DEPARTMENT OF AGRICULTURE
Regional Field Office No. 02
Tuguegarao City, Cagayan

TOMATO
PRODUCTION GUIDE

AGRI Pinoy

Tomato

Production Guide

This Publication is a project of the **Department of Agriculture, Regional Field Office No. 02, High Value Crops Development Program.** It contains the most recently available and locally adaptable technical information on **Tomato Production** in Region 02.

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INTRODUCTION

Tomato (*Lycopersicon esculentum,* Miller) locally known as *"kamatis"* is identified as one of the most important vegetables because of its versatility in usage. It is regarded as one of the most profitable crops for off-season production, preferably from May to September.

Fresh tomatoes are used as ingredient in many recipes, served as raw, baked, stewed and processed into various products such as catsup, paste, sauce, candy, juice and purees.

Tomato is the top source of Vitamins A and C. It also contains significant amount of dietary fiber, beta carotene, iron, magnesium, niacin, potassium, phosphorus, riboflavin and thiamine. It is rich in lycopene and anti-oxidant which destroys cancer-causing free radicals in the body. Tomato is a natural antiseptic. It improves the skin and purifies the blood. It also helps cure cases of gout, rheumatism, tuberculosis, high blood pressure, and sinus trouble.

ADAPTATION

Climatic and Soil Requirements

Tomato is adapted to a wide range of climatic conditions. However, it requires a relatively cool and dry climate. The optimum temperature requirement of tomato ranges from 21°C -24°C.

This vegetable is usually planted from September to January in hilly areas and from November to February in lowland areas. Grow off-season tomato from May to September to attain higher profit.

Tomato produces good yield in a fertile and well-drained soil rich in organic matter, particularly in sandy loam and clay loam soils with a pH value of 5.5-8.0.

During the wet season, choose a slightly elevated area with good drainage to avoid water logging. For dry season planting, make a catchment canal to drain excess water after irrigation.

Varietal Selection

Yield potential, adaptability and marketability determine the income of growers. Select varieties that are high-yielding, resistant to pests and diseases and with market preference.

There are two types of tomato grown in the country namely, the table type and the processing type. Table type tomatoes are non-seasonal while the processing type tomatoes are grown only during dry season. Varieties of tomato are indicated in Table 1.

Table 1. Varieties of Tomato Adapted to Region 02 condition.

Variety	Fruit Type		Features
	Color	Shape	
NSIC Tm 08	Orange red		Posseses big fruit
NSIC Tm 09	Red	Semi-globe	Heat tolerant
Diamante Max	Red	Round	Year round in the highlands
Marimar	Red	Oblong	Tolerant to heat and foliar disease
Rocky F1	Red Orange	Deep Oblate	Sweet taste, good for dry season
Improved Pope OP	Red Orange	Plum	Firm, excellent for shipping, good for all season
Supper Pope OP	Red Orange	Oblong	For dry seasosn
Maguilas OP	Pinkish Orange	Round	Delicious taste, firm and for all season

SEEDLING ESTABLISHMENT

There are two methods of raising seedlings: the seedbed method and the use of seedling trays or potlets.

Seedbed Method

Choose a level area fully exposed to sunlight, accessible to source of water, with good drainage and provided with windbreaks. Plow and harrow alternately until the soil attained fine tilt. Construct five (5) seedbeds measuring 1 x10 m at 15 cm high good for sowing 150-200 grams of seeds enough to plant a hectare.

Sterilize the seedbed to eliminate pathogens and weed seeds present in the soil. To sterilize, moisten the prepared seedbed for better heat penetration. Spread about 3-5 cm thick of either rice straw or rice hull on top of the seedbeds and burn slowly. Remove unburned materials and excess ash. To avoid toxic effects of burned materials, do not sow seeds immediately after sterilization.

To hasten germination, soak the required amount of seeds in clean water overnight and air-dry the seeds before sowing.

Water the seedbeds before sowing. Prepare rows at a distance of 5 cm with the use of a stick. Drill the seed evenly in the furrows and cover with fine soil.

Seedling Tray/Potlets

Raising seedlings in trays or potlets requires less seeds, promotes uniform growth of seedlings, minimizes transplanting shock and lessens seedling mortality. It also saves labor from thinning, weeding, watering, and pest management.

Prepare soil mixture or media composed of one (1) part compost, one part carbonized rice hull (CRH), and one part garden soil. Sterilize the garden soil by roasting method. Mix the garden soil with the other media one (1) day after sterilization.

Fill the holes of the plastic trays or potlets with the media. Use seedling trays with 100 or 104 holes.

Sowing

A hectare of farm requires 100-200 g of tomato seeds. One gram is approximately 250 seeds. To hasten germination, soak the required amount of seeds in clean water overnight. Air-dry the seeds before sowing.

Water the seedbeds before sowing. Prepare rows at a distance of 5 cm with the use of a stick. Drill the seed evenly in the furrows and cover with fine soil. When using seedling trays or potlets, sow one seed per hole or potlet at a depth of 1.0 cm. Cover the seeds with fine soil. Sprinkle the trays/potlets with water after sowing.

Care of Seedlings

Water the seedlings preferably in the morning. The amount of water to be applied should be just enough to keep the soil moist. Over-watering favors damping-off and production of weak seedlings.

To protect the seedlings from excessive sunlight and rain, construct a temporary shade using locally available materials such as cogon, talahib or coconut leaves and recycled plastic sack. Put posts of the shade at least 120 cm high on the east side and about 60 cm high on the west side.

Thin over-crowded seedlings 3-5 days after emergence (DAE) or when the seedlings have developed the first 2-3 leaves then prick in potlets. Water the pricked seedlings and place in a shaded area until these have recovered.

To grow healthy seedlings, drench the seedlings with starter solution of one (1) tbsp urea (45-0-0) or ammonium sulfate (21-0-0) dissolved in four (4) liters of water 10 DAE. Water the seedlings immediately after applying fertilizer to prevent leaf injury.

Harden the seedlings one week before transplanting by gradually exposing them to sunlight. For the first day, expose the seedlings up to 10 o'clock in the morning and increase duration every day until the seedlings can withstand the heat of the sun the whole day. However, make sure that the seedlings do not wilt severely.

Another way of hardening the seedlings is to gradually reduce the amount of water and frequency of application.

CULTURAL MANAGEMENT PRACTICES

Land Preparation

Prepare the field as early as possible to give enough time for the weeds and stubbles of previous crops to decompose. Plow at a depth of 15 - 20 cm 2-3 times at one week interval. Harrow every after plowing to break the clods and level the field. A well-pulverized soil promotes good soil aeration and enhances root formation.

Transplanting

Transplant 25-30 days old seedlings at a distance of 50 cm between hills.

Transplant the seedlings carefully. Hold the roots with the thumb and forefinger then push towards the soil at 3-5 cm deep depending on the length of the stem. For seedlings raised in trays or potlets, transplant together with the soil media.

Generally, transplant late in the afternoon or during cloudy days. Cover newly planted seedlings with banana stalk or any available shading materials during sunny days to minimize transplanting shock until the plants begin to recover. If seedlings are grown in trays or potlets, covering after transplanting is not necessary.

Replant missing hills and wilted transplants 3-5 days after transplanting (DAT). Refrain from smoking during transplanting to avoid infection of tobacco mosaic virus.

Fertilizer Application

The quantity and kind of fertilizer to apply depend on soil fertility and the previous cropping pattern. To provide the right nutrient requirement of the crop, submit soil samples for analysis at the Cagayan Valley Integrated Agricultural Laboratory (CVIAL), Department of Agriculture, RFO 02, Carig Sur, Tuguegarao City, Cagayan or at Ilagan Soils Laboratory, San Felipe, Ilagan City, Isabela.

In the absence of soil analyis, please refer to the recomended fertilizer application in Table 2.

Table 2. Kind, amount and time of fertilizer application for tomato

Time of Application	Kind of fertilizer	Amount of Fertilizer
Before land preparation	Decomposed animal manure/commercial organic fertilizer	20 bags per ha
Basal	Complete (14-14-14)	1tbsp per plant

Side-dress 10-15 DAT	Urea (46-0-0) Muriate of Potash (0-0-60)	1 tbsp per plant 10 tbsp per plant
30 DAT	Urea (46-0-0) Muriate of Potash (0-0-60)	10 tbsp per plant 10 tbsp per plant

Trellising or Staking

Some varieties of tomato are indeterminate, which need pole support to keep the plants above the ground especially during the rainy season. Provide trellis 15 DAT using locally available materials like nylon string and poles. Tie the main branch of the plants to the stakes to keep them in place.

Weeding and Cultivation

Effective weed control is an integral part of crop production. Pull weeds as they grow to eliminate possible hosts of insect-pests and disease-causing organisms. Off-bar 15-20 DAT and hill-up 25-30 DAT. Pull remaining weeds in between plants after hilling-up.

Irrigation

Tomato is very sensitive to flooding. Water or irrigate the plants just to moisten the root zone especially during the onset of flowering up to the last harvest. Quick furrow irrigation is recommended to minimize soil erosion and to favor high fruit setting. Generally, it requires 4-5 times irrigation from transplanting to 14 days before the last harvesting period. In the absence of surface irrigation, water the plants using sprinkler at weekly interval at the rate of one liter per hill.

Pruning

Prune the plants to attain better plant growth and improve fruit setting. Pruning is done 10-20 DAT or when the side branches of the plants start to elongate. Prune all side branches below the split. Remove also the bud growth on the split and old leaves. Prune in the morning to hasten healing of plant wounds.

Pests Management

Insect-pests and diseases reduce yield and lower the quality of produce, if not managed properly. Common pests of tomato are thrips, whiteflies, melon fly, leaf miner, aphids, cutworm and fruitworm.

Most prevalent diseases are mosaic virus, stem rot, early and light blight, fusarium wilt, anthracnose, bacterial leaf spot, leaf molds bacterial wilt and nematodes infection.

The occurrence of these pests is prevented by the following practices:

1. Use of resistant varieties
2. Cleanliness and sanitation
3. Crop rotation
4. Spray pesticides as the need arises, following the manufacturer's recommended dosage.

Harvesting

Harvesting of tomato fruits starts at 55-65 DAT or 15-20 days from flowering. Tomato extends its growth to more or less 100 DAT depending on the variety and management practices employed.

Harvest at weekly interval depending on market demand. Tomato can be harvested at three stages, namely:

- Mature green – harvest when fruits start to show cream streaks at the blossom end. This is applicable for distant market.

- Pink or breaker – harvest when the blossom end turns pinkish or reddish. This is applicable for nearby market.
- Red ripe – harvest when the fruits are already red. This is the best time to harvest for home consumption.

Postharvest Operations

To reduce wastage and improve market quality of produce, growers must practice proper postharvest techniques.

Sort the fruits according to size, color, shape, maturity and condition. Discard deformed and damaged fruits. Wash with clean water and wipe with clean, dry and soft cloth.

Pack fruits in suitable containers that are good and strong enough to protect the commodity. Use bamboo containers (kaing or basket), wooden crates, food grade plastic crates or boxes. Line the bottom of the containers with old newspapers or any cushioning materials to prevent damage.

Cost and Return Analysis for 1 hectare tomato production

PARTICULARS	NUMBER		VALUE IN PESO (P)
	Man-days	Man-animal-days	
A. Labor Cost			
1. Seedbed Preparation (5 seedbeds, 10m)			
a. Preparing beds, levelling and pulverizing	**4**		600.00
b. Mixing compost	**2**		300.00
c. Sowing seeds, watering & spraying	**4**		600.00
d. Care of seedlings, picking and hardening	**4**		600.00
2. Land Preparation			
a. 1st Plowing		**7**	2,100.00
b. 1st Harrowing		**4**	1,200.00
c. 2nd Plowing		**4**	1,200.00
d. 2nd Harrowing		**3**	900.00
e. Furrowing		**2**	600.00
3. Transplanting activities			-
a. Watering and pulling of seedlings	**2**		300.00
b. Furrow irrigation of the field before transplanting (need base)	**2**		300.00
c. Basal Fertilization	**5**		750.00
d. Transplanting	**15**		2,250.00
4. Establishment of support poles	**15**		2,250.00
5. Care of the plants			-
a. Irrigation water (20 application at the growing period	**40**		6,000.00
b. Off-barring (21 days from transplanting)		**3**	900.00
c. Hand weeding (3x)	**10**		1,500.00
d. Side dressing of fertilizer	**4**		600.00
e. Hilling up		**3**	900.00
f. 3rd fertilization	**2**		300.00
g. Control of pest & diseases (10 sprayings with 14 days interval)	**20**		3,000.00
6. Harvesting (12x4)	**48**		7,200.00
7. Sorting and packing	**15**		2,250.00
8. Hauling	**4**		600.00
Sub-Total			**37,200.00**

B. Inputs	Quantity	Unit Cost (P) 2/	Amount (P)
1. Seeds (OPV)	250 grams	1,500.00	375.00
2. Fertilizer			-
- Urea	3 bags	2,000.00	6,000.00
- Ammosul	3 bags	1,900.00	5,700.00
- Solophos	3 bags	540.00	1,620.00
- Organic fertilizer	20 bags	200.00	4,000.00
3. Insecticides	9 liters	850.00	7,650.00
4. Fungicides	3 kg	350.00	1,050.00
5. Fuel	40 liters	50.00	2,000.00
6. Bamboo (P60/pc)	50 pieces	60.00	3,000.00
7. Miscellaneous			1,500.00
Sub-Total			32,895.00
Sub-Total (A&B)			70,095.00
C. Contingency (15% of the total labor & material inputs)			10,514.25
GRAND TOTAL			**80,609.25**
Yield /ha (kg)	**25,000**		
Gross Income		**3/ 10.00/kg**	**250,000.00**
Net Income			**169,390.75**
Return on Investment (ROI)			**210.14 %**

1/ Man-days = P250
MAD = P400
2/ Cost of items as of December 2015
3/ Farm gate Price

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