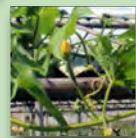


Catalog of Selected Summer Vegetables Commonly Grown in Nepal



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Summer Vegetables
Commonly Grown in
Nepal

This publication is prepared for the action research supported by High-Value Agriculture Project in Hill and Mountain Areas (HVAP) under Sector Development Fund. The study was conducted by a team of scientists working in SEAN Seed Service Centre Ltd. (SSSC) to characterize 12 varieties of nine summer season vegetables. The project is coordinated by the Horticulture Research Division (HRD) of Nepal Agriculture Research Council (NARC), Seed Quality Control Centre (SQCC) and Vegetable Development Directorate (VDD).

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Cover photo: *Clockwise*; Flowers and pods of french bean var. Chaumase, fruits of chili var. Jwala, pods of french bean var. Trishuli Simi, floral bud of sponge gourd var. Kantipure, plant of Asare Squash, seeds of bitter gourd var. Seto Karela, seedling of cucumber var. Bhaktapur Local, floral bud of Bhaktapur Local, and flowers of brinjal var. Purple Long; and (at centre) fruit of Bhaktapur Local.

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Catalog of Selected Summer Vegetables Commonly Grown in Nepal

Prepared by:

Damodar Poudyal

Research & Development Manager

Reviewer Team:

Gopal Prasad Shrestha,

Program/Research Coordinator, Nepal Seed & Fertilizer Project, CEAPRED, Lalitpur
(Former High-Value Agriculture Production Specialist, HVAP, Surkhet)

Indra Raj Pandey, Senior Horticulturist

Dipendra Keshari Neupane, Production Manager,

SEAN Seed Service Centre Ltd., Kathmandu

Ishwori Prasad Gautam, Principal Scientist,

Horticulture Research Division, NARC

Navin Gopal Pradhan, Senior Officer (Horticulture),

Horticulture Research Division, NARC, Khumaltar

Presented at:

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(Secretariat of National Seed Board), Hariharbhawan, Lalitpur, Nepal
15 September, 2017 (2074 Bhadra 30). Horticulturists and scientists
attended the meeting where major traits of the studied crop varieties were
discussed, verified and finally approved.

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Foreword

Horticultural crops particularly the vegetables are most suitable to bring in an inclusive growth to benefit commercial growers. Vegetable growing is most preferred by small and marginal land holders due to quick and high returns and several vegetable crops are preferred in crop diversification. Vegetables are important in human nutrition as they are rich sources of vitamins, minerals, food fiber and nutraceuticals.

There are 341 varieties of vegetables have been released and registered at National Seed Board (NSB) by FY 2072/73. Most of them are registered varieties for import and very few are released by the NSB. However, most of the released varieties are released before 2051 BS. Varietal characters of particular variety is very important while maintaining their true to type in seed production and quality assurance. Field inspection and roguing is merely based on the known characters for distinctness, uniformity and stability. In Nepal reference document, however, for the varietal characteristics is lacking.

The varietal catalog of some summer vegetables commonly grown in Nepal is prepared as the major output of the action research project by High-Value Agriculture Project in Hill and Mountain Areas (HVAP) under Sector Development Fund. This catalogue has compiled major morphological and agronomical characters of studied varieties. Out of studied nine crops, five common varieties like Chaumase Simi, Seto Karela, brinjal var Purple Long, tomato var BL410 are common in the local seed market but not registered/released yet. Cucumber var Bhaktapur Local is not registered but in the process of registration by Horticulture Research Division (HRD). We believe that this catalogue will be very useful to students, scientists, farmers, teachers, extension workers, crop inspectors, and all who are interesting in horticulture.

We complement all the contributors to this book for their painstaking efforts, especially scientists from SEAN Seed Service Centre Ltd. (SSSC) who led the characterization of 12 varieties of nine summer season vegetables, and collaborating scientists from HVAP, HRD of Nepal Agriculture Research Council (NARC), Seed Quality Control Centre (SQCC) and Vegetable Development Directorate (VDD) for their invaluable inputs.

November 5, 2017

SEAN Seed Service Centre Ltd.

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Introduction

Characterization is the description of plant germplasm placed by breeders or farmers by whom variety was selected or developed or cultivated for a long period. It determines the expression of highly heritable characters ranging from morphological or agronomical features to molecular markers. New plant varieties are tested to determine if they are unique, to allow a botanical description to be compiled, and, in the case of crops, to ensure they have agronomic merit in the recommended domain. Genetic character governs yields and market values. If there is any variation in characters, it is known as deterioration of the particular variety. It affects quality, consumer test, market value, production potential as well as other agronomical performances. So it is equally important to maintain the genetic quality to ensure varietal purity in the production cycle.

A variety catalog details the particular variety of interest. Genetic, morphological and agronomical information of the variety distinguishes among the varieties within a species and enables an easy and quick discrimination among phenotypes. It facilitates a check on the trueness-to-type, uniformity, allowing detection of off-types or duplicates among the phenotypes.

Variety descriptor helps scientist to identify off-type and stay on the true-to-type lot. Field crop inspection largely relies on varietal characteristics so that crop inspector can decide morphological variation among the genotypes. A descriptive publication on varietal characteristics of major vegetables can be a useful reference material for all concerned stakeholders and scientists in the respective field.

Materials and methods

In this action research on characterization of major summer vegetables common in Nepal, plants were observed through its ontogeny. Seeds of studied crop (9 crops) varieties (12 varieties) were collected from source farms under Nepal Agriculture Research Council (NARC), Department of Agriculture (DOA) and SEAN Seed Service Centre Ltd. (SSSC). Equipment and tools like digital camera, measuring tape, scale, vernier

callipers, digital balance, etc. were used during the characterization where meaningful.

Twenty plants per entry per replication were grown in a plot of 5m x 1m. Two sets of blocks with 12 such plots were prepared and varieties were randomized completely within the blocks. The first replication was continued up to flowering to collect floral and seed data. Plants grown in the second replication were observed for destructive measurements. This study was conducted in Thankot (1,350 m), Kathmandu. It is also assumed that studied species are adapted to, and major traits are expressed at Thankot condition.

Complementary characterization method was followed to capture the full information on varieties. It included morphological descriptors, agronomical attributes, and digital images. A set of morphological descriptors used to describe the phenotype. The standard protocol developed by Gene Bank and Horticulture Research Division (HRD) of NARC, Asian Vegetable Research and Development Centre (AVRDC)/World Vegetable Centre and International Board for Plant Genetic Resources (IBPGR) were followed to record data. For harmonisation in crop descriptor and data recording methods, an orientation training program was conducted and discussed among scientists from NARC and SSSC before the characterisation started. Plant, stem, leaf, root, curd, flower, pod and seed traits were scored or measured and expressed in numeric values, averages were checked with previous records where meaningful and finally presented in the range. Descriptive traits such as flower and fruit colour were, however, expressed as a narrative term (qualitative values). Special focus was given while measuring the economic parts. Sufficient detail captured in images to taxonomically identify the plant and demonstrated the traits that show distinctness. The images stored in a database linked with the morphological data. Images were taken especially for those character(s) which were difficult to describe verbally for example images of whole plant, racemes, flowers, pods and seeds. Finally, obtained data and observations were discussed among scientists and horticulturists for verification.

Squash (*Cucurbita pepo* var. *cylindrica* L.) variety Asare Squash

Seedling characteristics

The hypocotyl is greenish white. Cotyledonary leaf is entire and green with average length 5.54 cm and width 3.1 cm. The leaf of the seedling is normal green with the entire margin. Seedlings are glabrous.



Figure 1: Seedlings

Vegetative characteristics

Tendrils are absent in the plant. It has a short internode that ranges from 2-4 cm in length. The main vine is non-branching, erect in growth habit. Leaves are dark green, 60-65 cm long with 36-40 cm wide leaf lamina. Leaf petiole is light green, spines are present on the surface of the petiole, and an average diameter of the petiole is 2.75 cm (2.9 - 3.5 cm). Large leaf shows interveinal mottling, 12-15 in number and dark green. Small leaf develops inside the plant canopy, varies in number (12-18), light green in colour and lacks interveinal mottling.

The leaf blade is moderately incised, and the margin is serrated, intermediate in leaf lobbing with five lobes. Three sub-lobes are present in the first lobe (near to petiolar end), two in the second and up to 5 sub-lobes in the apical lobe. Dense pubescence is present on the lamina. Plants are uniform in morphology; plant height varies from 70-100 cm, no or low

plant lodging. Semi-prostrate ($\sim 45^\circ$) leaf angle of the petiole. Leaf bloom absent, the petiole is hollow, no overlapping of the petiole, petiole bears dense pubescence, and undulated surface and cross section of the petiole are oval.



Figure 2: Plant at vegetative stage (above and below left), deeply serrated leaf lamina into five lobes and sub-lobes, white mottled leaf (above middle) and non-mottled leaf developed inside plant canopy (above right), leaf petiole and its cross section (below right)

Fruit characteristics

The variety is early in maturity. Elongated fruits are ready for fresh harvest in 45-50 days after transplanting. Peduncle texture is hard. The length of peduncle ranged from 2-2.8 cm and angled smoothly in transactional shape. The shape of fruit at pedicle end is tapered and blocky at the blossom end. Fruits are cylindrical, blocky and smoothly bulged at the blossom end. Fruit surface is smooth. There are no ribs present on the surface of the fruit while observed in fruit cross-section.

Fruit length varies between 28 and 35 cm, and diameter at the mid-point ranges from 20-27 cm. Fruit colour is greyish green. Pre-dominant fruit skin colour at the time of harvesting is grey, and secondary skin colour is green, i.e. narrow and small grey patches are present on the green background. Such blotches are spotted and scattered on the fruit skin (> 0.5 cm long). Fruit skin is medium in thickness, 5-7 mm thick. Flesh colour is creamy white, intermediately moist and placental tissues are deficient in the flesh. The fruit weight ranges from 450-1,000 g. The green background on the fruit skin gradually turns yellow when fruit ripens. It's cooking quality is palatable, and productivity ranges from 95 to 100 MT per hectare.

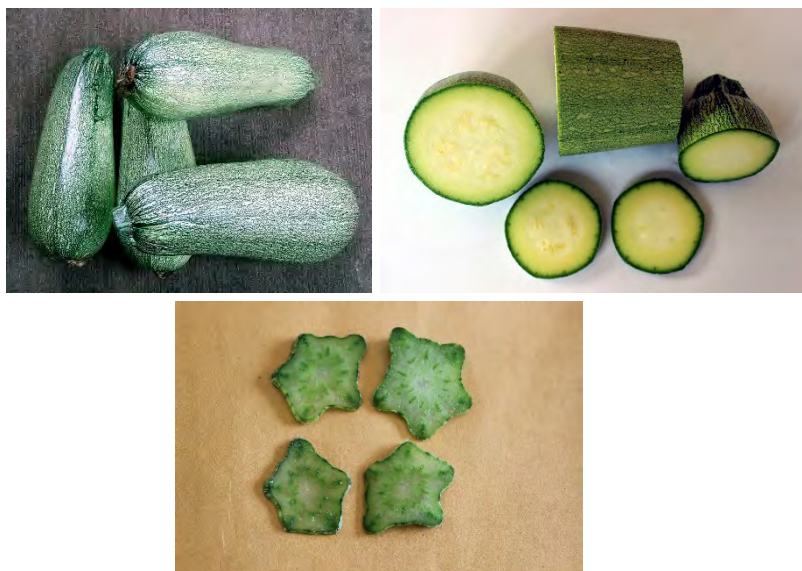


Figure 3: Freshly harvested fruits, flesh and fruit rib (above) and cross section of peduncle

Flower and seed characteristics

Develops monoecious flowers and flower colour is yellow. From the day of transplanting, it normally takes 35-40 days to develop the first flower. Annual in flowering.



Figure 4: Flowering plant, riped fruit, and seeds

Fruits ripe in 65-70 days after transplanting and ready for seed harvesting. Seed count per fruit ranged from 270 – 300. Seed surface is smooth, primary seed coat colour is creamy white, shape is oblong. Seed margin is thin and regular and colour is greyish white. Thousand seed weight (TSW) ranges from 146.4 to 148.1 g at 9% moisture.

Distinct characters:

- Hypocotyl greenish white
- Erect growth habit with non-branching vine
- Serrated leaf shows interveinal mottling with 5 lobes and sub-lobes
- Fruits are cylindrical and smoothly bulged
- Fruits are greyish green, blotches on the skin and turn yellow when ripe

French Bean (*Phaseolus vulgaris* L.) variety Chaumase

Seedling characteristics

The hypocotyl is purple, and seedling leaf is light green; entire leaf margin and the seedling is glabrous. Length and width of primary leaf vary between 5.2-5.6 cm and 5-5.6 cm respectively.



Figure 5: Seedling of Chaumase

Vegetative characteristics

Plants are indeterminate climbers. The stem is green with the medium in anthocyanin pigmentation. Leaf pubescence is few. The length of mature leaf ranges from 13 to 16 cm and width of mid-leaflet ranges from 13-16 cm. Leaflets are ovate in shape, medium type of tip length of terminal leaflet. Plants are uniform in morphology. This variety can be cultivated in four seasons (Spring, Summer, Rainy & Autumn) under irrigated sub-tropical conditions, hence named as 'Chaumase'.



Figure 6: Plants at vegetative stage, fruiting plants, and harvested pods and its cross section (below left)

Inflorescence and pod characteristics

The first flowering occurs in 40-45 days from seedling emergence. It bears pinkish flowers with an average 1.06 cm long pedicel (0.8 - 1.2 cm). Length of peduncle is 10-17 cm and one peduncle bears 4-7 pods. Pods are green; immature pods are less stringiness during the fresh harvest stage, soft, 'J' shaped, and 18-22 cm long. Individual pod weight varies between 10-15 g, pod width 9-11.2 mm and pod thickness ranges from 10.8-12.1 mm, average pod width and pod thickness ratio is 1:1.15. The shape of pod cross section is near 'C' shaped. Normally, pods are ready for fresh harvest within 55-60 days after emergence of seedling. Eight to ten locules per pod, recurving type of pod curvature but the degree of curvature is weak. The shape of distal part (excluding beak) of the pod is acute to truncate. Productivity 12-14 MT/ha.



Figure 7: Flowers, peduncle, leaves and fruiting plant

Seed characteristics

Matured pods ready for seed harvest in 70-100 days. Seed colour is black. Seed shape is cuboid in crosswise while elliptic in lengthwise and smooth in texture. Seed hilum is white. TSW ranges from 280.04 to 282.08 g at 9% moisture content.



Figure 8: Pods and seeds

Distinct characters:

- Hypocotyl is purple
- Ovate leaflet
- Flowers are pink
- Pods are recurving, 'J' shaped and smooth
- Seed coat colour is black and hilum is white

French Bean (*Phaseolus vulgaris* L.) variety Trishuli Simi

Seedling characteristics

The light green colour of hypocotyl, light green is the seedling leaf, entire leaf margin, and seedling glabrous. Length and width of primary leaf vary between 4.5-4.8 cm and 4.4-4.8 cm, respectively.



Figure 9: Seedlings

Vegetative characteristics

Plants are indeterminate climbers. The stem is green in colour with low in anthocyanin pigmentation. Leaf pubescence is few. The length of mature leaf ranges from 11 to 18 cm and width of mid-leaflet ranges from 12-16 cm. Leaflets are ovate in shape, medium type of tip length of terminal leaflet. Plants are uniform in morphology.



Figure 10: Plant at vegetative stage, flowers and leaves, and young pods

Inflorescence and pod characteristics

Takes 40-50 days from seedling emergence for the first flowering. It bears creamy white flowers with an average 0.94 cm long pedicel (0.8 - 1.1 cm). The peduncle, 11-17 cm long, bears four to seven pods. Pods are green; immature pods are less stringiness during fresh pod harvest, bolder than Chaumase's pod, soft, 'J' shaped, and 20-25 cm long. Individual pod weight varies between 11.8-15.2 g, pod width 9-10.2 mm and pod thickness ranges from 10.8-11.4 mm, average pod width to pod thickness ratio is 1:1.11. The shape of pod cross section is nearly '8' shaped. Normally, pods are ready for fresh harvest within 55-65 days after seedling emergence. Eight to ten locules per pod, recurving type of pod curvature but the degree of curvature is medium. The shape of distal part (excluding beak) of the pod is acute to truncate. Productivity is 13-14 MT/ha.



Figure 11: Flowers, pods, cross-section of the pod, and seeds

Seed characteristics

Can harvest mature pods in 75-100 days for seed. Seed colour is pale to dark brown (coffee brown colour). Seed shape is cuboid in crosswise while

elliptic in lengthwise and smooth in texture. Seed hilum is brownish white, and eye ring is purplish brown. TSW ranges from 317.5 to 319.7 g at 9% moisture content.

Distinct characters:

- Hypocotyl is green
- Ovate leaflet
- Flowers are white
- Pods are recurving, 'J' shaped and smooth
- Seed coat colour is pale to dark brown and hilum is brownish white
- Eye ring is purplish brown

Sponge Gourd (*Luffa cylindrica* L.) variety Kantipure

Seedling characteristics

Hypocotyl colour is greenish white. The margin of the seedling leaf is entire, cotyledonary leaves are 2.8-4 cm in length, and 1.7-2 cm in width, green in colour and seedling pubescence is absent.



Figure 12: Seedlings

Vegetative characteristics

Plant growth habit is prostrate, branching, climber vine. Tendrils present. Tendril branching is multifid i.e., 4-5 branches on the main tendril where middle one is longer than its counterpart. The stem is angular in shape. The diameter of the main stem from the 10th - 15th nodes at the time of 20th leaf expanding ranges from 4 - 4.4 mm. An average length of internode at the 10th to 15th nodes at the time of 20th leaf expanding cross section is 22.52 cm (20-24.5 cm). The shape of the leaf is reniform and intermediate in size, no spot presents on the leaf lamina, and dented leaf margin. Leaf dimension of 6th to 10th leaf at the time of 20th leaf expanding is 30-32 cm wide and 35-38 cm long. Leaf pedicel is 14-16 cm long. Leaf lobbing is intermediate in young leaves and shallow in old leaves. Low pubescence is on the dorsal (abaxial) surface of the leaf and high pubescence on the ventral (adaxial) surface of the leaf.



Figure 13: Flowering and fruiting plants (above), leaf at different growth stages (below left), stem, stem cross section and fruit cross section (below right)

There are 4-5 side shoots develop from the main stem in 110-120 days after transplanting. Stem pubescence absent.

Flower, fruit and seed characteristics

Flowers are yellow. The plant develops male and female flowers on the same plant but different nodes (monoecious) with the male to female ratio 12:1. The staminate flowers are in racemes while the pistillate flowers are solitary and long pedunculated. The peduncle is round shape and 14-16 cm long. Annual in flowering, takes 65-70 days from transplanting to develop the first flower. Flowering stalk colour is yellowish green. It is hard to separate fruit from the peduncle. Fruits are round at the blossom and pedicel end. Fruits are elongated-tapered in shape, light green in colour, and ready for the first harvest in 70-80 days after transplanting. Fruits are 46-70 cm long and 4-5.7 cm wide. It has 3-4 mm thick, hard and finely wrinkled fruit skin, and 37.8-53.4 mm thick, creamy white, smooth and highly moist flesh. Intermediate in fruit ribs and flavour. There are 20-25 fruits per plant with the average weight 315.4 g (300-423 g). Productivity 15-18 MT/ha.



Figure 14: Pistillate floral buds and seeds (left)

The first fruit is ready for seed extraction within 135-155 days after fruiting. The sponge is soft. Primary seed coat colour is black and smooth surface, flat in shape. Seed is 2-2.08 mm thick, 8-8.03 mm wide and 12-12.04 mm long. Seed margin is irregular and dark brown with light brown hilum, 250-400 seeds per fruit, and TSW ranges from 117.7 to 119.52 g at 9% moisture.

Distinct characters:

- Greenish white hypocotyl
- Prostate and branching vine
- A tendril branches into 4-5 small tendril, middle one is long
- Reniform leaf shape with no spot on the lamina
- Leaf lobes are intermediate in younger and shallow in the older leaf
- Fruits are long, smooth and light green
- Black seed with dark brown seed margin

Bitter Gourd (*Momordica charantia* L.) variety Seto Karela

Seedling characteristics

Light green hypocotyl colour, cotyledon is medium in size, good seedling vigour, crenate type of seedling leaf margin, glabrous, no pigmentation on leaves.



Figure 15: Seedlings

Vegetative characteristics

Prostrate in growth habit develops climbing vines and thrive with a medium number of branches. First true leaf blade apex is cuspidate, and the margin is denticulate. The internode between 4th and 5th node is 10-15 cm long. Leaf is green in colour. Leaf blade shape is ovate, strongly lobed with seven lobes, and blade margin is between serrate to dentate type. The blade tip is acute. The length of petiole in the middle region of the vine ranges from 9.5-12 cm. It starts climbing in 30 days after emergence. Stem pubescence absent. Stem cross section is angular in shape. The length of vine ranges from 360-510 cm.



Figure 16: Plants at vegetative stage (above) and leaves at different stage and pistillate flowers (below)

Flower, fruit and seed characteristics

Annual in flowering and plants are monoecious. Flowers are yellow. The female flower appears after 40-45 days of transplanting usually in the 18th-20th node. Pistillate flowers are spherical in shape; the ovary is slender and light green. Ovary length ranges from 3-5.5 cm and diameter

3.5-7 mm. Flowers open in the morning, 7 am to 11 am. The twinning tendency is none. The ratio of female to male flower is small (1:12).

Medium in fruit setting, white to milky white fruits, fruit weight ranges from 90-142 g with dimension of 17-34 cm length and 3.6-4.9 cm width. Fruits are long cylindrical. Fruit wall thickness is 6.1-9.1 mm. Tubercles present on the fruit surface. The warty pattern is intermediate, fruit ribbing is slightly deep, and peduncle length varies between 2-2.5 cm. Peduncle separation difficulty is intermediate. Fruit shape in blossom end is acute and rounded in peduncle end. Fruits ready for the fresh harvesting within 65-70 days after transplanting, moderately bitter and productivity ranges from 14-19 MT/ha.



Figure 17: Flowering and fruiting plants (above) and fruits and seeds (below)

Fruit ripens and ready for seed harvest within 80-90 days after transplanting. Medium to high in seediness, 29-40 seeds per fruit, rough texture of seed coat. Seeds are reddish brown in colour and seed coat mottling absent. Seed outline is elliptical to oblong in shape. Seeds are 15-16 mm long, 8-8.6 mm wide and 4-4.5 mm thick. TSW at 9% moisture level ranges from 226.8 to 229.75 g.

Distinct characters:

- Light green hypocotyl colour
- True leaf blade margin is denticulate
- Matured leaf margin is serrate to dentate with acute leaf tip
- Angular stem cross section, plant bears yellow flowers
- Slender ovary
- White to creamy white fruit of long cylindrical shape
- Moderate in bitterness

Bitter Gourd (*Momordica charantia* L.) variety Hariyo Karela

Seedling characteristics

Hypocotyl colour is pale green, cotyledon is medium in size, seedling vigour is good, crenate type of seedling leaf margin, glabrous, and no pigmentation presents on the leaves.



Figure 18: Seedlings

Vegetative characteristics

Prostrate in growth habit; develops climbing vines and intermediately develops branches. First true leaf blade apex is cuspidate, and the margin is denticulate. Internode between 4th and 5th node is 8-12 cm long. Leaf is dark green in colour (darker than Seto Karela). Leaf blade shape is ovate, strongly lobed with seven lobes, and blade margin is between serrate to dentate type. The blade tip is obtuse. It bears more hairiness towards apical part of the vine than the basal part. The length of petiole in the middle region of the vine ranges from 7.5-10 cm. It starts climbing in 28-30 days after emergence. Stem pubescence absent. Stem cross section is angular in shape. The length of vine ranges from 340-480 cm.



Figure 19: Plants at vegetative stage (above left), floral buds (above right) and fully expanded leaf (below)

Flower, fruit and seed characteristics

Annual in flowering and plants are monoecious. Normally, the female flower appears after 40-45 days of transplanting usually in the 17th-20th node. Flowers are yellow. Pistillate flowers are spherical in shape; the ovary is elliptic and dark green. Ovary length ranges from 3-3.6 cm and

diameter 2-3.7 mm. Flowers open in the morning time (7 am to 11 am). The twinning tendency is none. The ratio of female to male flower is tiny (1:13).

Medium in fruit setting, first harvesting of fresh green-colored fruit within 60-65 days after transplanting, fruit weight ranges from 51-75 g with dimension of 20-25 cm length and 2.8-4.1 cm width. Fruits are long elliptical shaped, and wall thickness is 5.5-7 mm. Fruit surface is light tubercle and presence of tubercles is medium. The warty pattern is intermediate, fruit ribbing is slightly deep, and peduncle length varies between 1.5-2.5 cm. Difficulty in peduncle separation is intermediate. Fruit shape both in blossom end and peduncle end is acute. Fruits are bitter than Seto Karela and productivity ranges from 12-16 MT/ha.

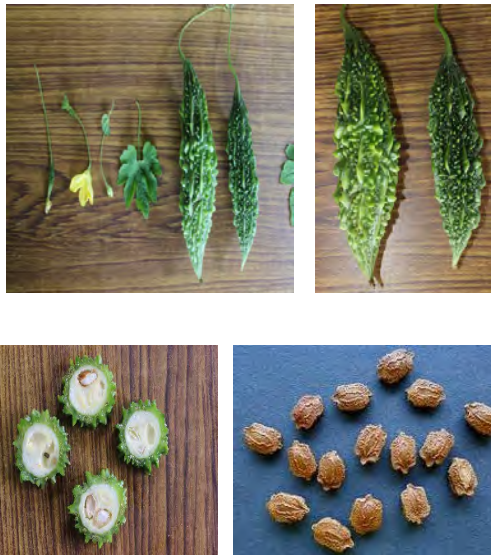


Figure 20: Fruits and seeds

Fruits ripened in 75-90 days after transplanting. Medium to high in seediness, 20-30 seeds per fruit, and rough texture of seed coat. Seeds are reddish brown to dark brown in colour and seed coat mottling absent. Seed outline is round to oblong in shape. Seeds are 13-14 mm long, 8-10 mm wide and 4-4.6 mm thick. TSW ranges from 217.25 to 219.11 g at 9% moisture level with an average weight 218.18 g.

Distinct characters:

- Pale green hypocotyl colour
- True leaf blade margin is denticulate
- Matured leaf margin is serrate to dentate with obtuse leaf tip
- Angular stem cross section, yellow flower
- Elliptical ovary
- Green fruits of club shape
- Bitter taste than Seto Karela

Okra (*Abelmoschus esculentus* L.) variety Arka Anamika

Seedling characteristics

Hypocotyl colour is light green. Cotyledonary leaf is green in colour, entire margin, and glabrous pubescence.

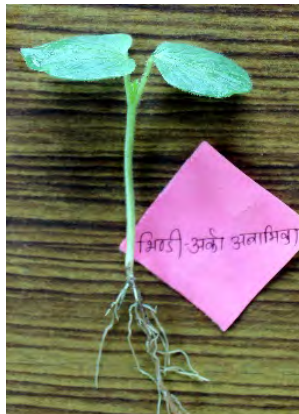


Figure 21: Seedling

Vegetative characteristics

Plant growth habit is erect and sparse branching. Tall in plant height, average plant height (measure extremity of the plant) at the vegetative stage is 229.9 cm (204-256 cm). The internode number ranges from 15-18. Green stem with purple shade and stem diameter at the base of the plant is 23-26 cm. The leaf blade is medium both in size and depth of lobbing, five lobes in each leaf. Dentate leaf margin, the leaf is dark green with light green veins. Petiole colour is pinkish green while leaf blade colour at the petiolar attachment is pink. The petiole is long and medium in width. Leaf pubescence is intermediate. Stem is hairy, green in colour.



Figure 22: Plant at fruiting stage (left) and fully matured leaf (right)

Flower, fruit and seed characteristics

Annual in flowering, hermaphrodite flowers, and starts flowering about 45 days after seedling emergence. It starts flowering from 4th-6th node. Corolla is creamy white colour; purple pigment presents both sides of the petal base. The calyx number ranges from 12-13 which are spiny in shape and persistent on the fruit. The position of the fruits of the primary stem is erect, green in colour, 18-28 cm long, intermediate in fruit pubescence, free from spines. Fruit bears five locules per fruit, five ridges and the surface between the ridges is flat. The shape of fruit apex is narrow acute and constriction at the basal part is very weakly expressed.

Plants are early in maturity, ready for fresh fruit harvest in 55-60 days after seedling emergence and fresh production ranges from 11-12 MT/ha. Pods mature in 25-35 days after fruiting for seed harvest. Seeds are round, glabrous, and greenish grey. TSW ranges from 62.8 to 63.96 g at 10% moisture.



Figure 23: Flowering plant (left), flowers, fruits and fruit's cross section (middle) and seeds (right)

Distinct characters:

- Hypocotyl colour is light green.
- Erect plant and sparse branching
- Leaf blade divided into 5 lobes with medium lobbing
- Hairy stem
- Cream colored flowers, purple at the base of the corolla
- Green fruits with 5 ridges and 5 locules
- Fruit apex is narrow acute and constriction at the base is very weakly expressed
- Seed is round and greenish grey

Tomato (*Solanum lycopersicum* L.) variety BL410

Seedling characteristics

Anthocyanin pigmentation on hypocotyl is present. A cotyledon is pale green. Stem pubescence is weak.



Figure 24: Seedlings

Vegetative characteristics

Semi-determinate growth habit; needs staking. Foliage colour is dark green. Seven to nine leaves develop under the first inflorescence. Type of leaf blade is bipinnate. Leaves are of a potato-leaf type and semi-drooping in attitude. Leaf is green in colour and 4-8 leaflets present on the leaf.



Figure 25: Plants at flowering and fruiting stage

Inflorescence characteristics

Starts flowering from 20-25 days after transplanting. The flowers per inflorescence range from 7-12. The inflorescence of the 2nd and 3rd truss is uniparous. Flowers are yellow. Sepal and petal length ranges from 0.5-0.7 cm and 0.9 - 1.2 cm, respectively. Style develops at the same level as the stamen. The average length of the stamen is 0.88 cm (0.8-0.9 cm).

Fruit and seed characteristics

Fruits ready for fresh harvest in 65-70 days after transplanting. Fruits are round in shape and size varies between 35-60 g. Productivity ranges from 25-35 MT/ha. Develops uniform fruits within a plant, absent fruit ribbing at blossom end but very weak ribbing exists at the peduncle end. Fruits are firm and no cracking on fresh fruit. Number of fruit at the 2nd inflorescence ranges from 6-10, fruit length 3.5-3.9 cm, fruit width 3.5-3.8 cm, and length of pedicel ranges from 0.6-0.8 cm. Pedicel attachment area is slightly depressed and flat at the blossom end. The shape of pistil scar is dot. Fruit turns red, and pericarp colour is also red when ripe. Transverse section is round, pericarp thickness ranges from 4-5.5 mm, the number of locules 2, and peeled fruit skin colour is yellow. Fair in peeling easiness. Fruit firmness ten days after storing is intermediate.



Figure 26: Flower (left), fruits transverse cross section of fruits showing locules and pericarp (middle), and seeds

Seed shape is ovate; seeds are yellowish brown. TSW ranges from 2.4 to 2.42 g at 9% moisture level.

Distinct characters:

- Purple hypocotyl
- Semi-determinate, bi-pinnate leaf blade with 4-8 leaflets
- Inflorescence is uniparous
- Fruits round in shape, weakly depressed and ribbing at pedicel end
- Fruit locules 2, seeds are yellowish brown and weakly hairy

Tomato (*Solanum lycopersicum* L.) variety NCL1

Seedling characteristics

Anthocyanin pigmentation on hypocotyl is absent. A cotyledon is green. Stem pubescence is absent.



Figure 27: Seedlings

Vegetative characteristics

Semi-determinate growth habit, hence needs staking. Foliage colour is green. 10-12 leaves develop under the first inflorescence. Type of leaf blade is bipinnate with 7-11 leaflets. Leaves are of a standard type and horizontal to semi-drooping in attitude; green in colour and 4-8 leaflets present on the leaf.



Figure 28: Flowering and fruiting plants

Inflorescence characteristics

Starts flowering from 20-25 days after transplanting. A number of flower per inflorescence ranges from 7-13. The inflorescence of the 2nd and 3rd truss is the uniparous type. Flowers are yellow. Sepal and petal length ranges from 0.6-0.9 cm and 0.7-1 cm, respectively. Style develops at the same level as the stamen. The average length of the stamen is 0.68 cm (0.5-0.9 cm).



Figure 29: Flowers and fruiting plants

Fruit and seed characteristics

Fruits ready for the first fresh harvest in 65-70 days after transplanting. Fruits are plum shaped, slightly round, and size varies between 60-75 g. Productivity ranges from 20-30 MT/ha. Develops uniform fruits within a plant, absent fruit ribbing at blossom and peduncle end. Fruits are firm and no radial-cracking on fresh fruit. Number of fruit at the 2nd inflorescence ranges from 7-13, fruit length 3.5-4 cm, fruit width 3.5-3.8 cm, and length of pedicel range from 0.4-0.7 cm. The shape of pedicel attachment area is flat, slightly tapered towards the blossom end and blunt. The shape of pistil scar is dot. Fruit turns red, and pericarp colour is orange to red when ripe. Transverse section cut is round; pericarp thickness ranges from 4-5.4 mm, two locules are most common, peeled fruit skin colour is yellow, fair in peeling easiness. Fruit firmness ten days after storing is intermediate.

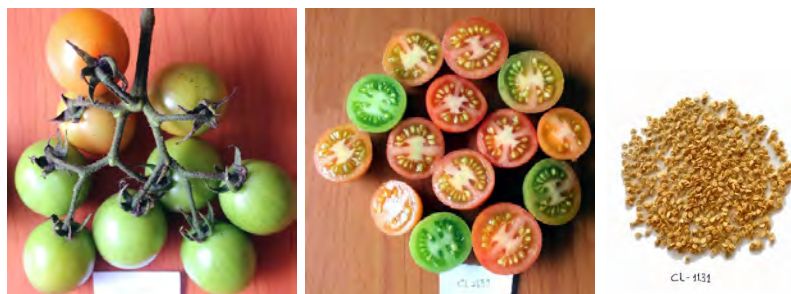


Figure 30: Fruits (left), transverse cut of fruits (middle) and seeds (right)

Seed shape is ovate; seeds are yellowish brown. TSW ranges from 2.5 to 2.54 g at 9% moisture level.

Distinct characters:

- Light green hypocotyl
- Semi-determinate, bipinnate leaf blade with 7-11 leaflets
- Uniparous inflorescence
- Fruits are plum shaped to slightly round; the shape of pedicel attachment area is flat, slightly tapered towards the blossom end and blunt at the end
- Number of fruit locules 2, seeds are yellowish brown and glabrous

Chili (*Capsicum frutescens* L.) variety Jwala

Seedling characteristics

Purple hypocotyl, pale green cotyledon and glabrous seedling. Length and width of the cotyledonous leaf are 1.5-1.7 cm and 0.28-0.36 mm, respectively and its shape is long-deltoid. Stem colour before transplanting is green with few purple stripes on the surface.

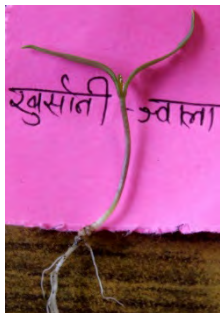


Figure 31: Seedling

Vegetative characteristics

Plants are erect in growth habit. Leaves are glabrous, dark green and ovate. The length and width of matured leaf range from 14.4-17.6 cm and 3.5-4.8 cm, respectively. The plant is intermediate in branching habit and size.

Plant stature is also intermediate (75-85 cm). The height of the first branch initiation point at the mature stage of plant is 16-20 cm, stem diameter ranges from 7-12 mm. Nodal anthocyanin is purple and present in the whole plant. In cross section, leaf petiole is flat.



Figure 32: Flowering (left) and fruiting plants at the field, leaves on the right

Inflorescence characteristics

Starts flowering from 40-45 days after transplanting. Petals are white, one pedicel (bearing flower) per axil, pedicel position is intermediate at anthesis, the angle between flower and pedicel is about 90°. White corolla length varies between 9-11 mm; anthers are pale blue with white filaments. Stigma exerted in relation to anthers at full anthesis.



Figure 33: Flowers and flowering plants

Fruit and seed characteristics

Fruits are long slender and elongated in shape. Shape in longitudinal section is narrowly triangular. The fruit is slightly corrugated at one-third from pedicel end. It is early type variety and can have the first harvest in 60-70 days after transplanting with productivity of matured fresh fruit 25-30 MT/ha.



Figure 34: Above from left: Fruits at different stage, blue arrow shows annular constriction and red arrows show blossom end appendage; below from left: calyx shape, pencil points the absence of neck at base of the fruit, fruit cross section showing locules and seeds to the right

Calyx aspect is non-enveloping, and its margin shape is dentate. Annular constriction at the junction of calyx and peduncle is visible at the mature green stage, fruit position is declining, and fruits are green at an immature stage, purplish green between immature and mature stage and red at a mature stage.

Fruit shape is obtuse at peduncle attachment, the neck is absent, and

pointed shape at the blossom end. Blossom end appendage is present on the fruit at green mature and absent in fully ripen stage. Fruits are persistence in nature and stay attached to the plant after ripening, and are highly pungent. Absent or very weak sinuation of pericarp at the basal part and weak sinuation in another part of the fruit. At the second harvest, fruit pedicel is 1.8-3 mm wide, and fruit length and width ranges from 5-8 cm and 0.9-1.01 cm, respectively. Commonly two locules per fruit and depth of interocular grooves are deep. Fruit wall thickness is 1-1.03 mm.

Seed colour is straw, 85-96 seeds per fruit. Seeds are smoothly round in shape with pointed hilum. TSW ranges from 4 to 4.16 g at 9% moisture level.

Distinct characters:

- Hypocotyl is purple
- Nodal anthocyanin present
- White flowers with pale blue anthers
- Fruits are long slender
- Calyx margin is dentate
- Two locules with deep groove
- Highly pungent
- Seed coat colour is straw

Cucumber (*Cucumis sativus* L.) variety Bhaktapur Local

Seedling characteristics

Hypocotyl colour is light green. Cotyledons are dark green and 3.6-4 mm long and 1.6-1.9 mm wide in dimension. True leaves are green with serrated leaf margin, and the seedling is glabrous.

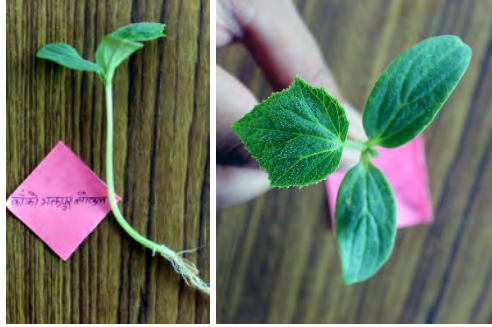


Figure 35: Seedlings

Vegetative characteristics

Plants are strong, prostrate in growth habit, branches up to 3-5 side shoots from the main stem. The stem is pubescence and angular. The average diameter of the main vine is 12.22 mm (10-13.08 mm) when measured between the internode of 4th and 5th. The internode length at the same segment is 5.98 cm (5-6.7 cm). Leaf blade shape is a rectangle, and its attitude is drooping. Tendrils are branched into 4-5 sub-tendrils (multifid) and strong. Leaf blade size is vast and dark green. Dense pubescence on leaf, leaves are usually 19-23 cm long, and 26-34 cm wide, and length of the petiole is 1.8-2.5 cm. The main vine is very long (>5 m).



Figure 36: Fruiting plants on the field

Inflorescence characteristics

Monoecious yellow flowers, slender type of ovary is medium in size. Ovary length varies between 3-3.6 cm, and ovary diameter ranges from

0.6-0.8 cm. Female flowers develop in 8th-10th node of main branch within 55-60 days after transplanting. The ratio of female to male flower is 1:11.

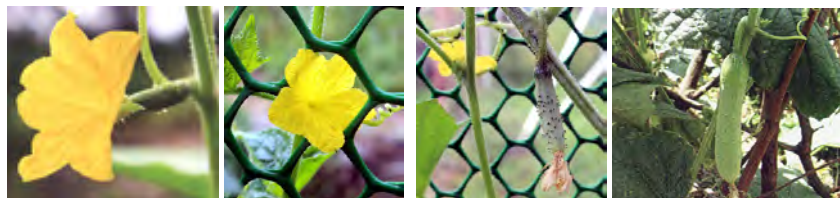


Figure 37: Female and male flowers and young fruits

Fruit and seed characteristics

Fruit setting is medium in this variety. Fruits ready for fresh harvest in 65-70 days after transplanting. Fruits are cylindrically elongated, obtuse at the stem end and rounded at the blossom end; light green stripes present on the smooth fruit surface. Type of vestiture is prickles, short, black and smooth spines (prickles) distributed intermediately on the fruit surface. Immature fruits are light green and turn yellow when ripe. Intermediately, firm fruits have smooth and white flesh with a strong aroma. Rind thickness ranges from 21-26 mm at maturity and storability is high. There are five locules. Fruits are soft and juicy while eating fresh.

The length of peduncle is 1-3 cm, the length of pistil scar is 0.5-0.6 cm, and wax on fruit is sparse. Fruit weight varies according to the growth stage. It ranges from 400-2,000 g during fresh harvest to 3,500-6,000 g when fruit ripe for seed harvesting. In commercial cucumber production, 400-500 g fruits can be harvested within 10-12 days after pollination of pistillate flowers. Fruits are medium to long, length ranges from 26-30 cm at table use maturity to 30-45 cm when ripe. Similarly, fruit diameter ranges from 5-10 cm at fresh fruit harvest stage to 10-17 cm at seed harvesting stage. Fruit ribs absent, and absent fruit sutures and creasing. Fruits are soft, juicy with strong aroma and attractive in looks while eating fresh. Productivity up to 30-40 MT/ha.



Figure 38: Immature and mature fruits and their respective transverse section below

Fruits ready for seed harvest in 120-130 days after sowing or 70-80 days after pollination. Fruits become brown when ripe. Seediness is high. A number of seeds per fruit ranges from 350-500. Seeds are flat, slightly ridged in the middle and long boat shaped. Seed coat colour is yellowish white, seed length and width ranges from 10.2-13.2 mm and 4-4.8 mm, respectively. The seed is 1.2-2 mm thick. TSW ranges from 33.89 to 35.64 g at 9% seed moisture.



Figure 39: Fruit ready for seed extraction and seeds on the right

Distinct characters:

- Light green hypocotyl and glabrous seedling
- Angular and hairy stem
- Rectangle and drooping type of leaf blade
- Monoecious plant, yellow flowers and light green ovary
- Cylindrical light green fruit with black smooth spines turns yellow when ripe
- Five locules in matured fruit
- No ribs, sutures and creasing on fruits
- Strong aroma of flesh
- Soft and juicy flesh while eating fresh

Brinjal (*Solanum melongena* L.) variety Purple Long

Seedling characteristics

Purplish green hypocotyl, pale green cotyledon and glabrous seedling. Cotyledon length/width ratio is intermediate (~2.5).



Figure 40: Seedling

Vegetative characteristics

Upright growth habit, intermediate in leaf blade length (16-21 cm) and width (12-14.5 cm). Anthocyanin pigmentation on the stem is weak. Leaf blades are intermediately lobbed with acute tip angle (50-55°). Sinuation of leaf margin is weak. Prickles on the upper surface of the young leaf are many and at lower leaf are very few. Leaf hairs are intermediate, and leaf is green in colour. Plant height at flowering stage ranges from 30-45 cm, and its foliage is intermediately wide (50-60 cm). Plant branching is weak (4-6 branches). Leaf petiole is purplish green and long (5.6-8.2 cm).



Figure 41: Plants at the field

Inflorescence characteristics

Starts flowering from 50-65 days after transplanting. Each inflorescence bears 3-5 flowers, mostly hermaphrodite and some functional male flowers also present. The style is relatively longer than the stamens. Pollen production is low. Fruit pedicel is long (5-5.5 cm) and thick (0.8-0.9 cm). No prickles present on the pedicel. The plant develops one fruit per infructescence. The corolla is light violet; filament is yellow, stigma

exserted in relation to anthers at full anthesis.

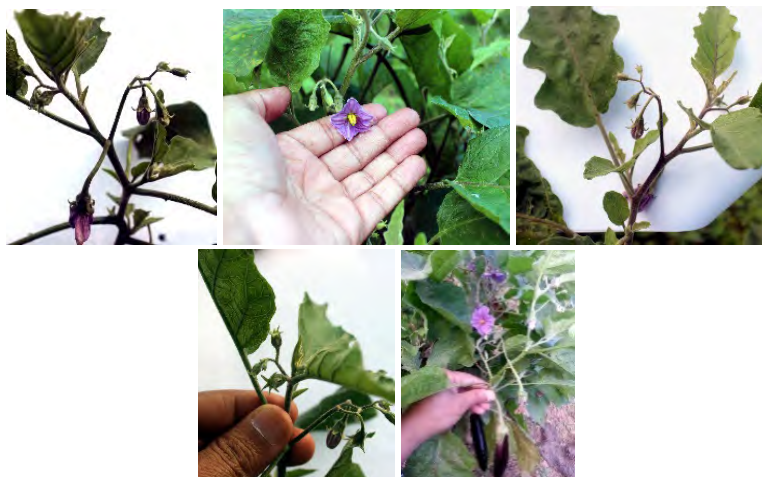


Figure 42: Flowering and fruiting plants

Fruit and seed characteristics

Fruit length from base of calyx to the tip of fruit is very long (25-31 cm), the middle part of the fruit is 24-28 mm in diameter and diameter at the broadest part is up to 61.8 mm. Average fruit length to breadth ratio is 10.88 i.e., several times as long as width. Fruit pedicel is 6-8 cm long, and average fruit weight 71 g (68-74 g). The sepals, 5, combine at the base are pale green. Detaching fruit from calyx is hard. Fruits are slightly curved to curve, and fruit shape is long cylindrical. Fruit apex is protruded, and the cross section is circular without grooves. The widest part of the fruit is about $\frac{1}{4}$ away from the base towards the tip. Fruit colour at commercial ripeness is purple and uniformly distributed at this stage. Fruit stripes are present at the apical portion of the fruit. No spine presents on the calyx. Fruit flesh is average in density. Fruits are semi-erect in position at the beginning and pendant at the physiological maturity stage.

Ready for the first harvest in 60-65 days after transplanting with productivity 25-30 MT/ha.



Figure 43: Fruits at different stage, fruit cross section and seeds

Seed colour is brownish yellow, thin, flat and round kidney shape with smooth edge. Number of seed ranges from 800-1,000 per fruit. Thousand seed weight at 9% moisture level is 3.78 g.

Distinct characters:

- Hypocotyl is purplish green
- Anthocyanin pigmentation on stem present
- Purplish leaf pedicel, leaf blade intermediately lobbed
- Leaf prickles present on upper surface of younger leaf
- Light violet corolla, yellow filaments and exerted stigma
- Purple and cylindrical long fruits
- Seed coat colour brownish yellow

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Annex A: Notification status of the studied varieties

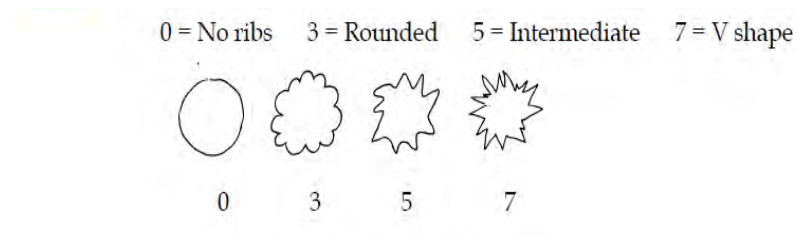
S.N.	Crop	Varieties	Year of notification	Status	Recommended domain
1	Bean	Chaumase	na	na	na
2	Bean	Trishuli Simi	2051	Released	Mid- and high hills
3	Bitter gourd	Seto Karela	na	na	na
4	Bitter gourd	Hariyo Karela	2051	Released	Terai and mid-hills
5	Brinjal	Purple Long	na	na	na
6	Chili	Jwala	2051	Released	Terai, mid- and high hills
7	Cucumber	Bhaktapur Local	na	na	na
8	Okra	Arka Anamika	2066	Registered	Terai, mid- and high hills
9	Sponge gourd	Kantipure	2051	Released	Terai, mid- and high hills
10	Squash	Asare Squash	2051	Released	Terai and mid-hills
11	Tomato	BL 410	na	na	na
12	Tomato	NCL 1	2051	Released	Terai and mid-hills

N.B.: na = not available (denotes neither registered nor released but common in Nepal)

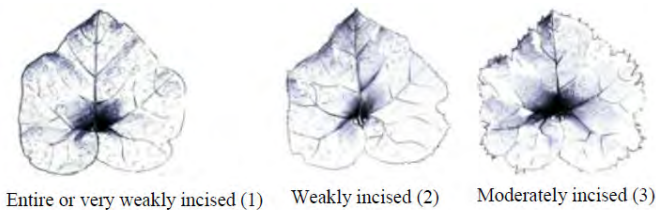
Annex B: Sketch of Character Descriptor

Cucurbits/Squash

Fruit rib shape of cucurbits

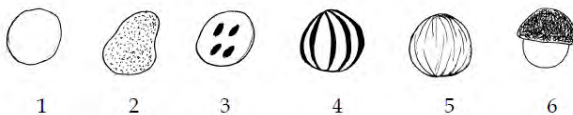


Leaf blade margin



Design produced by secondary fruit skin colour

- CB29** Design produced by secondary fruit skin color
- 1 = No secondary skin color
 - 2 = Speckled: Speckles are spots < 0.5 cm
 - 3 = Spotted: Blotches are spots > 0.5 cm
 - 4 = Striped: Stripes are bands that run from peduncle to blossom scar
 - 5 = Streaked: Short rays or streaks are elongated marks that are not continuous from one end of fruit to other and < 4 cm in length
 - 6 = Bisectional: Long streaks are as above but longer than 4 cm
 - 7 = Others



Fruit shape of cucurbits



8. Elongate forms

Fruit shape at peduncle end



Raised (1)

Flat (2)

Moderately depressed (3)

Strongly depressed (4)

Shape of blossom end (flower scar included)



Depressed (1)

Flat (2)

Raised (3)

Gourds:**Sponge gourd**

Leaf shape



Ovate

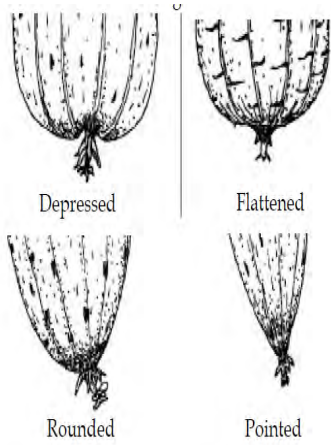


Orbicular

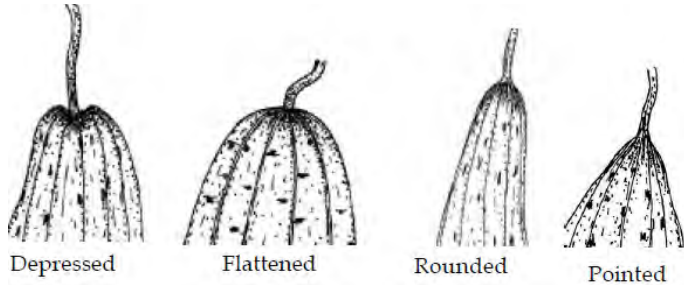


Reniform

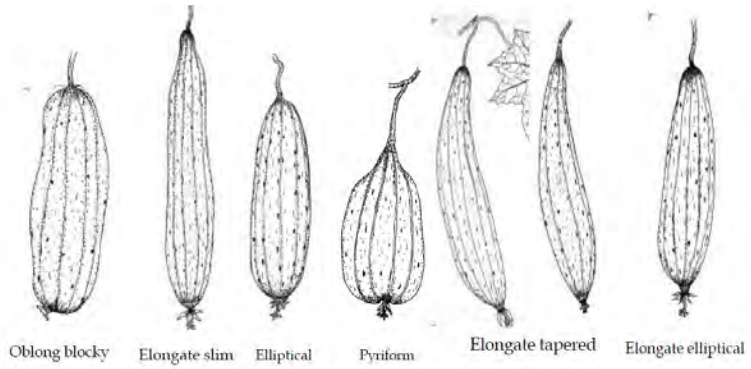
Blossom end fruit shape



Stem-end fruit shape



Fruit shape



Bitter gourd

Leaf blade margin



Entire (1)



Serrate (2)



Multifid(3)

Leaf blade shape



Obovate (1)



Cordate (2)



Oblong (3)



Reniform (4)

Leaf blade: number of lobe



5 lobes (1)



7 lobes (3)

Fruit shape of base at peduncle end

Ch.19: Fruit: shape of base at peduncle end



Acute (1)



Obtuse (2)



Rounded (3)



Flattened (4)

Ch.20: Fruit: shape of apex at blossom end



Acute (1)



Obtuse (2)



Rounded (3)



Flattened (4)

Ch.21: Fruit: shape in longitudinal section



Oblong (1)



Ovate (2)



Spindle

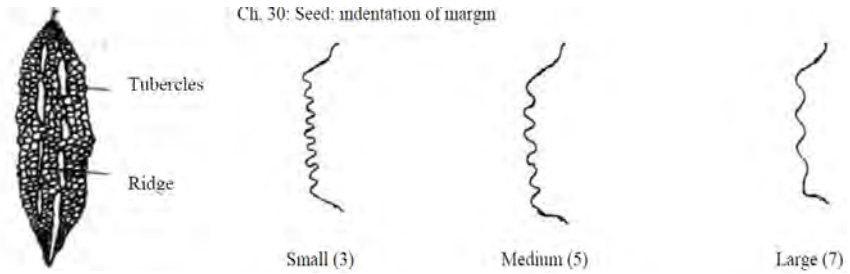


Club shape (4)



Triangular 95)

Fruit ridge and tubercles

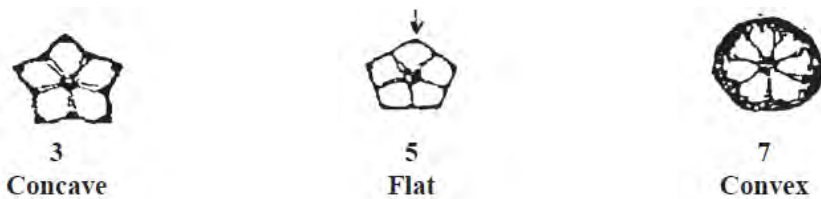


Okra/ Lady's Finger

Leaf blade: depth of lobbing



Fruit: surface between ridges

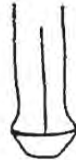


Fruit: constriction of basal part

Characteristic 22. Fruit: Constriction of basal part



1
Absent



3
Weak



7
Strong

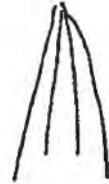
Fruit: shape of apex



1
Narrow acute



2
Acute



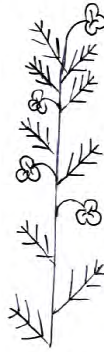
3
Blunt



Length

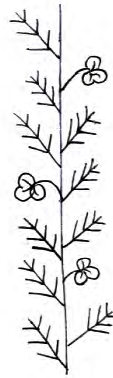
Tomato

Characteristic 3. Plant: Growth type



1

Determinate



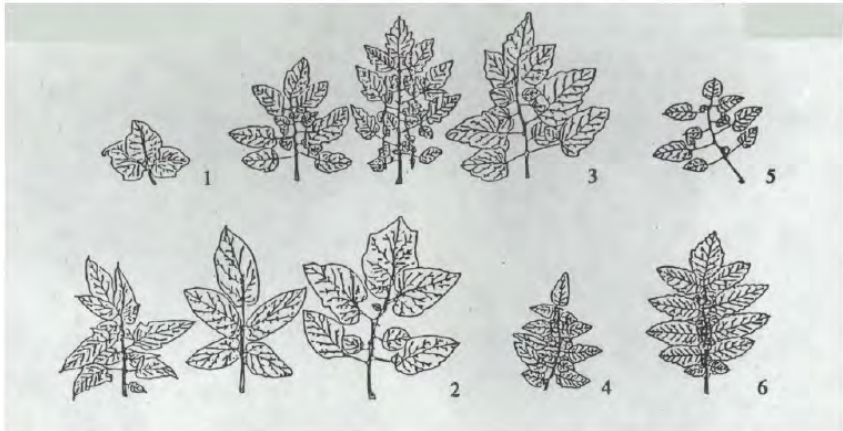
2

Indeterminate

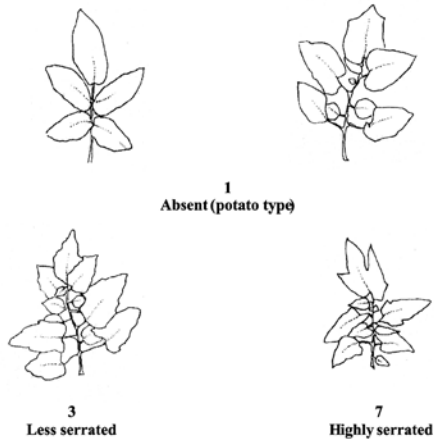
Leaf type

Leaf type

- 1 = Dwarf 2 = Potato leaf type 3 = Standard 4 = Peruvianum
 5 = Pimpinellifolium 6 = Hirsutum 7 = Other (specify) _____

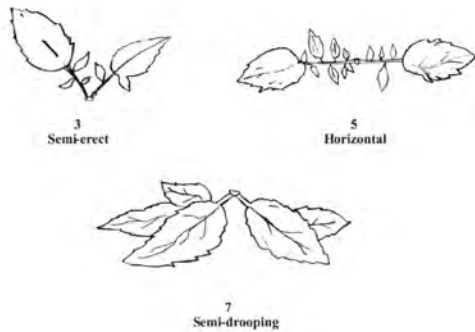


Leaflet serration



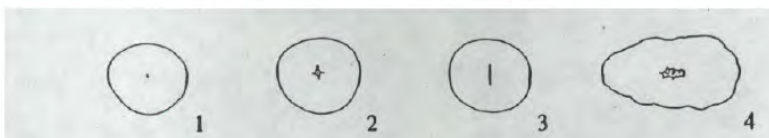
Leaf: attitude of petioles of leaflets in relation to main axis

Characteristic 15. Leaf: Attitude of petioles of leaflets in relation to main axis



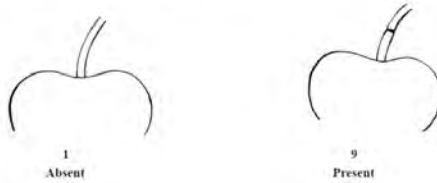
Shape of pistil scar

1 = Dot 2 = Stellate 3 = Linear 4 = Irregular X = Mixture

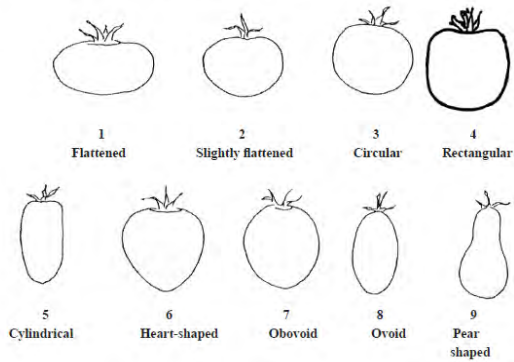


Peduncle: abscission layer

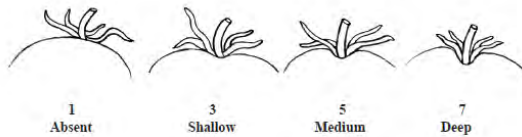
Characteristic 25. Peduncle: Abscission layer



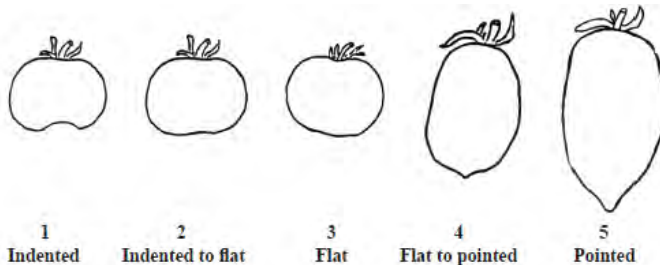
Fruit shape in longitudinal section



Fruit depression at peduncle end



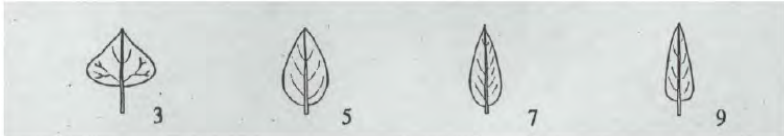
Shape at blossom end



Chili

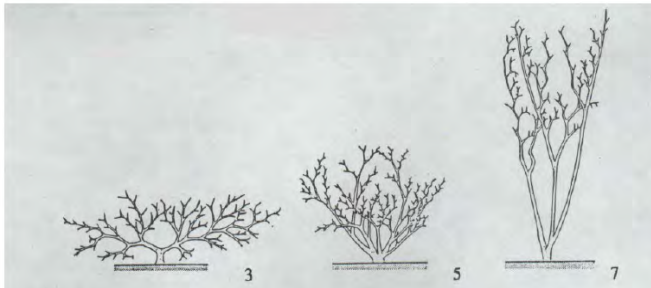
Cotyledons leaf shape

3 = Deltoid 5 = Ovate 7 = Lanceolate 9 = Elong-deltoid X = Mixture



Growth habit

3 = Prostrate 5 = Compact 7 = Erect X = Mixture



Stem: intensity of pubescence (hairiness)

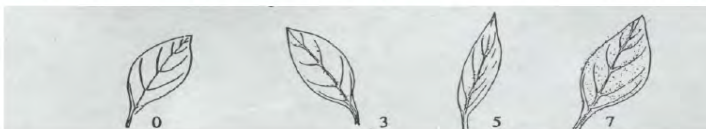


Leaf pubescence density (of youngest mature leaf when first fruit turning red)

Leaf pubescence density

(of youngest mature leaf when first fruit turning red)

0 = Glabrous 3 = Sparse 5 = Intermediate 7 = Abundant X = Mixture



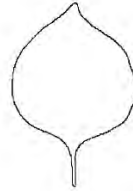
Leaf shape



1
Lanceolate



2
Ovate



3
Broad elliptic

Leaf: profile in cross section

Ad. 17: Leaf: profile in cross section



1
strongly concave



3
moderately concave



5
flat



7
moderately convex



9
strongly convex

Flower/fruit orientation

3 = Drooping

5 = Semi-drooping

7 = Erect

X = Mixture



Angle between flower and pedicel

Angle between flower and pedicel

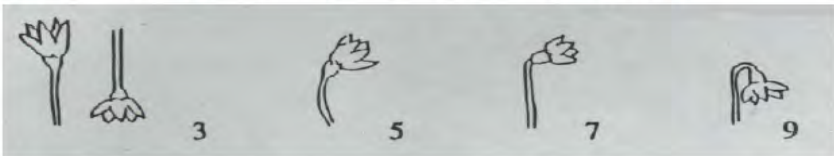
3 = 0°

5 = 45°

7 = 90°

9 = >90°

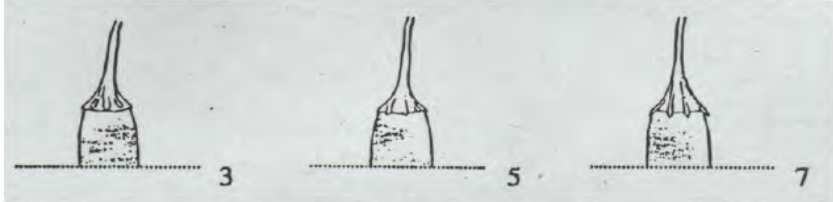
X = Mixture



Calyx margin shape

Calyx margin shape

3 = Smooth 5 = Intermediate 7 = Dentate X = Mixture



Calyx coverage

Calyx: Cover



1

Non-enveloping



9

Enveloping

Calyx margin

Calyx: Margin



1

Smooth



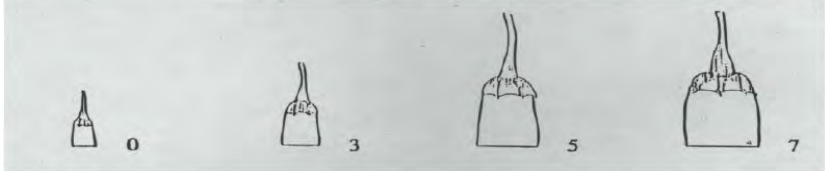
9

Dented

Annular constriction at junction of calyx and peduncle (at mature green stage)

Annular constriction at junction of calyx and peduncle (at mature green stage)

0 = Absent 3 = Not clear 5 = Clear 7 = Distinct and uniform X = Mixture



Calyx constriction

Calyx: Constriction



1
Absent



9
Present

Fruit blossom end appendage

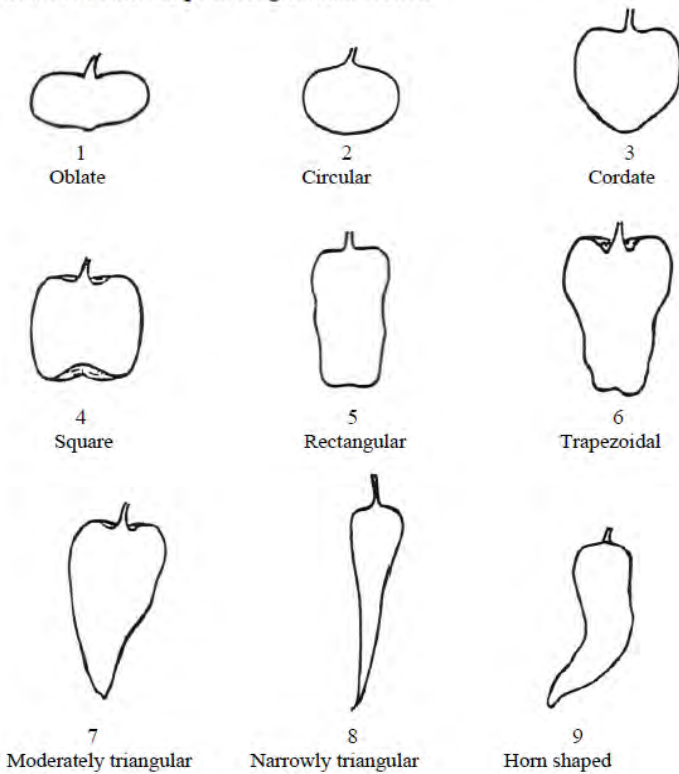
Fruit blossom end appendage

0 = Absent 1 = Present X = Mixture



Fruit shape in longitudinal section

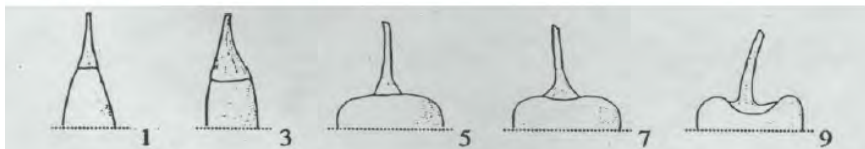
stic # 30: Fruit: shape in longitudinal section



Fruit shape at peduncle attachment

Fruit shape at peduncle attachment

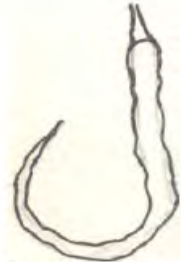
- 1 = Acute 3 = Obtuse 5 = Truncate 7 = Cordate
 9 = Lobate X = Mixture



Fruit curvature

Fruit: Curvature1
Absent9
Present

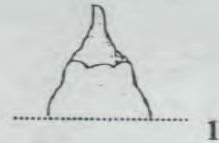
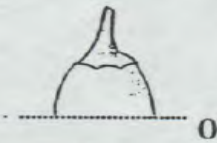
Fruit curvature intensity

stic # 32: Fruit: Curvature intensity3
Low5
Medium7
High

Neck at base of fruit

Neck at base of fruit

0 = Absent 1 = Present X = Mixture



Fruit shape at blossom end

Fruit shape at blossom end

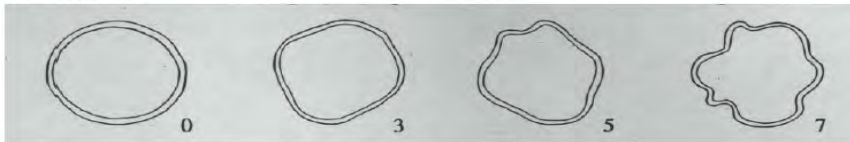
3 = Pointed 5 = Blunt 7 = Sunken 9 = Sunken and pointed



Fruit cross-sectional corrugation (1/3 from pedicel end)

Fruit cross-sectional corrugation (1/3 from pedicel end)

0 = Smooth 3 = Slightly corrugated 5 = Intermediate 7 = Corrugated
 X = Mixture



Fruit: sinuation of pericarp at basal part

Ad. 30: Fruit: sinuation of pericarp at basal part



1
absent or very weak



3
weak



5
medium



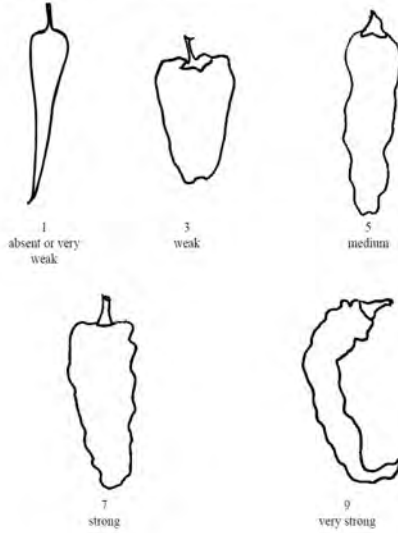
7
strong



9
very strong

Fruit: sinuation of pericarp excluding basal part

Ad. 31: Fruit: sinuation of pericarp excluding basal part



Cucumber

Leaf blade orientation: To be observed only for staked, vertically grown varieties



Erect (1)



Horizontal (2)



Drooping (3)

Leaf blade shape of apex of terminal lobe

1
acute2
rt angle3
obtuse4
rounded

Fruit shape:



Elongate (1)



Oblong (2)



Cylindrical (3)



Oval (4)

Fruit shape at peduncle end

Fruit: shape at peduncle end



Flat (1)



Acute (2)



Obtuse (3)

2: Fruit: shape at blossom end



Acute (1)



Obtuse (2)



Rounded (3)



Truncate (4)

Ch. 25: Fruit: ribs



Absent (1)



Present (9)

Fruit sutures: sutures are highly depressed in relation to the fruit surface)



Absent (1)

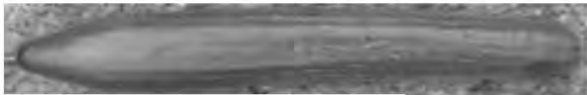


Present (9)

Ch. 27: Fruit: creasing

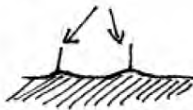


Absent (1)



Present (9)

Fruit: type of vestiture



Hairy (3)



Prickles (7)

Trishuli Simi/Chaumase Simi

French bean/snap bean/field bean/pole bean/common bean

Leaflet shape (see Figure 1.)

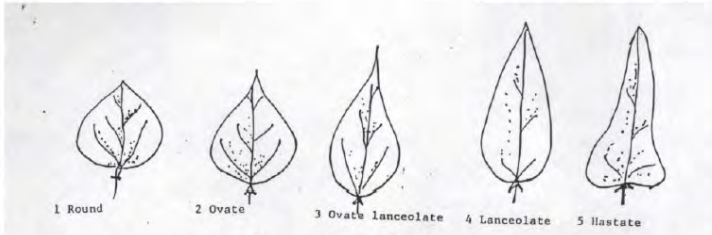
1 = Round

2 = Ovate

3 = Ovate lanceolate

4 = Lanceolate

5 = Hastate



Terminal leaflet: shape



1
triangular



3
circular



5
quadrangular

Ad. 13: Terminal leaflet: length of tip



1
short



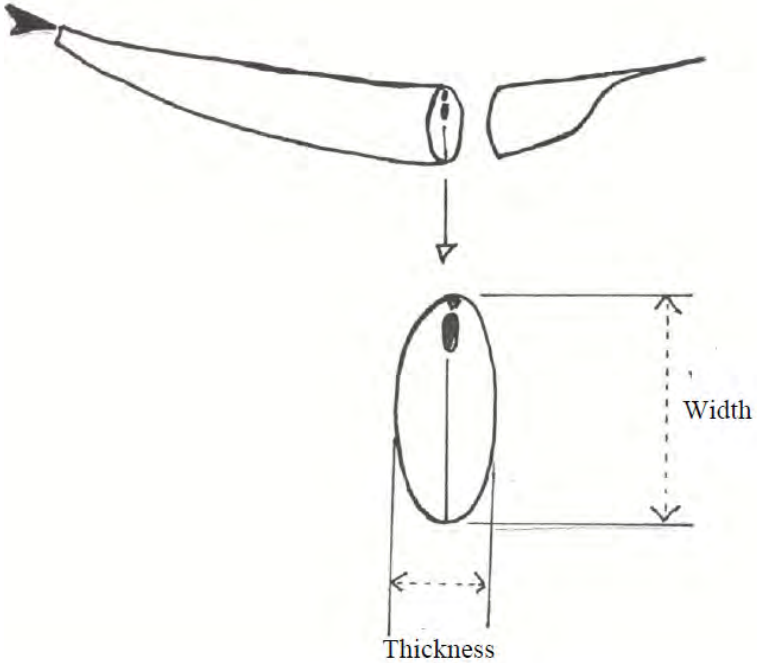
2
medium



3
long

.20: Pod: width

.21: Pod: thickness



: Pod: shape in cross section (through seed)



1
elliptic



2
ovate



3
cordate

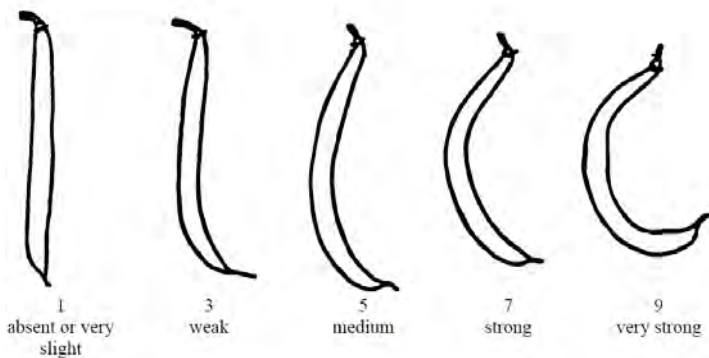


4
circular

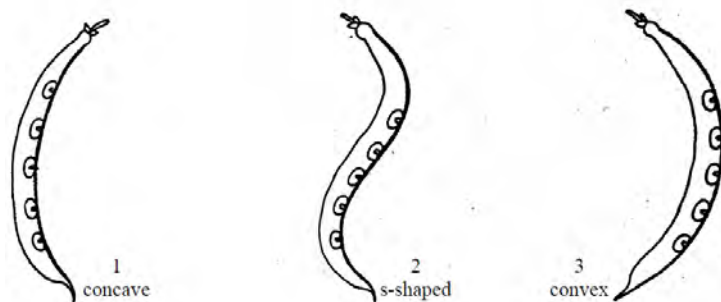


5
eight-shaped

30: Pod: degree of curvature



31: Pod: shape of curvature



Pod curvature (see Figure 2.)

1 = Straight 5 = Slightly curved 7 = Curved 9 = Recurving
X = Mixture

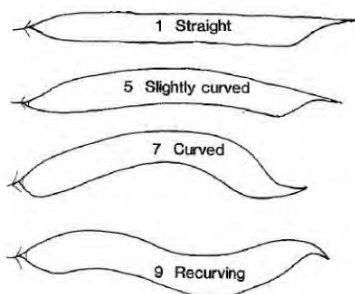


Figure 2. Pod curvature

Pod: shape of distal part (excluding beak)



1
acute



2
acute to truncate



3
truncate

General shape

1 = Round

2 = Oval

3 = Cuboid

4 = Kidney shaped

5 = Truncate fastigiata



1 Round



2 Oval



3 Cuboid



4 Kidney shaped



5 Truncate fastigiata

Figure 3. Seed shape

Seed shape

.d. 38: Seed: shape in longitudinal section



1
circular



2
circular to
elliptic



3
elliptic



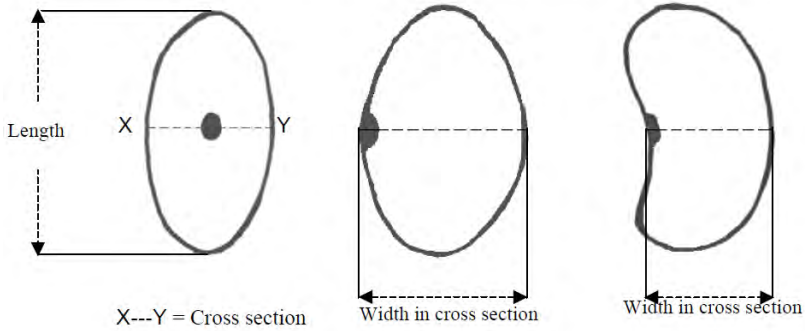
4
kidney-
shaped



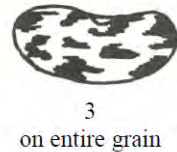
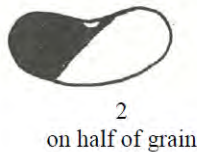
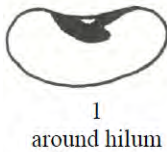
5
rectangular

Seed shape in cross section, width and length in cross section

0, 41, 42: Seed: shape in cross section (40), width in cross section (41), length (42)



46: Seed: distribution of secondary color



Brinjal

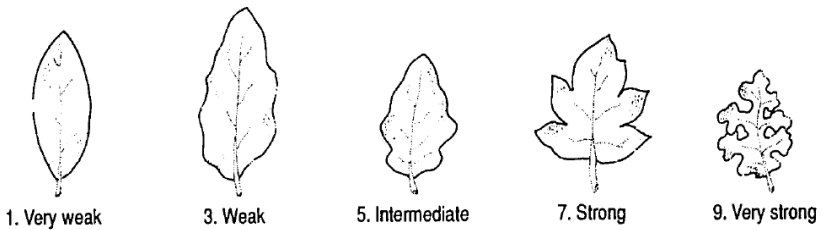


Fig. 1. Leaf blade lobing

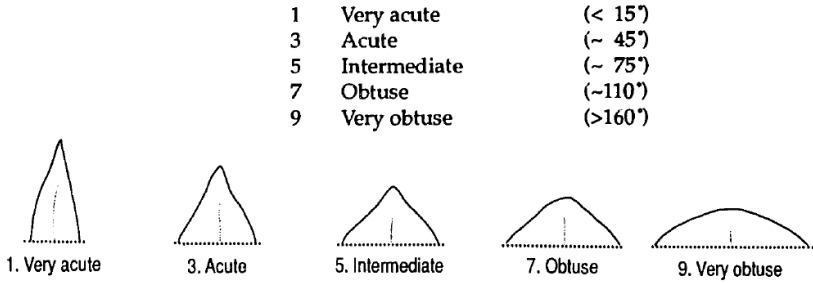


Fig. 2. Leaf blade tip angle

4.2.5 Fruit length/breadth ratio

See Fig. 3

- 1 Broader than long
- 3 As long as broad
- 5 Slightly longer than broad
- 7 Twice as long as broad
- 8 Three times as long as broad
- 9 Several times as long as broad

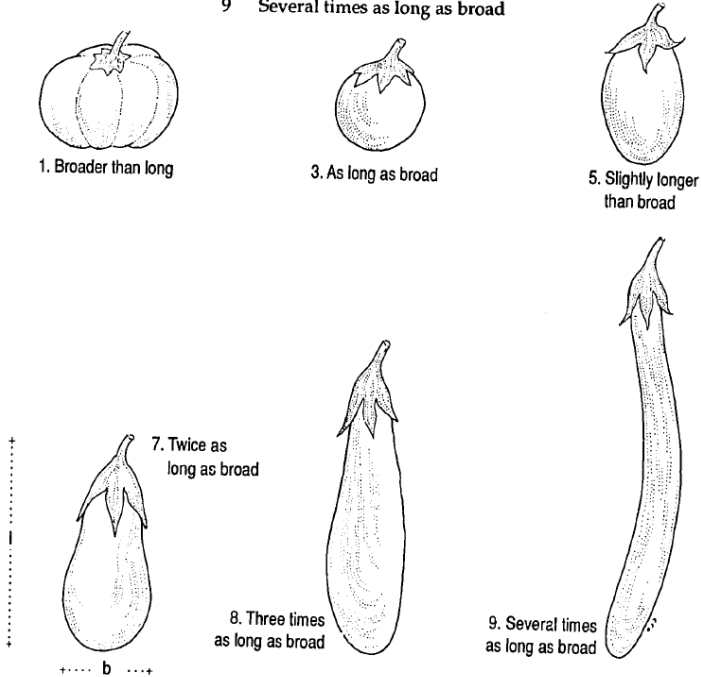


Fig. 3. Fruit length/breadth ratio

Fruit curvature

- 4.2.6. **Fruit curvature**
 See Fig. 4
- 1 None (fruit straight)
 - 3 Slightly curved
 - 5 Curved
 - 7 Snake shaped
 - 8 Sickie shaped
 - 9 U shaped

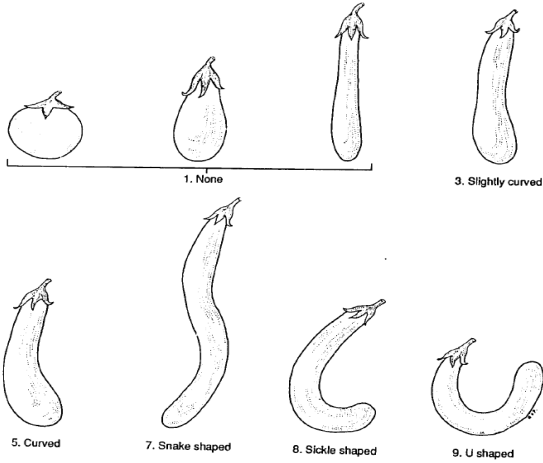
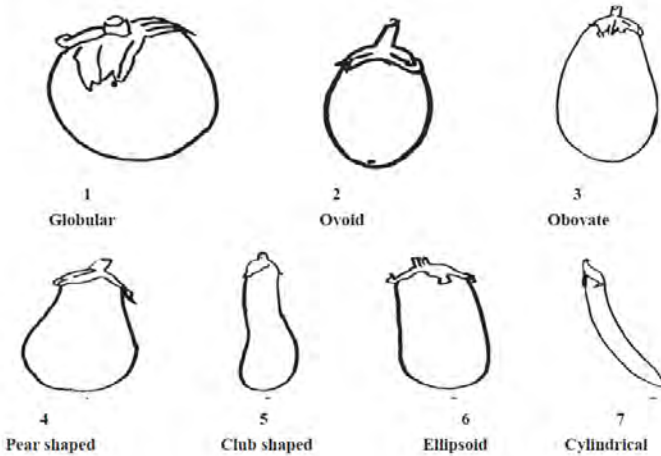


Fig. 4. Fruit curvature

Characteristic 23. Fruit: General shape



Fruit: Stripes

9
Present

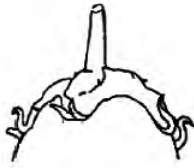
Fruit: Patches

9
Present

Figure 37. Fruit: Spininess of calyx



1: Absent



3: Weak



5: Medium



7: Strong

Name of some shapes and outlines

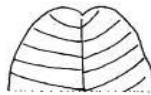
Shape of leaf apex



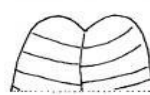
Mucronate



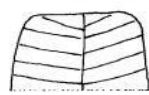
Cuspidate



Retuse



Emarginate



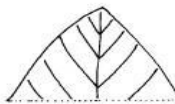
Truncate



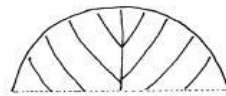
Acuminate



Acute

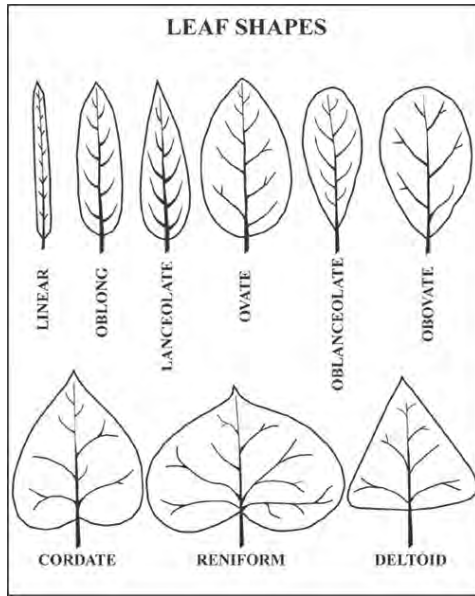


Obtuse

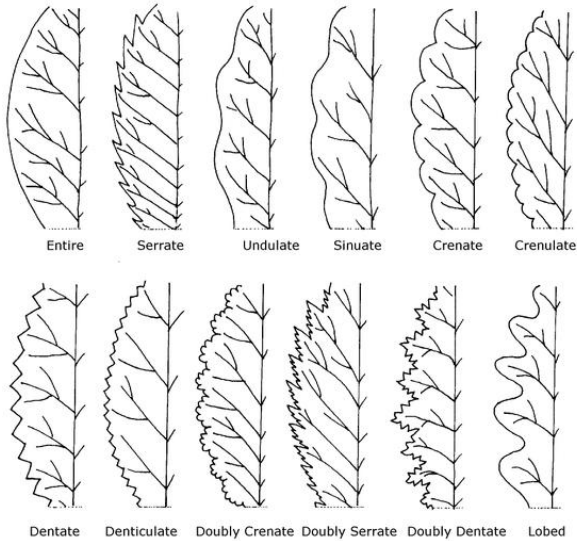


Round

Shape of leaf



Shape of leaf margin



Shape of leaf tip



1. Acute



2. Acuminate



3. Cuspidate



4. Rounded



5. Long tapering



6. Mucronate



7. Truncate



8. Emarginate



9. Notched

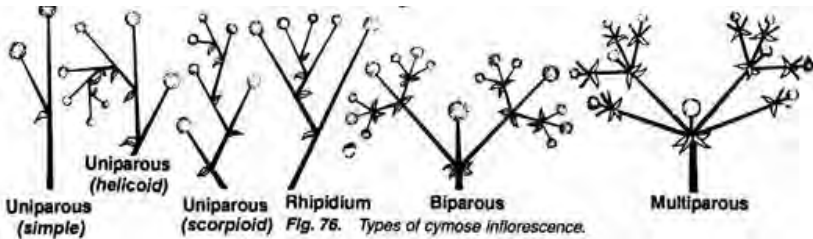


10. Bristle-tipped



11. Spine-tipped

Type of inflorescence branching





High Value Agriculture Project
Government of Nepal



Research-for-Development Section
SEAN Seed Service Centre Ltd.



Horticulture Research Division
Nepal Agriculture Research Council