



# Chile Pepper Growers' Notes: 2003

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**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 21<sup>st</sup> century global trade environment.



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# Chile Pepper Growers' Notes: 2003<sup>1, 2</sup>

By Roy Pennock<sup>3</sup>

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## Introduction

In November 1998, New Mexico State University (NMSU) and the southwestern chile industry joined forces as the New Mexico Chile Task Force. Their goal was to identify and implement ways to keep chile production and processing profitable through interdisciplinary research and development efforts. Initial task force projects focused on identifying best management practices and developing mechanical harvesting technologies.

This report outlines the chile production best management practices that were identified through five years of lab and field research. The first section looks at preplant considerations for establishing a good chile stand. These are the first, and some of the most critical, steps in producing profitable yields. The next two report sections explain the best management practices for stand-establishment and growing-season production phases. The last section addresses management practices that should be implemented immediately before and during harvest.

Research and experience show that there is no shortcut for producing a profitable chile crop. Carefully following these best management guidelines is currently one of a grower's best strategies. The task force will continue to research and test new growing practices.

The task force team (table 1) that developed this guide's best management practices included industry field representatives and consultants, growers, processors and university research and Extension specialists. Updated information will be posted regularly on the task force Web site at [www.chiletaskforce.org](http://www.chiletaskforce.org). As you read this report, please note the green-highlighted, underlined text. When you refer to this report on the task force Web site, you may click on these highlighted topics to obtain more in-depth information.

You also may obtain more information on management, mechanical harvesting and marketing by attending regular task force meetings on the second Wednesday of each month. For more information, contact the task force through NMSU's Extension Plant Sciences Department at (505) 646-5280.



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<sup>1</sup> This article was reviewed by Richard Phillips, project manager, New Mexico Chile Task Force, NMSU Extension Plant Sciences Department, Las Cruces; Robert Flynn, associate professor and Extension agronomy and soils specialist, NMSU Cooperative Extension Service, Artesia; and Cary Hamilton, pesticide registration/endangered species specialist, New Mexico Department of Agriculture, Las Cruces.

<sup>2</sup> NMSU College of Agriculture and Home Economics, U.S. Department of Agriculture, Agricultural Research Service, New Mexico Chile Commission and the State of New Mexico supported this best management practices project. The author thanks Marvin Clary, Vince Hernandez, Dave Layton and Andy Wiles for their many hours of technical assistance and repeated reviews.

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**Table 1. Contributors to *Chile Pepper Growers' Notes: 2003*.**

	Representative	Affiliation
<b>Industry field representativess and consultant</b>	Marvin Clary Shane Drake Vince Hernandez Dave Layton Lewis Needham Buddy Viramontes Andy Wiles	Clary Ag Services Gilroy Foods Biad Chili Ltd Co. Border Foods Southwest Spice Ag Market Resources Southwest Spice
<b>Growers</b>	Gale Carr Nick Carson Dino Cervantes Ed Curry Eddie Diaz Ed Goodbrake Herold Hobson Cass Keeler Steve Lyles Harvey Morrow John Morrow Joe Nelson Bill Netherlin Dickie Ogaz Rudy Provencio Dale Shiflett Robert Sondgeroth Rod Tharp Raymond Viramontes	Borderland Farms Kit Carson Farms Cervantes Farms Curry Farms Diaz Farms Goodbrake Farms Hobson Farms Keeler Farms Lyles Farms Harvey Morrow Farms John Morrow Farms Joe Nelson Farms Netherlin Farms Ogaz Farms Provencio Farms Shiflett Farms T & S Growers Tharp Farms Viramontes Farms
<b>Processors</b>	Victor Biad Louis Biad Dino Cervantes Dave Layton Lewis Needham Edward Ogaz Andy Wiles	Biad Chili Ltd Co. Rezolex Ltd Co. Cervantes Enterprises Inc. Border Foods Southwest Spice Seco Spice Gilroy Foods
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# Preplanting through Stand Establishment

## Field selection considerations

- ❑ **History.** Consider the following when you choose a planting site:
  - **Weed problems.** Avoid the planting site if weed problems are excessive.
  - **Herbicide carryover.** Know what herbicide was used during the previous season and the rate applied.
  - **Nematode problems.** Determine the nematode population with early fall soil sampling.
  - **Disease.** Avoid fields with a history of disease.
  - **Salinity.** Test the soil to determine the degree of the salinity problem.
  - **Previous crop.** Avoid following chile with chile. Use a four-year rotation cycle.
  - **Water quality.** Know irrigation water's salinity, sodium and pH levels.
  
- ❑ **Crop rotation.** The more successful growers do not follow chile with chile. They often plant chile following peanuts, corn, forage sorghums or alfalfa. Chile following a grass crop may offer improved broadleaf weed control if treatments were made to the grasscrop.
  
- ❑ **Previous crop.**
  - **Crop residues.** Do not till under crops with high carbon-to-nitrogen (C:N) ratios, such as small-grain straw and woody material. If residues are incorporated into the soil, apply extra nitrogen. Leaving residue on the soil surface is beneficial during establishment. Organic matter on the soil surface helps alleviate soil crusting.
  - **Pesticide residues.** Know what herbicides have been applied in the past, their carry-over rate and any potential damage that they can cause in chile crops.
  
- ❑ **Soil salinity.** Chile is moderately sensitive to soil salts and does not tolerate salinity above 3.5 deciSiemens per meter (dS/m). Chile is first affected by salinity at an electrical conductivity reading of 1.7 dS/m. Cotton is tolerant to salinity and is not a good indicator of how well chile will grow in a given field.
  
- ❑ **Water quality.** Surface and groundwater quality (salinity, sodium and pH) vary considerably across the state. Testing the water and soil allows you to calculate how much extra irrigation water may be needed to reduce salinity effects.



## Fall site preparation

- ❑ **Deep rip.** Deep rip if a hard pan exists or the soil is compacted.
  
- ❑ **Laser level.** Laser level for uniform flood irrigation. Use a 1:1000 drop-to-run ratio for clay soil and 2:1000 for sandy soil.

- ❑ **Prepare cantaloupe beds.** Consider using 80-in. cantaloupe beds. They have been used successfully in flood-irrigated fields with irrigation and/or salinity problems. Avoid planting in the center where salts accumulate. Practice alternate row irrigation if salinity is an issue.
- ❑ **Establish windbreaks.** Plant small grains for windbreaks in fields susceptible to wind erosion and subsequent plant damage.
- ❑ **Establish uniform beds.** Strive for uniformity in bed preparation.

## Soil testing

- ❑ **For soil fertility.** Take **soil samples** as soon as the beds are prepared in the fall. If soil is fumigated, sample soil only after it is safe to do so. It is best to sample soil and manage fields by soil type. A representative soil sample is a composite of 15 sub-samples randomly taken throughout the field. The top 12 inches of soil should be sampled with a hammer probe or auger. Submit a minimum of 2 lbs (2 cups) for soil fertility and salinity testing.
  - **Nitrate-nitrogen (NO<sup>3</sup>-N).** Maintain nitrate-nitrogen levels at 30 ppm from planting through fruit fill.
 

**Note:** In nitrogen applications, give credit for soil organic matter, including manure and legume crop residues. In general, every 1% of organic matter is equivalent to nitrogen amendment of 30 lb/acre. Approximately 35% of the total nitrogen in manure is available the first year. Legumes from the previous season can contribute nitrogen at a rate of 60-150 lb/acre. If materials with high carbon-to-nitrogen ratios, such as straw, are incorporated into the soil, additional nitrogen may be needed to assist in their decomposition and to avoid early nitrogen deficiency in the chile seedlings.
  - **Phosphorus (P).** Request the Olsen (sodium bicarbonate) phosphorous extract to assess plant available Phosphorus for chile. If the test result is less than 30 ppm, apply phosphorous in a band below the seed. Banded phosphorous, placed 2 inches below the seed at planting, is more effective than broadcast application. If the test result is greater than 30 ppm, phosphorus application is not necessary.
 

**Note:** Cool, early spring soil temperature reduces the plants' ability to use phosphorus.
  - **Potassium (K).** Request test for water-soluble potassium, if available. Water-extractable potassium, less than 60 ppm, may respond to additional potassium fertilizers. Ammonium acetate-extractable potassium is more common. Soil with potassium levels of more than 230 ppm from this extract usually will not respond to additional potassium.
  - **Micronutrients.** Request micronutrient analysis using the Diethylenetriaminepentaacetic acid (DTPA) extract. Zinc (Zn) is usually deficient in New Mexico soils (<1 ppm) and may need to be added to your fertilizer blend at planting. Iron, manganese and copper levels also can be tested.
- ❑ **For salinity.** Most **soil testing labs** can analyze for salinity if a large enough soil sample is submitted (at least 2 cups). However, a separate sample from the depth at which the

seed will be placed can better indicate the specific management practices needed to control salinity effects. Specify that the lab run a saturated paste extract soil test for salinity assessment that includes electrical conductivity (EC), pH and Exchangeable Sodium Percentage (ESP) tests.

- **Salinity.** If surface (seeding depth) EC is above 1.5 dS/m, consider seeking professional advice. Stand establishment and yield reductions will occur at the rate of approximately 14% per 1 dS/m of EC over 1.5 dS/m, especially if steps are not taken to reduce the effects of the salts.
- **ESP.** If ESP is 8% or higher, do not plant without professional advice. These fields may require more amendments and water than feasible. Work on amending the soil and reducing the sodium concentration at least a year before planting chile.

- **For root-knot nematodes.** Take a **soil sample** in the early fall from the root zone of the previous crop shortly after the last irrigation. Take a composite of 15 subsamples randomly from the root zone throughout the field. Sample from the top 8-12 inches. Mix the soil and place about 1 quart in a reclosable plastic bag. During transportation and storage, the soil should remain close to the temperature and moisture level at which it was sampled. Changes in the soil sample temperature may kill the nematodes, causing inaccurate test results.
  - If the root-knot nematode population exceeds 150 juveniles per 500 cc, get professional advice and consider treatment before planting. The nematode population will decrease by 50-90% during the winter. Samples taken from January through March are not as reliable because nematodes are in the egg stage and cannot be tested accurately. Site preparation mixes nematodes throughout the soil and makes detection difficult.
  - If there is a history of root-knot nematodes and you are unable to take soil samples in the fall, plan to treat for nematodes. Remember that you cannot visually check a corn, sorghum or onion crop for nematodes; you must conduct a soil test. Rotations from alfalfa should be soil tested for nematodes. Nematodes are more prevalent in light sandy soils.

### Equipment maintenance and calibration

- **Properly service and calibrate all precision and power equipment during the winter.**
  - Tractors.
  - Fertilizer applicators.
  - Planters.
  - **Sprayers.**
  - Decappers.
  - Other farm equipment and vehicles.
- **Untimely delays caused by preventable repairs, coupled with unpredictable weather, can be disastrous to stand establishment.**

## Pest management

### ❑ Pesticide labeling facts.

- **Pesticides approved for chile may change.** The pesticides discussed below are labeled for use on chile peppers at the time of publication. Constant changes in pesticide labeling may result in the loss or addition of materials. The task force will make all efforts to post changes and maintain current information on its Web site at [www.chiletaskforce.org](http://www.chiletaskforce.org). However, it is the legal responsibility of producers, consultants and applicators to read the entire label and check for registered uses. Product mention or omission does not constitute a recommendation or condemnation by NMSU or the New Mexico Cooperative Extension Service.
- **Read the label.** You must follow the label directions for all pesticides (herbicides, insecticides, fungicides and nematocides) to get the best results. Failure to follow labeled instructions may result in poor control, crop damage, contract violations, legal damages and wasted time, money and resources. If you have questions, contact a [crop consultant](#), [NMDA Pesticide Division staff member](#) or [NMSU Extension specialist](#) or [county agent](#).
- **Certified pesticide applicators.** Many products are restricted-use (RU) pesticides. Only certified pesticide applicators may purchase these products and certified applicators must supervise product application. For more information on the certified pesticide applicator program or on pesticides registered in New Mexico, contact the New Mexico Department of Agriculture (NMDA) Pesticide Division at (505) 646-2133.

### ❑ Fungicides.

- **Preplanting options.**
  - ♦ [K-PAM](#).
  - ♦ [Telone II \(RU\)](#).
  - ♦ [Telone C-35 \(RU\)](#).
- **Planting options.** Apply these chemicals separately, not as a mixture.
  - ♦ [Terraclor 75WP or Terraclor Flowable](#).
  - ♦ [Ridomil Gold](#).

### ❑ Herbicides.

- **Preplanting options.**
  - ♦ [K-PAM](#). K-Pam is most effective when applied in the fall.
  - ♦ [Telone II \(RU\)](#). Herbicidal activity is limited to use under a tarp.

### ❑ Insecticides.

Due to increased risk of soil-inhabiting insects following grain crops, alfalfa and some vegetables, insecticide applications prior to and at planting are particularly important. Systemic insecticides applied prior to or at planting will protect plants after emergence for a short time. However, when emergence is delayed due to cool soil or when frequent irrigations have occurred prior to emergence, residual of water-soluble insecticides will be reduced.

- **Preplanting options.**
  - ♦ [Di-Syston 15-G \(RU\)](#). You also may apply this insecticide at planting with a banding attachment. Do not apply it on top of the seed.

- **Planting options.**
  - ♦ [Platinum.](#)
  - ♦ [Admire 2-F.](#)
  - ♦ [Furadan 4-F \(RU\).](#) Special Local Need 24(c) Label SLN NM-98002 must be in the applicator's possession at application time.
- **Nematicides.** Preplant applications are best done in the fall while the soil is still warm and the nematode population is high. Treatment must be done well in advance of planting to avoid seedling mortality.
  - Note:** Using Telone C-35 as a soil fungicide also may control nematodes.
- **Preplanting options.**
  - ♦ [Telone II \(RU\).](#)
  - ♦ [Telone C-35 \(RU\).](#)
  - ♦ [K-PAM.](#)

## Planting practices

- **Uniform, early planting.** Planting into cold soil increases the risk of seedling loss due to damping off, insects and environmental stress. The planting date is more critical for red chile because time in the field is directly related to dry red weight and color. Historically, early planting (prior to March 20) has resulted in better stands. The planting dates for fresh green chile should be staggered to provide continuous harvest and a consistent supply to processors.
- **Chile seed requires a soil temperature of 50-55°F to begin germination.** Optimum temperature is 65-70°F. This does not preclude planting at lower soil temperatures in anticipation of reaching this critical temperature range. Within reason, the seed will begin the pre-germination process and be able to germinate when the appropriate soil temperature is reached.
  - Pre-irrigate 2-4 weeks prior to planting, depending on soil texture.
  - If possible, use offset planting (planting near the bed's south shoulder for east-west rows) on conventional beds to capture the sun's heat and reduce the adverse effect of salinity and poor irrigation practices.
  - Plant to a uniform depth. Most seeds are planted into a bed and capped with 2-4 inches of warm, moist soil. If no cap is placed over the seed, planting depth should not exceed 3/4 inch. Seed must be planted into moist soil. Sprinklers can help keep the seedbed moist and prevent crusting.
  - Ensure firm seed/soil contact at planting. Avoid compacting wet soils.
  - For open-pollinated seed varieties, plant seeds at a minimum rate of 4 lbs/acre (~240,000 seeds/acre).
- **Capping pros and cons.**
  - Capping can conserve moisture, prevent cracking on heavier soils and control early-season weeds. However, too large a cap will keep soil cold and delay germination. Moist soil retains heat better than dry soil.
  - No-cap plantings germinate sooner due to warmer soil. However, weed control may be more difficult. Warmer soil promotes the germination of weeds, such as yellow and purple nutsedge.

- On capped beds that have been irrigated after planting, run a properly adjusted rolling cultivator over the beds before decapping. This will soften the soil for uniform cap removal.
- Caps normally are not used with drip irrigation.
- Do not irrigate immediately after planting unless there is poor contact between the seed and moist soil. If moisture is low when beds are capped, irrigate immediately after capping.
- Depth of soil left after decapping is critical. The soil should be removed to just above the hypocotyl (crook) of the germinating chile, even though a few plants may be lost in the process. The chile plants will emerge from the soil surface within 12 hours after this operation. A precision decapper is essential to control depth of cut. Harrows, skids or other equipment that cannot be adjusted to precise, level depth will reduce the stand and, quite possibly, the yield.
- Decap timing is based on seedling stage and soil moisture. Decapping when there is excessive soil moisture will compact the soil so that most seedlings cannot emerge.
- Use only a properly adjusted decapper to remove the cap from chile. Growers should be present during the set-up and execution of this is critical treatment. If the decapper does not drag a few seedlings out of the ground during decapping, its setting is too high.
- If soil crusting occurs after decapping, use a loose-ringed roller to break the crust and loosen the soil on the beds. This has the added benefit of creating a rough surface that will reduce abrasion by wind-blown soil particles. Growers should be present during this treatment's set-up and execution.

### Emergence

- Carefully monitor the germination process.** Manage cultivation and irrigation based on the first good flush of seedlings.
- Do not overwater.** Measure soil moisture at taproot, not surface, depth to determine if irrigation is necessary. Do not try to germinate all the seeds through additional irrigation. You will lose more than you will gain. Damping-off, salinity burn and slow growth due to irrigation water's cooling effect hamper stand establishment. Overwatering is the biggest single cause of stand loss.
- Make sure that the irrigation-wetting front reaches below the seed depth.** When both furrows are filled for irrigation or when single-furrow irrigations do not push water below the seeds' depth, soluble salts may damage the emerging seedlings.

### Follow-up scouting

- Protect chile seedlings until they begin to develop true leaves and more extensive root systems.** Nothing is more important than regular inspection of the crop during this production phase.
- Over-irrigation, insects, birds, rabbits, rodents and wind can damage a potentially good stand.**

## Stand Establishment to Lay-by

### Pest management

#### **Read the label before using any pesticide.**

Do not use any chemical, whether it is an herbicide, insecticide, nematicide or fungicide, if it is not labeled for chile (peppers). If you have questions, contact a [crop consultant](#), [NMDA Pesticide Division staff member](#) or [NMSU Extension specialist](#) or [county agent](#).

Irrigation and fertilization control and timely cultural practices are of the utmost importance in pest management.



### □ Insects

- Scout/inspect for insects weekly during early season stand establishment, up to first bloom and flowering. You cannot spend too much time scouting during this time period.
- Consult a crop adviser or entomology specialist to assess the economic threshold. To preserve beneficial insects, delay spraying until the economic threshold for a particular insect is reached. Repeated foliar insecticide applications can reduce beneficial insect populations, causing secondary pest population increases.
- When the economic threshold for spraying is reached, you must provide treatment quickly.
- **Preplant insecticides.**
  - ♦ [Furadan® 4-F and Di-Syston® 15-G](#). These insecticides have residuals effects lasting no more than two weeks after emergence. Furadan 4-F has a Section 24(c) label that must be in the applicator's possession at application time.
  - ♦ [Admire® 2-E and Platinum®](#). These insecticides have longer residual effects, lasting 4-6 weeks after emergence, depending on application rates.
- **Insecticide use from stand establishment to first bloom.** Insects of primary concern during this growth stage are [thrips](#), [flea beetles](#), [flea hoppers](#), [aphids](#), [beet leafhoppers](#), [darkling beetles](#), [cutworms](#), [false chinch bugs](#), [leafminers](#), [beet armyworms](#), [spotted cucumber beetles](#), [wireworms](#) and [seed corn maggots](#). Insecticides that control these insects during this time include:
  - ♦ [Provado®](#). Controls aphids, flea beetles and thrips.
  - ♦ [Diazinon AG500](#). Controls aphids, wireworms, cutworms and leafminers.
  - ♦ [Actara®](#). Controls aphids, leafminers and beetles.
  - ♦ [Thiodan®](#). Controls aphids, flea beetles and leafhoppers.
  - ♦ [Dimethoate 400](#). Controls aphids, leafminers and maggots.
  - ♦ [Warrior®](#) with Zeon. Controls aphids, cucumber beetles and leafhoppers.
  - ♦ [Fulfill® 50WG](#). Controls aphids and whiteflies.
  - ♦ [SpinTor™ 2SC](#). Controls leafminers, beet armyworms. Suppresses thrips.
  - ♦ [Asana® XL](#). Controls flea beetles, beet armyworms and cucumber beetles.
  - ♦ [Avaunt®](#). Controls beet armyworms and loopers.

- ♦ [Lannate® LV](#). Controls aphids, beet armyworms and loopers.
- ♦ [Vydate® L](#). Controls leafminers, pepperweevils, thrips and aphids.
- ♦ [Bacillus thuringiensis](#). Biologically controls various worm species.
- **Insecticide use during thinning.** Insects of greatest concern during thinning are [beet leafhoppers, flea beetles, beet and fall armyworms, aphids and spotted cucumber beetles](#). Chemical control for these insects during this phase includes:
  - ♦ [SpinTor™ 2SC](#). Controls beet armyworms and lepidopterous larvae (maintenance).
  - ♦ [Confirm®](#). Controls beet and fall armyworms.
  - ♦ [Actara](#). Controls aphids and flea beetles.
  - ♦ [Provado](#). Controls aphids and flea beetles.
  - ♦ [Warrior® with Zeon](#). Provides broad-spectrum control of listed insects.
- **Insecticide use from flowering to lay-by.** Insects of concern during this period include [stinkbugs, thrips, leafminers, leafhoppers, aphids, corn earworms, beet armyworms, pepper weevils](#) and [spider mites](#). Consider commercial pheromone traps for early pepper weevil detection. Chemical control for these insects during this phase includes:
  - ♦ [SpinTor™ 2SC](#). Controls leafminers and beet armyworms. Suppresses thrips.
  - ♦ [Confirm®](#). Controls beet armyworms.
  - ♦ [Actara](#). Controls aphids, pepper weevils and stinkbugs.
  - ♦ [Provado](#). Controls aphids and beet leafhoppers.
  - ♦ [Warrior® with Zeon](#). Provides broad-spectrum control of listed insects.

#### □ [Diseases](#)

- **Biotic diseases that could be present during the period from stand establishment to lay-by are included below.** In addition, salt, wind and herbicide injury may occur.
  - ♦ [Rhizoctonia root rot](#). Plants are infected in early spring and symptoms of wilting under stress appear during the summer. Avoid over-irrigation of seedlings. *Rhizoctonia* commonly appears as one of the early damping off organisms.
  - ♦ [Pythium spp](#). This organism infects plants in early spring, causing damping off. Control by properly draining fields and seedbeds and avoiding over-irrigation of seedlings.
  - ♦ [Curly top virus](#). Peppers of all ages are susceptible to infection, but young peppers are most susceptible. The beet leafhopper transmits this virus.
  - ♦ [Powdery mildew](#). This disease favors warm temperatures with high humidity, but can occur at any time throughout the season.
  - ♦ [Phytophthora root rot](#). Infected plants become severely wilted, but leaves remain attached. Symptoms usually do not occur until late summer or early fall. Early season water management aids in control. Excessive soil moisture triggers and intensifies the disease. Provide good drainage so that water is not allowed to stand in fields. Severely infected plants have brown roots and white stems.
  - ♦ [Verticillium wilt](#). Severe wilting of occasional plants occurs when pod production starts. Crop rotation is essential for prevention. Severely infected plants have brown stems and white roots.
  - ♦ [Alfalfa mosaic virus](#). Aphids carry this virus from infected alfalfa plants to chile.
  - ♦ [Cucumber mosaic virus](#). Aphids carry this virus from cucumbers to chile. Avoid planting near urban areas where cucumbers may be present in home gardens.

- ♦ **Blossom-end rot.** This fruit disorder is associated with inconsistent watering and calcium deficiency. It is aggravated by root pruning.
- ♦ **Bacterial leaf spot.** This is a seed-borne disease. To control it, use only bleach-treated seed. Chemical control is marginal, at best.
- **Chemical control.** There is no effective chemical control for viral diseases after infection. Fungicide treatment of seeds can reduce damping off. The following chemicals provide some control:
  - ♦ Ridomil Gold EC.
  - ♦ Quadris/Flint/Cabrio EG.

#### □ **Weeds**

- **The following weeds are of greatest concern in New Mexico chile fields: field bindweed, Johnsongrass, purple nutsedge, yellow nutsedge, morning glories, oakleaf thornapple, spurred anoda, wright ground cherry, barnyard and jungle rice grass, lambsquarter and pigweed.**
- **Chemical control.**
  - ♦ **Treflan®.** New Mexico has a Section 24(c) label for post-emergence use. For control of annual grasses and small-seeded broadleaf weeds, apply to soil surface around 5-7 inch pepper plants and incorporate into the soil after application. Treflan, does not control existing weeds. Destroy existing weeds by cultivation prior to application. The Section 24(c) label must be in the applicator's possession at application time.
  - ♦ **Dual Magnum®.** New Mexico has a Section 24(c) label. This chemical is used primarily to control yellow nutsedge, annual grasses and some annual broadleaf weeds. Apply to freshly tilled, weed-free soil. It will not control established weeds. Irrigate after application to activate the chemical. The Section 24(c) label must be in the applicator's possession at application time.
  - ♦ **Poast® and Select®.** These are post-emergence herbicides that target weeds including annual grasses and Johnsongrass. The minimum preharvest interval, for both, is 20 days after application.

## **Irrigation**

#### □ **First irrigation.**

- Use the best **quality water** source available. Sodium adsorption ratio (SAR) of water should be less than 6.
- Monitor the soil moisture in the root zone, not at the surface, to determine if irrigation is necessary. Over-irrigation can cause damping off and salinity burn. The cooling effect of too much moisture can slow growth.
- Determine optimum irrigation time by testing soil moisture in the root zone by touch and with moisture sensors.
- Avoid irrigating when cold temperatures are anticipated. However, irrigation right before a frost can protect from frost damage if plants already have emerged.
- Use alternate row irrigation to manage salinity problems. Once initiated, you must be consistent, irrigating the same rows, up to lay-by.

- ❑ **Subsequent irrigation scheduling.**
  - Determine optimum irrigation times by testing soil moisture in the root zone by touch and with moisture sensors, not by the appearance of the soil surface and plants.
  - Irrigation times vary with amount of plant foliage, wind, sunlight, temperature fluctuation and relative humidity.
  - Phytophthora root rot can develop from water standing in any part of the field at any time. Good drainage is essential at all times.
  - Water stress, caused by extremes of drying and wetting, increases the incidence of blossom-end rot.

## Thinning

- ❑ **Early thinning promotes crop maturity.** However, if curly top, damping off or seasonal wind damage are anticipated, it is better to thin late than too early.
- ❑ **Consider thinning plants twice.** First, thin, leaving blocks of plants. Later, fine-tune to leave appropriately spaced healthy plants.

## Cultivation

- ❑ **The best cultivation is shallow, precision cultivation as close to the seed rows as possible.**
- ❑ **Shallow cultivation controls weeds and increases soil aeration.** Deep cultivation may prune roots, creating an entry point for Phytophthora root rot infection.
- ❑ **Timely cultivations, as soon as fields can be reasonably re-entered after irrigation, will help reduce the level of annual weed infestation.** Cultivation breaks the continuity of the soil, destroying weeds that are germinating. It also helps to conserve moisture in most soils.
- ❑ **Cultivate throughout the growing season so that soil is thrown to the center of seed rows.** This will prevent some weeds from emerging and help protect against wind damage by preventing girdling at the base of the plants. Cultivating in this way also provides plant support for heavy yields later in the season.

## Fertilization

- ❑ **Base nutrient management decisions on data from soil testing and leaf petiole analyses.** Do not over- or under-fertilize plants.
- ❑ **During the period from planting to first bloom, use soil test data to ensure that nitrogen (N), phosphorus (P) and potassium(K) are at recommended levels.**
- ❑ **The recommended nitrogen amendment should be split into 3-4 applications.** These applications can be side-dressed liquid or dry.
- ❑ **Jalapeños require nitrogen earlier than green and red chile.** To achieve plant size, they also require more nitrogen at first application.

- ❑ **Consider acid-based liquid fertilizers to improve phosphorus and micronutrient availability.**
- ❑ **Begin tissue testing from first bloom to last cultivation (sample every 7 days).**  
Micronutrients needed in early growth can be determined only by tissue testing.
- ❑ **Micronutrient needs are best met by foliar applications.** Time applications based on [leaf petiole analyses](#).
- ❑ **A steady supply of nitrogen is needed during fruit set.** Base application rates on data from petiole analyses.
- ❑ **Ammonium nitrogen sources may aggravate blossom-end rot by interfering with calcium uptake.**
- ❑ **Tissue testing (leaf and petiole analyses).**
  - To determine if a crop is adequately nourished, have plants analyzed during the growing season.
  - Table 2 shows the recommended range of nutrient levels that should be present in plant tissue. Leaf and petiole analyses will provide you with specific recommendations for your crop. To determine nitrate and phosphate levels, petiole tissue is analyzed. To determine levels of other nutrients, leaf tissue is analyzed.

**Table 2. Sufficiency ranges (first bloom to fruit fill).**

Nutrient	Desired range	
	ppm	%
Nitrogen (leaf)	40,000-60,000	(4-6%)
Nitrate (petiole)	>7,000	
Phosphorous (leaf)	3,500-10,000	(0.35-1%)
Phosphate (petiole)	>2,500	
Potassium (leaf)	40,000-60,000	(4-6%)
Calcium (leaf)	10,000-25,000	(1-2.5%)
Magnesium (leaf)	3,000-10,000	(0.3-1%)
Sulfur (leaf)	3,000-6,000	(0.3-0.6%)
Zinc (leaf)	50-200	
Iron (leaf)	60-300	
Manganese (leaf)	50-250	
Copper (leaf)	6-25	
Boron (leaf)	25-75	



# Growing Season

## Pest management

Read the label before using any pesticide. Do not use any chemical, whether it is an herbicide, insecticide, nematicide or fungicide, if it is not labeled for chile (peppers). If you have questions, contact a [crop consultant](#), [NMDA Pesticide Division staff member](#) or [NMSU Extension specialist](#) or [county agent](#).

Irrigation and fertilization management and timely cultural practices are important pest management tools.



### ☐ [Insects](#)

- Scout/inspect for insects weekly from lay-by through the growing season (up to last harvest). You cannot spend too much time scouting. Be aware of insect problems in the immediate area.
- Consult a crop adviser or entomology specialist to assess the economic threshold. To preserve beneficial insects, delay spraying until the economic threshold for a particular insect is reached. Repeated foliar insecticide applications can reduce beneficial insect populations, causing secondary pest population increases.
- When the economic threshold for spraying is reached, you must provide treatment quickly.
- Maintaining low pesticide residuals is critical at harvest onset. Pay attention to recommended harvest intervals on the label (days between last application and harvest), using pesticides that will leave the least residue. Processor representatives test all fields for pesticide residues. Processors will not accept crops with pesticide residues that are not within tolerance ranges.
- Insects of primary concern during this growth stage are:
  - ✦ [pepper weevils](#)
  - ✦ [beet and fall armyworms](#)
  - ✦ [corn earworms](#)
  - ✦ [leafminers](#)
  - ✦ [stinkbugs](#)
  - ✦ [beet leafhoppers](#)
  - ✦ [whiteflies](#)
  - ✦ [thrips](#)
  - ✦ [aphids](#)
- Insecticides registered in New Mexico that control these insects during this time include:
  - ✦ [Actara®](#). Controls pepper weevils, stinkbugs, aphids, leafminers and beetles.
  - ✦ [Asana® XL](#). Controls beet armyworms, corn earworms and loopers. Also, aids in control of pepper weevils.
  - ✦ [Avaunt®](#). Controls beet armyworms and loopers.
  - ✦ [Lannate® LV](#). Controls fall and beet armyworms, loopers and aphids.
  - ✦ [Vydate® L](#). Controls leafminers, pepperweevils, thrips and aphids.

- ♦ Warrior® with Zeon. Controls aphids, cucumber beetles and leafhoppers.
- ♦ Platinum. Controls aphids and whiteflies.
- ♦ Triqard. Controls leafminers.
- ♦ Confirm®. Controls beet and fall armyworms.
- ♦ SpinTor™ 2SC. Controls leafminers, beet armyworms and thrips.
- ♦ Provado®. Controls aphids, beet leafhoppers and thrips.
- ♦ Fulfill® 50WG. Controls aphids and whiteflies.
- ♦ Diazinon AG500. Controls aphids and leafminers.
- ♦ Thiodan®. Controls aphids and leafhoppers.
- ♦ Dimethoate 400. Controls aphids and leafminers.
- ♦ Bacillus thuringiensis. Biologically controls armyworms.

□ **Diseases**

- Biotic diseases that could be present during the growing season include those in the following list. There is no effective chemical control for viral diseases after infection.
  - ♦ Verticillium wilt. Severe wilting of random plants occurs when pod production starts. The stress of a maturing crop induces the disease's onset. There are no effective measures for controlling verticillium wilt once it occurs. Crop rotation is essential for prevention. Severely infected plants have brown stems and white roots.
  - ♦ Phytophthora root rot. Infected plants become severely wilted, but leaves remain attached. Symptoms usually do not occur until late summer or early fall. Excessive soil moisture triggers and intensifies the disease. Early season water management aids in control. Provide good drainage so that water is not allowed to stand in fields. Severely infected plants have brown roots and white stems.
  - ♦ Powdery mildew. This disease favors warm temperatures with high humidity, but can occur at any time throughout the season. The most noticeable symptom is a white, powdery growth on the underside of leaves. Infection can lead to defoliation and production losses. Effective chemical control depends on early disease detection and thorough application coverage, with the fungicide reaching the underside of the leaves and lower plant canopy. The following chemicals provide some control for powdery mildew:
    - Amistar.
    - Ridomil Gold EC®.
    - Quadris /Flint /Cabrio EG.
    - Nova 40-W. There is a Section 18 Specific Exemption for New Mexico. The label must be in the applicator's possession at application time. The effective dates for 2003 were July 25 - October 15. Check the task force Web site for Section 18 exemption renewal information for the 2004 growing season.
  - ♦ Blossom-end rot. This fruit disorder is associated with inconsistent watering and a calcium deficiency. Consider adding boron if soil/plant levels are too low to increase calcium availability. Root pruning aggravates this disorder.
  - ♦ Bacterial leaf spot. Bacterial spot pathogens can infect all aboveground parts of the plant. Spots form on leaves, stems and fruit, beginning as small, brown, water-soaked lesions. Warmer temperatures, high precipitation and high relative humidity favor disease development. To aid in control, use only Clorox™ (sodium hypochlorite-) treated seed. Apply bactericides or fungicide-bactericide

combinations where recommended. The following fungicide-bactericides are labeled for use in New Mexico for bacterial leaf spot control:

— [Kocide 101](#).

— [Tenn-Cop 5-E](#)

- ♦ [Curly top virus](#). Peppers of all ages are susceptible to infection, but young peppers are most susceptible. This virus is transmitted by the beet leafhopper. Removing known weed hosts from crop fields may help control the disease. Heavy seeding of direct-seeded peppers can compensate somewhat for loss of infected plants.
- ♦ [Tomato spotted wilt virus](#). This virus is transmitted from plant to plant almost exclusively by several species of thrips. To transmit the virus, thrips must have fed on infected plants as nymphs.
- Abiotic effects during the growing season include:
  - ♦ Salt injury.
  - ♦ Wind injury.
  - ♦ Herbicide injury.

#### □ [Weeds](#).

- Control weeds in fields and on field edges and ditch banks. The following weeds are of greatest concern in New Mexico chile fields:
  - ♦ [purple nutsedge](#)
  - ♦ [yellow nutsedge](#)
  - ♦ [morning glories](#)
  - ♦ [spurred anoda](#)
  - ♦ [wright ground cherry](#)
  - ♦ [lambsquarter](#)
  - ♦ [palmer armaranth](#)
  - ♦ [prostrate pigweed](#)
  - ♦ [barnyard grass](#)
  - ♦ [jungle rice](#)
  - ♦ [kochia](#)
  - ♦ [field bindweed](#)
  - ♦ [Johnsongrass](#)
  - ♦ [jimsonweed](#)
- Lay-by herbicide applications already should have been applied in properly managed fields. If problems exist that warrant herbicide use, be aware of the harvest interval (days) from last application.
- **Chemical control:** Note that [Treflan®](#) and [Dual Magnum®](#) do not have a lay-by registration. They are registered only for application to chile after thinning. [Sanda](#) maybe used, but must be applied as a post-emergence directed treatment.
  - ♦ [Treflan®](#). New Mexico has a Section 24(c) label for a post-emergence incorporated treatment. For control of annual grasses and small-seeded broadleaf weeds, apply to soil surface around 5-7 inch pepper plants and incorporate into the soil after application. Treflan® does not control emerged weeds. Destroy existing weeds by cultivation before application. A Section 24(c) label must be in the applicator's possession at application time.

- ♦ **Dual Magnum®**. New Mexico has a Section 24(c) label. This chemical is used primarily for the control of yellow nutsedge, annual grasses and select annual broadleaf weeds. It must be applied to freshly tilled, weed-free soil. Dual Magnum® will not control established weeds. Irrigate after application to activate the chemical. A Section 24(c) label must be in the applicator's possession at application time.
- ♦ **Sandea**. This chemical controls yellow and purple nutsedge well. It also controls many broadleaf weeds. Apply as a post-emergence, directed treatment.
- ♦ **Poast®** and **Select®**. These are post-emergence herbicides that target annual grasses and Johnsongrass. The minimum preharvest interval, for both, is 20 days after application.

## Irrigation

### ❑ Common irrigation scheduling

- Use the best **quality water** source available. Sodium adsorption ratio (SAR) of water should be less than 6.
- Optimum irrigation times should be determined by testing soil moisture in the root zone by touch (use soil probe) and with moisture sensors, not by the physical surface appearance of soil and plants. Avoid over-irrigation to prevent **phytophthora root and pod rot** and leaching of nutrients out of the root zone.
- Continue to use alternate row irrigation to manage salinity problems. Keep irrigating on the same rows. If water starts to break across the top of beds into un-irrigated rows, open the rows' tail ends to provide good drainage.
- Irrigation times vary with amount of plant foliage, age, wind, sunlight, rain, temperature fluctuation and relative humidity.
- Water management is the primary control for phytophthora root and pod rot. Good drainage is essential at all times. Phytophthora root and pod rot can develop from water standing in any part of the field at any time. Avoid tailwater (ponding). Monitor weather closely to avoid watering around predicted monsoon rains. During the rainy season, always provide a means to drain fields quickly.
- Water stress, as exemplified by extremes of drying and wetting, increases the incidence of blossom-end rot.
- Jalapeño, green and cayenne irrigation schedules. To ensure a continuous flow of product to the processors, coordinate irrigations around harvest schedules. Keep fields at or near field capacity to ensure maximum yields.
- The cutoff date for red chile furrow irrigation is approximately September 15. The only exception might be unseasonably warm temperatures occurring in late September and early October. This could warrant an additional light watering the last week of September.

## Cultivation

By now, cultivation probably is not feasible. Crop canopy is full or nearly full and any cultivation would do more harm than good.

Having followed all prior best management practices, including a lay-by herbicide application, weed control practices for this period should be minimal or unnecessary. Address any minimal problems with hand labor. Bindweed and morning glories need control because they will inhibit mechanical harvesting.

## Fertilization

- ❑ **During the growing season, fertilization needs become dependent on the type of harvest (jalapeño, green, cayenne or red).**
- ❑ **For jalapeños and green crops.** Jalapeños are subject to a multiple harvest (2-3 picks). For the most part, green chile is harvested only once, although early-harvested green has potential for a second pick. Jalapeños require nitrogen earlier than green and red chile. They also require more nitrogen at first application to achieve plant size. To maintain fertility levels in plants, apply nitrogen during the irrigations immediately prior to and after harvest. This will maximize yield and get the plant ready for the next harvest. To boost yield, apply Calcium Ammonium Nitrate-17 (CAN-17) a week before green chile harvest.
- ❑ **For a cayenne crop, fertilizer applications depend on end use and crop potential.** If no better data is available, follow red crop recommendations.
- ❑ **For a red crop, be very careful that you do not over-fertilize.** To ensure adequate harvest-time maturity, cut off fertilizer to red crops on approximately August 15.
- ❑ **Before the crop attains full-canopy cover, test soil nitrogen (N), phosphorus (P) and potassium (K) to determine whether levels will remain sufficient through harvest.** Verify sufficiency through tissue testing.
- ❑ **Under furrow irrigation, use slow-release nitrogen (ammonium sulfate) to avoid leaching.**
- ❑ **Base nutrient management decisions on [soil testing](#) and [leaf petiole analyses](#).** Do not over- or under-fertilize plants.
- ❑ **Consider acid-based liquid fertilizers to improve phosphorus and micronutrient availability.**
- ❑ **Micronutrient needs are met best by foliar applications.** Time applications based on leaf petiole analysis (sample every 7 days). Some micronutrients can be determined only by tissue testing.
- ❑ **Plants need a steady supply of nitrogen during fruit set.** Base application rates on data from petiole analyses.
- ❑ **Ammonium nitrogen may aggravate blossom-end rot by interfering with calcium uptake.**

### **Tissue testing (leaf and petiole analyses)**

To determine if a crop is adequately nourished, have the plant analyzed during the growing season.

Table 3 shows the recommended range of nutrient levels that should be present in plant tissue. Leaf and petiole analyses will provide you with specific recommendations for your crop. To determine nitrate and phosphate levels, petiole tissue is analyzed. To determine levels of other nutrients, leaf tissue is analyzed.

**Table 3. Sufficiency ranges (mid-season).**

Nutrient	Desired range	
	ppm	%
Nitrogen (leaf)	35,000-50,000	(3.5 -5%)
Nitrate (petiole)	>1,000	
Phosphorous (leaf)	2,200-7,000	(0.22 - 0.7%)
Phosphate (petiole)	>2,000	
Potassium (leaf)	35,000-45,000	(3.5 - 4.5%)
Calcium (leaf)	10,000-25,000	(1.0 - 2.5%)
Magnesium (leaf)	3,000-10,000	(0.3 - 1.0%)
Sulfur (leaf)	3,000-6,000	(0.3 - 0.6%)
Zinc (leaf)	50-200	
Iron (leaf)	60-300	
Manganese (leaf)	50-250	
Copper (leaf)	6-25	
Boron (leaf)	25-75	

## Preharvest and Harvest

### Preharvest considerations

- ❑ **Communication.** Communication among the grower, company field representative and processor becomes even more critical as the time for harvest nears. Everyone needs to be on the same page about harvest schedules and any problems that have developed. Communication is a must among all parties.
- ❑ **Red chile [plant growth regulator](#).** Any application of a growth regulator should be only by mutual agreement between grower and processor to fit harvesting schedules. If you and the processor determine that ethephon application is needed to hasten red chile ripening in a particular field, then:
  - Apply when about 30% of the fruits are red and about 50% are mature green. Ethephon will not ripen immature fruits and can reduce yields if applied too early.
  - Use higher concentrations under cool-temperature or dense-foliage conditions and lower rates when temperatures are warm. Temperature can affect ethephon activity greatly.
  - Growth regulators should not be applied when temperatures exceed 95°F. Excessive defoliation and fruit drop can occur.
  - Temperatures below 60°F reduce or negate the growth regulator's effect.
  - Harvest crops receiving ethephon within 3-4 weeks of application. If crops are scheduled for delayed harvest (after frost), do not apply ethephon.
- ❑ **Harvest-aid defoliant.** Some growers use sodium chlorate ( $\text{NaClO}_3$ ) as a crop desiccant, when crop canopies are thick. Desiccants cause leaves to drop, exposing the pods to more sunlight. Increased light penetration hastens maturity of the pods, helps dehydrate the pods and reduces pod diseases caused by slower dry-down and higher humidity under leafy canopies.



### [Pest management](#)

Read the label before using any pesticide. Do not use any chemical, whether it is an herbicide, insecticide, nematicide or fungicide, if it is not labeled for chile (peppers). If you have questions, contact a [crop consultant](#), [NMDA Pesticide Division staff member](#) or [NMSU Extension specialist or county agent](#).

- ❑ **[Insects](#)**
  - Scout (inspect for insects) weekly during and up to last harvest. You cannot spend too much time scouting. Be constantly aware of insect problems in the immediate area.
  - Insecticide use prior to and through harvest.
    - ✦ Maintaining low pesticide residuals is critical at harvest onset. Pay attention to recommended harvest intervals on label (days between last application and harvest), using pesticides that will leave the lowest residuals.
    - ✦ Processor representatives test all fields for pesticide residues. Processors cannot accept crops with pesticide residues that are not within tolerance ranges.

- Insects of primary concern during this stage are [pepper weevils](#), [beet and fall armyworms](#), [corn earworms](#), [stinkbugs](#), [loopers](#) and [leafminers](#). Insecticides registered in New Mexico that control these insects during this period include:
  - ♦ [Actara®](#). Controls pepper weevils, stinkbugs, aphids, leafminers and beetles.
  - ♦ [Asana® XL](#). Controls beet armyworms, corn earworms and loopers. Also, aids in control of pepper weevils.
  - ♦ [Avaunt®](#). Controls beet armyworms and loopers.
  - ♦ [Confirm®](#). Controls beet and fall armyworms.
  - ♦ [Lannate® LV](#). Controls beet and fall armyworms and loopers
  - ♦ [Proclaim®](#). (Labeled for aerial application.) Controls beet and fall armyworms, loopers and leafminers.
  - ♦ [Spintor®](#). Controls leafminers and beet armyworms.
  - ♦ [Vydate® L](#). Controls leafminers and pepper weevils.
  - ♦ [Warrior® with Zeon](#). Controls beet and fall armyworms and corn earworm.
  - ♦ [Bacillus thurengiensis](#). Biologically controls armyworms.

#### □ [Diseases](#)

- Viral diseases can spread like wildfire under the right conditions. Diseases may be spread by hand pickers in a field or by mixing harvested pepper loads from different parts of one field or from several fields. Therefore, it is important to isolate diseased areas in a field to avoid contamination of disease-free peppers during harvest.
- Biotic diseases that could be present prior to and during harvest include those in the following list. There is no effective chemical control for viral diseases after infection.
  - ♦ [Phytophthora pod rot](#). The same fungus that causes [phytophthora root rot](#) also can cause pod rot. Infected pods shrivel and rot. A white mold often can be found inside the pod. Inoculum in the soil can be spread to aboveground parts of plants by wind or by splash dispersal during rainfall or overhead irrigation.
  - ♦ [Powdery mildew](#). This disease favors warm temperatures with high humidity. The most noticeable symptom is a white, powdery growth on the underside of leaves. Infection can lead to defoliation and production losses. Effective chemical control depends on early disease detection and thorough application coverage, with the fungicide reaching the underside of the leaves and lower plant canopy. The following chemicals show some signs of control for powdery mildew:
    - [Amistar](#).
    - [Ridomil Gold® EC](#).
    - [Quadris® / Flint / Cabrio™ EG](#).
    - [Nova 40-W](#). There is a Section 18 Specific Exemption for New Mexico. The label must be in the applicator's possession at application time. The effective dates for 2003 were July 25–October 15. Check the task force Web site for Section 18 renewal information for 2004.
  - ♦ [Blossom-end rot](#). This fruit disorder is associated with inconsistent watering and calcium deficiency. To increase calcium availability, add boron if soil/plant boron levels are low. Root pruning aggravates this disorder.
  - ♦ [Bacterial leaf spot](#). Bacterial spot pathogens can infect all above-ground parts of the plant. Spots form on leaves, stems and fruit, beginning as small, brown, water-soaked lesions. Warmer temperatures, high precipitation and high relative humidity promote disease development. Bactericides or fungicide-bactericide combinations

may be applied where recommended. The following fungicide-bactericides are labeled for use in New Mexico for bacterial leaf spot control:

— **Kocide® 101.**

— **Tenn-Cop® 5-E.**

- ♦ **Verticillium wilt.** Severe wilting of random plants occurs when pod production starts. The stress of a maturing crop induces the disease's onset. There are no effective measures for controlling verticillium wilt once the disease has occurred in a field.

#### ☐ **Weeds**

- Control weeds in fields, along field edges and on ditch banks. If all prior best management practices have been followed, including a lay-by herbicide application, weed control practices for this period should be minimal or unnecessary. Address any minimal problems with hand labor.
- **Bindweed** and **morning glories** need control because they can cause severe problems during hand and mechanical harvesting.

### **Irrigation**

#### ☐ **Common irrigation scheduling**

- Continue to use alternate row irrigation to manage salinity problems. Keep irrigating on the same rows. If water starts to break across the beds' tops into unirrigated rows, open the rows' tail ends to provide good drainage.
- Good drainage is essential at all times. Phytophthora root and pod rot can develop from water standing in any part of the field at any time. Avoid tailwater (ponding) by knocking down end borders after irrigations. Monitor weather closely to avoid watering around monsoon rains. During the rainy season, always provide a means to drain fields quickly.
- Jalapeño, green chile and cayenne irrigation schedules. To ensure a continuous flow of product to the processors, coordinate irrigations around harvest schedules. Keep fields at or near field capacity to ensure maximum yields.
- Cutoff date for red chile furrow irrigation is approximately September 15. The only exception might be unseasonably warm temperatures in late September. This could warrant an additional light watering the last week of September. If phytophthora pod rot is present in red chile fields after September 1, do not irrigate further.

### **Cultivation**

- ☐ By now, cultivation may not be feasible. Crop canopy is full or nearly full and any cultivation may do more harm than good.

### **Fertilization**

During preharvest and harvest, fertilization needs depend on chile type (jalapeño, green, cayenne or red).

- **Jalapeños and green crops.** Jalapeños are subject to a multiple harvest (2-3 picks). For the most part, green chile is harvested only once, although early harvested green has potential for a second pick. Jalapeños require nitrogen earlier than green and red chile. To achieve plant size, they require more nitrogen at first application. To maintain pod size and get the plant ready for the next harvest, apply nitrogen during the irrigations immediately before and after harvest.

- **Cayenne crops.** Fertilizer applications depend on end use and crop potential. If no better data is available, follow red crop recommendations.
- **Red chile crops.** Do not over-fertilize. To ensure adequate maturity at harvest time, stop red chile fertilization on approximately August 15 (or sooner if nitrate levels are sufficient prior to August 15).
- ❑ **Before full canopy cover, test soil nitrogen (N), phosphorus (P) and potassium (K) levels to ensure that levels will be sufficient through harvest.** Verify sufficiency with tissue testing.
- ❑ **Base nutrient management decisions on data from soil testing and leaf petiole analyses.** Do not over- or under-fertilize plants.

## Harvest considerations

- ❑ **Communication.**
  - Daily communication among the grower, company field representative and processor is an integral part of the harvest.
  - A single load of peppers on one farm that is not harvested or processed according to schedule may not affect the overall harvest. However, cumulatively from farm to farm, these small delays can be devastating, extending the overall harvest by 2-3 weeks.
  - Growers, field representatives and processors should inform the appropriate parties if their operations are not going according to plan so that all concerned can adjust their operations accordingly.
- ❑ **Inclement weather**
  - During periods of inclement weather, it is important that growers who are able to pick be willing to do so.
  - In some years, inclement weather is the rule and not the exception. Growers must keep this in mind and commence harvest operations whenever possible to maintain as constant as possible a flow of product through the system.
- ❑ **Field invoices (bills of lading)**
  - Make sure that bills of lading are properly filled out and signed for every load leaving your farm. Include grower field identification and variety.
  - It is important to have valid grower/driver/processor-signed invoices to ensure proper credit for incoming pepper loads.

## Postharvest handling

- ❑ **Promptly move harvest from field to processing plant.** Once harvested, crops should be moved from the field to the food processing facility as quickly as possible. Delayed harvest is more desirable than backlogs of harvested product in the field or at the food processing facility.
  - Crops suffer rapid quality loss beginning 24-36 hours after harvest if temperatures are above 50-55°F.
  - Do not harvest more than you are scheduled to harvest in any 24-hour period.
- ❑ **Guidelines for loading jalapeño, green chile, cayenne and red chile.**
  - Do not mix varieties on a load of harvested peppers. If a field change makes mixed loading necessary, keep varieties separate and labeled. Let the processor know to expect a mixed load. Even the same variety from different fields should be kept separate and labeled as such. Again, let the processor know.

- Isolate diseased areas in your fields to avoid contamination of disease-free peppers. Viral diseases can be spread by hand pickers in the field. Contamination from a small part of a load can spread rapidly throughout the entire load.

□ **Additional guidelines for loading red chile.**

- Early in the red harvest, peppers are in a *fresh succulent state*. As the season progresses, the pepper pods begin to field dry. The first hard killing freeze results in pods that are sloppy because of membrane breakage. Typically, in 10-14 days, the *sloppy-state* pods begin to dry, turning into leather-like chile pods. In the *leather state*, chile pods are very flexible. The last state is *completely field-dried* chile.
  - ♦ Fresh succulent state. In most cases, loading peppers level across the top of the load, with no packing in of peppers, will result in the load being near the legal gross weight for over-the-road travel.
  - ♦ Sloppy state. Do not allow packing of the chile pepper pods at this time. Packing and over-loading will increase the processing time greatly. Harvest only from your driest fields during this critical time.
  - ♦ Leather state. This is the time to maximize packing of chile peppers into your load. However, keep in mind the potential for exceeding legal gross weight for over-the-road hauling. Use netting or a canvas tarp to keep chile from blowing out.
  - ♦ Field-dried state. Do not allow packing or tromping. It will shatter the pepper pods and the processor cannot capture the lost seed. Heap these loads as high as possible because the load will settle tremendously, even before it leaves the farm. Loads in this state absolutely must be covered with netting or a canvas tarp.

□ **Mechanical harvest versus hand harvest of red chile.**

- When optimum field conditions are achieved during red chile harvest, processors are able to run at peak capacity. Due to today's limited and expensive labor pool, growers often cannot keep up with processor demand. This is fueling the trend toward mechanical red chile harvest. As the industry enters this new era, all members must work together diligently to maintain New Mexico's superior quality product. To the industry's credit, a spirit of cooperation is characterizing the current mechanization effort.
- Even with increasing mechanization, some hand labor will continue to be needed and growers must remain informed of agricultural labor laws and regulations. For helpful information, refer to *The Farm Labor Employer's Handbook, New Mexico Chile Task Force Report 7*. It may be downloaded from the task force Web site at [www.chiletaskforce.org](http://www.chiletaskforce.org) or obtained from Rich Phillips at (505) 646-2353 or [rphillip@nmsu.edu](mailto:rphillip@nmsu.edu).



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## **New Mexico Chile Task Force Web site**

[www.chiletaskforce.org](http://www.chiletaskforce.org)

Visit the task force Web site for:

- Current task force news and events.
- Updated best management practices.
- Agronomy information for chile growers (by topic).
- Reports on task force mechanical harvesting and cleaning, thinning and destemming projects.
- Reports on other task force projects, including marketing, breeding, trade issues, food technology, labor concerns and personal data assistant (PDA) units.
- All task force reports (publications), videos, state regulatory information and other documents.
- Many Internet links, such as:
  - ◆ New Mexico Pesticide Information Retrieval System at Purdue University.
  - ◆ Measurements, conversion units and calculations useful to farmers and agriculture specialists.
- Contact information for field consultants, soil and water labs, Extension specialists, task force members and commercial suppliers.
- Information about the task force, including its history and goals.

## Notes

## Notes

## **New Mexico Chile Task Force Publication List**

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**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



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