



Appropriate Practices

Applying Technology to Increase the Value of Chili Production

Presented by:

Department of Agricultural Extension
and Kasetsart University
Year 2025 (B.E. 2568)



**Guideline for Appropriate Practices:
Applying Technology to Increase the Value of Chili
Production**

Department of Agricultural Extension in collaboration with Kasetsart University
Project: Promoting Technology to Increase the Value of Agricultural Products (Chili)
Agricultural Learning Centers (ALC): Nong Muang Khai District, Phrae Province;
Lamduan District, Surin Province
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1. Executive Summary

This guideline presents research-informed recommendations for the cultivation of large-fruited and small-fruited chili varieties commonly grown in Thailand. It integrates local practical experience and scientific evidence to improve productivity, disease resistance, and market value through sustainable practices.

2. Varieties and their characteristics

2.1 Green Young Chili — “Prik Noom” (e.g., *Prik Noom Khiao Yok Siam 1059*)

- Appearance: light to dark green when immature, 5–10 cm in length (cultivar-dependent).
- Taste: mild to moderate spiciness, slightly sweet; used for stir-fries, green curry, and green chili paste.
- Agronomic features (hybrid example Chia Tai “Khiao Yok Siam 1059”): strong stems, good branching; fruit 2.2×18 cm (example), glossy green skin, thick flesh, early maturity (≈ 65 –70 days post-transplant), high yield (reported 4–6 t/rai under recommended management).



2.2 Large-fruited “Prik Kee Noo Yai”

- Fruit length: ~3–12 cm; tapered with pointed tip; immature green → ripe red; taste: spicy.
- Uses: fresh consumption, cooking (nam prik, som tum), processing (drying, chili powder).
- Seed sources: local saved-seed varieties (e.g., Yod Son, Hua Ruea, Jinda) and commercial hybrids (higher uniformity, vigor, and marketable appearance).

SuperHot hybrids uniform long fruits (commonly 5–9 cm depending on type), thick flesh, high yield, good transport tolerance, strong disease resistance, harvesting ~70–90 days after transplant.



Note: Variety selection should be matched to market demand (fresh vs processing), climate, and disease history of the field.

3. Agroecological requirements

3.1 Climate

- Optimal daytime temperature: 20–30 °C. Temperatures >33 °C can cause flower drop; abrupt increases >35 °C may cause young fruit drop. Water stress similarly induces flower abortion. (See extension literature for temperature effects on fruit set).

3.2 Soil

- Prefer loose, well-drained soils (sandy loam to loam) with pH ≈ 6.0–6.5.
- Avoid waterlogged sites; for rainy-season planting, choose raised beds or well-drained areas.

- Pre-plant organic matter (compost or well-fermented manure) at ~800–1,000 kg/rai helps improve structure, drainage, and microbial activity.

4. Crop growth and development (overview)

- Chili growth typically produces an upright main stem. The main stem forks (first branching) at node ~9–15; subsequent branches develop and produce flowers at many nodes.
- For large-fruited types, lower sub-branches below the first fork are often removed (pinched) to concentrate assimilates in the main canopy and improve ventilation and harvest efficiency. For small-fruited types (Prik Kee Noo), retain 1–2 vigorous sub-branches if wider spacing is used.

5. Seedling propagation and nursery management

5.1 Materials & media

- Recommended trays: 72-cell or 105-cell seedling trays.
- Growing medium: porous, moisture-retentive, disease-free. Example mix (by volume): 1 part sieved coconut coir (pre-soaked) : 1 part fully fermented manure/compost. Adjust moisture to ~80% (squeeze test: holds shape). Amendments (optional): mycorrhiza, beneficial fungi (Trichoderma), or microbial biostimulants.
- Use covered plastic for incubation to maintain moisture until germination.

5.2 Sowing procedure

1. Fill tray cells with medium.
2. Make a 1-cm hole; sow 1–2 viable seeds per cell; lightly cover.
3. Maintain even moisture for 3–5 days (light frequent watering or covered incubation).
4. Remove cover after germination; thin to one seedling per cell if two germinated.
5. Fertilize in the nursery: balanced complete fertilizer (e.g., 15-15-15) at low rate; apply twice at ~10-day intervals. Example: 50 g per 20 L water (follow label instructions and local extension guidelines).

5.3 Hardening

- 7 days before transplant: reduce watering frequency and gradually expose seedlings to direct sun to harden them (improves transplant survival). Avoid succulent, waterlogged seedlings. If seedling roots become pot/root-bound (>50–60 days in tray), lightly slash the root mass vertically 1–2 times to stimulate new root growth.



6. Land preparation and bed formation

6.1 Soil testing and pre-plant management

- Collect soil samples to assess fertility and pH; adjust liming (dolomite) and nutrient applications accordingly. Example: dolomite at 2 kg/rai as a corrective/liming input is sometimes recommended where soil is acidic.

6.2 Green manuring and solarization

- Sow a green manure (e.g., sunn hemp) and plow under at flowering (≈ 45 – 60 days) to increase organic matter. After plowing under, leave beds sun-exposed (solarize) for ~ 30 days to reduce soil pathogens.

6.3 Bed dimensions & mulch

- Typical bed height: ~ 50 cm; bed width: 100–120 cm (match plastic mulch width). Walkways ≈ 80 cm for access.
- Mulching materials: rice straw, plant residues, or plastic film. Organic mulches reduce soil temperature fluctuations and conserve moisture; plastic mulch enhances weed control and warming (but may increase soil temperature).



7. Transplanting and spacing

- Recommended spacing: 40–50 cm between plants × 40–50 cm between rows; zigzag (staggered) planting with two rows per bed is common for intensive systems.
- At transplant: incorporate a starter fertilizer into planting holes (e.g., 16-16-16 at a small rate) and optional growth-promoting inoculants (e.g., *Azospirillum*/ *Azotobacter* formulations) following product label recommendations.



8. Cultural practices

8.1 Irrigation

- Maintain consistent soil moisture; avoid waterlogging. Watering interval: 1–5 days depending on weather, soil type, and system. Drip irrigation or localized methods that maintain drier foliage are preferred to minimize foliar disease; however, localized surface (blast) irrigation is used locally and can be adapted if managed to reduce foliage wetting and pathogen spread.



8.2 Staking & trellising

- Use one stake per plant (bamboo or other material) and horizontal strings/trellises (multiple tiers) to support the canopy, prevent lodging, ease harvesting, spraying, and improve air circulation.



8.3 Pruning & flower removal

- For large-fruited types: remove branches below the first fork at early stage (when small) to reduce competition and improve canopy ventilation. Remove the very first flower/fruit at the first fork in some systems to stimulate vegetative growth and stronger canopy establishment (based on local experimentation).



9. Fertilization management

9.1 Principles

- Combine organic matter with chemical fertilizers. Adjust rates to soil test results and expected yield. Fruiting crops typically require higher K and moderate N; P often lower relative to N and K. A general N:P:K ratio of ~3:1:4 is a typical guidance for fruiting stage (reflects higher K demand).

9.2 Example fertilizer schedule (adjust to soil test & local recommendations)

- Total fertilization for season: approx. 100–150 kg/rai (split into multiple applications; adapt to yield target). Example split:
 - 1st: 10–15 days after transplant — side-dress with 21-0-0 at 20 kg/rai.
 - 2nd: 25 days after transplant — side-dress with 15-15-15 at 30 kg/rai.
 - 3rd: 40 days after transplant — side-dress with 13-13-21 at 30 kg/rai.
 - 4th: 55 days after transplant — side-dress with 13-13-21 at 30 kg/rai.

9.3 Foliar and soluble fertilizers

- Foliar feeding and water-soluble fertilizers can provide uniform nutrient distribution; typical dilution rates vary by product (e.g., 5–10 kg/200 L water for some soluble NPKs). Always follow product labels and extension guidelines.

9.4 Calcium and boron

- Spray Ca and B during flowering/fruit set weekly (or per label recommendations) to strengthen cell walls and reduce physiological disorders and disease susceptibility (e.g., blossom-end issues).



10. Integrated pest and disease management (IPDM)

10.1 General prevention principles

- Use pathogen-free seeds and clean nursery practices; rotate crops away from solanaceous hosts; maintain good drainage and canopy ventilation; remove infected plant debris promptly and destroy it off-site or by burning where regulations allow. Solarization (sun-drying beds under plastic) and deep ploughing may reduce soil-borne inoculum.

10.2 Key diseases — symptoms, favorable conditions, and management

(Selected diseases with practical controls)

Anthracnose (*Colletotrichum* spp.)

- Symptoms: sunken, water-soaked lesions on fruit often with concentric rings and orange- to black-colored spore masses under humid conditions.
- Favorable: warm, humid, continuous rain; splash-dispersal and infected seed/plant debris.
- Management: use disease-free seed/transplants; avoid overhead irrigation; prune for ventilation; remove infected fruits; begin protective fungicide spray programs at flowering/fruit set when needed (rotate modes of action)



Wet rot (*Choanephora* spp.)

- Symptoms: brown blight/rot on young shoots, flowers, and fruits; white mycelia under humid conditions.
- Management: improve airflow, avoid field operations when plants are wet, remove infected tissues, and follow fungicide recommendations if severe.



Bacterial wilt (*Ralstonia solanacearum*)

- Symptoms: sudden wilting with green foliage; vascular browning; milky exudate when cut and placed in water.
- Favorable: poorly drained soils, infected irrigation water, high temperatures.
- Management: avoid planting in fields with wilt history; remove and destroy infected plants; use crop rotation and raised beds/drainage; soil solarization and hot-water treatments can reduce pathogen loads; use resistant varieties where available.



Viral diseases (CMV, ChiVMV)

- Symptoms: mosaic, leaf distortion, stunting, flower drop; aphids are common vectors.
- Management: control aphid vectors, use insect-proof nursery (e.g., 32-mesh net), remove infected plants, control nearby weed reservoirs.



Collar and root rots (*Phytophthora* spp., *Pythium* spp.)

- Symptoms: damping-off, root rot, basal stem rot; favored by overwatering/poor drainage.
- Management: sterilized nursery media, avoid evening watering of trays, rotate crops, improve drainage.



Frog-eye leaf spot (*Cercospora* spp.)

- Symptoms: Small, circular lesions appear on leaves with light brown to gray centers and distinct dark brown or purplish margins, resembling a frog's eye—hence the name. Severe infection may cause premature leaf drop, reducing photosynthetic area and yield. Lesions may also occur on stems and pods in humid conditions.
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- Favorable conditions: Warm (25–30 °C), humid environments with frequent rain, dew, or overhead irrigation that keeps foliage wet for long periods favor disease development.
 - Management:
 1. Remove infected plant debris and practice crop rotation with non-host crops for at least one season to break the disease cycle.
 2. Avoid overhead irrigation; instead, use drip or furrow systems to reduce leaf wetness.
 3. Maintain good spacing and prune excess foliage to improve air circulation.
 4. Apply protectant fungicides, such as those containing chlorothalonil or mancozeb, at early symptom appearance and repeat as necessary per label instructions.
 5. Integrate *Trichoderma* spp. as a biological control agent to suppress *Cercospora* spp. inoculum in soil and leaf litter.

10.3 Biocontrol agents & microbial products

Trichoderma spp.

- Beneficial antagonist fungi used as seed treatment, soil amendment, or foliar/soil spray to suppress many fungal pathogens, enhance seed germination and root vigor, and induce plant resistance. Typical applications in practice include seed coating (e.g., 6–10 g *Trichoderma* powder per kg seed), nursery/media amendments (e.g., 100 g per 20 L water or 1 kg per 200 L for drench) and periodic foliar/soil sprays (product-specific rates). Avoid direct tank-mixing with fungicides antagonistic to *Trichoderma*; if fungicides are needed, apply them 7–10 days apart from *Trichoderma* applications.

Bacillus subtilis

- Antagonistic bacterium effective against certain fungal diseases (e.g., anthracnose); follow label rates for foliar sprays and store microbial formulations under recommended conditions. Do not mix with bactericidal chemical agents (e.g., copper-based bactericides) if incompatibilities are stated.

11. Major insect pests — identification and management

11.1 Thrips (*Scirtothrips dorsalis*)

- Symptoms: curling, leaf distortion, silvery and scarring on leaves and fruit; thrips prefer underside of young leaves and flowers.
- Management: sanitation (weed removal), monitoring with yellow sticky traps, use of registered insecticides with rotation of modes of action to reduce resistance, and cultural measures to maintain higher humidity (sprinkler) during outbreaks in some systems.



11.2 Aphids

- Symptoms: leaf curling, stunting, honeydew/sooty mold; aphids vector viruses.
- Management: monitor early, use reflective mulches or barrier nets in nursery, biological control (natural enemies), and insecticides when necessary. Remove weeds that host aphids.



11.3 Broad mites (*Polyphagotarsonemus latus*)

- Symptoms: distorted, thick, brittle leaves; stunted growth.
- Management: early detection, miticide treatments per label, and cultural practices to reduce mite habitat.



11.4 Chili fruit fly (*Bactrocera latifrons*)

- Symptoms: egg-laying inside fruit → larval feeding → internal rotting and fruit drop.
- Management: baited traps (lures mixed with insecticide), sanitation (remove fallen/infested fruits), fruit bagging, and integrated trapping strategies. Follow guidance for attractant and insecticide mixing rates from local extension.



11.5 Cotton bollworm and other chewing larvae

- Symptoms: holes in flowers and fruits, boring into fruits.
- Management: BT (*Bacillus thuringiensis*) for caterpillars, pyrethroid group insecticides as appropriate (follow label and resistance-management advice), and spray timing (evening applications) to target feeding larvae.



12. Monitoring, record-keeping, and thresholds

- Regular scouting (weekly or more often during high-risk periods) is essential. Use yellow sticky traps for thrips monitoring; pheromone/lure traps for fruit fly detection. Maintain simple field records (planting date, variety, fertilizer and pesticide applications, pest/disease observations, yield) to refine decisions and evaluate interventions.



13. Harvesting and post-harvest handling

- Harvest according to market requirements (green vs fully ripe red). Handle fruits carefully to avoid bruising; cool produce promptly for market or processing. For drying or powder production, follow hygienic processing and drying protocols to ensure quality and food safety.



14. Safety, regulations, and environmental considerations

- Always follow label instructions for agrochemicals and registered product recommendations. Use PPE for pesticide applications. Favor integrated measures and biological agents to reduce chemical dependency. Dispose of chemical containers per regulation and avoid contaminating water sources.



15. Summary of practical recommendations (quick checklist)

- Choose varieties to match market and field history.
- Test soil and amend (pH and organic matter) before planting.
- Use healthy nursery practices and harden seedlings pre-transplant.
- Maintain 40–50 cm spacing, good drainage, and mulch to conserve moisture.
- Implement staking and canopy management for ventilation and harvest ease.
- Apply split fertilization based on soil test; emphasize K during fruiting.

- Use IPDM: sanitation, rotation, resistant varieties (if available), biologicals (Trichoderma, Bacillus), and targeted chemical applications when necessary.
- Monitor pests/diseases and keep records.
- Ensure post-harvest handling for market quality.



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