
Pure Seed	>98%
Germination	>80%
Other Chile Types	<1%
Other Seed	< 1%
Inert Matter	< 2%
Weed Seed	None

Certified Chile Seed Crop Production Checklist

- **Rotate crops.** Seed-crop fields must not have been planted with chile the previous year and, ideally, fields should not have been planted with chile for five or more years. Long-term chile rotations significantly improve chile yield and quality and reduce diseases and weeds.
- **Test soil for nematodes.** Test for nematodes in the fall prior to planting. Avoid infested soils or treat with a nematicide if root-knot nematodes are present. Nematodes usually are not a problem on sandy soils and are less of a problem on clay soils. Contact your county Extension agent for information about nematode sample testing laboratories.

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- **Test soil for fertility and salinity.** Conduct soil tests at least six weeks before planting to allow time to apply any necessary soil amendments.
- **Balance fertility.** Apply soil amendments to balance phosphorus, potassium, calcium and micronutrients. These soil nutrients should be in the high range, especially when large amounts of nitrogen (>150 lbs/acre) are applied. High phosphorus availability is important for seed yield and quality. Fertility imbalance, especially deficient potassium, reduces seed quality and yield (Harrington, 1960).
- **Do not over- or underapply nitrogen.** In a study of nitrogen application on 'Anaheim' chile, fertilization at 185-215 lbs/acre (210-240 kg/ha) maximized seed yield, with lower yields above or below these rates (Payero, Bhangoo and Steiner, 1990).
  - The best response for seed yield was achieved at 60 lbs/acre (70 kg/ha) split into three applications: at planting, early fruit set and full fruit size.
  - An alternative is to apply nitrogen at 60 lbs/acre (70 kg/ha) at planting and another 30 lbs/acre (35 kg/ha) when leaf petiole nitrate levels fall to 2,000 parts per million (ppm).
- **Sample leaves every six to eight weeks after emergence to check fertility.** Payero et al (1990) found that the standard recommendation for chile pod production of maintaining more than 5,000 ppm nitrate in leaf petioles reduced seed yield and quality. This finding suggests that chile seed crop nitrogen fertility should be different than fertility for chile fruit crops. Contact your soil and plant testing lab or county Extension agent for chile tissue sampling methods and labs.
- **Isolate chile seed fields from other chile fields.** Chile seed crops must be isolated from other chile fields by at least three miles for the seed to be "certified," one-half mile for seed to be "registered" and one mile for seed to be designated "foundation seed." Ideally, the seed crop should be isolated from other chile crops by one mile.
- **Grow seed crops for seed only. Use red fruit only as a by-product of seed extraction.** The seed crop cannot be harvested partially for green chile.
- **Keep fields clean of weeds and diseased plants.** Aggressively rogue (remove) off-type and diseased plants from seed fields throughout the season.
- **Harvest only healthy plants for seed.** Diseased fields, or diseased sections within a field, should not be harvested for seed. A field, or portion of a field, cannot be harvested for certified seed if more than 5% of the plants show symptoms of chile wilt (*Phytophthora, Verticillium* or *Fusarium*) or curly top virus. Chile seed fields also must be free from bacterial leaf spot disease. Certified seed must be treated with sodium hypochlorite (bleach solution) or have a negative lab test for bacterial leaf spot. For more information about chile diseases, please refer to Chile Pepper Diseases, NMSU Cooperative Extension Service Circular 549.
- **Allow seed crops to properly mature.** Late in the season, fertilizer applications should be stopped and irrigation should be reduced. This will stimulate fruit to ripen and partially dry the fruit to a leatherlike condition. Chile crops that are growing actively during a killing frost produce poor quality seed, because fruits decompose rapidly and there is a greater proportion of immature fruit.
- **Don't use ripening hormone on seed crops.** Prior to harvest, chile seed crops should not be treated with the ripening chemical ethylene (Ethephon or Etheryl) or with crop desiccants (leaf droppers) like sodium chlorate.
- **Harvest only red, ripe chile.** Immature, green and diseased fruits should be removed completely. Seeds from immature peppers lack vigor and germinate poorly.

They have a fish-mouth appearance because of incompletely developed endosperm (Bosland and Votava, 1999).

- **Extract seed immediately after harvest.** Crops should be processed as soon as possible after harvest, preferably within 24-72 hours. Warmer weather or storage conditions cause rapid crop deterioration after harvest.

Seed Disinfection Treatments

Certified seed must have a negative lab test for bacterial leaf spot disease or be treated with sodium hypochlorite. Seed producers should take the following steps after seed crops are harvested:

- Extracted seed should be soaked in a 3% sodium hypochlorite solution at 50º-75ºF (10º-25ºC) for no longer than 20 minutes to disinfect seed from diseases, such as bacterial leaf spot (Khah and Passam, 1992).
- Keep the soaking solution clean and free from dirt and organic matter.
- Household bleach usually contains about 5% sodium hypochlorite. Do not use bleach products that contain ingredients other than sodium hypochlorite, such as sodium hydroxide or fragrances.
- To make a 3% sodium hypochlorite solution from household bleach, mix three parts plain household bleach with two parts water. To avoid seed damage, do not soak seed longer than 20 minutes. An alternate recommendation is to soak seeds in a 1% sodium hypochlorite solution for 40 minutes (Goldburg, 1995). Mix 20% household bleach with 80% water (one part bleach to four parts water) to make a 1% solution.
- Sodium hypochlorite seed treatments can disinfect seed and stimulate germination when properly applied (Fieldhouse and Sasser, 1975), but soaking seed too long or in concentrations higher than 3% can injure seeds and reduce germination.
- Sodium hypochlorite's effect on chile seed germination is influenced by the soaking time and temperature, and seed age. Recently harvested seed is more reactive to the treatment. Longer soaking times at low sodium hypochlorite concentrations may not thoroughly disinfect seed, especially when the soaking solution is dirty (Khah and Passam, 1992).
- Check chlorine levels in soaking tanks several times a day and add sodium hypochlorite to maintain proper chlorine concentration. Time soaking carefully. Order chlorine solution testing equipment from swimming pool supply companies or search for suppliers on the Internet.

Seed Drying and Handling

- After disinfecting and cleaning seed, it should be dried with warm (85º F) air to 10% moisture and graded to remove lightweight seed.
- Air temperatures above 85ºF damage seeds.
- To obtain percent seed moisture, dry 100 grams of seed in a 140ºF oven for 48 hours. Reweigh the seed. Subtract the dry weight of the seed from 100 to obtain percent moisture. Discard heat-damaged seed samples.
- Recently harvested seed of some pepper cultivars or seed-lots can exhibit dormancy or delayed germination. After-ripening or curing seed at 70º-80ºF for six weeks can remove dormancy (Randle and Homna, 1981).

- After processing and curing, seed should be stored in a cool (40-50ºF), dry, dark place in airtight, waterproof containers and protected from insects and rodents.
- Seed can be treated with a registered seed fungicide just prior to planting to avoid seedling diseases. In cool, wet soils, seed fungicides may not control some seedling diseases, such as damping-off. A list of registered seed fungicides is available from agricultural supply companies or from the plant pathologist at NMSU's Extension Plant Sciences Department at (505) 646-2875.

Further Information

To obtain information about seed testing, contact the State Seed Lab at: P.O. Box 30005, MSC 3190, NMSU, Las Cruces, N.M. 88003-8005. Phone: (505) 646-3407.

For information about chile seed quality, refer to *Chile Seed Quality*, New Mexico Chile Task Force Report 4.

For information about chile seed planting, emergence, and transplanting, please refer to *Growing Chiles in New Mexico*, NMSU Cooperative Extension Service Guide H-230.

For a list of suppliers of New Mexico certified chile seed or seed processors and cleaners, please contact the New Mexico Crop Improvement Association, MSC 3CI, Box 30003, New Mexico State University, Las Cruces, NM 88003-0003; phone: (505) 646-4125 or on the Internet at http://www.nmsu.edu/~nmcia

NMSU Cooperative Extension Service publications mentioned in this report are available from: NMSU's Agricultural Communications Department, Box 30003, MSC 3AI, NMSU, Las Cruces, NM 88003; phone: (505) 646-1075; e-mail: bulletin@nmsu.edu or on the Internet at http://www.cahe.nmsu.edu

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New Mexico Chile Task Force Publication List

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

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