CABBAGE

BOTANICAL NAME : *Brassica oleracea* var. *capitata* Linn.
COMMON NAME : Bund Gobhi
FAMILY : Cruciferae or Brassicaceae
CHROMOSOME NUMBER : 2n=2x=18

ORIGIN AND HISTORY

- Cabbage was originated from a wild non-heading type plant *Brassica oleracea* var.*sylvestris* Syn. (*Brassica sylvestris*) commonly known as wild cliff cabbage or cole worts.
- It was introduced by Portuguese and later it became popular during the British rule.
- Cabbage is the English name which was derived from French word 'cabus' which means head. (Head is formed by the development of densely packed leaves above the growing point [i.e., leaf modification]
- It is native to the Mediterranean region.
- The real headed cabbage was evolved in Germany.
- The savoy cabbage originated in Italy and spread to France and Germany in the sixteenth and seventeenth centuries.
- At present, cabbage is grown in Caribbean countries, Indonesia, Malaysia, Central East and West America.
- Though cabbage is a biennial crop, it is being cultivated as an annual.
- At the time of origin, it was non heading type. Later due to mutation and adoption during 16th century, it became heading type. [Mutation : A sudden new variation in the genetic constitution due to individual gene or chromosomal changes]
- *Pre mature bolting:* In Cole crops, when young plants are exposed to sub-optimum temperature i.e., 4 to 10^{o}C, they will produce flowering stem and seed without producing edible part / head / curd. This is called pre-mature bolting. Under natural condition, it occurs rarely but under artificial method, we can induce this for seed production.

USES

- These are eaten in the raw state as well as cooked.
- These are known for their rich source of vitamin A and C. Also, contains minerals including P, K, Ca, Na and Fe.
- There may be some protective properties against human bowl cancer in these vegetables.
- They are used against ailments such as gout, diarrhea, coeliac trouble, stomach trouble, deafness and headache.
- The leaves are used to cover wounds and ulcers and also recommended against hangover.

- Cabbage juice is said to be a remedy against poisonous mushrooms and also used as a gargle against hoarseness.

NUTRITIVE VALUE AND USES:

- Cabbage leaves are low in calories (24 per cent), fat (0.2 per cent) and carbohydrates (5.4 per cent).
- It is a good source of protein (1.3 per cent).
- Cabbage is an excellent source of minerals such as calcium, iron, magnesium, sodium, potassium, and phosphorus.
- It contains good amount of ascorbic acid.
- Cabbage is used mainly as a vegetable and nice pickle (sauerkraut) is prepared from it.
- It is also used for salad purposes.
- Cabbage is well known for its medicinal properties. It is widely used for cough, fever, peptic ulcers and skin diseases.
- Occasionally bitter taste is due to glucosinolate.

AREA AND PRODUCTION

- India is the third largest producer of cabbage in the world.
- It is mainly grown in states like Uttar Pradesh, Orissa, Bihar, Assam, West Bengal, Maharashtra and Karnataka.
- Apart from India, the other major cabbage producers in the world are China, Russian Federations, Japan, Korea Republic, Poland, USA, Indonesia and Ukraine.
- The area under this crop in India is 369 thousand ha having a production 7949 thousand tonnes with a productivity of 21.5MT/ha (NHB, 2011).

VARIETIES/HYBRIDS

The cabbages are classified into three broad groups:

- **White Cabbage:** Most common shapes for cultivated cabbages are pointed, round and flat or drumhead.
- **Red Cabbage:** Leaves have distinct coat of wax and tolerant to diamond back moth.
- **Savoy Cabbage:** Blistered leaves and the shape is pointed round and flat.

A. White Cabbage: cultivars are divided into 3 groups on the basis of maturity of heads after transplanting

Early Group (Takes 55-70 days to maturity)	**Mid season Group** (Cultivars fall between early and late) 80-90 days	**Late Group** (Takes 85-130 days)
Golden Acre, Pride of India, Copenhagen Market, Pusa	Wisconsin All Green, All Heads early, Glory of	Pusa Drum Head, Danish Ball Head, Indian Edips,

Ageti, Pusa Mukta, Pusa Sambandh (Synthetic var.) Pusa Synthetic	Enkhuizen, September, Pusa Drum Head	Late Flat Dutch, Late K-1, Late Large Drum Head

B. Red Cabbage: 1. Red Acre 2. Red Mammoth

C. Savoy Cabbage:

Open Pollinated Varieties

a) Early and mid season

Copenhagen Market:

- This is still being grown but on a limited area.
- This is an introduction, which has been replaced by "Golden Acre" and `Pride of India` because of their earliness and smaller head size.

Early Drum Head:

- It is an early variety having light green foliage.
- Leaves are medium to large, curving inward and enclosing the head loosely.
- Leaves fold over each other at the center to form head. The heads are flat.

Golden Acre:

- This is an earliest variety evolved by selection from the Copenhagen Market and recommended by IARI for cultivation in India.
- It takes about 60-65 days from transplanting to head formation.
- The heads are solid, short core and weighing about 1.0-1.5 kg.
- The heads should be harvested immediately after head formation otherwise, cracking may take place.

Jersey Wakefield:

- It is an introduction with pointed head good in taste and preferred by some growers.
- It takes about 55-60 days for head formation.
- The outer leaves are few and slightly crinkled.
- Average weight is 1.0 – 1.5kg.

Pride of India:

- It is an introduction, early in maturity and good in taste.
- The plant type of this variety is similar to `Golden Acre` but it is about a week later in maturity. It has bigger sized heads, weighing about 1.5 to 2.0kg per head.

Pusa Synthetic:

- This variety has been developed from IARI, Regional Station, Kartain, Kullu Valley, HP.
- It is an early synthetic variety.
- The yield potential of this variety is 350-460 q/ha.

Pusa Mukta (Sel.8):

- This is a new variety developed by Indian Agricultural Research Institute, Regional Station, Katrain by hybridization between EC 24855 x EC 10109.
- The light green foliage with wavy margins is a distinguishing character of the variety.
- The heads are compact, slightly flattish round with loose wrapper leaves at the top.
- Average head weight is 1.5-2.0 kg.
- It is resistant to black rot

Pusa Drum Head:

- It is an important selection released by IARI, Regional Station, Katrain (Kullu Valley, HP).
- Heads are solid and flat weighing about 3 to 4kg.
- It takes about 80-90 days from transplanting to harvesting.
- It also possesses field resistant to black leg.

b) Late group:

September:

- It is an introduction from Germany. It is very popular in the Nilgiri hills and recommended for cultivation by Tamil Nadu State Department of Horticulture.
- The foliage is dark green with wavy margin.
- The stalk is long and heads usually tilt on one side after formation.
- It has solid, flattish round to slightly oblong heads.
- It has very good keeping quality.
- This variety takes about 96 to 100Ddays from transplanting to head formation.

Late Drum head:

- It is late maturing variety.
- It takes about 105-110days from transplanting to head formation.
- Stalk is short with small frame and few outer leaves.
- Heads are uniform, solid, large, flat, drum shaped and pale green in colour.

Red Cabbage:

- Heads are red in colour.
- All the red cabbage cultivars are tolerant to diamond back moth.
- It has distinct coat of wax and produces a head of 1-2kg, taking about 90days from transplanting to head formation.

Hybrids:

a) Early and mid season:

H-113:

- This is a self-incompatible based hybrid between Sel-8 and 83-6 line, developed at IARI Regional Station, Katrain.
- Plants bear roundish, compact head (13.5 x16 cm), blush green and waxy leaves.
- It gives average yield of 473q/ha in 60-68 days of crop duration.

Suhda (BSS-115):

- The hybrid has been developed by Beejo Sheetal Seeds Pvt. Ltd., Jalna.
- Heads are highly compact and mature in 75days.
- This hybrid can be grown round the year.
- The average weight of head is 2-3kg.
- This hybrid is resistant to *Fusarium* wilt.

Bajrang (BSS-50):

- The hybrid has been developed by Beejo Sheetal Seeds Pvt. Ltd., Jalna.
- Heads are dark green, smooth, highly compact.
- The outer leaves are upright. It matures in 65days but can stand on the field for 45days after maturity.
- It can tolerate high temperature (up to 36o C) and resistant to *Fusarium* wilt.
- Average head weight is one kilogram.

Kranti:

- It is ready for harvesting within 60 days after transplanting.
- It is good for high density planting.
- Heads are round and compact with 0.8-1.2kg per head weight.

Mitra:

- It is an early hybrid with excellent head to plant ratio.
- Heads are fresh green, uniform, compact, ball shaped and weights around 0.8 to 1.2kg each.
- It has good field retention ability.

Pusa Ageti:

- It has been developed from TKCBS -28 (F1 Hybrid) procured from Tiwan.
- It takes about 70-90days from transplanting to harvesting.
- Head weight varies from 600 to 1,200g.
- This hybrid is resistant to *Fusarium* wilt.

Quisto:

- It is a high yielder hybrid and has ability to stand over severe hot condition.
- Head can stand in the field condition up to 70days.
- Heads are solid with dark blackish colour. It is good for tropical climate.

BSS-44:

- The hybrid has been developed by Beejo Sheetal Seeds Pvt, Ltd., Jalna.
- The head is roundish, average weight 2.5 kg and mature in 75 days after transplanting.

- Its head can also stand for 20 days in field after maturity.
- This hybrid can grow well both in cold and hot weather conditions.

b) Late group:

Harirani Gole:

- It is a good hybrid for medium late maturity.
- It produces medium sized ball shaped dark green, solid head with good wrapper leaves.
- Average head weight is 1.5-2.0kg.
- It can be harvested 95-100 days after transplanting.

Sri Ganesh Gol:

- This hybrid has been developed by Maharashtra Hybrid Seeds Co. Ltd., Jalna and recommended for cultivation in Andhra Pradesh.
- Heads are round, compact, attractive, bluish green and become ready for harvest in 90 to 95days.
- Average yield is 500 to 750q/ha.

Suvarna (BSS-32):

- The hybrid has been developed by Beejo Sheetal Seeds Pvt. Ltd., Jalna.
- Heads are round and average head weight is 3kg.
- This hybrid has strong smooth outer leave. It matures in 110days.

CLIMATIC REQUIREMENTS

- Cabbage can be grown under a wide range of environmental conditions but cool moist climate is most suitable.
- The optimum soil temperature for seed germination is between 21.2 to 26.2^{o}c.
- The optimum temperature for growth and heading is between 15-20^{o}C.
- Minimum temperature for growth of cabbage is just above 0^{o}C.

SOIL

- Cabbage can be grown in a wide range of sandy to heavy soils.
- Early cultivars grow well in light soils, whereas, late maturing ones perform better on heavy soils.
- In heavy soils plants grow slowly and keeping quality of heads is good rather than crops grown in light soils.
- The optimum pH of soil for cabbage cultivation is between 6.0-6.5.
- Most of the cabbage varieties are tolerant to salts. In saline soils, the plants are more prone to diseases.
- Cabbage cannot be grown under water logged and highly acidic conditions.

SOWING TIME [SOWING SEASON]

- In high hills, seeds are sown in May-June for summer/autumn crop.
- In the hilly areas which receive heavy rains, the summer and autumn crop is rather limited and sowing is done in autumn to harvest them in late spring or early summer by over watering them.
- In the plains of Northern India, sowing in situ or in seed beds starts from August and in Eastern India, it starts from mid to late September.

SEED RATE

Cultivars / varieties

- Early & mid season: 875 to 1000g/ha.
- Late season: 625 to 750 g/ha
- One gram seed give rise to about 100 seedlings

Hybrids

- Seed rate : 325 g /ha

SPACING

- The planting distance may be varying according to cultivars, planting season and soil.
- Early maturing cultivars: 45 cm x 45 cm or 60 cm x 30 cm.
- Mid season: 60 cm x 45 cm
- Late maturing: 60 cm x 60 cm.
- Hybrids: 60 x 60 cm
- The planting is done in the flat bed or ridges and furrows depending on soil and climate.

NUTRIENT MANAGEMENT

- Manures and fertilizer requirements in cabbage depend upon fertility of soil.
- Accordingly, add 25t/ha farmyard manure and it should be mixed thoroughly at the time of field preparation.
- Application of nitrogen, phosphorus and potash varies with soil type, varieties and place.
- The requirement of N: P: K is 150:100:125 kg /hectare.
- 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 after 30-45days of transplanting.

NURSERY MANAGEMENT

- Cabbage is basically a transplanted crop.
- The seeds are sown in seed bed.
- In the plains, the seed beds for early crop require cover (mulching) to save the small seedlings from rains, while in the high hills, it may be better to grow them under glass flames or poly tunnels.

- The seedlings of mid-season or late cultivars may be raised in the open.
- The soil of nursery should be well prepared and free from diseases.
- Well rottened farmyard manure should be added @ 2-3kg/m^2
- The optimum spacing between rows in the nursery beds is 10cm and the depth of sowing is 1.5-2.5cm.
- 15 nursery beds of 7.5m x 1.2 m x 10 cm size required for one hectare.
- After sowing, the seeds are properly covered with a thin layer of mixture of fine manure and soil.
- Regular and optimum moisture supply is needed. Then cover the nursery beds with dry grass.
- Generally, 4-6weeks old seedlings are ready for transplanting but seedlings up to 8weeks age can also be transplanted.
- The time of transplanting varies in different climatic conditions.
- In plains of India, it can be done from August to December and in hills from April to August.

INTERCULTURAL OPERATIONS

WEED MANAGEMENT

- Cabbage is a shallow rooted crop, so do shallow hoeing to remove weeds and to avoid any injury to the roots.
- Regular hoeing operations keep crop weed free and provide aeration to the root system.
- Once the foliage has covered the soil, it is better to stop hoeing since it may damage the roots.
- Crust formation in medium heavy and clay soils hinder water and air penetration in root system and should be broken otherwise adversely affect plant growth.
- After weeding, go for top dressing with 50% N and the earthing up.
- Earthing up is important in rainy season as roots get exposed after every shower and should be done 4-5weeks after transplanting.
- Critical period for crop- weed competition is between 30-50days after transplanting.
- Use herbicides in initial stages followed by hand weeding in later stages of plant growth along with fertilizer top dressings.
- Application of Alachlor (Lasso) @ 2kg a.i. /ha or Trifluralin@ 0.5kg/ha or Fluchloralin @ 0.5kg/ha before transplanting is beneficial for controlling annual and broad leaved weeds.
- Pendimethalin (Stomp @1.2kg a.i. /ha or Oxyflurofen (Goal) @ 600ml/ha) can also be used before transplanting if there is problem of annual weeds only.

WATER MANAGEMENT

- 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.
- Cabbage is usually irrigated by furrow method of irrigation.
- Heavy irrigation should be avoided when the heads have formed, as it will result in splitting of heads.

HARVESTING

- The harvesting of cabbage is done when the heads attain marketable size.
- The early cultivars grown under comparatively warmer conditions develop loose head at the initial stage, but later become compact.
- In some cultivars, the heads start cracking soon after the maturity.
- In such cases, the quality of heads deteriorates fast, if harvesting is delayed.
- Harvesting should be done at right stage for getting good quality head.
- Harvesting should be done preferably in the late evening or early morning so that the product remains turgid and fresh.
- Trim diseased, damaged, rotten and discoloured leaves.
- The early cultivars take about 60-80days, medium 80-100days and late 100-130days for harvesting after transplanting.
- Owing to higher prices and small family requirements, the demand of market is for small to medium sized heads weighing around 0.5-1.0kg.
- The heads are harvested by cutting with knife with some wrapper leaves attached. This will give the head some degree of protection while transporting.

YIELD

- Cabbage varieties yield from 20t/ha in OP varieties and that of hybrids between 50-70t/ha.
- Early & mid season varieties: 20-25 t/ha
- Late season varieties : 25-30 t/ha
- Hybrids : 50-70 t/ha

POST HARVEST HANDLING AND STORAGE

- Avoid direct contact of heads with the soil and exposure to direct sunlight. Proper packing is to be done to avoid bruising.
- Grading of cabbage should be done on the basis of size and firmness of head.
- The early varieties can be stored for 4-6weeks at 0°C-1.7°C and RH between 92-95%while the late ones for 12 weeks due to firmness of heads.

PACKAGING

- Cabbage heads are sent to the market in loose condition in trucks or in sacks.
- For transportation of early cultivars, either loose or in sacks, there is damage of the heads due to their succulence and looseness.
- Heads are packed according to their size.
- Crates are popularly used for packing.

VALUE ADDED PRODUCTS

- Sauerkraut
- Drying
- Pickling
- Canning
- Cole slaw

SEED PRODUCTION AND SEED CERTIFICATION STANDARDS

Climatic requirements

- Cabbage thrives well in a cool, moist climate with moderate rainfall.
- It can withstand frost in the head stage.
- It requires a dormant period of cool temperature (Chilling/vernalization) to bolt and initiate seed stalks and flower.
- After the cold treatment at 4 to 7oC for 4-6weeks, the plant bolt sooner and flower more abundantly but the plants must have passed juvenile phase (pencil thickness of stem).
- Intensity of flowering depends upon age of plants and 3-5months old plants are capable of transformation (early vernalized) since they pass the juvenile phase.

Land requirements:

Land should be free from volunteer plants and crop debris.

Methods of seed production

- Being a biennial, cabbage requires two seasons to produce seed.
- For seed production, sowing time should be adjusted in such a way that heads get ready by the onset of winters.

- In the first season, the heads are produced and in the following season formation of seed stalks begin and the process of seed production follows.
- The seed crop can be left *in situ* or replanted during autumn.
- The *in-situ* method is usually followed for certified seed production and the *ex-situ* for nucleus seed production.
- In *in-situ* method, the crop is allowed to over winter and produce seed in their original position, i.e. where they are first planted in the seedling stage.
- In higher hills where heavy snowfall is experienced during winters, heads are uprooted and stored in trenches to avoid snow injury to the heads.
- In replanting method, the mature heads/plants are uprooted.
- After removing whorls (non wrapper leaves), the plants are immediately reset in a well prepared new field, in such a way that the whole stem below the head is set in the soil with the head resting just above their surface.

***Ex-situ*/replanting method of producing seed of cabbage:**

This method is further divided into three methods to produce seed of cabbage:

i) Stump method:

- In this method, when the crop in the first season is fully mature, the heads are examined for true to type.
- The plants with off type heads are removed.
- Then heads are cut just below the base by means of a sharp knife, keeping the stem with outer whorl of leave intact.
- The beheaded portion of the plant is called "Stump".
- The heads are marketed and the stumps either are left in-situ, or replanted in the second season i.e. during autumn.
- The following spring, after the dormancy is broken, the bud sprout forms the axils of all the leaves and leaf scars.

Advantages:

- This method gives extra income by way of sale of heads.
- The crop matures 12-15days earlier than the head intact method and seed yield is slightly higher.

Disadvantages:

- In this method, flowering shoots are decumbent and require very heavy staking, otherwise they breakdown very easily while interculturing or spraying.

ii) Stump with central core method:

- In this method, when the crop is fully mature in the first season, the heads are examined for true to type.
- Plants with off-type heads are removed and rejected.
- Then the heads are chopped on all sides with downward perpendicular cuts in such a way that the central core is not damaged.
- This is an improvement over stump method in that the shoots arising from the main stem are not decumbent.
- During the last week of March, and until 15th April, when the heads start bursting, two vertical cross-cuts are given on the heads (Kalpa valley of HP).
- Taking care that the central growing point is not injured.
- In the absence of such cuts, the heads burst out irregularly and sometimes the growing tip is broken.
- The operation is completed by going around the field twice or thrice during this period.

Advantages:

- Shoots arising from the main stem are not decumbent, hence very heavy staking is not required and seed yield is increased.

Disadvantage:

- The chopped head cannot be marketed.

iii) Head intact method:

- In this method, when the crop is fully mature in the first season, the heads are examined for true to type.
- The plants with off-type heads are removed from the field.
- The head is kept intact and only a cross cut is given to facilitate the emergence of a stalk.

Advantage:

- The removal of head (stump method) or chopping of heads on all sides (central core intact method) is not required.
- This saves time and labour and staking is not required.

Disadvantage:

- The seed yield is slightly low as compared to stump and stump with central core intact method.

Brief Cultural Practices (*In-situ* method)

Time of sowing and transplanting

- The sowing time of different varieties should be adjusted according to complete head formation by the end of October or first week of November in high hills before snowfall.
- When the mean temperature falls to 10^{o}C or below the heads stand best for over wintering.

- Early varieties are sown from 10th July to 25th July and transplanted when the seedlings are three to four weeks old.
- The late crop, planted during September does not form heads and bolts directly during spring.
- Late varieties takes about 2 to 3 months to produce mature heads and should be sown during the second and first fortnight of June, respectively and transplanting finished by the first week of August.
- The mean temperatures *viz.*, 22.5°C, 20°C and 14°C of August, September and October, respectively, afford optimum requirements for growth and head development.
- The transplanted crop starts head formation during spring and continues up to June and usually does not produce seed stalks.

Preparation of land for replanting

- Prepare the land to a fine tilth by repeated ploughings and harrowing followed by leveling.

Nutrient management

- Cabbage grows well only when the supply of organic matter is liberal.
- In addition to head crop, apply 100quintals of farmyard manure per hectare at the time of land preparation for good seed crop.
- Also apply about 100 kg nitrogen, 100 kg phosphorus and55 kg potash per hectare before replanting of heads.
- Another dose of 50 kg/ha nitrogen will be applied at the time of seed stalk emergence during March –April.
- Extra application of nitrogen may be given as and when there is a need before flowering starts, depending upon the condition of the crop.

Spacing

- Early varieties 45 x 45 cm
- Medium varieties 60 x 45 cm
- Late varieties 60 x 60 cm

Irrigation

- Cabbage requires a continuous supply of moisture.
- Irrigate the crop as frequently as required.
- Heavy irrigation should, however, be avoided when the heads are formed.
- A sudden heavy irrigation after a dry spell may cause bursting of heads.

Hoeing and Weeding

- At least three weddings and hoeing till the end of October are essential.
- One weeding and earthing up during June the second during August is required which control weeds and also help in proper drainage during winter and thereafter.

Handling the Mature Head

- Before the onset of winters, fully developed heads are uprooted and selected on the basis of varietal characteristics for seed production.
- Handling of plants can be done by any one of the methods described earlier.

Roguing

- The first roguing is done at the time of uprooting and selection of the mature heads.
- All off type heads, diseased, or otherwise undesirable types, are removed at this stage.
- The second rouging is done before the heads start bursting.
- The loose leaved, poorly heading plants and those having a long stem with heavy frame must be rouged out at this stage.
- It is highly undesirable to keep such poor plants in the seed plots.
- Subsequent roguing for off-types, diseased plants affected by phyllody, black leg, soft rot or leaf spot should be done from time to time as required.

Staking

- After the flower stalks are sufficiently developed, staking is necessary to keep the plants in an upright position.

Harvesting and Threshing

- Cabbage starts seed stalk elongation from March onwards when the mean temperature rises to 10-13^{o}C.
- Flowering and pod formation starts during the first week of April at mean temperature of 13-18.5^{o}C.
- From 15th April, to 15th May, the crop is in full flush of flowering and fruiting.
- The ripening of pods commences by 15th June to 20th June and the harvesting continues up to second week of July.
- At mean temperature below 20oC during June and July, the maturity of crop is delayed at least by a fortnight and the harvesting may continue up to July end.
- To avoid shattering of seeds, the whole crop is harvested in two or three lots with sickles.
- Generally, the early maturing plants are harvested first and when the pod colour is about 60-70per cent of the rest of the crop changes to yellowish brown, it is harvested completely and piled up for curing.
- After 4-5days, it is then threshed with sticks and sifted with hand sifters.
- Afterwards, the seeds are cleaned and stored.

Seed Yield

- 700 kg per hectare.

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	1.50

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