#### CABBAGE

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Cabbage (*Brassica aleracea L. var. capitatacruciferae*) is a leafy green vegetable grown densely-leaved heads. Closely related to other Cole crops such as broccoli, cauliflower and Brussels sprouts, it descends from *B. oleracea* var. *oleracea*, a wild field cabbage. Cabbage heads generally range from 1 to 8 pounds (0.45 to 3.6 kg), and are found in green, purple and white. Smooth-leafed firm-headed green cabbages are the most common, but crinkle-leafed savoy cabbages are also found.

Cabbage is locally known as "repolyo", grown for its firm, compact, round to flat heads. It belongs to a group of cultivated varieties of the species *B. oleracea* called "cole crops". It is the most widely grown crucifer locally.Cabbage ranks as one of the most economically important vegetable crop in the highlands. In the country, an area of 8,502 hectares was planted with cabbage and 123, 443 metric tons of cabbage was harvested in 2007. (BAS)

In the Cordillera Administrative Region a total of 5,526 hectares were planted with cabbage and 99,957 metric tons were harvested in 2007(BAS). Cabbage is one of the major cash crops of vegetable producers in the Cordillera and one of the leading vegetable crops in the world.

Cabbage, is rich in minerals, specially sulfur compounds and magnesium. It is sometimes used in the treatment of mineral deficiencies and is restores vitality and fitness. It is also effective in calming the nerves and promote relaxation and sleep. It has been recommended as an herbal treatment for hyperthyroidism, headaches, migraines, arthritis, varicose ulcers, constipation, and mineral deficiency.

It is a good source of beta-carotene, vitamin C and fiber. It is a cruciferous vegetable, and has been shown to reduce the risk of some cancers, especially those in the colorectal group. This is possibly due to the glucosinolates found in cole crops, which serve as metabolic detoxicants, or due to the sulphoraphane content, also responsible for metabolic anti-carcinogenic activities. Purple cabbage also contains anthocyanins, which in other vegetables have been proven to have anti-carcinogenic properties. Along with other cole crops, cabbage is a source of indole-3-carbinol, a chemical that boosts DNA repair in cells and appears to block the growth of cancer cells. Research suggests that boiling these vegetables reduces their anti-carcinogenic properties.

## **Variety Requirement**

Pointed head (Scorpio) is preferred over round to flat head in Luzon however, in Visayas and Mindanao flat varieties that are not compact but have long shelf life are preferred.

# Main Varieties

- 1. Green Smooth: Ramgo, RV Cross, Scorpio, Rare Ball, Blue Dynasty; It has smooth, green outer leaves and pale interior leaves.
- 2. Red: Red Acre, Red Dynasty, Red Jewel; Round, compact and heavy for its size, it boasts dark-red thick and pliable shiny leaves. The color of this cabbage has an effect on its slightly peppery flavor. The darker the red, the better the taste. Chefs prize it for adding vivid color to salads and cooked dishes.Red cabbage gets its color because it contains pigment molecules called anthocyanins. These same plant pigments produce red, pink, violet and magenta colors in different parts of several types of plants.
- 3. Savoy: Curly leaves are the most tender and sweet of the cabbage varieties with a deliciously distinctive flavor; in addition it lacks the sulphur-like odor that is associated with so many cabbage varieties when they are being cooked. Its crinkly leaves are quite pliable and therefore it lends itself very well to making stuffed cabbage. It is tender enough to be eaten raw in salads. A drawback of its tender nature is that it does not have the keeping quality of its sturdier cousins. A week is generally the longest a head of Savoy cabbage will stay fresh in the refrigerator. A good head of Savoy cabbage will be solid in the center, somewhat conical shaped and heavy in relationship to size, with deep blue-green outer leaves and a pale green center. It tends to be available year round.

## Other Varieties

- 1. Apo Verde Its maturity date is 55 60 days. It is semi-flat in shape, weighing 0.8 to 1 kilo, deep green and glossy in color. It can be grown year round. It has a good disease tolerance and wide adaptation to different climates.
- 2. Gladiator (Condor) Its maturity date is 65 70 days. It is round in shape, weighing 1.3 to 1.5 kilo, green in color. It can be grown year round. It is widely adaptable and has a compact head with good shipping quality and shelf life.
- 3. Helios (Sakata) Its maturity date is 65 70 days. It is semi-flat in shape, weighing 1.5 to 2 kilos, dark green in color. It can be grown year round. It is a new variety that is bred for multiple disease resistance. It is suitable for cultivating in semi to highland areas. It is easy to grow.
- 4. (F1 Hybrid) Justy (Musashino) Its maturity date is 60 days. It is semi-flat in shape, weighing 1.5 to 2 kilos, light green in color. It can be grown year round. It is extremely tolerant to black rot and many other diseases.
- 5. (F1 hybrid) Magic Ball (Noong Woo Bio) Its maturity date is 58 days. It is globe in shape, weighing 1.3 to 1.5 kilos, bluish green in color. It can be grown year round. It has excellent field standing ability.
- 6. Corona de Oro (Condor) Its maturity date is 60 65 days. It is globe in shape, weighing 1.2 to 1.8 kilos, dark green in color. It can be grown year round. It is widely adaptable, which can be planted in lowland condition and its head is very compact.
- 7. Red Jewel (Sakata) Its maturity date is 70 75 days. It is round in shape, weighing

1.2 to 2 kilos, deep red in color. It is a round red cabbage with attractive color.

- 8. Scorpio (Sakata) Its maturity date is 65 70 days. It is ball shaped, weighing 1 to 1.5 kilos, bluish in color. It can be grown year round. Its head is very firm and short cored, with good flavor and texture. It is one of the most popular cabbages in sub-tropical regions.
- 9. T-756 (Takii) Its maturity date is 60 65 days. It is flat in shape, weighing 7 to 1.5 kilos, green in color. It can be grown year round. It uniform head formation, very compact with very attractive yellow interior. It is best grown in mid to high elevation.
- 10. Wakamine (Takii) Its maturity date is 65 days. It is oblate in shape, weighing 1.5 kilos, deep green in color. It can be grown year round. It is slow bursting and is good for close planting.
- 11. Blue Dynasty Hybrid Its maturity date is 75 days. It is globe in shape, weighing 2 kilos, deep green in color. It can be grown during summer and rainy season. It is resistant to black rot and fusarium yellow, race 1.
- 12. Irodi Hybrid Its maturity date is 65 days. It is semi- globe in shape, weighing 1.6 to 2 kilos, deep green in color. It is a very slow bursting and has resistance to fusarium yellow and high tolerance to black rot.
- 13. Justy Hybrid Its maturity date 60 days. It is globe in shape, weighing 1.5 to 2 kilos, light green in color. It is extremely tolerant to black rot and many other diseases.
- 14. Pontiac 619 Hybrid Its maturity date is 100 130 days. It weighs 0.96 to 1.2 kilos, dark gray, and green in color. It is moderately resistant to diamond back moth infestation and resistant to black rot.
- 15. Rare Ball Hybrid It is ball shaped, weighing 1.5 to 2 kilos, and dark green in color. It is adapted for long distance shipping. It has excellent tolerance to black rot and black leg.
- 16. Red Dynasty Hybrid Its maturity date is 75 100 days. It is round to oval in shape, weighing 1.6 to 2 kilos. It is resistant black rot.
- 17. Red Mart Hybrid Its maturity date is 78 days. It is semi-globe in shape, weighing 1.2 to 1.5 kilo, red in color. It is very easy to grow and is a high yielder with a very vigorous plant habit. It is a very popular variety in the tropics, good for transporting with a firm head.
- 18. Ruby Mart Hybrid Its maturity date is 65 70 days. It weighs 1.3 to 1.6 kilos. It grows best during the summer time. It is late bursting and good for transporting and is has a good shelf life.
- 19. Scorpio Hybrid It is ball shaped. It has the best flavor in the market. It is good for shipping and has a good shelf life.
- 20. Summer Summit Its maturity date is 50 days. It is elliptical in shape, weighing 1.5 kilos, green in color. It is highly recommended for warm weather planting and is well adapted to lowland areas.
- 21. Tarakii Cabbage It is green in color. It has good retention capacity.
- 22. Natcubare Hybrid Its maturity date is 70 days. It is globe in shape, weighing 1.3 to 2 kilos, dark green in color. It has resistance to Fusarium yellow and high tolerance to black rot and bursting.

# **Climatic Requirement**

Cabbage grows best in a relatively cool and humid climate but can successfully grow in the lowlands during the cooler months.

Leaves are more distinctly petiole and the quality of the head is impaired in drier atmospheres .The delicate flavor is also lost under these conditions. Yield and quality are poor in summer and it is also difficult to control insect pests. The optimum temperatures for growth and development are from 18 °C to 20 °C. It is fairly resistant to frost and can survive temperatures as low as - 3 °C without damage. Cabbage is also adapted to a wide variety of climatic conditions and can be grown throughout the year in most regions.

### **Soil Requirement**

Cabbage grows well in deep, well drained soils high in organic matter with an optimum pH range from 6.0 to 6.8. The soil also requires Boron and Molybdenum with moisture level not less than 2.5 cm deficit.

## Culture and Management

- 1. **Sowing of Seeds**. From 1/5 to 1/4 kg. of seeds is required per hectare. For limited scale of gardening, seedlings are raised in seed boxes, containing soil rich in humus and free from diseases and other harmful soil organisms. In extensive gardening like in Benguet Province, farmers grow seedlings in variant beds provided with a portable glass or plastic roofing's. The beds are watered with a solution of ammonium sulphate (3 to 4 tablespoonfuls ammonium sulphate dissolved in one kerosene can of water) to serve as starter. The optimum age of seedlings for transplanting ranges from 25 to 35 days after sowing. "Hardening" is essential to reduce high mortality and cost of replanting. This is achieved by suspending irrigation of the beds a few days before transplanting.
- 2. **Soil Preparation.** The planting area should be cleaned from weeds or debris from previous cropbefore planting. If the land is being operated for the first time, it should be plowed twice or dug twice for a two-week interval to minimize and control weed growth.
- 3. **Planting.** Seedlings should be transplanted as soon as they reach the desired size and only well-hardened, young, stocky plants should be used. Transplanting is done on moist soil. The soil around the roots should be firm and irrigated as soon as possible after the seedlings set. In wet areas, cabbage should be planted on raised beds or ridges to reduce water-logging and stem or root rot diseases.

After plots/beds have been properly leveled to desire height for (elevated beds) holes should be established spaced with 30-35 cm in rows and 30-35 cm also between rows. Plant only one seedling per hill. During planting, the seedling shoot apex should be higher than the ground level of the bed.

Plant population and spacing influence head size, head shape and yield. Cabbage plant populations vary according to the target market for a particular crop. Cabbage forms

smaller and slightly more pointed heads when they are spaced closely. It is recommended that large-headed cultivars should be planted 600 to 700 mm apart between rows and 450 mm apart within rows. Smaller-headed varieties are planted 600 X 300 mm apart.

- 4. **Fertilization**. Cabbage is a heavy feeder and requires supplemental fertilization in the formof manure or compost, nitrogen, phosphorus and potassium (Animal dung or chicken dung 2-3 tons/ha). Cabbage requires 200 to 250 kg nitrogen per hectare. The first application is made together with phosphorusand potassium. The remainder is side-dressed two to three weeks after transplantingand again three weeks later or applied once at about six weeks. Cabbage also needs micronutrients for proper growth and development.
- 5. **Irrigation.** Cabbage should be irrigated immediately after sowing or transplanting. Thereafter, irrigation should be applied at intervals of 10 to 12 days in heavysoils or eight days in light soils and the schedule should be followed until theheads are fully developed and firm. Young plants should receive enough waterfor vegetative growth before forming heads. Excess moisture when theheads have formed may cause them to crack.
- 6. **Weed control.** Weeds are controlled mechanically or by hand as well as chemically through the application of registered herbicides. Mechanical cultivation should bedone during land preparation until the plants are about half-grown. The first cultivationshould be done two to three weeks after transplanting.

## 7. Pest and Disease Control

a. **Aphids** (*several kinds*). Cabbage is attacked by several aphids but the grey cabbage aphid (Brevicorynebrassicae) and the green peach aphid (*Myzuspersicae*) are the mostcommon. Damage is caused when they suck sap from the plant and contaminate edible product. Feeding of the cabbage aphid causes a chlorosis and malformation of the leaf.

**Natural Enemies**. Predators like lady beetles, wasps, spiders, Syrphids, lacewings and some parasitic fungi.

**Management**. Use yellow pan trap and a layer of aluminum foil under plants reflects light to underside of leaves making them an undesirable habitat for aphids.

b. **Cabbage Butterfly or Cabbage worm (***Pieresrapae***L).** The larva feeds on the leaves by making large holes and leaving several black feces. The old larvae move upward and eat the growing shoot.

**Natural Enemies**.Parasitic wasps like braconids, chalcid, ichneumonids and trichogramma and predators like earwigs, syrphids and spiders.

Management. Catch the adults with nets during daytime.

c. **Cabbage Center Grub (***Hellularogatalis***Hulst)**. It makes holes on the shoots Feeding is concentrated at the heart of young plants or inside a developed head.

**Natural Enemies**.Predators like ants, earwigs, pentatomid bugs, spiders, beetles and syrphids and parasitoids like wasps and nuclear polyhedrosis virus.

**Management**. Trap the adults with light traps during night time. Flooding the soil may also be done to kill the larvae.

d. **Diamond-black moth** (*Plutellaxylostella*). The larvae make holes on the leaves preferably on the underside and not including the leaf veins. The holes become biggeras the plant grows. Severely damaged crops have skeletonized leaves and fail to produce heads. The larvae also feed on the shoots of young plants. DBM I is the most serious pest of cabbage. Growth and yields can be seriously reduced by heavy infestation.

**Natural Enemies**.Parasitoid wasps like Diadegma and Trichgramma and predators like syrphids, spiders earwigs, ladybeetles' Trichomalopsis, green and white muscardine fungus disease.

**Management.** Diadegma, is readily available at BPI-BNCRDC and BSU. Release the Diadegma according to the recommendation of the agency where you got the stock. There are Diadegmain the fields where pesticides are not usually used and they should be conserved. To conserve them apply the recommended insecticides only if the average number of DBM larva from 10 plants is two (2) from transplanting to head formation. The use of BT insecticide is recommended so that the Diadegma will not be killed. "Rainbird" irrigation will also prevent the adult diamond back moth tolay eggs on the plants.

a. **Cabbage looper (***Trichoplusiani***Hubner)** Damaged plants show irregularly holes on the veins and midribs of the leaves

#### Natural Enemies

Wasps like *Apanteles* and nuclear polyhedrosis virus parasitize the larvae and another wasp called the *Brachymyria sp*.Parasitize the pupa.

- 1. Be sure to purchase only clean transplants or raise your own in clean greenhouse settings in order to avoid all three species.
- 2. Cruciferous weed control..
- 3. After harvesting early season brassica crops, the crop debris should be tilled into the soil to destroy larvae and pupae that could lead to higher populations on later brassica crops.

- 4. Trap crops have had variable success. Trap crops are plants that are more attractive to moths for egg laying; however one has to be careful that populations that build up on the trap crop do not spill over to the cash crop.
- b. **Greater cabbage moth** (*Crocidolomiabinotalis*) The larvae spin a thin web over their feeding places. Damage is severe duringearly attacks when they destroy the growing point of the plants.

**Natural Enemies.**Predators like earwigs, pentatomid bugs and spiders and parasitoid wasps like ichneumonids, braconids and trichgramma.

Management. Trap adults with light during night time

c. **Flea Beetle** (*Phyllotreta sp.*). The adult feeds on leaves by chewing, making many small round holes They may also feed on stems. The larvae feed on the roots of the plant.

Natural Enemies. Earwigs and Carabid Beetles

Management. Trap the adults with sticky yellow trap and flooding.

d. **Leafminer** (*Liriomyza*huidobrensis Blanchard). The larvae makes serpentineor curled mines on the leaves. The mines start to appear on matured leaves, first on the lower mature leaf then towards the upper leaves as the plant mature. The female adult also makes pinholes on the leaves.

**Natural Enemies.** Wasps such as icheneumonids and braconids including earwigs and short winged beetles.

**Management.** Use yellow sticky traps apart from the cultural management practices. A community wide use of sticky traps is recommended.

e. **Cutworm** (*Agrotis spp.*). The larvae feeds on the stem as a result the stem is cut. Plants with cut stems fall and dry up during daytime that is why it is easy to determine if there are cutworms in the field. The surrounding soil where the cutworm also stays dry up. Some larvae climb up to the leaves and make holes or bore into developing heads of cabbage.

**Natural Enemies.**Earwigs, spiders, pentatomid bugs and wasps like ichneumonids, braconids and trichogramma.

**Management.** Trap the adults with light during night time. Removal of weeds before planting is also recommended.

f. **Slugs.** The young and adult chew irregular holes with smooth edges on the leaves and they cut young shoots and stems. Look for the silver mucous trails to confirm damage caused by slugs.

Natural Enemies. Ground beetles, frogs birds and lizards

**Management.**Trap the adults by placing fermented substance like beer in shallow containers at night near the bottom of the plants to attract, drown and kill the adults. Adding molasses or flour will make the trap attractive to slugs.

g. **Nematodes.** Plants are stunted and there is premature wilting and slow recovery to improved soil moisture conditions, leaf chlorosis (yellowing) and other symptoms characteristic of nutrient deficiency. Plants exhibiting stunted or decline symptoms usually occur in patches of nonuniform growth rather than as an overall decline of plants within an entire field. Root symptoms induced by root-knot may cause swollen areas (galls) on the roots of infected plants. Gall size may range from a few spherical swellings to extensive areas of elongated, convoluted, tumorous swellings which result from exposure to multiple and repeated infections.

**Management.**Control measures such as crop rotation, using resistant cultivars, cultural and tillage practices and use of transplants, and preplantnematicide treatments.

**Damping off** (*Altenaria spp., Rhizoctoniasolani, Pythium spp.*).Infected seedlings wilt, turn purple and die, and often have no lateral roots.

## Management

- Use treated seed
- Sterilize the seedbed before planting
- Remove infected plants when symptoms appear
- h. *Sclerotonia rot or white mold (sclerotiniasclerotiorum.).* The disease is favored by cool, wet conditions and it can survive for two tothree years in the soil. Above-ground parts of infected plants may be covered with a white action growth. The tissue beneath the mould turns soft and watery.

with a white cottony growth. The tissue beneath the mould turns soft and watery.

- Crop rotation
- Plant on ridges or raised beds
- Remove and destroy infected crop residues
- Good water management aimed at keeping the soil dry
- Avoid using susceptible annual legumes as cover crops.
- Control broadleaf weeds.
- Promote air circulation by increasing row spacing.
- Maintain proper nitrogen fertilization.

i. **Clubroot**(*Plasmodiophorabrassicae.*). The disease is soil-borne and the spores can survive for up to 20 years in thesoil. It is most severe on acid soils or moderate pH soils that are poorly drainedor have high clay content. Infected plants are characterised by stunting, wiltingand purpling of leaves. The roots change into a mass of large, elongatedor rounded swellings or clubs. The clubs rot and form bad smelling wet masses

### Management

- 1. Practice sanitation
- 2. Crop rotation
- 3. Grow transplants in fumigated beds
- 4. Apply lime
- n. **Fusarium wilt or cabbage yellows** (*Fusariumoxysporumf.conglutinans*). Fusarium wilt is more prevalent in summer and the fungus persists indefinitelyin the soil. Initially the symptoms appear as yellow foliage, often mainlyon one side of the plant. The leaves become distorted and gradually turnbrown and drop prematurely. The vascular area also discolors.

## Management

- 1. Planting resistant cultivars
- 2. Planton soils free of disease
- 3. Soil fumigate before planting
- 4. Crop rotation
- 5. Practice sanitation
- o. **Black rot**(*Xanthomonascampestris*). The disease is introduced to fields in seed and its spread is very rapid underhot, rainy, windy conditions. The disease survives for three to five years infields and in the stems of host plants. The symptoms first appear as yellow to light brown patches at the margins ofleaves and later a network of black veins develops within these areas. Affectedareas turn brown and dry out and often leave a characteristic triangular-shaped lesion on the leaf margin, with one point of the triangle directedtowards the midrib. Older infected leaves also drop and the vascular tissueturns brown as the bacteria move into the main veins and vascular system. Plants infected at the seedling stage may die or remain stunted.

- 1. Plant resistant cultivars
- 2. Use disease-free seed or seed treated with hot water
- 3. Crop rotation
- 4. Control cruciferous weeds
- 5. Avoid the use of sprinkler irrigation
- 6. Increase the interval between irrigation
- 7. Deep-ploughing of all infected plant material

p. **Downy mildew** (*Peronosperaparasitica*). Downy mildew is common in cool, humid weather. The fungus survives indebris and is spread by air-borne spores in large numbers. Infected leaves appear as if they have been lightly sprinkled with pepper. The leaves become yellow around the pepper spots. Lesions merge to cover large areas of leaves. Fine, fluffy white mould appears on the lesions on the underside of the leaf during humid conditions.

## Management

- 1. Plants should not be irrigated after 3:00 pm and before 10:00 am.
- 2. Treat seedlings with fungicides.
- 3. Fumigate the seedbed.
- 4. Good seedbed preparation.
- q. **Black leg** (*Phoma lingam*). Black leg is seed-borne and it can infect the whole seedbed when an infected seed germinates. The whole plant wilts when infected. White to light brown lesions with a purple to black margin develop on the stem and on leaves. The lesions have small black dots in the centre. The centre of the lesion gets woody and cracks.

# Management

- 1. Use seedlings grown in seedling boxes.
- 2. Fungicide treatment of seedbed.
- 3. Seedbeds should be situated far from old production fields.
- 4. Seedbed should be destroyed if leaf lesions are found.
- 5. All cabbage material remaining in seedbeds should be removed.
- 6. Removal of cruciferous weeds from production fields.
- 7. All debris should be removed after harvesting.
- r. **Cabbage Soft Rot.** Leaves turn yellow (chlorotic) beginning at margins and spreading inwards. Veins within area are turn. Infections enter main stem turning the inside black. Plants either die or are dwarfed when young, become defoliated if more mature.

Management. Plant resistant varieties and rotate crops from year to year.

s. **Bacterial leafspot** (*Pseudomonas syringaepv. maculicola*). Bacterial leafspot is more severe in cool, moist weather. The symptoms initially appear as small, faint, water-soaked areas on the underside of leaves. The affected areas develop into brownish to purplish grey necrotic spots, fairly irregular after a few days. They may coalesce to form large irregularly shaped spots. The leaf becomes wrinkled and the tissue may tear when the lesions are many.

- 1. Chemical control.
- 2. Plant resistant cultivars.
- 3. Use disease-free seed or seed treated with hot water.
- 4. Crop rotation.

- 5. Avoid using sprinkler irrigation.
- 6. Increase the interval between irrigation.
- 7. Control cruciferous weeds.
- 8. All infected plant material should be deep-ploughed.
- t. Alternaria leaf spot (*Alternaria spp.*). The disease is common during cool, rainy weather. Initially, symptoms appear as small, dark areas and they rapidly enlarge to form large circular lesions thatdevelop a bull's-eye pattern or target spot. The lesions are dark brown duringwet periods. A brown, velvety, spore-bearing growth can be noticed on the older lesions.

## Management

- 1. Use disease-free or treated seed
- 2. Removal of plant refuse
- 3. Chemical control
- 8. **Harvesting.** The crop is harvested when the heads attain their full size and become firm and hard but tender. The color of the head is sometimes used as a maturity index. A fully developed head has a lighter shade of green. If harvesting is delayed, the heads may split and rot while the heads harvested early may be soft.

The crop for the fresh market is harvested by hand with a knife or sickle. The heads should be cut off in such a way that a few of the large, open wrapper leaves are left for protection around the heads. Harvesting should be such that bruising of the heads is avoided as this makes them unattractive. Most of the stem should be left on the head if the crop is to be stored.

- 9. **Post-harvest Handling.** Harvested produce should always be removed from direct sunlight and transported to the packing shed as soon as possible. Cabbage and leafy greens are particularly susceptible to wilting and other damage from high temperatures. When there is a delay of more than an hour or two between harvest and packing, a water drench or spray arrangement can help prevent dehydration and overheating.
- 10. **Sorting and Grading.** The injured leaves should be removed.
- 11. Packing. Cabbage is packed in mesh pockets or sold loose.
- 12. **Storage.**The optimum storage temperature for cabbage is 0 °C and relative humidity of 90% to 95%. Cabbage to be stored should be mature and disease-free and should not have been exposed to prolonged frost or cold. Further trimming may be necessary, mainly to remove the discolored butt upon removal from storage.
- 13. **Transport**. Care must be taken such that trucks are not overloaded on the bottom layers of produce, otherwise they will be crushed. Generally, the produce should be covered with a sheet to prevent frosting or desiccation, but on warmer days, when sweating and heating might occur, the sheet should be left off.

### Utilization

- 1. An important ingredient of coleslaw or mixed salads.
- 2. Consumed fresh, cooked, boiled, steamed, stir-fried, pickled or dehydrated.
- 3. Locally served in pancit, chopsuey, lumpiang sariwa and meat dishes like nilaga and pochero.
- 4. Used in salad, rolls, sauerkraut or fermented cabbage.
- 5. Eaten raw before meals in Rome to prevent hang-over.
- 6. Provide pain relief for breast feeding mothers.
- 7. Juice used for treatment of ulcer.

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## **COSTING -CABBAGE**

Р	lanting	Area-	1,000	sa.	meters
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Seedling (3,000 @ 1.00 / piece)	3,000.00
Inputs:	
Fertilizer	13,000.00
Lime	1,750.00
Pesticide (Insecticide & Fungicide)	3,900.00
Sub-Total:	21,650.00

Labor: 200 per day

Tillage		mandays	200	800.00
Digging		mandays	200	800.00
Planting	4	mandays	200	800.00
Spraying	4	manday	200	800.00
Hilling Up	4	mandays	200	3,200.00
Irrigation				600.00
Harvest (2x)				3,000.00
Sub-Total:				10,000.00

Administrative Cost (per month)	3,000.00
Land Rental 12.00 Php / sq. Meters	4,000.00
Packaging Materials	2,000.00
Transportation	1,500.00
Overhead & Contingency (10%)	3,715.00
Sub-Total	14,215.00
Grand Total	45,865.00
Cost per Kilo (Php45,865.00/2,500 kilos projected harvest)	Php18.34 / kilo
Mark Up (50%)	Php27.51 / kilo

Pictures



Basal fertilizer Application Transplanting







Watering

Weeding Pictures taken in Paoay, Atok, Benguet

Varieties





Green Smooth

Savoy

Red Cabbage

Pictures of cabbage varieties: http://www.buzzle.com/articles/types-of-cabbage.html



Diseases Pictures of insect pest and diseases by: Diver, S. 1998. Nature Farming and Effective Microorganisms.<u>http://www.nationalwatercenter.org/natfarm.htm</u>



Black leg



Cabbage soft rot White mold

Insect Pests







Aphids

Cabbage

looper larvae



Damage of cabbage moth

Cabbage Moth

