

# Organic Pepper Production



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**INSTITUTE OF PLANT BREEDING (IPB)**  
Crop Science Cluster, College of Agriculture  
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<b>Sub-total (A+B)</b>		<b>93,500.00</b>
C. Contingencies (15%)		<b>14,025.00</b>
<b>Grand Total Cost (A+B+C)</b>		<b>107,525.00</b>
<b>II. Gross Income**</b>		<b>250,000.00</b>
<b>Net Income</b>		<b>142,475.00</b>
<b>% Return on investment</b>		<b>132.50</b>

\*MAD - man-animal day; MD - man day

\*\*Marketable yield is 10 t/ha; farm gate price is P25/kg.

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the variety name and date of seed production. Small quantities can be kept in an air-tight container inside a refrigerator. For larger quantities, a cold storage room with controlled humidity and temperature should be used. The temperatures should not exceed 20°C and RH in the storage area should not exceed 40%.

**Table 2. Cost and return analysis for a one-hectare organic pepper production.**

Items	Unit Cost (P)	Total (P)
<b>I. Variable Costs</b>		
A. Labor *		
Plowing (5 MAD)	600/MAD	3,000.00
Harrowing (3 MAD)	600/MAD	1,800.00
Furrowing/ Bedding (5 MAD)	600/MAD	3,000.00
Organic fertilizer application during bed preparation and side dressing (10 MD)	300/MD	3,000.00
Seedling production (15 MD)	300/MD	4,500.00
Transplanting (10 MD)	300/MD	3,000.00
Spraying with fermented plant food supplement (FPFS) (20 MD)	300/MD	6,000.00
Irrigation (60 MD)	300/MD	18,000.00
Weeding and pruning for sanitation (30 MD)	300/MD	9,000.00
Harvesting (20 MD)	300/MD	6,000.00
Miscellaneous (20 MD)	300/MD	6,000.00
Sub-total		<b>63,300.00</b>
B. Materials		
Seeds (100 g/ha)	1100/50 g	2,200.00
Organic fertilizer (2T)	7,500/t	15,000.00
FPFS		2,500.00
Biopesticides		500.00
Net bags, crates, and knives		5,000.00
Miscellaneous		5,000.00
<b>Sub-total</b>		<b>30,200.00</b>

from other pepper lines. Isolation can also be achieved by covering the pepper plants with 16-mesh nylon nets to keep out bees or by growing the pepper plants inside an insect-proof greenhouse or screen house. For small-scale seed production, use net bags to isolate selected plants. Alternatively, individual flowers can be bagged or covered using aluminum foil or a piece of soda straw before they open.

If optimum isolation is not possible, plant tall barrier crops such as sorghum, trellised vegetables, or adlai around the pepper area to restrict the movement of bees. Remove the off types early in the season to prevent contamination. Collect fruits only from the central part of the area for seeds.

Harvest mature or ripe fruits for seeds. To extract the seeds, the following steps may be done:

1. Wear rubber gloves or just wrap fingers with masking tape before cutting open the fruits. Carefully scrape the seeds from the core. Work in a well-ventilated area as fumes released during seed processing can be quite unbearable. Alternatively, a blender can be used to chop the fruits and core (viable seeds sink).
2. Pour off remaining debris with water. After all the debris have been washed away, dry the pepper seeds on a screen. Do not dry the seeds in direct sunlight, as it will damage them.
3. Spread the seeds on a screen for drying at 25°C and 40% RH for one week. Use an air dryer if available.
4. Stir the seeds occasionally and/or use a fan to hasten drying.

Pepper seeds can be stored for at least 3–5 years if properly dried and stored in airtight containers such as sealed glass jars, metal cans, or foil envelopes. Seeds may also be placed in appropriate containers such as glassine bags, manila/coin envelopes, cloth or mesh bags, or plastic containers. Label the containers with

**Table 1b. Disease management options in pepper.**

Diseases	Recommendations
Bacterial wilt ( <i>Ralstonia solanacearum</i> )	<ul style="list-style-type: none"> <li>• Use resistant variety.</li> <li>• Plant after irrigated rice. Avoid planting after other solanaceous crops such as tomato and eggplant.</li> </ul>
Bacterial soft rot ( <i>Erwinia carotovora</i> subsp. <i>Carotovora</i> )	<ul style="list-style-type: none"> <li>• Remove fruits with soft rot symptoms.</li> <li>• Wash fruits properly with alum solution.</li> </ul>
Anthracnose ( <i>Colletotrichum</i> sp.)	<ul style="list-style-type: none"> <li>• Practice crop rotation.</li> <li>• Use resistant variety.</li> <li>• Spray sulfur or copper fungicides approved for organic production. Observe strict sanitation and use compost tea and tea manure.</li> </ul>
Cercospora leaf spot ( <i>Cercospora capsici</i> )	<ul style="list-style-type: none"> <li>• Spray plants with vermitea.</li> <li>• Observe strict sanitation and use compost tea and tea manure.</li> </ul>
Viruses	<ul style="list-style-type: none"> <li>• Use resistant varieties.</li> <li>• Avoid smoking in the area.</li> <li>• Remove virus-infected plants or spray with tea manure or FPJ to increase plant vigor and resistance.</li> </ul>

## Harvesting and Postharvest

Harvest mature green fruits at 80–100 days from transplanting or 21–42 days after flowering. Sort fruits according to market standards while separating deformed and damaged fruits. Fresh fruits can be stored up to five weeks at 4°C and 95% relative humidity (RH).

## Seed Production

Pepper is classified as an often-crossed crop, with out-crossing rate even exceeding 30%. Cross-pollination is primarily caused by bees and less often caused by other insects such as thrips and ants and by wind.

Isolation by distance to maintain variety purity can be achieved by growing the crop at least 200 m away

## Introduction

Sweet pepper (*Capsicum annuum* L.) also known as capsicum, 'kampana,' or 'lara' is the most widely used condiment all over the world. It is consumed fresh, dried, or processed. There are several color types: green, yellow, orange, violet, and brown.

Capsicum species are members of the Solanaceae family. There are five cultivated species under this genus: *C. annuum* (sweet and chili peppers), *C. baccatum* (known in South America as 'aji' when fresh and 'cusqueño' when dried), *C. frutescens* (known as tabasco, squash peppers, and 'siling labuyo'), *C. chinense* (known as the hottest peppers including 'Bhutjolakia,' Trinidad Scorpion, and Carolina Reaper), and *C. pubescens* (known as 'Manzano').



### Production Management

Sweet pepper in general can be difficult to grow organically, but the hot and ‘panigang’ types are easier to grow under specific organic conditions.

Most of the pepper varieties are better adapted to semi-temperate conditions and grow better in mid- and high-elevation areas. Thus, it is important to grow several varieties initially to determine adaptability and then seed produce the selected plant or line.

#### Varieties

There are several variety types of pepper based on cultivation, shape, and pungency. The open-field type is generally determinate in growth habit while those grown in greenhouses tend to be tall or indeterminate.

Based on shape, there are the bell type such as California Wonder; the long bell type such as 'Lamuyo'; conical or Chinese type such as Smooth Cayenne; horn type or panigang, and the bird pepper, chili, or labuyo pepper. The variety type or classification in other countries is based mainly on shape: Serrano, Cubanelle (frying type), Cayenne, Pimento, Anaheim Chile, Cherry, Jalapeno, Elongate bell, Ancho, Banana, and Blocky bell.

Among the new potential varieties selected under the project "Variety Development, On-Farm Trials and Seed Production of Organic Vegetables in Southern Luzon" funded by DOST-PCAARRD are 10423, 10449, 10505, 10507, 10509, and 10510.

#### Soil and Climate Requirements

Sweet pepper requires cool weather for best fruit quality. In low-elevation areas, start planting on the second week of October up to the first week of November. The Chinese and panigang types can be grown in low elevations throughout the year. In mid- and high-elevations, almost all varieties can be grown throughout the year.

Sweet pepper grows best in sandy loam soil with a pH of 5.5–6.5. It cannot tolerate waterlogged conditions.

#### Seedling Production

Seedlings are produced through the following steps:

- About 100–200 grams (g) of seeds are needed for 1-hectare (ha) planting. Prepare five seedbeds that measure 1 meter (m) x 10 m each.
- Pulverize the soil and incorporate 1 kilogram (kg) fully decomposed chicken manure and 300 g carbonized rice hull per square meter (m<sup>2</sup>).
- Wet the seedbeds and make shallow lines 7–10 cm apart across the seedbeds.
- Soak the seeds overnight to hasten germination. Air-dry and sow thinly. Cover lightly with soil and mulch with rice hull or chopped rice straw.

For hybrid seedlings, prick in nursery trays at two-leaf stage. Provide partial shade. During wet season, provide plastic roofing to protect the seedlings from heavy rain. Harden seedlings one week before transplanting by exposing fully to sunlight and watering only when the plants show signs of temporary wilting.

#### Land Preparation

Land is prepared through the following steps:

- Plow and harrow twice. For double row planting, make beds 1.0 m wide and 0.75 m apart. Make furrows 0.75 m apart for single row planting.
- Incorporate 0.5 kg fully decomposed animal manure or vermicompost and 300 g carbonized rice hull per m<sup>2</sup>. Dig holes with a distance of 0.4 m x 0.4 m for double row planting and 0.4 m between hills for single row planting.
- Use plastic mulch or rice straw if available.

If plastic mulch is used, roll it out with the film silver side up. At about 1 m before the plot ends, pull the film and fully stretch the plastic without further rolling it out. Cover the ends and the sides with soil. Make holes using heated tin cans 7–10 cm in diameter. The holes may be spaced at 30 cm x 50 cm. Allow the weeds to grow along the alleys for pest, soil, and mulch management.

Pepper can also be grown using the no-till system of permaculture. This involves making beds of biodegradable materials such as Napier grass and leaves of legumes then transplanting the eggplant seedlings on the plot by boring holes through the biodegradable materials. Additional farm debris can be added as the materials decompose. This will make the nutrients available to the pepper plants slowly and help conserve soil moisture as well as control weeds.

#### Transplanting

Water the soil before transplanting. Plant one seedling/hill and mulch with rice straw. If mulching film is used, install after bed preparation. If possible, transplant in the afternoon to avoid wilting. Replant missing hills at once.

#### Irrigation

Irrigate weekly or depending on soil moisture and prevailing weather conditions. Mulching helps in minimizing soil moisture.

#### Fertilization

Water the plants with tea manure or compost tea weekly or depending on plant vigor. Apply fermented plant juice (FPJ) as supplementary fertilizer during the vegetative stage and fermented fruit juice (FFJ) during the fruiting stage.

To prepare tea manure, soak ¾ sack of dried cow or horse manure in water filling ¾ of a 200-liter (L) capacity plastic drum. Soak for 5–7 days with frequent stirring.

To prepare FPJ, mix two parts chopped plant shoots or banana trunk with one part raw sugar or molasses. Ferment mixture for seven days.

The tea manure may be diluted at 1 part tea to 20–40 parts water, while FPJ may be diluted at a ratio of 2 tablespoons (tbsp) of the concentrate to 1 L of water and drenched on the plots or used as foliar fertilizer. Base the rate and frequency of fertilization on the vigor of the plants.

FFJ is prepared using overripe fruits and peelings. Mix two parts of fruits with one part raw sugar or molasses and ferment for seven days. Fish amino acid (FAA) is prepared from fish wastes such as gills that are fermented with equal part molasses for around two weeks. Calcium phosphate is prepared from egg shells, fish bones, and animal bones by charring to the ideal brown color, grinding, and mixing with ten parts natural vinegar then letting stand for two weeks.

#### Pest and Disease Management

Major insect pests of sweet pepper are aphids, spider mites, and fruit fly. To minimize pest incidence, intercrop with herbs, alliums, ginger, lemon grass, and other aromatic plants. Spray recommended biopesticides. Use fruit fly attractant or grow inside screen houses. Grow flowering plants such as cosmos and sunflower to attract beneficial insects and predators. Tables 1a and 1b present some pest management strategies.

Prepare compost tea or tea manure by soaking ½ sack of compost or cow manure in ¾ drum of water. Stir the water daily. The mixture is ready for use after 24 hours or until the mixture has the characteristic tea color.

Pests	Recommendations
Aphids ( <i>Aphis gossypii</i> , <i>Myzuspersicae</i> )	<ul style="list-style-type: none"><li>Spray with hot pepper extract (100 g macerated hot pepper/16 L water) and soap solution.</li> <li>'Langkawas' (<i>Alpinia pyramidata</i>) extract spray can also be used.</li></ul>
Broadmites ( <i>Polyphagotarsonemus latus</i> Banks)	<ul style="list-style-type: none"><li>Check for shoots with virus-like symptoms.</li> <li>Use natural enemies such as Orius, predatory mites, and lacewing. Spray soap solution.</li></ul>
Thrips ( <i>Thrips palmi</i> Karny)	<ul style="list-style-type: none"><li>Spray with soap solution.</li> <li>Mulch the beds with rice straw or plastic. Infestation is severe especially during the dry season.</li></ul>
Fruitfly	<ul style="list-style-type: none"><li>Intercrop with hot pepper.</li> <li>Grow resistant varieties or grow pepper in a screen house.</li></ul>
Fruitworm ( <i>Helicoverpa armigera</i> Hubner)	<ul style="list-style-type: none"><li>Grow repellent crops such as basil, onion, and marigold.</li> <li>Clip off the affected shoots along with the larva inside.</li> <li>Use pheromone or <i>Trichogramma</i>.</li> <li>Spray with <i>Bacillus thuringiensis</i> (Bt) or Nuclear Polyhedrosis Virus (NPV). Collect NPV-infected larvae and store in the freezer for later use. These can be macerated then diluted at 2 infected larvae/L water. Spread earwigs to feed on pod borers.</li></ul>
Leaf Miner	<ul style="list-style-type: none"><li>Conserve natural enemies such as spiders, lacewings, and syrphid flies.</li> <li>Intercrop with okra, eggplant, tomato or other suitable vegetables.</li> <li>Maintain low weed population along alleys to minimize the pest.</li></ul>
Nematodes	<ul style="list-style-type: none"><li>Intercrop with marigold and grow in rotation to corn.</li></ul>