CHINESE CABBAGE

AIM: Chinese cabbage is an important crop of temperate region. It is an important leafy cum salad vegetable of South East Asian countries. Its cultivation is possible only under moderate to cool countries (15-20^{0}C). All cultural operations Chinese cabbage are same as those for cabbage except that the seeds of Chinese cabbage can also be produced under North Indian plains. The study of present chapter will make the students understand regarding its importance, production technology, seed production techniques and plant protection measures.

BOTANICAL NAME: *Brassica compestris var. pekinensis* (Heading type)

Brassica compestris var. chinensis (Non-heading type)

FAMILY : Cruciferae

CHROMOSOME NUMBER : 2n=18

ORIGIN :

- It is native of China.
- Originated from hybridization of "Pak choi"" (non-heading Chinese cabbage) and "turnip" when they were grown together in the city of Young-chou.
- It is not a member of cole group but regarded as very closely allied crop due to Similarity in breeding systems, Cultivation practices, Season of growing and other features besides being a member of *Brassica* vegetables.

SOIL AND CLIMATE

- Fertile soil with sufficient moisture supply and good physical condition of soil is required Soil pH 6.8-7.8.
- Because of its sensitivity to high temperature, chinese cabbage cultivation in low land areas is confined to winter months.
- During summer, this crop is grown in high altitudes on a limited scale.
- It thrives best at temperature ranging from 15-21^{0}C, below which seed stalk may emerge before the production of heads.

TYPES AND VARIETIES

There are two more or less distinct spp. of Chinese cabbage, *Pe-tsai* (*B pekinensis*) and *Pak choi* (*B chinensis*).

- Under *Pe-tsai*, two varieties exist.

1. Chihili (tall, elongated, cylindrical, types about 4x18 inches heads): Jade Pagoda, Mounmeny, Michihli and Statue.
2. Napa or Wong Bok (short, blunt, barrel shaped about 5x12 inches, chunky heads): All autumn, China flash and China Pride.

- In Pak choi, the plants produce non heading types. It produces dark rather smooth leaves with fleshy white petioles.

Chinese cabbage can also be broadly classified into four types:

1. **Loose leaved variety (var. *dissoluta*):** Terminal bud under developed, forming no leaf bud; rosette leaves oblanceolate, spreading or erect & usually grown in spring and summer in all parts of China.

2. **Semi heading variety (var. *imfareta*):** Terminal bud with its outer layer of leaves fairly well developed, forming head with a hollow centre; plants large & tall. Usually grown in autumn.

3. **Fluffy topped heading variety (var. *laxa*):** Terminal bud well developed forming rather a solid head with its leaf tips curling upwards & forming a fluffy top; plants small, rosette leaves obovate and spreading. Usually grown in late summer & autumn and

4. **Heading variety (var. *cephalata*):** Terminal bud well developed forming a solid head with leaf tips close to over lapping on the top; grown usually either as an early crop for autumn or a late crop for winter. This variety is further classified into three types (i) ovate type (*f. ovata* Li, (ii) flat topped type (*f. depressa* Li) and (iii) cylindrical (*f. cylindrical* Li).

CULTIVARS

Palampur Green:

- Leaves green, tender, stem creamy and late flowering type.
- Provides 5 -6cuttings, first after 23-30 days and subsequent after 15 days.

Pusa Sag:

- A cross from Wongbok (Suttons) x Turnip.
- Tastes like local sag.

Solan Band Sarson:

- A heading variety, heads long and solid, head weight 700-1100gram and 6-9 outer leaves.
- Ready in 120days, leaves light, core light golden in colour.
- Suitable for long distance transportation, used for salad and cooking.
- Average yield 400q/ha.

Solan Selection:

- Leaves tender, well filled light green petioles.
- Average yield 150-190q/ha.

Chinese Sarson No. 1:

- It is a non heading type with light-green, broad leaves and semi-erect plant habit.
- Its mid rib is white, succulent and tender.
- It takes about 30days for the first cutting after transplanting.
- It is quiet rejuvenating, giving 6-8 cuttings.
- Its average yield is 40q/ha.
- It poses field resistance to *Alternaria* leaf spot.

Other cultivars fall in the following groups.

- Chiffu Group
- Hotoren Group
- Kaga Group
- Aichi Group
- Kenshin Group

SOWING TIME

- In plains, sowing is done in mid September to end of November while in mid hills; it is done in April to July.

SEED RATE

- For direct sown crop, seed rate is 2-2.5kg/ha but if transplanted then the seed rate will be 500-750g/ha.

SPACING

- 30-40 x 30-40cm - Early maturing variety
- 70 cm x 55cm - Late maturing variety

NUTRIENT MANAGEMENT

- Manures and fertilizer requirements in Chinese cabbage depend upon fertility of soil.
- Accordingly, add 200 -250q/ha farmyard manure and it should be mixed thoroughly at the time of field preparation.
- The application of nitrogen, phosphorus and potash varies with soil type, varieties and place.
- The requirement of N: P: K is 250-300:150-200:250-300kg /hectare. Apply half quantity of nitrogen and full quantity each of phosphorus and potash is applied at the time of transplanting.
- Remaining quantity of nitrogen is applied 30days after transplanting.

IRRIGATION

- First irrigation should be given immediately after transplanting.

WATER MANAGEMENT

- Chinese cabbage is very sensitive to soil moisture.
- Maximum growth and yield can only be obtained when sufficient quantity of water is available to the plants.
- First irrigation is given just after transplanting of seedlings.
- Irrigation may be applied at 10-15days interval according to the season and soil but optimum soil moisture should be maintained regularly.
- Usually, the crop is irrigated by furrow method of irrigation.
- Heavy irrigation is avoided at the time of maturity of heads.

BINDING

- For harvesting in winter, heads which are nearing maturity, are covered with outer leaves and bound with rice straw to protect them from cold damage.

HARVESTING

1. **Heading Type**

- Harvesting begins when compact heads (1-2 kg) have formed.
- Heads are cut off with a kitchen knife.
- Fully developed heads are cut from the stalk and loose outer leaves removed before marketing.

2. **Non-Heading Type:**

- Harvest the fully developed leaves from near the base without injuring the central growing point.

YIELD

- Yield varies from 250-500q/ha

STOROGE

- Storage life is shorter at higher temperatures.
- Shelf life is 30 days at 5^{o}C, 60days at 2.5^{0}C and 90 – 120days at 0^{o}C.
- Can be stored for several weeks at 0oC and 95%RH under controlled atmospheric conditions.
- Low O_2 (2%) in combination with low CO_2 (2%) improves shelf life.

SEED PRODUCTION

- For the production of market seed, seed to seed method is used.
- For stock/breeder‟s seed, it is better to use head to seed method.
- The stump method gives the lower seed yield.
- For both, foundation and certified seed use seed to seed method.

Three important methods are

- Seed to seed method
- Head to seed method
- Stump method

Details similar to that of cabbage

- Cultural practices for seed production namely, nutrient management, hoeing and weeding, irrigation and harvesting and threshing are similar to that of cabbage.

SEED CERTIFICATION STANDARDS

I. Field inspection

A minimum of three inspections should be done, the first before the marketable stage, the second at the marketable stage and the third at flowering stage.

II. Field standards

A. General requirements

Isolation:

- Seed fields should be isolated from the contaminants shown below:

Contaminants	Minimum distance (Meters)	
	Foundation	Certified
Fields of other varieties	1600	1000
Fields of the same variety not conforming to varietal purity	1600	1000

B. Specific requirements

Factors	Maximum Permitted (Per cent)	
	Foundation	Certified
Off types	0.10	0.20
Plants affected by seed borne diseases	0.10	0.50

C. Seed Standards

Factors	Standards for each class	
	Foundation	Certified
Pure seed (minimum) %	98	98
Inert matter (maximum) %	2	2
Other crop seeds (maximum) Number/kg	5	10
Weed seeds (maximum) Number/kg	5	10
Germination (minimum) %	65	65
Moisture (maximum) %	7	7