



DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

ONION

PRODUCTION GUIDE



Onion
Allium cepa



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The ONION Plant

Alliums are important vegetable crops in the Philippines. The most common grown alliums in the country are the red, sweet yellow onions, shallots and garlic. Onion (*Allium cepa* L.), otherwise known as “sibuyas”, was one of the largest contributors in domestic vegetable earnings in the amount of P2.1B in 2006. Shallot or “sibuyas tagalog”, is a biennial herb used as food, spice and seasoning. Onions can be eaten raw, cooked, fried dried or roasted. They are commonly used to flavor dips, salads, soups, spreads, stir-fry and other dishes. It is popular as a gourmet vegetable in both the domestic and export markets.

Onions are grown from October to February. The off-season type is grown in some parts of Mindanao. Peak harvest season is from March to April while lean season is from June to December. World production in 2005 was 59.512 million metric tons (MMT); top producers were China (19.047 MMT), India (5.5 MMT), USA (3.35 MMT), Turkey (2.0 MMT) and Pakistan (1.764 MMT). The production in 2006 was 75,978 mt, down by 7.4% than the output of the previous year at 82,019 mt. Area harvested in 2006 was 8,442 ha, down by 5% from 8,884 ha in 2005.

Onion and other *Allium* vegetables are characterized by their rich content of thiosulfinates, sulfides, sulfoxides and other odoriferous sulfur compounds. The cysteine sulfoxides are primarily responsible for the onion flavor and produce the eye-irritating compounds that induce lacrimation. The thiosulfinates exhibit antimicrobial properties. Onion is effective against many bacteria including *Bacillus subtilis*, *Salmonella* and *E. coli*.

Onions have a variety of medicinal effects. Early American settlers used wild onions to treat colds, coughs and asthma, and to repel insects. In Chinese medicine, onions have been used to treat angina, coughs, bacterial infections, and breathing problems.

The World Health Organization (WHO) supports the use of onions for the treatment of poor appetite and prevents atherosclerosis. In addition, onion extracts are recognized by WHO for providing relief in the treatment of coughs and colds, asthma and bronchitis. Onions are known to decrease bronchial spasms. An onion extract was found to decrease allergy-induced bronchial constriction in asthma patients.

Onion is a rich source of fructo-oligosaccharides. These oligomers stimulate the growth of healthy bifidobacteria and suppress the growth of potentially harmful bacteria in the colon. In addition, they can reduce the risk of tumors developing in the colon.

The rounded edible bulb of this plant, composed of fleshy, tight, concentrate enlarge leaf bases or scales have a pungent odor and taste. The outer leaf bases lose moisture and become scaly, the inner leaves generally thicken as bulbs develop. The green leaves above the bulb are hollow and arise sequentially from a growing point on the stem at the centermost point at the base of the bulb. The onion root system is fibrous, spreading just beneath the soil surface to a distance of 30 to 46 cm. There are few laterals and the total root growth is considered sparse and able to plant in crowding distance particularly in loose and friable soil.

The yield of onion is determined by the number of leaves that form prior to bulbing. Bulbing in each cultivar is triggered by a specific daylength. Early planting is the most effective method of improving bulb size and spacing also controls size. However, some cultivars may bolt if the growing period precedes a cold exposure.

VARIETIES

Table 1. Recommended Varieties

Variety	Days to Harvest	Variety	Days to Harvest
Yellow Grannex	90- 100 (for export because of its sweetness)	Red Creole	110 (for domestic due to its pungent taste and longer storage life)
Grannex 429	90- 100	Red Pinoy	110
Texas Grano	90- 100	Rio Raji Red	110
Rio Bravo	90- 100	*Rio Tinto	70-90 days from planting

Rio Hondo	90- 100		
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*Source: Allied Botanical Corporation leaflet.

Table 2. Onion varieties listed in the PSIA Seed Catalogue.

OWNER	VARIETY	MATURITY (DAT)	FRUIT TYPE			SEASON	FEATURES
			Shape	Color	Weight (g)		
BM Domingo & Co. Inc.	Niagra red creole	110 days	Round	Red	50	Dry	Fresh market
BM Domingo & Co. Inc.	cx-12	110 days	Round	Red	50-60	Dry	Fresh market

CULTURE AND MANAGEMENT

A. Soil and Climate Requirement. Onions are produced best in open, friable, well drained/loam soils with good water holding capacity but they are adapted also to a wide range of soils with proper preparation, good drainage, fertilization and irrigation. The optimum pH for onion production is between 6 and 7. If the soil is too acidic (pH 5.5), 4 bags/ha of Dolomite should be added 2 to 3 weeks before planting, incorporate organic matter such as green manures, rice hulls and plant debris to improve the soil condition. Fresh animal manure is not recommended because it can increase the pungency (high sulfur) and the increased possibility of the disease like pink rot.

It is a cool season crop but adapted to a wide range of temperatures. The plant grows best between 13°C and 24°C. The best growth and onion quality are obtained if the temperature is cool during the vegetative stage from generation to bulb initiative. High temperatures favor bulbing and curing. The onion is classified as a long day plant, it bulbs in response to day length. The varieties grown in the Philippines are short day onions, some intermediate varieties maybe adapted to the Northern Philippines, Claveria in Misamis Oriental, Valencia in Bukidnon and in Davao. The day length varies between 12 hours in the shortest day of the year (December) and 13 hours in the longest day of the year (June).

B. Land Preparation. Prepare the area for planting by plowing and harrowing soil for two to three times until soil is already loose. Make planting beds of about 1m to 1.5m. To manage weed growth problems, plastic mulch may be placed on planting beds. Basal application of 2tons/ha processed chicken manure must be done two weeks before planting. Basal application of complete fertilizer (14-14-14) must be done 1 week before planting. Side dressing of urea (46-0-0) must be done once during vegetative stage of plant.

C. Seeds, Seeding and Planting. Three system of planting may be employed, direct seeding, transplanting and by sets. Direct seeding is preferred for most acreage, saves labor but needs more seeds. It also produces variable bulb sizes since it is difficult to make the regular planting distance. Transplanting is the preferred method for onions intended for export market and local special market. Seedlings for transplanting have to be hardened by reducing the irrigation frequency for a week before transplanting. Transplants normally have three to five well-formed leaves. For export quality, transplanting is highly recommended to obtain uniform plant spacing and more uniform bulb shape and size. Lower percentage of rejects falls in graded outs. Sets are used in some areas to ensure large bulb size and uniform maturity. Sets are more dry bulbs, produced from the previous season. Either system maybe used for early green onion production.

In most commercial areas, beds of 1.0 meter wide with 6 to 8 rows are seeded or planted. The seeding rate can be adjusted easily for preferred bulb size. For normal storage onions, seeds are spaced 7.5 cm apart, for pearl onions spacing would be reduced to 2.5 cm in the row and the large bulb size is promoted by spacing 10 cm or more.

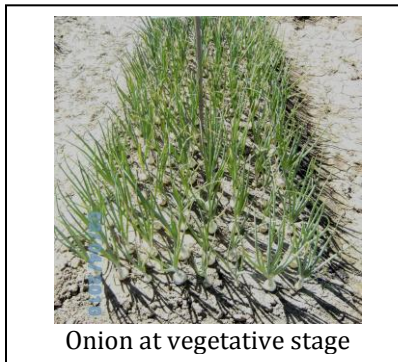
The bulb size of onion required by the market dictates the distance of planting. The bigger the distance between plants, the bigger the bulbs. The export market requires large-sized bulbs while the local market requires smaller ones which are cheaper.

Incorporate Ridomil at 24-48 ml/100 m² into the seedbed before planting, if the climate is favorable (cool, humid or cloudy) for development of damping-off (*Phythium*), drench with Ridomil (MZ-5X) at 25 gm/100 m². Frequency of irrigation varies between 4 and 7 days. If the soil did not form a ball when squeezed on palm, then it is time to irrigate. Irrigation will be terminated when 20% to 30% of the plant tops fall over naturally in 2-3 weeks before harvest.

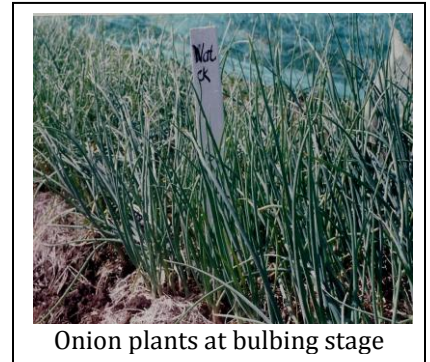
For additional nutrient foliar application of Guano extract should be done once a week from transplanting to fruiting stage.



Newly transplanted onions



Onion at vegetative stage



Onion plants at bulbing stage

- D. Harvesting.** When onions begin to mature, the neck begins to soften causing the leaves to double or fall naturally. When 50% of the onion's pseudostem, fall down the onion plants should be undercut mechanically. Hot dry days are ideal for onion maturation and curing in the field.



Top fall stage (ready for harvesting)

- E. Post-harvest handling and storage.** Proper postharvest handling starts with harvesting at the right stage of maturity. The onions' neck should be thin or small, because the neck serves as passageway for gases and microorganism. Thick necks would mean easy deterioration.

Yellow onions have a very short dormancy period (1-4 months) while red onions have 4-6 months. The dormancy period can be prolonged by proper storage. Damaged root plate or stem base and removal of the papery scales hasten the sprouting and softening of the bulbs in storage.

Topping (cutting of the leaves) and proper curing (drying the scales and neck) should be done for long storage life. Topping is cutting the leaves up to 2-3 cm. above neck. Curing could be sun-drying, air-drying and mechanical drying. Sun-drying should be 6-10 days.

For ambient storage, room should be clean, cool and dry with good ventilation. For controlled atmosphere, CO₂ is at 5-10% and O₂ at 1-5% (Salunkhe & Desai, 1984), 5% CO₂ – 3% O₂ at 1°C (Smittle, 1988). Keeping onion bulbs in high CO₂ + low O₂ + 0°C results in no sprouting in storage for 7-8 months.



PEST AND DISEASE MANAGEMENT

Table 3. Common Pests and diseases and their control

Pests/Diseases	Recommended control
Thrips	Overhead irrigation can suppress thrips population, apply dust of diatomaceous earth to control thrips, allow beneficial insects such as predaceous mites, minute pirate bugs and lacewings to feed on thrips
Armyworms	use pheromone traps to determine the main flight periods for moths, then release trichogramma wasps to parasitize newly laid eggs, allow beneficial insects, such as lacewing, ladybugs and minute pirate bugs to feed on army worm eggs as well as the young larval stage, Handpick armyworms that are found and drop them in a bucket of soapy water
Cutworms	Plan rotations to avoid row or hill crops following a grassy sod, plant a thick “trap crop” of sunflower, a favored host around the planting area
White rot	Most effective controls are avoidance and sanitation, cessation of irrigation can minimize damage, follow a long-term rotation schedule
Bacterial blight	Crop rotation, sanitation, use clean seed and transplants, stress and wound avoidance, 2-year or longer rotation to a non-susceptible host like corn and small grains, avoid close rotations with leguminous crops, eliminate volunteer onions and weeds in and around fields, avoid overhead irrigation and reuse of irrigation water, avoid excessive nitrogen fertilization.
Fusarium wilt	Use certified healthy planting material, if cuttings are from sprouts cut 5cm above the soil line; solarization under plastic kills the mycelium, and conidia up to 20cm deep, crop rotation with non-host plants.
Iris yellow spot	Maintain good fertility and adequate soil moisture to reduce plant stress, practice good sanitation and remove and destroy infected plants along with cull piles, remove weeds in and around onion fields including volunteer onions and wild alliums.
Pink root	Avoid repeated cropping of onion on the same soil; solarization (simple nonchemical technique that captures radiant heat and energy from the sun that cause physical, chemical and biological change in the soil) can be done.
Downy mildew	Use disease-free bulbs, sets and seeds, perform a 3-year rotation away from Allium crops in fields where disease has occurred, plant onions in areas where there is good air movement to promote rapid drying of foliage.
Purple blotch	Destroy infected crops, remove or rotate cull piles, rotate non-host crops (e.g. carrot,

	celery and lettuce), monitor and control onion thrips levels, harvest onions during dry weather.
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Table 4. Cost and Return Analysis of Onion Per Hectare

Item	Total Cost (PhP/ha)
I. Variable Costs	
A. Labor Costs (250/MD)	
Clearing/weeding (20MD)	5,000
Bed preparation (20MD)	5,000
Placing plastic mulch (4MD X 2)	2,000
Planting and fertilizer application (basal application) (10MD)	2,500
Irrigation (24MD)	6,000
Hilling up/side dressing (10MD)	2,500
Spraying/Pest Control (7MD)	1,750
Foliar application (5 MD)	1,250
Harvesting (20MD)	5,000
Sorting and Drying (10MD)	2,500
Subtotal	33,500
B. Seeds	
10 cans X 3,000	30,000
C. Fertilizer	
40 bags processed manure (50PhP/bag)	2,000
10 bags (14-14-14)	14,000
2 bags (46-0-0)	2,800
4 bags Dolomite	1,800
Botanical extracts (citronella+marigold etc.)	500
Fungicides (Nordox)	1,500
Fungicide (Ridomil)	500
Foliar Fertilizer (Guano extract) 2 L	700
Rice hull (10PhP/bag) -100bags	1,000
Red bags 1900 X 8	15,200
Plastic Mulch - 8rolls (1600/roll)	12,800
Subtotal	82,800
Total Variable Cost	116,300
Miscellaneous (15% total variable cost)	17,445
II. Fixed Cost	
A. Land Rental	8,000
TOTAL COST	141,745
Total yield/ha -20,000kg (25PhP/kg)	
GROSS INCOME	500,000
NET INCOME	358,255
ROI	257.75%

REFERENCES

- Lantin-Rosario Teresita, PhD., Wesley kline, Shirley Kline, “ Onion Production for Export”, Professor UPLB, College Laguna, Consultant USAID respectively, Published by GEM Program 1997.
- Bautista, Ofelia K. Ph. D., “Bulbcrops Database”, Book Series No. 172/2000, PCARRD-DOST.
- Pathak, C.S. Phd. Onion Breeder, AVRDC, Shanhua Tainan, Taiwan 1997.
- Winston Craig, MPH, PhD, RD. “Onions are Beneficial for Your Health” Professor of Nutrition, Andrews University, MI, USA. 2003 – 2011
- G.R. Nielsen, University of Vermont Extension, 1999. Date retrieved, September 18, 2012. <http://www.uri.edu/ce/factsheets/sheets/cutworms.html>
- Day Eric and Alexandra Spring. Thrips. Date retrieved, September 18, 2012. <http://pubs.ext.vt.edu/3104/3104-1556/3104-1556.html>
- Pest and Diseases. Queensland Government. Department of Agriculture Fisheries and Forestry. Date retrieved, September 18, 2012. www.daff.qld.gov.au/26_18994.htm
- UC Pest Management Guidelines. University of California Agriculture and Natural Resources. Date retrieved, September 18, 2012. <http://www.ipm.ucdavis.edu/PMG/r584100111.html>
- Fusarium Wilt. Date retrieved, September 19, 2012. <http://keys.lucidcentral.org/keys/sweetpotato/key/Sweetpotato%20Diagnoses/Media/Html/TheProblems/DiseasesFungal/FusariumWilt/fusarium%20wilt.htm>
- Allen, Jennifer. Purple Blotch of Onions. Ontario, Ministry of Agriculture, Food and Rural Affairs. Date modified, August 12, 2011. <http://www.omafra.gov.on.ca/english/crops/hort/news/hortmatt/2005/21hrt05a6.htm>
- Schwartz H.F. and D.H. Gent. Xanthomonas Leaf Blight of Onion. Date updated, August 3, 2012. <http://www.ext.colostate.edu/pubs/garden/02951.html>

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